TEACHER’S GUIDE

FORWARD

Why use Skill Builders?

Too often, through the teaching, learning and assessment process, teachers identify weaknesses and gaps in student learning but the constraints of the classroom severely limit remediation opportunities.

The Maths Mate Skill Builder series was prepared in response to requests from teachers and parents who want an easy but effective way to help students who identify skill deficiencies using the Maths Mate Programme, and are motivated to do something about them.

The Maths Mate record keeping sheets found at the start of each term in each Student Pad (and on each CD ~ Record Keeping Sheets, pages 1 to 4) enable students to find out what they know and what they still need to learn and practise.

The Skill Builders extensively target through instruction and practice, all skills within the related Maths Mate Programme except the problem solving questions. The Problem Solving Hints & Solutions (see CD ~ Problem Solving Hints & Solutions) can be used by teachers to develop students’ problem solving skills. The Skill Builders also contain a Glossary of important facts and reference material that will provide instant help when students present with difficulties.

Background to the design of Maths Mate and Skill Builders

Any question on the Maths Mate sheets is part of a set of 4 similar questions in the term. For example, consider sheets 1, 2, 3 and 4 in Level 3.2 term 1. Question 10 on each sheet is similar in design, content and degree of difficulty. This grouping of question style is also true of the next set of four sheets and so on. Thus the Maths Mate tests made available in the Teacher Resource Book and CD (see CD ~ Test Masters, pages 1 to 32 and Test Answers, pages 1 to 32) also reflect this grouping of question style and substance. Generally too, the Skill Builders can be linked to each set of 4 similar questions. These links are identified in the grid at the title of each skill. The grid shown here for example, would relate a skill to questions in the first 4 sheets of MM Level 3.2 term 1, the last 4 sheets of MM Level 4.1 term 2 and the first 4 sheets of MM Level 4.1 term 1. Once understood, these links will be helpful to students in their selection of Skill Builders and to you in your allocation of Skill Builders to students.

On each Maths Mate worksheet, questions 1 through to 21 get progressively harder. (Refer - How to use the Skill Builders, page iv)

Suggestions for the preparation and organisation of Skill Builders

Teachers can either direct students to their digital copies or print copies of particular pages for students. Rather than photocopying Skill Builders one at a time, you may find it helpful to set up a file in a central area that contains perhaps five copies of each Skill Builder. In this way you will save time and be prepared in advance. Students should be reminded that the Glossary is a valuable resource that can be added to. The Glossary too can be photocopied for students as a resource.

How you can help

We are confident that your students will be rewarded for the effort you have made in making these worksheets available to them. As with any program, however, there is always room for improvement and we place great value in feedback from people like yourself. Please, if you have any suggestions at all, contact us.

page iii  www.mathsmate.co.nz  © Maths Mate 3.2/4.1 Skill Builder
HOW TO USE MATHS MATE SKILL BUILDERS

1. Determine which Maths Mate questions pose a difficulty

If a student gets one or more incorrect answers, represented by one or more successive unshaded boxes on their worksheet results sheet, then that question requires a Skill Builder.

For example, question 13 in Sheets 1, 2, 3 and 4 is not shaded, so Skill 13.1 from Skill Builder 13 needs to be handed to the student.

2. Find the relevant Skill Builder on the Maths Mate worksheet results sheet

Check across the question that is posing difficulties on the worksheet results sheet to find the list of skills within the Skill Builder that are most relevant to that question.

Obtain a copy of one or all of the skills listed for that question (pages 1 to 205). You can also double check with the grid at the right of each skill title, that the chosen skill is appropriate.

Remember, students should work through the skills in order. The skills where possible are arranged in increasing degree of difficulty.

Be aware that some skills may require the knowledge of previous skills, so when a student has several areas of weakness, they should work on the lowest numbered skill builders first. For example, a student struggling with Q9 and Q12 may need to build skills required for Q9 before they can improve Q12.
3. Look up any unknown terms in the Skill Builder glossary

The glossary (pages 207 to 240) is more than just a list of definitions. It contains a wealth of relevant information that may help the students to better understand the question at hand. Weaker students may find that referring to a copy of the glossary, and even building on it, is a helpful strategy for improving their overall mathematical competency.

For example, a student might need to look up the word “operation” before attempting to complete Skill 13.1.

4. Complete the relevant Skill Builder

Work through the examples given for that skill, and complete the exercises.

There are many techniques or methods that can be used to teach the same basic skills, even something as simple as adding 7 and 9. It is good for a student to be given a range of alternatives appropriate for each skill but space restrictions make this impossible. These sheets often suggest an approach that may be different to a student’s past experience. If a student feels more comfortable with his current technique, that is fine. In most cases it is the end result that counts.

It is possible to take a very weak student back to a Skill Builder from a lower level if this is necessary. It is also possible to use a higher level book for students to have further practice if required.

5. Correct the relevant Skill Builders from the Skill Builder answer sheets (from page 249)

6. Circle the completed skill numbers on the Maths Mate worksheet results sheet

7. Go back and repeat previous Maths Mate questions

After completing a Skill Builder, students should be encouraged to go back and attempt again those particular questions on the recently completed Maths Mate worksheets.
Dear Parents

As part of their Mathematics programme this year, all students have been given a weekly Maths Mate worksheet.

The programme is now under way. The diagnostic nature of the worksheets helps students monitor their own progress. After they correct their worksheet and complete the record keeping sheet, over time, your child will be able to identify areas of strength and weakness in their mathematical learning.

If your child is having difficulty with a question for consecutive weeks or believes that their understanding is not at the level they would like, then Skill Builder sheets will be made available to develop each of the skills in the Maths Mate programme. Each Skill Builder focuses on and explores one question from the Maths Mate worksheets.

As each question in the Maths Mate is generally more difficult than the last, finishing with the problem solving questions, then it would be advised that, if students are concerned with more than one question, they tackle lower numbered questions first.

The Skill Builders may also help to motivate students to make another attempt at mastering skills that they have found too difficult in the past, given that it will become clear to them that they will be confronted by the same type of question on a regular basis.

While we will be monitoring your child's progress and supporting their skill development in the school environment, it would be appreciated if you would complete the tear off slip at the bottom of this page so that we can be sure that you are aware of our expectations regarding both the Maths Mate worksheets and the availability of Skill Builder worksheets. We ask also that you continue to sign the completed worksheets each week so that we can ensure each student is working independently and regularly but with your support.

We thank you in anticipation of your involvement and remind you that you are encouraged to call and discuss your child's progress at any time.

Yours sincerely

Class Teacher

Principal

Maths Mate Programme - Skill Builder Return Slip

Student's Name: ......................................................... Class: .................

As a parent / guardian I have signed this form to indicate that I am aware of the support Maths Mate Skill Builders can give my child in their mathematical development.

Parent's Signature: ......................................................... Date: .................
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<td>14.8 Finding prime and composite numbers.</td>
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<td>14.9 Writing 5-digit numbers in words.</td>
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<td>14.10 Writing 6-digit numbers in words.</td>
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<td>14.11 Comparing integers.</td>
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<td>14.12 Recognising positive and negative integers.</td>
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<td>14.13 Reading integers on a number line.</td>
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<td>[Number Patterns / Equations]</td>
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<td>15.1 Completing number patterns by adding the same number.</td>
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<td>15.2 Solving equations involving addition (+).</td>
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<td>15.3 Completing number patterns by subtracting the same number.</td>
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<td>15.4 Solving equations involving subtraction (−).</td>
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<td>15.5 Completing number patterns by multiplying by the same number.</td>
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<td>15.7 Solving equations involving multiplication (×).</td>
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<td>15.8 Completing number patterns by using changing values in the rule.</td>
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<td>15.9 Completing number patterns involving decimals and fractions.</td>
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<td>15.10 Solving equations involving ‘of’.</td>
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<td>[Units of Measurement]</td>
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<td>16.1 Selecting the appropriate units of measurement.</td>
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<td>16.2 Estimating length, mass etc. using units of measurement.</td>
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<td>16.3 Converting units of length.</td>
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<td>16.4 Converting units of mass.</td>
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<td>16.5 Converting units of capacity.</td>
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<td>16.6 Solving problems involving units of measurement.</td>
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<td>17.1 Expressing the time in words.</td>
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<td>17.2 Expressing the time in digital form.</td>
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<td>17.3 Showing the time on an analogue clock.</td>
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<td>17.4 Converting units of time.</td>
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<td>17.5 Calculating periods of time.</td>
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<td>17.6 Comparing periods of time.</td>
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<td>17.7 Reading timetables.</td>
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<td>18.</td>
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<td>18.1 Estimating length.</td>
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<td>18.2 Reading and using scales.</td>
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<td>18.3 Calculating the perimeter of a shape using a grid.</td>
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<td>18.4 Calculating the area of a shape by counting squares.</td>
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<td>18.5 Calculating the area of a shape by counting triangles.</td>
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<td>18.6 Calculating the area of a shape as a result of the enlargement of another shape.</td>
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<td>18.7 Describing volume of prisms by counting cubes.</td>
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<td>18.8 Comparing volume of prisms by counting cubes.</td>
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<tr>
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<td></td>
<td>18.9 Calculating perimeter by using a ruler.</td>
<td></td>
</tr>
</tbody>
</table>
### MM SB [Maths Mate - Mathematical strand]

#### 19. [Shapes]

- 19.1 Comparing angles to a right angle.
- 19.2 Recognising 2D shapes.
- 19.3 Drawing 2D shapes.
- 19.4 Describing polygons.
- 19.5 Recognising properties of triangles and quadrilaterals.
- 19.6 Describing 3D shapes.
- 19.7 Measuring angles using a protractor.
- 19.8 Recognising and drawing different types of angles.
- 19.9 Identifying the shape of a cross section.
- 19.10 Identifying nets of 3D shapes.
- 19.11 Drawing top, side and front views of 3D shapes.

#### 20. [Location / Transformation]

- 20.1 Describing the movement of an object.
- 20.2 Drawing lines of symmetry through a shape.
- 20.3 Locating places using compass bearings N, E, S and W.
- 20.4 Following directions to find a place on a map.
- 20.5 Locating places using simple bearings (closest, left, first turn).
- 20.6 Using regions on a grid to describe location, e.g. A3.
- 20.7 Sketching symmetrical shapes.
- 20.8 Using a linear scale to calculate distance.
- 20.9 Drawing reflections on a grid.
- 20.10 Drawing reflections, translations, rotations, enlargements and reductions on a grid.
- 20.11 Identifying line and rotational symmetry.
- 20.12 Finding the coordinates of a point on a Cartesian plane, first quadrant.
- 20.13 Finding the coordinates of a point on a Cartesian plane, all quadrants.

#### 21. [Statistics / Probability]

- 21.1 Interpreting stacked bar graphs without a scale.
- 21.2 Interpreting stacked bar graphs with a scale.
- 21.3 Interpreting pictographs without a scale.
- 21.4 Interpreting pictographs with a scale.
- 21.5 Interpreting tables.
- 21.6 Interpreting bar graphs.
- 21.7 Interpreting multiple stacked bar graphs.
- 21.8 Recognising the relative likelihood of an event.
- 21.9 Finding the number of objects to achieve a given outcome.
- 21.10 Describing the likelihood of an outcome.
- 21.11 Calculating the probability of a simple event.
- 21.12 Interpreting pie charts.
1. **[+ Whole Numbers to 10]**

**Skill 1.1  Adding whole numbers from 1 to 10 by counting on.**

- Start with the largest number.
- Count on the smaller number.

### Q.

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<td>9</td>
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</table>

9 counting on... 10 11 12 OR 9 counting on... 10, 11, 12

9 + 3 = ? Start with the largest number 9.
Count on 3 more.
9 + 3 = ?

### a)

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© Maths Mate 3.2/4.1 Skill Builder 1
### Skill 1.2 Adding whole numbers from 1 to 10 using a number line.

**Q.**

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<tr>
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<th>10</th>
<th>2</th>
<th>7</th>
<th>5</th>
<th>3</th>
<th>1</th>
<th>9</th>
<th>6</th>
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**A.**

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<tbody>
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<td>16</td>
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<td>13</td>
<td>11</td>
<td>9</td>
<td>7</td>
<td>15</td>
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</table>

8 + 6 = ?

Start at 8. Go forward 6 places. You are at 14.

8 + 6 = 14

**a)**

<table>
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<th>6</th>
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<th>2</th>
<th>8</th>
<th>3</th>
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**b)**

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**c)**

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**d)**

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<tbody>
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</tbody>
</table>
Skill 1.3    Adding 7, 8 or 9 by making 10.

- Find the largest number.
- Work out what number you need to add to the largest number, to make 10.
- Break down the smaller number to include the number you need.
- Regroup the numbers to create a sum of 10. (10’s are easy!)

Q.

\[
\begin{array}{cccccccc}
8 & 6 & 2 & 7 & 10 & 1 & 5 & 4 & 9 & 3 \\
+7 & & & & & & & & \\
\end{array}
\]

A.

\[
\begin{array}{cccccccc}
8 & 6 & 2 & 7 & 10 & 1 & 5 & 4 & 9 & 3 \\
+7 & 15 & 13 & 9 & 14 & 17 & 8 & 12 & 11 & 16 & 10 \\
\end{array}
\]

8 + 7 = ?  
8 is the largest number.

Ask: ‘What number added to 8, will make 10?’

Answer: 8 + ? = 10
8 + 2 = 10  You need a 2

Break down the smaller number 7, into 2 and 5.

2 + 5 = 7
Regroup the 2 with the 8 to make 10.

\[
8 + \boxed{7} = \boxed{15}
\]

\[
\begin{array}{cccccccc}
4 & 9 & 2 & 10 & 8 & 3 & 6 & 1 & 7 & 5 \\
+9 & 13 & 18 & & & & & & & \\
\end{array}
\]

Hint: When you add 9 the unit in the answer is always one less than the unit in the question!

\[
\begin{array}{cccccccc}
7 & 6 & 2 & 8 & 10 & 1 & 5 & 4 & 9 & 3 \\
+8 & 15 & 14 & & & & & & & \\
\end{array}
\]

\[
\begin{array}{cccccccc}
9 & 11 & 4 & 12 & 7 & 5 & 10 & 8 & 3 & 6 \\
+7 & 16 & & & & & & & & \\
\end{array}
\]
Skill 1.4 Adding whole numbers from 1 to 10 using an addition table.

Q.

\[
\begin{array}{cccccccccc}
5 & 7 & 9 & 1 & 8 & 6 & 3 & 10 & 2 & 4 \\
\end{array}
\]

\[
+8 \\
\]

A.

\[
\begin{array}{cccccccccc}
5 & 7 & 9 & 1 & 8 & 6 & 3 & 10 & 2 & 4 \\
\end{array}
\]

\[
+8 \\
\]

\[
\begin{array}{cccccccccc}
13 & 15 & 17 & 9 & 16 & 14 & 11 & 18 & 10 & 12 \\
\end{array}
\]

5 + 8 = ?
Move down the column from 5.
Move across the row from 8.
The number crossed is the result.
5 + 8 = 13
8 + 5 = 13

a)

\[
\begin{array}{cccccccccc}
4 & 10 & 2 & 3 & 5 & 7 & 9 & 1 & 8 & 6 \\
\end{array}
\]

\[
+5 \\
\]

\[
\begin{array}{cccccccccc}
9 & 15 \\
\end{array}
\]

b)

\[
\begin{array}{cccccccccc}
7 & 8 & 2 & 1 & 5 & 10 & 4 & 3 & 9 & 6 \\
\end{array}
\]

\[
+4 \\
\]

\[
\begin{array}{cccccccccc}
11 & 12 \\
\end{array}
\]

c)

\[
\begin{array}{cccccccccc}
1 & 6 & 4 & 8 & 2 & 9 & 5 & 10 & 3 & 7 \\
\end{array}
\]

\[
+9 \\
\]

\[
\begin{array}{cccccccccc}
10 \\
\end{array}
\]

d)

\[
\begin{array}{cccccccccc}
2 & 9 & 7 & 3 & 10 & 8 & 4 & 6 & 1 & 5 \\
\end{array}
\]

\[
+2 \\
\]

\[
\begin{array}{cccccccccc}
4 \\
\end{array}
\]
Skill 2.1 Subtracing whole numbers from 1 to 10 by counting back.

- Start with the first number given.
- Count backwards the second number.

**Q.**

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<th>4</th>
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<th>7</th>
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**A.**

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<td>4</td>
<td>3</td>
<td>10</td>
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</tbody>
</table>

9 counting back... \[\begin{array}{c}8 \\ 7 \\ 6 \end{array}\] OR 9 counting back... \[\begin{array}{c}8 \\ 7 \\ 6 \end{array}\]

9 - 3 = ? Start with the first number given, 9.
Count backwards 3.
9 - 3 = 6

**a)**

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<th>6</th>
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**b)**

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Skill 2.2 Subtracting whole numbers from 1 to 10 using a number line.

Q. 8 14 10 12 7 15 13 11 9 16

−6

A. 8 14 10 12 7 15 13 11 9 16

−6 2 8 4 6 1 9 7 5 3 10

8 − 6 = ? Start at 8. Go backward 6 places. You are at 2.

8 − 6 = 2

a) 6 5 12 8 13 14 11 7 10 9

−4 2

b) 14 7 12 8 10 11 16 13 9 15

−7

c) 15 17 10 14 11 18 13 9 12 16

−8

d) 9 11 4 12 7 5 10 8 13 6

−3
Skill 2.3 Subtracting whole numbers from 1 to 10 from two-digit numbers with smaller unit values (e.g. 13 – 8 = 5).

- Look at the unit value of the two-digit number.
- Break down the single digit number to include this number and the remainder.
- Subtract the number from the two-digit number, 10 will be the result.
- Then subtract the remainder from 10.

Q. 17 15 11 14 9 16 18 10 13 12

-8

A. 17 15 11 14 9 16 18 10 13 12

-8 9 7 3 6 1 8 10 2 5 4

\[17 - 8 = 17 - (7 + 1)\]

The unit value of 17 is 7. You need a 7.

Breakdown 8 into 7 and 1. 7 + 1 = 8

\[= (17 - 7) - 1\]

Subtract 7 from 17 to get 10.

Subtract 1 from 10.

\[= 9\]

a) 14 9 16 12 8 13 10 11 7 15

-6 8 3 10 2 4 1

\[14 - 6 = 14 - (4 + 2)\]

\[= 14 - 4 - 2\]

\[= 10 - 2\]

\[= 8\]

b) 17 16 12 8 10 11 15 14 9 13

-7 10 1 3 2

c) 9 11 14 12 17 15 10 18 13 16

-8 1 2 10

d) 10 15 14 18 19 12 16 13 11 17

-9 1 10
Skill 2.4 Subtracting 7, 8 or 9 by building up.

- Build up 7, 8 or 9 to 10 by adding the amount needed.
- Build up the number being subtracted from, by adding the same amount.
- Then complete the subtraction from 10.

Q.  
\[
\begin{array}{cccccccccc}
16 & 15 & 14 & 13 & 12 & 11 & 10 & 9 & 8 & 17 \\
-7 & & & & & & & & & \\
\end{array}
\]

A. 
\[
\begin{array}{cccccccccc}
16 & 15 & 14 & 13 & 12 & 11 & 10 & 9 & 8 & 17 \\
-7 & 9 & 8 & 7 & 6 & 5 & 4 & 3 & 2 & 1 & 10 \\
\end{array}
\]

To subtract 7 from 16: Build up 7 to 10 by adding 3.
Also build up 16 by adding 3.
16 becomes 19.
Then subtract 10 from 19.

\[
\begin{align*}
16 - 7 &= 16 + 3 - 7 - 3 \\
&= 19 - 10 \\
&= 9
\end{align*}
\]

Hint: When you subtract 9 the unit in the answer is always one more than the unit in the question!

b) 
\[
\begin{array}{cccccccccc}
13 & 17 & 18 & 10 & 15 & 11 & 14 & 16 & 12 & 9 \\
-8 & & & & & & & & & 1 \\
\end{array}
\]

c) 
\[
\begin{array}{cccccccccc}
10 & 12 & 8 & 11 & 14 & 15 & 9 & 13 & 17 & 16 \\
-7 & 3 & & 1 & & 2 & & 10 & & \\
\end{array}
\]
Skill 2.5  Subtracting whole numbers from 1 to 10 using an addition table.

Q.  

\[
\begin{array}{cccccccccccc}
15 & 17 & 9 & 11 & 18 & 16 & 13 & 10 & 12 & 14 \\
-8 & & & & & & & & & \\
\end{array}
\]

A.  

\[
\begin{array}{cccccccccccc}
15 & 17 & 9 & 11 & 18 & 16 & 13 & 10 & 12 & 14 \\
-8 & 7 & 9 & 1 & 3 & 10 & 8 & 5 & 2 & 4 & 6 \\
\end{array}
\]

15 – 8 = ?
Reword the subtraction by turning it into an addition.

Ask: ‘What number, when added to 8, will give 15?’
8 + ? = 15

Answer: Using the addition table:
8 + 7 = 15
So 15 – 8 = 7

a)  

\[
\begin{array}{cccccccccccc}
14 & 10 & 12 & 13 & 15 & 7 & 9 & 11 & 8 & 6 \\
-5 & & 9 & 5 & & & & & & & \\
\end{array}
\]

b)  

\[
\begin{array}{cccccccccccc}
7 & 8 & 12 & 11 & 5 & 10 & 14 & 13 & 9 & 6 \\
-4 & 3 & 4 & & & & & & & & \\
\end{array}
\]

c)  

\[
\begin{array}{cccccccccccc}
11 & 16 & 14 & 8 & 12 & 9 & 15 & 10 & 13 & 7 \\
-6 & & 5 & & & & & & & & \\
\end{array}
\]

d)  

\[
\begin{array}{cccccccccccc}
12 & 9 & 7 & 3 & 10 & 8 & 4 & 6 & 11 & 5 \\
-2 & 10 & & & & & & & & & \\
\end{array}
\]
3. [× Whole Numbers to 10]

Skill 3.1 Multiplying whole numbers from 1 to 10 by 1 or 10.

Multiplication forms patterns.

Multiplication is the same as repeated additions.

Any number, multiplied by 1, equals the sum of 1 of the numbers.
Example: \(6 \times 1 = 6\)
Hint: The number stays the same.

Any number, multiplied by 10, equals the sum of 10 of the numbers.
Example:
\[6 \times 10 = 6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 + 6 = 60\]
Hint: Add a zero to the number.

Multiplication is ‘counting by’ a number of times.

You can multiply by 1 by counting by that number, 1 time.
Example: 6

You can multiply by 10 by counting by that number, 10 times.
Example: 6, 12, 18, 24, 30, 36, 42, 48, 54, 60

Multiplication is reversible.
Example: \(10 \times 6 = 6 \times 10\)

Q.  
\[
\begin{array}{cccccccc}
6 & 7 & 4 & 8 & 1 & 5 & 3 & 10 \\
\times 10 & & & & & & & \\
\end{array}
\]

A.  
\[
\begin{array}{cccccccc}
6 & 7 & 4 & 8 & 1 & 5 & 3 & 10 \\
\times 10 & 60 & 70 & 40 & 80 & 10 & 50 & 30 \\
\end{array}
\]

When you multiply a number by 10, add a zero to the end of the number.

a)  
\[
\begin{array}{cccccccc}
3 & 8 & 10 & 4 & 1 & 6 & 2 & 9 \\
\times 1 & 3 & & & & & & \\
\end{array}
\]

b)  
\[
\begin{array}{cccccccc}
10 & 4 & 9 & 3 & 5 & 7 & 1 & 2 \\
\times 10 & 100 & & & & & & \\
\end{array}
\]
Skill 3.2 Multiplying whole numbers from 1 to 10 by 5.

Multiplication forms patterns.

Multiplication is the same as repeated additions.

Any number, multiplied by 5, equals the sum of 5 of the numbers.
Example: \(9 \times 5 = 9 + 9 + 9 + 9 + 9 = 45\)

Multiplication is ‘counting by’ a number of times.
You can multiply by 5 by counting by that number, 5 times.
Example: 9, 18, 27, 36, 45

Multiplication is reversible.
Example: \(9 \times 5 = 5 \times 9\)

Hint: Multiplying by 5 produces a value that is half that of a multiplication by 10.
\(9 \times 10 = 90\)
\(9 \times 5 = 45\)

Hint: Multiplying by 5 produces a value that always ends in 0 or 5.

Hint: Multiplying by 5 produces the same values as the minutes on a clock face.

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</table>

Q. \(\times 5\)

| 9 | 2 | 1 | 5 | 7 | 8 | 3 | 10| 6 | 4 |

A. \(\times 5\)

| 45| 10| 5 | 25| 35| 40| 15| 50| 30| 20 |

a) \(\times 5\)

| 5 | 1 | 6 | 2 | 7 | 4 | 9 | 3 | 10| 8 |

| 25| | | | | | | | | |
Skill 3.3  Multiplying whole numbers from 1 to 10 by 2 or 4.

Multiplication forms patterns.

Multiplication is the same as repeated additions.

Any number, multiplied by 2,
equals the sum of 2 of the numbers.
Example: $7 \times 2 = 7 + 7 = 14$

Any number, multiplied by 4,
equals the sum of 4 of the numbers.
Example: $7 \times 4 = 7 + 7 + 7 + 7 = 28$

Multiplication is ‘counting by’ a number of times.

You can multiply by 4
by counting by that number, 4 times.
Example: $7, 14, 21, 28$

Multiplication is reversible.
Example: $7 \times 2 = 2 \times 7$

Hint: Multiplying by 2 always produces an even number.
Hint: Multiplying by 2 is the same as doubling.
Double 7 is 14  OR  $7 \times 2 = 14$

Hint: Multiplying by 4 is the same as doubling the number and then multiplying by 2.
$7 \times 4 = 14 \times 2 = 28$

Q.  
\[
\begin{array}{cccccccccc}
6 & 3 & 8 & 1 & 7 & 9 & 2 & 10 & 4 & 5 \\
\times 4 & & & & & & & & & \\
\end{array}
\]

A.  
\[
\begin{array}{cccccccccc}
6 & 3 & 8 & 1 & 7 & 9 & 2 & 10 & 4 & 5 \\
\times 4 & 24 & 12 & 32 & 4 & 28 & 36 & 8 & 40 & 16 & 20 \\
\end{array}
\]

a)  
\[
\begin{array}{cccccccccc}
5 & 8 & 2 & 7 & 3 & 1 & 6 & 10 & 9 & 4 \\
\times 2 & 10 & & & & & & & & \\
\end{array}
\]

\[5 \times 2 = 5 + 5 \text{ Repeated additions} = 10\]

b)  
\[
\begin{array}{cccccccccc}
3 & 10 & 5 & 4 & 9 & 7 & 2 & 6 & 1 & 8 \\
\times 4 & 12 & & & & & & & & \\
\end{array}
\]

\[3 \times 4 = 6 \times 2 \text{ Double 3 and } \times 2 = 12\]
Skill 3.4 Multiplying whole numbers from 1 to 10 by 3.

Multiplication forms patterns.

Multiplication is the same as repeated additions.

Any number, multiplied by 3, equals the sum of 3 of the numbers.

Example: \(8 \times 3 = 8 + 8 + 8 = 24\)

Multiplication is ‘counting by’ a number of times.

You can multiply by 3 by counting by that number, 3 times.

Example: \(8, 16, 24\)

Multiplication is reversible.

Example: \(8 \times 3 = 3 \times 8\)

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Q. \(\times 3\)

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A. \(\times 3\)

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a) \(\times 3\)

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b) \(\times 3\)

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Skill 3.5  Multiplying whole numbers from 1 to 10 by 6, 7, 8 or 9.

- Number the fingers on each hand from 6 to 10 starting with the thumb as 6.
- Touch the appropriate fingers together to match the table you are working on. Example: $7 \times 8$
- Count your thumbs, the touching fingers and any fingers in between (shaded lightly). This result makes up the tens.
  (2 fingers on left hand, 3 fingers on right hand) $\Rightarrow 2 + 3 = 5$
  5 tens = 50
- Count separately, the fingers on each hand that are beyond the touching fingers (shaded dark). Multiply the sums. This result makes up the units.
  (3 fingers on left hand, 2 fingers on right hand) $\Rightarrow 3 \times 2 = 6$
  6 units = 6
- Finally add the tens and units.
  50 + 6 = 56
  So $7 \times 8 = 56$

Q.  

$$\begin{array}{cccccccccc}
\times 7 & 6 & 2 & 5 & 1 & 8 & 7 & 4 & 10 & 3 & 9 \\
\end{array}$$

A.  

$$\begin{array}{cccccccccc}
\times 7 & 42 & 14 & 35 & 7 & 56 & 49 & 28 & 70 & 21 & 63 \\
\end{array}$$

$$6 \times 7 = ?$$

1 + 2 = 3 tens = 30  (light fingers)
4 \times 3 = 12 units = 12  (dark fingers)
30 + 12 = 42
So $6 \times 7 = 42$

a)  

$$\begin{array}{cccccccccc}
\times 8 & 72 & & & & & & & & \\
\end{array}$$

b)  

$$\begin{array}{cccccccccc}
\times 7 & 21 & & & & & & & & \\
\end{array}$$

c)  

$$\begin{array}{cccccccccc}
\times 6 & & & & & & & & & & \\
\end{array}$$

d)  

$$\begin{array}{cccccccccc}
\times 9 & & & & & & & & & & \\
\end{array}$$
Skill 3.6  Multiplying whole numbers from 1 to 10 by 9.

- Number the fingers on each hand from 1 to 10.

- Bend the finger that matches the 9\times table you are working on. Example: For 8 \times 9, bend the 8th finger.

- Count the fingers before the bent finger. This result makes up the tens.
  7 fingers \Rightarrow 7 \text{ tens} = 70

- Count the fingers after the bent finger. This result makes up the units.
  2 fingers \Rightarrow 2 \text{ units} = 2

- Add the tens and units.
  70 + 2 = 72

So \ 8 \times 9 = 72

Q.  
\[
\begin{array}{cccccccc}
7 & 5 & 1 & 9 & 2 & 8 & 10 & 6 & 3 & 4 \\
\times 9 & & & & & & & & & \\
\end{array}
\]

A. 
\[
\begin{array}{cccccccc}
7 & 5 & 1 & 9 & 2 & 8 & 10 & 6 & 3 & 4 \\
\times 9 & 63 & 45 & 9 & 81 & 18 & 72 & 90 & 54 & 27 & 36 \\
\end{array}
\]

Hint: When multiplying by 9, the digits in the answer always add to 9.

To find 7 \times 9 = ?, bend the 7th finger.

6 fingers before the bent finger \Rightarrow 6 \text{ tens} = 60

3 fingers after the bent finger \Rightarrow 3 \text{ units} = 3

60 + 3 = 63

So \ 7 \times 9 = 63

a) 
\[
\begin{array}{cccccccc}
4 & 5 & 2 & 7 & 6 & 9 & 10 & 1 & 3 & 8 \\
\times 9 & 36 & & & & & & & & \\
\end{array}
\]

b) 
\[
\begin{array}{cccccccc}
3 & 10 & 6 & 2 & 1 & 8 & 5 & 4 & 9 & 7 \\
\times 9 & 27 & & & & & & & & \\
\end{array}
\]
4. **[÷ Whole Numbers to 10]**

**Skill 4.1 Dividing by whole numbers from 1 to 10 using a multiplication table.**

Division forms patterns.

Division and multiplication are inverse operations. (Division undoes multiplication)

**Example:** If \( 7 \times 8 = 8 \times 7 = 56 \)
then \( 56 \div 8 = 7 \)  
or \( 56 \div 7 = 8 \)

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<td>64</td>
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<td>63</td>
<td>72</td>
<td>81</td>
<td>90</td>
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<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

**Q.**

\[ \begin{array}{cccccccccc}
56 & 7 & 14 & 35 & 21 & 42 & 28 & 49 & 70 & 63 \\
\div 7 & & & & & & & & &
\end{array} \]

**A.**

\[ \begin{array}{cccccccccc}
56 & 7 & 14 & 35 & 21 & 42 & 28 & 49 & 70 & 63 \\
\div 7 & 8 & 1 & 2 & 5 & 3 & 6 & 4 & 7 & 10 & 9
\end{array} \]

\( 56 \div 7 = ? \) \ How many 7’s go into 56? 
Reword the division by turning it into a multiplication. 
Ask: ‘7 multiplied by what number makes 56?’ \((7 \times ? = 56)\) 
Answer: Using the multiplication table 
\( 7 \times 8 = 56 \) 
So \( 56 \div 7 = 8 \)

**b)**

\[ \begin{array}{cccccccccc}
80 & 8 & 56 & 24 & 48 & 32 & 72 & 40 & 16 & 64 \\
\div 8 & 10 & & & & & & & &
\end{array} \]

**c)**

\[ \begin{array}{cccccccccc}
12 & 18 & 60 & 42 & 30 & 36 & 24 & 48 & 6 & 54 \\
\div 6 & 2 & & & & & & & &
\end{array} \]
Skill 4.2 Dividing by whole numbers from 1 to 10 using subtraction.

Division is the same as repeated subtractions.

Example: \(56 \div 7 = ?\) How many 7’s go into 56?

OR If you have 56, how many times can you take away 7?

\[
56 - 7 - 7 - 7 - 7 - 7 - 7 - 7 = 0
\]

8 times

If you have 56 you can take 7 away, 8 times.
So \(56 \div 7 = 8\)

Q. \[
\begin{array}{cccccccc}
21 & 6 & 12 & 30 & 24 & 3 & 18 & 27 & 9 & 15 \\
\div 3 & & & & & & & & & \\
\end{array}
\]

A. \[
\begin{array}{cccccccc}
21 & 6 & 12 & 30 & 24 & 3 & 18 & 27 & 9 & 15 \\
\div 3 & 7 & 2 & 4 & 10 & 8 & 1 & 6 & 9 & 3 & 5 \\
\end{array}
\]

How many 3’s go into 21?
Reword the division by turning it into a subtraction.

Ask: ‘If you have 21, how many times can you take away 3?’

\[
21 - 3 - 3 - 3 - 3 - 3 - 3 - 3 = 0
\]

7 times

Answer: If you have 21 you can take 3 away, 7 times. So \(21 \div 3 = 7\)

a) \[
\begin{array}{cccccccc}
16 & 2 & 6 & 20 & 12 & 4 & 14 & 18 & 10 & 8 \\
\div 2 & 8 & & & & & & & & \\
\end{array}
\]

\[
16 \div 2 \\
\Rightarrow 16 - 2 - 2 - 2 - 2 - 2 - 2 - 2 = 0 \text{ Take 2 away 8 times.} \\
\text{So } 16 \div 2 = 8
\]

b) \[
\begin{array}{cccccccc}
18 & 54 & 63 & 27 & 9 & 36 & 90 & 72 & 45 & 81 \\
\div 9 & 2 & & & & & & & & \\
\end{array}
\]

c) \[
\begin{array}{cccccccc}
15 & 40 & 25 & 35 & 50 & 5 & 30 & 45 & 20 & 10 \\
\div 5 & 3 & & & & & & & & \\
\end{array}
\]

d) \[
\begin{array}{cccccccc}
56 & 70 & 14 & 35 & 21 & 49 & 7 & 28 & 42 & 63 \\
\div 7 & 8 & & & & & & & & \\
\end{array}
\]
5. **[Large Number +]**

Skill 5.1  Adding large numbers without carry over using columns.

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Add from right to left.

<table>
<thead>
<tr>
<th>Q.</th>
<th>A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 5 + 4 3</td>
<td>1 6 8</td>
</tr>
</tbody>
</table>

- **Units:**
  - $5 + 3 = 8 \implies 8$ units
- **Tens:**
  - $2 + 4 = 6 \implies 6$ tens
- **Hundreds:**
  - $1 + 0 = 1 \implies 1$ hundred

### Questions

- **a) 6:3 + 2:4 = 8:7**
- **b) 3:8 + 4:1 = 7:9**
- **c) 1:5 + 4:3 = 5:8**
- **d) 1:3:4 + 2:3 = 3:6:7**
- **e) 4:3:7 + 1:5:2 = 5:8:9**
- **f) 3:0:5 + 6:8:1 = 9:9:6**
- **g) 4:2:4:5 + 7:4:2 = 8:6:6:7**
- **h) 6:0:3:1 + 2:3:5:8 = 8:3:8:9**
- **i) 2:1:2:4 + 3:1 = 2:4:3:5**
- **j) 5:3 + 5:1:6 = 7:1:2:0**
- **k) 1:1:4 + 8:6:3 = 9:7:7:7**
- **l) 7:1:6:4 + 1:4:0:3 = 8:2:0:7**
- **m) 1:7:3:0 + 1:5:2:1 + 1:2 = 3:4:8:3**
- **n) 3:2:0:5 + 2:1:0 = 5:3:0**
- **o) 3:0:0 + 4:0:2 + 2:1 = 7:0:4:3**
- **p) 6:2:0:1 + 1:4:0 + 3:2:2 = 8:9:4:4**
Skill 5.2 Adding large numbers with carry over using columns.

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Add from right to left.

Q.  

A.  

Units: \[6 + 7 = 13 = 1 \text{ ten} + 3 \text{ units}\]

Tens: \[4 + 4 + 1 \text{ (carry over)} = 9 \Rightarrow 9 \text{ tens}\]

Hundreds: \[1 + 0 = 1 \Rightarrow 1 \text{ hundred}\]

a)  

b)  

c)  

d)  

e)  

f)  

g)  

h)  

i)  

j)  

k)  

l)  

m)  

n)  

o)  

p)  

---

Carry over the 1 ten to the tens column.

Units first!
Skill 5.3 Adding large numbers by adding each place value, then adding the totals.

- Add the digits in each place value.
- Then add the totals.

Q. 685 + 246

A. Add the units (U): 5 + 6 = 11
Add the tens (T): 80 + 40 = 120
Add the hundreds (H): 600 + 200 = 800

931

### Questions

<table>
<thead>
<tr>
<th>Q.</th>
<th>A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>685</td>
<td>+ 246</td>
</tr>
<tr>
<td>8 + 3</td>
<td>11</td>
</tr>
<tr>
<td>10 + 70</td>
<td>80</td>
</tr>
<tr>
<td>Add the units (U): 5 + 6 = 11</td>
<td></td>
</tr>
<tr>
<td>Add the tens (T): 80 + 40 = 120</td>
<td></td>
</tr>
<tr>
<td>Add the hundreds (H): 600 + 200 = 800</td>
<td></td>
</tr>
</tbody>
</table>

**Example:**

- a) 18 + 73 = 91
- b) 26 + 44 = 70
- c) 287 + 195 = 482
- d) 318 + 246 = 564
- e) 1652 + 47 = 1699
- f) 3937 + 51 = 3988
- g) 8235 + 435 = 8670
### 6. [Large Number – ]

**Skill 6.1** Subtracting large numbers without carry over using columns.

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Subtract from right to left.

#### Q.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

- **Units:**
  - \(7 - 3 = 4\) ⇒ 4 units
  - Tens:
    - \(4 - 4 = 0\) ⇒ 0 tens
  - **Hundreds:** \(1 - 0 = 1\) ⇒ 1 hundred

#### A.

<p>| | | | |</p>
<table>
<thead>
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<td>4</td>
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<tr>
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</tr>
</tbody>
</table>

- **Units:**
  - \(4 - 3 = 1\) ⇒ 1 unit
  - Tens:
    - \(1 - 0 = 1\) ⇒ 1 ten
  - Hundreds:
    - \(0 - 0 = 0\) ⇒ 0 hundreds

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
<th>d)</th>
</tr>
</thead>
<tbody>
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<td>9</td>
<td>2</td>
<td>5</td>
<td>4</td>
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<tr>
<td>8</td>
<td>0</td>
<td>6</td>
<td>7</td>
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<td>5</td>
<td>3</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

- **Units:**
  - \(5 - 4 = 1\) ⇒ 1 unit
  - Tens:
    - \(2 - 0 = 2\) ⇒ 2 tens
  - **Hundreds:** \(1 - 0 = 1\) ⇒ 1 hundred

<table>
<thead>
<tr>
<th>e)</th>
<th>f)</th>
<th>g)</th>
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<tr>
<td>2</td>
<td>1</td>
<td>8</td>
<td>3</td>
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</tbody>
</table>

- **Units:**
  - \(7 - 4 = 3\) ⇒ 3 units
  - Tens:
    - \(6 - 2 = 4\) ⇒ 4 tens
  - **Hundreds:** \(1 - 1 = 0\) ⇒ 0 hundreds

<table>
<thead>
<tr>
<th>i)</th>
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</thead>
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<td>1</td>
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<tr>
<td>3</td>
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<tr>
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<td>4</td>
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</tbody>
</table>

- **Units:**
  - \(3 - 1 = 2\) ⇒ 2 unit
  - Tens:
    - \(0 - 0 = 0\) ⇒ 0 tens
  - **Hundreds:** \(1 - 1 = 0\) ⇒ 0 hundreds

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<td>3</td>
<td>1</td>
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<td>3</td>
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</tbody>
</table>

- **Units:**
  - \(5 - 3 = 2\) ⇒ 2 units
  - Tens:
    - \(7 - 2 = 5\) ⇒ 5 tens
  - **Hundreds:** \(1 - 1 = 0\) ⇒ 0 hundreds

<table>
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<td>0</td>
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<tr>
<td>2</td>
<td>6</td>
<td>5</td>
<td>8</td>
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</tbody>
</table>

- **Units:**
  - \(8 - 4 = 4\) ⇒ 4 units
  - Tens:
    - \(7 - 0 = 7\) ⇒ 7 tens
  - **Hundreds:** \(2 - 2 = 0\) ⇒ 0 hundreds

<table>
<thead>
<tr>
<th>Units</th>
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<tbody>
<tr>
<td>a) 4</td>
</tr>
<tr>
<td>b) 1</td>
</tr>
<tr>
<td>c) 7</td>
</tr>
<tr>
<td>d) 1</td>
</tr>
<tr>
<td>e) 1</td>
</tr>
<tr>
<td>f) 4</td>
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<tr>
<td>g) 6</td>
</tr>
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<td>h) 7</td>
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<td>q) 8</td>
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<td>r) 5</td>
</tr>
<tr>
<td>s) 3</td>
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<tr>
<td>t) 8</td>
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</tbody>
</table>
Skill 6.2 Subtracting large numbers with carry over using columns.

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Subtract from right to left.

Units:

5 - 7 = ? units. The result is < 0.
To make the answer positive break down the 4 tens.

\[ 4 \text{ tens} = 3 \text{ tens} + 10 \text{ units} \]

Re-group the 10 units with the 5 units to make 15 units.

\[ 40 + 5 = 30 + 15 \]

Now...

15 - 7 = 8 \[ \Rightarrow 8 \text{ units} \]

Tens:

3 - 2 = 1 \[ \Rightarrow 1 \text{ ten} \]

Hundreds:

5 - 3 = 2 \[ \Rightarrow 2 \text{ hundreds} \]

Q. 5 4 5
    - 3 2 7

A. 8

Units:

5 4 5
- 3 2 7

\[ 8 \text{ units} \]

Tens:

3
- 2

\[ 1 \text{ ten} \]

Hundreds:

5
- 3

\[ 2 \text{ hundreds} \]

A. 5 4 5
- 3 2 7

\[ 2 1 8 \]

Q. 5 4 5
    - 3 2 7

A. 8

Units:

4 tens = 3 tens + 10 units

Re-group the 10 units with the 5 units to make 15 units.

40 + 5 = 30 + 15

Now...

15 - 7 = 8 \[ \Rightarrow 8 \text{ units} \]

Tens:

3 - 2 = 1 \[ \Rightarrow 1 \text{ ten} \]

Hundreds:

5 - 3 = 2 \[ \Rightarrow 2 \text{ hundreds} \]

A. 5 4 5
- 3 2 7

\[ 2 1 8 \]

a) 6 3 2
    - 2 8

\[ 6 0 4 \]

b) 4 4 4
    - 3 9

c) 3 6 3
    - 2 0 7

d) 7 0 0
    - 1 4 6

e) 5 7 3 9
    - 1 8 3

f) 2 4 1 4
    - 6 5

g) 6 0 0 0
    - 4 5 7

h) 3 6 4 8
    - 3 8 8

i) 4 5 9 1
    - 2 4 3 5

j) 5 7 8 4
    - 3 1 5 8

k) 9 2 1 3
    - 4 6 5 8

l) 4 3 7 2
    - 1 0 7 6

\[ 1 2 \]
Skill 6.3 Subtracting from a multiple of 10 (e.g. 20, 700, etc).

- Always keep your working columns in line, aligning units with units, tens with tens, etc.
- Subtract from right to left.

Q. 300
   − 58
   ______

A. Units:
   0 − 8 = ? units. The result is < 0.
   To make the answer positive break down the 3 hundreds (no tens available).
   3 hundreds = 2 hundreds + 9 tens + 10 units

   Now...
   10 − 8 = 2 ⇒ 2 units

   Tens:
   9 − 5 = 4 ⇒ 4 tens

   Hundreds:
   2 − 0 = 2 ⇒ 2 hundreds

a) 90
   − 7
   ______
b) 30
   − 4
   ______
c) 60
   − 15
   ______
d) 40
   − 28
   ______
e) 90
   − 16
   ______
f) 50
   − 13
   ______
g) 70
   − 37
   ______
h) 80
   − 54
   ______
i) 400
   − 5
   ______
j) 500
   − 9
   ______
k) 900
   − 57
   ______
l) 800
   − 63
   ______
m) 540
   − 82
   ______
n) 810
   − 29
   ______
o) 1000
   − 205
   ______
p) 2050
   − 461
   ______
Skill 7.1 Multiplying a whole number by a power of 10 using zeros as place holders.

- When multiplying by 10 move each digit one place to the left.

\[
\begin{array}{c}
\text{hundreds} \\
\text{tens} \\
\text{units}
\end{array}
\begin{array}{c}
2.5 \\
1.0 \\
\Rightarrow \\
2.5
\end{array}
\Rightarrow
\begin{array}{c}
\text{hundreds} \\
\text{tens} \\
\text{units}
\end{array}
\begin{array}{c}
2.5 \\
1.0 \\
\Rightarrow \\
2.5
\end{array}
\]

*Hint: Multiplying by a power of 10 does not change the digits in the number.*

Example: \(25 \times 10 = 250\) the 2 and the 5 remain in the answer.

- When multiplying by 100 move each digit two places to the left.
- When multiplying by 1000 move each digit three places to the left.
- Add zeros as place holders in the vacated places.

**Q.**

\[
\begin{array}{c}
\text{units} \\
\text{tens} \\
\text{hundreds}
\end{array}
\begin{array}{c}
5.9 \\
\times 1.0 \\
\Rightarrow \\
590
\end{array}
\]

**A.**

\[
\begin{array}{c}
\text{thousands} \\
\text{hundreds} \\
\text{tens} \\
\text{units}
\end{array}
\begin{array}{c}
5.9 \\
1.0 \\
\Rightarrow \\
590
\end{array}
\]

59 \times 100 means 59 groups of 100.

Shift 5 and 9 two places to the left.

Use 0’s as place holders in the vacated units and tens places.

\[
\begin{array}{c}
a) \quad 7.0 \\
\times 1.0 \\
\Rightarrow \\
7.00
\end{array}
\quad
\begin{array}{c}
b) \quad 2.5 \\
\times 1.0 \\
\Rightarrow \\
2.50
\end{array}
\quad
\begin{array}{c}
c) \quad 2.2 \ 4 \\
\times 1.0 \\
\Rightarrow \\
2.2\ 40
\end{array}
\quad
\begin{array}{c}
d) \quad 3.7 \ 0 \\
\times 1.0 \\
\Rightarrow \\
3.7\ 00
\end{array}
\quad
\begin{array}{c}
e) \quad 2.5 \\
\times 1.0 \\
\Rightarrow \\
2.50
\end{array}
\quad
\begin{array}{c}
f) \quad 7.3 \\
\times 1.0 \\
\Rightarrow \\
7.30
\end{array}
\quad
\begin{array}{c}
g) \quad 8.0 \\
\times 1.0 \\
\Rightarrow \\
8.00
\end{array}
\quad
\begin{array}{c}
h) \quad 1.0 \ 9 \\
\times 1.0 \\
\Rightarrow \\
1.0\ 90
\end{array}
\quad
\begin{array}{c}
i) \quad 3.9 \\
\times 1.0 \\
\Rightarrow \\
3.90
\end{array}
\quad
\begin{array}{c}
j) \quad 6.0 \\
\times 1.0 \\
\Rightarrow \\
6.00
\end{array}
\quad
\begin{array}{c}
k) \quad 8.5 \ 0 \\
\times 1.0 \\
\Rightarrow \\
8.5\ 00
\end{array}
\quad
\begin{array}{c}
l) \quad 2.4 \ 7 \\
\times 1.0 \\
\Rightarrow \\
2.4\ 70
\end{array}
\]

Use zero as a place holder

Units first!
Skill 7.2 Multiplying a whole number by a power of 10 using columns.

- When multiplying a number by a power of 10, simply add the same number of zeros at the end of the number.

Q.  

A.

Units: 
0 \times 17 = 0 \Rightarrow 0 \text{ units}

Tens: 
0 \times 17 = 0 \Rightarrow 0 \text{ tens}

Hundreds: 
1 \times 17 = 17 
17 \text{ hundreds} = 1 \text{ thousand} + 7 \text{ hundreds} \Rightarrow 7 \text{ hundreds}

Carry over the 1 thousand to the thousands column.

Thousands: 
\Rightarrow 1 \text{ thousand}

---

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
<th>d)</th>
</tr>
</thead>
</table>
| \[
\begin{array}{c}
56 \\
\times 100 \\
\hline
5600 \\
\end{array}
\]
| \[
\begin{array}{c}
138 \\
\times 100 \\
\hline
13800 \\
\end{array}
\]
| \[
\begin{array}{c}
470 \\
\times 100 \\
\hline
47000 \\
\end{array}
\]
| \[
\begin{array}{c}
2095 \\
\times 100 \\
\hline
209500 \\
\end{array}
\]

<table>
<thead>
<tr>
<th>e)</th>
<th>f)</th>
<th>g)</th>
<th>h)</th>
</tr>
</thead>
</table>
| \[
\begin{array}{c}
47 \\
\times 1000 \\
\hline
47000 \\
\end{array}
\]
| \[
\begin{array}{c}
75 \\
\times 1000 \\
\hline
75000 \\
\end{array}
\]
| \[
\begin{array}{c}
50 \\
\times 1000 \\
\hline
50000 \\
\end{array}
\]
| \[
\begin{array}{c}
953 \\
\times 1000 \\
\hline
953000 \\
\end{array}
\]

<table>
<thead>
<tr>
<th>i)</th>
<th>j)</th>
<th>k)</th>
<th>l)</th>
</tr>
</thead>
</table>
| \[
\begin{array}{c}
600 \\
\times 100 \\
\hline
60000 \\
\end{array}
\]
| \[
\begin{array}{c}
340 \\
\times 100 \\
\hline
34000 \\
\end{array}
\]
| \[
\begin{array}{c}
702 \\
\times 100 \\
\hline
70200 \\
\end{array}
\]
| \[
\begin{array}{c}
581 \\
\times 100 \\
\hline
58100 \\
\end{array}
\]

<table>
<thead>
<tr>
<th>m)</th>
<th>n)</th>
<th>o)</th>
<th>p)</th>
</tr>
</thead>
</table>
| \[
\begin{array}{c}
98 \\
\times 10000 \\
\hline
980000 \\
\end{array}
\]
| \[
\begin{array}{c}
70 \\
\times 10000 \\
\hline
700000 \\
\end{array}
\]
| \[
\begin{array}{c}
950 \\
\times 10000 \\
\hline
9500000 \\
\end{array}
\]
| \[
\begin{array}{c}
326 \\
\times 10000 \\
\hline
3260000 \\
\end{array}
\]

---

Hint: One thousand, seven hundred can also be called seventeen hundred.
Skill 7.3 Dividing a whole number by a power of 10 using fractions.

- Convert the division to a fraction and.......  

EITHER
- Divide both the numerator and the denominator by the value of the denominator.

\[
\frac{40}{10} = \frac{40}{10} = \frac{40 \div 10}{10 \div 10} = \frac{4}{1} = 4 \\
\frac{600}{100} = \frac{600}{100} = \frac{600 \div 100}{100 \div 100} = \frac{6}{1} = 6
\]

OR
- Cancel the zeros in the numerator against the zeros in the denominator.

\[
\frac{40}{10} = \frac{40}{10} = \frac{4}{1} = 4 \\
\frac{600}{100} = \frac{600}{100} = \frac{6}{1} = 6
\]

Q. \( \frac{5400}{100} = \)

A. \( \frac{5400}{100} = \)

\[
= \frac{5400}{100} = \frac{5400 \div 100}{100 \div 100} = \frac{54}{1} = 54
\]

How many groups of 100 make up 5400?

Convert the division to a fraction.

Divide the numerator and the denominator by 100.

54 groups of 100 make up 5400.

Hint: Five thousand, four hundred can also be called fifty-four hundred.

a) \( \frac{800}{100} = \)

\[
= \frac{800}{100} = \frac{800 \div 100}{100 \div 100} = \frac{8}{1} = 8
\]

b) \( \frac{70}{10} = \)

c) \( \frac{850}{10} = \)

\[
= \frac{850}{10} = \frac{850 \div 10}{10 \div 10} = \frac{85}{10} = 8.5
\]

d) \( \frac{900}{100} = \)

\[
= \frac{900}{100} = \frac{900 \div 100}{100 \div 100} = \frac{9}{1} = 9
\]

e) \( \frac{500}{100} = \)

\[
= \frac{500}{100} = \frac{500 \div 100}{100 \div 100} = \frac{5}{1} = 5
\]

f) \( \frac{2400}{100} = \)

\[
= \frac{2400}{100} = \frac{2400 \div 100}{100 \div 100} = \frac{24}{1} = 24
\]

g) \( \frac{13200}{100} = \)

\[
= \frac{13200}{100} = \frac{13200 \div 100}{100 \div 100} = \frac{132}{1} = 132
\]

h) \( \frac{9800}{10} = \)

\[
= \frac{9800}{10} = \frac{9800 \div 10}{10 \div 10} = \frac{980}{10} = 98
\]

i) \( \frac{15000}{1000} = \)

\[
= \frac{15000}{1000} = \frac{15000 \div 1000}{1000 \div 1000} = \frac{15}{1} = 15
\]
### Skill 7.4  Dividing a whole number by a power of 10 by removing zeros or changing place values.

#### EITHER
- Remove the same number of zeros as in the divisor from the end of the whole number.
  - (1 for 10, 2 for 100, 3 for 1000, etc.)
- Example:
  
  
  $98000 \div 10 = 9800$
  $98000 \div 100 = 980$
  $98000 \div 1000 = 98$

#### OR
- Move the decimal point the same number of places to the left as there are zeros in the divisor.
- **Hint:** There is a decimal point and zeros which are not written, at the end of any whole number.

  - 1 zero ⇒ 1 place left. $98000.0 \Rightarrow 9800$
  - 2 zeros ⇒ 2 places left. $98000.0 \Rightarrow 980$
  - 3 zeros ⇒ 3 places left. $98000.0 \Rightarrow 98$

#### Q. 44000 ÷ 1000 = A. 44000 ÷ 1000 =

  - 1000 has 3 zeros.
  - To divide by 1000 remove 3 zeros from both numbers.

#### Exercises

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>$600 \div 10 = $</td>
<td>b)</td>
<td>$90 \div 10 =$</td>
</tr>
<tr>
<td></td>
<td>$600.0 \div 10 =$</td>
<td></td>
<td>$600.0 \div 10 =$</td>
</tr>
<tr>
<td></td>
<td>$60 = $</td>
<td></td>
<td>$60 = $</td>
</tr>
<tr>
<td>d)</td>
<td>$1600 \div 10 = $</td>
<td>e)</td>
<td>$5500 \div 10 =$</td>
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<tr>
<td></td>
<td>$1600.0 \div 10 =$</td>
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<td>$5500.0 \div 10 =$</td>
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<td></td>
<td>$= $</td>
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<td>$= $</td>
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<td>g)</td>
<td>$800 \div 100 =$</td>
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<td>$9500 \div 100 =$</td>
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<td>$800.0 \div 100 =$</td>
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<td>$9500.0 \div 100 =$</td>
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<td>$= $</td>
<td></td>
<td>$= $</td>
</tr>
<tr>
<td>j)</td>
<td>$45900 \div 100 =$</td>
<td>k)</td>
<td>$9000 \div 1000 =$</td>
</tr>
<tr>
<td></td>
<td>$45900.0 \div 100 =$</td>
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<td>$9000.0 \div 1000 =$</td>
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<td>$= $</td>
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<td>$= $</td>
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</table>
### Skill 8.1 Multiplying a large number by a single digit without carry over, using columns.

- Multiply the units, tens, hundreds and thousands by the single digit.
- Multiply from right to left.

#### Q.

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>312</td>
<td>×</td>
<td>3</td>
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<tr>
<td>936</td>
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</tbody>
</table>

#### A.

- **Units:**
  - $3 \times 2 = 6 \Rightarrow 6$ units
  - $3 \times 1 = 3 \Rightarrow 3$ tens
  - $3 \times 3 = 9 \Rightarrow 9$ hundreds

#### Exercises

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<tr>
<td>97</td>
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#### Solutions

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<td>2</td>
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<td>32</td>
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<td>340</td>
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<td>2</td>
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<td>131</td>
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</thead>
<tbody>
<tr>
<td>322</td>
<td>×</td>
<td>3</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Skill 8.2  Multiplying a large number by a single digit with carry over, using columns.

- Multiply the units, tens, hundreds and thousands by the single digit.
- Multiply from right to left.
- If there is a 'carry over': First multiply. Then add on the carry over.

<table>
<thead>
<tr>
<th>Q. 119</th>
<th>A. 8</th>
<th>Units:</th>
</tr>
</thead>
<tbody>
<tr>
<td>× 8</td>
<td></td>
<td>8 × 9 = 72</td>
</tr>
<tr>
<td></td>
<td></td>
<td>72 units = 7 tens and 2 units (⇒) 2 units</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carry over the 7 tens to the tens column.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tens:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 × 1 = 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 + 7 (carry over) = 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 tens = 1 hundred and 5 tens (⇒) 5 tens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carry over the 1 hundred to the hundreds column.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hundreds:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 × 1 = 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 + 1 (carry over) = 9 (⇒) 9 hundreds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a) 80 &lt;br&gt; × 5</th>
<th>b) 90 &lt;br&gt; × 4</th>
<th>c) 94 &lt;br&gt; × 2</th>
<th>d) 65 &lt;br&gt; × 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e) 36 &lt;br&gt; × 3</th>
<th>f) 23 &lt;br&gt; × 7</th>
<th>g) 48 &lt;br&gt; × 6</th>
<th>h) 82 &lt;br&gt; × 6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>i) 164 &lt;br&gt; × 2</th>
<th>j) 207 &lt;br&gt; × 5</th>
<th>k) 409 &lt;br&gt; × 7</th>
<th>l) 803 &lt;br&gt; × 4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>m) 180 &lt;br&gt; × 6</th>
<th>n) 567 &lt;br&gt; × 3</th>
<th>o) 410 &lt;br&gt; × 9</th>
<th>p) 522 &lt;br&gt; × 5</th>
</tr>
</thead>
</table>

Units first!
Skill 8.3  Multiplying a large number by a two-digit number, using columns.

- Multiply by the unit digit first, working from right to left. 
  Reminder: Put a zero in the units place before you start multiplying by the tens.
- Then multiply by the ten digit, working from right to left.
- Add the results last.

Q.  

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>×</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

A.

First multiply 85 by the 4 units.

**Units:**
4 × 5 = 20
20 units = 2 tens and 0 units ⇒ 0 units
Carry over the 2 tens to the tens column.

**Tens:**
4 × 8 = 32
32 + 2 (carry over) = 34
34 tens = 3 hundreds and 4 tens ⇒ 4 tens

**Hundreds:** ⇒ 3 hundreds

Then multiply 85 by the 1 ten.

**Units:** Write 0 as a place holder for the ten. ⇒ 0 units

**Tens:**
1 × 5 = 5 ⇒ 5 tens

**Hundreds:**
1 × 8 = 8 ⇒ 8 hundreds

Add these results: 340 + 850 = 1190

---

a) 3 4  
   × 2 1  
   6 8 0  
   7 1 4  

b) 1 5  
   × 3 2  
   3 0  

c) 2 4  
   × 4 3  

---

d) 7 1  
   × 6 2  

e) 5 8  
   × 4 5  

f) 9 2  
   × 7 3  

---

g) 4 6  
   × 3 8  

h) 3 3  
   × 9 6  

---

page 33  www.mathsmate.co.nz  © Maths Mate 3.2/4.1 Skill Builder 8
Skill 8.4 Dividing a large number by a single digit, without carry over.

- Divide from left to right across the digits, one at a time.

Q. 2) 486

A. Hundreds: 4 ÷ 2 = 2 ⇒ 2 hundreds
   Tens: 8 ÷ 2 = 4 ⇒ 4 tens
   Units: 6 ÷ 2 = 3 ⇒ 3 units

Read as: 486 divided by 2 equals? OR How many 2’s go into 486? OR 486 divides by 2 how many times?

Consider: 486 ÷ 2 = 243

2 × 243 = 486

a) 4) 80
    2) 200
  b) 3) 69
  c) 2) 46
  d) 4) 48
  e) 2) 200
  f) 2) 800
  g) 3) 909
  h) 7) 770
  i) 4) 408
  j) 3) 396
  k) 2) 284
  l) 3) 366
  m) 3) 6000
  n) 2) 8000
  o) 2) 2860
  p) 3) 9063
  q) 2) 8864
  r) 2) 4806
  s) 3) 3009
  t) 4) 4048
  u) 3) 3966
  v) 2) 8204
  w) 4) 8408
  x) 3) 3699
Skill 8.5 Dividing a large number by a single digit, with carry over - no remainder.

- Divide from left to right across the digits one at a time.
- If any result is less than 1: Break down the number being divided into.
  ‘Carry over’ this amount to the next column.
  Add on the carry.
  Then try dividing again.

Q.  

A.  

**Hundreds:**

1 \( \div \) 4 = ?

The result is < 1.

Break down the 1 hundred into 10 tens and carry them to the tens column.

**Tens:**

2 \( + \) 10 (carry over) = 12

12 \( \div \) 4 = 3  \( \Rightarrow \) 3 tens

**Units:**

8 \( \div \) 4 = 2  \( \Rightarrow \) 2 units

Read as: 128 divided by 4 equals?

OR How many 4’s go into 128?

OR 128 divides by 4 how many times?

Consider: 128 \( \div \) 4 = 32

4 \( \times \) 32 = 128

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
<th>d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ( \overline{1} )</td>
<td>3 ( \overline{2} )</td>
<td>2 ( \overline{4} )</td>
<td>4 ( \overline{3} )</td>
</tr>
<tr>
<td>5 ( ) 2 5 5</td>
<td>3 ( ) 2 1 6</td>
<td>2 ( ) 1 4 8</td>
<td>4 ( ) 3 2 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e)</th>
<th>f)</th>
<th>g)</th>
<th>h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ( \overline{2} )</td>
<td>8 ( \overline{5} )</td>
<td>6 ( \overline{2} )</td>
<td>7 ( \overline{3} )</td>
</tr>
<tr>
<td>4 ( ) 2 1 2</td>
<td>8 ( ) 5 9 2</td>
<td>6 ( ) 2 0 4</td>
<td>7 ( ) 3 3 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>i)</th>
<th>j)</th>
<th>k)</th>
<th>l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 ( \overline{1} )</td>
<td>5 ( \overline{4} )</td>
<td>4 ( \overline{1} )</td>
<td>2 ( \overline{1} )</td>
</tr>
<tr>
<td>6 ( ) 1 8 0 0</td>
<td>5 ( ) 4 5 0 0</td>
<td>4 ( ) 1 0 6 0</td>
<td>2 ( ) 1 7 3 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>m)</th>
<th>n)</th>
<th>o)</th>
<th>p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 ( \overline{6} )</td>
<td>3 ( \overline{4} )</td>
<td>6 ( \overline{7} )</td>
<td>5 ( \overline{5} )</td>
</tr>
<tr>
<td>3 ( ) 6 0 8 1</td>
<td>3 ( ) 4 1 2 5</td>
<td>6 ( ) 7 2 1 8</td>
<td>5 ( ) 5 1 5 0</td>
</tr>
</tbody>
</table>
9. [Decimals]

Skill 9.1 Counting tenths and hundredths in a $10 \times 10$ grid (1).

- Count the number of squares in 1 row or 1 column.
  Hint: Each row (or column) shows 10 tenths. The whole grid shows 100 hundredths.

To count tenths
- Count the number of completely shaded rows (or columns).

To count hundredths
- Add on the amount of shaded squares in the shorter shaded row (or column) to the number of tenths. OR
- Count the total number of shaded squares.

Q.

A. $6$ tenths + $4$ hundredths $= 0.64$

Hundredths:
There are 4 shaded squares in the shorter row $\Rightarrow 4$ hundredths

Tenths:
There are 6 rows completely shaded $\Rightarrow 6$ tenths

Q.

a) $47$ hundredths $= 0.47$

b) $35$ hundredths $= 0.$

c) $\square$ tenths $= 0.$

d) $\square$ tenths $= 0.$

e) $\square$ hundredths $= 0.$

f) $\square$ hundredths $= 0.$
Skill 9.1  Counting tenths and hundredths in a $10 \times 10$ grid (2).

\[\text{g) tenths + hundredths = } 0.\]

\[\text{h) tenths + hundredths = } 0.\]

\[\text{i) tenths + hundredths = } 0.\]

\[\text{j) tenths + hundredths = } 0.\]

\[\text{k) tenths + hundredths = } 0.\]

\[\text{l) tenths + hundredths = } 0.\]

\[\text{m) tenths + hundredths = } 0.\]

\[\text{n) tenths + hundredths = } 0.\]

\[\text{o) tenths + hundredths = } 0.\]

\[\text{p) tenths + hundredths = } 0.\]

\[\text{q) tenths + hundredths = } 0.\]

\[\text{r) tenths + hundredths = } 0.\]
Skill 9.2 Expressing word decimal numbers in numerals.

Rule 1: Write the numbers from left to right in the same order as the words.
Rule 2: If the number is less than one then put a zero before the decimal point.
Rule 3: The decimal point goes between the units and the tenths.
Rule 4: Write a zero as a place holder in any place that is left empty between other digits.

Three hundredths = 0.03

|DECIMAL PLACE VALUE|
|Units | Tenths | Hundredths |
|0         | 0       | 3          |

Q. Write as a decimal:

a) Write as a decimal:
twenty tenths

b) Write as a decimal:
seven tenths

c) Write as a decimal:
nine tenths

d) Write as a decimal:
three and two tenths

e) Write as a decimal:
four and one tenth

f) Write as a decimal:
five and eight tenths

g) Write as a decimal:
six and one tenth

h) Write as a decimal:
six hundredths

i) Write as a decimal:
three hundredths

j) Write as a decimal:
twenty-four hundredths

k) Write as a decimal:
seventy-one hundredths

l) Write as a decimal:
sixty-six hundredths

m) Write as a decimal:
two and thirty-one hundredths

n) Write as a decimal:
five and sixty-nine hundredths

o) Write as a decimal:
one and twelve hundredths

A. 0.58

To show a number is less than 1, first put a zero and then a decimal point.
Then write the numbers 5 and 8 in order.
Check that the 8 is in the hundredths position.
The 5 should be in the tenths position.
Skill 9.3  Reading a decimal number on a scale (1).

- Count the number of spaces between two whole numbers. 
  (Always one more than the number of marks.)
- Work out the value of each space.
  Example: 10 spaces between each whole number $\Rightarrow 1 \div 10 = 0.1$
  Each mark is further along the scale by one tenth or 0.1

\[2 \quad 0.1 \quad 1 \quad \ldots \quad 3\]
2 2.1 2.2 2.3

- Starting at the last whole number, count on by 0.1. Point to each mark as you go.

Q. Show with an arrow the number 0.7 on the scale.

A. There are 10 spaces between 0 and 1.
Each space is worth one tenth:
\[
\frac{1}{10} = 1 \div 10 = 0.1
\]
From ‘0’ you can count on:
0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7 OR
Knowing the middle mark is 0.5, count on from 0.5: 0.5, 0.6, 0.7

a) Use the scale to find the height of the giraffe in metres.

b) Use the scale to find the height of the goose in metres.

c) Use the scale to find the height of the rhinoceros in metres.

d) Use the scale to find the length of the fish in centimetres.
Skill 9.3  Reading a decimal number on a scale (2).

**e)** Use the scale to find the length of the dog in metres.

![Dog Scale](image1.png)

**f)** Use the scale to find the wing span of the bee in centimetres.

![Bee Scale](image2.png)

**g)** Use the scale to find the length of the hippopotamus in metres.

![Hippopotamus Scale](image3.png)

**h)** Use the scale to find the length of the cow in metres.

![Cow Scale](image4.png)

**i)** Show with an arrow the number 3.8 on the scale.

![Arrow 3.8](image5.png)

**j)** Show with an arrow the number 7.3 on the scale.

![Arrow 7.3](image6.png)

**k)** Show with an arrow the number 0.6 on the scale.

![Arrow 0.6](image7.png)

**l)** Show with an arrow the number 4.2 on the scale.

![Arrow 4.2](image8.png)

**m)** Show with an arrow the number 6.5 on the scale.

![Arrow 6.5](image9.png)

**n)** Show with an arrow the number 1.9 on the scale.

![Arrow 1.9](image10.png)
Skill 9.4 Converting cent amounts into dollar amounts.

Less than 100 cents
- Write a zero first if the cents are less than 100.
- Write the decimal point.
- Write the cents after the decimal point.

**Hint:** Use 0 as a place holder after the decimal point for any amount less than 10 cents.

Example: 6¢ = $0.06

More than 100 cents
- Separate the hundreds of cents to make whole dollars.
- Write the whole dollars followed by the decimal point.
- Write the remaining cents after the decimal point.

**Conversion Fact - MONEY**

100 cents = 1 dollar

---

Q. Write these cents in dollars:

638¢ =

A. 638¢

= 600¢ + 38¢

= $6 + 38¢

= $6.38

---

a) Write these cents in dollars:

24¢ =

$ 0.24

d) Write these cents in dollars:

100¢ =

$

g) Write these cents in dollars:

126¢ =

$

j) Write these cents in dollars:

90¢ =

$

m) Write these cents in dollars:

206¢ =

$
p) Write these cents in dollars:

8¢ =

$

b) Write these cents in dollars:

31¢ =

$

e) Write these cents in dollars:

900¢ =

$

h) Write these cents in dollars:

459¢ =

$

k) Write these cents in dollars:

30¢ =

$

n) Write these cents in dollars:

704¢ =

$

o) Write these cents in dollars:

801¢ =

$

r) Write these cents in dollars:

3¢ =

$
Skill 9.5  Comparing place value in decimal numbers.

- Line up the decimal numbers at their decimal points.
- Compare the size of digits in the same places, starting from the left.

**Hint:** Using zeros as place holders does not change the value of a number when the zeros are put:

**EITHER**

Before the first digit in any number

Example: 5
The digit 5 is in the units place:
5 = 05 = 005

**OR**

After the last digit of a decimal number, after the decimal point

Example: 0.5
The digit 5 is in the tenths place:
0.5 = 0.50 = 0.500

---

**Q.** Which of the following are true? **A. A and D**

A) 6.0 = 6.00
B) 400 = 40
C) 0.7 = 0.070
D) 0.8 = 0.800

Line up the numbers at their decimal points.
Compare from the left.

A) 6.0 = 6.00  True
B) 400 = 40  False
C) 0.7 = 0.070  False
D) 0.8 = 0.800  True

Only A and D are true.

---

**a)** Which of the following are true?

A) 6 = 60.0
B) 50.0 = 50
C) 0.3 = 0.3
D) 00.2 = 2.00

B and C

**b)** Which of the following are true?

A) 70 = 7
B) 9 = 0.9
C) 0.5 = 0.50
D) 8.0 = 8.00

and

**c)** Which of the following are true?

A) 10.0 = 1.0
B) 50.0 = 50
C) 0.07 = 0.007
D) 4 = 4.0

and

**d)** Which of the following are true?

A) 90 = 90.0
B) 4 = 40.0
C) 20.0 = 0.20
D) 0.50 = 0.5

and

**e)** Which of the following are true?

A) 0.03 = 0.30
B) 0.4 = 0.40
C) 7 = 0.70
D) 8.0 = 8.0000

and

**f)** Which of the following are true?

A) 5.0 = 5
B) 20 = 20.0
C) 0.4 = 0.004
D) 0.30 = 3.0

and
Skill 9.6  Adding dollars and cents.

- Add the cents first.
- Convert cents to dollars where possible.
- Add the dollars next.
- Add the totals.

Q. $3.40 + $3.65 =

A. $3.40 + $3.65 =

\[
\begin{align*}
40\,\text{c} + 65\,\text{c} &= 105\,\text{c} \\
105\,\text{c} &= \$1.05 \\
3.00 + 3.00 &= \$6.00 \\
\hline
\text{Total} &= \$7.05
\end{align*}
\]

Conversion Fact - MONEY
100 cents = 1 dollar

<table>
<thead>
<tr>
<th>Cents:</th>
<th>Dollars:</th>
<th>Totals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 + 65 = 105 cents</td>
<td>1 + 6 = 7 dollars</td>
<td>$1.05 + $6.00 = $7.05</td>
</tr>
</tbody>
</table>

\[\begin{align*}
\text{a)} & \quad 2.30 + 3.95 = \\
& \quad 30\,\text{c} + 95\,\text{c} = 125\,\text{c} \\
& \quad 125\,\text{c} = \$1.25 \\
& \quad 2.00 + 3.00 = \$5 \\
& \quad \text{Total} = \$6.25
\end{align*}\]

\[\begin{align*}
\text{b)} & \quad 2.40 + 5.60 = \\
& \quad 40\,\text{c} + 60\,\text{c} = 100\,\text{c} \\
& \quad \text{Total} = \$
\end{align*}\]

\[\begin{align*}
\text{c)} & \quad 4.55 + 2.05 = \\
& \quad \text{Total} = \$
\end{align*}\]

\[\begin{align*}
\text{d)} & \quad 1.65 + 3.45 = \\
& \quad \text{Total} = \$
\end{align*}\]

\[\begin{align*}
\text{e)} & \quad 3.50 + 1.95 = \\
& \quad \text{Total} = \$
\end{align*}\]

\[\begin{align*}
\text{f)} & \quad 3.85 + 4.50 = \\
& \quad \text{Total} = \$
\end{align*}\]
Skill 9.7 Calculating the change from whole dollars.

- Write the word problem as a number sentence.

EITHER
- Consider the cents first.
- Build up the cents, in steps if necessary, to the next whole dollar.

OR
- Subtract the decimal number from the whole number. (see skill 9.10, page 49)

Q. How much change will you receive from $10.00 if you spend $5.15?

A. $5.15 + 85¢ = $6.00
   $6.00 + $4.00 = $10.00
   85¢ + $4.00 = $4.85

“How much must I add to $5.15 to have $6.00?”

“How $5.15 plus 5 cents makes $5.20
   And 80 cents more will make $6.00
   Altogether I need 85 cents more.”

So $5.15 and $0.85 make $6.00
Then $4.00 more will make $10.00

a) How much change will you receive from $5.00 if you spend $3.45?

$3.45 + 55¢ = $4.00

$4.00 + $1.00 = $5.00

55¢ + $1.00 = $1.55

b) How much change will you receive from $5.00 if you spend $2.30?

c) How much change will you receive from $10.00 if you spend $2.05?

d) How much change will you receive from $10.00 if you spend $0.90?

e) How much change will you receive from $10.00 if you spend $4.65?

f) How much change will you receive from $5.00 if you spend $3.85?
Skill 9.8  Adding decimal numbers with carry over using columns (1).

- Always keep your working columns in line, aligning the decimal points, the decimal places, units with units, tens with tens, etc.
- Add from right to left.

### Q.

\[
\begin{array}{c}
\text{\$2.75} \\
+ \text{\$1.45}
\end{array}
\]

\[
\begin{array}{c}
\$4.20
\end{array}
\]

### A.

**Hundredths:**

\[
5 + 5 = 10
\]

10 hundredths = 1 tenth and 0 hundredths

\[\Rightarrow 0 \text{ hundredths}\]

Carry over the 1 tenth to the tenths column.

**Tenths:**

\[
7 + 4 + 1 = 12
\]

12 tenths = 1 unit and 2 tenths

\[\Rightarrow 2 \text{ tenths}\]

Carry over the 1 unit to the units column.

Put the decimal point in the answer box under the other decimal points.

**Units:**

\[
2 + 1 + 1 = 4
\]

\[\Rightarrow 4 \text{ units}\]

### Q.

a) \[
\begin{array}{c}
\text{\$1.50} \\
+ \text{\$3.50}
\end{array}
\]

\[
\begin{array}{c}
\$5.00
\end{array}
\]

b) \[
\begin{array}{c}
\text{\$4.35} \\
+ \text{\$2.45}
\end{array}
\]

c) \[
\begin{array}{c}
\text{\$2.60} \\
+ \text{\$1.75}
\end{array}
\]

\[
\begin{array}{c}
\text{\$4.35}
\end{array}
\]

d) \[
\begin{array}{c}
\text{\$3.75} \\
+ \text{\$8.05}
\end{array}
\]

\[
\begin{array}{c}
\text{\$11.80}
\end{array}
\]

e) \[
\begin{array}{c}
\text{\$4.60} \\
+ \text{\$1.90}
\end{array}
\]

\[
\begin{array}{c}
\text{\$6.50}
\end{array}
\]

f) \[
\begin{array}{c}
\text{\$2.30} \\
+ \text{\$2.85}
\end{array}
\]

\[
\begin{array}{c}
\text{\$5.15}
\end{array}
\]

g) \[
\begin{array}{c}
\text{\$7.80} \\
+ \text{\$0.65}
\end{array}
\]

\[
\begin{array}{c}
\text{\$8.45}
\end{array}
\]

h) \[
\begin{array}{c}
\text{\$6.25} \\
+ \text{\$3.95}
\end{array}
\]

\[
\begin{array}{c}
\text{\$10.20}
\end{array}
\]

i) \[
\begin{array}{c}
0.64 \\
+ 1.5
\end{array}
\]

\[
\begin{array}{c}
2.14
\end{array}
\]

j) \[
\begin{array}{c}
4.1 \\
+ 3.94
\end{array}
\]

\[
\begin{array}{c}
8.04
\end{array}
\]

k) \[
\begin{array}{c}
2.05 \\
+ 6.65
\end{array}
\]

\[
\begin{array}{c}
8.70
\end{array}
\]

l) \[
\begin{array}{c}
4.8 \\
+ 2.75
\end{array}
\]

\[
\begin{array}{c}
7.55
\end{array}
\]
### Skill 9.8 Adding decimal numbers with carry over using columns (2).

- **m)**
  - \[ \begin{array}{c}
  6.37 \\
  + \ 1.34 \\
  \hline
  7.71 \\
  \end{array} \]

- **n)**
  - \[ \begin{array}{c}
  9.18 \\
  + \ 0.34 \\
  \hline
  9.52 \\
  \end{array} \]

- **o)**
  - \[ \begin{array}{c}
  2.19 \\
  + \ 8.72 \\
  \hline
  10.91 \\
  \end{array} \]

- **p)**
  - \[ \begin{array}{c}
  5.65 \\
  + \ 3.8 \\
  \hline
  9.45 \\
  \end{array} \]

- **q)**
  - \[ \begin{array}{c}
  7.65 \\
  + \ 3.63 \\
  \hline
  11.28 \\
  \end{array} \]

- **r)**
  - \[ \begin{array}{c}
  2.38 \\
  + \ 5.72 \\
  \hline
  8.10 \\
  \end{array} \]

- **s)**
  - \[ \begin{array}{c}
  1.5 \\
  + \ 4.74 \\
  \hline
  6.24 \\
  \end{array} \]

- **t)**
  - \[ \begin{array}{c}
  3.66 \\
  + \ 0.9 \\
  \hline
  4.56 \\
  \end{array} \]

- **u)**
  - \[ \begin{array}{c}
  1.75 \\
  + \ 0.96 \\
  \hline
  2.71 \\
  \end{array} \]

- **v)**
  - \[ \begin{array}{c}
  1.88 \\
  + \ 1.24 \\
  \hline
  3.12 \\
  \end{array} \]

- **w)**
  - \[ \begin{array}{c}
  1.58 \\
  + \ 1.43 \\
  \hline
  3.01 \\
  \end{array} \]

- **x)**
  - \[ \begin{array}{c}
  2.67 \\
  + \ 4.31 \\
  \hline
  7.98 \\
  \end{array} \]

- **y)**
  - \[ \begin{array}{c}
  1.81 \\
  2.53 \\
  + \ 4.52 \\
  \hline
  9.06 \\
  \end{array} \]

- **z)**
  - \[ \begin{array}{c}
  5.05 \\
  6.28 \\
  + \ 1.43 \\
  \hline
  13.76 \\
  \end{array} \]

- **A)**
  - \[ \begin{array}{c}
  2.6 \\
  3.7 \\
  + \ 1.99 \\
  \hline
  8.39 \\
  \end{array} \]

- **B)**
  - \[ \begin{array}{c}
  9.81 \\
  2.57 \\
  + \ 4.13 \\
  \hline
  16.51 \\
  \end{array} \]

- **C)**
  - \[ \begin{array}{c}
  2.504 \\
  1.087 \\
  + \ 3.95 \\
  \hline
  7.541 \\
  \end{array} \]

- **D)**
  - \[ \begin{array}{c}
  1.632 \\
  4.08 \\
  + \ 3.64 \\
  \hline
  9.352 \\
  \end{array} \]

- **E)**
  - \[ \begin{array}{c}
  9.17 \\
  4.253 \\
  + \ 1.47 \\
  \hline
  15.893 \\
  \end{array} \]

- **F)**
  - \[ \begin{array}{c}
  2.359 \\
  8.43 \\
  + \ 3.601 \\
  \hline
  14.39 \\
  \end{array} \]
Skill 9.9 Subtracting decimal numbers with carry over using columns.

- Keep the units, decimal points, tenths and hundredths in their own column.
- Work from right to left.

Q. 3.65  
- 1.9  

A. 1.75

Hundredths:
5 – 0 = 5  ⇒ 5 hundredths

Tenths:
6 – 9 = ? tenths.
To make the answer positive break down the 3 units.
3 units = 2 units and 10 tenths.
Re-group the 10 tenths with the 6 tenths to make 16 tenths.
Now...
16 – 9 = 7  ⇒ 7 tenths

Put the decimal point in the answer box under the other decimal points.

Units:
2 – 1 = 1  ⇒ 1 unit

<table>
<thead>
<tr>
<th>a)</th>
<th>b)</th>
<th>c)</th>
<th>d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.65</td>
<td>3.27</td>
<td>5.51</td>
<td>4.82</td>
</tr>
<tr>
<td>-2.8</td>
<td>-1.54</td>
<td>-2.36</td>
<td>-3.84</td>
</tr>
<tr>
<td>3.85</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e)</th>
<th>f)</th>
<th>g)</th>
<th>h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.21</td>
<td>7.75</td>
<td>6.13</td>
<td>5.55</td>
</tr>
<tr>
<td>-3.04</td>
<td>-1.08</td>
<td>-0.62</td>
<td>-1.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>i)</th>
<th>j)</th>
<th>k)</th>
<th>l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.54</td>
<td>2.06</td>
<td>4.24</td>
<td>3.66</td>
</tr>
<tr>
<td>-0.97</td>
<td>-1.29</td>
<td>-1.98</td>
<td>-2.88</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>m)</th>
<th>n)</th>
<th>o)</th>
<th>p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.37</td>
<td>24.19</td>
<td>36.52</td>
<td>17.46</td>
</tr>
<tr>
<td>-5.62</td>
<td>-11.73</td>
<td>-20.18</td>
<td>-8.09</td>
</tr>
</tbody>
</table>
Skill 9.10 Subtracting a decimal number less than 1 from a whole number.

- Write the whole number first, with a decimal point and one or two zeros after it. 
  
  **Hint:** The number does not change. 5 = 5.00
- Write the decimal number underneath.
- Line up the decimal points.
- Subtract using columns. (see skill 9.9, page 48)

### Q. 5 − 0.94 =

**A.**

#### Hundredths:

$0 - 4 = \, ?$ hundredths

To make the answer positive break down the 5 units:

5 units = 4 units + 9 tenths + 10 hundredths

Now...

$10 - 4 = 6 \Rightarrow 6$ hundredths

#### Tenths:

$9 - 9 = 0 \Rightarrow 0$ tenths

Put the decimal point in the answer box.

#### Units:

$4 - 0 = 4 \Rightarrow 4$ units

### A.

a) 2 − 0.3 =

```
  2.0
− 0.3
  1.7
```

b) 1 − 0.5 =

```
  1.0
− 0.5
  0.5
```

c) 7 − 0.8 =

```
  7.0
− 0.8
  6.2
```

d) 4 − 0.9 =

```
  4.0
− 0.9
  3.1
```

e) 3 − 0.25 =

```
  3.00
− 0.25
  2.75
```

f) 9 − 0.35 =

```
  9.00
− 0.35
  8.65
```

g) 6 − 0.61 =

```
  6.00
− 0.61
  5.39
```

h) 4 − 0.27 =

```
  4.00
− 0.27
  3.73
```

i) 3 − 0.18 =

```
  3.00
− 0.18
  2.82
```

j) 5 − 0.34 =

```
  5.00
− 0.34
  4.66
```

k) 2 − 0.83 =

```
  2.00
− 0.83
  1.17
```

I) 7 − 0.72 =

```
  7.00
− 0.72
  6.28
```
Skill 9.11 Solving problems involving GST.

Note: Add the price and the GST to get the price including GST.
- Add the cents first.
- Convert cents to dollars where possible.
- Add the dollars next.
- Add the totals.

Q. 10% GST must be added to a $21.90 CD. What is the price of the CD after adding $2.19 GST?

A. $21.90 + $2.19 =
\[
\begin{align*}
90c + 19c &= 109c \\
109c &= $1.09 \\
$21.00 + $2.00 &= $23.00 \\
\text{Cent:} 90c + 19c &= 109 cents \\
\text{Dollars:} 21 + 2 &= 23 dollars \\
\text{Total:} $1.09 + $23.00 &= $24.09
\end{align*}
\]

Cents:
90 + 19 = 109 cents
109 cents = 1 dollar and 9 cents

Dollars:
21 + 2 = 23 dollars

Totals:
$1.09 + $23.00 = $24.09

<table>
<thead>
<tr>
<th>Q. 10% GST must be added to a $13 book. What is the price of the book after adding $1.30 GST?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 10% GST must be added to a $13 book. What is the price of the book after adding $1.30 GST?</td>
</tr>
<tr>
<td>b) 10% GST must be added to a $15.50 ring. What is the price of the ring after adding $1.55 GST?</td>
</tr>
<tr>
<td>c) The price of a tennis racquet is $45 including GST. If the price before GST is $40.91, what is the GST?</td>
</tr>
<tr>
<td>d) The price of a lipstick is $30 including GST. If the price before GST is $27.27, what is the GST?</td>
</tr>
<tr>
<td>e) The price of a USB stick is $24 including GST. If the price before GST is $21.82, what is the GST?</td>
</tr>
<tr>
<td>f) The price of a set of water colours is $120 including GST. If the price before GST is $109.09, what is the GST?</td>
</tr>
<tr>
<td>g) The price of a Lego set is $50 including GST. If the price before GST is $45.45, what is the GST?</td>
</tr>
<tr>
<td>h) The price of a show ticket is $135 including GST. If the price before GST is $122.73, what is the GST?</td>
</tr>
</tbody>
</table>
Skill 9.12 Multiplying decimal numbers by powers of 10.

- To multiply by a power of 10, move the decimal point to the right one place for each 0.
- Remove the decimal point at the end of the number if no other digits follow.
- Remove all the zeros at the end of the decimal number if needed.

Example: \(15.600 = 15.6\)

### Q.

<table>
<thead>
<tr>
<th>Q. 7.48 (\times) 10 =</th>
<th>A. 7.48 (\times) 10 = one zero, one place</th>
<th>= 74.8</th>
</tr>
</thead>
</table>

### a) 5.3 \(\times\) 10 =

\[
= 5.3 \times 10 = 53
\]

### b) 6.2 \(\times\) 10 =

\[
= 6.2 \times 10 = \quad 62
\]

### c) 9.7 \(\times\) 10 =

\[
= 9.7 \times 10 = \quad 97
\]

### d) 1.8 \(\times\) 10 =

\[
= 1.8 \times 10 = \quad 18
\]

### e) 0.7 \(\times\) 10 =

\[
= 0.7 \times 10 = \quad 7
\]

### f) 0.1 \(\times\) 10 =

\[
= 0.1 \times 10 = \quad 1
\]

### g) 4.18 \(\times\) 10 =

\[
= 4.18 \times 10 = \quad 41.8
\]

### h) 5.06 \(\times\) 10 =

\[
= 5.06 \times 10 = \quad 50.6
\]

### i) 3.79 \(\times\) 10 =

\[
= 3.79 \times 10 = \quad 37.9
\]

### j) 1.03 \(\times\) 10 =

\[
= 1.03 \times 10 = \quad 10.3
\]

### k) 2.74 \(\times\) 10 =

\[
= 2.74 \times 10 = \quad 27.4
\]

### l) 9.56 \(\times\) 10 =

\[
= 9.56 \times 10 = \quad 95.6
\]

### m) 2.7 \(\times\) 100 =

\[
= 2.7 \times 100 = \quad 270
\]

### n) 9.1 \(\times\) 100 =

\[
= 9.1 \times 100 = \quad 910
\]

### o) 8.3 \(\times\) 100 =

\[
= 8.3 \times 100 = \quad 830
\]

### p) 0.5 \(\times\) 100 =

\[
= 0.5 \times 100 = \quad 50
\]

### q) 4.7 \(\times\) 100 =

\[
= 4.7 \times 100 = \quad 470
\]

### r) 0.9 \(\times\) 100 =

\[
= 0.9 \times 100 = \quad 90
\]

### s) 6.25 \(\times\) 100 =

\[
= 6.25 \times 100 = \quad 625
\]

### t) 7.81 \(\times\) 100 =

\[
= 7.81 \times 100 = \quad 781
\]

### u) 4.39 \(\times\) 100 =

\[
= 4.39 \times 100 = \quad 439
\]
Skill 9.13  Multiplying decimal numbers by a single digit.

- Work from right to left.
- Count the total number of digits to the right of the decimal point in the question.
- Count over, from the right in the answer, the same number of digits and place the decimal point.

Q. \[ \begin{array}{c}
\times 4 \\
2.42 \\
\hline
9.68
\end{array} \]

A. \[ \begin{array}{c}
\times 4 \\
2.42 \\
\hline
9.68
\end{array} \]

\[ 4 \times 2 = 8 \Rightarrow 8 \]
\[ 4 \times 4 = 16 \]

Write the 6 and carry the 1. \[ 6 \]
\[ 4 \times 2 = 8 \text{ Add the 1 carry.} \]
\[ 8 + 1 = 9 \Rightarrow 9 \]

Count the total number of digits to the right of the decimal point in the question. There are 2.

Count over 2 numbers from the right and place the decimal point in the answer.

Q. a) \[ \begin{array}{c}
\times 3 \\
2.01 \\
\hline
6.03
\end{array} \]
b) \[ \begin{array}{c}
\times 4 \\
2.12 \\
\hline
8.48
\end{array} \]
c) \[ \begin{array}{c}
\times 3 \\
1.23 \\
\hline
3.69
\end{array} \]
d) \[ \begin{array}{c}
\times 2 \\
3.42 \\
\hline
6.84
\end{array} \]
e) \[ \begin{array}{c}
\times 3 \\
2.41 \\
\hline
7.23
\end{array} \]
f) \[ \begin{array}{c}
\times 3 \\
1.26 \\
\hline
3.78
\end{array} \]
g) \[ \begin{array}{c}
\times 4 \\
2.24 \\
\hline
8.96
\end{array} \]
h) \[ \begin{array}{c}
\times 2 \\
1.64 \\
\hline
3.28
\end{array} \]
i) \[ \begin{array}{c}
\times 5 \\
1.03 \\
\hline
5.15
\end{array} \]
j) \[ \begin{array}{c}
\times 4 \\
1.52 \\
\hline
6.08
\end{array} \]
k) \[ \begin{array}{c}
\times 3 \\
2.51 \\
\hline
7.53
\end{array} \]
l) \[ \begin{array}{c}
\times 4 \\
1.23 \\
\hline
4.92
\end{array} \]
m) \[ \begin{array}{c}
\times 2 \\
2.53 \\
\hline
5.06
\end{array} \]
n) \[ \begin{array}{c}
\times 3 \\
3.26 \\
\hline
9.78
\end{array} \]
o) \[ \begin{array}{c}
\times 3 \\
4.03 \\
\hline
12.09
\end{array} \]
p) \[ \begin{array}{c}
\times 6 \\
5.01 \\
\hline
30.06
\end{array} \]
10. [Fractions]

Skill 10.1 Illustrating proper fractions.

- Count the number of shaded parts.
- Count the total number of parts.
- Write the number of shaded parts over the total number of parts.

**PROPER FRACTION**

- **numerator** (the number of shaded parts)
- **denominator** (the number of total parts)

Q. What fraction of the circle is shaded?

![Circle divided into 4 equal parts with 3 shaded](image)

A. \(\frac{3}{4}\)

The circle is divided into 4 equal parts so the denominator of the fraction is 4. Only 3 parts of the circle are shaded so the numerator is 3. The fraction of the circle that is shaded is three fourths or \(\frac{3}{4}\).

a) What fraction of the bar is shaded?

![Bar divided into 5 equal parts with 2 shaded](image)

b) What fraction of the bar is shaded?

![Bar divided into 5 equal parts with 3 shaded](image)

c) What fraction of the bar is shaded?

![Bar divided into 5 equal parts with 4 shaded](image)

d) What fraction of this group of lollies is shaded?

![Lollies](image)

f) Shade in \(\frac{5}{8}\) of this group of balloons.

![Balloons](image)

h) Shade in \(\frac{3}{8}\) of this parallelogram.

![Parallelogram](image)

j) Shade in \(\frac{1}{5}\) of this circle.

![Circle](image)

3

5

\(\frac{3}{5}\)

\(\frac{2}{5}\)

\(\frac{4}{5}\)

\(\frac{5}{8}\)

\(\frac{3}{8}\)

\(\frac{1}{5}\)
Skill 10.2  Reading a fraction on a number line.

- Count the number of spaces between two consecutive whole numbers. The number of spaces tells you the value of the denominator.

Example: If there are 6 spaces between the whole numbers, then each space equals \( \frac{1}{6} \).

\[ \begin{array}{c}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\hline
\end{array} \]

There are four spaces between 0 and 1.
Each space equals \( \frac{1}{4} \).
The arrow points to \( \frac{3}{4} \).

Q. Name the fraction shown by the arrow on the number line.

A. \( \frac{3}{4} \)

There are four spaces between 0 and 1.
Each space equals \( \frac{1}{4} \).
The arrow points to \( \frac{3}{4} \).

a) Name the fraction shown by the arrow on the number line.

b) Name the fraction shown by the arrow on the number line.

c) Name the fraction shown by the arrow on the number line.

d) Name the fraction shown by the arrow on the number line.

e) Name the fraction shown by the arrow on the number line.

f) Name the fraction shown by the arrow on the number line.

g) Name the fraction shown by the arrow on the number line.

h) Name the fraction shown by the arrow on the number line.

i) Name the fraction shown by the arrow on the number line.

j) Name the fraction shown by the arrow on the number line.
Skill 10.3 Writing 1 as a fraction.

Hint: A fraction equals 1 if the numerator is the same as the denominator.

Q. Which of the following equal 1?
   A) \( \frac{3}{3} \)  B) \( \frac{4}{3} \)  C) \( \frac{2}{3} \)  D) \( \frac{4}{4} \)

A. A and D

The only fractions in which the numerator is the same as the denominator are \( \frac{3}{3} \) and \( \frac{4}{4} \)

\( \frac{3}{3} = 1 \) (three thirds make a whole)

\( \frac{4}{4} = 1 \) (four fourths or quarters make a whole)

a) Which of the following equal 1?
   A) \( \frac{3}{3} \)  B) \( \frac{1}{8} \)  C) \( \frac{8}{8} \)  D) \( \frac{3}{8} \)

A and C

b) Which of the following equal 1?
   A) \( \frac{5}{2} \)  B) \( \frac{2}{2} \)  C) \( \frac{1}{2} \)  D) \( \frac{5}{5} \)

and

c) Which of the following equal 1?
   A) \( \frac{6}{6} \)  B) \( \frac{4}{4} \)  C) \( \frac{5}{8} \)  D) \( \frac{4}{3} \)

d) Which of the following equal 1?
   A) \( \frac{9}{7} \)  B) \( \frac{1}{9} \)  C) \( \frac{7}{7} \)  D) \( \frac{9}{9} \)

and

e) Write a fraction equal to 1 that has a denominator of 8.

f) Write a fraction equal to 1 that has a denominator of 7.

g) Write a fraction equal to 1 that has a denominator of 5.

h) Write a fraction equal to 1 that has a denominator of 9.

i) Write a fraction equal to 1 that has a denominator of 12.

j) Write a fraction equal to 1 that has a denominator of 4.

k) Write a fraction equal to 1 that has a denominator of 15.

l) Write a fraction equal to 1 that has a denominator of 3.

\( \frac{1}{1} = \frac{2}{2} = \frac{3}{3} = \frac{4}{4} = \frac{5}{5} = 1 \)
Skill 10.4 Finding the remaining fraction from a whole.

ONE WHOLE is made out of:

<table>
<thead>
<tr>
<th>two halves</th>
<th>three thirds</th>
<th>four quarters</th>
<th>five fifths</th>
<th>six sixths</th>
<th>seven sevenths</th>
<th>eight eighths</th>
<th>nine ninths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/2</td>
<td>3/3</td>
<td>4/4</td>
<td>5/5</td>
<td>6/6</td>
<td>7/7</td>
<td>8/8</td>
<td>9/9</td>
</tr>
</tbody>
</table>

- Subtract the fraction from the whole amount.

Q. If one third of the birthday cake was eaten, what fraction of the cake remains?

A. \( \text{one whole} - \text{one third} = \frac{2}{3} \)

Three thirds make the cake. If one third was eaten, there are two thirds left.

a) Lou has painted one half of the wall. What fraction of the wall is left to paint?

\( \text{one whole} - \text{one half} = \frac{1}{2} \)

b) Luke has spent one sixth of his pocket money. What fraction of the money is left?

c) Three quarters of the lesson is over. What fraction of the lesson remains?

d) If three fifths of the show is over, what fraction of the performance is left?

e) If two sevenths of the students are boys, what fraction of the students are girls?

f) If two thirds of the birthday cake was eaten, what fraction of the cake remains?

\( \text{one whole} - \text{two thirds} = \frac{1}{3} \)

g) Dad finished unpacking three eighths of the box. What fraction of the box is left to unpack?

h) Laura learnt seven tenths of the song on the piano. What fraction of the song is left to learn?

\( \text{one whole} - \text{seven tenths} = \frac{3}{10} \)
**Skill 10.5 Recognising mixed numbers.**

**Recognising mixed numbers**

To name the whole number:
- Count the fully shaded shapes.

To name the fraction:
- Count the shaded parts of the last shape.
- Count the total parts of the last shape.
- Write the shaded parts over the total parts.

**Reading mixed numbers on a number line**

- Count the number of spaces between two consecutive whole numbers. The number of spaces tells you the value of the denominator.

Example: If there are 6 spaces between the whole numbers, then each space equals \( \frac{1}{6} \).

There are five spaces between 5 and 6. Each space equals \( \frac{1}{5} \). The arrow points to \( 5 \frac{1}{5} \).

**Q. Name the mixed number shown by the arrow on the number line.**

**A. \( 5 \frac{1}{5} \)**

**a)** Name the mixed number represented by these shaded squares.

\[ \text{\begin{array}{c}
\text{1} \\
\text{1} \\
\text{1/2}
\end{array}} \]  \[ \begin{array}{c}
2 \frac{1}{2}
\end{array} \]

**b)** Name the mixed number represented by these shaded triangles.

\[ \text{\begin{array}{c}
\text{\triangle}
\end{array}} \]

**c)** Name the mixed number represented by these shaded rectangles.

\[ \text{\begin{array}{c}
\text{\text{rectangle}}
\end{array}} \]

**d)** Name the mixed number represented by these shaded hexagons.

\[ \text{\begin{array}{c}
\text{\text{hexagon}}
\end{array}} \]

**e)** Name the mixed number shown by the arrow on the number line.

**f)** Name the mixed number shown by the arrow on the number line.

**g)** Name the mixed number shown by the arrow on the number line.

**h)** Name the mixed number shown by the arrow on the number line.
Skill 10.6 Converting mixed numbers to improper fractions.

- Consider the mixed number as two bits: a whole number and a proper fraction.
- Shade whole shapes to match the whole number.
- Partially shade the last shape to match the fraction.

**Q.** Shade the circles to show that \(2\frac{1}{3} = \frac{7}{3}\)

- Shade two whole circles and a third of the remaining circle.
- In total, 7 thirds have been shaded. This shows that \(2\frac{1}{3} = \frac{7}{3}\)

**A.** Shade the circles to show that \(2\frac{2}{3} = \frac{8}{3}\)

\[
2\frac{2}{3} = 1 + 1 + \frac{1}{3} \\
\frac{7}{3} = \frac{3}{3} + \frac{3}{3} + \frac{1}{3}
\]

Shade two whole circles and a third of the remaining circle.
In total, 7 thirds have been shaded. This shows that \(2\frac{1}{3} = \frac{7}{3}\)

**a)** Shade the pentagons to show that \(3 = \frac{15}{5}\)

**b)** Shade the circles to show that \(2\frac{2}{3} = \frac{8}{3}\)

**c)** Shade the rectangles to show that \(4 = \frac{24}{6}\)

**d)** Shade the circles to show that \(3\frac{1}{6} = \frac{19}{6}\)

**e)** Shade the rectangles to show that \(1\frac{3}{5} = \frac{8}{5}\)

**f)** Shade the squares to show that \(3\frac{5}{8} = \frac{29}{8}\)

**g)** Shade the triangles to show that \(4\frac{2}{3} = \frac{14}{3}\)

**h)** Shade the rectangles to show that \(2\frac{5}{7} = \frac{19}{7}\)
Skill 10.7  Modelling addition and subtraction of fractions with the same denominators, by using parts of a whole.

To add two fractions by using parts of a whole
- Colour the fraction bar to represent the second fraction.
- Count the number of shaded parts.
- Write this number as the top number of the result.
- Count the total number of parts.
- Write this number as the bottom number of the result.

To subtract two fractions by using parts of a whole
- Count the total number of light shaded parts.
- Write this number as the top number of the result.
- Count the total number of parts.
- Write this number as the bottom number of the result.

Q. Complete the subtraction.

a) Shade to complete the sum.

\[
\frac{3}{8} + \frac{2}{8} = \frac{5}{8}
\]

b) Shade to complete the sum.

\[
\frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1
\]

c) Shade to complete the sum.

\[
\frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}
\]

d) Shade to complete the sum.

\[
\frac{7}{10} + \frac{1}{10} = \frac{8}{10} = \frac{4}{5}
\]

e) Complete the subtraction.

\[
\frac{5}{8} - \frac{2}{8} = \frac{3}{8}
\]

f) Complete the subtraction.

\[
\frac{6}{7} - \frac{1}{7} = \frac{5}{7}
\]

g) Complete the subtraction.

\[
\frac{7}{9} - \frac{2}{9} = \frac{5}{9}
\]

h) Complete the subtraction.

\[
\frac{6}{6} - \frac{5}{6} = \frac{1}{6}
\]
Skill 10.8 Comparing two fractions with the same denominators.

Using fraction bars
- Compare the size of the two shaded areas.
- Use < if the area showing the first fraction is smaller than the area showing the second fraction.
- Use = if the areas are equal.
- Use > if the area showing the first fraction is larger than the area showing the second fraction.

Hint: The fraction with the larger numerator is larger.

Q. Use <, = or > to make this true.

\[
\begin{array}{cccccc}
\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} \\
\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} \\
\end{array}
\]

A. \( \frac{4}{5} > \frac{3}{5} \) 4 is greater than 3.

a) Use <, = or > to make this true.

\[
\begin{array}{cccccc}
\frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\
\frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\
\end{array}
\]

b) Use <, = or > to make this true.

\[
\begin{array}{cccccc}
\frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} \\
\frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} \\
\end{array}
\]

c) Show with arrows the fractions \( \frac{4}{6} \) and \( \frac{1}{6} \) on the number line. Which fraction is greater?

\[
\begin{array}{cccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

d) Show with arrows the fractions \( \frac{7}{10} \) and \( \frac{5}{10} \) on the number line. Which fraction is greater?

\[
\begin{array}{cccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

e) Show with arrows the fractions \( \frac{5}{7} \) and \( \frac{1}{7} \) on the number line. Which fraction is greater?

\[
\begin{array}{cccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

f) Show with arrows the fractions \( \frac{3}{6} \) and \( \frac{5}{6} \) on the number line. Which fraction is greater?

\[
\begin{array}{cccccccc}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

Using number lines
- Compare the position of the fractions on the number line.
- Use < if the first fraction is to the left of the second fraction on the number line.
- Use = if the two fractions are at the same point on the number line.
- Use > if the first fraction is to the right of the second fraction on the number line.
Skill 10.9 Comparing two fractions with the same numerators.

- Compare the position of the fractions on the number line.
- Use < if the first fraction is to the left of the second fraction on the number line.
- Use = if the two fractions are at the same point on the number line.
- Use > if the first fraction is to the right of the second fraction on the number line.

Hint: The fraction with the smaller denominator is larger.

Q. Use <, = or > to make this true.

A. \( \frac{3}{7} < \frac{3}{4} \)

One seventh is smaller than one fourth. Therefore three sevenths is less than three fourths.

a) Use <, = or > to make this true.

b) Use <, = or > to make this true.

c) Use <, = or > to make this true.

d) Use <, = or > to make this true.

e) Use <, = or > to make this true.

f) Use <, = or > to make this true.
**Skill 10.10 Completing equivalent fractions (1).**

The fractions \(\frac{1}{2}, \frac{2}{4}, \frac{3}{6}\) and \(\frac{4}{8}\) are all equivalent because they represent the same amount: \(\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}\)

**To find an equivalent fraction by drawing a diagram**
- Draw two fraction bars one under the other.
- Divide each box into equal parts, as shown by the denominators.
- Shade both fraction bars to show the given fraction.
- Read the second fraction from the bottom fraction bar.

**To find an equivalent fraction from a given diagram**
- Read the shaded fractions from both fraction bars.
- Complete the missing number in one of the fractions.

---

**Q. Shade the bars to complete the equivalent fractions.**

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
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<td>(\frac{1}{8})</td>
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<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
</tr>
</tbody>
</table>

\(\frac{1}{4} = \frac{1}{8}\)

**A. \(\frac{1}{4} = \frac{2}{8}\)**

- 4 equal parts
- 8 equal parts

**a) Shade the bars to complete the equivalent fractions.**

<p>| | |</p>
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<thead>
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<tbody>
<tr>
<td>(\frac{1}{2})</td>
<td>(\frac{1}{2})</td>
</tr>
<tr>
<td>(\frac{1}{12})</td>
<td>(\frac{1}{12})</td>
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</table>

\(\frac{1}{2} = \frac{1}{12}\)

**b) Shade the bars to complete the equivalent fractions.**

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
</tr>
<tr>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
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</tbody>
</table>

\(\frac{2}{3} = \frac{2}{9}\)

**c) Shade the bars to complete the equivalent fractions.**

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
</tr>
<tr>
<td>(\frac{1}{12})</td>
<td>(\frac{1}{12})</td>
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</tbody>
</table>

\(\frac{1}{3} = \frac{1}{12}\)

**d) Shade the bars to complete the equivalent fractions.**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>(\frac{1}{2})</td>
<td>(\frac{1}{2})</td>
<td>(\frac{1}{2})</td>
</tr>
<tr>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
</tr>
</tbody>
</table>

\(\frac{1}{2} = \frac{1}{6}\)
Skill 10.10 Completing equivalent fractions (2).

**e)** Shade the bars to complete the equivalent fractions.

\[
\begin{array}{cccccccc}
\frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} & \frac{1}{10} \\
\frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} & \frac{1}{5} \\
\end{array}
\]

\[\frac{4}{10} = \frac{2}{5}\]

**f)** Shade the bars to complete the equivalent fractions.

\[
\begin{array}{cccccccccc}
\frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} & \frac{1}{9} \\
\frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\
\end{array}
\]

\[\frac{3}{9} = \frac{1}{3}\]

**g)** Shade the bars to complete the equivalent fractions.

\[
\begin{array}{ccccccccc}
\frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} & \frac{1}{15} \\
\frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\
\end{array}
\]

\[\frac{5}{15} = \frac{1}{3}\]

**h)** Shade the bars to complete the equivalent fractions.

\[
\begin{array}{ccccccccc}
\frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} & \frac{1}{8} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\end{array}
\]

\[\frac{6}{8} = \frac{3}{4}\]

**i)** Complete to form equivalent fractions:

\[\frac{4}{5} = \frac{16}{20}\]

**j)** Complete to form equivalent fractions:

\[\frac{2}{3} = \frac{6}{9}\]

**k)** Complete to form equivalent fractions:

\[\frac{1}{3} = \frac{9}{27}\]

**l)** Complete to form equivalent fractions:

\[\frac{2}{6} = \frac{1}{3}\]

**m)** Complete to form equivalent fractions:

\[\frac{1}{2} = \frac{8}{16}\]

**n)** Complete to form equivalent fractions:

\[\frac{4}{10} = \frac{5}{12}\]

**o)** Complete to form equivalent fractions:

\[\frac{2}{8} = \frac{1}{4}\]

**p)** Complete to form equivalent fractions:

\[\frac{4}{12} = \frac{1}{3}\]

**q)** Complete to form equivalent fractions:

\[\frac{6}{15} = \frac{5}{10}\]

**r)** Complete to form equivalent fractions:

\[\frac{2}{7} = \frac{8}{28}\]

**s)** Complete to form equivalent fractions:

\[\frac{2}{3} = \frac{18}{27}\]

**t)** Complete to form equivalent fractions:

\[\frac{3}{10} = \frac{9}{30}\]
Skill 10.11 Comparing fractions (1).

Using fraction bars
- Shade each fraction bar.
- Compare the shaded areas to decide which is the largest.
*Hint: The fraction with the largest shaded area is greater.*

Using number lines
- Mark the positions of the fractions on the number line.
- Write the fraction whose position is to the right of the other fraction on the number line.

Q. Shade the fraction bars to show \( \frac{2}{3} \) and \( \frac{5}{9} \). Which fraction is greater?

A. \( \frac{2}{3} \)

Shade two thirds of the first bar.
Shade five ninths of the second bar.
The fractions are close in value, however \( \frac{2}{3} \) is greater than \( \frac{5}{9} \).

a) Shade the fraction bars to show \( \frac{2}{3} \) and \( \frac{3}{4} \). Which fraction is greater?

b) Shade the fraction bars to show \( \frac{1}{4} \) and \( \frac{2}{5} \). Which fraction is greater?

c) Shade the fraction bars to show \( \frac{3}{5} \) and \( \frac{2}{3} \). Which fraction is smaller?

d) Shade the fraction bars to show \( \frac{3}{4} \) and \( \frac{7}{8} \). Which fraction is greater?

e) Shade the fraction bars to show \( \frac{4}{7} \) and \( \frac{5}{6} \). Which fraction is greater?

f) Shade the fraction bars to show \( \frac{5}{8} \) and \( \frac{4}{7} \). Which fraction is smaller?

g) Shade the fraction bars to show \( \frac{3}{5} \) and \( \frac{5}{9} \). Which fraction is greater?

h) Shade the fraction bars to show \( \frac{3}{4} \) and \( \frac{5}{6} \). Which fraction is smaller?
Skill 10.11 Comparing fractions (2).

i) Use $<, =$ or $>$ to make this statement true.
\[ \frac{3}{10} \quad \square \quad \frac{1}{3} \]

j) Use $<, =$ or $>$ to make this statement true.
\[ \frac{5}{7} \quad \square \quad \frac{6}{9} \]

k) Use $<, =$ or $>$ to make this statement true.
\[ \frac{2}{3} \quad \square \quad \frac{5}{8} \]

l) Use $<, =$ or $>$ to make this statement true.
\[ \frac{3}{4} \quad \square \quad \frac{7}{11} \]

m) Use $<, =$ or $>$ to make this statement true.
\[ \frac{1}{2} \quad \square \quad \frac{5}{9} \]

n) Use $<, =$ or $>$ to make this statement true.
\[ \frac{4}{8} \quad \square \quad \frac{3}{5} \]

o) Use $<, =$ or $>$ to make this statement true.
\[ \frac{3}{7} \quad \square \quad \frac{2}{6} \]

p) Use $<, =$ or $>$ to make this statement true.
\[ \frac{4}{5} \quad \square \quad \frac{5}{6} \]
Skill 10.12 Adding fractions with the same denominators.

- Add the numerators (top numbers of the fractions).
  Note: Do not change the denominators.

**Q.** \[\frac{1}{9} + \frac{3}{9} = \quad A. \quad \frac{4}{9}\]

Add the fractions:
One ninth plus three ninths is four ninths.
Add only the top numbers.

\[
\begin{array}{l}
\text{one ninth} + \text{three ninths} = \text{four ninths}
\end{array}
\]

\[
\frac{1}{9} + \frac{3}{9} = \frac{4}{9}
\]

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

<table>
<thead>
<tr>
<th>a) [\frac{1}{3} + \frac{1}{3} = ]</th>
<th>b) [\frac{2}{7} + \frac{3}{7} = ]</th>
<th>c) [\frac{2}{5} + \frac{2}{5} = ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[\text{Add only the top numbers.}]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| d) \[\frac{4}{9} + \frac{3}{9} = \] |
| e) \[\frac{1}{6} + \frac{4}{6} = \] |
| f) \[\frac{2}{4} + \frac{1}{4} = \] |

| g) \[\frac{1}{5} + \frac{3}{5} = \] |
| h) \[\frac{1}{8} + \frac{2}{8} = \] |
| i) \[\frac{2}{9} + \frac{2}{9} = \] |

| j) \[\frac{3}{8} + \frac{4}{8} = \] |
| k) \[\frac{3}{10} + \frac{4}{10} = \] |
| l) \[\frac{5}{12} + \frac{6}{12} = \] |

| m) \[\frac{1}{7} + \frac{5}{7} = \] |
| n) \[\frac{2}{9} + \frac{5}{9} = \] |
| o) \[\frac{1}{5} + \frac{1}{5} = \] |

| p) \[\frac{6}{13} + \frac{6}{13} = \] |
| q) \[\frac{7}{10} + \frac{2}{10} = \] |
| r) \[\frac{8}{11} + \frac{2}{11} = \] |
Skill 10.13 Subtracting fractions with the same denominators.

- Subtract the numerators (top numbers of the fractions).
  Note: Do not change the denominators.

<table>
<thead>
<tr>
<th>Q. ( \frac{4}{7} - \frac{2}{7} = )</th>
<th>A. ( \frac{2}{7} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract the fractions:</td>
<td>Four sevenths minus two sevenths is two sevenths.</td>
</tr>
<tr>
<td>Note: Do not change the denominators.</td>
<td>Subtract only the top numbers.</td>
</tr>
</tbody>
</table>

\[
\frac{4}{7} - \frac{2}{7} = \frac{2}{7}
\]

\[\text{four sevenths} - \text{two sevenths} = \text{two sevenths}\]

\[
\frac{4}{7} - \frac{2}{7} = \frac{2}{7}
\]

\[\text{four sevenths} - \text{two sevenths} = \text{two sevenths}\]

<table>
<thead>
<tr>
<th>a) ( \frac{2}{3} - \frac{1}{3} = )</th>
<th>b) ( \frac{4}{5} - \frac{1}{5} = )</th>
<th>c) ( \frac{6}{9} - \frac{2}{9} = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) ( \frac{6}{7} - \frac{3}{7} = )</td>
<td>e) ( \frac{5}{8} - \frac{2}{8} = )</td>
<td>f) ( \frac{3}{5} - \frac{2}{5} = )</td>
</tr>
<tr>
<td>g) ( \frac{9}{10} - \frac{6}{10} = )</td>
<td>h) ( \frac{8}{12} - \frac{3}{12} = )</td>
<td>i) ( \frac{7}{11} - \frac{2}{11} = )</td>
</tr>
<tr>
<td>j) ( \frac{11}{17} - \frac{1}{17} = )</td>
<td>k) ( \frac{8}{15} - \frac{1}{15} = )</td>
<td>l) ( \frac{9}{13} - \frac{5}{13} = )</td>
</tr>
<tr>
<td>m) ( \frac{4}{4} - \frac{1}{4} = )</td>
<td>n) ( \frac{8}{9} - \frac{2}{9} = )</td>
<td>o) ( \frac{5}{6} - \frac{2}{6} = )</td>
</tr>
</tbody>
</table>
Skill 10.14 Simplifying fractions.

- Decide if the fraction can be simplified.
- Divide both the numerator and the denominator by the same number.

**Hint:** If the numbers are both even then you can always start with dividing by 2.

**Example:**

\[
\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}
\]

- Continue dividing by any of the prime factors (2, 3, 5 ...) until the fraction can no longer be simplified.

<table>
<thead>
<tr>
<th>Q. Simplify: ( \frac{6}{10} )</th>
<th>A. ( \frac{6 \div 2}{10 \div 2} = \frac{3}{5} )</th>
<th>Both 6 and 10 are even numbers. They can be divided by 2. The fraction can be simplified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Simplify: ( \frac{12}{18} )</td>
<td>b) Simplify: ( \frac{4}{6} )</td>
<td>c) Simplify: ( \frac{9}{12} )</td>
</tr>
<tr>
<td>( \frac{12 \div 2}{18 \div 2} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3} )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Simplify: ( \frac{5}{10} )</td>
<td>e) Simplify: ( \frac{3}{9} )</td>
<td>f) Simplify: ( \frac{8}{14} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g) Simplify: ( \frac{10}{12} )</td>
<td>h) Simplify ( \frac{9}{15} )</td>
<td>i) Simplify: ( \frac{4}{20} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j) Simplify: ( \frac{15}{25} )</td>
<td>k) Simplify: ( \frac{10}{25} )</td>
<td>l) Simplify: ( \frac{20}{70} )</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m) Which of the following fractions <strong>cannot</strong> be simplified?</td>
<td>n) Which of the following fractions <strong>cannot</strong> be simplified?</td>
<td>o) Which of the following fractions <strong>cannot</strong> be simplified?</td>
</tr>
<tr>
<td>A) ( \frac{2}{15} ) B) ( \frac{3}{15} ) C) ( \frac{4}{15} ) D) ( \frac{5}{15} ) and</td>
<td>A) ( \frac{4}{10} ) B) ( \frac{6}{10} ) C) ( \frac{7}{10} ) D) ( \frac{9}{10} ) and</td>
<td>A) ( \frac{6}{18} ) B) ( \frac{7}{18} ) C) ( \frac{9}{18} ) D) ( \frac{11}{18} ) and</td>
</tr>
</tbody>
</table>
Finding a fraction of a whole number.

First find one fraction of the number by dividing by the denominator.
Then multiply the number of fractions you need by the result.

Example: Three fifths of 10?
First find one fifth of 10 by dividing 10 by 5. $10 \div 5 = 2$
Then find three fifths of 10 by multiplying 2 by 3. $2 \times 3 = 6$
So three fifths of 10 is 6.

Q. Eric kicked two thirds of his team’s 12 goals. How many goals did he kick?

A. 8
Find one third of 12.
Divide 12 by 3. $12 \div 3 = 4$
Find two thirds of 12.
Multiplying 2 by 4. $2 \times 4 = 8$

a) Three fourths of the 28 students in the class are boys. How many boys are in the class?

one fourth of 28 = $28 \div 4 = 7$

three fourths of 28 = $3 \times 7 = 21$

b) Two fifths of the 50 children at the nursery had the flu. How many children had the flu?

one fifth of 50 = ...
two fifths of 50 = ...

c) Ian scored five eighths of the 40 points on the test. How many points did he score?

one eighth of 40 = ...

d) Five sixths of the 30 horses in the race jumped over the first hurdle. How many horses jumped the first hurdle?

e) Of the 24 students in a class, one third are chosen for the school play. How many students are chosen for the play?

f) Of the 100 cakes at a party, seven tenths were eaten in the first hour. How many cakes were eaten in the first hour?

g) Of the 28 students in the class, two sevenths did not go to camp. How many students did not go to camp?

h) Gina has finished reading five ninths of the 360 pages of her book. How many pages did Gina finish reading?
Skill 10.16  Adding mixed numbers with the same denominators.

- Add the whole numbers first.
- Then add the numerators (top numbers of the fractions).
  - Note: Do not add the denominators (bottom numbers of the fractions).
- Write the result as a mixed number.

Q. \(\frac{1}{4} + \frac{2}{4} = \)  

A. \(3 \frac{3}{4}\)

Add the whole numbers first:
\[1 + 2 = 3\]
Add the fractions:
One fourth plus two fourths is three fourths.

\[
\begin{array}{cccc}
\text{\(\frac{1}{4}\)} & + & \text{\(\frac{2}{4}\)} & = \\
\hline
\text{\(\frac{3}{4}\)} & & & \\
\end{array}
\]

a) \(\frac{1}{10} + \frac{3}{10} = \)  

b) \(\frac{2}{7} + \frac{3}{7} = \)  

c) \(\frac{4}{8} + \frac{5}{8} = \)

d) \(\frac{6}{10} + \frac{2}{10} = \)

e) \(\frac{3}{5} + \frac{1}{5} = \)

f) \(\frac{4}{6} + \frac{3}{6} = \)

g) \(\frac{2}{9} + \frac{4}{9} = \)

h) \(\frac{5}{7} + \frac{3}{7} = \)

i) \(\frac{2}{11} + \frac{3}{11} = \)

ej) \(\frac{5}{4} + \frac{1}{4} = \)

k) \(\frac{2}{9} + \frac{4}{9} = \)

l) \(\frac{5}{7} + \frac{3}{7} = \)

m) \(\frac{1}{8} + \frac{3}{8} = \)

n) \(\frac{8}{11} + \frac{2}{11} = \)

o) \(\frac{2}{6} + \frac{4}{6} = \)
Skill 10.17 Subtracting mixed numbers.

- Subtract the whole numbers first.
  
  Hint: You may need to convert 1 whole number to an equivalent fraction.

  Example: $1 = \frac{5}{5}$ one whole equals five fifths

- Then subtract the numerators (top numbers of the fractions).
  
  Note: Do not subtract the denominators (bottom numbers of the fractions).

Q. $3\frac{3}{6} - 1\frac{2}{6} = \text{A. } 2\frac{1}{6}$

Subtract the whole numbers first:

$3 - 1 = 2$

Subtract the fractions:

Three sixths take away two sixths is one sixth.

\[
\begin{array}{c}
3\frac{3}{6} \\
- 1\frac{2}{6} \\
\hline
2\frac{1}{6}
\end{array}
\]

a) $3\frac{7}{10} - 1\frac{3}{10} =$

b) $5\frac{6}{7} - 2\frac{1}{7} =$

c) $4\frac{5}{8} - 1\frac{4}{8} =$

d) $6\frac{9}{10} - 3\frac{2}{10} =$

e) $7\frac{3}{5} - 5\frac{1}{5} =$

f) $3\frac{5}{6} - 2\frac{3}{6} =$

g) $8\frac{7}{9} - 6\frac{2}{9} =$

h) $6\frac{3}{7} - 2\frac{2}{7} =$

i) $5\frac{10}{11} - 3\frac{6}{11} =$

j) $5\frac{3}{4} - 4\frac{2}{4} =$

k) $4\frac{8}{9} - 2\frac{6}{9} =$

l) $7\frac{5}{7} - 3\frac{2}{7} =$

m) $3\frac{7}{8} - 1\frac{2}{8} =$

n) $5\frac{9}{11} - 2\frac{4}{11} =$

o) $4\frac{4}{6} - 3\frac{1}{6} =$
11. [Decimals / Fractions]

Skill 11.1 Finding equivalent decimal place values.

To change from smaller units to larger units
- Divide by the conversion factor (because you need less).
  
  Example: To change 40 hundredths to tenths ÷ by 10

To change from larger units to smaller units
- Multiply by the conversion factor (because you need more).
  
  Example: To change 4 units to tenths × by 10

Hint: Conversion Factors
1 unit = 10 tenths = 100 hundredths
1 tenth = 10 hundredths

Q. four = ______ hundredths

A. $4 \times 100 = 400$

Units are larger than hundredths so you need to multiply.
$4 \times 100 = 400$

a) 8 tenths = 80 hundredths

b) one = ______ tenths

c) one = ______ hundredths

d) six = ______ tenths

e) seven = ______ tenths

f) three = ______ hundredths

g) 2 tenths = ______ hundredths

h) 4 tenths = ______ hundredths

i) five = ______ tenths

j) six = ______ hundredths
Skill 11.2 Expressing tenths and hundredths as fractions.

- Write the number of tenths as the number out of 10.
- Write the number of hundredths as the number out of 100.
- Write the number out of 10 or 100 as the top of the fraction (numerator).

### Q.

<table>
<thead>
<tr>
<th>75 hundredths =</th>
<th>A. 75 out of 100 = $\frac{75}{100}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\underline{\square}$ out of 100 = $\underline{\frac{75}{100}}$</td>
<td></td>
</tr>
</tbody>
</table>

75 hundredths is the same as 75 out of 100 or $\frac{75}{100}$

### a) 6 tenths =

- **b)** 3 tenths =
- **c)** 9 tenths =

### d) 5 tenths =

- **e)** 1 tenth =
- **f)** 7 tenths =

### g) 38 hundredths =

- **h)** 12 hundredths =
- **i)** 6 hundredths =

### j) 19 hundredths =

- **k)** 9 hundredths =
- **l)** 76 hundredths =

### m) 1 hundredth =

- **n)** 47 hundredths =
- **o)** 29 hundredths =
Skill 11.3 Writing a fraction as a decimal number.

When the denominator is a power of 10:
- Say the fraction out loud using tenths or hundredths.
- Write the last digit of the numerator in the place spoken of in the denominator.
- Fill in the numerator working backwards to the decimal point.
- Use zeros as place holders where necessary.

Examples:

\[
\frac{7}{10} = 0.7
\]

\[
\frac{7}{100} = 0.07
\]

Hint: The number of zeros in the denominator shows the number of digits after the decimal point.

Q. Write \( \frac{15}{100} \) as a decimal.  
A. 0.15  

Read as: fifteen hundredths

a) Which of these decimal numbers equals \( \frac{5}{10} \)?  
A) 1.5  B) 1.05  C) 0.5

b) Which of these decimal numbers equals \( \frac{2}{10} \)?  
A) 2  B) 0.2  C) 2.0

c) Which of these decimal numbers equals \( \frac{35}{100} \)?  
A) 3.05  B) 3.5  C) 0.35

d) Write \( \frac{6}{10} \) as a decimal.

e) Write \( \frac{1}{10} \) as a decimal.

f) Write \( \frac{8}{100} \) as a decimal.

g) Write \( \frac{27}{100} \) as a decimal.

h) Write \( \frac{50}{100} \) as a decimal.

i) Write \( \frac{147}{1000} \) as a decimal.

j) Complete the table.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{7}{10} )</td>
<td></td>
</tr>
</tbody>
</table>

k) Complete the table.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \frac{13}{100} )</td>
</tr>
</tbody>
</table>

l) Complete the table.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \frac{403}{1000} )</td>
</tr>
</tbody>
</table>
Skill 11.4 Writing a decimal number as a fraction.

- From left to right (ignoring zeros and the decimal point) write the digits as the numerator.
- Use the place value of the last digit of the decimal number to determine the size of the denominator. (see skill 11.3, page 75)

Q. Write 0.19 as a fraction.  
A. $0.19 = \frac{19}{100}$  
Write 19 at the top of the fraction.  
The nine is in the hundredths place.  
Write 100ths as the denominator.  
Said as: $\frac{19}{100}$ “nineteen hundredths”

a) Write 0.5 as a fraction.  
b) Write 0.9 as a fraction.  
c) Write 0.7 as a fraction.  
d) Which of these fractions equals 0.8?  
A) $\frac{8}{10}$ B) $\frac{18}{100}$ C) $\frac{80}{10}$  
eight tenths

e) Which of these fractions equals 0.13?  
A) $\frac{13}{100}$ B) $\frac{3}{10}$ C) $\frac{31}{100}$

f) Which of these fractions equals 0.23?  
A) $\frac{3}{10}$ B) $\frac{2}{100}$ C) $\frac{23}{100}$

g) Which of these fractions equals 0.7?  
A) $\frac{70}{10}$ B) $\frac{700}{100}$ C) $\frac{7}{10}$

h) Which of these fractions equals 0.45?  
A) $\frac{45}{100}$ B) $\frac{4}{10}$ C) $\frac{54}{100}$

i) Which of these fractions equals 0.05?  
A) $\frac{5}{10}$ B) $\frac{5}{100}$ C) $\frac{50}{100}$

j) Write 0.3 as a fraction.  
k) Write 0.07 as a fraction.  
l) Write 0.41 as a fraction.

m) Write 0.17 as a fraction.  
n) Write 0.006 as a fraction.
o) Write 0.057 as a fraction.

p) Complete the table.  

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.43</td>
<td></td>
</tr>
</tbody>
</table>

q) Complete the table.  

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>

r) Complete the table.  

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.052</td>
<td></td>
</tr>
</tbody>
</table>
Skill 11.5 Converting between fractions and decimals using a number line.

- Start from the left to complete the number line.
- Use the place value of the last digit of the decimal number to determine the size of the denominator of the fraction above. (see skill 11.3, page 75)

Q. Complete the number line.

a) Complete the number line.

b) Complete the number line.

c) Complete the number line.

d) Complete the number line.

e) Complete the number line.

f) Complete the number line.

g) Complete the number line.

h) Complete the number line.
Skill 11.6 Writing a mixed number as a decimal number.

When the denominator is a power of 10:
- Write the whole number first.
- Write the decimal point.
- Write the fraction as a decimal number.
(see skill 11.3, page 75)

Example:

<table>
<thead>
<tr>
<th>units</th>
<th>tenths</th>
<th>hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

Write the 8 in the hundredths place.

- Decimal point
- Work backwards filling in the 4.

Hint: The number of zeros in the denominator shows the number of digits after the decimal point.

\[
\frac{16}{1000} = 0.016
\]

When the denominator is not a power of 10:
- Divide the numerator by the denominator.

\[
\frac{13}{5} = 13 \div 5 = 2.6
\]

Hint: \(13 = 13.0\)

<table>
<thead>
<tr>
<th>Q. Write the mixed number (8 \frac{24}{100}) as a decimal.</th>
<th>A. 8.24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read as: Eight and twenty-four hundredths</td>
<td></td>
</tr>
</tbody>
</table>

a) Write the mixed number \(5 \frac{7}{10}\) as a decimal.
   \(5 \text{ and } 7 \text{ tenths} = 5.7\)

b) Write the mixed number \(2 \frac{46}{100}\) as a decimal.

\[
2.46
\]

c) Write the mixed number \(3 \frac{9}{10}\) as a decimal.

\[
3.9
\]

d) Write the mixed number \(3 \frac{2}{100}\) as a decimal.

\[
3.02
\]

e) Write the mixed number \(6 \frac{3}{10}\) as a decimal.

\[
6.3
\]

f) Write the mixed number \(3 \frac{1}{2}\) as a decimal.

\[
3.5
\]

g) Write the mixed number \(2 \frac{1}{5}\) as a decimal.

\[
2.2
\]

h) Write the mixed number \(4 \frac{1}{2}\) as a decimal.

\[
4.5
\]

i) Write the mixed number \(3 \frac{3}{5}\) as a decimal.

\[
3.6
\]
Skill 11.7  Converting fractions in word form to decimals.

- Use 1 x 10 grids to visualise whole numbers and tenths.
  
  A half = 5 tenths = 0.5

- Use 10 x 10 grids to visualise whole numbers and hundredths.
  
  A quarter = 25 hundredths = 0.25

Q. Write as a decimal:
  three quarters.

A.  
  three quarters =
  = 75 hundredths
  = 0.75

a) Write as a decimal:
  one and a half

  one & 5 tenths =

  ..............................................................

b) Write as a decimal:
  three and a half

  ..............................................................

c) Write as a decimal:
  eight and a half

  ..............................................................

d) Write as a decimal:
  one quarter

  ..............................................................

e) Write as a decimal:
  four and a quarter

  ..............................................................

f) Write as a decimal:
  seven and a quarter

  ..............................................................

g) Write as a decimal:
  five and three quarters

  ..............................................................

h) Write as a decimal:
  one and three quarters

  ..............................................................

i) Write as a decimal:
  six and three quarters

  ..............................................................
Skill 11.8 Writing an improper fraction as a decimal.

When the denominator is a power of 10:
- Divide the numerator by 10, 100 or 1000 by moving the decimal point the same number of places to the left as there are zeros.

Examples:
\[ \frac{16}{10} = 1.6 \]
\[ \frac{160}{100} = 1.6 \]

Hints: Fractions are just divisions. There is a decimal point and zeros which are not written, at the end of any whole number. The number does not change: 16 = 16.0

Example: \( \frac{16}{10} = 16 \div 10 \)
\[ = 16.0 \div 10 \]
\[ = 1.6 \]

When the denominator is not a power of 10:
- Multiply both the numerator and denominator by the same number to make the denominator a power of 10.

Example:
\[ \frac{74}{50} = \frac{74 \times 2}{50 \times 2} = \frac{148}{100} \]

- Then divide by moving the decimal point.

Example: \( \frac{148}{100} = 148 \div 100 \)
\[ = 14.8 \div 100 \]
\[ = 1.48 \]

Q. Write the improper fraction \( \frac{12}{5} \) as a decimal.

A. \( \frac{12}{5} = \frac{24}{10} \)
\[ = 24.0 \div 10 \]
\[ = 24.0 \div 10 \]
\[ = 2.4 \]

Multiply the denominator and the numerator by 2 to make the denominator a power of 10.

a) Write the improper fraction \( \frac{27}{10} \) as a decimal.

\[ \frac{27}{10} \]
\[ = 2.7 \]

b) Write the improper fraction \( \frac{15}{10} \) as a decimal.

\[ \frac{15}{10} \]
\[ = 1.5 \]

c) Write the improper fraction \( \frac{38}{10} \) as a decimal.

\[ \frac{38}{10} \]
\[ = 3.8 \]

d) Write the improper fraction \( \frac{136}{100} \) as a decimal.

\[ \frac{136}{100} \]
\[ = 1.36 \]

e) Write the improper fraction \( \frac{245}{100} \) as a decimal.

\[ \frac{245}{100} \]
\[ = 2.45 \]

f) Write the improper fraction \( \frac{8}{5} \) as a decimal.

\[ \frac{8}{5} \]
\[ = 1.6 \]

g) Write the improper fraction \( \frac{11}{2} \) as a decimal.

\[ \frac{11}{2} \]
\[ = 5.5 \]

h) Write the improper fraction \( \frac{9}{2} \) as a decimal.

\[ \frac{9}{2} \]
\[ = 4.5 \]

i) Write the improper fraction \( \frac{9}{5} \) as a decimal.

\[ \frac{9}{5} \]
\[ = 1.8 \]
Skill 11.9 Writing a decimal number as a fraction in simplest form.

- Write the decimal as a fraction with a power of 10 as the denominator.
- Decide if the fraction can be simplified.
  If both numbers, top (numerator) and bottom (denominator), can be divided by the same number then the fraction can be simplified.
  Hint: If the numbers are both even then you can start with dividing by 2.

\[ \frac{6}{10} \rightarrow \frac{2}{5} \]

\[ \frac{6}{10} = \frac{3}{5} \]

- Divide both the numerator and the denominator by the same number.

Q. Write 0.02 as a fraction in simplest form.

A. \[ \frac{2}{100} = \frac{1}{50} \]

Write 0.02 as a fraction over 100.
Divide the numerator and the denominator by 2.

a) Write 0.4 as a fraction in simplest form.

\[ \frac{4}{10} = \frac{2}{5} \]

b) Write 0.75 as a fraction in simplest form.

\[ \frac{75}{100} = \frac{3}{4} \]

c) Write 0.8 as a fraction in simplest form.

\[ \frac{8}{10} = \frac{4}{5} \]

d) Write 0.2 as a fraction in simplest form.

\[ \frac{2}{10} = \frac{1}{5} \]

e) Write 0.15 as a fraction in simplest form.

\[ \frac{15}{100} = \frac{3}{20} \]

f) Write 0.36 as a fraction in simplest form.

\[ \frac{36}{100} = \frac{9}{25} \]

g) Write 0.5 as a fraction in simplest form.

\[ \frac{5}{10} = \frac{1}{2} \]

h) Write 0.45 as a fraction in simplest form.

\[ \frac{45}{100} = \frac{9}{20} \]

i) Write 0.06 as a fraction in simplest form.

\[ \frac{6}{100} = \frac{3}{50} \]

j) Write 0.62 as a fraction in simplest form.

\[ \frac{62}{100} = \frac{31}{50} \]

k) Write 0.88 as a fraction in simplest form.

\[ \frac{88}{100} = \frac{22}{25} \]

l) Write 0.12 as a fraction in simplest form.

\[ \frac{12}{100} = \frac{3}{25} \]
Skill 11.10 Converting between fractions, decimals and percentages by using diagrams (1).

**Fraction as Percentage**
- Find the equivalent fraction which has a denominator of 100.
- **Hint:** Percent means “fraction of one hundred”.
- Example: One quarter = 25 out of 100
  \[ \frac{25}{100} = 25\% \]

**Decimal as percentage**
- Move the decimal point 2 places to the right.
- Use zeros as place holders to write the decimal.
- Add the percentage sign.
- Example: 0.5 = 0.5000 = 50%

**Percentage as Fraction**
- **Hint:** Percent means “fraction of one hundred”.
- Examples: 50% = 50 out of 100
  \[ \frac{50}{100} = \frac{1}{2} \]
- Examples: 75% = 75 out of 100
  \[ \frac{75}{100} = \frac{3}{4} \]

**Percentage as decimal**
- Remove the percent sign.
- Place the decimal point after the number.
- Move the decimal point 2 places to the left.
- Use zeros as place holders to write the decimal.
- Example: 9% = 0.09

Q. Write 50% in decimal form.

A. 50%
   - Remove the % sign.
   - Place the decimal point and add zeros either side of the number.
   - Move the decimal point 2 places to the left.
   - = 0.5

a) One half is what percentage?
   - 50%
b) Three quarters is what percentage?
   - %
c) Six tenths is what percentage?
   - %
d) Nine tenths is what percentage?
Skill 11.10 Converting between fractions, decimals and percentages by using diagrams (1).

e) Write 10% in decimal form.
\[ \frac{1}{10} = \]

f) Write 25% in decimal form.

\[ \frac{1}{4} = \]

g) Write 75% in decimal form.

\[ \frac{3}{4} = \]

h) Write 15% in decimal form.

\[ \frac{3}{20} = \]

i) Write 0.4 as a percentage.

\[ 40\% = \]

j) Write 0.6 as a percentage.

\[ 60\% = \]

k) Write 0.25 as a percentage.

\[ 25\% = \]

l) Write 0.45 as a percentage.

\[ 45\% = \]

m) Write 25% as a fraction.

\[ \frac{1}{4} = \]

n) Write 75% as a fraction.

\[ \frac{3}{4} = \]

o) Write 50% as a fraction.

\[ \frac{1}{2} = \]

p) Write 30% as a fraction.

\[ \frac{3}{10} = \]

q) Write 10% as a fraction.

\[ \frac{1}{10} = \]

r) Write 20% as a fraction.

\[ \frac{1}{5} = \]
**Skill 11.11 Converting between decimals, fractions and percentages.**

- Convert between decimals, fractions and percentages.
  (see skill 11.9, page 81 and skill 11.10 page 82)

![Diagram showing conversions between decimals, fractions, and percentages]

---

**Q. Complete the table:**

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>$\frac{50}{100}$ OR $\frac{1}{2}$</td>
<td>50%</td>
</tr>
<tr>
<td>0.85</td>
<td></td>
<td>85%</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td>20%</td>
</tr>
</tbody>
</table>

**A.**

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{6}{10}$</td>
<td>$0.6$</td>
<td>60%</td>
</tr>
<tr>
<td>$\frac{6}{10}$</td>
<td>$\frac{60}{100}$</td>
<td>60%</td>
</tr>
<tr>
<td>$\frac{0.5}{1}$</td>
<td></td>
<td>50%</td>
</tr>
<tr>
<td>$\frac{0.85}{1}$</td>
<td></td>
<td>85%</td>
</tr>
<tr>
<td>$\frac{0.2}{1}$</td>
<td></td>
<td>20%</td>
</tr>
</tbody>
</table>

---

**a)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>$\frac{50}{100}$ OR $\frac{1}{2}$</td>
<td>50%</td>
</tr>
</tbody>
</table>

**b)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.45</td>
<td>$\frac{45}{100}$</td>
<td>90%</td>
</tr>
</tbody>
</table>

**c)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{51}{100}$</td>
<td></td>
<td>51%</td>
</tr>
</tbody>
</table>

**d)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.85</td>
<td></td>
<td>85%</td>
</tr>
</tbody>
</table>

**e)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td></td>
<td>90%</td>
</tr>
</tbody>
</table>

**f)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{23}{100}$</td>
<td></td>
<td>23%</td>
</tr>
</tbody>
</table>

**g)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td></td>
<td>20%</td>
</tr>
</tbody>
</table>

**h)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{75}{100}$ OR $\frac{3}{4}$</td>
<td></td>
<td>75%</td>
</tr>
</tbody>
</table>

**i)** Complete the table:

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{0.8}{1}$ OR $\frac{4}{5}$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. [Place Value]

Skill 12.1 Understanding the place value of a digit in a number (1).

- Compare the position of the digit to the position of the decimal point.
  Hint: There is a decimal point which is not written, at the end of any whole number.

<table>
<thead>
<tr>
<th>Place value</th>
<th>thousands</th>
<th>hundreds</th>
<th>tens</th>
<th>units</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>25</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Q. In the number 5893 which of the digits 5, 8, 9 or 3 lies in the hundreds column?

A. 8

The digit three places to the left of the decimal point is in the hundreds place. So 8 is in the hundreds column.

a) Name the place of the underlined digit in the number 798. [Hint: Is it units, tens or hundreds?]

b) Name the place of the underlined digit in the number 284. [Hint: Is it units, tens or hundreds?]

c) Name the place of the underlined digit in the number 497. [Hint: Is it units, tens or hundreds?]

d) Name the place of the underlined digit in the number 925. [Hint: Is it units, tens or hundreds?]

e) In the number 210 which of the digits 2, 1 or 0 lies in the tens column?

f) In the number 3472 which of the digits 3, 4, 7 or 2 lies in the hundreds column?

g) In the number 2006 which of the digits 2, 0 or 6 lies in the thousands column?

h) In the number 2301 which of the digits 2, 3, 0 or 1 lies in the units column?

i) In the number 3447 which of the digits 3, 4 or 7 lies in the thousands column?

j) In the number 564.2 which of the digits 5, 6, 4 or 2 lies in the units column?

k) In the number 7210 which of the digits 7, 2, 1 or 0 lies in the hundreds column?

l) In the number 15.26 which of the digits 1, 5, 2 or 6 lies in the hundredths column?
**Skill 12.1** Understanding the place value of a digit in a number (2).

**m)** In the number 5491 which of the digits 5, 4, 9 or 1 lies in the tens column?

**n)** In the number 45.73 which of the digits 4, 5, 7 or 3 lies in the tenths column?

**o)** In the number 42,006 which of the digits 4, 2, 0 or 6 lies in the thousands column?

**p)** In the number 21.80 which of the digits 2, 1, 8 or 0 lies in the units column?

**q)** In the number 1.025 which of the digits 1, 0, 2 or 5 lies in the hundredths column?

**r)** In the number 78.92 which of the digits 7, 8, 9 or 2 lies in the tenths column?

**s)** Which digit in 6578 is in the same place as the 1 in 415?

**t)** Which digit in 4087 is in the same place as the 1 in 165?

**u)** Which digit in 12,376 is in the same place as the 4 in 348?

**v)** Which digit in 38.25 is in the same place as the 4 in 1.47?

**w)** Which digit in 5937 is in the same place as the 2 in 208?

**x)** Which digit in 456.2 is in the same place as the 6 in 63.79?

**y)** Which digit in 109.2 is in the same place as the 6 in 0.61?

**z)** Which digit in 3.457 is in the same place as the 2 in 41.32?
Skill 12.2  Finding the value of a digit in a number.

- Compare the position of the digit to that of the decimal point.

  Hint: There is a decimal point which is not written, at the end of any whole number.

<table>
<thead>
<tr>
<th>Place value</th>
<th>thousands</th>
<th>hundreds</th>
<th>tens</th>
<th>units</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>2000</td>
<td>600</td>
<td>70</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Q. In which number does the digit 3 have a greater value?

A) 97 300
B) 13 900

A. B

Check the position of the digit 3.
In 97 300 the 3 is in the hundreds place.
In 13 900 the 3 is in the thousands place.
So 3 has greater value in 13 900.

a) What is the value of the digit 5 in the number 4567?  

b) What is the value of the digit 7 in the number 271?

c) What is the value of the digit 6 in the number 39.6?

d) What is the value of the digit 3 in the number 1.032?

e) In which number does the digit 8 have a smaller value?

A) 987
B) 823

f) In which number does the digit 3 have a greater value?

A) 6713
B) 439

g) In which number does the digit 5 have a greater value?

A) 529
B) 3657

h) In which number does the digit 4 have a smaller value?

A) 420
B) 6247

i) In which number does the digit 7 have a greater value?

A) 14 700
B) 27 400

j) In which number does the digit 3 have a smaller value?

A) 820.37
B) 4.138
Skill 12.3  Comparing whole numbers.

- Compare the size of the digits in the same place, one at a time.
- Work from left to right across each number.

<table>
<thead>
<tr>
<th>Q. Which number is greater?</th>
<th>A. 1364</th>
</tr>
</thead>
<tbody>
<tr>
<td>1346 or 1364?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Thousands:**
  - Both numbers have the digit 1 in the thousands place.

- **Hundreds:**
  - Both numbers have the digit 3 in the hundreds place.

- **Tens:**
  - In the tens place 6 is greater than 4.
  - So 1364 is greater than 1346.

| a) 535 > 553                  | false   |
| True or false?                |         |
| c) 677 < 766                  |         |
| True or false?                |         |
| e) 4014 > 4104                |         |
| True or false?                |         |
| g) 59054 < 59504              |         |
| True or false?                |         |
| i) Which number is smaller?   |         |
| 232 or 223                    |         |
| j) Which number is smaller?   |         |
| 125 or 152                    |         |
| k) Which number is greater?   |         |
| 788 or 778                    |         |
| l) Which number is smaller?   |         |
| 7557 or 7575                  |         |
| m) Which number is greater?   |         |
| 2113 or 2131                  |         |
| n) Which number is smaller?   |         |
| 7437 or 7374                  |         |
| o) Which number is smaller?   |         |
| 13094 or 13904                |         |
| p) Which number is greater?   |         |
| 40454 or 40554                |         |
### Skill 12.4  Ordering whole numbers.

- Compare the size of the digits in the same place, one at a time.
- Work from left to right across each number.

#### Q. Place in order from largest to smallest:

- 300, 298, 308, 302, 309

#### A. 309, 308, 302, 300, 298

- **Hundreds:**
  - 300 is larger than 200.
- **Tens:**
  - All four numbers starting with 3 have zero in the tens place.
- **Units:**
  - The four numbers starting with 3 have the digits 0, 8, 2 and 9 in the units place. Ordering from largest to smallest gives 9, 8, 2, and 0.

  So far in order we have 309, 308, 302, 300. Then place 298.

#### a) Place in order from largest to smallest:

- 25, 75, 22, 72, 57

  **Answer:** 75, 72, 57, 25, 22

#### b) Place in order from smallest to largest:

- 78, 87, 83, 37, 77, 38

#### c) Place in order from largest to smallest:

- 12, 42, 24, 14, 22, 44

#### d) Place in order from smallest to largest:

- 46, 54, 34, 55, 45, 35

#### e) Place in order from largest to smallest:

- 768, 786, 776, 787, 777

#### f) Place in order from smallest to largest:

- 456, 546, 465, 564, 556

#### g) Place in order from largest to smallest:

- 3001, 3020, 3030, 2300

#### h) Place in order from smallest to largest:

- 1011, 1101, 1001, 1111

#### i) Place in order from largest to smallest:

- 9015, 9501, 9105, 9510

#### j) Place in order from smallest to largest:

- 4606, 4066, 6046, 4640
Skill 12.5 Writing decimal numbers illustrated by an abacus showing place values.

- Count the discs in each column.
- Put the decimal place in position.
- Write the digits in the appropriate places to form a number.

Q. Write the decimal number.

A. 4.26

a) Write the decimal number.

b) Write the decimal number.

c) Write the decimal number.

d) Write the decimal number.

e) Write the decimal number.

f) Write the decimal number.

g) Write the decimal number.

h) Write the decimal number.

i) Write the decimal number.

j) Write the decimal number.
Skill 12.6  Comparing decimal numbers.

- Line up the decimal numbers at their decimal points.
- Compare digits in their same place values, starting from the left.

Q. Which number is greater?  
4.30 or 4.03

A. 4.30

Units:  
They are both 4.

Tenths:  
3 is greater than 0. OR 3 > 0

Therefore 4.30 is greater than 4.03

Q. 3.6 < 3.07  
True or false?

A. False

Remember ‘<’ means ‘less than’.  
Units:  
They are both 3.

Tenths:  
6 is greater than 0. OR 6 > 0

Therefore 3.6 is not less than 3.07 and the statement is false.

---

a) Which number is greater?  
6.38 or 6.3

b) Which number is smaller?  
15.4 or 15.42

c) Which number is greater?  
2.2 or 2.22

d) Which number is smaller?  
13.88 or 13.78

e) Which number is greater?  
12.23 or 12.32

f) Which number is smaller?  
1.7 or 1.07

g) Which number is smaller?  
13.094 or 13.9

h) Which number is greater?  
0.859 or 0.895

i) 4.2 > 4.22  
True or false?

j) 1.5 < 1.05  
True or false?

k) 389.9 < 400  
True or false?

l) 24.3 > 24.33  
True or false?

m) 3109.24 < 3109.42  
True or false?

n) 0.606 > 0.66  
True or false?
Skill 12.7  Ordering decimal numbers.

- Line up the decimal numbers at their decimal points.
- Compare digits in their same place values, starting from the left.

Q. Place in order from largest to smallest:
9.8, 8.9, 8.8, 9, 9.9

A. 9.9, 9.8, 9, 8.9, 8.8

Units:
9 is larger than 8.

Tenths:
When the number is whole like the 9
then think of it as 9.0
The numbers starting with 9 have 8, 0
and 9 in the tenths place. Ordering
from largest to smallest, gives 9, 8, 0.
So far in order we have 9.9, 9.8, 9, then
place 8.9 and 8.8

a) Place in order from smallest to largest:
3.5, 3.3, 5.5, 5.3, 3

b) Place in order from largest to smallest:
1.2, 2.2, 1.1, 2.1, 2.01

c) Place in order from smallest to largest:
6.7, 7.7, 6.6, 6, 7.6

d) Place in order from largest to smallest:
4.9, 9.4, 9, 4.4, 9.9

e) Place in order from largest to smallest:
42.0, 40.2, 42.4, 40.4, 44.2

f) Place in order from smallest to largest:
5.55, 5.05, 5.5, 5, 0.55

3, 3.3, 3.5, 5.3, 5.5

3, 3.3, 3.5, 5.3, 5.5

3.41, 4, 3.43, 3.04, 4.13

2.63, 3.62, 6.32, 3.6, 2.62

6.8, 8.06, 6.08, 8, 8.6

7.44, 4.74, 7.47, 4.77, 7.77

j) Place in order from smallest to largest:
7.44, 4.74, 7.47, 4.77, 7.77

Units:
9 is larger than 8.

Tenths:
When the number is whole like the 9
then think of it as 9.0
The numbers starting with 9 have 8, 0
and 9 in the tenths place. Ordering
from largest to smallest, gives 9, 8, 0.
So far in order we have 9.9, 9.8, 9, then
place 8.9 and 8.8
### Skill 12.8 Rounding whole numbers to a given place.

- If the digit to the right of the place is
  - 0, 1, 2, 3 or 4 - round down
  - 5, 6, 7, 8 or 9 - round up

- Keep the number of digits in the answer the same as in the question by using zeros to fill the vacated spaces.

#### Q. Round 448 to the nearest ten.  
**A. 450**  
The digit to the right of the tens place is 8 so round up.  
Add 1 to the 4 in the tens place.  
Use a zero in the units place.

<table>
<thead>
<tr>
<th><strong>Q.</strong> Round 448 to the nearest ten.</th>
<th><strong>A. 450</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q. Round 448 to the nearest ten.</td>
<td>A. 450</td>
</tr>
<tr>
<td>The digit to the right of the tens</td>
<td>The digit</td>
</tr>
<tr>
<td>place is 8 so round up.</td>
<td>right of</td>
</tr>
<tr>
<td>Add 1 to the 4 in the tens place.</td>
<td>the tens</td>
</tr>
<tr>
<td>Use a zero in the units place.</td>
<td>place is</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>a)</strong> Round 57 to the nearest ten.</th>
<th><strong>b)</strong> Round 72 to the nearest ten.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Round 57 to the nearest ten.</td>
<td>b) Round 72 to the nearest ten.</td>
</tr>
<tr>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>c)</strong> Round 366 to the nearest ten.</th>
<th><strong>d)</strong> Round 691 to the nearest ten.</th>
</tr>
</thead>
<tbody>
<tr>
<td>c) Round 366 to the nearest ten.</td>
<td>d) Round 691 to the nearest ten.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>e)</strong> Round 804 to the nearest ten.</th>
<th><strong>f)</strong> Round 3149 to the nearest ten.</th>
</tr>
</thead>
<tbody>
<tr>
<td>e) Round 804 to the nearest ten.</td>
<td>f) Round 3149 to the nearest ten.</td>
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<tr>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>g)</strong> Round 772 to the nearest hundred.</th>
<th><strong>h)</strong> Round 209 to the nearest hundred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>g) Round 772 to the nearest hundred.</td>
<td>h) Round 209 to the nearest hundred.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>i)</strong> Round 455 to the nearest hundred.</th>
<th><strong>j)</strong> Round 2481 to the nearest hundred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Round 455 to the nearest hundred.</td>
<td>j) Round 2481 to the nearest hundred.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>k)</strong> Round 2315 to the nearest hundred.</th>
<th><strong>l)</strong> Round 5482 to the nearest hundred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>k) Round 2315 to the nearest hundred.</td>
<td>l) Round 5482 to the nearest hundred.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>m)</strong> Round 1782 to the nearest hundred.</th>
<th><strong>n)</strong> Round 4543 to the nearest hundred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>m) Round 1782 to the nearest hundred.</td>
<td>n) Round 4543 to the nearest hundred.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Skill 12.9  Rounding decimal numbers to the nearest whole number.

- If the digit to the right of the decimal point is
  0, 1, 2, 3 or 4 - round down
  - keep the digit in the units place unchanged.
  5, 6, 7, 8 or 9 - round up
  - add 1 to the digit in the units place.
- Leave off all digits after the decimal point and the decimal point.

### Q.
- Round 18.2 to the nearest whole number.

### A.
- **18**
  The digit to the right of the decimal point is 2.
  Round down by keeping the 8 in the units place unchanged.

### Exercises

<table>
<thead>
<tr>
<th>a) Round 3.8 to the nearest whole number.</th>
<th>b) Round 9.6 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.8</td>
<td>9</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Round 4.2 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d) Round 6.1 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e) Round 15.7 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f) Round 14.5 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g) Round 13.4 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>h) Round 11.3 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>i) Round 72.8 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>73</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>j) Round 41.23 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>41</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>k) Round 30.51 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>l) Round 29.56 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>29</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>m) Round 59.5 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n) Round 6.09 to the nearest whole number.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>
Skill 12.10 Estimating outcomes by rounding to the nearest 10 or 100.

- If the digit to the right of the requested place is
  0, 1, 2, 3 or 4 - round down
  - keep the digit in the requested place unchanged.
  5, 6, 7, 8 or 9 - round up
  - add 1 to the digit in the requested place.
- Keep the number of digits in the answer the same as in the question by using zeros to fill the vacated spaces.

Q. Estimate the difference between 418 and 103 by rounding to the nearest ten before subtracting.

A. 418 – 103
   ≈ 420 – 100
   = 320

Round 418 up to 420 and 103 down to 100. Subtract these answers to estimate the difference.

<table>
<thead>
<tr>
<th>a)</th>
<th>Estimate the product of 28 and 53 by rounding to the nearest ten before multiplying.</th>
</tr>
</thead>
<tbody>
<tr>
<td>28 × 53</td>
<td></td>
</tr>
<tr>
<td>≈ 30 × 50 = 1500</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b)</th>
<th>Estimate the sum of 71 and 29 by rounding to the nearest ten before adding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>71 + 29</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c)</th>
<th>Estimate the sum of 123 and 49 by rounding to the nearest ten before adding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>123 + 49</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d)</th>
<th>Estimate the sum of 48 and 31 by rounding to the nearest ten before adding.</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 + 31</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e)</th>
<th>Estimate the difference between 888 and 214 by rounding to the nearest hundred before subtracting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>888 – 214</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>f)</th>
<th>Estimate the difference between 452 and 249 by rounding to the nearest ten before subtracting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>452 – 249</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g)</th>
<th>Estimate the product of 38 and 64 by rounding to the nearest ten before multiplying.</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 × 64</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>h)</th>
<th>Estimate the product of 36 and 29 by rounding to the nearest ten before multiplying.</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 × 29</td>
<td></td>
</tr>
<tr>
<td>≈ =</td>
<td></td>
</tr>
</tbody>
</table>
Skill 12.11 Rounding decimal numbers to a given place.

- If the digit to the right of the place is
  0, 1, 2, 3 or 4 - round down
  - keep the digit in the requested place unchanged.
  5, 6, 7, 8 or 9 - round up
  - add 1 to the digit in the requested place.
- Keep the number of digits in the answer the same as in the question by using zeros to fill the vacated spaces.

Rounding Rule

< 5 Round down
≥ 5 Round up

Q. Round 34.21 to the nearest tenth.

A. 34.2

The digit to the right of the tenths is 1.
1 < 5 so round down.
Keep the 2 in the tenths place unchanged.

a) Round 3.89 to the nearest tenth.

b) Round 4.51 to the nearest tenth.

3.9

9 ≥ 5 Round up by adding 1 to 8

3.9

c) Round 6.34 to the nearest tenth.

d) Round 27.85 to the nearest tenth.

3.4

3.8

e) Round 15.76 to the nearest tenth.

f) Round 45.08 to the nearest tenth.

5.8

5.0

3.8

4.1

9 ≥ 5 Round up by adding 1 to 8

5.8

5.1

5.0

5.1

3.8

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6.3
Skill 12.12 Estimating outcomes by rounding decimals to whole numbers.

- If the digit to the right of the decimal point is 0, 1, 2, 3 or 4 - round down
  - keep the digit in the units place unchanged.
- 5, 6, 7, 8 or 9 - round up
  - add 1 to the digit in the units place.
- Leave off all digits after the decimal point.

Q. Estimate the total cost by rounding to the nearest dollar:
$15.25 + $3.10 + $4.80 + $6.95

A. $15.25 + $3.10 + $4.80 + $6.95
≈ $15 + $3 + $5 + $7
= $30

Round each dollar value, then add to estimate the total cost.

a) Estimate the sum of 5.4 and 8.7 by rounding to the nearest whole number before adding.

\[
5.4 + 8.7
\]
\[
\approx 5 + 9 = 14
\]

b) Estimate the difference between 9.3 and 6.8 by rounding to the nearest whole number before subtracting.

\[
\nearrow
\]
\[
\nearrow
\]

c) Estimate the difference between 22.8 and 12.9 by rounding to the nearest whole number before subtracting.

\[
\nearrow
\]
\[
\nearrow
\]

d) Estimate the sum of 7.6 and 6.2 by rounding to the nearest whole number before adding.

\[
\nearrow
\]
\[
\nearrow
\]

e) Estimate the perimeter of a rectangular yard with a length of 4.7 m and a width of 8.2 m by rounding to the nearest metre.

\[
\nearrow
\]
\[
\nearrow
\]

f) Estimate the difference between 6.7 and 2.03 by rounding to the nearest whole number before subtracting.

\[
\nearrow
\]
\[
\nearrow
\]

g) Estimate the total cost by rounding to the nearest dollar:
$10.30 + $5.15 + $8.95 + $6.25

\[
\nearrow
\]
\[
\nearrow
\]

h) Estimate the total cost by rounding to the nearest dollar:
$24.95 + $9.85 + $3.15 + $12.35

\[
\nearrow
\]
\[
\nearrow
\]

ROUNDING RULE

< 5 Round down
≥ 5 Round up
≈ approximately equals
13. [Operations]

Skill 13.1 Using the commutative property for addition.

**COMMUTATIVE PROPERTY for +**

\[
\begin{align*}
2 + 5 &= 7 \\
5 + 2 &= 7
\end{align*}
\]

You can add numbers in any order and not change the outcome.

**SO** \(2 + 5 = 5 + 2\)

Q. \(6 + 3 = 3 + 6\)

A. true

Solve both sides of the equation and compare the results.

\(6 + 3 = 9\)

\(3 + 6 = 9\)

The results are the same.

**Q.**

**A.**

**True or false?**

\(10 - 4 = 4 - 10\)

\(10 - 4 = 6\) but

\(4 - 10 \neq 6\)

\(10 - 4 = 6\) but

\(4 - 10 \neq 6\)

\(9 - 3 = 3 - 9\)

\(2 + 9 = 9 + 2\)

\(8 - 1 = 1 - 8\)

\(9 + 6 = \boxed{9} \boxed{+ 9}\)

\(4 + 1 = \boxed{4} \boxed{+ 4}\)

\(3 + 9 = \boxed{3} \boxed{+ 3}\)

\(17 + 10 = \boxed{17} \boxed{+ 17}\)

\(11 + 19 = \boxed{11} \boxed{+ 11}\)

\(15 + 18 = \boxed{15} \boxed{+ 15}\)

\(13 + \boxed{13} = 31 + 13\)

\(16 + \boxed{28} = 7 + 27\)

You can add numbers in any order and not change the outcome.

\(2 + 5 = 5 + 2\)
Skill 13.2 Using the commutative property for multiplication.

**COMMUTATIVE PROPERTY for ×**

\[
\begin{align*}
2 \times 5 &= 10 \\
5 \times 2 &= 10
\end{align*}
\]

You can multiply numbers in any order and not change the outcome. SO \(2 \times 5 = 5 \times 2\)

Q. \(\square \times 5 = 5 \times 9\)
A. 9
Ask: “What number multiplied by 5 equals 5 multiplied by 9?”
Answer: \(9 \times 5 = 5 \times 9\)

a) \(10 \div 2 = 2 \div 10\) True or false?
\(10 \div 2 = 5\) but \(2 \div 10 \neq 5\) false

b) \(4 \times 5 = 5 \times 4\) True or false?

c) \(7 \times 9 = 9 \times 7\) True or false?

\[\square \times 5 = 5 \times 2\]
\[\square \times 4 = 4 \times 2\]
\[\square \times 1 = \square \times 4\]
\[\square \times 9 = 9 \times 9\]
\[\square \times 12 = 12 \times 4\]
\[\square \times 19 = 19 \times 4\]
\[\square \times 11 = 11 \times 11\]
\[\square \times 18 = 18 \times 6\]
\[\square \times 13 = 13 \times 13\]
\[\square \times 7 = 7 \times 7\]
\[\square \times 17 = 24 \times 24\]
\[\square \times 13 = 13 \times 13\]
\[\square \times 4 = 4 \times 4\]
\[\square \times 9 = 9 \times 9\]
\[\square \times 18 = 18 \times 6\]
\[\square \times 13 = 13 \times 13\]

You can multiply numbers in any order and not change the outcome.
Skill 13.3 Recognising the identity element for addition.

IDENTITY ELEMENT for + is ZERO

14 + 0 = 14

The sum of zero and any number is that number.

Q. + 0 = 2  A. 2

Ask: “What number added to zero makes 2?”
Answer: 2 + 0 = 2

a) 10 + 0 = 10
   True or false?
   true

b) 6 + 0 = 0
   True or false?

b) 6 + 0 = 0
   True or false?

true

c) 0 + 7 = 7
   True or false?

true

d) 0 + 8 = 8
   True or false?

false

e) 3 − 0 = 0
   True or false?

false

f) 9 − 0 = 9
   True or false?

true

g) 8 + 0 = 8

h) + 0 = 5

i) 3 + 0 =

false

j) 9 + = 9

k) 2 − = 0

l) 5 − = 5

m) Which expression equals 7?
   A) 0 + 7
   B) 0 × 7
   C) 0 − 7

c) 0 + 7

n) Which expression equals 8?
   A) 0 × 8
   B) 0 − 8
   C) 0 + 8

e) 3 − 0 = 0

o) Which expression equals 5?
   A) 1 + 5
   B) 1 × 5
   C) 1 − 5

p) Which expression equals 3?
   A) 3 + 0
   B) 0 − 3
   C) 3 × 0

q) Which expression equals 4?
   A) 1 + 4
   B) 1 − 4
   C) 1 × 4

r) Which expression equals 6?
   A) 6 × 0
   B) 0 − 6
   C) 6 + 0
Skill 13.4 Recognising the identity element for multiplication.

IDENTITY ELEMENT for $\times$ is ONE

$14 \times 1 = 14$

The product of one and any number is that number.

Q. $\square \times 1 = 8$  A. 8

Ask: “What number multiplied by 1 makes 8?”

Answer: $8 \times 1 = 8$

Q. Which expression equals 13?  A. B

Solve all expressions and then compare the results.

A) $1 + 13$
B) $1 \times 13$
C) $1 \div 13$

a) $6 \times 1 = 6$
True or false?

b) $1 \times 4 = 4$
True or false?

c) $1 \times 1 = 2$
True or false?

d) $9 \times 1 = 9$
True or false?

e) $15 \div 1 = 1$
True or false?

f) $3 \div 1 = 3$
True or false?

$\square \times 1 = 2$

h) $\square \times 1 = 7$

i) $4 \times 1 = \square$

j) $5 \times \square = 5$

k) $4 \div \square = 4$

l) $8 \div \square = 1$

m) Which expression equals 4?
A) $1 \times 4$
B) $1 + 4$
C) $1 \div 4$

d) Which expression equals 5?
A) $1 + 5$
B) $1 + 5$
C) $1 \times 5$

o) Which expression equals 12?
A) $1 + 12$
B) $1 + 12$
C) $1 \times 12$

p) Which expression equals 6?
A) $1 \div 6$
B) $1 - 6$
C) $1 \times 6$

q) Which expression equals 10?
A) $1 \div 10$
B) $10 \times 1$
C) $10 + 1$

r) Which expression equals 17?
A) $17 \times 17$
B) $17 + 1$
C) $1 + 17$
**Skill 13.5 Using ‘order of operations’ involving + and/or − and × and/or ÷**

<table>
<thead>
<tr>
<th>Only + and/or −</th>
<th>Only × and/or +</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Add (+) and/or subtract (−) from left to right.</td>
<td>• Multiply (×) and/or divide (÷) from left to right.</td>
</tr>
</tbody>
</table>

### Q.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 − 2 − 5 + 6</td>
<td>A. 8 − 2 − 5 + 6 = 6 − 5 + 6 = 1 + 6 = 7</td>
</tr>
<tr>
<td>Start with 8 and subtract 2. The result is 6. Then subtract 5 from 6. The result is 1. Finally add 1.</td>
<td></td>
</tr>
</tbody>
</table>

#### a) 8 + 2 + 4

= 10 + 4

= 14

#### b) 6 + 5 − 3

= 11 + 2

= 12 − 2

= 10

#### c) 14 − 7 − 6

= 11 − 6

= 5

#### d) 7 − 5 + 9

= 4 + 9

= 13

#### e) 19 − 8 + 1

= 11 + 1

= 12

#### f) 16 − 2 + 5

= 14 + 5

= 19

#### g) 4 + 6 + 3

= 10 + 3

= 13

#### h) 13 − 7 − 4

= 6 − 4

= 2

#### i) 5 + 8 − 9

= 13 − 9

= 4

#### j) 6 + 5 + 1 − 2

= 11 + 1 − 2

= 12 − 2

= 10

#### k) 8 − 4 + 3 + 2

= 4 + 3 + 2

= 9 + 2

= 11

#### l) 9 + 7 − 5 − 1

= 16 − 5 − 1

= 11 − 1

= 10

#### m) 7 + 3 + 5 − 6

= 10 + 5 − 6

= 15 − 6

= 9

#### n) 5 − 2 + 7 − 5

= 3 + 7 − 5

= 10 − 5

= 5

#### o) 9 − 3 − 2 − 1

= 6 − 2 − 1

= 4 − 1

= 3

#### p) 2 × 5 × 3

= 10 × 3

= 30

#### q) 5 × 3 + 3

= 15 + 3

= 18

#### r) 16 + 4 + 2

= 20 + 2

= 22

#### s) 5 × 4 + 4

= 20 + 4

= 24

#### t) 18 ÷ 6 + 3

= 3 + 3

= 6

#### u) 7 × 2 + 7

= 14 + 7

= 21

#### v) 4 × 2 × 2

= 8 × 2

= 16

#### w) 2 × 9 + 6

= 18 + 6

= 24

#### x) 20 ÷ 5 + 2

= 4 + 2

= 6

### Only × and/or ÷

- Multiply (×) and/or divide (÷) from left to right.

- **Multiply:** (×)
  - From left to right.
- **Divide:** (÷)
  - From left to right.

**MM3.2**  
**MM4.1**
Skill 13.6 Identifying inverse operations +/− and ×/+ 

**Inverse Operations + and −**

- **Example:** 17 + 5 − 5 = 17 + 0 = 17 because adding 5 and then subtracting 5 gives 0.
- **Subtraction of a number undoes addition of that same number.**

**Inverse Operations × and ÷**

- **Example:** 6 × 8 ÷ 8 = 6 × 1 = 6 because multiplying by 8 and then dividing by 8 gives 1.
- **Division by a number undoes multiplication by that same number.**

- Keep the number unchanged when it is followed by two inverse operations applied to the same number.

<table>
<thead>
<tr>
<th>Q.</th>
<th>A.</th>
<th>Subtraction 9 undoes adding 9 OR +9 and −9 cancel each other. 24 remains unchanged.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 + 9 − 9 =</td>
<td>24 + 9 − 9 =</td>
<td>= 24 + 0 = 24</td>
</tr>
<tr>
<td>a) 43 + 12 − 12 =</td>
<td>b) 31 − 6 + 6 =</td>
<td>c) 17 + 3 − 3 =</td>
</tr>
<tr>
<td>d) 15 + 8 − 8 =</td>
<td>e) 23 − 19 + 19 =</td>
<td>f) 24 − 7 + 7 =</td>
</tr>
<tr>
<td>g) 20 + 13 − 13 =</td>
<td>h) 18 − 9 + 9 =</td>
<td>i) 21 − 10 + 10 =</td>
</tr>
<tr>
<td>j) 20 ÷ 4 × 4 =</td>
<td>k) 14 × 2 ÷ 2 =</td>
<td>l) 25 ÷ 5 × 5 =</td>
</tr>
<tr>
<td>m) 16 × 4 ÷ 4 =</td>
<td>n) 45 ÷ 2 ÷ 2 =</td>
<td>o) 32 ÷ 8 × 8 =</td>
</tr>
<tr>
<td>p) 9 × 7 ÷ 7 =</td>
<td>q) 18 ÷ 3 ÷ 3 =</td>
<td>r) 24 ÷ 6 × 6 =</td>
</tr>
</tbody>
</table>
**Skill 13.7 Using ‘order of operations’ involving single \( \times \) or \(+\) and \(+\) or \(-\).**

- Use the order of operations rules: First multiply (\( \times \)) or divide (\( \div \)).
  - Finally add (\( +\)) or subtract (\( -\)).

**Q.**  

<table>
<thead>
<tr>
<th>Q. ( 6 + 12 \div 3 = )</th>
<th>A. ( 6 + 12 \div 3 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 6 + 4 )</td>
<td>First do 12 divided by 3.</td>
</tr>
<tr>
<td>( = 10 )</td>
<td>The result is 4.</td>
</tr>
<tr>
<td></td>
<td>Then add 6 and 4.</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>a) ( 21 \div 3 - 2 = )</th>
<th>b) ( 4 + 3 \times 3 = )</th>
<th>c) ( 6 \times 2 + 8 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 7 - 2 = 5 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>d) ( 15 \div 5 - 2 = )</th>
<th>e) ( 2 \times 5 - 4 = )</th>
<th>f) ( 6 + 3 \times 5 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>g) ( 6 + 9 + 3 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>h) ( 18 + 2 + 4 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>i) ( 3 \times 4 + 7 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>j) ( 13 - 3 \times 3 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>k) ( 4 \times 4 - 7 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>l) ( 15 - 10 + 5 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>m) ( 21 \div 7 - 1 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>n) ( 8 + 12 \div 4 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>o) ( 15 - 5 \times 2 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>p) ( 18 - 12 \div 2 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>q) ( 16 \div 4 + 4 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>r) ( 18 \div 6 - 3 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>s) ( 8 + 28 \div 4 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>t) ( 9 \times 6 - 3 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>u) ( 24 - 12 \div 4 = )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( = )</td>
</tr>
<tr>
<td>( = )</td>
</tr>
</tbody>
</table>
Skill 13.8 Using ‘order of operations’ involving brackets ()

- Use the order of operations rules: First evaluate inside the brackets. Then multiply (×) and/or divide (÷) from left to right. Finally add (+) and/or subtract (−) from left to right.

Q. 9 + 12 ÷ (9 − 5) =

A. 9 + 12 ÷ (9 − 5) =

Simplify inside the brackets and subtract 5 from 9.
The result is 4.
Then divide 12 by 4.
The result is 3.
Finally add 9 and 3.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 + 12 ÷ (9 − 5)</td>
<td>9 + 12 ÷ 4 first brackets, then divide 9 + 3 then work from left to right = 12</td>
</tr>
<tr>
<td>9 + (7 − 4) × 3</td>
<td>9 + (7 − 4) × 3 = 9 + 3 × 3 = 9 + 9 = 18</td>
</tr>
<tr>
<td>9 × (4 − 2)</td>
<td>9 × 2 = 18</td>
</tr>
<tr>
<td>10 − (9 − 2)</td>
<td>10 − 7 = 3</td>
</tr>
<tr>
<td>7 × (6 − 2)</td>
<td>7 × 4 = 28</td>
</tr>
<tr>
<td>7 × (4 − 2)</td>
<td>7 × 2 = 14</td>
</tr>
<tr>
<td>9 − (4 + 3)</td>
<td>9 − 7 = 2</td>
</tr>
<tr>
<td>7 − (5 − 2)</td>
<td>7 − 3 = 4</td>
</tr>
<tr>
<td>10 − (9 − 2)</td>
<td>10 − 7 = 3</td>
</tr>
<tr>
<td>(4 + 4) × 3</td>
<td>(4 + 4) × 3 = 8 × 3 = 24</td>
</tr>
<tr>
<td>15 ÷ (5 − 2)</td>
<td>15 ÷ 3 = 5</td>
</tr>
<tr>
<td>28 ÷ (1 + 6)</td>
<td>28 ÷ 7 = 4</td>
</tr>
<tr>
<td>42 ÷ (5 + 2)</td>
<td>42 ÷ 7 = 6</td>
</tr>
<tr>
<td>(12 − 7) × 4</td>
<td>(12 − 7) × 4 = 5 × 4 = 20</td>
</tr>
<tr>
<td>(5 + 8) × 2</td>
<td>(5 + 8) × 2 = 13 × 2 = 26</td>
</tr>
<tr>
<td>(12 − 9) × 5</td>
<td>(12 − 9) × 5 = 3 × 5 = 15</td>
</tr>
<tr>
<td>8 + (5 + 1) ÷ 2</td>
<td>8 + 3 ÷ 2 = 8 + 1.5 = 9.5</td>
</tr>
<tr>
<td>14 − 6 − (5 + 3)</td>
<td>14 − 6 − 8 = 14 − 14 = 0</td>
</tr>
<tr>
<td>15 ÷ 3 − (2 + 2)</td>
<td>15 ÷ 3 − 4 = 5 − 4 = 1</td>
</tr>
<tr>
<td>9 + (7 − 4) × 3</td>
<td>9 + (7 − 4) × 3 = 9 + 3 × 3 = 9 + 9 = 18</td>
</tr>
<tr>
<td>18 ÷ (9 − 3) + 2</td>
<td>18 ÷ 6 + 2 = 3 + 2 = 5</td>
</tr>
<tr>
<td>9 ÷ (8 − 4)</td>
<td>9 ÷ 4 = 2.25</td>
</tr>
</tbody>
</table>

b) 9 − (4 + 3) =

t) 18 ÷ (9 − 3) + 2 =

Then divide 12 by 4.
The result is 3.
Finally add 9 and 3.
14. [Exploring Numbers]

Skill 14.1 Expressing word numbers in numerals.

Rule 1: Leave a space, or put a comma, between the thousands and the hundreds.
2: Write a zero in any place that is left empty between other digits.

Q. Express in numerals: Eighteen thousand, seven hundred and two.

A. 18 702

The digits 1 and 8, 7 and 2 will be in the number.
Numbers read from left to right so start with 18 thousand. The last digit of this number goes in the thousands position.
The seven goes in the hundreds position. There is no ten, so put a 0. Write 2 as the unit.

a) Express in numerals: Six thousand, three hundred and fifty-four.

b) Express in numerals: Two hundred and eighteen.

c) Express in numerals: Nine hundred and twenty-seven.

d) Express in numerals: Eight thousand, four hundred and six.

e) Express in numerals: Three thousand and thirteen.

f) Express in numerals: Seven thousand and eight.

g) Express in numerals: Eighty thousand.

h) Express in numerals: Seventy thousand, nine hundred.

i) Express in numerals: Sixteen thousand, two hundred and three.

j) Express in numerals: Ninety-six thousand.

k) Express in numerals: Four hundred thousand.

l) Express in numerals: Five hundred thousand and one.
Skill 14.2 Writing 2-digit numbers in words.

General Rules for writing a number in words
Rule 1: Consider one digit at a time starting from the left.
  2: First write the word for the digit (unless it is a 0).
  Next write the place of the digit.

Exceptions for 2-digit numbers
Multiples of 10 have their own words:
10 ten  20 twenty  30 thirty  40 forty  50 fifty
60 sixty  70 seventy  80 eighty  90 ninety

For the numbers 11 to 19 use:
11 eleven  12 twelve  13 thirteen  14 fourteen  15 fifteen
16 sixteen  17 seventeen  18 eighteen  19 nineteen

For all numbers 21 to 99 use a hyphen (-) to separate the word for the tens from the word for the units.

Q. Write the number 27 in words.
A. twenty-seven

Starting from the left the 2 is in the tens position. As a multiple of 10 it has its own word and is written as ‘twenty’.
The next digit 7 is written as ‘seven’.
27 is between 21 and 99, so it has a hyphen ‘-’ when written in words.

a) Write the number 35 in words.
   thirty-five

c) Write the number 69 in words.

e) Write the number 23 in words.

f) Write the number 74 in words.

g) Write the number 11 in words.

h) Write the number 48 in words.
Skill 14.3  Writing 3-digit numbers in words.

Rule 1: Consider one digit at a time starting from the left.
   2: First write the word for the digit (unless it is a 0).
      Next write the place of the digit.
   3: Always write ‘hundred’ not ‘hundreds’.
   4: Place the word ‘and’ after the word ‘hundred’ if other values follow.

AND  Consider the rules for 2-digit numbers on page 108.

Q. Write the number 943 in words.

A. nine hundred and forty-three

<table>
<thead>
<tr>
<th>Places</th>
<th>Tens of thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Start from the left. The 9 is in the hundreds position so write ‘nine hundred’. Include ‘and’ as other values follow.

The next digit is 4. It is in the tens position so it is written as ‘forty’.

The 3 is a unit and written as ‘three’.

43 is between 21 and 99, so it has a hyphen ‘-’ when written in words.

a) Write the number 610 in words.

   six hundred and ten

b) Write the number 800 in words.

c) Write the number 400 in words.

d) Write the number 160 in words.

e) Write the number 290 in words.

f) Write the number 738 in words.

g) Write the number 657 in words.

h) Write the number 901 in words.

i) Write the number 306 in words.

j) Write the number 582 in words.
Skill 14.4 Writing 4-digit numbers in words.

Rule 1: Consider one digit at a time starting from the left.
2: First write the word for the digit (unless it is a 0). Next write the place of the digit.
3: Always write ‘thousand’ not ‘thousands’ and ‘hundred’ not ‘hundreds’.
4: Place the word ‘and’ after the word ‘thousand’ if there are no hundreds.
5: Place the word ‘and’ after the word ‘hundred’ if other values follow.

AND Consider the rules for 2-digit numbers on page 108.

Q. Write the number 2610 in words.

A. **two thousand, six hundred and ten**

<table>
<thead>
<tr>
<th>Tens of thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Start from the left. The 2 is in the thousands position so write ‘two thousand’.
The 6 is in the hundreds position so write ‘six hundred’. Include ‘and’ as other values follow.
The next two digits are 1 and 0 in the tens and units places. They are written as ‘ten’.

a) Write the number 3018 in words.

three thousand and eighteen

c) Write the number 4300 in words.

d) Write the number 7500 in words.

e) Write the number 8070 in words.

f) Write the number 9090 in words.

g) Write the number 5002 in words.

h) Write the number 4006 in words.

i) Write the number 2059 in words.

j) Write the number 3021 in words.
### Skill 14.5 Finding and ordering odd and even numbers.

#### Q. Write the largest odd, 4 digit number that includes the digits 2, 3, 5 and 6.

**A.** \(6523\)

Consider the requirements one by one. Use all 4 digits.

The largest number requires that the largest digits go first \(\Rightarrow 6532\)

An odd number means the last digit must not be divisible by 2. Swap the order of the last two digits \(\Rightarrow 6523\)

---

#### a) What is the largest odd number less than 16?

15

#### b) What is the largest odd number less than 8?

#### c) What is the smallest even number greater than 13?

---

#### d) Write the smallest even, 3 digit number that includes the digits 2, 5 and 8.

#### e) Write the largest odd, 3 digit number that includes the digits 1, 2 and 9.

#### f) Write the smallest odd, 3 digit number that includes the digits 3, 5 and 9.

---

#### g) Write in order from largest to smallest the odd numbers between 10 and 16.

#### h) Write in order from smallest to largest the odd numbers between 4 and 10.

#### i) Write in order from largest to smallest the even numbers between 7 and 15.

---

#### j) Write the smallest even, 4 digit number that includes the digits 1, 3, 4 and 6.

#### k) Write the largest odd, 4 digit number that includes the digits 2, 3, 8 and 9.

#### l) Write the smallest odd, 4 digit number that includes the digits 5, 6, 7 and 8.

---

#### m) Using the digits 1, 5, 6 and 9 write an even number between 9150 and 9200.

#### n) Using the digits 1, 3, 4 and 5 write an odd number between 5300 and 5350.

#### o) Using the digits 2, 3, 7 and 8 write an even number between 8700 and 8750.
Skill 14.6 Finding the multiples of a number.

- Count by the number, i.e. add the number to itself continuously.
- Multiply the number by 1, then 2, 3, 4, 5, etc. to get the multiples in order.

<table>
<thead>
<tr>
<th>Q. Complete the next two multiples of 7.</th>
<th>A. 7, 14, 21, __, __, 28, 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>7, 14, 21, __, __</td>
<td>Add 7 to the previous number.</td>
</tr>
<tr>
<td></td>
<td>21 + 7 = 28</td>
</tr>
<tr>
<td></td>
<td>28 + 7 = 35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a) Complete the next two multiples of 2.</th>
<th>b) Complete the next two multiples of 3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 4, 6, 8, 10, __, 12, 14</td>
<td>3, 6, 9, 12, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Complete the next two multiples of 11.</th>
<th>d) Complete the next two multiples of 8.</th>
</tr>
</thead>
<tbody>
<tr>
<td>11, 22, 33, __, __</td>
<td>8, 16, 24, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e) Complete the next two multiples of 4.</th>
<th>f) Complete the next two multiples of 7.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12, 16, 20, __, __</td>
<td>21, 28, 35, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g) Complete the next two multiples of 5.</th>
<th>h) Complete the next two multiples of 3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>65, 70, 75, __, __</td>
<td>18, 21, 24, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>i) Complete the next two multiples of 10.</th>
<th>j) Complete the next two multiples of 9.</th>
</tr>
</thead>
<tbody>
<tr>
<td>80, 90, 100, __, __</td>
<td>27, 36, 45, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>k) Complete the next two multiples of 6.</th>
<th>l) Complete the next two multiples of 12.</th>
</tr>
</thead>
<tbody>
<tr>
<td>36, 42, 48, __, __</td>
<td>36, 48, 60, __, __</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Skill 14.7 Finding the factors of a number.

- To decide if a number is a factor of another number the first number must divide evenly into the second number, with no remainder.
  
  Hint: A number always has at least 2 factors, 1 and the number itself.

- Use trial and error. Be systematic.
  Divide 2 into the number. If 2 divides evenly then 2 and the result are factors of the number.
  Divide 3 into the number. If 3 divides evenly then 3 and the result are factors of the number.
  Divide 4 into the number. If 4 divides evenly then 4 and the result are factors of the number.
  Continue until all possibilities are exhausted.

Q. Which number is not a factor of 42?
   3, 4 or 6

A. 4

Divide each number into 42.

\[
\begin{align*}
42 \div 3 &= 14 \\
42 \div 4 &= 10 \text{ remainder } 2 \\
42 \div 6 &= 7 \\
4 \text{ does not divide evenly into } 42 \text{ so } 4 \text{ is not a factor of } 42.
\end{align*}
\]

a) Which number is a factor of 15?
   3, 4 or 7

\[
\begin{align*}
15 \div 3 &= \ \boxed{5} \\
15 \div 4 &= \ \boxed{3} \\
15 \div 7 &= \ \boxed{2}.
\end{align*}
\]

b) Which number is not a factor of 14?
   2, 6 or 7

\[
\begin{align*}
14 \div 3 &= \ \boxed{4} \\
14 \div 4 &= \ \boxed{3} \\
14 \div 7 &= \ \boxed{2}.
\end{align*}
\]

c) Which number is not a factor of 18?
   3, 4 or 6

\[
\begin{align*}
18 \div 3 &= \ \boxed{6} \\
18 \div 4 &= \ \boxed{4} \\
18 \div 6 &= \ \boxed{3}.
\end{align*}
\]

d) Which number is a factor of 25?
   5, 6 or 7

\[
\begin{align*}
25 \div 5 &= \ \boxed{5} \\
25 \div 6 &= \ \boxed{4} \\
25 \div 7 &= \ \boxed{3}.
\end{align*}
\]

e) Which list has only factors of 35?
   A) 1, 3, 5, 35
   B) 1, 5, 7, 35

\[
\begin{align*}
1 \times 35 &= \ \boxed{35} \\
1 \times 7 &= \ \boxed{7}.
\end{align*}
\]

f) Which list has only factors of 22?
   A) 1, 2, 4, 12,
   B) 1, 2, 11, 22

\[
\begin{align*}
1 \times 22 &= \ \boxed{22} \\
1 \times 11 &= \ \boxed{11}.
\end{align*}
\]

g) Which list has only factors of 30?
   A) 1, 3, 5, 15
   B) 1, 10, 20, 30

\[
\begin{align*}
1 \times 30 &= \ \boxed{30} \\
1 \times 15 &= \ \boxed{15}.
\end{align*}
\]

h) Which list has only factors of 28?
   A) 1, 4, 7, 14, 28
   B) 1, 2, 3, 8, 28

\[
\begin{align*}
1 \times 28 &= \ \boxed{28} \\
1 \times 14 &= \ \boxed{14}.
\end{align*}
\]

i) Which of the numbers 2, 3, 4, 5 and 10 are factors of 2016?

\[
\begin{align*}
2 \times 2016 &= \ \boxed{4032} \\
3 \times 2016 &= \ \boxed{6048} \\
4 \times 2016 &= \ \boxed{8064} \\
5 \times 2016 &= \ \boxed{10080}.
\end{align*}
\]

j) Which of the numbers 3, 4, 5, 7 and 9 are factors of 2025?

\[
\begin{align*}
3 \times 2025 &= \ \boxed{6075} \\
4 \times 2025 &= \ \boxed{8094} \\
5 \times 2025 &= \ \boxed{10025} \\
7 \times 2025 &= \ \boxed{14175} \\
9 \times 2025 &= \ \boxed{18225}.
\end{align*}
\]
Skill 14.8 Finding prime and composite numbers.

Q. Which number is not a prime number?
   2, 3, 4 or 5

A. 4
   List the factors of each number.
   2: 1, 2
   3: 1, 3
   4: 1, 2, 4
   5: 1, 5
   Only 4 has more factors than 1 and the number.

Q. List the composite numbers between 11 and 17.

A. 12, 14, 15, 16
   Consider each number one at a time. The only prime number is 13 so all others are composite.

a) Which of the following is not a composite number?
   4, 5 or 6

b) Which of the following is a composite number?
   2, 8 or 11

c) Which of the following is a prime number?
   12, 15, 16 or 19

d) Which of the following is a composite number?
   11, 12 or 13

e) Which of the following is a prime number?
   6, 7, 8 or 9

f) Which of the following is not a prime number?
   23, 27 or 29

g) List the composite numbers between 2 and 7.
   .....................................................................................................

h) List the prime numbers between 8 and 15.
   .....................................................................................................

i) List the composite numbers between 13 and 23.
   .....................................................................................................

j) List the prime numbers between 18 and 26.
   .....................................................................................................
Skill 14.9 Writing 5-digit numbers in words.

Rule 1: Consider one digit at a time starting from the left.
2: First write the word for the digit (unless it is a 0).
3: Always group the tens of thousands digit to the thousands digit using the 2-digit rules.
4: Always write ‘thousand’ not ‘thousands’ and ‘hundred’ not ‘hundreds’.
5: Place the word ‘and’ after the word ‘thousand’ if there are no hundreds.
6: Place the word ‘and’ after the word ‘hundred’ if other values follow.

AND Consider the rules for 2-digit numbers on page 108.

Q. Write the number 15078 in words.

A. fifteen thousand and seventy-eight

<table>
<thead>
<tr>
<th>Tens of thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>0</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

Start from the left. The 1 is in the tens of thousands position and the 5 is in the thousands position so consider them together. Write ‘fifteen thousand’. Include ‘and’ as there are no hundreds. The next digit is 7. It is in the tens position so it is written as ‘seventy’. The 8 is a unit and written as ‘eight’. 78 is between 21 and 99, so it has a hyphen ‘-’ when written in words.

a) Write the number 27006 in words.
twenty-seven thousand and six

c) Write the number 60000 in words.

e) Write the number 45000 in words.

b) Write the number 13000 in words.

d) Write the number 79000 in words.

f) Write the number 21001 in words.

g) Write the number 18004 in words.

h) Write the number 10016 in words.
Skill 14.10  Writing 6-digit numbers in words.

Rule 1: Consider one digit at a time starting from the left.
2: First write the word for the digit (unless it is a 0).
3: Next write the place of the digit.
4: Always group the hundreds of thousands digit and the tens of thousands digit to the thousands digit using the 2-digit and 3-digit rules.
5: Always write ‘thousand’ not ‘thousands’ and ‘hundred’ not ‘hundreds’.
6: Place the word ‘and’ after the word ‘thousand’ if there are no hundreds.
7: Place the word ‘and’ after the word ‘hundred’ if other values follow.

AND Consider the rules for 2-digit numbers on page 108.

Q. Write the number 950 073 in words.

A. nine hundred and fifty thousand and seventy-three

<table>
<thead>
<tr>
<th>Hundreds of thousands</th>
<th>Tens of thousands</th>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

Start from the left. The 9 is in the hundreds of thousands position, the 5 is in the tens of thousands position and the 0 in the thousands position so consider them together. Write ‘nine hundred and fifty thousand’.

Include ‘and’ as there are no hundreds.

The next digit is 7. It is in the tens position so it is written as ‘seventy’.

The 3 is a unit and written as ‘three’.

73 is between 21 and 99, so it has a hyphen ‘-‘ when written in words.

a) Write the number 100 030 in words.

one hundred thousand and thirty

d) Write the number 800 050 in words.

g) Write the number 730 004 in words.

h) Write the number 200 001 in words.
Skill 14.11 Comparing integers.

Consider each temperature as they would appear on a thermometer. + means above zero, − means below zero. Hotter temperatures are higher so −6°C or 6°C below zero is the highest of the three shown.

Q. Which temperature is higher?
A) 9°F below zero
B) 6°F below zero
C) 13°F below zero

A. B

a) Which golf score is closest to par for the round?
A) 4 under par
B) 8 under par

b) Which scuba diver is closest to the ocean floor?
A) 13 feet below sea level
B) 16 feet below sea level

c) Which time period is the most recent?
A) 135 - 195 million years ago (Jurassic)
B) 195 - 225 million years ago (Triassic)

d) Which elevation is higher?
A) 52 ft below sea level (Lake Eyre - Australia)
B) 282 ft below sea level (Death Valley - USA)

e) Which temperature is colder?
A) 4°F above zero
B) 5°F below zero

f) Which year is most recent?
A) 20 B.C. (before Christ)
B) 8 A.D. (year of the Lord)

g) Who won the 2013 US Open? [Hint: The lowest score wins in golf.]
A) J. Day with −7
B) A. Scott with −9
C) T. Woods with −5

h) In which month does the firm perform best?
A) April: −$200,000
B) May: −$220,000
C) June: −$202,000
Skill 14.12 Recognising positive and negative integers.

- Consider the words used with the numbers.
  Positive integers would be associated with words like: above, after, deposit, over, gain, A.D.
  Negative integers would be associated with words like: below, before, withdraw, under, loss, B.C.

  *Hint: Consider zero to be ground level. Above ground is positive. Below ground is negative.*

<table>
<thead>
<tr>
<th>Q. Write as a positive or negative number:</th>
<th>A. $-300$ Write the number in digits. Considering the preposition ‘below’ use a negative sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>three hundred metres below sea level</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>a) Write as a positive or negative number:</th>
<th>b) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a deposit of twenty dollars</td>
<td>on the seventh floor</td>
</tr>
<tr>
<td>+20</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Write as a positive or negative number:</th>
<th>d) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>sixteen degrees below zero</td>
<td>ten seconds after take-off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e) Write as a positive or negative number:</th>
<th>f) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>forty-two years B.C.</td>
<td>eight hundred metres above sea level</td>
</tr>
<tr>
<td>(before Christ)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g) Write as a positive or negative number:</th>
<th>h) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a score of eleven over par in golf</td>
<td>a gridiron player gaining four yards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>i) Write as a positive or negative number:</th>
<th>j) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a withdrawal of six dollars</td>
<td>second floor underground</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>k) Write as a positive or negative number:</th>
<th>l) Write as a positive or negative number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a deposit of twenty-five dollars</td>
<td>a score of four under par in golf</td>
</tr>
</tbody>
</table>
Skill 14.13 Reading integers on a number line.

- Locate zero on the scale.
- Identify negative integers (−) or less than (<) zero and positive integers (+) or greater than (>o) zero.

Q. What numbers are shown at points A and B?

A. \(A = 0\) \(B = -6\)

Q. Mark the following points on the number line:

A at +4 and B at −5.

A.

a) What numbers are shown at points A and B?

A = -2 \(B = 3\)

b) What numbers are shown at points A and B?

A = \(\) \(B = \)  

c) Mark the following points on the number line:

A at 0 and B at −5.

d) Mark the following points on the number line:

A at −1 and B at 5.

e) What numbers are shown at points A and B?

A = \(\) \(B = \)  

f) What numbers are shown at points A and B?

A = \(\) \(B = \)  

g) Mark the following points on the number line:

A at +2 and B at −4.

h) Mark the following points on the number line:

A at −3 and B at +3.
15. [Number Patterns / Equations]

Skill 15.1 Completing number patterns by adding the same number.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations.

<table>
<thead>
<tr>
<th>Q.</th>
<th>A.</th>
<th>1, 7, 13, 19, 25,</th>
<th>1, 7, 13, 19, 25, 31, 37</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>+6 +6 +6 +6 +6</td>
<td>+6 +6 +6 +6 +6</td>
</tr>
</tbody>
</table>

Ask: “Are the numbers increasing or decreasing?”
“How can you get from 1 to 7?”

Answer: To get from 1 to 7, add 6.
To get from 7 to 13, add 6.
To get from 13 to 19, add 6, etc.
So the rule of the pattern is:
“Add 6 to the previous number.”

Apply this rule to the last given number.
25 + 6 = 31
31 + 6 = 37

a) 5, 9, 13, 17, 21, 25, 29
b) 9, 14, 19, 24, 29,
   +4 +4 +4 +4

c) 8, 11, 14, 17, 20,
   _ _ _ _

d) 6, 16, 26, 36, 46,
   _ _ _ _

e) 3, 10, 17, 24, 31,
   _ _ _ _

f) 5, 14, 23, 32, 41,
   _ _ _ _

g) 5, 11, 17, 23, 29,
   _ _ _ _

h) 10, 17, 24, 31, 38,
   _ _ _ _

i) 44, 46, 48, 50, 52,
   _ _ _ _

j) 7, 15, 23, 31, 39,
   _ _ _ _
### Skill 15.2  Solving equations involving addition (+)

- Rewrite the addition as an equivalent subtraction.
  
  Hint: \(3 + 8 = 11\) can also be written as \(11 - 8 = 3\) OR \(11 - 3 = 8\)

- Guess the value of the missing number that will make the equation true.
  (Both sides of the number sentence must be equal).

- Fill in this value in the equation and check the sum.
  
  Hint: If the total on the left hand side of the equation is not enough then add a larger number.
  
  If the total on the left hand side of the equation is too great then add a smaller number.

- Keep guessing and checking until the number sentence is true.

---

#### Q.

\[ \square + 7 = 16 \]

\[ A. \quad ? + 7 = 16 \]

\[ 16 - 7 = ? \]

\[ 9 = ? \]

\[ \text{SO} \quad ? = 9 \]

\[ OR \quad ? + 7 = 16 \]

\[ 10 + 7 = 17 \]

\[ 9 + 7 = 16 \]

The addition can be written as an equivalent subtraction.

The unknown number is 9.

---

#### a)

\[ 8 + \boxed{19} = 27 \]

\[ 27 - 8 = ? \]

\[ 19 = ? \]

---

#### b)

\[ 12 + \square = 18 \]

---

#### c)

\[ 5 + \square = 13 \]

---

#### d)

\[ \square + 12 = 30 \]

---

#### e)

\[ \square + 9 = 21 \]

---

#### f)

\[ \square + 16 = 25 \]

---

#### g)

\[ 17 + \square = 25 \]

---

#### h)

\[ 14 + \square = 29 \]

---

#### i)

\[ 26 + \square = 43 \]

---

#### j)

\[ \square + 15 = 28 \]

---

#### k)

\[ \square + 13 = 23 \]

---

#### l)

\[ \square + 16 = 30 \]

---
**Skill 15.3 Completing number patterns by subtracting the same number.**

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

*Hint: Every number pattern is created by a rule involving numbers and operations.*

**Q.**

59, 50, 41, 32, 23, __, __

**A.** 59, 50, 41, 32, 23, __, __

\[ \begin{array}{ccccccc}
 & -9 & -9 & -9 & -9 & -9 & -9 \\
\end{array} \]

Ask: “Are the numbers increasing or decreasing?”
“How can you get from 59 to 50?”

Answer: To get from 59 to 50, subtract 9.
To get from 50 to 41, subtract 9.
To get from 41 to 32, subtract 9, etc.

So the rule of the pattern is: “Subtract 9 from the previous number.”

Apply this rule to the last given number:

23 \(-9 = 14\\
14 \(-9 = 5

<table>
<thead>
<tr>
<th>a)</th>
<th>45, 38, 31, 24, 17,</th>
<th>10, 3</th>
<th>b)</th>
<th>16, 14, 12, 10, 8,</th>
<th>__, __</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(-7, -7, -7, -7, -7, -7</td>
<td></td>
<td></td>
<td>(\ldots, \ldots, \ldots, \ldots, \ldots, \ldots</td>
<td>)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c)</th>
<th>42, 36, 30, 24, 18,</th>
<th>__, __</th>
<th>d)</th>
<th>33, 28, 23, 18, 13,</th>
<th>__, __</th>
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<td>(\ldots, \ldots, \ldots, \ldots, \ldots, \ldots</td>
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<table>
<thead>
<tr>
<th>e)</th>
<th>51, 43, 35, 27, 19,</th>
<th>__, __</th>
<th>f)</th>
<th>51, 47, 43, 39, 35,</th>
<th>__, __</th>
</tr>
</thead>
<tbody>
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<td>(\ldots, \ldots, \ldots, \ldots, \ldots, \ldots</td>
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<table>
<thead>
<tr>
<th>g)</th>
<th>39, 36, 33, 30,</th>
<th>__, __</th>
<th>h)</th>
<th>108, 99, 90, 81,</th>
<th>__, __</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(\ldots, \ldots, \ldots, \ldots, \ldots, \ldots</td>
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<table>
<thead>
<tr>
<th>i)</th>
<th>77, 67, 57, 47,</th>
<th>__, __</th>
<th>j)</th>
<th>42, 38, 34, 30,</th>
<th>__, __</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(\ldots, \ldots, \ldots, \ldots, \ldots, \ldots</td>
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</tbody>
</table>
Skill 15.4 Solving equations involving subtraction (−)

- Rewrite the subtraction as an equivalent addition or subtraction.
  
  Hints: $12 - 7 = 5$ can also be written as $5 + 7 = 12$ OR $12 - 5 = 7$
  
  OR

- Guess the value of the missing number that will make the equation true.
  (Both sides of the number sentence must be equal).

- Fill in this value in the equation and check the subtraction.
  
  Hints: If the total on the left hand side of the equation is not enough then subtract a smaller number.
  
  If the total on the left hand side of the equation is too great then subtract a larger number.

- Keep guessing and checking until the number sentence is true.

Q. 21 − □ = 14

A. 21 − ? = 14

  21 − 14 = ?

  7 = ?

  so ? = 7

OR 21 − ? = 14

  21 − 5 = 16

  21 − 7 = 14

The subtraction can be written as another equivalent subtraction.

The unknown number is 7.

Guess 5.

Subtracting 5 gives a result of 16 - too big, so guess a larger number.

Guess 7.

Check again.

<table>
<thead>
<tr>
<th>a) 23 − 7 = 16</th>
<th>b) □ − 9 = 7</th>
<th>c) □ − 6 = 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 + 7 = ?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 = ?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d) 17 − □ = 13</th>
<th>e) 25 − □ = 18</th>
<th>f) 30 − □ = 21</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g) 19 − □ = 5</th>
<th>h) 18 − □ = 11</th>
<th>i) 33 − □ = 15</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>j) □ − 8 = 24</th>
<th>k) □ − 15 = 21</th>
<th>l) □ − 12 = 35</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Skill 15.5  Completing number patterns by multiplying by the same number.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

**Hint:** Every number pattern is created by a rule involving numbers and operations.

<table>
<thead>
<tr>
<th>Q.</th>
<th>A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 5, 25, 125,</td>
<td>1, 5, 25, 125, 625, 3125</td>
</tr>
<tr>
<td>[ \times 5 ] [ \times 5 ] [ \times 5 ] [ \times 5 ] [ \times 5 ] &amp; [ \times 5 ] [ \times 5 ] [ \times 5 ] [ \times 5 ] [ \times 5 ]</td>
<td></td>
</tr>
<tr>
<td><strong>Ask:</strong></td>
<td><strong>Are the numbers increasing or decreasing?”</strong></td>
</tr>
<tr>
<td><strong>Answer:</strong></td>
<td>“How can you get from 1 to 5?”</td>
</tr>
<tr>
<td>To get from 1 to 5, multiply by 5.</td>
<td>To get from 5 to 25, multiply by 5.</td>
</tr>
<tr>
<td>To get from 25 to 125, multiply by 5.</td>
<td>So the rule of the pattern is:</td>
</tr>
<tr>
<td>“Multiply the previous number by 5.”</td>
<td>Apply this rule to the last given number.</td>
</tr>
<tr>
<td>125 \times 5 = 625</td>
<td>625 \times 5 = 3125</td>
</tr>
</tbody>
</table>

a) 2, 8, 32, 128, 512, 2048 | b) 1, 2, 4, 8, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |

c) 1, 3, 9, 27, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |
d) 9, 18, 36, 72, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |

e) 15, 30, 60, 120, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |
f) 2, 6, 18, 54, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |

g) 1, 4, 16, 64, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |
h) 3, 30, 300, 3000, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |

i) 2, 10, 50, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |
j) 4, 20, 100, 500, \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] \[ \times 4 \] |
Skill 15.6 Completing number patterns by dividing by the same number.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

**Hint:** Every number pattern is created by a rule involving numbers and operations.

<table>
<thead>
<tr>
<th>Q.</th>
<th>243, 81, 27, 9,</th>
<th>A.</th>
<th>243, 81, 27, 9, 3, 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>+3</td>
<td>+3 +3 +3 +3</td>
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</tbody>
</table>

Ask:  
“Are the numbers increasing or decreasing?”  
“How can you get from 243 to 81?”

Answer:  
To get from 243 to 81, divide by 3.  
To get from 81 to 27, divide by 3.  
To get from 27 to 9, divide by 3.  
So the rule of the pattern is:  
“Divide the previous number by 3.”  
Apply this rule to the last given number.  
9 ÷ 3 = 3  
3 ÷ 3 = 1

a) 64, 32, 16, 8, 4, 2  
+2 +2 +2 +2

d) 224, 112, 56, 28,  
.......... .......... .......... ..........       3750, 750, 150, 

e) 972, 324, 108, 36,  
.......... .......... .......... ..........       f) 1215, 405, 135, 45, 
Skill 15.7  Solving equations involving multiplication (×)

- Rewrite the multiplication as an equivalent division.
  Hint:  $3 \times 8 = 24$ can also be written as $24 \div 8 = 3$ OR $24 \div 3 = 8$

OR
- Guess the value of the missing number that will make the equation true.
  (Both sides of the number sentence must be equal).
- Fill in this value in the equation and check the multiplication.
  Hints: If the total on the left hand side of the equation is not enough then multiply by a larger number.
  If the total on the left hand side of the equation is too great then multiply by a smaller number.
- Keep guessing and checking until the number sentence is true.

Q. $\square \times 7 = 63$

A. $? \times 7 = 63$

$63 \div 7 = ?$

$9 = ?$

so $? = 9$

OR $? \times 7 = 63$

$8 \times 7 = 56$

$9 \times 7 = 63$

The multiplication can be written as an equivalent division.

The unknown number is 9.

Guess 8.

Multiplying by 8 gives a result of 56 - not enough, so guess a larger number.

Guess 9.

Check again.

a) $8 \times \boxed{5} = 40$

$40 \div 8 = ?$

$5 = ?$

b) $6 \times \boxed{8} = 48$

c) $4 \times \boxed{9} = 36$

d) $\boxed{8} \times 7 = 56$

e) $\boxed{7} \times 6 = 42$

f) $\boxed{9} \times 9 = 54$

g) $9 \times \boxed{9} = 81$

h) $7 \times \boxed{11} = 77$

i) $5 \times \boxed{10} = 50$

j) $\boxed{12} \times 12 = 120$

k) $\boxed{20} \times 20 = 60$

l) $\boxed{11} \times 11 = 44$
Skill 15.8 Completing number patterns by using changing values in the rule.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

Hint: Every number pattern is created by a rule involving numbers and operations. Counting numbers, even numbers and odd numbers have patterns themselves that will create changing numbers in the rule.

Q. 50, 49, 46, 41, 34, __, __

A. 50, 49, 46, 41, 34, __, __

-1 -3 -5 -7 -9 -11

Ask: “Are the numbers increasing or decreasing?”

“How can you get from 50 to 49?”

Answer: To get from 50 to 49, subtract 1. To get from 49 to 46, subtract 3. To get from 46 to 41, subtract 5, etc. So the rule of the pattern is: “Subtract consecutive odd numbers from the previous number.”

Apply this rule to the last given number.

34 – 9 = 25

25 – 11 = 14

a) 15, 15, 16, 18, 21, 25, 30, __, __
b) 2, 4, 8, 14, 22, __, __

c) 42, 30, 20, 12, 6, __, __
d) 2, 5, 11, 20, 32, __, __

e) 21, 20, 18, 15, 11, __, __
f) 2, 9, 15, 20, 24, __, __

g) 3, 4, 7, 12, 19, __, __
h) 5, 15, 24, 32, 39, __, __

i) 48, 46, 42, 36, 28, __, __
j) 41, 40, 37, 32, 25, __, __
Skill 15.9 Completing number patterns involving decimals and fractions.

- Find the number used to get from term to term.
- Find the operation used to get from term to term.

*Hint: Every number pattern is created by a rule involving numbers and operations.*

### Q.

<table>
<thead>
<tr>
<th>3, 5.5, 8, 10.5, 13</th>
<th>__, __</th>
<th>A. 3, 5.5, 8, 10.5, 13, 15.5, 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+2.5</td>
<td>+2.5 +2.5 +2.5 +2.5 +2.5 +2.5</td>
</tr>
<tr>
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<td>+2.5</td>
<td>+2.5 +2.5 +2.5 +2.5 +2.5 +2.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To get from 3 to 5.5, add 2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To get from 5.5 to 8, add 2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To get from 8 to 10.5, add 2.5, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>So the rule of the pattern is:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>“Add 2.5 to the previous number.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply this rule to the last given number.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 + 2.5 = 15.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.5 + 2.5 = 18</td>
<td></td>
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</tr>
</tbody>
</table>

### a) 7, 6.2, 5.4, 4.6, 3.8, __, __

-0.8 -0.8 -0.8 -0.8 -0.8 -0.8

### b) 2, 3.5, 5, 6.5, 8, __, __

### c) 4.3, 4.9, 5.5, 6.1, 6.7, __, __

### d) 5.2, 4.8, 4.4, 4, 3.6, __, __

### e) 3, 4.2, 5.4, 6.6, 7.8, __, __

### f) 10, 9.5, 9, 8.5, 8, __, __

### g) \( \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7} \), __, __

### h) \( \frac{29}{6}, \frac{26}{6}, \frac{23}{6}, \frac{20}{6} \), __, __

### i) \( \frac{62}{12}, \frac{57}{12}, \frac{52}{12}, \frac{47}{12} \), __, __

### j) \( \frac{31}{4}, \frac{27}{4}, \frac{23}{4}, \frac{19}{4} \), __, __

### k) \( \frac{2}{9}, \frac{3}{9}, \frac{2}{9}, \frac{2}{9}, \frac{5}{9} \), __, __

### l) \( \frac{31}{8}, \frac{27}{8}, \frac{23}{8}, \frac{19}{8} \), __, __
Skill 15.10  Solving equations involving ‘of’.

EITHER

- Guess the value of the missing number that will make the equation true.
- To check, divide this guess by the denominator of the fraction.

Hints: If the total on the left hand side of the equation is not enough then use a larger number.
If the total on the left hand side of the equation is too great then use a smaller number.
- Keep guessing and checking until the equation is true.

OR

- Multiply the answer by the denominator of the fraction.

‘OF’ is another way of saying ‘×’

MULTIPLYING BY FRACTIONS

\( \frac{1}{2} \) of 8 = \( \frac{1}{2} \times 8 = 8 \div 2 = 4 \)

Multiplying by \( \frac{1}{2} \) means dividing by 2.
AND  Multiplying by \( \frac{1}{3} \) means dividing by 3 etc.

Q. \( \frac{1}{2} \) of \( \square \) = 18

A. \( ? \div 2 = 18 \)
   \( 40 \div 2 = 20 \)
   \( ? \div 2 = 18 \)
   \( 36 \div 2 = 18 \)
   so \( ? = 36 \)

\( OR \) 18 \( \times 2 = 36 \)


\( a) \ \frac{1}{4} \) of \( \square \) = 6

\( 6 \times 4 = ? \)

\( \square = ? \)

\( b) \ \frac{1}{2} \) of \( \square \) = 9

\( c) \ \frac{1}{2} \) of \( \square \) = 12

\( d) \ \frac{1}{3} \) of \( \square \) = 10

\( e) \ \frac{1}{4} \) of \( \square \) = 7

\( f) \ \frac{1}{3} \) of \( \square \) = 12

\( g) \ \frac{1}{2} \) of \( \square \) = 16

\( h) \ \frac{1}{2} \) of \( \square \) = 21

\( i) \ \frac{1}{4} \) of \( \square \) = 20
16. [Units of Measurement]

Skill 16.1 Selecting the appropriate units of measurement.

- Compare the size, mass or capacity to that of common objects (tennis court, bag of flour or carton of milk).
- Consider any standard units you know, chosen because they are sensible and accurate.
  Example: Carpenters measure wood lengths in millimetres.
  Height of a person is measured in centimetres.
  Mountains are measured in metres.

Q. Choose the appropriate units:
grams, kilograms or tonnes.
“The total amount of salt a healthy person should eat each day is 6…”

A. grams

The weight of the nutritional elements of food are usually measured in grams or milligrams.
Compare the amount of salt to known amounts of a single unit e.g.
1 kilogram of sugar or a 1 tonne truck.

a) Choose the appropriate units: millilitres, litres or megalitres.
“A water tap that drips every second would, each year, waste 10 000…”

b) Choose the appropriate units: millilitres, litres or megalitres.
“The capacity of one cup is about 250…”

litres

c) Choose the appropriate units: centimetres, metres or kilometres.
“The highest peak in Antarctica is Mt Vinson with a height of 5140…”

d) Choose the appropriate units: grams, kilograms or tonnes.
“The heaviest animal, the blue whale, weighs about 90…”

e) Choose the appropriate units: centimetres, metres or kilometres.
“From the Snowy Mountains to the Southern Ocean, the Murray River has a length of 2530…”

f) Choose the appropriate units: centimetres, metres or kilometres.
“The world’s tallest waterfall is Angel Falls in Venezuela measuring 979…”

g) Choose the appropriate units: millilitres, litres or megalitres.
“The amount of juice in an average lemon is about 35…”

h) Choose the appropriate units: grams, kilograms or tonnes.
“The average amount of rubbish produced by every Australian each year is 1…”
Skill 16.2 Estimating length, mass etc. using units of measurement.

Q. How many of these objects are likely to have a capacity less than 1 litre?
   - A soap dispenser
   - A bath
   - A perfume bottle
   - A hand basin

A. 2

Compare the capacity of each object to that of a standard object that you know e.g. 1 litre of milk.

Only the soap dispenser and perfume bottle would be likely to have a capacity of less than 1 litre.

a) How many of these objects are likely to have a capacity greater than 1 litre?
   - A human mouth
   - A soft drink can
   - A bird bath
   - A salt shaker

b) How many of these objects are likely to have a mass less than 1 kilogram?
   - A dozen eggs
   - A block of chocolate
   - A loaf of bread
   - A box of washing powder

c) How many of these objects are likely to have an area more than 1 square metre?
   - An open book
   - A doona
   - A cinema screen
   - A bath mat

d) How many of these objects are likely to have a temperature greater than 30 degrees Celsius?
   - A lake
   - A person
   - A furnace
   - A cellar

e) How many of these objects are likely to have a mass less than 1 tonne?
   - An ocean liner
   - A helium balloon
   - A Great Dane
   - A motorbike

f) How many of these places are likely to have an area less than 1 hectare?
   - Auckland Zoo
   - Kakadu National Park
   - Centre court - Wimbledon
   - Eden Park

g) How many of these objects are likely to have a temperature less than 30 degrees Celsius?
   - A salad
   - An ice cream
   - A bowl of soup
   - A glass of tap water

h) How many of these objects are likely to have a capacity less than 1 litre?
   - A cattle trough
   - A toilet cistern
   - A baby’s bottle
   - A wheel barrow
Skill 16.3 Converting units of length (1).

**Conversion Facts - LENGTH**

- 1 km = 1000 m = 100 000 cm = 1 000 000 mm
- 1 m = 100 cm = 1000 mm
- 1 cm = 10 mm

<table>
<thead>
<tr>
<th>mm</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

To change from **smaller** units to **larger** units
- Divide by the conversion factor (because you need less).
  
Example: To change 40 mm to cm
  \[ \div 10 \]

To change from **larger** units to **smaller** units
- Multiply by the conversion factor (because you need more).
  
Example: To change 4 cm to mm
  \[ \times 10 \]

Q. Which is greater?  
600 cm or 50 000 mm

A.  
\[ 600 \text{ cm} \times 10 = 6000 \text{ mm} \]

50 000 mm is greater

Decide which unit to convert. To convert cm to mm, multiply by 10.

---

**Questions**

- **a)** Convert to metres:
  
  1000 cm = \[
  10 \text{ m} \]

  \[ 100 \text{ cm} = 1 \text{ m} \text{ so } 1000 \div 100 = \]

- **b)** Convert to centimetres:
  
  100 mm = \[
  \text{ cm} \]

- **c)** Convert to metres:
  
  3 km = \[
  \text{ m} \]

- **d)** Convert to millimetres:
  
  60 cm = \[
  \text{ mm} \]

- **e)** Convert to metres:
  
  1500 cm = \[
  \text{ m} \]

- **f)** Convert to millimetres:
  
  10 m = \[
  \text{ mm} \]

- **g)** Convert to kilometres:
  
  8000 m = \[
  \text{ km} \]

- **h)** Convert to centimetres:
  
  900 mm = \[
  \text{ cm} \]

- **i)** Convert to millimetres:
  
  2.4 cm = \[
  \text{ mm} \]

- **j)** Convert to metres:
  
  3.75 km = \[
  \text{ m} \]

- **k)** Convert to centimetres:
  
  1.9 m = \[
  \text{ cm} \]

- **l)** Convert to millimetres:
  
  1.36 m = \[
  \text{ mm} \]
Skill 16.3 Converting units of length (2).

m) Express in metres:
   \[ 500 \text{ cm} + 3 \text{ m} = \] __________ m

n) Express in millimetres:
   \[ 4 \text{ cm} + 200 \text{ mm} = \] __________ mm

o) Express in metres:
   \[ 7 \text{ km} + 3100 \text{ m} = \] __________ m

p) Express in metres:
   \[ 6.15 \text{ km} + 400 \text{ m} = \] __________ m

q) Express in kilometres:
   \[ 12 \text{ km} + 6000 \text{ m} = \] __________ km

r) Express in centimetres:
   \[ 4.5 \text{ m} + 30 \text{ cm} = \] __________ cm

s) Which is greater?
   \[ 2 \text{ km} \text{ or } 1500 \text{ m} \]

\[ \text{2 km} \]

\[ \text{1500 m} \]

\[ \text{2 km} \]

\[ \text{1500 m} \]

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\[ \text{1500 m} \]

\[ \text{2 km} \]

\[ \text{1500 m} \]

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\[ \text{1500 m} \]

\[ \text{2 km} \]

\[ \text{1500 m} \]
Skill 16.4 Converting units of mass (1).

Conversion Facts - MASS
1 tonne = 1000 kg = 1 000 000 g
1 kg = 1000 g

To change from **smaller** units to **larger** units
- Divide by the conversion factor (because you need less).
  
  Example: To change 3000 g to kg
  \[ 3000 \text{ g} \div 1000 = 3 \text{ kg} \]

To change from **larger** units to **smaller** units
- Multiply by the conversion factor (because you need more).
  
  Example: To change 3 kg into g
  \[ 3 \times 1000 = 3000 \text{ g} \]

Q. Express in grams:
\[ 4 \text{ g} + 3 \text{ kg} = \text{ g} \]

\[ 4 \text{ g} + 3 \times 1000 \text{ g} = \text{g} \]

A. \[ 4 \text{ g} + 3 \text{ kg} = 4 \text{ g} + 3000 \text{ g} = 3004 \text{ g} \]

To convert kg to g, multiply by 1000.

3 kg \[ 3 \times 1000 = 3000 \text{ g} \]

\[ 4 \text{ kg} \]

\[ 4 \times 1000 = 4000 \text{ g} \]

\[ 3 \text{ t} \]

\[ 3 \times 1000 \times 1000 = 3000000 \text{ kg} \]

\[ 0.5 \text{ kg} \]

\[ 0.5 \times 1000 = 500 \text{ g} \]

\[ 4.6 \text{ kg} \]

\[ 4.6 \times 1000 = 4600 \text{ g} \]
Skill 16.4 Converting units of mass (2).

m) Express in grams:
\[3 \text{ kg} + 150 \text{ g} = \underline{\text{}} \text{ g}\]

n) Express in kilograms:
\[1 \text{ t} + 420 \text{ kg} = \underline{\text{}} \text{ kg}\]

o) Express in grams:
\[3 \text{ g} + 4 \text{ kg} = \underline{\text{}} \text{ g}\]

p) Express in tonnes:
\[7 \text{ t} + 1000 \text{ kg} = \underline{\text{}} \text{ t}\]

q) Express in grams:
\[6.9 \text{ kg} + 300 \text{ g} = \underline{\text{}} \text{ g}\]

r) Express in kilograms:
\[0.8 \text{ t} + 2000 \text{ kg} = \underline{\text{}} \text{ kg}\]

s) Which is greater?
\[19 \text{ kg} \text{ or } 2000 \text{ g}\]

\[2000 \text{ g} = 2 \text{ kg}\]

\[2 \text{ t} = 2000 \text{ kg}\]

\[2000 \text{ kg} = 2 \text{ kg}\]

\[3 \text{ t} \text{ or } 6000 \text{ kg}\]

\[900 \text{ g} \text{ or } 3 \text{ kg}\]

u) Which is greater?
\[3 \text{ t} \text{ or } 6000 \text{ kg}\]

\[900 \text{ g} \text{ or } 3 \text{ kg}\]

w) Circle the greatest mass.

\[20 \text{ kg} \quad 2 \text{ t} \quad 2000 \text{ g}\]

\[2 \text{ t} = 2000 \text{ kg}\]

\[2000 \text{ g} = 2 \text{ kg}\]

\[13000 \text{ g} \quad 0.5 \text{ t} \quad 750 \text{ kg}\]

x) Circle the smallest mass.

\[3000 \text{ kg} \quad 30 \text{ t} \quad 30000 \text{ g}\]

\[4 \text{ t} \quad 400000 \text{ g} \quad 40000 \text{ kg}\]
Skill 16.5 Converting units of capacity (1).

Conversion Facts - CAPACITY
1 ML (megalitre) = 1 000 kL = 1 000 000 L
1 kL = 1 000 L
1 L = 1000 mL (millilitre)

To change from smaller units to larger units
- Divide by the conversion factor (because you need less).
  Example: To change 2000 mL to L ÷ by 1000

To change from larger units to smaller units
- Multiply by the conversion factor (because you need more).
  Example: To change 2 L to mL × by 1000

Q. Circle the smallest capacity.
   6000 mL  5 L  600 mL
   The smallest capacity is 600 mL.

   6000 mL  5 L  600 mL

A. \[5 \times 1000 = 5000 \text{ mL}\]
The smallest capacity is 600 mL.

   6000 mL  5 L  600 mL
   Change each amount to the same unit (mL).
   To convert L to mL, multiply by 1000.

   a) Convert to litres:
      \[20\ 000 \text{ mL} = \boxed{20 \ L}\]
      \[1000 \text{ mL} = 1 \text{ L so } 20\ 000 \div 1000 = \]

   b) Convert to millilitres:
      \[1 \text{ L} = \boxed{1000 \text{ ml}}\]

   c) Convert to litres:
      \[5000 \text{ mL} = \boxed{5 \ L}\]

   d) Convert to litres:
      \[3\ 000\ 000 \text{ mL} = \boxed{3 \text{ L}}\]

   e) Convert to litres:
      \[78\ 000 \text{ mL} = \boxed{78 \ L}\]

   f) Convert to millilitres:
      \[2.6 \text{ L} = \boxed{2600 \text{ ml}}\]

   g) Convert to millilitres:
      \[5.8 \text{ L} = \boxed{5800 \text{ ml}}\]

   h) Convert to millilitres:
      \[0.7 \text{ L} = \boxed{700 \text{ ml}}\]
Skill 16.5 Converting units of capacity (2).

i) Express in litres:

\[ 12 \text{ L} + 2000 \text{ mL} = \] \[\text{ L} \]

j) Express in millilitres:

\[ 800 \text{ mL} + 3.2 \text{ L} = \] \[\text{ mL} \]

k) Express in litres:

\[ 5000 \text{ mL} + 6 \text{ L} = \] \[\text{ L} \]

l) Express in millilitres:

\[ 1.7 \text{ L} + 200 \text{ mL} = \] \[\text{ mL} \]

m) Which is greater?

\[ 40000 \text{ mL} \text{ or } 4 \text{ L} \]

n) Which is greater?

\[ 100 \text{ L} \text{ or } 10000 \text{ mL} \]

o) Which is greater?

\[ 6000 \text{ mL} \text{ or } 12 \text{ L} \]

p) Which is greater?

\[ 5.2 \text{ L} \text{ or } 10000 \text{ mL} \]

q) Circle the greatest capacity.

\[ 60000 \text{ mL} \quad 50 \text{ L} \quad 7.5 \text{ L} \]

\[ 50 \text{ L} = 50000 \text{ mL} \]

\[ 7.5 \text{ L} = 7500 \text{ mL} \]

r) Circle the smallest capacity.

\[ 1000 \text{ mL} \quad 9 \text{ L} \quad 900 \text{ mL} \]

s) Circle the smallest capacity.

\[ 4000 \text{ mL} \quad 3.5 \text{ L} \quad 40 \text{ L} \]

t) Circle the greatest capacity.

\[ 28 \text{ L} \quad 2800 \text{ mL} \quad 3000 \text{ mL} \]
**Skill 16.6 Solving problems involving units of measurement.**

Q. One lap of the oval fountain in Hyde Park, London is 21 000 cm. How many metres is this?

A. \[21\,000 \div 100 = 210 \text{ m}\]

To convert cm to m divide by 100.

---

a) The Fox Glacier ends at a point above sea level that is 300 times the height of a 100 cm person. At what height above sea level is this?

\[100 \times 300 = 30\,000 \text{ cm}\]

\[30\,000 \div 100 = 300 \text{ m}\]

b) How many basketballs, each with a mass of 620 g, can be taken by the coach on to the plane if there is only two and a half kilograms allowed?

\[=\]

---

c) How many 250 mL cups are necessary to fill a 3 L vase?

\[=\]

d) An average orange has a mass of 200 g. How many oranges would you expect to find in a 3 kg bag?

\[=\]

e) A half flush of a toilet uses 6 L of water. How many millilitres is this?

\[=\text{ mL}\]

f) Charlie’s average stride length is 80 cm. At this rate, how many steps would he take to walk the 400 m?

\[=\]

g) How many metres above ground is Uluru if it is 136 times the height of a 250 cm tree?

\[=\text{ m}\]

h) A 50¢ piece is about 25 mm wide. How many 50¢ pieces, end to end, would you need to run the length of a table that is 400 cm long?

\[=\]

17. [Time]

Skill 17.1 Expressing the time in words.

**TIME - Past**
Big hand between 12 and 6

- 55 past o’clock
- 50 past
- 45 past
- 40 past
- 35 past
- 30 or half past

“Twenty PAST eight”

“a quarter PAST eight”

**TIME - To**
Big hand between 6 and 12

- 5 to o’clock
- 10 past
- 15 or quarter past
- 20 past
- 25 past
- 30 or half past

“Ten TO nine” OR “Nine fifty”

“half PAST ten”

“A quarter TO two”

**Hours (h)**
Smaller hand
1 number = 1 h
1 lap = 12 h

**Minutes (min)**
Bigger hand
1 mark = 1 min
1 number = 5 min
1 lap = 1 h = 60 min

Q. Write the time in words.

A. **Five to five**

or **Four fifty-five**

The big hand has turned 55 minutes.
It is nearly back to the o’clock.
The little hand is almost, but not quite up to the five.

a) Write the time in words.

b) Write the time in words.

c) Write the time in words.

d) Write the time in words.
Skill 17.2 Expressing the time in digital form.

- Write the hours first. The smaller hand will be exactly on or just past a number.
- Then put the symbol “:”
- Count clockwise by 5’s from 12 (or 0 minutes) to the bigger hand. Write the minutes.

Example: The clocks show 8:20 (*eight twenty*) and 8:50 (*eight fifty*).

<table>
<thead>
<tr>
<th>Hours (h)</th>
<th>Minutes (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smaller hand</td>
<td>Bigger hand</td>
</tr>
<tr>
<td>1 number = 1 h</td>
<td>1 mark = 1 min</td>
</tr>
<tr>
<td>1 lap = 12 h</td>
<td>1 number = 5 min</td>
</tr>
<tr>
<td></td>
<td>1 lap = 1 h = 60 min</td>
</tr>
</tbody>
</table>

Q. Write the time in digital form.

A. 2:35

Counting from 12, the big hand has turned 35 minutes.
The little hand is just past 2 or midway between the 2 (II) and the 3 (III).

a) Write the time in digital form.

b) Write the time in digital form.

c) Write the time in digital form.

d) Write the time in digital form.

e) Write the time in digital form.

f) Write the time in digital form.
Skill 17.3 Showing the time on an analogue clock.

Drawing the minute (min) hand.
- If the time says “past”: Count clockwise by 5’s, pointing as you go, the clock numbers starting with 12.
  - Example: “twenty past eight” 8:20
- Draw the big hand pointing to 4.
- If the time says “to”: Count anti-clockwise by 5’s, pointing as you go, the clock numbers starting with 12.
  - Example: “ten to nine”
- Draw the big hand pointing to 10.
- If the time given is digital: Count clockwise by 5’s from 12 (or 0 min)
  - Example: “eight twenty” 8:20 or “eight fifty” 8:50

Drawing the hour (h) hand.
- If the time says “past”: Draw the smaller hand after the hour.
- If the time says “to”: Draw the smaller hand before the hour.
- If the time given is digital: Draw the hour hand on or past the hour and moving toward the next number.
  - Example: “eight fifty” 8:50

Q. Draw hands on the clock to show that the time is quarter past eight.

A. One quarter of 60 is 15. So the big hand is at 15 minutes past.
  Counting by 5’s the big hand is pointing to the 3. The little hand is quarter of the way past the eight and toward the nine.

a) Draw hands on the clock to show that the time is 7:40.

b) Draw hands on the clock to show that the time is half past ten.

c) Draw hands on the clock to show that the time is 6:05.

d) Draw hands on the watch to show that the time is 5:20.

e) Draw hands on the second clock to show that the time is 2 hours and 10 minutes later.

f) Draw hands on the second clock to show that the time is 4 hours and 15 minutes earlier.
**Skill 17.4 Converting units of time.**

**Conversion Facts - TIME**
- 1 century = 100 years
- 1 decade = 10 years
- 1 year = 12 months = 52 weeks = 365 days
- 1 leap year = 366 days
- 1 fortnight = 2 weeks
- 1 week = 7 days
- 1 day = 24 hours
- 1 hour = 60 minutes
- 1 minute = 60 seconds

**Days in the month:**
- 30 days have September, April, June, and November.
- All the rest have 31 except for February alone which has 28 days clear and 29 in each leap year.

**Q.** Convert to minutes:
- \(3 \frac{1}{2} \text{ hours} = \) min

**A.**
- \(3 \text{ h} \times 60 = 180 \text{ min}\)
- \(\frac{1}{2} \text{ hr} = 30 \text{ min}\)
- \(180 + 30 = 210 \text{ min}\)

**b)** Convert to days:
- 24 hours = day

**c)** Convert to days:
- Month of May = days

**d)** Convert to minutes:
- 1 \(\frac{1}{4}\) hours = min

**e)** Convert to weeks:
- 4 fortnights = weeks

**f)** Convert to seconds:
- 2 \(\frac{1}{2}\) min = s

**g)** Convert to years:
- 5 centuries = years

**h)** Convert to hours:
- 180 minutes = h

**i)** Convert to days:
- 2 years = days

**j)** Convert to days:
- 8 weeks = days

To convert hours to minutes, multiply by 60. Add the minutes.
Skill 17.5 Calculating periods of time (1).

TIME OF DAY
Morning - sunrise to midday
Afternoon - midday to 6 pm
Evening - 6 pm to bedtime
Night - sunset to sunrise

Rule 1: After 60 minutes go to the next hour.
Rule 2: After 12 hours go to the same time but use, am instead of pm or pm instead of am
Example: It is 11:00 am. In another twelve hours it will be 11:00 pm.
Rule 3: After 24 hours go to the same time but the next day. (Similar for 48 and 72 hours also.)
Rule 4: Change from am to pm when you pass midday.
Rule 5: Change from pm to am when you pass midnight.

Q. It is 8:00 pm. In another 20 hours will it be morning or afternoon?

A. afternoon

Break 20 hours up into 12 + 4 + 4 h.
12 hours after 8:00 pm is 8:00 am.
Add the remaining 8 hours by adding
4 hours to get to midday and then
4 more hours to get to 4:00 pm.

a) It is 1:00 pm on Monday. In another 40 hours what day will it be?

b) It is 9:30 pm on Saturday. In another 36 hours what day will it be?

c) It is 7:00 am. In another 50 hours will it be morning or afternoon?

d) It is 3:00 pm. In another 20 hours will it be morning or afternoon?

e) It is 1:30 am. What was the time 2 hours and 20 minutes before this?

f) It is 3:00 pm. In another 10 hours what time will it be?

g) It is 18:00. In another 10 hours what time will it be?
[Use the 24-hour clock.]

h) It is 17:15. What was the time 2 hours and 20 minutes before this?
[Use the 24-hour clock.]
i) The Australian F1 Grand Prix starts at 2:00 pm. At what time will it finish if it goes for 1 hour and 25 minutes?

j) Clarke woke at 6:30 am after 10 hours sleep. At what time did Clarke go to sleep?

k) The movie started at 3:40 pm and played for 105 minutes. At what time did the movie finish?

l) Samantha was in a queue for 3 hours and 55 minutes and purchased concert tickets at 5:20 pm. At what time did she join the queue?

m) A fruit cake requires 75 minutes baking time. It is 11:10 am when the mix is put in the oven. At what time will the cake be cooked?

n) It is now 9:25 am. Fred has an appointment in 4 hours and 35 minutes time. At what time is Fred’s appointment?

o) Queen’s Bohemian Rhapsody plays for nearly 6 minutes. If the song finishes when the clock strikes 10:00 pm, at what time did it start?

p) The women’s world record for the 3000 m is 8:06.11. The youth world record for girls over the same distance is 8:36.45. How much faster are the women?

q) The movie ‘A Hitchhiker’s Guide to the Galaxy’ runs for 110 minutes. If the movie finishes at 1:20 pm, at what time does it start?

r) Up to 2013, the longest ever Davis Cup tennis match went for 7 hours and 2 minutes. How much longer was the Wimbledon match that lasted 11 hours and 5 minutes?

s) You get on the bus at 10:30 am. The trip is expected to take 2 hours and 50 minutes. At what time should you arrive?

t) Joseph spends 1 hour and 20 minutes swimming each morning. He starts at 6:15 am. At what time does Joseph finish?
Skill 17.6 Comparing periods of time.

- Convert all times to the same unit. (see skill 17.4, page 144)
- Compare the times.

<table>
<thead>
<tr>
<th>Q. Circle the longest time.</th>
<th>A. 2 h = 120 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 h 2100 s 210 min</td>
<td>2100 s = 35 min</td>
</tr>
<tr>
<td></td>
<td>210 min = 210 min</td>
</tr>
<tr>
<td></td>
<td>2 h 2100 s 210 min</td>
</tr>
</tbody>
</table>

Convert to minutes.

<table>
<thead>
<tr>
<th>a) Circle the longest time.</th>
<th>b) Circle the longest time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 weekend 96 h 3 days</td>
<td>3 months 100 days 15 weeks</td>
</tr>
<tr>
<td>1 weekend = 2 days</td>
<td></td>
</tr>
<tr>
<td>96 hours = 4 days</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c) Circle the shortest time.</th>
<th>d) Circle the longest time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 fortnight 4 weeks 12 days</td>
<td>15 months 1 year 245 days</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e) Circle the shortest time.</th>
<th>f) Circle the shortest time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mins 1500 s 4 h</td>
<td>quarter of an hour 10 mins 500 s</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g) Circle the longest time.</th>
<th>h) Circle the shortest time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000 s 106 min 1 1/2 h</td>
<td>2500 min 2 days 50 h</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Skill 17.7  Reading timetables.

Q. According to the schedule, what is the longest amount of time the Yarraville Library is open for in any one day?

Yarraville Library
Opening Hours

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Closed</td>
<td>10am - 1pm</td>
<td>10am - 1pm</td>
<td>2pm - 5pm</td>
<td>2pm - 5pm</td>
<td>10pm - 12noon</td>
<td>Closed</td>
</tr>
</tbody>
</table>

A. 3 hours

Check the number of open hours for each day.
10 am until 1 pm is 3 hours.
2 pm until 5 pm is 3 hours.

a) How much time do you spend watching TV if you watch ‘Jakers’ through to the end of ‘Roller Coaster’?

You watch from 4:10 to 6:05.
There are 50 min from 4:10 until 5:00 and 1 h and 5 min after that.

1 h 55 min

b) What train would you need to catch from Central station to be at Bondi station by 5:15 am?

Sydney - Eastern Suburbs & Illawarra Line

<table>
<thead>
<tr>
<th>Destination</th>
<th>From</th>
<th>To</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redfern</td>
<td></td>
<td></td>
<td>4:39 am</td>
<td>4:49 am</td>
<td>5:04 am</td>
</tr>
<tr>
<td>Central</td>
<td></td>
<td></td>
<td>4:42 am</td>
<td>4:52 am</td>
<td>5:07 am</td>
</tr>
<tr>
<td>Town Hall</td>
<td></td>
<td></td>
<td>4:44 am</td>
<td>4:54 am</td>
<td>5:09 am</td>
</tr>
<tr>
<td>Martin Place</td>
<td></td>
<td></td>
<td>4:46 am</td>
<td>4:56 am</td>
<td>5:11 am</td>
</tr>
<tr>
<td>Kings Cross</td>
<td></td>
<td></td>
<td>4:48 am</td>
<td>4:58 am</td>
<td>5:13 am</td>
</tr>
<tr>
<td>Edgecliff</td>
<td></td>
<td></td>
<td>4:50 am</td>
<td>5:00 am</td>
<td>5:15 am</td>
</tr>
<tr>
<td>Bondi Junction</td>
<td></td>
<td></td>
<td>4:53 am</td>
<td>5:03 am</td>
<td>5:18 am</td>
</tr>
</tbody>
</table>

c) According to the schedule, what day is it if the Footscray Library is opening at 1 pm?

Footscray Library
Opening Hours

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10am - 8pm</td>
<td>10am - 8pm</td>
<td>10am - 8pm</td>
<td>10am - 8pm</td>
<td>1pm - 5pm</td>
<td>2pm - 5pm</td>
<td></td>
</tr>
</tbody>
</table>

d) According to the session times, in what state am I if my showing of ‘Bewitched’ ends at 11:42 am?

Bewitched (PG) 102 mins

<table>
<thead>
<tr>
<th>Destination</th>
<th>Depart</th>
<th>Arrive</th>
<th>Frequency</th>
<th>Ferry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rockingham</td>
<td>10:00 am</td>
<td>10:15 pm</td>
<td>TWTFSS</td>
<td>Ararere</td>
</tr>
<tr>
<td>Brisbane Regent</td>
<td>10:15 am</td>
<td>10:30 am</td>
<td>Daily</td>
<td>Arahura</td>
</tr>
<tr>
<td>George St Cinemas</td>
<td>10:30 am</td>
<td>10:45 am</td>
<td>Daily</td>
<td>Kaitaki</td>
</tr>
<tr>
<td>Aranui Cinemas</td>
<td>10:45 am</td>
<td>10:55 am</td>
<td>Daily</td>
<td>Ararere</td>
</tr>
</tbody>
</table>

f) What is the actual time of arrival at Wellington if the 1:10 pm ferry from Picton is running 7 minutes late?

Cook Strait Ferry Timetable - Picton to Wellington

<table>
<thead>
<tr>
<th>Destination</th>
<th>Departs</th>
<th>Arrives</th>
<th>Frequency</th>
<th>Ferry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellington</td>
<td>6:30 pm</td>
<td>7:00 pm</td>
<td>TWTFSS</td>
<td>Ararere</td>
</tr>
<tr>
<td>Wellington</td>
<td>10:30 am</td>
<td>11:00 am</td>
<td>Daily</td>
<td>Arahura</td>
</tr>
<tr>
<td>Wellington</td>
<td>1:10 pm</td>
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18. [Measuring]

Skill 18.1 Estimating length.

EITHER
- Compare the length of the object to a known length. Example: The line segments shown.

OR
- Measure the length against an everyday object. Example: Your thumb.

Q. Estimate the length of the eraser.

A. 50 mm

The eraser looks to be about five times the length of the 10 mm line. A reasonable estimate would be 50 mm.

a) Estimate the length of the tweezers.

Accept 85 to 95

90 mm

b) Estimate the length of the postage stamp.

20 mm

1 cm

20 mm

Accept 1 to 2

cm

c) Estimate the length of the lipstick.

20 mm

mm

d) Estimate the length of the hi-liter.

20 mm

mm

e) Estimate the length of the lips.

1 cm

cm

f) Estimate the length of the leaf.

10 mm

mm
Skill 18.2 Reading and using scales.

- Determine the value of each mark and...
  OR
- Start at zero and count by that amount, pointing to each mark as you go.

Q. At what speed is the car travelling?

A. 56 km/h

The darker calibrations mark every 20 km.
The arrow is between 40 and 60 but after 50 km.
The lighter calibrations mark every 2 km. The arrow is at 3 marks after 50.
Counting 2, 4 to 6.
The car is travelling at 56 km/h.

a) Using the ruler, measure the length of the line.

b) Using the ruler, measure the length of the line.

4 cm

cm

4 cm

cm

c) Using a ruler, measure the length of a side of the square in millimetres.

mm

d) According to the thermometer what is the temperature of the room?

°C

°C

e) At what speed is the car travelling?

f) How much water is in the measuring cylinder?
Skill 18.3 Calculating the perimeter of a shape using a grid.

Q. Find the perimeter of the shape.

A. **14 cm**

Each grid length measures 1 cm.
Mark a starting point.
Count the number of grid lengths around the outside of the shape.
There are 14 lengths or centimetres.

---

**Q.** Find the perimeter of the shape.

**A. 14 cm**

---

**Q.** Find the perimeter of the shape.

**A. 18 cm**

---

**Q.** Find the perimeter of the shape.

**A. cm**

---

**Q.** Find the perimeter of the shape.

**A. cm**

---

**Q.** Find the perimeter of the shape.

**A. cm**

---

**Q.** Find the perimeter of the shape.

**A. cm**
Skill 18.4 Calculating the area of a shape by counting squares (1).

- Count the number of squares of a certain size that are needed to cover the shape.

Q. Find the area of this shape.

A. \(6 \text{ cm}^2\) Each square is 1 cm on each side. Count the squares that cover the surface inside the rectangle. There are 6 squares, each with an area of 1 cm\(^2\)

\[
\text{Area} = 6 \times 1 \text{ cm}^2 = 6 \text{ cm}^2
\]

a) How many small squares are needed to cover the larger shape?

b) How many small squares are needed to cover the larger rectangle?

c) Find the area of this shape.

d) Find the area of this shape.

e) Find the area of this shape.

f) Find the area of this shape.
Skill 18.4  Calculating the area of a shape by counting squares (2).

**g)** Find the area of the shaded rectangle.

![Rectangle](image1.png)

**h)** Find the area of the shaded rectangle.

![Rectangle](image2.png)

**i)** Find the area of the shaded rectangle.

![Rectangle](image3.png)

**j)** Find the area of the shaded square.

![Square](image4.png)

**k)** The shapes below have the same:
   A) perimeter and area
   B) perimeter
   C) area

![Shapes](image5.png)

**l)** The shapes below have the same:
   A) perimeter and area
   B) perimeter
   C) area

![Shapes](image6.png)

**m)** The shapes below have the same:
   A) perimeter and area
   B) perimeter
   C) area

![Shapes](image7.png)

**n)** The shapes below have the same:
   A) perimeter and area
   B) perimeter
   C) area

![Shapes](image8.png)
Skill 18.5 Calculating the area of a shape by counting triangles.

Q. Find the area of this shape.

A. 6 cm²

First count the number of complete squares.
There are 5 complete squares.

Then count the triangles.
Each triangle doubled forms 1 square.
There are 2 triangles in the shape. Together they make 1 more square.

5 + 1 = 6 squares

a) How many small triangles are needed to cover the parallelogram?

b) How many small triangles are needed to cover the shape?

c) Find the area of this shape.

d) Find the area of this triangle.

e) Find the area of this trapezium.

f) Find the area of this parallelogram.
Skill 18.6  Calculating the area of a shape as a result of the enlargement of another shape.

- Count the number of squares that make the area of both the original and the enlarged rectangles.
- Divide the enlarged area by the original area.

Q. Double the length and the width of this rectangle. How many times bigger is the area of the new rectangle compared to the original rectangle?

A. 4

Original area = 14 square units
Enlarged area = 56 square units

Enlarged area ÷ original area = 56 ÷ 14
= 4

a) Double the length and the width of this rectangle. How many times bigger is the area of the new rectangle compared to the original rectangle?

b) Double the length of this square. How many times bigger is the area of the new rectangle compared to the original square?

c) Triple the width of this rectangle. How many times bigger is the area of the new rectangle compared to the original rectangle?

d) Triple the length and the width of this rectangle. How many times bigger is the area of the new rectangle compared to the original rectangle?
Skill 18.7 Describing volume of prisms by counting cubes.

- Count the number of cubes needed to fill the top layer.
- Multiply this amount by the number of layers.

Q. How many cubes were used to make the prism?

A. \[3 \times 5 = 15\]
\[15 \times 4 = 60\]

First count the cubes in the top layer. There are 3 rows of 5 cubes.

Then count the number of layers. There are 4 layers of cubes.

\(\text{Volume} = 1 \text{ cm}^3\)
Skill 18.8 Comparing volume of prisms by counting cubes.

- Count the number of cubes in each prism.
  Hint: Find a shortcut. Count the cubes in the top layer and multiply by the number of rows.
- Compare the number of cubes in each shape.

Q. Which prism has the greater volume?
   A) B)

A.

A) Top layer = 8 cubes
   Number of layers = 6
   \[6 \times 8 = 48 \text{ cubes}\]

B) Top layer = 12 cubes
   Number of layers = 3 layers
   \[3 \times 12 = 36 \text{ cubes}\]

\[48 > 36\] so the answer is A

a) Which prism has the greater volume?
   A) B)

b) Which prism has the lesser volume?
   A) B)

c) Which prism has the greater volume?
   A) B)

d) Which prism has the lesser volume?
   A) B)
Skill 18.9 Calculating perimeter by using a ruler.

- Measure the side lengths of the shape.
- Add the lengths of all sides.

Example: Side length = 2 cm, then the perimeter of the square = 2 + 2 + 2 + 2 = 8 cm

Q. Using a ruler measure the side lengths of the rectangle in centimetres. What is the perimeter of the rectangle?

A. 5 cm 5 cm 2 cm + 2 cm 14 cm

A rectangle has opposite sides the same length.

Measure the length of 1 side.
(5 cm long)

Measure the length of the adjacent side.
(2 cm long)

Add all four sides.
The perimeter of the rectangle is 14 cm.

a) Using a ruler measure the side lengths of the rectangle in centimetres. What is the perimeter of the rectangle?

b) Using a ruler measure the side lengths of the rectangle in centimetres. What is the perimeter of the rectangle?

c) Using a ruler measure the side lengths of the rectangle in centimetres. What is the perimeter of the rectangle?

d) Using a ruler measure the side lengths of the rectangle in centimetres. What is the perimeter of the rectangle?
Skill 19.1 Comparing angles to a right angle.

- Place the corner of a page (which is a right angle) at the corner (vertex) of the angle.
- Align the base of the page with one line of the angle.
- Compare the angle to the right angle that is the page.

If the other line of the angle extends beyond the page, then the angle is “greater than” a right angle.

If the corner of the page matches perfectly, then the angle is “equal to” a right angle.

If the other line of the angle is inside the page, then the angle is “less than” a right angle.

Q. Is the angle shown “less than”, “equal to” or “greater than” a right angle?

A. greater than

The angle appears greater than 90°. Check by placing the corner of a Maths Mate page inside the angle.

a) Is the angle “less than”, “equal to” or “greater than” a right angle?

b) Is the angle “less than”, “equal to” or “greater than” a right angle?

c) Is the angle “less than”, “equal to” or “greater than” a right angle?

d) Is the angle “less than”, “equal to” or “greater than” a right angle?

e) Is the angle “less than”, “equal to” or “greater than” a right angle?

f) Is the angle “less than”, “equal to” or “greater than” a right angle?
Skill 19.2 Recognising 2D shapes.

Q. One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

A. Trace and cut out the shapes to lay over the maze. Slide them to check possible positions. [Remember: Do not change their orientation by turning them. The shapes must have every edge outlined.]

a) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

b) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

c) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

d) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

e) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]

f) One of these shapes is hidden in the maze. Find it and colour it in. [Same size and orientation.]
Consider the name:

gon = angle
penta = 5

You need to draw a shape that has 5 interior angles and therefore 5 sides.

• Draw two dimensional shapes (2D) in two directions, length and width.
  
  **Hint:** 2D shapes have no height.

• Use the name of the shape (based on Latin and Greek words) to work out the number of sides.

Q. Draw a pentagon.

A. Consider the name:

gon = angle
penta = 5

You need to draw a shape that has 5 interior angles and therefore 5 sides.

a) Draw a quadrilateral.

b) Draw a triangle.

c) Draw a rectangle.

d) Draw a square.

e) Draw a decagon.

f) Draw a heptagon.

g) Draw a pentagon.

h) Draw an octagon.

i) Draw a nonagon.

j) Draw a trapezium.

k) Draw a hexagon.

l) Draw a rhombus.
Skill 19.4 Describing polygons.

- Use the name of the polygon (poly means ‘many’ and gon means ‘angle’) to determine the number of interior angles or the number of sides.

**Hint:** The number of interior angles = The number of sides.

**Q.** How many sides does a rhombus have?

A. **4**

A rectangle, square, trapezium and rhombus all belong to the quadrilateral family: \( \text{quad} = 4 \)

**lateral** = sides

**a)** How many interior angles does a triangle have?

**b)** How many sides does a rectangle have?

**c)** How many sides does a decagon have?

**d)** How many interior angles does a square have?

**e)** How many interior angles does a hexagon have?

**f)** How many sides does a pentagon have?

**g)** How many sides does a nonagon have?

**h)** How many sides does an octagon have?

**i)** How many interior angles does a quadrilateral have?

**j)** How many sides does a heptagon have?
Skill 19.5 Recognising properties of triangles and quadrilaterals.

- Look for equal sides or equal angles.
- Look at the types of angles inside the triangle.
- Look at the types of lines inside the triangle or quadrilateral (parallel, perpendicular, symmetry).

Q. This triangle has:
   A) one line of symmetry
   B) two parallel sides
   C) all sides of equal length
   D) one right angle

A. D
   A, B and C are not true.
   D is the correct answer, because the triangle has a right angle.

a) This square has:
   A) one obtuse angle
   B) no line of symmetry
   C) all sides of equal length
   D) two acute angles

b) This kite has:
   A) two parallel sides
   B) one line of symmetry
   C) two perpendicular sides
   D) all sides of equal length

C

c) This rhombus has:
   A) one right angle
   B) two perpendicular sides
   C) all angles equal
   D) two lines of symmetry

d) This trapezium has:
   A) one line of symmetry
   B) two perpendicular sides
   C) two parallel sides
   D) all sides of equal length


e) I am a quadrilateral. I have both pairs of sides parallel. I have four right angles. Any two adjacent sides are not equal in length. What shape am I?
   A) rectangle
   B) square
   C) rhombus

f) I am a quadrilateral. I have opposite sides that are parallel. My diagonals are not equal in length. What shape am I?
   A) square
   B) parallelogram
   C) trapezium


g) I am a quadrilateral. I have both pairs of sides parallel. My diagonals are not equal in length but they do cross at right angles. What shape am I?
   A) parallelogram
   B) square
   C) rhombus

h) I am a quadrilateral. I have two pairs of equal sides. My diagonals cross at right angles. I have only one line of symmetry. What shape am I?
   A) square
   B) kite
   C) rectangle
Skill 19.6 Describing 3D shapes.

- Count the number of: Faces, Edges and/or Vertices (points/corners).

Q. What is the shape of the 3 lateral faces of the triangular prism?

A. *rectangle*

The 2 parallel bases of a triangular prism are triangular in shape. These triangles, as for all prisms, are joined by rectangular faces. The number of rectangular faces is the same as the number of sides on the base shape.

a) How many vertices does a triangular pyramid have?

b) How many edges does a rectangular pyramid have?

c) How many edges does a rectangular prism have?

d) How many faces does a hexagonal pyramid have?

e) The base of a tetrahedron is triangular. What shape are the other faces?

f) What is the shape of the 8 lateral (vertical) faces of the octagonal prism?

g) How many vertices does a pentagonal pyramid have?

h) What is the name of this solid?
   A) pentagonal prism
   B) hexagonal pyramid
   C) pentagonal pyramid
   D) hexagonal prism
Skill 19.7 Measuring angles using a protractor.

- Place the centre of the protractor at the corner (vertex) of the angle.
- Align one line of the angle with a zero line on the protractor.
- Take the reading from where the second line of the angle crosses the scale on the protractor.

**Hint:** Protractors can be read using either the inside or outside scale depending on which zero is used.

Q. Using the protractor measure the size of the angle shown.

A. $55^\circ$

Read from the outside scale. One line of the angle is at $0^\circ$ and the other line of the angle extends around to $55^\circ$.

a) Using the protractor measure the size of the angle shown.

b) Using the protractor measure the size of the angle shown.

c) Using the protractor measure the size of the angle shown.

d) Using the protractor measure the size of the angle shown.
Skill 19.8 Recognising and drawing different types of angles.

To recognise a type of angle
- Draw a right angle using one of the lines and the corner over each of the given angles.
- Compare each angle to the right angles you have drawn.

To draw a type of angle
- Draw a line starting from one end of the given line.
- Draw the line according to the type of angle required (see Glossary).
- Mark the angle with a curved line.

**RIGHT ANGLE**
A right angle measures 90° (degrees).
It is marked with a corner.

---

**Q. Which angle is an obtuse angle?**

A)  
B)  
C)  

**A. C**

The angle is smaller than a right angle ⇒ not obtuse

The angle is equal to a right angle ⇒ not obtuse

The angle is greater than a right angle ⇒ obtuse

---

**a) Which angle is a right angle?**

A)  
B)  
C)  

**b) Which angle is a straight angle?**

A)  
B)  
C)  

d) Draw an acute angle using this line.

d) Draw an obtuse angle using this line.

e) Match the angle to its description.

acute
obtuse
reflex

d) Match the angle to its description.

right
reflex
straight
Q. Name the shape of the cross section through the pentagonal pyramid.

A. **pentagon**

The base of the pyramid is a pentagon. The shape of the cross section will also be pentagonal.

a) Name the shape of the cross section through the triangular prism.

b) Name the shape of the cross section through the hexagonal pyramid.

c) A fly on the ceiling, a father and a baby all looked at the television. Which view looks like the one seen by the fly?

A) B) C)

A) B) C) 

The view of the cross-section is the same as the view from the top.

d) Which tree appears to be the biggest?

e) Name the shape of the cross section through the pentagonal prism.

f) Name the shape of the cross section through the square prism.

g) Which shape shows the cross section produced by slicing through the points indicated on the cube?

h) Which shape shows the cross section produced by slicing through the points indicated on the cube?
Skill 19.10 Identifying nets of 3D shapes (1).

Nets of 3D Shapes

- Identify the shapes in the net.
- Imagine the shape folded.

OR
Make a model by tracing, cutting out and folding the net.

Q. Which shape can this net be used to make?
A) hexagonal pyramid
B) hexagonal prism
C) rectangular prism

A. B
The net is formed from 2 hexagons and 6 rectangles. Pyramids have triangles as their lateral sides. Prisms have rectangles. It must be a prism not a pyramid. This prism has hexagons as its base and top.

OR
Trace, cut out and fold the shape.

a) Which of the boxes can be made from the net below?
A) 
B) 
C) 

Trace, cut out and fold the shape.

b) Which shape can this net be used to make?
A) cube
B) tetrahedron
C) square prism

B

C) Which shape can this net be used to make?
A) square prism
B) rectangular prism
C) cube

d) Which shape can this net be used to make?
A) triangular pyramid
B) square prism
C) square pyramid
Skill 19.10 Identifying nets of 3D shapes (2).

e) Which shape can this net be used to make?
   A) cube
   B) triangular prism
   C) triangular pyramid

f) Which of the boxes can be made from the net below?
   A) 
   B) 
   C) 

g) What 3-dimensional shape can this net be used to make?

h) What 3-dimensional shape can this net be used to make?

i) What 3-dimensional shape can this net be used to make?

j) What 3-dimensional shape can this net be used to make?

k) What 3-dimensional shape can this net be used to make?

l) What 3-dimensional shape can this net be used to make?
Skill 19.11 Drawing top, side and front views of 3D shapes.

**Drawing the top view of a 3D shape**
- Imagine what you would see if you were looking at the solid from directly above.

**Drawing the side view of a 3D shape**
- Imagine what you would see if you were looking at one of the sides of the solid.

**Drawing the front view of a 3D shape**
- Imagine what you would see if you were looking at the front of the solid.

Q. Draw the side view of this solid.

A. 

Which shape is the side view of the solid above?

A)  

Which shape is the top view of the solid above?

A)  

C)  

c) Draw the front view of this solid.

d) Draw the side view of this solid.
20. [Location / Transformation]

Skill 20.1 Describing the movement of an object.

Q. Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)

A.

A) Hold a mirror vertically on the right edge of position 1. This shows the object has been reflected to achieve position 2. correct
   Sketch the object as in position 1.

B) Try sliding it. Note the change in position as a result. incorrect

C) Try turning it. Note the change in position as a result. incorrect

a) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)

   The truck has been turned a quarter of a turn, anticlockwise.

b) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)

   

c) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)


d) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)


e) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)


f) Which movement has transformed this shape?
   A) flip (reflection)
   B) slide (translation)
   C) turn (rotation)


Skill 20.2 Drawing lines of symmetry through a shape.

- Imagine a line along which the shape can be folded to have one part fit exactly over the other part.

Q. Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

A. 2

a) Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

b) Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

c) Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

d) Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

e) Draw the lines of symmetry through the shape. How many lines of symmetry does the shape have?

f) Draw the lines of symmetry through the kite. How many lines of symmetry does it have?

g) Draw the lines of symmetry through the triangle. How many lines of symmetry does it have?

h) Draw the lines of symmetry through the octagon. How many lines of symmetry does it have?
Skill 20.3 Locating places using compass bearings N, E, S and W.

- Refer to the 4 point compass to find your bearings.
  Hint: (Clockwise) - ‘Never Eat Sea Weed’ - North, East, South, West.

Q. Which capital city is east of Skopje, the capital of Macedonia?

A. Istanbul

Find Skopje on the map. Consider that you are there. Imagine the central point of a compass on Skopje. Turn and face the direction of the arrow pointing east. Which capital city would you be looking at?

a) Hansel and Gretel left a trail along the forest path. In which direction did they walk when they first left their house?

b) Hermione’s house is on the north side of Separation Street. On which side of the street is Ron’s house?

c) Of the Queensland cities shown below, which city is the most northerly?

d) In which direction is the Red Sea from Saudi Arabia?
Skill 20.4  Following directions to find a place on a map.

Q.  Head south from the starting point. Take the first road west and the second south. Which beach is at the end of the road?

A.  Newport Beach

Consider one movement at a time. Mark your position as you go.

a) You head south towards ‘E’ street and turn west. To which number Independence Square are you headed?

b) From the corner of Kiewa and Dean Street you walk east for two blocks and then walk south for two blocks. If you then go west, which street are you in?

c) Head north on Morphett St. Turn east into North Terrace. Then take the second turn south. Which square are you approaching?

d) Start at the compass. Go east on E 15th Ave and take the second road north. Turn east again at the next corner. Which street are you in?
**Skill 20.5 Locating places using simple bearings (closest, left, first turn).**

**Q.** In our Solar System which planet is between Mars and Neptune but closest to Mars?

**A.** Jupiter

Check the meaning of any unknown terms used to describe location. *Between* means somewhere in the middle of the boundaries. *Closest* means the shortest distance from.

**Q.** In our Solar System which planet is between Mars and Neptune but closest to Mars?

**A.** Jupiter

**Q.** At Sovereign Hill, which building is between the Ballarat Times and the Tent Maker but closest to the Tent Maker?

**Q.** A dog enters a shed and goes into the pen that is second on the right. What animal is it now with?

**Q.** On the Central Line in London which station is between White City and Bond Street but closest to Bond Street?

**Q.** From the main entry of the church in the Alamo compound you take the second opening on the left and then the first on the right. Where are you?
Skill 20.6 Using regions on a grid to describe location, e.g. A3 (1).

- Start at the bottom left corner of the grid.
- First read **across** the horizontal axis to find the letter that matches the column you need.
- Then read **up** the vertical axis to find the number that matches the row you need.
  The grid space that is common to both lines marks the position you are locating.

Q. Which Island is found at H4?

A. **Churchill Island**

a) Where is the Australian Racing Museum located on the grid?

b) Which animal is located at C1?

c) What is the location of the drain on the tiled bathroom floor?

d) Alaska is located at A3 on this map. Where is New Zealand located?
Skill 20.6 Using regions on a grid to describe location, e.g. A3 (2).

e) Where is the rickshaw located on the grid?

f) Where is the person who is poking out his tongue located on the grid?

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A | B | C | D |

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A | B | C | D | E

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g) Of these fantasy creatures, what would you be if you were at E2?

h) There are 7 pairs of paw prints in this diagram. Find the grid reference of the paw print that has no pair.

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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A | B | C | D | E

---

i) Find the coordinates of the only two identical icecreams. [Hint: cone type, cone colour, scoop type and scoop number all vary.]

j) Find the coordinates of the only two identical tuxedos. [Hint: suit colour, bow tie, buttons and pocket handkerchief all vary.]

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A | B | C | D

---

and
Skill 20.7  Sketching symmetrical shapes.

- Hold a mirror on the fold line to see what you should sketch.
- Sketch this image on the other side of the fold line.

Q. Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

A. [Diagram]

a) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

b) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

c) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

d) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

e) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

f) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

g) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.

h) Paper is folded in half. This design is cut out. Draw the paper unfolded with the full cutout.
Skill 20.8 Using a linear scale to calculate distance (1).

- Put a piece of paper along the distance to be measured.
- Mark the start and end points on the paper.
- Place the paper against the scale matching the starting points.
- Slide the paper across the length of the scale marking the start and end points as you go.
- Add together the distance covered.

Q. Using the scale, what is the marked distance from Perth to Sydney? [Round off to the nearest 500 km.]

A. **4000 km**

Check the scale against the length of the line. Slide the scale as necessary. $4 \times 1000 = 4000$

a) Use the scale to find the length of Brauman Street. [Round off to the nearest 50 m.]

b) Use the scale to find the width of Colorado. [Round off to the nearest 100 km.]

c) Using the scale, what is the marked distance from Cape Manifold to Wreck Reef? [Round off to the nearest 100 km.]

d) Using a ruler and the scale, find the distance between the South Pole and Casey Station. [Round off to the nearest 1000 km.]
Skill 20.8 Using a linear scale to calculate distance (2).

e) Calculate the marked distance from the front door to the kitchen. [Round off to the nearest 1 m.]

f) What is the marked distance from end to end of the Hawaiian islands? [Round off to the nearest 20 km.]

h) Using the scale, what is the distance from the tee to the hole on the first fairway? [Round off to the nearest 1 m.]

i) What is the marked distance from the intersection of the Hume Highway and Townsend Street to Dean Street in Albury? [Round off to the nearest 50 m.]

j) What is the marked distance from Dr Sun Yat-sen Classical Chinese Garden to the Police station? [Round off to the nearest 100 m.]
Skill 20.9  Drawing reflections on a grid (1).

- Mark every vertex on the shape.
- Measure the distance to the dashed line.
- Measure the same distance on the other side of the dashed line.
- Draw a point.
- Join the points.

Q. Complete the drawing so that it has a line of symmetry as shown by the dotted line.

A. 

a) Complete the drawing so that it has a line of symmetry as shown by the dotted line.

b) Complete the drawing so that it has a line of symmetry as shown by the dotted line.

c) Complete the drawing so that it has a line of symmetry as shown by the dotted line.

d) Complete the drawing so that it has a line of symmetry as shown by the dotted line.

e) Complete the drawing so that it has a line of symmetry as shown by the dotted line.

f) Complete the drawing so that it has a line of symmetry as shown by the dotted line.
Skill 20.9 Drawing reflections on a grid (2).

**Skill 20.9 Drawing reflections on a grid (2).**

**g)** Complete the drawing so that it has a line of symmetry as shown by the dotted line.

![Drawing](image1)

**h)** Complete the drawing so that it has a line of symmetry as shown by the dotted line.

![Drawing](image2)

**i)** Complete the drawing so that it has a line of symmetry as shown by the dotted line.

![Drawing](image3)

**j)** Complete the drawing so that it has a line of symmetry as shown by the dotted line.

![Drawing](image4)

**k)** Draw the reflection of this shape in the dotted line.

![Drawing](image5)

**l)** Draw the reflection of this shape in the dotted line.

![Drawing](image6)

**m)** Draw the reflection of this shape in the dotted line.

![Drawing](image7)

**n)** Draw the reflection of this shape in the dotted line.

![Drawing](image8)
Skill 20.9  Drawing reflections on a grid (3).

o) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

q) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

s) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

t) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

u) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

v) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

w) Complete this design so that it has two lines of symmetry as shown by the dotted lines.

x) Complete this design so that it has two lines of symmetry as shown by the dotted lines.
Skill 20.10 Drawing reflections, translations, rotations, enlargements and reductions on a grid (1).

**To draw a shape moved by a reflection**
- Mark every vertex on the shape.
- Measure the distance to the dashed line.
- Measure the same distance on the other side of the dashed line.
- Draw a point.
- Join the points.

**To draw a shape moved by a rotation**
- Rotate each vertex by the given angle, in the given direction.
- Plot and join the rotated points.

**To draw a shape moved by a translation**
- Mark every vertex on the shape.
- From each vertex move across the required number of units.
- Draw a point.
- Join the points.

**To draw a reduced or enlarged shape**
- Measure the length of one side.
- Calculate the reduction or enlargement for this side.
- Repeat for all sides of the shape.
- Redraw the shape.

**Q.** Redraw this shape after doubling its size.

![Diagram](image1)

Doubling means \( \times 2 \).
The distance from A to B is 4 units.
\[ 4 \times 2 = 8 \text{ units} \]
Start drawing the enlargement, 8 units long, from the given corner.
Repeat for all sides of the shape.

**A.**

![Diagram](image2)

**a)** Redraw this shape after translating it 8 units to the right.

![Diagram](image3)

**b)** Redraw this shape after translating it 4 units down.

![Diagram](image4)

**c)** Redraw this shape after translating it 7 units to the left and then 3 units up.

![Diagram](image5)

**d)** Redraw this shape after halving its size.

![Diagram](image6)
Skill 20.10 Drawing reflections, translations, rotations, enlargements and reductions on a grid (2).

e) Redraw this shape after translating it 6 units to the right and then 3 units down.

f) Redraw this shape after reflecting it in the dotted line, and then translating it 3 units down.

g) Redraw this shape after translating it 3 units up and then 5 units to the left.

h) Redraw this shape after doubling its size.

i) Redraw this shape after turning it 90° anticlockwise around the marked point.

j) Redraw this shape after turning it 90° clockwise around the marked point and then translating it 4 units to the right.

k) Redraw this shape after reflecting it in the dotted line, and then translating it 6 units to the left.

l) Redraw this shape after tripling its size.
Skill 20.11 Identifying line and rotational symmetry.

For line symmetry
- Imagine a line along which the shape can be folded to have one part fit exactly over the other part.

For rotational symmetry
- Try to visualise the shape during a full turn of 360° and make sure that the shape could cover itself at least once before the full turn is completed.

Q. The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

A. C

This shape covers itself 4 times before a full 360° turn.
The shape has also line symmetry.

a) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

b) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

c) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

d) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

e) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

f) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

g) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry

h) The shape has:
   A) line symmetry
   B) rotational symmetry
   C) both line and rotational symmetry
Skill 20.12 Finding the coordinates of a point on a Cartesian plane, 
first quadrant.

- Read the coordinate along the horizontal or x-axis first.
- Then read the coordinate on the vertical or y-axis.

Hint: x comes before y in the alphabet.

Q. What are the coordinates of the shark and the surfer on the grid?

A. shark = (1,2) surfer = (4,3)

Trace down from the shark to the x-axis. Write the number (1, ). 1 is the x-coordinate for the shark.

Trace across from the shark to the y-axis. Add the number 2 to the coordinate pair (1,2). 2 is the y-coordinate for the shark.

Repeat for the surfer: (4,3)

a) What are the coordinates of the umpire and the football on the oval?

b) What are the coordinates of the ship and the tugboat on the grid?

umpire = football =

ship = tugboat =

c) Start at (4,1). Draw a line to (3,3) and continue to (6,5), (8,5), (7,3) and (4,1).

d) Find the letter at each pair of coordinates to decode the word.

(4,2) (7,4) (1,5) (7,0) (6,5) (8,3) (7,0)
Skill 20.13 Finding the coordinates of a point on a Cartesian plane, all quadrants.

- Read the coordinate along the horizontal or x-axis first.
- Then read the coordinate on the vertical or y-axis.

*Hint: x comes before y in the alphabet.*

Q. What are the coordinates of the point labelled P on the Cartesian plane?

A. \( P = (-5, -3) \)

Trace toward the x-axis.
Write the number \((-5, \_ )\).

\(-5\) is the x-coordinate for P.

Trace across from P to the y-axis.
Add the number \(-3\) to the coordinate pair.

\(-3\) is the y-coordinate for P.

---

a) List the points in the second quadrant.

b) What are the coordinates of the point labelled M on the Cartesian plane?

---

c) List the points in the fourth quadrant.

d) What are the coordinates of the point labelled C on the Cartesian plane?

- Count the number of grid spaces along the line.
- OR
- If the line crosses an axis, add the number of grid spaces from either side of the axis.

Q. What is the length in units of the segment AB?

A. Length of AB = 10 units

There are 3 grid spaces from A to the x-axis.
There are 7 grid spaces from the x-axis to B.
\[3 + 7 = 10\]

a) What is the length in units of the segment CD?

b) What is the length in units of the segment JK?

c) What is the length in units of the segment MN?

d) What is the perimeter in units of the rectangle ABCD?
21. [Statistics / Probability]

Skill 21.1 Interpreting stacked bar graphs without a scale.

Q. Which group of Australians represent the smallest proportion of our over 18 population?

**AUSTRALIAN Population over 18 years**

- Employees
- Aged pensioners
- Other pensioners
- Self funded retirees
- Students & other

A. **Self funded retirees**

Compare the length of each shaded bar.

Self funded retirees is the shortest length bar.

a) Australian and English cricketers have played for the Ashes since 1876. Which country has had the most wins?

**Ashes Series**

- England
- Australia
- Draw

b) Which coloured medal did Canadians win second most at the 2010 Vancouver Winter Olympics?

**WINTER OLYMPIC MEDALS**

(Vancouver 2010)

- GOLD
- SILVER
- BRONZE

c) What is the main metal in British Pewter?

**Typical Composition of British Pewter**

- Tin
- Antimony
- Copper

d) Which of the ancient Chinese dynasties reigned for the least amount of time?

**Length of ancient Chinese Dynasties**

- Three sovereigns and five emperors
- Xia
- Shang
- Zhou

e) Which category had the most additions to the Hollywood Walk of Fame in 2012?

**Hollywood Walk of Fame - 2012 additions**

- Television
- Motion Pictures
- Musical/Recording
- Radio

f) Which of the types of adult body tissue shown has the lowest percentage of water?

**Adult body tissue - percentage of water by weight**

- Muscle
- Blood
- Fat
- Bone
Skill 21.2 Interpreting stacked bar graphs with a scale.

Q. What percentage of a typical 50 cent piece is copper?

A. 75%

The copper section of the bar is shaded white. It runs from 25% to 100%.

100 – 25 = 75

a) Which chemical element makes up the largest proportion of the Earth’s mass?

b) How many irons are there in this set of golf clubs?

c) How many forwards in a rugby union team?

d) What percentage of 12 year olds have intermediate photographic skills?

e) Which sector employs 15% of New Zealanders?

f) How much is spent on lollies and video games each week?
Skill 21.3  Interpreting pictographs without a scale.

- Add the value of each symbol in the category.

Q. How many silver medals did Italy win at the London 2012 Olympics?

A. \(2 + 2 + 2 + 2 + 1 = 9\)

The silver category has 4 complete medals and half a medal.

London 2012 Olympics - Italy

<table>
<thead>
<tr>
<th>Gold</th>
<th>Silver</th>
<th>Bronze</th>
</tr>
</thead>
<tbody>
<tr>
<td>🏅</td>
<td>🏅</td>
<td>🏅</td>
</tr>
<tr>
<td>🏅</td>
<td>🏅</td>
<td>🏅</td>
</tr>
<tr>
<td>Each 🏅 = 2 medals</td>
<td>Each 🏅 = 1 medal</td>
<td></td>
</tr>
</tbody>
</table>

a) How many premolars does a human have?

Human Teeth

<table>
<thead>
<tr>
<th>Incisors</th>
<th>Canines</th>
<th>Premolars</th>
<th>Molars</th>
</tr>
</thead>
<tbody>
<tr>
<td>🦷</td>
<td>🦷</td>
<td>🦷</td>
<td>🦷</td>
</tr>
<tr>
<td>each 🦷 = 4 teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) How many par 4 holes on the Augusta National golf course?

Augusta National

<table>
<thead>
<tr>
<th>par 3</th>
<th>par 4</th>
<th>par 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each up = 2 holes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

c) Which city is a 5 hour drive from Berlin?

Drive Time

<table>
<thead>
<tr>
<th>Berlin - Paris</th>
<th>Berlin - Warsaw</th>
<th>Berlin - Amsterdam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each 🕒 = 2 hours</td>
<td>Each 🕒 = 1 hour</td>
<td></td>
</tr>
</tbody>
</table>

d) What is the population of Birmingham?

ENGLAND

[Map showing Birmingham]

<table>
<thead>
<tr>
<th>Birmingham</th>
<th>Leeds</th>
<th>Manchester</th>
<th>Nottingham</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000,000 people</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100,000 people</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q. How many more woodwind than brass instruments are in the ABC Symphony Orchestra?

Each interval on the scale equals one instrument.
There are 18 woodwind instruments.
There are 12 brass instruments.

18 \- \ 12 = 6

A. 6

**Instruments in the ABC Symphony Orchestra**

<table>
<thead>
<tr>
<th>Instruments</th>
<th>0</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>String</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woodwind</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Which landmark is closest to 70 m in height?

**Famous Landmarks**

<table>
<thead>
<tr>
<th>Famous Landmark</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sydney Opera House</td>
<td>0 - 50</td>
</tr>
<tr>
<td>Brandenburg Gate</td>
<td>50 - 100</td>
</tr>
<tr>
<td>Leaning Tower of Pisa</td>
<td>100 - 150</td>
</tr>
<tr>
<td>Big Ben</td>
<td>150 - 200</td>
</tr>
<tr>
<td>Statue of Liberty</td>
<td>200 - 250</td>
</tr>
</tbody>
</table>

*as of Feb 2011


d) In which year did Beyonce win her 9th grammy award?

**Grammy Awards - Beyonce**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Grammys</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1</td>
</tr>
<tr>
<td>2001</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>2</td>
</tr>
<tr>
<td>2005</td>
<td>3</td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
</tr>
<tr>
<td>2007</td>
<td>4</td>
</tr>
<tr>
<td>2008</td>
<td>3</td>
</tr>
<tr>
<td>2009</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>1</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
</tr>
</tbody>
</table>
e) How many cars per 100 people are there in Canada?

f) Pain is felt once a sound goes beyond 125 decibels. How many of these sounds would hurt your ears?

- Normal conversation
- Amplified rock music
- Thunder clap
- Rocket launch

g) Name the cities with metro systems between 300 and 400 kilometres in length.

h) How many of the years shown had between 600 and 700 birds hitting high capacity aeroplanes.

i) Which Enid Blyton Series has 15 books?

j) Which of these billionaires has a wealth of approximately 50 billion dollars?
Skill 21.5 Interpreting tables.

- Check what each row and column represents.

Q. Which lessons are Australian girls most likely to choose?  

<table>
<thead>
<tr>
<th>Cultural lessons - Australian Children (5 - 14)</th>
<th>Participation Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td>Boys</td>
</tr>
<tr>
<td>Musical Instrument</td>
<td>13</td>
</tr>
<tr>
<td>Singing</td>
<td>3</td>
</tr>
<tr>
<td>Dancing</td>
<td>2</td>
</tr>
<tr>
<td>Drama</td>
<td>3</td>
</tr>
</tbody>
</table>

A. Dancing

First find the ‘girls’ column.

Then check participation rates down the column. The highest is 24%.

Trace the 24% back along the row to its title, dancing.

a) Which Australian state recorded the earthquake with the highest magnitude?

<table>
<thead>
<tr>
<th>Earthquakes in Australia</th>
<th>Date</th>
<th>Location</th>
<th>State</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.05.2013</td>
<td>NE of Koorda</td>
<td>WA</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>25.05.2013</td>
<td>NW of Koorda</td>
<td>WA</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>25.05.2013</td>
<td>W of Macquarie Island</td>
<td>WA</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>22.05.2013</td>
<td>S of Mundubbera</td>
<td>QLD</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>22.05.2013</td>
<td>Franklin River</td>
<td>WA</td>
<td>2.6</td>
</tr>
</tbody>
</table>

b) Which Imperial ship is closest in length to the Rebellion ship the Y-wing?

<table>
<thead>
<tr>
<th>Rebellion Ships</th>
<th>Length (m)</th>
<th>Imperial Ships</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-wing</td>
<td>12.5</td>
<td>Twin-Ion Engine Starfighters (TIE)</td>
<td>6.3</td>
</tr>
<tr>
<td>Y-wing</td>
<td>16</td>
<td>Imperial Shuttle</td>
<td>20</td>
</tr>
<tr>
<td>B-wing</td>
<td>16.9</td>
<td>AT - AT</td>
<td>14</td>
</tr>
<tr>
<td>Blockade Runner</td>
<td>150</td>
<td>Imperial Star Destroyer</td>
<td>1600</td>
</tr>
<tr>
<td>Mon Calamari Cruiser</td>
<td>1200</td>
<td>Death Star</td>
<td>120 000</td>
</tr>
</tbody>
</table>

c) Which group, males or females, are twice as likely to play with the Wii as their primary console?

<table>
<thead>
<tr>
<th>Primary Console Players</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>X box 360</td>
<td>11%</td>
<td>38%</td>
</tr>
<tr>
<td>Wii</td>
<td>80%</td>
<td>41%</td>
</tr>
<tr>
<td>PS3</td>
<td>9%</td>
<td>21%</td>
</tr>
</tbody>
</table>

d) How far is it from Invercargill to Queenstown?

Road distances between some major cities, given in kilometres.
Skill 21.6 Interpreting bar graphs (1).

Q. What was the most common reason for children to visit the doctor?

A. **Throat problems**

Check the scale along the base of the graph. The more visits to the doctor, the longer the bar.

The longest bar is beside ‘Throat problems’.

---

a) What speed can a koala reach?

**How fast?**

<table>
<thead>
<tr>
<th>Animal</th>
<th>Speed (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Kangaroo</td>
<td>60</td>
</tr>
<tr>
<td>Grey Kangaroo</td>
<td>70</td>
</tr>
<tr>
<td>Koala</td>
<td>50</td>
</tr>
<tr>
<td>Crocodile</td>
<td>30</td>
</tr>
</tbody>
</table>

b) Which of the countries shown has the tallest woman?

**Average height of females** (selected countries)

<table>
<thead>
<tr>
<th>Country</th>
<th>Average adult height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1.6</td>
</tr>
<tr>
<td>Brazil</td>
<td>1.65</td>
</tr>
<tr>
<td>New Zealand</td>
<td>1.65</td>
</tr>
<tr>
<td>China</td>
<td>1.7</td>
</tr>
<tr>
<td>France</td>
<td>1.75</td>
</tr>
<tr>
<td>Canada</td>
<td>1.75</td>
</tr>
</tbody>
</table>

---

c) Name the planet with the greatest diameter.

**OUR SOLAR SYSTEM** (Diameters of planets)

- Earth: 12,000 km
- Jupiter: 139,200 km
- Saturn: 120,600 km

---

d) What is the weight of a newborn giraffe? [Give your answer to the nearest ten.]

**Newborn weight**

- Clydesdale (horse): 100 kg
- Elephant: 110 kg
- Gorilla: 10 kg
- Giraffe: 50 kg
- Hippopotamus: 60 kg
- Polar Bear: 120 kg

---
Skill 21.6 Interpreting bar graphs (2).

e) How many more lighthouses are there in Queensland than Victoria?

f) How many of baseball’s great hitters have made over 700 home runs?

h) Harry booked the 398th and last seat in the room. Which part of the Sydney Opera House was Harry in?

i) The underground railway system in which city has nearly the same number of stations as kilometres in its length?

j) Which continent is closest to 15 million square kilometres in area?
Skill 21.7 Interpreting multiple stacked bar graphs.

Q. Which of these monkeys has the shortest average tail length?

A. Snow monkey

Check the scale along the base of the graph. The shorter the tail length, the shorter the bar.

Check the key. The white bars represent the tail. The shortest white bar is beside the snow monkey.

a) In which round of the 2013 Australian Masters did Karrie Webb score the least pars?

b) Which of the 3 countries shown has the largest percentage of under 15 year olds in their population structure?

c) Which country has the greatest number of public holidays?

d) Which expense is greater than the cost of food for both dog and cat owners?

Annual costs for cat and dog owners
Skill 21.8 Recognising the relative likelihood of an event.

**Q.** Which alternative is closest in meaning to the expression “Par for the course”?

**A.** Consider each alternative. Par on a golf course is set so that ‘some’ people can achieve it. Par is neither certain, nor impossible.

<table>
<thead>
<tr>
<th>a)</th>
<th>Choose the best phrase <em>(is likely to / is unlikely to / will not)</em> to complete this statement: “The moon <strong>will not</strong> collide with the Earth tonight.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>Which alternative is closest in meaning to the expression “Find a needle in a haystack”?</td>
</tr>
<tr>
<td>c)</td>
<td>Which alternative is closest in meaning to the expression “Skating on thin ice”?</td>
</tr>
<tr>
<td>d)</td>
<td>Which alternative is closest in meaning to the expression “It’s a toss up”?</td>
</tr>
<tr>
<td>e)</td>
<td>Which alternative is closest in meaning to the expression “Fat chance”?</td>
</tr>
<tr>
<td>f)</td>
<td>Choose the best phrase <em>(is certain to / is likely to / is unlikely to / will not)</em> to complete this statement: “The Southern Cross be in the Southern sky.”</td>
</tr>
<tr>
<td>g)</td>
<td>Choose the best phrase <em>(is certain to / is likely to / is unlikely to / will not)</em> to complete this statement: “A Russian <strong>will not</strong> win a Commonwealth Games gold medal.”</td>
</tr>
<tr>
<td>h)</td>
<td>Choose the best phrase <em>(is certain to / is likely to / is unlikely to / will not)</em> to complete this statement: “Beethoven <strong>will not</strong> have played the piano.”</td>
</tr>
<tr>
<td>Skill 21.9</td>
<td>Finding the number of objects to achieve a given outcome.</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Q.</strong></td>
<td>A bag contains the letters A R C H I T E C T. Letters are drawn at random. How many letters do you need to pick from the box to be certain you can make the word CAR?</td>
</tr>
<tr>
<td><strong>A.</strong></td>
<td><strong>9</strong>&lt;br&gt;It is possible to pick these letters first: H, I, T, E, T&lt;br&gt;Then it is possible to pick these letters: C, C&lt;br&gt;The next pick will either be an A or an R and still the word CAR cannot be formed.&lt;br&gt;Therefore all 9 letters must be picked to be certain that the word CAR is formed.</td>
</tr>
<tr>
<td><strong>a)</strong></td>
<td>You have six 10-cent coins and ten 20-cent coins in your pocket. What is the smallest number of coins you need to take out of your pocket to be certain of having at least one of each coin? <strong>11</strong></td>
</tr>
<tr>
<td><strong>b)</strong></td>
<td>In the game of Mahjong there are 16 wind tiles, 4 each of North, South, East and West. If the tiles are turned face down on the table, how many tiles do you need to select to be sure to choose at least one East wind?</td>
</tr>
<tr>
<td><strong>c)</strong></td>
<td>You have 10 light bulbs and 3 do not work. What is the smallest number of light bulbs you must check to be certain of having a good one?</td>
</tr>
<tr>
<td><strong>d)</strong></td>
<td>There are 6 orange, 8 blue and 10 red flippers in the swimming bag. How many flippers must you take out of the bag, without looking, to be sure you have a pair of orange flippers?</td>
</tr>
<tr>
<td><strong>e)</strong></td>
<td>There are six pairs of runners in the back of Mike’s closet. Because the closet is dark, how many individual runners must he take out of the closet to make sure he has a matching pair of runners?</td>
</tr>
<tr>
<td><strong>f)</strong></td>
<td>A shop keeper has six green cricket pads, four red pads and two white pads in the store room. There is a power failure and he reaches into the room in the dark. How many pads must he take out to be certain of having at least two green cricket pads?</td>
</tr>
<tr>
<td><strong>g)</strong></td>
<td>A bag contains the letters M E A S U R E M E N T. Letters are drawn at random. How many letters do you need to pick from the box to be certain you can make the word ME?</td>
</tr>
<tr>
<td><strong>h)</strong></td>
<td>A bag contains the letters M I S S I S S I P P I. Letters are drawn at random. How many letters do you need to pick from the box to be certain you can make the word SIP?</td>
</tr>
</tbody>
</table>
Skill 21.10 Describing the likelihood of an outcome.

**Q.** A bag contains 2 white marbles and 12 green marbles. What is the chance that the first marble drawn will be white?

A) impossible  
B) unlikely  
C) likely  
D) certain

**A.**

Only 2 of the 14 marbles are white. Only 2 out of 14 draws will give a white marble.

It is not impossible but it is unlikely that with your first draw you will pick a white marble.

There are 12 chances to draw a green marble.

---

**a)** In a lotto draw, balls numbered 1 to 50 are mixed together. A machine then randomly selects balls numbered 8, 14, 2, 26 and 42. Is the sixth number drawn:

A) more likely to be odd than even,  
B) more likely to be even than odd or  
C) just as likely to be odd as even?

---

**b)** A bag contains 4 white marbles and 4 green marbles. What is the chance that the first marble drawn will be orange?

A) impossible  
B) unlikely  
C) likely  
D) certain

---

**c)** In a lotto draw, balls numbered 1 to 50 are mixed together. A machine then randomly selects balls numbered 8, 14, 2, 21 and 17. Is the sixth number drawn:

A) more likely to be more than 25,  
B) more likely to be less than 25 or  
C) just as likely to be less than 25 as more than 25?

---

**d)** A bag contains 8 white marbles and 4 green marbles. What is the chance that the first marble drawn will be white?

A) impossible  
B) unlikely  
C) likely  
D) certain

---

**e)** A pack contains 5 white, 9 purple, 6 green and 3 orange jelly beans. What is the chance that the first jelly bean taken will be purple?

A) impossible  
B) unlikely  
C) likely  
D) certain

---

**f)** Amanda has six $1 coins and twelve $2 coins in her pocket. What is the chance that the first coin she takes out will be a $1 coin?

A) impossible  
B) unlikely  
C) likely  
D) certain
Skill 21.11 Calculating the probability of a simple event (1).

Probability of an event = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}

- Find the number of favourable outcomes for the event.
- Find the total number of possible outcomes.
- Divide the number of favourable outcomes by the number of possible outcomes.

Q. What is the probability of rolling a number greater than 2 with one roll of a die? [Give the answer as a fraction in its simplest form.]

A. \frac{2}{3}

Event: rolling a number greater than 2
Favourable outcomes (FO): 4 (rolling 3, 4, 5 or 6)
Possible outcomes (PO): 6 (rolling 1, 2, 3, 4, 5, or 6)
Probability: \frac{4}{6} = \frac{2}{3}

a) What is the probability of drawing a Queen from a standard deck of playing cards? [Give the answer as a fraction in its simplest form.]

$$\frac{FO}{PO} = \frac{4}{52} = \frac{1}{13}$$

b) What is the probability of throwing a dart inside an 11-point area when you hit the dart board? [Give the answer as a fraction in its simplest form.]

$$\frac{FO}{PO} = \frac{3}{12}$$

c) Each of the letters in PROBABILITY is put into a bag. If a letter is randomly selected, what is the probability of choosing a consonant? [Give the answer as a fraction in its simplest form.]

$$\frac{FO}{PO} =$$

d) A money bag contains twenty 50-cent coins and sixty 10-cent coins. A coin is randomly selected. What is the probability of a 50-cent coin being selected? [Give the answer as a fraction in its simplest form.]

$$\frac{FO}{PO} =$$
Skill 21.11 Calculating the probability of a simple event (2).

e) A spinner is spun. What is the probability that it will stop on an even number? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

f) A spinner is spun. What is the probability that it will stop on an odd number? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

g) A box has 10 chocolate, 10 plain and 12 creamed biscuits. If a biscuit is randomly selected from the box, what is the probability of choosing a plain biscuit? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

h) A deck of cards has 5 navy, 5 yellow and 5 black cards. A card is randomly picked from the deck. What is the probability of a black card being picked? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

i) What is the probability of rolling a number less than 5 with one roll of a die? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

j) What is the probability of rolling an even number with one roll of a die? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

k) Ben and 11 other athletes are racing in the 800 m event. What is the probability that Ben will win one of 3 medals? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]

l) Janet bought 20 raffle tickets. If there are 200 tickets altogether, what is the probability that one of her tickets will win? [Give the answer as a fraction.]

\[ \frac{\text{FO}}{\text{PO}} = \]
Skill 21.12 Interpreting pie charts.

- Consider each section of the pie chart as a sector of a circle (pie).

**Pie Charts**
Each piece of pie represents a percentage of the total.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>90°</td>
</tr>
<tr>
<td>50%</td>
<td>180°</td>
</tr>
<tr>
<td>75%</td>
<td>270°</td>
</tr>
<tr>
<td>100%</td>
<td>360°</td>
</tr>
</tbody>
</table>

**Q.** Which continent has the least number of countries?

**A. South America**

Look for the smallest sector of the circle.
South America is slightly smaller than Oceania.

**Number of Countries by Continent**

- North America
- South America
- Oceania
- Europe
- Asia
- Africa

**a) What percentage of children in the USA live with their mother only?**

**Child Population by Household USA**

- mother only
- father only
- married couple

- 25%

**b) Which part of an insulated brick veneer home is responsible for one quarter of the heat loss in winter?**

**Insulated Brick Veneer Heat Loss in Winter**

- Ventilation Points
- Windows
- Walls
- Floor
- Ceiling & Roof

**c) If you were one of the 65,000,000 households in the USA to have dogs as a pet, how many are you most likely to have?**

**Households With Dogs**

- 1 dog
- 2 dogs
- 3 dogs

**d) Which age group accounts for closest to 20% of all Facebook users?**

**Facebook Users by age (years) 2011**

- 13-17 years
- 18-25 years
- 26-34 years
- 35-44 years
- 45-54 years
- 55-64 years
<table>
<thead>
<tr>
<th>TERMS</th>
<th>DEFINITIONS</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>abacus</td>
<td>• Beads on a frame used for counting and calculating.</td>
<td><img src="image" alt="Abacus Diagram" /></td>
</tr>
<tr>
<td>acute angle</td>
<td>• An angle measuring less than 90°.</td>
<td><img src="image" alt="Angle Diagram" /></td>
</tr>
<tr>
<td>add (+)</td>
<td>• To join together.</td>
<td>If you add together the number of cows, there are 3.</td>
</tr>
<tr>
<td>addition</td>
<td>• The operation of finding the total or sum of two or more numbers to make one number.</td>
<td>Adding 15 and 6 we reach a total (sum) of 21. 15 + 6 = 21</td>
</tr>
<tr>
<td>am (ante meridiem)</td>
<td>• The time from midnight to midday (morning).</td>
<td><img src="image" alt="AM Clock" /></td>
</tr>
<tr>
<td>analogue clock</td>
<td>• A clock or watch that has rotating hands and shows 12 hour time.</td>
<td><img src="image" alt="Analogue Clock" /></td>
</tr>
</tbody>
</table>
| angle        | • The amount of turning between two straight lines that are fixed at a point.  
• An angle is measured in degrees. | ![Angle Diagram](image)                                                                            |
| annual       | • Happening once a year.                                                   | ![Annual Image](image)                                                                              |
| anticlockwise | • Moving in the opposite direction to the hands on a clock.                | ![Anticlockwise Clock](image)                                                                      |
| approximate  | • Very close to the actual size.                                            
• To estimate by rounding off.                                      | If you have $24.85 in your wallet, you can say you have approximately $25.00.                      |
| **area** | • The amount of surface covered by a 2D-shape.  
• Area is measured in square units e.g. square centimetres (cm²) or square metres (m²).  
  
  | The area of a rectangle is calculated by multiplying length by width:  
  \[ A = lw \]  
  \[ A = 4 \times 2 \]  
  \[ A = 8 \]  
  
  Area = 8 square units  

| **axis of symmetry** | • (pl. axes) See line of symmetry.  
  
  |  

| **backwards** | • Away from your front.  
• In reverse of the usual way.  
  
  |  

| **bar graph** | • Uses bars to show quantities or numbers so they can be easily compared.  
  
  |  

| **base** | • A line or surface on which a figure stands.  
  
  |  

| **between** | • At a place bounded by two or more places.  
  
  | Canberra is between Sydney and Melbourne.  

| **bi** | • (or di) Prefix meaning two.  
  
  | A bicycle has 2 wheels.  

| **brackets ( )** | • A pair of symbols used to group mathematical expressions together.  
  
  | (20 ÷ 5) + 5 = 9  
Brackets group 20 divided by 5  

| **calculate** | • To work something out.  
  
  | 3 + 5 + 6 = 14  

| **calendar** | • A *time* chart that tells us what *day, week, month* and *year* it is. |
| **calibration** | • A mark on a *scale*. |
| **capacity** | • Or *volume*, is the measure of the amount of liquid a container can hold. |
| **cardinal number** | • A *whole number* that shows the amount. |
| **carry over** | • The amount passed to the next *place value* in an algorithm. |
| **Cartesian plane** | • A *plane* divided into four *quadrants* by a *horizontal line* called the *x-axis* and a *vertical line* called the *y-axis*. |
| **cent (¢)** | • The *smallest unit* of money.  
100 cents = 1 *dollar* |
| **century** | • A *unit of time* equal to 100 *years*.  
The 21st century will go from 2001 until 2100. |
<table>
<thead>
<tr>
<th>term</th>
<th>definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>certain</strong></td>
<td>• Being sure.</td>
</tr>
<tr>
<td></td>
<td>• Will definitely happen.</td>
</tr>
<tr>
<td><strong>chance</strong></td>
<td>• The possibility of getting a particular result.</td>
</tr>
<tr>
<td><strong>change (money)</strong></td>
<td>• The leftover money you are given back after buying something.</td>
</tr>
<tr>
<td><strong>clockwise</strong></td>
<td>• Moving in the direction of the hands on a clock.</td>
</tr>
<tr>
<td><strong>closest</strong></td>
<td>• Nearest to.</td>
</tr>
<tr>
<td><strong>column</strong></td>
<td>• A <em>vertical</em> line of <em>data</em> in a table.</td>
</tr>
<tr>
<td><strong>compass</strong></td>
<td>• An instrument that shows <em>direction</em>.</td>
</tr>
<tr>
<td><strong>composite number</strong></td>
<td>• A positive integer that has <em>factors</em> other than just 1 and the number itself.</td>
</tr>
<tr>
<td><strong>commutative property</strong></td>
<td>(of addition and multiplication)</td>
</tr>
<tr>
<td></td>
<td>• Rule: When <em>adding</em> or <em>multiplying</em>, no matter how the numbers are ordered, the answers will always be the same.</td>
</tr>
</tbody>
</table>

**Netball: Aust v NZ**

<table>
<thead>
<tr>
<th></th>
<th>NZ</th>
<th>Netball: Aust v NZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shooting</td>
<td>Actual</td>
</tr>
<tr>
<td></td>
<td>goals</td>
<td>goals</td>
</tr>
<tr>
<td>1st</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2nd</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>3rd</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>4th</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

12 is a composite number. 

$12 = 1 \times 12 = 2 \times 6 = 3 \times 4$

The factors of 12 are: 1, 2, 3, 4, 6, 12
<table>
<thead>
<tr>
<th>cone</th>
<th>• A <em>solid</em> with one circular base and one <em>vertex</em>.</th>
</tr>
</thead>
<tbody>
<tr>
<td>consecutive numbers</td>
<td>• Numbers that follow each other.</td>
</tr>
<tr>
<td>convert</td>
<td>• Change from a unit to another.</td>
</tr>
</tbody>
</table>
| coordinates | • Two numbers that locate a *point*.  
• The *first* number tells you the position of a point along the *x*-axis. The *second* tells you the position of a point along the *y*-axis.  
• They are written in *brackets* with a comma between. |
| counting number | • Any of the *whole numbers* from zero onwards. |
| cross section | • The face that results when an object is cut through. |
| cube | • *A solid* with six identical *square* faces. |
| cylinder | • *A solid* with two *parallel* circular ends of the same size. |
| data | • Collection of information that can include facts, numbers or measurements. |
| day | • *A unit of time* equal to 24 *hours*. |
| deca | • Prefix meaning ten. |
decade • A unit of time equal to 10 years. 2000 to 2009 make a decade.

decagon • A shape with 10 sides.

decimal number • A number based on the ten place value system. The decimal number 4.3 represents: 4 - ones 3 - tenths. OR 4 and 3 tenths.

decimal place

<table>
<thead>
<tr>
<th>units</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

7 is in the tenths place. 6 is in the hundredths place. 3 is in the thousandths place.

decimal point (.) • A point that separates the units and tenths in a decimal number. 2.5 is a decimal number where the 2 and the 5 are separated by a decimal point.

decrease • To make smaller. 8 must decrease by 5 to become 3.

deduct • To take away. If you deduct 1 from 3 there are 2 left. 3 – 1 = 2

degree (°) • A unit used to measure the amount of turn in an angle. The measure of this angle is 45°

degrees Celsius (°C) • A unit used to measure temperature. The thermometer shows 14°C.

denominator • The number below the fraction bar in a fraction. 3 5 – denominator - how many equal parts in one whole
| **diagonal** | • A straight line inside a *polygon* joining any two corners that are not next to each other. |
| **die** | • *(pl. dice)* A numbered *cube* that is used in games. |
| **difference** | • The result when a number is *subtracted* from another number.  
• The amount by which one number is bigger or smaller than another number.  
**The difference between 5 and 3 is 2.**  
\[5 - 3 = 2\] |
| **digit** | • Any of the first ten *whole numbers* from 0 to 9.  
**There are 10 digits:**  
0, 1, 2, 3, 4, 5, 6, 7, 8 or 9. |
| **digit sum** | • The *sum* of the *digits* in a number.  
**124 has a digit sum of 7.**  
\[1 + 2 + 4 = 7\] |
| **digital clock** | • A clock that uses only numbers to show the *time*. *(No hands!)* |
| **dimension** | • A measure of size.  
A *two dimensional* shape (2D shape) has *length* and *width*.  
A *three dimensional* shape (3D shape) has *length*, *width* and *height*. |
| **direction** | • The *way* something is placed or pointing.  
**North, east, south, west, up, down, sideways, backwards and forwards.** |
| **distance** | • The *length* between two points.  
**The distance between the fish is 3 metres.** |
| **divide (÷)** | • To share into groups.  
**These 6 cows are divided into 2 groups.**  
\[6 \div 2 = 3\] in each group |
| **divisible** | • Can be divided without a *remainder*.  
**20 \div 2 = 10\] with 0 remainder.  
So 20 is divisible by 2. |
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>division</strong></td>
<td>The <em>operation</em> of sharing or grouping a number into <em>equal</em> parts.</td>
<td>The division $6 \div 2 = 3$ means: How many groups of 2 can 6 be divided into? OR How many groups of 2 can be taken from 6 before none remain? $\Rightarrow 3$ groups of 2.</td>
</tr>
<tr>
<td><strong>divisor</strong></td>
<td>The second number written in a division. In a <em>fraction</em> the divisor is the denominator.</td>
<td>$8 \div 4 \div 2$ OR $\frac{8}{4} = 2$</td>
</tr>
<tr>
<td><strong>dollar ($$)</strong></td>
<td>A unit of money. 1 dollar = 100 <em>cents</em></td>
<td><img src="image1.png" alt="Dollar images" /></td>
</tr>
<tr>
<td><strong>double</strong></td>
<td><em>Twice</em> as much. <em>Multiplied</em> by two.</td>
<td>Double 4 is: $4 + 4 = 8$ OR $4 \times 2 = 8$.</td>
</tr>
<tr>
<td><strong>east</strong></td>
<td>A <em>compass direction</em>.</td>
<td>The sun rises in the east.</td>
</tr>
<tr>
<td><strong>edge</strong></td>
<td>Where two faces of a solid meet.</td>
<td><img src="image2.png" alt="Edge diagram" /></td>
</tr>
<tr>
<td><strong>eighth</strong></td>
<td>The position after <em>seventh</em>.</td>
<td>1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th...</td>
</tr>
<tr>
<td><strong>enlargement</strong></td>
<td>To reproduce and make bigger.</td>
<td>The original triangle has been enlarged to make it 2× bigger.</td>
</tr>
<tr>
<td><strong>equal (=)</strong></td>
<td>Exactly the same in value or size.</td>
<td>100 centimetres is equal to 1 metre: $100 \text{ cm} = 1 \text{ m}$</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
<td>Example</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>equation</td>
<td>A mathematical sentence formed by placing an equals sign (=) between two expressions.</td>
<td>$6 \times 2 = 9 + 3$ is an equation.</td>
</tr>
<tr>
<td>equivalent fractions</td>
<td><em>Fractions</em> that represent the same number.</td>
<td>$\frac{2}{16}$ and $\frac{8}{64}$ are equivalent fractions. They both equal $\frac{1}{8}$.</td>
</tr>
<tr>
<td>estimate</td>
<td>To make a close guess based on rounding.</td>
<td>$48 + 21 = ?$ By rounding to 50 + 20, the estimation of the sum is 70.</td>
</tr>
<tr>
<td>evaluate</td>
<td>To work out the value.</td>
<td>$21 + x = 3$ Evaluate for $x$. $x = 7$</td>
</tr>
<tr>
<td>even numbers</td>
<td>A whole number that can be divided by two.</td>
<td>$134$ is an even number. $\text{134 \checkmark}$</td>
</tr>
<tr>
<td></td>
<td>Even numbers end with 0, 2, 4, 6 and 8.</td>
<td>$431$ is not an even number. $\text{431 \times}$</td>
</tr>
<tr>
<td>event</td>
<td>Possible outcomes resulting from a particular experiment.</td>
<td>Experiment: A die is rolled. Possible outcomes: Either a 5 or a 6 may result</td>
</tr>
<tr>
<td>faces of a solid</td>
<td>Polygons that join on their edges to form a solid.</td>
<td>A rectangular prism has 6 rectangular faces.</td>
</tr>
<tr>
<td>factor</td>
<td>A whole number that divides exactly into another number. See divisibility tests.</td>
<td>Because $1 \times 12 = 12$ and $2 \times 6 = 12$ and $3 \times 4 = 12$</td>
</tr>
<tr>
<td></td>
<td>1, 2, 3, 4, 6 and 12 are all factors of 12.</td>
<td></td>
</tr>
<tr>
<td>fifth</td>
<td>The position after fourth.</td>
<td>1st, 2nd, 3rd, 4th, 5th......</td>
</tr>
<tr>
<td>first</td>
<td>Placed before anything else.</td>
<td>The first athlete to cross the finish line won the gold medal.</td>
</tr>
<tr>
<td>flip</td>
<td>To turn across a line so the result is a mirror image. See reflection.</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>fortnight</strong></td>
<td>• A unit of time equal to 2 whole weeks or 14 days.</td>
<td></td>
</tr>
</tbody>
</table>
| **forwards**         | • In the direction of your front.  
• The usual way.                                      |
| **fourth**           | • The position after third.  
1st, 2nd, 3rd, 4th…….                                 |
| **fraction**         | • Part of a group.  
• Part of a whole.                                     
• A number in the form $\frac{a}{b}$ ($b \neq 0$) where $a$ is the numerator and $b$ is the denominator.  
• Fractions can be proper fractions or improper fractions.|
| **front view**       | • What you see of an object looking from a frontal perspective.  
• Three-dimensional objects have 3 views: front, top and side. |
| **gram (g)**         | • A unit of measurement for mass equal to 1000 milligrams.                                       |
| **graph**            | • A diagram that shows a collection of data.                                                    |
| **greater than (>)** | • A symbol showing which is bigger.  
10 > 2 means that 10 is greater than 2.                                                              |
| **grid reference**   | • A pair of letters and/or numbers that describe location within a grid. See also coordinates.  |
### Glossary

<table>
<thead>
<tr>
<th><strong>GST (money)</strong></th>
<th>• An abbreviation for the Goods and Services Tax which is applied to certain purchases at a designated <em>rate</em>.</th>
<th>The standard GST in Australia is 10%. If the price of an item is $150 excluding GST then its GST inclusive price would be $165.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>half</strong></td>
<td>• (pl. <em>halves</em>) One of two <em>equal</em> parts expressed as a fraction.</td>
<td>One half is 1 of 2 parts of one whole pizza:</td>
</tr>
<tr>
<td><strong>hectare (ha)</strong></td>
<td>• A <em>unit of area equal</em> to 10000 square metres (100 m × 100 m).</td>
<td>The field measures 2 hectares.</td>
</tr>
<tr>
<td><strong>hedron</strong></td>
<td>• (pl. <em>hedra</em>) Face.</td>
<td>Polyhedron - A solid object that has polygons as faces.</td>
</tr>
<tr>
<td><strong>height</strong></td>
<td>• The <em>vertical</em> distance from top to bottom.</td>
<td></td>
</tr>
<tr>
<td><strong>hepta</strong></td>
<td>• Prefix meaning seven.</td>
<td>See heptagon</td>
</tr>
<tr>
<td><strong>heptagon</strong></td>
<td>• A <em>polygon</em> with 7 sides.</td>
<td></td>
</tr>
<tr>
<td><strong>hexa</strong></td>
<td>• Prefix meaning six.</td>
<td>See hexagon</td>
</tr>
<tr>
<td><strong>hexagon</strong></td>
<td>• A <em>polygon</em> with 6 sides.</td>
<td></td>
</tr>
<tr>
<td><strong>hexagonal prism</strong></td>
<td>• A <em>three dimensional shape</em>. Two identical <em>bases</em> are hexagons. <em>Six faces</em> are rectangles.</td>
<td></td>
</tr>
<tr>
<td><strong>hexagonal pyramid</strong></td>
<td>• A <em>three dimensional shape</em>. The <em>base</em> is a hexagon. <em>Six faces</em> are triangles.</td>
<td></td>
</tr>
<tr>
<td><strong>horizontal line</strong></td>
<td>• <em>Parallel</em> to the horizon.</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>hour (h)</td>
<td>• A unit of time equal to 60 minutes.</td>
<td></td>
</tr>
<tr>
<td>hours</td>
<td>1825.763 has 8 hundreds.</td>
<td></td>
</tr>
<tr>
<td>hundreds</td>
<td>• The place value between tens and thousands.</td>
<td></td>
</tr>
<tr>
<td>hundredth</td>
<td>• One part out of 100 parts of one whole.</td>
<td></td>
</tr>
<tr>
<td>hundredths</td>
<td>• The place value between tenths and thousandths.</td>
<td></td>
</tr>
</tbody>
</table>
| identity element (for addition) | Rule: The sum of any number and zero equals that number.  
• Zero is the identity element for addition.                                                                                                                                                                                                                                                                                     |
| identity element (for multiplication) | Rule: The product of any number and one equals that number.  
• One is the identity element for addition.                                                                                                                                                                                                                                                                                      |
<p>| impossible               | • Cannot happen.                                                                                                                                                                                                                                                                                                                           |
| improper fraction        | • Any fraction in which the numerator is greater than or equal to the denominator.                                                                                                                                                                                                                                                         |
| increase                 | • To make larger or grow in size.                                                                                                                                                                                                                                                                                                       |
| interior angle           | • An angle inside a polygon.                                                                                                                                                                                                                                                                                                            |</p>
<table>
<thead>
<tr>
<th><strong>interacting lines</strong></th>
<th>• Lines that meet at a point.</th>
</tr>
</thead>
</table>
| **integer (\(\mathbb{Z}\))** | • Any *negative number*, zero or *positive number*.  
| | \(-3, -2, -1, 0, 1, 2, 3\) are integers. \(3.5\) and \(\frac{2}{3}\) are not integers. |
| **inverse of an operation** | • The *opposite* operation. Operations that undo each other.  
| | \(+\) is opposite \(-\) \n| | \(\times\) is opposite \(+\) |
| **kilogram (kg)** | • A *unit of weight* equal to 1000 grams.  
| | My father weighs 85 kg. |
| **kilometre (km)** | • A *unit of distance* equal to 1000 metres.  
| | The distance from Melbourne to Sydney is 900 km. |
| **largest to smallest** | • Ranking in order from the biggest to the littlest.  
| | 1st  2nd  3rd  4th |
| **lateral faces** | • The *vertical* surfaces on a solid.  
| | A rectangular prism has 4 lateral faces. |
| **leap year** | • A *year* with 366 *days* that falls every *fourth* year and includes the 29th of February as the extra day.  
| | A leap year is divisible by 4. 2012 will be a leap year. |
| **left** | • The *direction* to the *west* of your body if you are facing *north*.  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  |
| **length** | • The *distance* from one end to the other.  
| | • How long a shape is.  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  
<p>| | 🧵bbie 🧵bbie 🧵bbie 🧵bbie  |</p>
<table>
<thead>
<tr>
<th><strong>less than (&lt;)</strong></th>
<th>• A symbol showing which is smaller.</th>
<th>2 &lt; 10 means that 2 is less than 10.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>likely</strong></td>
<td>• Will probably happen.</td>
<td>This spinner is likely to land on a Z.</td>
</tr>
<tr>
<td><strong>line of symmetry</strong></td>
<td>• A line that divides a shape so that one side is a mirror image of the other. Both sides match exactly when folded.</td>
<td><img src="image" alt="Line of symmetry" /></td>
</tr>
<tr>
<td><strong>litre (L)</strong></td>
<td>• A unit of capacity equal to 1000 millilitres.</td>
<td>1 litre of milk.</td>
</tr>
<tr>
<td><strong>location</strong></td>
<td>• The exact place, where something is situated.</td>
<td><img src="image" alt="Location" /></td>
</tr>
<tr>
<td><strong>longest</strong></td>
<td>• Having the biggest length.</td>
<td>The reticulated python of SE Asia regularly exceeds 6.25 m. The record length is 10 m for a specimen shot in Celebes, Indonesia in 1912.</td>
</tr>
<tr>
<td><strong>magic square</strong></td>
<td>• A square grid filled with numbers • The sum of the numbers in every row, column and diagonal is the same.</td>
<td><img src="image" alt="Magic Square" /></td>
</tr>
<tr>
<td><strong>map</strong></td>
<td>• A diagram of a region showing its position in the world.</td>
<td><img src="image" alt="Map" /></td>
</tr>
</tbody>
</table>

---

1 litre of milk.
<table>
<thead>
<tr>
<th><strong>mass</strong></th>
<th>• The amount of matter in an object.</th>
<th>The mass of 3 oranges is about 1 kg.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>maximum</strong></td>
<td>• The highest value.</td>
<td>The maximum speed in a residential area is 50 kilometres per hour.</td>
</tr>
<tr>
<td><strong>metre (m)</strong></td>
<td>• A unit of length equal to 100 centimetres.</td>
<td>Track distances are measured in metres.</td>
</tr>
</tbody>
</table>
| **millilitre (mL)** | • A unit of capacity.  
  • 1000 millilitres is equal to 1 litre. | Medicines are measured in mL. |
| **millimetre (mm)** | • A unit of length.  
  • 1000 millimetres is equal to 1 metre. | Timber length is measured in millimetres. |
| **million** | • A thousand thousands. | 1 000 000 |
| **minimum** | • The lowest value. | The minimum temperature reached yesterday was 25°C. |
| **minus (−)** | • Another word for subtract. To take away. | $20$ minus $5$ is $15$.  
  $20 − 5 = 15$ |
| **minute (min)** | • A unit of time equal to 60 seconds. | One minute has 60 seconds. |
| **mixed number** | • The sum of a whole number and a fraction less than one. | $3\frac{5}{7}$ is a mixed number. |
| **month** | • A unit of time equal to 28, 29, 30 or 31 days. | There are 12 months in a year starting with January. |
| **morning** | • The early part of the day ending at 12 noon. | |
| **multiple** | • A multiple of a whole number is the product of that number with any non-zero whole number. | The multiples of 2 are 2, 4, 6, 8, 10, ....  
  $2 \times 1 = 2$  
  $2 \times 2 = 4$  
  $2 \times 3 = 6$ etc. |
<table>
<thead>
<tr>
<th><strong>multiplication</strong></th>
<th>• An <em>operation</em> where a number is added to itself a number of times.</th>
<th>$2 + 2 + 2 + 2 + 2 = 10$ or $5 	imes 2 = 10$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>multiply (×)</strong></td>
<td>• To find the <em>total</em> of a number of identical groups.</td>
<td>Three lots of 2 cows is 6. $3 	imes 2 = 6$ or $2 + 2 + 2 = 6$</td>
</tr>
<tr>
<td><strong>negative number</strong></td>
<td>• A number that is less than zero.</td>
<td>$-1, -2, -3, -4, -5, ...$ are negative numbers.</td>
</tr>
<tr>
<td><strong>net</strong></td>
<td>• The pattern you cut out to form a 3D shape.</td>
<td>Net of a cube.</td>
</tr>
<tr>
<td><strong>ninth</strong></td>
<td>• The <em>position</em> after eighth.</td>
<td>1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th......</td>
</tr>
<tr>
<td><strong>nona</strong></td>
<td>• Prefix meaning nine.</td>
<td>See nonagon</td>
</tr>
<tr>
<td><strong>nonagon</strong></td>
<td>• A <em>polygon</em> with 9 sides.</td>
<td><img src="image" alt="Nonagon Regular nonagon" /></td>
</tr>
<tr>
<td><strong>north</strong></td>
<td>• A <em>compass direction</em>.</td>
<td><img src="image" alt="North" /></td>
</tr>
<tr>
<td><strong>northeast</strong></td>
<td>• A <em>compass direction</em>.</td>
<td><img src="image" alt="Northeast" /></td>
</tr>
<tr>
<td><strong>northwest</strong></td>
<td>• A <em>compass direction</em>.</td>
<td><img src="image" alt="Northwest" /></td>
</tr>
<tr>
<td><strong>number line</strong></td>
<td>• An evenly marked <em>line</em> that shows position of numbers.</td>
<td><img src="image" alt="Number line" /></td>
</tr>
<tr>
<td><strong>number sentence</strong></td>
<td>• A sentence using numbers and <em>operations</em>.</td>
<td>“Mary had four cats and two dogs. How many pets did she have?” Number sentence: $4 + 2 = 6$</td>
</tr>
<tr>
<td><strong>numeral</strong></td>
<td>• A symbol used to represent a number.</td>
<td>Arabic numerals: 1, 2, 3, 4, 5 Roman numerals: I, II, III, IV, V</td>
</tr>
<tr>
<td><strong>numerator</strong></td>
<td>• The number above the fraction bar in a fraction.</td>
<td>![numerator](three fifths)</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>oblique line</strong></td>
<td>• A line at an angle to the horizon.</td>
<td><img src="angle" alt="oblique line" /></td>
</tr>
<tr>
<td><strong>obtuse angle</strong></td>
<td>• An angle measuring greater than 90° and less than 180°.</td>
<td><img src="angle" alt="obtuse angle" /></td>
</tr>
<tr>
<td><strong>octa</strong></td>
<td>• Prefix meaning eight.</td>
<td><img src="octopus" alt="octa" /></td>
</tr>
<tr>
<td><strong>octagon</strong></td>
<td>• A polygon with 8 sides.</td>
<td><img src="octagon" alt="octagon" /></td>
</tr>
<tr>
<td><strong>odd numbers</strong></td>
<td>• A whole number that is not divisible by 2.</td>
<td><img src="numbers" alt="odd numbers" /></td>
</tr>
<tr>
<td><strong>of</strong></td>
<td>• Means to multiply.</td>
<td><img src="multiply" alt="of" /></td>
</tr>
<tr>
<td><strong>once</strong></td>
<td>• On one occasion.</td>
<td><img src="once" alt="once" /></td>
</tr>
<tr>
<td><strong>operation</strong></td>
<td>• A mathematical process performed according to certain rules.</td>
<td><img src="operations" alt="operation" /></td>
</tr>
<tr>
<td><strong>opposite</strong></td>
<td>• The equivalent position but on the other side.</td>
<td><img src="opposite" alt="opposite" /></td>
</tr>
<tr>
<td><strong>order</strong></td>
<td>• Placing a group in a special arrangement.</td>
<td><img src="order" alt="order" /></td>
</tr>
</tbody>
</table>
| **order of operations** | • The order of doing *operations*.  
1) *Simplify* inside all *brackets*.  
2) Calculate × and ÷ from left to right.  
3) Calculate + and – from left to right. | Calculate \( 4 + 3 \times (6 - 2) \) by  
1) \( = 4 + 3 \times 4 \)  
2) \( = 4 + 12 \)  
3) \( = 16 \) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ordinal numbers</strong></td>
<td>• A <em>whole number</em> that shows position.</td>
<td>1st, 2nd, 3rd, 4th, 5th...... are ordinal numbers.</td>
</tr>
<tr>
<td><strong>orientation</strong></td>
<td>• Position relative to <em>direction</em>.</td>
<td>The tornado is coming from the west.</td>
</tr>
<tr>
<td><strong>outcome</strong></td>
<td>• Result.</td>
<td>The outcome (result) of ( 2 \times 4 ) is 8</td>
</tr>
<tr>
<td><strong>pair</strong></td>
<td>• Two together.</td>
<td></td>
</tr>
</tbody>
</table>
| **parallelogram** | • A special *quadrilateral*.  
*Opposite* sides are *parallel lines*.  
*Opposite* sides are equal in length. | | |
| **pattern** | • Numbers or objects that are arranged following a rule. | | |
| **penta** | • Prefix meaning five. | See *pentagon* |
| **pentagon** | • A *polygon* with 5 sides. | | |
| **pentagonal prism** | • A *three dimensional* shape.  
Two identical, *parallel bases* are *pentagons*.  
Five *faces* are *rectangles*. | | |
| **pentagonal pyramid** | • A *three dimensional* shape.  
*Base* is a *pentagon*.  
Five *faces* are *triangles*. | | |
| **per** | • For each.  
• Can be written as a forward slash (/). | 5 kilometres per hour or 5 km/h means 5 km travelled for each hour. |
| **percentage** | • Out of 100  
• ‘Per’ means for each, ‘cent’ means 100. | \( 59\% = \frac{59}{100} = 0.59 \) |
<table>
<thead>
<tr>
<th>perimeter</th>
<th>• The distance around the outside of a shape.</th>
<th>Add the length of all sides. Perimeter $= 4 + 5 + 6 = 15$ cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>perimeter figure</td>
<td><img src="image.png" alt="Perimeter Figure" /></td>
<td></td>
</tr>
<tr>
<td>perspective</td>
<td>• The appearance of objects affected by size and position.</td>
<td></td>
</tr>
<tr>
<td>pictograph</td>
<td>• A graph that uses pictures or symbols to represent data.</td>
<td></td>
</tr>
<tr>
<td>pie chart</td>
<td>• A graph that represents data as a sector of a circle.</td>
<td></td>
</tr>
<tr>
<td>place holder</td>
<td>• Minds a spot in a number.</td>
<td>Zeros are used as place holders in long multiplication algorithms.</td>
</tr>
<tr>
<td>place holder</td>
<td><img src="image.png" alt="Place Holder" /></td>
<td></td>
</tr>
<tr>
<td>place value</td>
<td>• Value according to position in a number.</td>
<td>954 5 is in the tens place 5 has a value of 50</td>
</tr>
<tr>
<td>place value table</td>
<td><img src="image.png" alt="Place Value Table" /></td>
<td></td>
</tr>
<tr>
<td>plane</td>
<td>• A flat surface.</td>
<td>2 cows plus 3 cows gives you 5 cows. 2 + 3 = 5</td>
</tr>
<tr>
<td>plus (+)</td>
<td>• Another word for addition. To add.</td>
<td></td>
</tr>
</tbody>
</table>
**pm (post meridiem)**
- The *time* from midday to midnight.
- Every night Jimmy starts reading at 9 pm.

**polygon**
- A closed *two-dimensional* shape for which all sides are line segments.
  - 3 or more *sides* and *angles*.
- ‘Poly’ means many ‘gon’ means angle.
  - triangle (3 angles)

<table>
<thead>
<tr>
<th>polygon</th>
<th>regular polygon</th>
<th>Number of Sides</th>
<th>Number of Interior angles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangle</td>
<td>Equilateral triangle</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Quadrilateral</td>
<td>Square</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Pentagon</td>
<td>Regular pentagon</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Hexagon</td>
<td>Regular hexagon</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Heptagon</td>
<td>Regular heptagon</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Octagon</td>
<td>Regular octagon</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Nonagon</td>
<td>Regular nonagon</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Decagon</td>
<td>Regular decagon</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**polyhedron**
- A *three dimensional* shape.
  - Four or more *faces*.
  - Described by their *faces*, *edges* and *vertices*.
- ‘Poly’ means many ‘hedron’ means faces.
  - tetrahedron (4 faces)

**position**
- Where something is in relation to things around it.
- In, on, under, behind, next to.

**positive numbers**
- A number that is *greater than* zero.
- +1, +2, +3, +4, +5, ....... are positive numbers.

**possible**
- Can happen.
- landing on a head
<table>
<thead>
<tr>
<th>power</th>
<th>• An expression, such as $4^3$, in which the base (4) is multiplied by itself a number of times equal to the exponent (3).</th>
</tr>
</thead>
<tbody>
<tr>
<td>powers of ten</td>
<td>• 1 followed by a certain number of zeros.</td>
</tr>
<tr>
<td>previous</td>
<td>• The one before.</td>
</tr>
</tbody>
</table>
| prime number | • A **whole number** that has exactly two **factors**, 1 and itself.  
• 1 is not a prime number. |
| prism | • A **three dimensional** shape.  
**Two parallel bases** are the same. |
<table>
<thead>
<tr>
<th>prism</th>
<th><strong>Properties</strong></th>
<th><strong>Number of</strong></th>
<th><strong>Examples</strong></th>
</tr>
</thead>
</table>
| Triangular Prism | Bases are triangles  
Lateral faces are rectangles | 5 | 9 | 6 |
| Square Prism | Bases are squares  
Lateral faces are rectangles | 6 | 12 | 8 |
| Rectangular Prism | Bases are rectangles  
Lateral faces are rectangles | 6 | 12 | 8 |
| Pentagonal Prism | Bases are pentagons  
Lateral faces are rectangles | 7 | 15 | 10 |
| Hexagonal Prism | Bases are hexagons  
Lateral faces are rectangles | 8 | 18 | 12 |
| product | • The result when two or more numbers are multiplied. |
| profit | • What is gained, less any expenses.  
**Profit** = **Revenue** − **Expense**.  

The product of 4 and 5 is 20:  
$4 \times 5 = 5 \times 4 = 20$  

Revenue from a business activity is $20.  
If the expenses are $15 then the profit would be $5.
**proper fraction**

- Any fraction in which the numerator is less than the denominator.

- Example: \(\frac{5}{8}\) where the numerator is 5 and the denominator is 8. Since \(5 < 8\), it is a proper fraction.

---

**protractor**

- A semi-circular tool used to measure degrees. There are 180° on a protractor.

---

**pyramid**

- A three dimensional shape.
- One base is a polygon.
- All other faces are triangles that meet at one point called vertex.
- A pyramid is named for the shape of its base.

<table>
<thead>
<tr>
<th>Pyramid</th>
<th>Properties</th>
<th>Number of</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triangular Pyramid</td>
<td>Base is a triangle</td>
<td>4 6 4</td>
<td><img src="image1" alt="Triangular Pyramid" /></td>
</tr>
<tr>
<td></td>
<td>Lateral faces are triangles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Square Pyramid</td>
<td>Base is a square</td>
<td>5 8 5</td>
<td><img src="image2" alt="Square Pyramid" /></td>
</tr>
<tr>
<td></td>
<td>Lateral faces are triangles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectangular Pyramid</td>
<td>Base is a rectangle</td>
<td>5 8 5</td>
<td><img src="image3" alt="Rectangular Pyramid" /></td>
</tr>
<tr>
<td></td>
<td>Lateral faces are triangles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentagonal Pyramid</td>
<td>Base is a pentagon</td>
<td>6 10 6</td>
<td><img src="image4" alt="Pentagonal Pyramid" /></td>
</tr>
<tr>
<td></td>
<td>Lateral faces are triangles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexagonal Pyramid</td>
<td>Base is a hexagon</td>
<td>7 12 7</td>
<td><img src="image5" alt="Hexagonal Pyramid" /></td>
</tr>
<tr>
<td></td>
<td>Lateral faces are triangles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**quadrant**

- Any quarter of a plane divided by an x-axis and a y-axis.

- Example: Quadrant 1, Quadrant 2, Quadrant 3, Quadrant 4.
### quarter
- One of four equal parts of a group or object.
- Written as the fraction $\frac{1}{4}$.

### rectangle
- A special parallelogram.
  Four right angles.

### rectangular prism
- A three dimensional shape.
  Six rectangular faces.

### rectangular pyramid
- A three dimensional shape.
  One rectangular base.
  All the other faces are triangles.

### reduction
- Make smaller or decrease.

### reflection
- A movement that flips a figure across a line so that the figure is in the mirror image position.
<table>
<thead>
<tr>
<th><strong>reflex angle</strong></th>
<th>• An <em>angle</em> measuring greater than 180° and less than 360°.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>regular shape</strong></td>
<td>• A shape with all <em>sides</em> and all <em>angles equal</em>.</td>
</tr>
<tr>
<td><strong>remainder</strong></td>
<td>• The amount left over when one number cannot be <em>divided</em> exactly by another.</td>
</tr>
<tr>
<td><strong>reversible</strong></td>
<td>• Able to be turned in the <em>opposite</em> way.</td>
</tr>
<tr>
<td><strong>rhombus</strong></td>
<td>• A special <em>parallelogram</em>. Four <em>equal sides</em>. <em>Opposite angles equal</em>.</td>
</tr>
<tr>
<td><strong>right</strong></td>
<td>• The <em>direction</em> to the <em>east</em> of your body if you are facing <em>north</em>.</td>
</tr>
<tr>
<td><strong>right angle</strong></td>
<td>• An <em>angle</em> measuring exactly 90°. It is marked with a corner.</td>
</tr>
<tr>
<td><strong>Roman numerals</strong></td>
<td>• Numeral system invented by the ancient Romans.</td>
</tr>
<tr>
<td><strong>rotation</strong></td>
<td>• A movement that turns a shape about a fixed <em>point</em> (the centre of rotation) by a given <em>angle</em> (the angle of rotation).</td>
</tr>
</tbody>
</table>
**rotational symmetry**

- A shape has rotational symmetry if a rotation of 180° or less produces an image that fits exactly on the original shape.

This shape has rotational symmetry because after a rotation of 120° it looks identical to the original.

---

**round**

- To approximate a number to a given place value.
  Look at the next digit after the given place value you are rounding to.
  If this digit is less than 5, keep the digit in the given place value the same.
  If this digit is greater than or equal to 5, add 1 to the digit in the given place value. Then make the digit you were looking at zero.

Round 263 to the nearest 10:

- 3 < 5 so 6 stays
- 3 becomes 0
- 263 = 260

Round 268 to the nearest 10:

- 8 ≥ 5 so add 1 to 6
- 8 becomes 0
- 268 = 270

---

**row**

- A horizontal line of data in a table.

---

**scale**

- A key on a scale drawing/map that tells how the drawing’s dimensions and life size dimensions are related.
- Set of marks on a line.

If the scale on a map is 1 cm:10 m then every cm on the drawing represents 10 m in real life.

---

**scale drawing**

- Changing the size of an object but not the shape.

---

**second**

- The position after first.

---

**second (s)**

- A very short unit of time.

There are 60 seconds in 1 minute.

---

**segment**

- Two points and all points on the line between the two points. Part of a line.

---

**seventh**

- The position after sixth.
| **shortest** | • Having the smallest *length*. | Sam is the shortest in the class. |
| **side** | • One of the lines that form a *polygon*. | |
| **side view** | • What you see of an object looking from a side *perspective*.  
• *Three-dimensional* objects have 3 views: front, top and side. | |
| **simplest form of a fraction** | • *A fraction* is in its simplest form when the only number that divides into both the *numerator* and the *denominator* is 1. | The simplest form of $\frac{6}{9}$ is $\frac{2}{3}$.  
(Divide 6 and 9 by 3.  
2 and 3 can only be divided by 1 so they can not be reduced.) |
| **simplify** | • To reduce to the *simplest form*. | To simplify the ratio 14:6 divide both sides by 2.  
14:6 simplified is 7:3. |
| **sixth** | • The *position* after fifth. | 1st, 2nd, 3rd, 4th, 5th, 6th……. |
| **size** | • How big an object is. | The size of the wave is 2 metres. |
| **slide** | • Move without changing direction. | |
| **smallest to largest** | • Ranking in order from the littlest to the biggest. | 1st 2nd 3rd 4th |
| **solid** | • A *three dimensional* shape that encloses a part of space. | |
| **south** | • A *compass direction*. | |
| **southeast** | • A *compass direction*. | |
| **southwest** | • A *compass direction*. | |
| **sphere** | • A set of *points* in space of equal distance from the central point. |
| **square** | • A *rectangle* with all *sides* of equal length. |
| **square number** | • A number that results from multiplying another number by itself.  
  \[ 4 \times 4 = 16 \]  
  16 is a square number. |
| **square centimetre** | • A *unit of area equal* to 1 centimetre by 1 centimetre. |
| **square metre** | • A *unit of area equal* to 1 metre by 1 metre. |
| **square prism** | • A *three dimensional shape*.  
  Two identical square bases.  
  All the other faces *rectangles*. |
| **square pyramid** | • A *three dimensional shape*.  
  One square base.  
  All the other faces are *triangles*. |
| **square units** | • A *unit of area equal* to the area of a square with side lengths of 1 unit.  
  \[ A = lw \]  
  \[ A = 3 \times 2 \]  
  \[ A = 6 \]  
  Area = 6 square units |
| **squared** | • Multiplying a number by itself.  
  A number raised to the second *power*.  
  4 squared written as \( 4^2 \):  
  \[ 4^2 = 4 \times 4 = 16 \] |
| **straight angle** | • An *angle* measuring 180°. |
| **subtract** | • To take away or *minus*.  
  If you subtract 10 from 15 you are left with 5:  
  \[ 15 - 10 = 5 \] |
| **sum** | • The result when two or more numbers are added.  
  The sum of 20 and 6 is 26:  
  \[ 20 + 6 = 6 + 20 = 26 \] |
symmetry

- A shape has a *line of symmetry* when a line can be drawn through the shape so that one side of the shape is the mirror image of the other.

There are 3 kinds of symmetry:
- horizontal symmetry
- vertical symmetry
- rotational symmetry

---

table

- *Data* organised in *columns* and *rows*.

<table>
<thead>
<tr>
<th>NZ (Quarters)</th>
<th>Shooting chances</th>
<th>Actual goals</th>
<th>Success %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>9</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>2nd</td>
<td>14</td>
<td>13</td>
<td>92.85</td>
</tr>
<tr>
<td>3rd</td>
<td>23</td>
<td>20</td>
<td>86.95</td>
</tr>
<tr>
<td>4th</td>
<td>18</td>
<td>17</td>
<td>94.44</td>
</tr>
</tbody>
</table>

---

temperature

- How hot or cold a thing is.
- Temperature is measured in *degrees* Celsius (°C) with a *thermometer*.

100°C is the temperature at which water boils.

---

tens

- The *place value* between the *units* and *hundreds*.

1825.763 has 2 tens.

---

tenth

- One part out of 10 parts of one whole.

---

tenths

- The *place value* after the *decimal point* between the *units* and *hundredths*.

1825.763 has 7 tenths.

---

term

- A number or unknown amount.

---

tetrahedron

- A *three dimensional, regular* shape.
- The *base* is an *equilateral triangle*.
- Three faces are *equilateral triangles*.
| **thermometer** | • An instrument used to measure *temperature*. |
| **third** | • The *position* after *second*. |
| **thousands** | • The *place value* between *hundreds* and tens of thousands. |
| **thousandth** | • One part out of 1000 parts of one whole. |
| **thousandths** | • The *place value* after *hundredths*. |
| **three dimensional (3D)** | • Able to be measured in three directions namely *length*, *width* and *height*. |
| **time** | • The continuum from past to present to future. |
| **time zone** | • Regions of different times around the world. Based on Greenwich Mean Time (GMT), each 15° of longitude away from Greenwich, England represents 1 hour of time. |
| **tonne (t)** | • A *unit of measurement* for *mass equal* to 1000 kilograms. |
| **top view** | • What you see of an object looking from a top perspective.  
• Three-dimensional objects have 3 views: front, top and side. |
| **total** | • The whole lot.  
• The sum of two or more quantities.  
The total of 2 and 7 and 3 is 12:  
$$2 + 7 + 3 = 12$$ |
| **transformation** | • A movement of a shape in a coordinate plane. Types of transformations are translations, reflections and rotations.  
See translation, reflection and rotation |
| **translation** | • A movement that slides a shape without lifting or changing direction.  
The shape is unchanged. |
| **trapezium** | • A quadrilateral.  
Two opposite sides are parallel. |
| **tri** | • Prefix meaning three.  
A tricycle has 3 wheels. |
| **trial and error** | • To try repeatedly and learn from mistakes.  
This sum can be solved using trial and error.  
$$\begin{array}{c} \text{TWO} \\ + \text{TWO} \\ \text{FOUR} \end{array}$$ |
| **triangle** | • A polygon with 3 straight sides. |
| **triangular prism** | • A three dimensional shape.  
Two identical triangular bases.  
Three rectangular faces. |
| **triangular pyramid** | • A three dimensional shape.  
One triangular base.  
The other three faces are triangles. |
| **triple** | • Multiply by three.  
Children $\times 3 =$ triplets! |
<table>
<thead>
<tr>
<th><strong>turn</strong></th>
<th>• To <em>rotate</em> about a point.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>twenty-four hour time</strong></td>
<td>• Time told in 24 hour lots using 4 <em>digits</em>. Nine thirty is 0930 or 09:30 Two thirty is 1430 or 14:30</td>
</tr>
<tr>
<td><strong>twice</strong></td>
<td>• Two times. Sam has $5 and Jo has $10. Jo has twice as much as Sam.</td>
</tr>
<tr>
<td><strong>two dimensional (2D)</strong></td>
<td>• Able to be measured in 2 <em>directions</em> (<em>length</em> and <em>width</em>).</td>
</tr>
<tr>
<td><strong>uncertain</strong></td>
<td>• Not sure it will happen.</td>
</tr>
<tr>
<td><strong>unit</strong></td>
<td>• One. The unit of measurement for length is metre (m).</td>
</tr>
<tr>
<td><strong>units</strong></td>
<td>• The <em>place value</em> before the decimal point between the <em>tens</em> and <em>tenths</em>. 1825.763 has 5 units.</td>
</tr>
</tbody>
</table>
## Venn diagram
- A diagram using shapes to show the relationship between sets of objects.

## unlikely
- Probably will not happen.

## Vertex
- *(pl. vertices)* The point at which two *sides* (of a *polygon*) or three *edges* (of a *solid*) meet.

## Vertical line
- A line at right angles to the horizon.

## Units of Measurement

<table>
<thead>
<tr>
<th>Unit</th>
<th>Abbreviation</th>
<th>Examples</th>
<th>Used for measuring.....</th>
</tr>
</thead>
<tbody>
<tr>
<td>millimetre</td>
<td>mm</td>
<td>thickness of a plank of wood</td>
<td>LENGTH</td>
</tr>
<tr>
<td>centimetre</td>
<td>cm</td>
<td>width of a photo frame</td>
<td></td>
</tr>
<tr>
<td>metre</td>
<td>m</td>
<td>length of a lap of a stadium</td>
<td></td>
</tr>
<tr>
<td>kilometre</td>
<td>km</td>
<td>distance between two cities</td>
<td></td>
</tr>
<tr>
<td>gram</td>
<td>g</td>
<td>weight of an egg</td>
<td>MASS</td>
</tr>
<tr>
<td>kilogram</td>
<td>kg</td>
<td>weight of a bag of apples</td>
<td></td>
</tr>
<tr>
<td>tonne</td>
<td>t</td>
<td>weight of an elephant</td>
<td></td>
</tr>
<tr>
<td>millilitre</td>
<td>mL</td>
<td>liquid in a glass</td>
<td>CAPACITY</td>
</tr>
<tr>
<td>litre</td>
<td>L</td>
<td>liquid in a bucket</td>
<td></td>
</tr>
<tr>
<td>megalitre</td>
<td>ML</td>
<td>liquid in a water tower</td>
<td></td>
</tr>
<tr>
<td>square centimetre</td>
<td>cm²</td>
<td>area of a Maths book cover</td>
<td>AREA</td>
</tr>
<tr>
<td>square metre</td>
<td>m²</td>
<td>area of basketball court</td>
<td></td>
</tr>
</tbody>
</table>

## Units
- **millimetre**
- **centimetre**
- **metre**
- **kilometre**
- **gram**
- **kilogram**
- **tonne**
- **millilitre**
- **litre**
- **megalitre**
- **square centimetre**
- **square metre**

## Abbreviation Examples
- Thickness of a plank of wood
- Width of a photo frame
- Length of a lap of a stadium
- Distance between two cities
- Weight of an egg
- Weight of a bag of apples
- Weight of an elephant
- Liquid in a glass
- Liquid in a bucket
- Liquid in a water tower
- Area of a Maths book cover
- Area of basketball court

## Units of Measurement Chart

<table>
<thead>
<tr>
<th>Unit</th>
<th>Abbreviation</th>
<th>Examples</th>
<th>Used for measuring.....</th>
</tr>
</thead>
<tbody>
<tr>
<td>millimetre</td>
<td>mm</td>
<td>thickness of a plank of wood</td>
<td>LENGTH</td>
</tr>
<tr>
<td>centimetre</td>
<td>cm</td>
<td>width of a photo frame</td>
<td></td>
</tr>
<tr>
<td>metre</td>
<td>m</td>
<td>length of a lap of a stadium</td>
<td></td>
</tr>
<tr>
<td>kilometre</td>
<td>km</td>
<td>distance between two cities</td>
<td></td>
</tr>
<tr>
<td>gram</td>
<td>g</td>
<td>weight of an egg</td>
<td>MASS</td>
</tr>
<tr>
<td>kilogram</td>
<td>kg</td>
<td>weight of a bag of apples</td>
<td></td>
</tr>
<tr>
<td>tonne</td>
<td>t</td>
<td>weight of an elephant</td>
<td></td>
</tr>
<tr>
<td>millilitre</td>
<td>mL</td>
<td>liquid in a glass</td>
<td>CAPACITY</td>
</tr>
<tr>
<td>litre</td>
<td>L</td>
<td>liquid in a bucket</td>
<td></td>
</tr>
<tr>
<td>megalitre</td>
<td>ML</td>
<td>liquid in a water tower</td>
<td></td>
</tr>
<tr>
<td>square centimetre</td>
<td>cm²</td>
<td>area of a Maths book cover</td>
<td>AREA</td>
</tr>
<tr>
<td>square metre</td>
<td>m²</td>
<td>area of basketball court</td>
<td></td>
</tr>
</tbody>
</table>
### Volume
- The amount of space that a *solid* occupies. Volume is measured in cubic units, e.g. cubic centimetres (cm³) or cubic metres (m³).

Volume of a rectangular prism is calculated by multiplying length by width by height:

\[ V = lwh \]

\[ V = 4 \times 2 \times 3 \]

\[ V = 24 \]

Volume = 24 cubic units

### Week
- A *unit of time* equal to 7 days; Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday.

Roger was on holidays for one week (seven days).

### Weight
- The heaviness of an object. Equals the *mass* of an object times the force of gravity. This means that weight changes with any change in gravity.

A 3 kg brick weighs:
- 3 kg on Earth,
- about 0.5 kg on the moon,
- 0 kg in space.

### West
- A *compass direction*.

The sun sets in the west.

### Whole Numbers
- The *counting numbers* from zero to infinity.

0, 1, 2, 3, 4, 5, ........ are whole numbers.

### Width
- How wide an object is. The sideways *dimension*.

The width of the CD is 12 cm.

### X-axis
- The *horizontal* axis.

### X-coordinate
- The *first* number in an ordered pair. The position of a point along the X-axis.
<table>
<thead>
<tr>
<th><strong>y-axis</strong></th>
<th>• The <em>vertical</em> axis.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>y-coordinate</strong></td>
<td>• The <em>second</em> number in an ordered pair. The position of a point along the <em>Y</em>-axis.</td>
</tr>
<tr>
<td><strong>year</strong></td>
<td>• A <em>unit</em> of <em>time</em> equal to 365 days. (366 in a leap year).</td>
</tr>
</tbody>
</table>
### SYMBOLS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>plus or add</td>
</tr>
<tr>
<td>−</td>
<td>minus or subtract</td>
</tr>
<tr>
<td>×</td>
<td>multiplied by, times, lots of</td>
</tr>
<tr>
<td>÷</td>
<td>divided by, into groups of</td>
</tr>
<tr>
<td>=</td>
<td>equals, is equal to</td>
</tr>
<tr>
<td>≠</td>
<td>is not equal to</td>
</tr>
<tr>
<td>≈</td>
<td>is approximately equal to</td>
</tr>
<tr>
<td>&lt;</td>
<td>is less than, 4 &lt; 6</td>
</tr>
<tr>
<td>&gt;</td>
<td>is greater than, 8 &gt; 5</td>
</tr>
<tr>
<td>≤</td>
<td>is less than or equal to</td>
</tr>
<tr>
<td>≥</td>
<td>is greater than or equal to</td>
</tr>
<tr>
<td>%</td>
<td>percentage, 12% = (\frac{12}{100})</td>
</tr>
<tr>
<td>.</td>
<td>decimal point as in 7.9</td>
</tr>
<tr>
<td>( )</td>
<td>parentheses, or brackets -</td>
</tr>
<tr>
<td></td>
<td>a grouping symbol</td>
</tr>
<tr>
<td>(\frac{4}{7})</td>
<td>fraction, (4 ÷ 7), four sevenths</td>
</tr>
<tr>
<td></td>
<td>right angle</td>
</tr>
<tr>
<td></td>
<td>parallel lines</td>
</tr>
<tr>
<td></td>
<td>lines of equal length</td>
</tr>
</tbody>
</table>
### NUMBER FACTS (1)

#### Adding and subtracting 0

Adding and subtracting 0 to any number leaves the number unchanged.

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3 + 0$</td>
<td>$3$</td>
</tr>
<tr>
<td>$2.5 + 0$</td>
<td>$2.5$</td>
</tr>
<tr>
<td>$\frac{4}{9} + 0$</td>
<td>$\frac{4}{9}$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expression</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>$3 - 0$</td>
<td>$3$</td>
</tr>
<tr>
<td>$2.5 - 0$</td>
<td>$2.5$</td>
</tr>
<tr>
<td>$\frac{4}{9} - 0$</td>
<td>$\frac{4}{9}$</td>
</tr>
</tbody>
</table>

#### Multiplying by 0

The product of any number and 0 is 0.

- $7 \times 0 = 0$
- $81.6 \times 0 = 0$
- $\frac{3}{5} \times 0 = 0$

#### Dividing by 0

Dividing by 0 is meaningless. 4 ÷ 0 and $\frac{3}{0}$ are meaningless operations.

#### Power of 0

Any number raised to the power of 0 is 1.

- $1^0 = 1$
- $(0.5)^0 = 1$
- $(-24)^0 = 1$

#### 0 as the result of a sum

The sum of any number, except zero, and its opposite is 0.

- $4 + (-4) = 0$
- $2.6 + (-2.6) = 0$
- $\frac{5}{8} + (-\frac{5}{8}) = 0$

#### 0 used in decimals

0’s can be added when needed after the last digit and the decimal point.

- $4 = 4.000$

0’s can be added when needed before the first digit of the decimal number.

- $4 = 4.0 = 0004.0$

By convention, decimal numbers less than 1 are written with a 0 before the decimal point.

- $.4 = 0.4$

#### 0 as a probability

When the probability of an event is 0, the event is ‘impossible’.

#### 0 in words

Some of the words used to represent 0 are: nought, nil, none, nothing, zilch, zip.

#### 0 facts

0 is a whole number and a digit but is neither a positive nor a negative number.
### Multiplying by 1

Any number multiplied by 1 remains unchanged.

- $3 \times 1 = 3$
- $2.5 \times 1 = 2.5$
- $\frac{4}{9} \times 1 = \frac{4}{9}$

### Dividing by 1

Any number divided by 1 remains unchanged.

- $7 \div 1 = 7$
- $81.6 \div 1 = 81.6$
- $\frac{3}{5} \div 1 = \frac{3}{5}$

### 1 as a fraction

1 can be renamed as a fraction whenever the numerator is the same as the denominator.

- $1 = \frac{2}{2}$
- $1 = \frac{3}{3}$
- $1 = \frac{4}{4}$
- $1 = \frac{5}{5}$

### Power of 1

Any number raised to the power of 1 remains unchanged.

- $7^1 = 7$
- $(6.8)^1 = 6.8$
- $(-4)^1 = -4$

### 1 as a percentage

1 is the same as 100%.

- $1 = \frac{100}{100} = 100\%$

### 1 as the result of a product

The product of any number, except zero, and its reciprocal is 1.

- $4 \times \frac{1}{4} = 1$

### 1 in words

Some of the words used to represent 1 are: one, a, an, each, single, unit.

### 1 facts

1 is a whole number and a digit but not a prime number.

1 is a factor of any whole number.
**Number Facts (3)**

**Place Value**

<table>
<thead>
<tr>
<th>millions</th>
<th>hundreds of thousands</th>
<th>tens of thousands</th>
<th>thousands</th>
<th>hundreds</th>
<th>tens</th>
<th>units</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000,000</td>
<td>100,000</td>
<td>10,000</td>
<td>1000</td>
<td>100</td>
<td>10</td>
<td>1</td>
<td>0.1</td>
<td>0.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Decimals / Fractions / Percentages**

For denominator put 1 followed by one zero for each digit after the decimal point and simplify

1) Simplify inside all brackets first.
2) Evaluate powers and square roots.
3) Do all multiplications or divisions in order from left to right.
4) Do all additions or subtractions in order from left to right.

**Prime Numbers < 100**

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89 and 97

**Operation Terminology**

**Addition:** sum, all together, in total, more than

**Subtraction:** difference, less than, change

**Multiplication:** product, times, lots of

**Division:** a fraction (half, third, quarter) of, quotient

**Order of Operations**

1) Simplify inside all brackets first.
2) Evaluate powers and square roots.
3) Do all multiplications or divisions in order from left to right.
4) Do all additions or subtractions in order from left to right.
## MEASUREMENT FACTS (1)

### CONVERSIONS

<table>
<thead>
<tr>
<th>Length</th>
<th>Temperature - degrees Celsius (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 millimetres (mm) = 1 centimetre (cm)</td>
<td>0°C = freezing point of water</td>
</tr>
<tr>
<td>100 cm = 1 metre (m)</td>
<td>100°C = boiling point of water</td>
</tr>
<tr>
<td>1000 mm = 1 kilometre (km)</td>
<td>37°C = human body temperature</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100 square mm (mm²) = 1 square cm (cm²)</td>
<td></td>
</tr>
<tr>
<td>10 000 cm² = 1 square metre (m²)</td>
<td></td>
</tr>
<tr>
<td>10 000 m² = 1 hectare (ha)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mass</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 milligrams (mg) = 1 gram (g)</td>
<td></td>
</tr>
<tr>
<td>1000 g = 1 kilogram (kg)</td>
<td></td>
</tr>
<tr>
<td>1000 kg = 1 tonne (t)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid Capacity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 millilitres (mL) = 1 litre (L)</td>
<td></td>
</tr>
<tr>
<td>1000 L = 1 kilolitre (kL)</td>
<td></td>
</tr>
<tr>
<td>1000 kL = 1 megalitre (ML)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>60 seconds (s) = 1 minute (min)</td>
<td></td>
</tr>
<tr>
<td>60 minutes (min) = 1 hour (h)</td>
<td></td>
</tr>
<tr>
<td>24 hours (h) = 1 day</td>
<td></td>
</tr>
<tr>
<td>7 days = 1 week</td>
<td></td>
</tr>
<tr>
<td>2 weeks = 1 fortnight</td>
<td></td>
</tr>
<tr>
<td>4 weeks (approx.) = 1 month</td>
<td></td>
</tr>
<tr>
<td>365 =</td>
<td></td>
</tr>
<tr>
<td>52 weeks (approx.) = 1 year</td>
<td></td>
</tr>
<tr>
<td>12 months =</td>
<td></td>
</tr>
<tr>
<td>366 days = 1 leap year</td>
<td></td>
</tr>
<tr>
<td>10 years = 1 decade</td>
<td></td>
</tr>
<tr>
<td>100 years = 1 century</td>
<td></td>
</tr>
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</table>
## MEASUREMENT FACTS (2)

### TIME

<table>
<thead>
<tr>
<th>O’CLOCK</th>
<th>ANALOGUE - PAST</th>
</tr>
</thead>
</table>
| BIG HAND on 12  
LITTLE HAND on the hour | PAST - big hand to the right |
| **five o’clock**  
5:00 | **20 minutes past 7** |

<table>
<thead>
<tr>
<th>A QUARTER PAST</th>
<th>ANALOGUE - TO</th>
</tr>
</thead>
</table>
| BIG HAND on 3  
LITTLE HAND past the hour | TO - big hand to the left |
| **a quarter past five**  
5:15 | **10 minutes to 4** |

<table>
<thead>
<tr>
<th>HALF PAST</th>
<th>DIGITAL - PAST</th>
</tr>
</thead>
</table>
| BIG HAND on 6  
LITTLE HAND half way past the hour | DIGITAL - PAST |
| **half past five**  
5:30 | **4:25** |

<table>
<thead>
<tr>
<th>A QUARTER TO</th>
<th>DIGITAL - TO</th>
</tr>
</thead>
</table>
| BIG HAND on 9  
LITTLE HAND before the hour | **a quarter to six**  
5:45 |
| **10:40** | **10:40** |
GEOMETRY FACTS

2D shapes

<table>
<thead>
<tr>
<th>Acute</th>
<th>Right</th>
<th>Obtuse</th>
<th>Straight</th>
<th>Reflex</th>
<th>Revolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 90°</td>
<td>90°</td>
<td>more than 90°</td>
<td>180°</td>
<td>more than 180°</td>
<td>360°</td>
</tr>
<tr>
<td>90°</td>
<td>0°</td>
<td>less than 180°</td>
<td>0°</td>
<td>less than 360°</td>
<td>360°</td>
</tr>
</tbody>
</table>

Triangle types

- **Sides and angles**
  - no equal sides/angles: **scalene**
  - two equal sides/angles: **isosceles**
  - three equal sides/angles: **equilateral**

- **Angles**
  - all acute angles: **acute-angled**
  - one right angle: **right-angled**
  - one obtuse angle: **obtuse-angled**

Quadrants

There are 4 quadrants in a Cartesian plane.
In this Cartesian plane coordinates (-3,2) are in quadrant 2.
9. [Decimals] page 37

Skill 9.1
a) 47 hundredths = 0.47, b) 35 hundredths = 0.35
c) 6 tenths = 0.6, d) 8 tenths = 0.8
e) 23 hundredths = 0.23, f) 19 hundredths = 0.19
g) 4 tenths + 6 hundredths = 0.46
h) 9 tenths + 1 hundredth = 0.91
i) 3 tenths + 2 hundredths = 0.32
j) 6 tenths + 6 hundredths = 0.66
k) 8 tenths + 3 hundredths = 0.83
l) 2 tenths + 7 hundredths = 0.27
m) 7 tenths + 0 hundredths = 0.70
n) 5 tenths + 4 hundredths = 0.54
o) 7 tenths + 8 hundredths = 0.78
p) 1 tenth + 0 hundredths = 0.10
q) 2 tenths + 9 hundredths = 0.29
r) 6 tenths + 5 hundredths = 0.65

Skill 9.2
a) 0.2, b) 0.7, c) 0.9, d) 3.2, e) 4.1, f) 5.8, g) 6.1, h) 0.06
i) 0.03, j) 0.24, k) 0.71, l) 0.66, m) 2.31, n) 5.69, o) 1.12

Skill 9.3
a) 4.4 m, b) 0.7 m, c) 1.9 m, d) 2.7 cm, e) 1.2 m, f) 1.6 cm
g) 3.4 m, h) 2.3 m
i) 

Skill 9.4
a) $0.24, b) $0.31, c) $0.59, d) $1.00, e) $9.00, f) $4.00
g) $1.26, h) $4.59, i) $7.46, j) $0.90, k) $0.30, l) $0.50
m) $2.06, n) $7.04, o) $8.01, p) $0.08, q) $0.04, r) $0.03

Skill 9.5
a) B and C, b) C and D, c) B and D, d) A and D, e) B and D
f) A and B

Skill 9.6
a) $6.25, b) $8.00, c) $6.60, d) $5.10, e) $5.45, f) $8.35

Skill 9.7
a) $1.55, b) $2.70, c) $7.95, d) $9.10, e) $5.35, f) $1.15

Skill 9.8
a) 0.05, b) 0.60, c) 0.45, d) 1.10, e) 0.65, f) 0.55
g) $8.45, h) $1.20, i) 2.14, j) 8.04, k) 8.70, l) 7.55, m) 7.71
n) 9.52, o) 10.91, p) 9.45, q) 11.28, r) 8.10, s) 6.24, t) 4.56
u) 18.46, v) 14.28, w) 13.53, x) 31.01, y) 8.86, z) 12.76
A) 8.29, B) 16.51, C) 39.86, D) 24.04, E) 66.40, F) 68.03

Skill 9.9
a) 3.85, b) 1.73, c) 3.15, d) 0.98, e) 1.17, f) 6.67, g) 3.51
h) 3.82, i) 2.57, j) 0.77, k) 2.26, l) 0.78, m) 12.75, n) 12.46
o) 13.46, p) 9.37

Skill 9.10
a) 1.7, b) 0.5, c) 6.2, d) 3.1, e) 2.75, f) 8.65, g) 5.39, h) 3.73
i) 2.82, j) 4.68, k) 1.17, l) 6.28

Skill 9.11
a) $14.30, b) $17.05, c) $4.09, d) $2.73, e) $2.18, f) $10.91
g) $4.55, h) $12.27

Skill 9.12
a) 53, b) 62, c) 97, d) 18, e) 7, f) 1, g) 41.8, h) 50.6, i) 37.9
j) 10.3, k) 27.4, l) 95.6, m) 270, n) 910, o) 830, p) 50
q) 470, r) 90, s) 625, t) 781, u) 439

Skill 9.13
a) 60.3, b) 84.8, c) 36.9, d) 68.4, e) 72.3, f) 37.8, g) 89.6
h) 32.8, i) 5.15, j) 6.08, k) 7.53, l) 4.92, m) 5.06, n) 9.78
o) 12.09, p) 30.06

10. [Fractions] page 53

Skill 10.1
a) $\frac{2}{5}$, b) $\frac{3}{11}$, c) $\frac{4}{7}$, d) $\frac{3}{5}$, e) $\frac{3}{4}$

Skill 10.2
a) $\frac{1}{2}$, b) $\frac{1}{4}$, c) $\frac{1}{3}$, d) $\frac{2}{5}$, e) $\frac{2}{3}$

Skill 10.3
a) A and C, b) B and D, c) A and B, d) C and D
e) $\frac{1}{6}$, f) $\frac{1}{7}$, g) $\frac{1}{5}$, h) $\frac{1}{9}$, i) $\frac{12}{12}$, j) $\frac{4}{4}$, k) $\frac{15}{15}$, l) $\frac{3}{3}$

Skill 10.4
a) $\frac{1}{2}$, b) $\frac{1}{6}$, c) $\frac{1}{4}$, d) $\frac{2}{5}$, e) $\frac{5}{7}$, f) $\frac{1}{3}$, g) $\frac{5}{8}$, h) $\frac{3}{10}$

Skill 10.5
a) $\frac{2}{3}$, b) $\frac{13}{24}$, c) $\frac{23}{35}$, d) $\frac{3}{5}$, e) $\frac{4}{13}$, f) $\frac{10}{3}$

Skill 10.6
a) 

Skill 10.7
a) $\frac{5}{8}$

Skill 10.8
a) $<$, b) $\frac{1}{6}$

Skill 10.9
a) $>$, b) $\frac{3}{7}$, c) $\frac{1}{1}$, d) $\frac{2}{3}$, e) $\frac{3}{5}$, f) $\frac{4}{6}$

Skill 10.10
a) $\frac{6}{6}$

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### Skill 10.11

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{3}{4}$</td>
<td>$0.75$</td>
<td>$75%$</td>
</tr>
<tr>
<td>$\frac{5}{8}$</td>
<td>$0.625$</td>
<td>$62.5%$</td>
</tr>
<tr>
<td>$\frac{3}{5}$</td>
<td>$0.6$</td>
<td>$60%$</td>
</tr>
<tr>
<td>$\frac{4}{5}$</td>
<td>$0.8$</td>
<td>$80%$</td>
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### Skill 10.12

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</tr>
</thead>
<tbody>
<tr>
<td>$\frac{7}{10}$</td>
<td>$0.7$</td>
<td>$70%$</td>
</tr>
<tr>
<td>$\frac{11}{12}$</td>
<td>$0.92$</td>
<td>$92%$</td>
</tr>
<tr>
<td>$\frac{2}{5}$</td>
<td>$0.4$</td>
<td>$40%$</td>
</tr>
<tr>
<td>$\frac{9}{10}$</td>
<td>$0.9$</td>
<td>$90%$</td>
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### Skill 10.13

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<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{3}{5}$</td>
<td>$0.6$</td>
<td>$60%$</td>
</tr>
<tr>
<td>$\frac{1}{2}$</td>
<td>$0.5$</td>
<td>$50%$</td>
</tr>
<tr>
<td>$\frac{3}{4}$</td>
<td>$0.75$</td>
<td>$75%$</td>
</tr>
<tr>
<td>$\frac{5}{8}$</td>
<td>$0.625$</td>
<td>$62.5%$</td>
</tr>
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### Skill 10.14

<table>
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<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{2}{3}$</td>
<td>$0.666\ldots$</td>
<td>$66.6%$</td>
</tr>
<tr>
<td>$\frac{1}{3}$</td>
<td>$0.333\ldots$</td>
<td>$33.3%$</td>
</tr>
<tr>
<td>$\frac{3}{5}$</td>
<td>$0.6$</td>
<td>$60%$</td>
</tr>
<tr>
<td>$\frac{2}{5}$</td>
<td>$0.4$</td>
<td>$40%$</td>
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### Skill 10.15

<table>
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<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{3}{4}$</td>
<td>$0.75$</td>
<td>$75%$</td>
</tr>
<tr>
<td>$\frac{5}{8}$</td>
<td>$0.625$</td>
<td>$62.5%$</td>
</tr>
</tbody>
</table>

### Skill 10.16

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{8}{10}$</td>
<td>$0.8$</td>
<td>$80%$</td>
</tr>
<tr>
<td>$\frac{6}{7}$</td>
<td>$0.857\ldots$</td>
<td>$85.7%$</td>
</tr>
<tr>
<td>$\frac{7}{8}$</td>
<td>$0.875$</td>
<td>$87.5%$</td>
</tr>
<tr>
<td>$\frac{5}{6}$</td>
<td>$0.833\ldots$</td>
<td>$83.3%$</td>
</tr>
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### Skill 10.17

<table>
<thead>
<tr>
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<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{4}{7}$</td>
<td>$0.571\ldots$</td>
<td>$57.1%$</td>
</tr>
<tr>
<td>$\frac{5}{7}$</td>
<td>$0.714\ldots$</td>
<td>$71.4%$</td>
</tr>
<tr>
<td>$\frac{3}{5}$</td>
<td>$0.6$</td>
<td>$60%$</td>
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</table>

### Skill 11.11

<table>
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<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{2}$</td>
<td>$0.5$</td>
<td>$50%$</td>
</tr>
<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
</tr>
<tr>
<td>$\frac{1}{5}$</td>
<td>$0.2$</td>
<td>$20%$</td>
</tr>
<tr>
<td>$\frac{1}{8}$</td>
<td>$0.125$</td>
<td>$12.5%$</td>
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### Skill 11.12

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
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<tbody>
<tr>
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<td>$50%$</td>
</tr>
<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
</tr>
<tr>
<td>$\frac{1}{5}$</td>
<td>$0.2$</td>
<td>$20%$</td>
</tr>
<tr>
<td>$\frac{1}{8}$</td>
<td>$0.125$</td>
<td>$12.5%$</td>
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### Skill 11.13

<table>
<thead>
<tr>
<th>Fraction</th>
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<tbody>
<tr>
<td>$\frac{1}{2}$</td>
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<td>$50%$</td>
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<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
</tr>
<tr>
<td>$\frac{1}{5}$</td>
<td>$0.2$</td>
<td>$20%$</td>
</tr>
<tr>
<td>$\frac{1}{8}$</td>
<td>$0.125$</td>
<td>$12.5%$</td>
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### Skill 11.14

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{2}$</td>
<td>$0.5$</td>
<td>$50%$</td>
</tr>
<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
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<td>$\frac{1}{5}$</td>
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<tr>
<td>$\frac{1}{8}$</td>
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<td>$12.5%$</td>
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### Skill 11.15

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{2}$</td>
<td>$0.5$</td>
<td>$50%$</td>
</tr>
<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
</tr>
<tr>
<td>$\frac{1}{5}$</td>
<td>$0.2$</td>
<td>$20%$</td>
</tr>
<tr>
<td>$\frac{1}{8}$</td>
<td>$0.125$</td>
<td>$12.5%$</td>
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</table>

### Skill 11.16

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{2}$</td>
<td>$0.5$</td>
<td>$50%$</td>
</tr>
<tr>
<td>$\frac{1}{4}$</td>
<td>$0.25$</td>
<td>$25%$</td>
</tr>
<tr>
<td>$\frac{1}{5}$</td>
<td>$0.2$</td>
<td>$20%$</td>
</tr>
<tr>
<td>$\frac{1}{8}$</td>
<td>$0.125$</td>
<td>$12.5%$</td>
</tr>
</tbody>
</table>
12. [Place Value] page 85

Skill 12.1  a) ones, b) tens, c) hundreds, d) hundreds, e) 1, f) 4, g) 2 h) 1, i) 3, j) 4, k) 2, l) 6, m) 9, n) 7, o) 2, p) 1, q) 2, r) 9 s) 7, t) 0, u) 7, v) 2, w) 9, x) 5, y) 2, z) 5

Skill 12.2  a) 500, b) 70, c) 610, d) 3, e) A, f) B, g) A, h) B, i) B, j) B

Skill 12.3  a) false, b) true, c) true, d) true, e) false, f) true, g) true h) false, i) 223, j) 125, k) 788, l) 7557, m) 2131, n) 7374 o) 13094, p) 40554

Skill 12.4  a) 75, b) 57, c) 25, d) 22, e) 37, f) 38, g) 78, h) 83, i) 87, j) 44, k) 42, l) 24, m) 42, n) 40, o) 40, p) 42, q) 42, r) 42, s) 40, t) 55, u) 55, v) 55, w) 55, x) 55, y) 55, z) 55

Skill 12.5  a) 126, b) 70, c) 6, d) 8, e) 8, f) 8, g) 70, h) 1615, i) 0, j) 471, k) 342, l) 3

Skill 12.6  a) 6.38, b) 15.4, c) 6.22, d) 13.78, e) 12.32, f) 1.07 g) 103.09, h) 0.895, i) false, j) false, k) true, l) false, m) true n) false

Skill 12.7  a) 3, 3, 3.5, 5.3, 5.5, b) 2, 2.1, 2, 2.1, 1.1, c) 6.6, 6.7, 7.6, 7.7, d) 9.9, 9.4, 9, 4.9, 4.4 e) 44.2, 42.4, 42.0, 40.4, 40.2, f) 0.55, 5.05, 5.5, 5.5, 5.5 g) 3.04, 3.41, 3.43, 4, 4.13, h) 6.32, 3.62, 3.6, 2.63, 2.62 i) 3.6, 8.06, 6.8, 6.08, j) 4.74, 7.47, 7.77, k) 4.77, l) 7.77

Skill 12.8  a) 60, b) 70, c) 370, d) 690, e) 800, f) 800, g) 800, h) 200 i) 500, j) 2500, k) 2300, l) 5500, m) 1800, n) 4500

Skill 12.9  a) 4, b) 10, c) 4, d) 6, e) 16, f) 15, g) 13, h) 11, i) 73, j) 41 k) 31, l) 30, m) 60, n) 6

Skill 12.10  a) 1500, b) 100, c) 170, d) 80, e) 700, f) 200, g) 2400 h) 1200

Skill 12.11  a) 3.9, b) 4.5, c) 6.3, d) 27.9, e) 15.8, f) 15.1, g) 8.0, h) 0, i) 3.76, j) 9.11, k) 7.25, l) 2.58, m) 3.05, n) 8.07

Skill 12.12  a) 14, b) 2, c) 10, d) 14, e) 26 m) 5, f) 5, g) 30, h) 50


Skill 13.1  a) false, b) true, c) true, d) false, e) true, f) false, g) 8, h) 6 i) 1, j) 2, k) 5, l) 9, m) 6, n) 10, o) 19, p) 14, q) 12, r) 18 s) 31, t) 28, u) 7

Skill 13.2  a) false, b) true, c) true, d) false, e) true, f) false, g) 8, h) 2 i) 1, j) 6, k) 12, l) 10, m) 3, n) 18, o) 12, p) 16, q) 17, r) 15 s) 4, t) 10, u) 7

Skill 13.3  a) true, b) false, c) true, d) true, e) false, f) true, g) 8, h) 5 i) 3, j) 0, k) 2, l) 0, m) A, n) B, o) A, p) A, q) C, r) C

Skill 13.4  a) true, b) true, c) false, d) true, e) false, f) true, g) 2, h) 7 i) 4, j) 1, k) 1, l) 8, m) A, n) C, o) C, p) C, q) B, r) B

Skill 13.5  a) 14, b) 8, c) 1, d) 11, e) 12, f) 19, g) 13, h) 2, i) 4, j) 10 k) 9, l) 10, m) 9, n) 5, o) 3, p) 30, q) 5, r) 2, s) 5, t) 1, u) 2 v) 16, w) 3, x) 2

Skill 13.6  a) 43, b) 31, c) 17, d) 15, e) 23, f) 24, g) 20, h) 18, i) 21 j) 20, k) 14, l) 25, m) 16, n) 45, o) 32, p) 9, q) 18, r) 24

Skill 13.7  a) 5, b) 13, c) 20, d) 1, e) 6, f) 21, g) 9, h) 13, i) 19, j) 4, k) 9 l) 13, m) 2, n) 11, o) 5, p) 12, q) 8, r) 0, s) 15, t) 51, u) 21

Skill 13.8  a) 14, b) 2, c) 4, d) 3, e) 24, f) 5, g) 28, h) 8, i) 4, j) 15, k) 3 l) 6, m) 20, n) 26, o) 15, p) 11, q) 0, r) 1, s) 18, t) 5, u) 21
16. [Units of Measurement] page 131

Skill 16.1  a) litres, b) millilitres, c) metres, d) tonnes, e) kilometres
f) metres, g) millilitres, h) tonne

Skill 16.2  a) 1 (a bird bath), b) 3 (a dozen eggs, a block of chocolate
a loaf of bread), c) 2 (a doona, a cinema screen)
d) 2 (a person, a furnace), e) 3 (a helium balloon,
a Great Dane, a motorbike)
f) 1 (Centre court - Wimbledon)
g) 3 (a salad, an ice cream, a glass of tap water)
h) 1 (a baby's bottle)

Skill 16.3  a) 10 m, b) 10 cm, c) 3000 m, d) 600 mm, e) 15 m
f) 10000 mm, g) 8 km, h) 90 cm, i) 24 mm, j) 3750 m
k) 190 cm, l) 1360 mm, m) 8 m, n) 240 mm, o) 10 100 m
p) 6550 m, q) 18 km, r) 480 cm, s) 2 km, t) 4000 cm
u) 900 mm, v) 3000 mm

Skill 16.4  a) 20000 g, b) 1000 kg, c) 13 t, d) 4000 g, e) 1000 g
f) 3000 kg, g) 701, h) 22 kg, i) 500 g, j) 2300 kg, k) 4600 g
l) 900 kg, m) 3150 g, n) 1200 g, o) 4003 g, p) 8 t
q) 7200 g, r) 2800 kg, s) 19 kg, t) 2 t, u) 6000 kg, v) 3 kg
w) 20 kg, x) 2 t, y) 2000 g

Skill 16.5  a) 20 L, b) 1000 mL, c) 5 L, d) 3000 L, e) 78 L, f) 2600 mL
g) 5800 mL, h) 700 mL, i) 14 L, j) 4000 L, k) 11 L
l) 1900 mL, m) 40000 mL, n) 100 L, o) 12 L, p) 10 000 mL
q) 60 000 mL, r) 50 L, s) 7.5 L
t) 1000 mL, u) 9 L, v) 900 mL

Skill 16.6  a) 300 m, b) 4, c) 12, d) 15, e) 6000 mL, f) 500
g) 340 m, h) 160
19. [Shapes] page 159

Skill 19.1  a) less than, b) greater than, c) equal to, d) greater than e) less than, f) less than

Skill 19.2  a) , b) , c) , d) , e) , f) 

Skill 19.3  a) , b) , c) , d) , e) , f) , g) , h) , i) , j) 

Skill 19.4  a) 3, b) 4, c) 10, d) 7, e) 140°, f) 

Skill 19.5  a) C, b) B, c) D, d) C, e) A, f) B, g) C, h) B

Skill 19.6  a) 4, b) 8, c) 12, d) 7, e) triangle, f) rectangle, g) 6, h) A

Skill 19.7  a) 165°, b) 110°, c) 30°, d) 140°

Skill 19.8  a) A, b) C, c) , d) 

Skill 19.9  a) triangle, b) hexagon, c) A, d) A, e) pentagon f) rectangle, g) A, h) B

Skill 19.10 a) B, b) A, c) C, d) B, e) C, f) C, g) cube, h) hexagonal prism, i) triangular prism, j) rectangular prism k) rectangular prism, l) hexagonal pyramid

Skill 19.11 a) C, b) B, c) , d) 

20. [Location / Transformation] page 171

Skill 20.1  a) C, b) B, c) C, d) A, e) B, f) A

Skill 20.2  a) 2, b) 1, c) 4, d) 8, e) 4, f) 1, g) 1, h) 8

Skill 20.3  a) south, b) south, c) Cairns, d) west

Skill 20.4  a) Two Independence Square, b) Hume Street c) Hindmarsh Square, d) E 16th Avenue

Skill 20.5  a) pig, b) grocer, c) Marble Arch, d) sacristy

Skill 20.6  a) F3, b) kiwi, c) D2, d) F1, e) B3, f) D1, g) mermaid h) A3, i) A1 and C2, j) A3 and C2
20. [Location / Transformation] (cont.)

Skill 20.10
a) ![Graph](image1)
   b) ![Graph](image2)
   c) ![Graph](image3)
   d) ![Graph](image4)
   e) ![Graph](image5)
   f) ![Graph](image6)
   g) ![Graph](image7)
   h) ![Graph](image8)
   i) ![Graph](image9)
   j) ![Graph](image10)

Skill 20.11

Skill 20.12
a) umpire = (6,4) football = (5,1)
b) ship = (2,2) tugboat = (5,1), c) ![Graph](image11)
d) IRONMAN

Skill 20.13
a) S, Z, b) (5, -3), c) P, B, T, d) (-6, -2)

Skill 20.14
a) 6 units, b) 3 units, c) 6 units, d) 20 units

21. [Statistics / Probability] page 191

Skill 21.1
a) Australia, b) silver, c) copper, d) Xia
e) musical/recording, f) fat

Skill 21.2
a) iron, b) 6, c) 8, d) 30%, e) manufacturing, f) $10

Skill 21.3
a) 8, b) 10, c) Warsaw, d) 2400000

Skill 21.4
a) Discovery, b) Sydney Opera House, c) 22, d) 2006 e) 50
f) 2, g) New York and Moscow, h) 3, i) Secret seven
j) Warren Buffet

Skill 21.5
a) WA, b) AT - AT, c) males, d) 187 km

Skill 21.6
a) 50 km/h, b) New Zealand, c) Jupiter, d) 80 kg, e) 7, f) 2
g) Leyton Hewitt, h) Playhouse, i) Tokyo, j) Antarctica

Skill 21.7
a) 2, b) Kenya, c) Japan, d) vet

Skill 21.8
a) will not, b) C, c) B, d) A, e) B, f) is certain to, g) will not
   h) is certain to

Skill 21.9
a) 11, b) 13, c) 4, d) 20, e) 7, f) 8, g) 10, h) 10

Skill 21.10

Skill 21.11
a) \(\frac{1}{13}\), b) \(\frac{1}{4}\), c) \(\frac{7}{11}\), d) \(\frac{1}{4}\), e) \(\frac{1}{2}\), f) 1, g) \(\frac{5}{16}\), h) \(\frac{1}{3}\), i) \(\frac{2}{3}\)

Skill 21.12
a) 25%, b) walls, c) 1, d) 13 - 17 years