17. [Exploring Numbers]

- Compare the size of the digits in the same place, one at a time.
- Work from left to right across each number.

Q. Which number is the largest?

A) 24 706
B) 24 670
C) 24 760

A. *C*

Tens of thousands and thousands:
All numbers have the same digit in the tens of thousands place (2), and the same digit in the thousands place (4).

Hundreds:
In the hundreds place 7 is greater than 6.
So A and C are greater than B.

Tens:
In the tens place 6 is greater than 0.
So 24 760 is greater than 24 706.

> means "is greater than"   *< means "is less than"*

a) 45 804 > 45 480
True or false? *compare the hundreds place*

8 > 4   ⇒ | **true** |

b) 3207 < 3072
True or false?

⇒ | |

c) 60 198 > 61 980
True or false?

⇒ | |

d) 9137 < 9317
True or false?

⇒ | |

e) 52 620 > 52 260
True or false?

⇒ | |

f) 7548 > 7584
True or false?

⇒ | |

g) Which number is the largest?

A) 1805
B) 1850
C) 1800   *compare the digits in the tens place*

5 > 0   ⇒ | B |

h) Which number is the largest?

A) 30 931
B) 30 391
C) 30 913

⇒ | |

i) Which number is the largest?

A) 19 054
B) 19 504
C) 19 450

⇒ | |

j) Which number is the largest?

A) 2380
B) 2083
C) 2308

⇒ | |

k) Which number is the largest?

A) 62 075
B) 62 570
C) 62 750

⇒ | |

l) Which number is the largest?

A) 47 091
B) 47 190
C) 47 019

⇒ | |

- 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.

Place value	tens of thousands	thousands	hundreds	tens	units	tenths	hundredths	thousandths
Value	*30 000*	*6000*	*100*	*50*	*8*	$\frac{2}{10}$	$\frac{4}{100}$	$\frac{7}{1000}$
	3	**6**	**1**	**5**	**8**	**2**	**4**	**7**

Decimal point

Q. What is the value of the underlined digit in the number 3̲6 158.247?

A. *30 000*   Consider the position of the digit 3 to that of the decimal point. 3 is five places to the left so it is in the tens of thousands place. The 3 represents 3 tens of thousands or 30 000

---

a) In the number 14 058 which digit is in the tens place?

5

b) In the number 9023 which digit is in the units place?

c) In the number 5836 which digit is in the hundreds place?

d) In the number 24 108 which digit is in the thousands place?

e) In the number 16.253 which digit is in the units place?

f) In the number 0.017 which digit is in the hundredths place?

g) In the number 45.809 which digit is in the tenths place?

h) In the number 0.0874 which digit is in the thousandths place?

i) What is the value of the underlined digit in the number 25̲9?

5 tens   ⇒ 50

j) What is the value of the underlined digit in the number 32̲70?

⇒

k) What is the value of the underlined digit in the number 16̲092?

⇒

l) What is the value of the underlined digit in the number 86 9̲25?

⇒

m) What is the value of the underlined digit in the number 5124?

$\Rightarrow$ ☐

n) What is the value of the underlined digit in the number 73 061?

$\Rightarrow$ ☐

o) What is the value of the underlined digit in the number 29 603?

$\Rightarrow$ ☐

p) What is the value of the underlined digit in the number 8714?

$\Rightarrow$ ☐

q) What is the value of the underlined digit in the number 35.043?

4 hundredths $= \dfrac{4}{100}$ $= \boxed{0.04}$

r) What is the value of the underlined digit in the number 5.082?

2 thousandths $=$ $= \boxed{}$

s) What is the value of the underlined digit in the number 0.98?

$= \boxed{}$

t) What is the value of the underlined digit in the number 1.076?

$= \boxed{}$

u) In which number does the digit 4 have greater value?   A) 4.65
                                                              B) 30.4

A) value 4

B) value 0.4 $4 > 0.4$ $\Rightarrow \boxed{A}$

v) In which number does the digit 6 have greater value?   A) 20 406
                                                              B) 1063

A)

B) $\Rightarrow \boxed{}$

w) In which number does the digit 1 have greater value?   A) 3.15
                                                              B) 1.98

A)

B) $\Rightarrow \boxed{}$

x) In which number does the digit 9 have greater value?   A) 4907
                                                              B) 10 892

A)

B) $\Rightarrow \boxed{}$

y) In which number does the digit 3 have greater value?   A) 8.931
                                                              B) 1.375

A)

B) $\Rightarrow \boxed{}$

z) In which number does the digit 5 have greater value?   A) 0.652
                                                              B) 0.526

A)

B) $\Rightarrow \boxed{}$

Skill 17.3   Writing word numbers as numerals.

- Write the digits in order.
- Leave a space between the thousands and the hundreds, and between the millions and the hundreds of thousands.
- Write a zero in any place that is left empty between other digits.

Q. Express in numerals:
fifty thousand, six hundred and nine

A. *50 609*

Tens of Th.	Th.	H	T	U
5	*0*	*6*	*0*	*9*

First write 50 for the words "fifty thousand", then write a comma.
Write the digit 6 for the hundreds, then write the digit 0, because there are no tens.
Finally write the digit 9 for the units.

a) Express in numerals:
two hundred and fifteen   215

b) Express in numerals:
four thousand, one hundred and fifty

c) Express in numerals:
six thousand and eighty-two

d) Express in numerals:
eight thousand, one hundred and seventeen

e) Express in numerals:
nine hundred and two

f) Express in numerals:
three thousand, four hundred

g) Express in numerals:
two hundred and ninety-eight

h) Express in numerals:
seven thousand, three hundred and nine

i) Express in numerals:
five hundred and thirty

j) Express in numerals:
twelve thousand, six hundred

k) Express in numerals:
seven hundred and fourteen

l) Express in numerals:
fourteen thousand and sixty-three

m) Express in numerals:
sixty thousand, five hundred and forty

n) Express in numerals:
thirty-one thousand and seven

o) Express in numerals:
four hundred and three thousand, two hundred

p) Express in numerals:
eight hundred thousand and fifty

q) Express in numerals:
one million, nine hundred thousand and twenty-six

r) Express in numerals:
seven million, six hundred thousand and forty

- Start from left and write the word for each digit (unless it is a 0), followed by its place value.
- Do not write anything for any 0's.

word first!

$200 =$ two hundred

place next

To write 2-digit numbers in words
- Use a hyphen (-) to separate the word for the tens from the word for the units, for all numbers from 21 to 99; e.g. 67 is written as sixty-seven.

   Hint: Some 2-digit numbers have names that do not follow the usual rules. Use the following:

10 ten	50 fifty	90 ninety	14 fourteen	18 eighteen
20 twenty	60 sixty	11 eleven	15 fifteen	19 nineteen
30 thirty	70 seventy	12 twelve	16 sixteen	
40 forty	80 eighty	13 thirteen	17 seventeen	

To write 3-digit numbers in words
- Describe the number of hundreds first. Always write 'hundred' not 'hundreds'.
- Write 'and' after the word 'hundred', if other values follow.

To write 4-digit numbers in words
- Describe the number of thousands first. Always write 'thousand' not 'thousands'.
- Write 'and' between the word 'thousand' and the following numerals when hundreds are missing.

To write 5-digit numbers in words
- Describe the number of thousands by following the rules for 2-digit numbers.

To write 6-digit numbers in words
- Describe the number of thousands by following the rules for 3-digit numbers.

Q. Write the number 7069 in words.

A. *seven thousand and sixty-nine*

Th.	H	T	U
7	0	6	9

7 thousands, 0 hundreds, 6 tens and 9 units become in words:
seven thousand and sixty-nine

---

a) Write the number 318 in words.

   three hundred and eighteen

b) Write the number 65 in words.

c) Write the number 90 in words.

d) Write the number 413 in words.

e) Write the number 706 in words.

f) Write the number 520 in words.

g) Write the number 800 in words.

h) Write the number 609 in words.

i) Write the number 570 in words.

j) Write the number 1600 in words.

k) Write the number 4200 in words.

l) Write the number 2004 in words.

m) Write the number 5007 in words.

n) Write the number 3012 in words.

o) Write the number 8040 in words.

p) Write the number 35 000 in words.

q) Write the number 86 000 in words.

r) Write the number 19 000 in words.

s) Write the number 10 700 in words.

t) Write the number 24 300 in words.

u) Write the number 15 090 in words.

v) Write the number 17 008 in words.

w) Write the number 903 000 in words.

x) Write the number 406 000 in words.

y) Write the number 102 000 in words.

z) Write the number 905 000 in words.

- Circle the digit to the right of the requested place.
- If this digit is 0, 1, 2, 3 or 4 (< 5) - **round down** - keep the digit in the requested place the same.
  5, 6, 7, 8 or 9 (≥ 5) - **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. Round 4067 to the nearest hundred.

A. *4100*

Th.	H	T	U		Th.	H	T	U
4	0	⑥	7	⇒	4	1	0	0

The digit to the right of the hundreds place is 6.
$6 \geq 5$ so round up.
Add 1 to the 0 in the hundreds place to make 1.
Put zeros in the tens and units places.

---

a) Round 12 360 to the nearest thousand.

12③60 ⟵ *3 < 5 round down by keeping 2* ⇒ | 12 000 |

b) Round 345 to the nearest ten.

⇒

c) Round 2574 to the nearest hundred.

⇒

d) Round 806 to the nearest ten.

⇒

e) Round 221 to the nearest ten.

⇒

f) Round 34 220 to the nearest thousand.

⇒

g) Round 1657 to the nearest hundred.

⇒

h) Round 71 635 to the nearest thousand.

⇒

i) Round 4907 to the nearest ten.

⇒

j) Round 1449 to the nearest hundred.

⇒

k) Round 20 506 to the nearest thousand.

⇒

l) Round 3650 to the nearest hundred.

⇒

m) Round 168 to the nearest ten.

⇒

n) Round 5630 to the nearest hundred.

⇒

- Line up the decimal numbers at their decimal points.
- Compare digits in the same places, starting from the left, until you find the smallest digit.
  Hint: The number with the smallest digit will be the smallest number.
- Look for the second smallest number.
- Continue in this way until you find the largest number.

Q. Place in ascending order:
0.27, 0.07, 0.207, 0.702

A. *0.07, 0.207, 0.27, 0.702*

		U	.	T	H	Th
	3rd	0	.	2	7	
smallest	1st	0	.	0	7	
	2nd	0	.	2	0	7
largest	4th	0	.	7	0	2

Find the smallest digits.
Work from left to right.
Units: all 0
Tenths: 0 < 2 < 7
                     so 0.07 is the smallest
                     0.702 is the largest
                     either 0.207 or 0.27 is the
                     2nd smallest
Hundredths: 0 < 7
                     so 0.207 is the 2nd smallest
                     0.27 is the 3rd smallest

a) Place in order from largest to smallest:
0.096, 0.69, 0.609, 0.09

U	.	T	H	Th	
0	.	0	9	6	
0	.	6	9		the largest number
0	.	6	0	9	
0	.	0	9		the smallest number

b) Place in ascending order:
0.047, 0.74, 0.407, 0.074

U	.	T	H	Th

c) Place in ascending order:
0.508, 0.08, 0.085, 0.58

d) Place in descending order:
0.135, 0.53, 0.105, 0.513

e) Place in ascending order:
0.807, 0.07, 0.87, 0.087, 0.708

f) Place in order from smallest to largest:
0.364, 0.063, 0.63, 0.34, 0.043

g) Place in order from largest to smallest:
0.239, 0.209, 0.093, 0.302, 0.3

h) Place in ascending order:
0.156, 0.105, 0.51, 0.016, 0.065

- Find the least common denominator of the fractions, which is the Lowest Common Multiple (LCM) of the denominators.
- Change the fractions to equivalent fractions with the lowest common denominator.
- Arrange the fractions in order of the numerators (the smallest fraction has the smallest numerator and so on).

smallest numerator = smallest fraction → $\dfrac{1}{6} < \dfrac{3}{6} < \dfrac{5}{6}$ — *same denominator*

Hint: If unsure which is the LCM of the denominators, use their product as the common denominator. When the smaller denominators divide evenly into the biggest denominator, this biggest number becomes the common denominator.

Q. Place in ascending order:

$$\frac{3}{5}, \frac{1}{2}, \frac{2}{3}$$

A. $\dfrac{1}{2}, \dfrac{3}{5}, \dfrac{2}{3}$

$\dfrac{3}{5}, \dfrac{1}{2}, \dfrac{2}{3}$ — *LCM of 2, 5 and 3 is $2 \times 5 \times 3 = 30$*

$\dfrac{3^{\times 6}}{5_{\times 6}} = \dfrac{18}{30}$

$\dfrac{1^{\times 15}}{2_{\times 15}} = \dfrac{15}{30}$ $\Rightarrow 15 < 18 < 20$, so $\dfrac{15}{30} < \dfrac{18}{30} < \dfrac{20}{30}$

$\dfrac{2^{\times 10}}{3_{\times 10}} = \dfrac{20}{30}$ *or* $\dfrac{1}{2} < \dfrac{3}{5} < \dfrac{2}{3}$

a) Which fraction has greater value?

$\dfrac{3}{8}$ or $\dfrac{2}{5}$ — *LCM of 8 and 5 is 40*

$\dfrac{3^{\times 5}}{8_{\times 5}} = \dfrac{15}{40}$ $\dfrac{2^{\times 8}}{5_{\times 8}} = \dfrac{16}{40}$ $\Rightarrow \dfrac{15}{40} < \dfrac{16}{40} \Rightarrow \boxed{\dfrac{2}{5}}$

b) Which fraction has greater value?

$\dfrac{5}{8}$ or $\dfrac{5}{11}$

c) Which fraction has greater value?

$\dfrac{3}{5}$ or $\dfrac{7}{10}$

d) Which fraction has greater value?

$\dfrac{4}{9}$ or $\dfrac{5}{12}$

e) Place in order from smallest to largest:

$\dfrac{1}{2}, \dfrac{5}{8}, \dfrac{3}{5}$ — *LCM of 2, 8 and 5 is $8 \times 5 = 40$*

$\dfrac{1^{\times 20}}{2_{\times 20}} = \dfrac{20}{40}$ $\dfrac{5^{\times 5}}{8_{\times 5}} =$

f) Place in order from largest to smallest:

$\dfrac{5}{6}, \dfrac{4}{5}, \dfrac{9}{10}$

To round a decimal number to the nearest whole number
- Circle the first digit after the decimal point.
- If this digit is: 0, 1, 2, 3 or 4 (< 5) - **round down** - keep the unit digit unchanged and drop all the digits after the decimal point.

  5, 6, 7, 8 or 9 (≥ 5) - **round up** - add 1 to the unit digit and drop all the digits after the decimal point.

To round a decimal number to a given place (One decimal place means tenths, two decimal places means hundredths and three decimal places means thousandths.)
- Circle the digit to the right of the requested place.
- If this digit is: 0, 1, 2, 3 or 4 (< 5) - **round down** - keep the digit in the requested place unchanged and drop all following digits.

  5, 6, 7, 8 or 9 (≥ 5) - **round up** - add 1 to the digit in the requested place and drop all following digits.

Q.   Round 2.75 to the nearest whole number.

A.   *3*

Units	Tenths	Hundredths
2	⑦	5

⇒

Units	Tenths	Hundredths
3	0̸	0̸
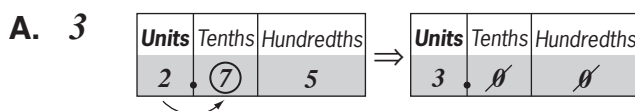
The first digit after the decimal point is 7.
7 ≥ 5 so round up.
Add 1 to the 2 in the units place to make 3.
Omit the digits after the decimal point.

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a)   Round 13.4 to the nearest whole number.

13.④   *4 < 5 round down by keeping 3*   ⇒   **13**

b)   Round 17.97 to the nearest whole number.

⇒

c)   Round 45.85 to the nearest whole number.

⇒

d)   Round 2.468 to the nearest whole number.

⇒

e)   Round 1.8736 to three decimal places.

1.873⑥   *6 ≥ 5 round up by adding 1 to 3*   ⇒

f)   Round 18.683 to two decimal places.

⇒

g)   Round 0.59 to one decimal place.

⇒

h)   Round 9.81 to one decimal place.

⇒

i)   Round 7.843 to two decimal places.
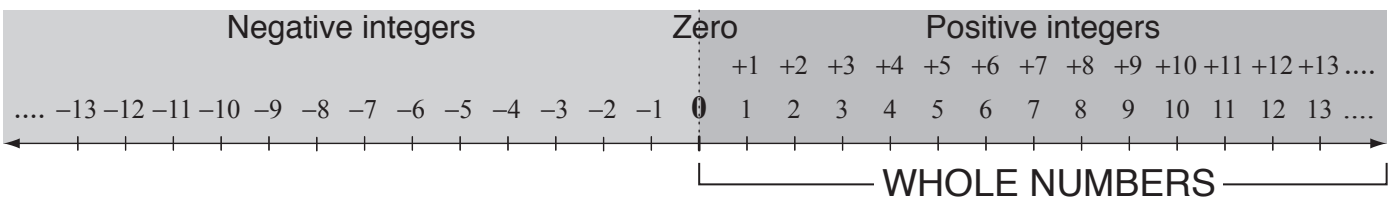
⇒

j)   Round 0.0856 to three decimal places.

⇒

k)   Round 0.52 to one decimal place.

⇒

l)   Round 0.1968 to three decimal places.

⇒

─────────────────── INTEGERS ───────────────────

Negative integers	Zero	Positive integers

+1 +2 +3 +4 +5 +6 +7 +8 +9 +10 +11 +12 +13 ....

.... −13 −12 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1 **0** 1 2 3 4 5 6 7 8 9 10 11 12 13 ....

─────────── WHOLE NUMBERS ───────────

Whole Numbers

Negative integers, fractions and decimals are **not** whole numbers apart from these 2 situations:

1) Any positive fraction whose numerator is divisible by the denominator. $\dfrac{12}{4} = 3$

2) Any positive decimal with only zeros after the decimal point. $8.00 = 8$

Integers

Fractions and decimals are **not** integers, apart from these 2 situations:

1) Any fraction whose numerator is divisible by the denominator. $-\dfrac{5}{1} = -5$

2) Any decimal with only zeros after the decimal point. $-3.00 = -3$

Q. Choose the whole numbers from this list:
$-19, 8.2, \dfrac{6}{2}, -\dfrac{7}{5}, 34, 0$

A. *−19 is negative, so not a whole number*
8.2 is a decimal, so not a whole number
$\dfrac{6}{2} = 6 \div 2 = 3$ *is a whole number*
$-\dfrac{7}{5}$ *is a fraction, so not a whole number*
So $\dfrac{6}{2}$*, 34, 0 are whole numbers.*

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a) Choose the whole numbers from this list:
Ⓞ68, $\dfrac{9}{5}$, −31, 0.24, Ⓞ7 → **68, 7**

b) Choose the whole numbers from this list:
$7\dfrac{1}{6}, 52, -100, 3.14, 98$

c) Choose the whole numbers from this list:
$\dfrac{3}{10}, 79, -95, 4.86, 21$

d) Choose the whole numbers from this list:
$0.095, \dfrac{8}{11}, 250, -72, 13$

e) Choose the integers from this list:
$-1512, \dfrac{1}{14}, 54.32, 48, 60$

f) Choose the integers from this list:
$21, 1\dfrac{1}{9}, -4, -3.27, 7500$

g) Choose the integers from this list:
$-63, \dfrac{3}{5}, 0.72, 0, -824$

h) Choose the integers from this list:
$\dfrac{25}{5}, 7.823, -1, -\dfrac{4}{7}, 110$

i) Choose the integers from this list:
$-0.68, \dfrac{12}{4}, 71, -54, -1039$

j) Choose the integers from this list:
$30, -11, \dfrac{10}{2}, 6.25, 4000$

Rational Numbers

Include all **Integers**	all **Fractions**	all **Terminating decimals**	all **Square roots** of perfect squares
$-2, 0, 700, \dfrac{5}{1}, \dfrac{25}{5}$	$-\dfrac{3}{4}, \dfrac{12}{85}, \dfrac{23}{500}$	$2.16, -5.753469$	$\sqrt{9}, \sqrt{16}$

Q. Which numbers are rational?

A) 0.17   B) π

C) $\sqrt{3}$ D) -26

A. *A) 0.17 is rational (terminating decimal)*

B) π is not rational (an infinite non-repeating decimal)

C) $\sqrt{3}$ is not rational (square root of a prime number)

D) -26 is rational (negative integer)

*So **A and D** are rational.*

a) Choose the rational numbers from the list:

$\sqrt{12}, \dfrac{1}{3}, 7.95, \pi, -24$

b) Choose the rational numbers from the list:

$-150, \dfrac{\pi}{2}, 0.72, \dfrac{18}{101}, -\sqrt{6}$

c) Choose the rational numbers from the list:

$-\dfrac{19}{3}, 3.1415, \sqrt{80}, 15, -4$

d) Choose the rational numbers from the list:

$\dfrac{14}{569}, 98, 3.58904, \sqrt{50}, -79$

e) Which numbers are rational?

A) $\sqrt{10}$ B) π

C) 3.1415   D) $\dfrac{7}{8}$ and

f) Which numbers are rational?

A) π B) 0.0004

C) $\dfrac{3}{4}$ D) $\sqrt{20}$ and

g) Which numbers are rational?

A) 8.2323   B) $\sqrt{3}$

C) $1\dfrac{1}{7}$ D) $-\dfrac{\pi}{4}$ and

h) Which numbers are rational?

A) -1 B) $\sqrt{5}$

C) $\dfrac{\pi}{3}$ D) $\dfrac{23}{800}$ and

i) Which is **not** a rational number?

A) $\sqrt{7}$ B) -360

C) 2.518   D) $-\dfrac{4}{9}$

j) Which is **not** a rational number?

A) 0.085   B) -1996

C) $-\dfrac{\pi}{2}$ D) $\dfrac{34}{71}$