19. [Shapes]

- 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.

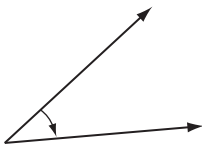|	**RIGHT ANGLE**	
If the other line of the angle extends beyond the page, then the angle is "greater than" a right angle.	If the corner of the page matches perfectly, then the angle is "equal to" a right angle.	If the other line of the angle is inside the page, then the angle is "less than" a right angle.

Q. Is the angle shown "less than", "equal to" or "greater than" a right angle?
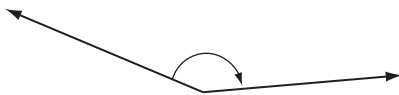
A. *greater than*

The angle appears greater than 90°. Check by placing the corner of a Maths Mate page inside the angle.

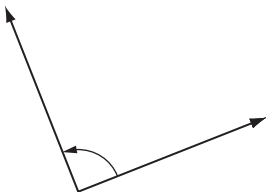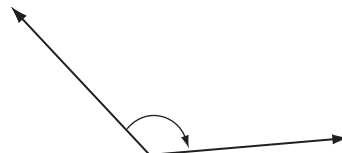**a)** Is the angle "less than", "equal to" or "greater than" a right angle?

less than

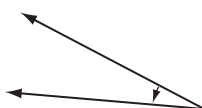**b)** Is the angle "less than", "equal to" or "greater than" a right angle?

c) Is the angle "less than", "equal to" or "greater than" a right angle?
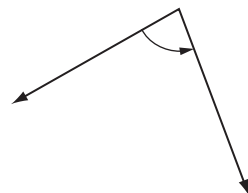

d) Is the angle "less than", "equal to" or "greater than" a right angle?

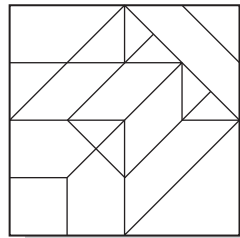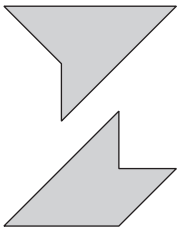**e)** Is the angle "less than", "equal to" or "greater than" a right angle?

f) Is the angle "less than", "equal to" or "greater than" a right angle?
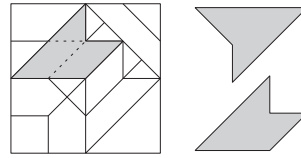
Q. One of these shapes is hidden in the maze. Find it and colour it in.
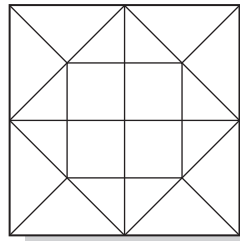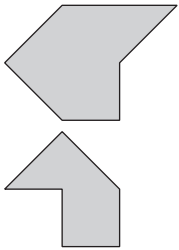[Same size and orientation.]

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.]
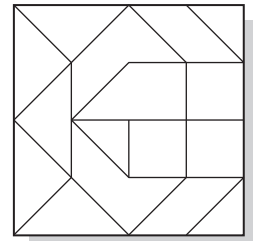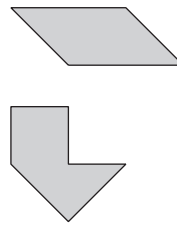
a) One of these shapes is hidden in the maze. Find it and colour it in.
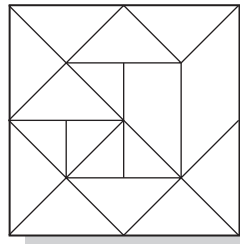[Same size and orientation.]

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.
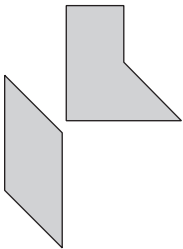[Same size and orientation.]

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.
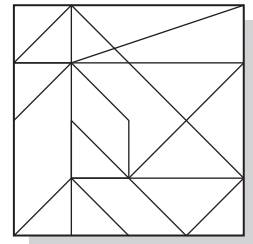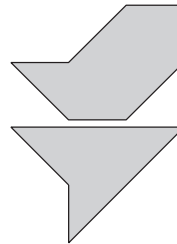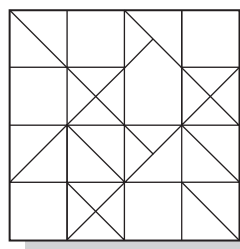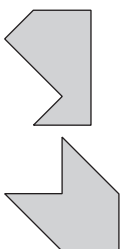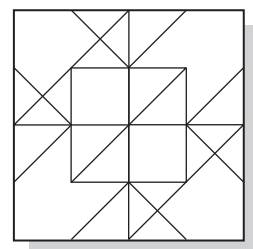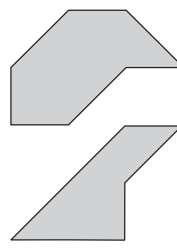[Same size and orientation.]

LATIN and GREEK TERMS	mono	-	one	hexa	-	six
poly	-	many	bi or di	-	two	hepta	-	seven
equi	-	equal	tri	-	three	octa	-	eight
gon	-	angle	quad or tetra	-	four	nona	-	nine
lateral	-	side	penta	-	five	deca	-	ten

- 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.
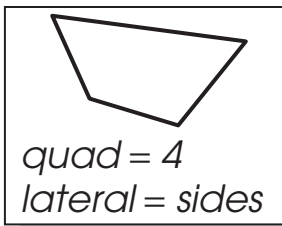
Q. Draw a pentagon.

A.

 or
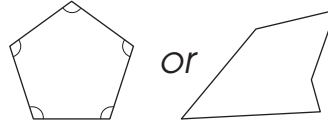
Consider the name:
gon = angle
penta = 5
You need to draw a shape that has 5 interior angles and therefore 5 sides.

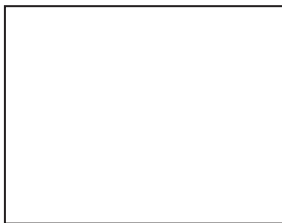**a)** Draw a quadrilateral.

quad = 4
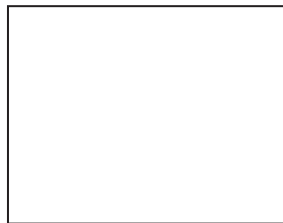*lateral = sides*

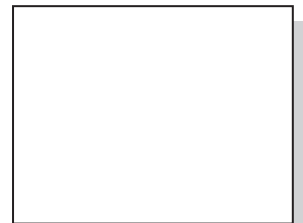**b)** Draw a triangle.

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.

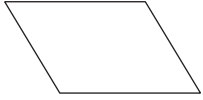**k)** Draw a hexagon.

l) Draw a rhombus.

www.mathsmate.co.nz

- 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.
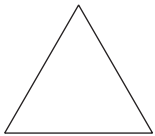
Q. How many sides does a rhombus have?

A. *4*

A rectangle, square, trapezium and rhombus all belong to the quadrilateral family: quad = 4
                                                                      lateral = sides

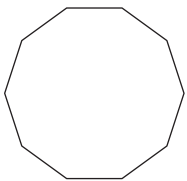**a)** How many interior angles does a triangle have?

3
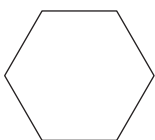
b) How many sides does a rectangle have?

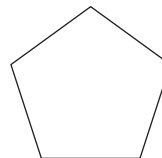**c)** How many sides does a decagon have?
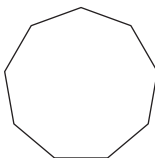
d) How many interior angles does a square have?

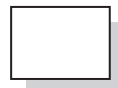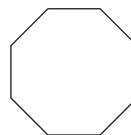**e)** How many interior angles does a hexagon have?
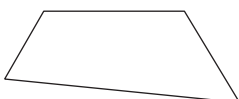
f) How many sides does a pentagon have?

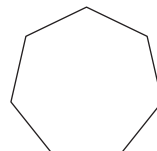**g)** How many sides does a nonagon have?
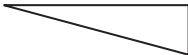
h) How many sides does an octagon have?

**i)** How many interior angles does a quadrilateral have?

j) How many sides does a heptagon have?

- Look for equal sides or equal angles.
- Look at the types of angles inside the triangle.
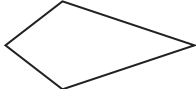- Look at the types of lines inside the triangle or quadrilateral (parallel, perpendicular, symmetry).

Q. This triangle has:
- A) one line of symmetry
- B) two parallel sides
- C) all sides of equal length
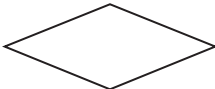- D) one right angle

A. *D*

A, B and C are not true.
D is the correct answer, because the triangle has a right angle.
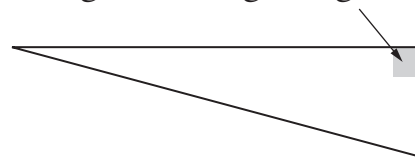
a) This square has:
- A) one obtuse angle
- B) no line of symmetry
- C) all sides of equal length
- D) two acute angles

C

b) This kite has:
- A) two parallel sides
- B) one line of symmetry
- C) two perpendicular sides
- D) all sides of equal length

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

- Count the number of: Faces,
  Edges and/or
  Vertices (points/corners).

3D SHAPE

vertex   face
    edge
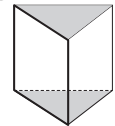
......   ← lateral face
(vertical face)
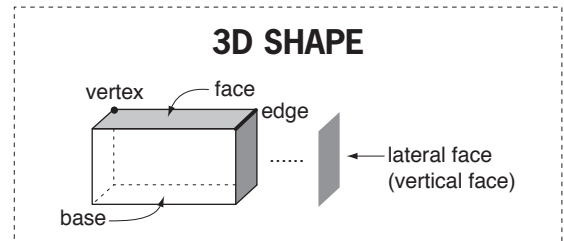
base

**Q.** What is the shape of the 3 lateral faces of the triangular prism?
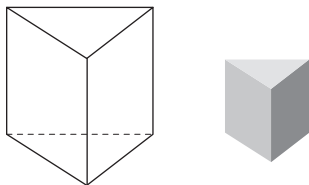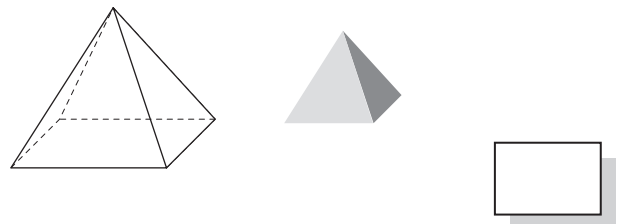
A. *rectangle*

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.
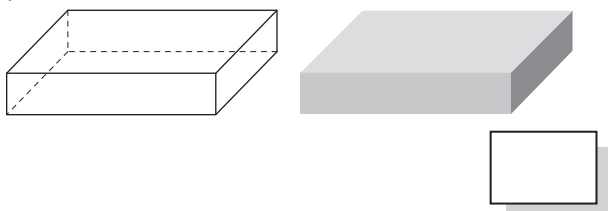
a) How many vertices does a triangular pyramid have?

1

Count the number of points.

4   2

3
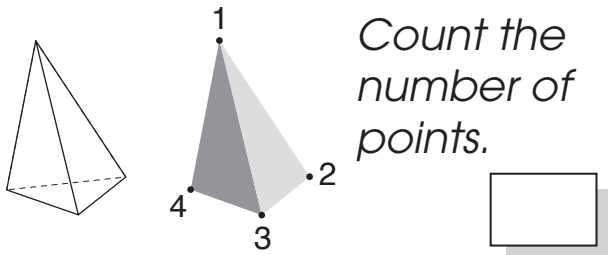
b) How many edges does a rectangular pyramid have?

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?
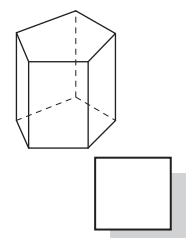
f) What is the shape of the 8 lateral (vertical) faces of the octagonal prism?

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

- 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.*

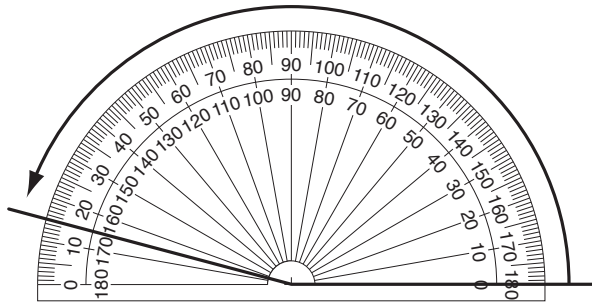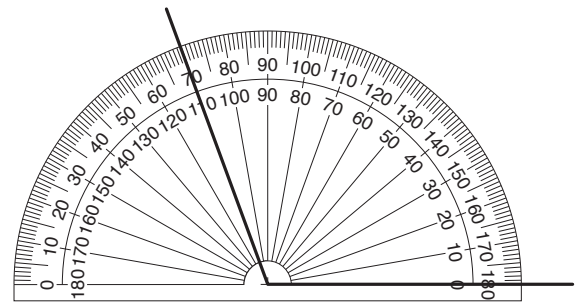**Q.** Using the protractor measure the size of the angle shown.
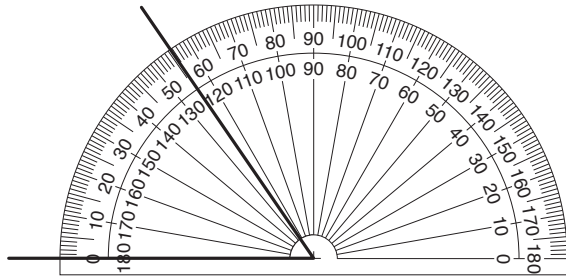
A. **55°**
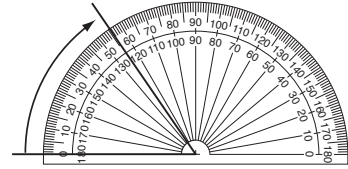
Read from the outside scale.
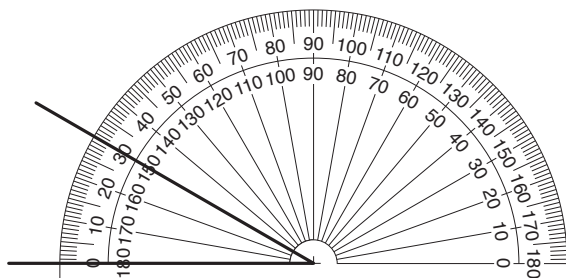One line of the angle is at 0° and the other line of the angle extends around to 55°.

---

a) Using the protractor measure the size of the angle shown.
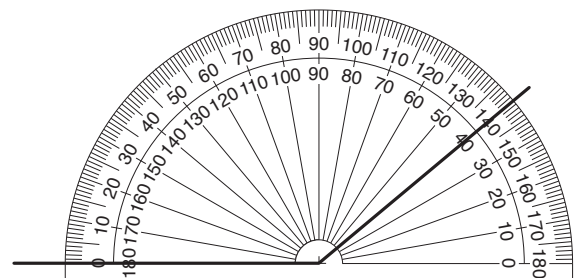
b) Using the protractor measure the size of the angle shown.

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.

MM3.2 11 22 3 **3** 44
MM4.1 11 22 **3** 3 44

To recognise a type of angle
- Draw a right angle using one of the lines and the corner over each of the given angles.
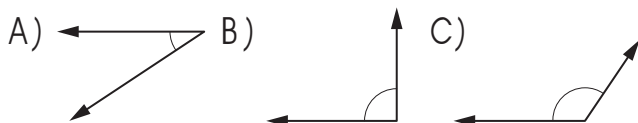- Compare each angle to the right angles you have drawn.

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).
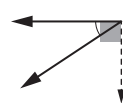- Mark the angle with a curved line.

RIGHT ANGLE

A right angle measures 90° (degrees).
It is marked with a corner.

90°
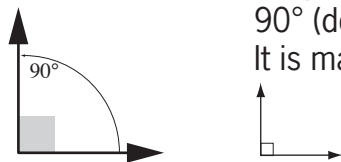
Q. Which angle is an obtuse angle?

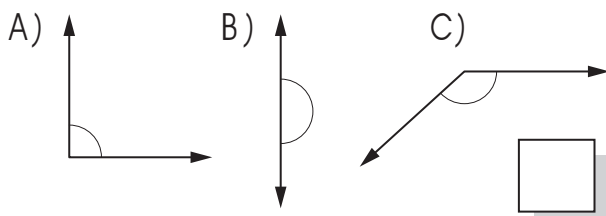A) ← B) → C) →

A. **C**

The angle is smaller than a right angle ⟹ not obtuse
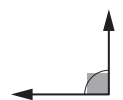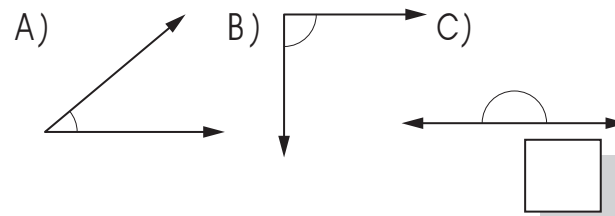
The angle is equal to a right angle ⟹ not obtuse
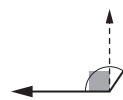
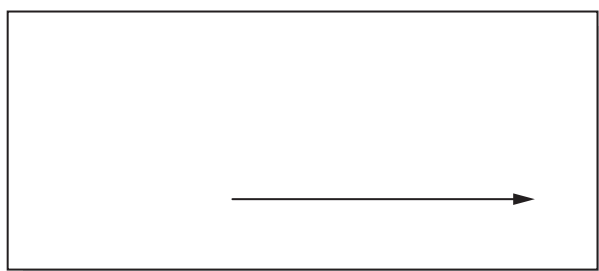The angle is greater than a right angle ⟹ obtuse
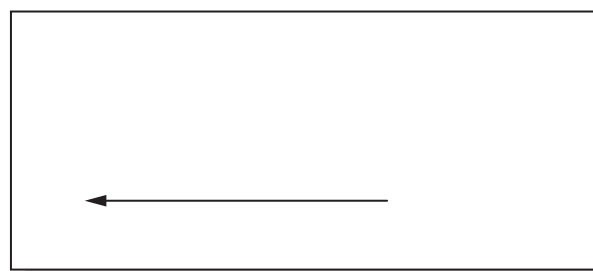
a) Which angle is a right angle?
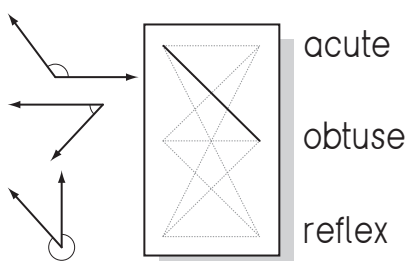
A) B) C)

b) Which angle is a straight angle?

A) B) C)

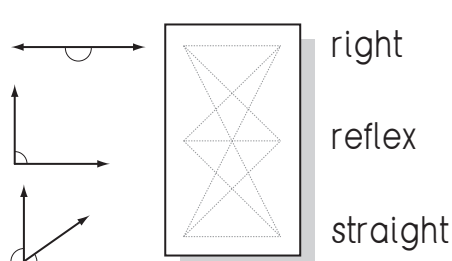**c)** Draw an obtuse angle using this line.

d) Draw an acute angle using this line.
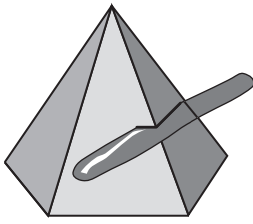
e) Match the angle to its description.

acute

obtuse

reflex

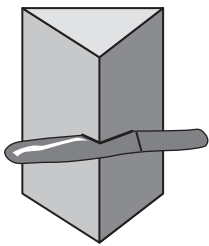**f)** Match the angle to its description.

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.
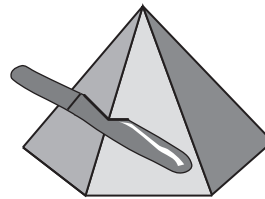
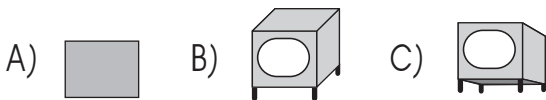**a)** Name the shape of the cross section through the triangular prism.

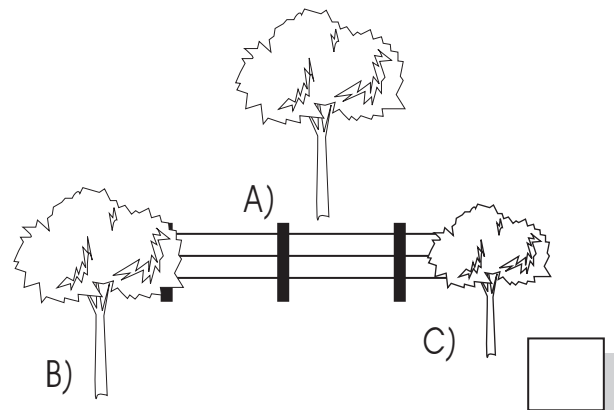*The view of the cross-section is the same as the view from the top.*

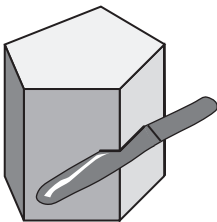**b)** Name the shape of the cross section through the hexagonal pyramid.

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?
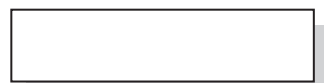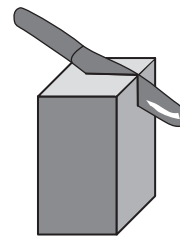
A)   B)   C)

**d)** Which tree appears to be the biggest?

A)
B)
C)

**e)** Name the shape of the cross section through the pentagonal prism.

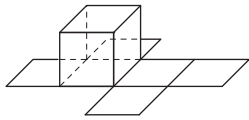**f)** Name the shape of the cross section through the square prism.

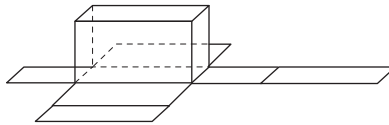**g)** Which shape shows the cross section produced by slicing through the points indicated on the cube?

A   B   C

h) Which shape shows the cross section produced by slicing through the points indicated on the cube?

A   B   C

www.mathsmate.co.nz   © Maths Mate 3.2/4.1 Skill Builder 19
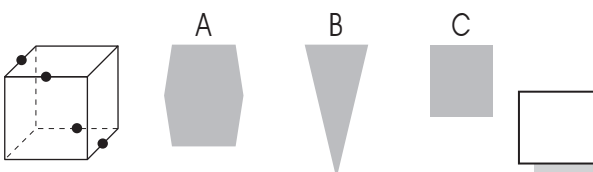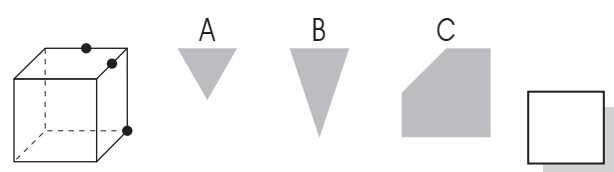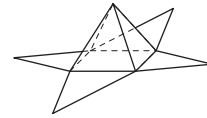
NETS of 3D SHAPES

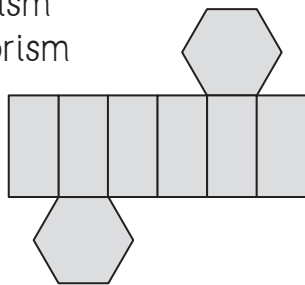**Cube**   **Prism**   **Pyramid**

- 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
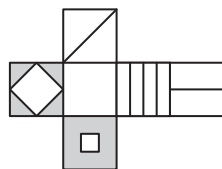B) hexagonal prism
C) rectangular prism

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.

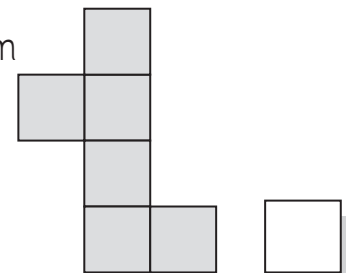**a)** Which of the boxes can be made from the net below?

A)

B)

C)

Trace, cut out and fold the shape.

B
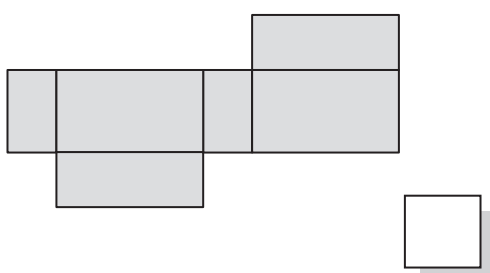

b) Which shape can this net be used to make?
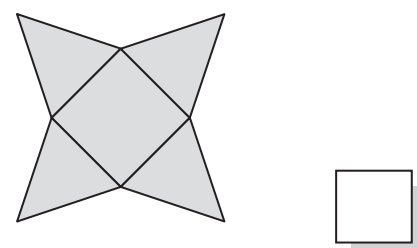
A) cube
B) tetrahedron
C) square prism

c) Which shape can this net be used to make?
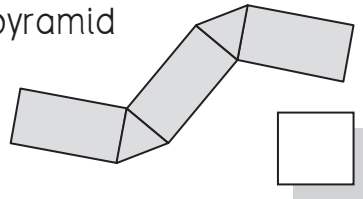
A) square prism
B) rectangular prism
C) cube

d) Which shape can this net be used to make?
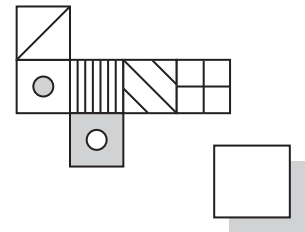
A) triangular pyramid
B) square prism
C) square pyramid

e) Which shape can this net be used to make?
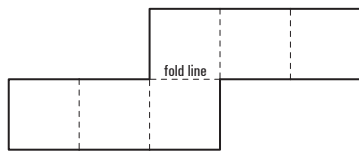
A) cube
B) triangular prism
C) triangular pyramid
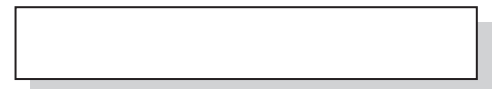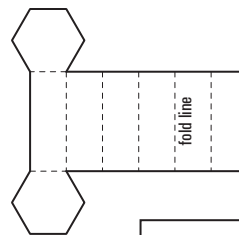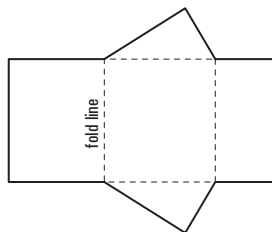
f) Which of the boxes can be made from the net below?

A)

B)

C)

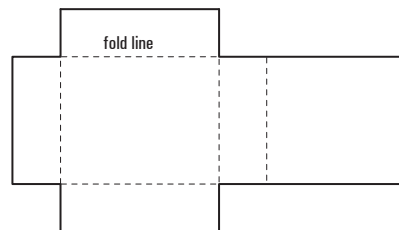**g)** What 3-dimensional shape can this net be used to make?

fold line

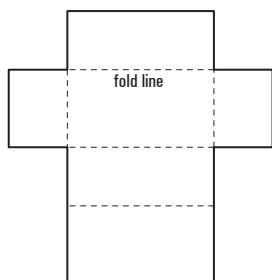**h)** What 3-dimensional shape can this net be used to make?

fold line

i) What 3-dimensional shape can this net be used to make?

fold line

j) What 3-dimensional shape can this net be used to make?

fold line

k) What 3-dimensional shape can this net be used to make?

fold line

l) What 3-dimensional shape can this net be used to make?

fold line

Skill 19.11 Drawing top, side and front views of 3D shapes.
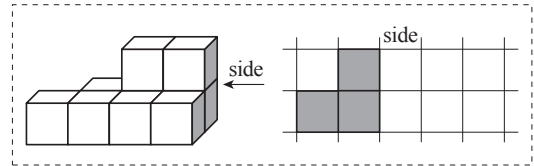
MM3.2 11 22 33 44
MM4.1 11 22 33 4 4
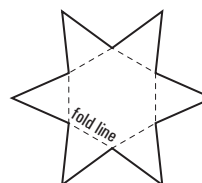
Drawing the top view of a 3D shape
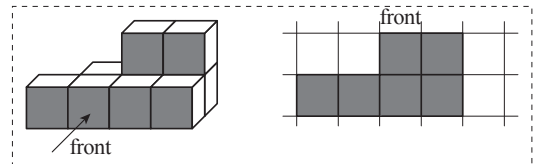- Imagine what you would see if you were looking at the solid from directly above.
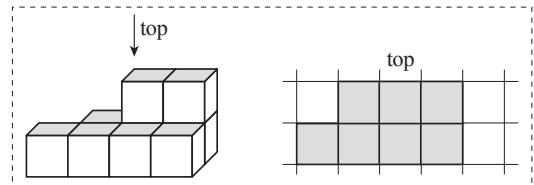
Drawing the side view of a 3D shape
- Imagine what you would see if you were looking at one of the sides of the solid.
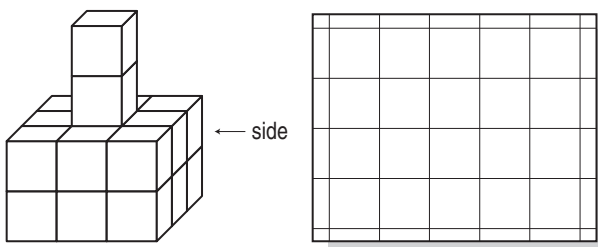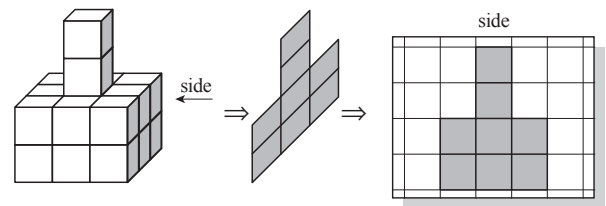
Drawing the front view of a 3D shape
- Imagine what you would see if you were looking at the front of the solid.
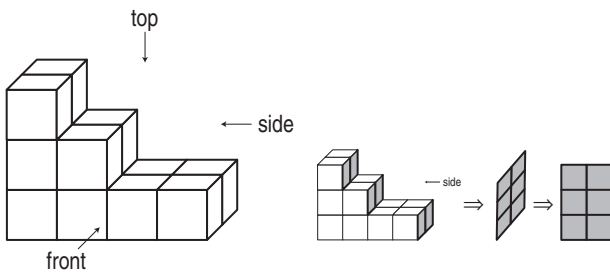
Q. Draw the side view of this solid.
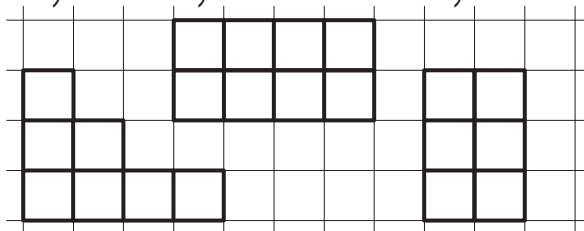
A.
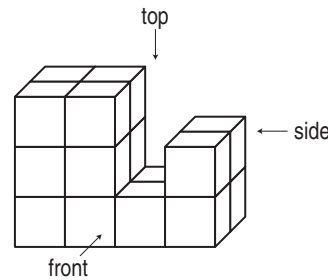
a)

Which shape is the side view of the solid above?

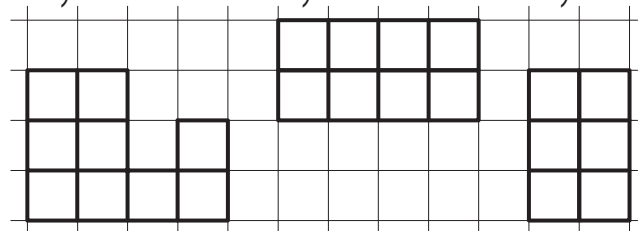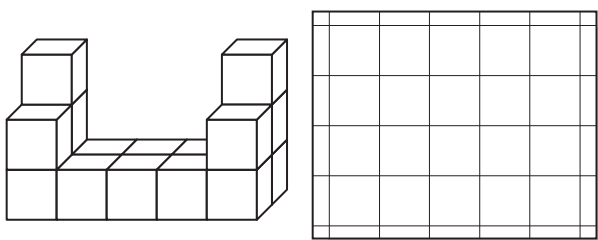A)   B)   C)

b)

Which shape is the top view of the solid above?

A)   B)   C)

c) Draw the front view of this solid.

d) Draw the side view of this solid.