Discussions and practical activities with full answers

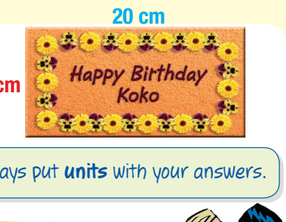
Perimeter

The distance around the outside of a shape is called the **perimeter**.

Example

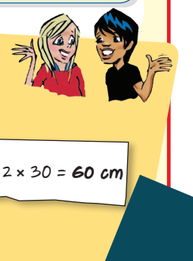
It is Koko's birthday.
The perimeter of his cake is

$20 + 10 + 20 + 10 = 2 \times 20 + 2 \times 10$
$= 40 + 20$
$= \mathbf{60\ cm}$



Discussion

- In the example above, why were 20 and 10 added twice to find the perimeter?
- Explain Jess's thinking.



- What does Ziggy mean by units?

Practical

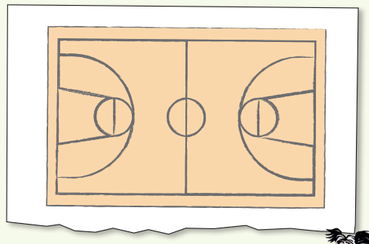
How far do I need to walk?

- a tape measure
- a ruler
- a measuring wheel

1 Choose a rectangular room or court at your school.

2 Make a quick sketch of the rectangle you chose.

Example Jess sketched the basketball court like this.



3 Work out how far you would walk if you walked around the outside of your rectangle.
What is the smallest number of sides you must measure?
Which sides do you **need** to measure?

GM2-1: Create and use appropriate units and devices to measure length, area, volume ...

FULL DETAILED ANSWERS

5 a less b more c more
6 A
7 C
8 A
9 A
10 C
11 A
12 C
13 a $1\frac{1}{2}$ b 18 c 4 d 1 e 8 f 40
14 Jess should estimate too low because she wants the water to be at least this depth to be safe. If she estimates too high the water might not be deep enough to dive into safely.
15 a A little low because they want the truck to fit through the tunnel. If they estimate it too high the truck may not fit.
b A little high because Jess would not want to miss the start of the movie. She needs to leave enough time to get there.
c A little high because it is better to have too much pasta than not enough.
d A little high because they want to make sure that the class is not going to break the bridge.

Puzzles ..... page 207
1 a They are both the same length.
b They are both the same size.
c They are both the same size.
d They are both the same size.
2 4 lots of 7 kg weights = 28 kg and 3 lots of 15 kg.
3 3 L bowl = 9 L
..... page 208
2 a 3 kg
3 8 kg
4 9 teaspoons
5 415 g
6 40 cm
7 11 km
8 28 L
9 $61\frac{1}{2}$ kg
10 6 blocks

Discussion ..... page 210
- 2 quarter turns equal 1 half turn because $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$
- Four quarter turns equal 1 full turn because $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$
- 5

Practical – Angle it ..... page 210
1 a 2 blue angles b 4 blue angles
2 a 2 pink angles b 4 pink angles
c 8 pink angles
3 a 2 orange angles b 4 orange angles
c 8 orange angles d 16 orange angles
4 The blue angle equals a quarter ($\frac{1}{4}$) of a full turn.
The pink angle equals an eighth ($\frac{1}{8}$) of a full turn.
The orange angle equals a sixteenth ($\frac{1}{16}$) of a full turn.
The purple angle equals one full turn.
The red angle equals a half ($\frac{1}{2}$) of a full turn.

12 Perimeter, area and volume page 211

Getting started – Bird watching ..... page 211
Some possible answers are:
a Jess could find the **perimeter** of the bird watching area, the duck pond, the playground and the car park.
b She could find the **area** of the bird watching area, duck pond, playground, car park, sandpit, a seat, the tiles in the rose garden.
c She could find the **volume** of the water tank, the birdbath, the sandpit and the rubbish bin.

Check up ..... page 212
1 a The blue circle
b Yes, because the blue circle is bigger than the green circle so any circle bigger than the blue circle must also be bigger than the green one.
2 a The purple rectangle b The orange rectangle
3 The green container
4 a Student's own items. Possible items are: the top of the desk, the classroom, a netball court.
b Student's own items. Possible items are: an ice cream container, a toy box, a sandpit, a cup.

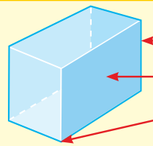
Rich task 1 – Gift wrapping ..... page 213
- Student's own answers.

Discussion ..... page 214
- The cake has four sides and two pairs of sides have the same length. One pair of sides is 20 cm long and the other pair is 10 cm long, so two lots of 20 cm and two lots of 10 cm must be added to find the perimeter.
- Jess has added together the length of one long side, 20 cm, and one short side, 10 cm, to give 30 cm. As there are two long sides and two short sides she has multiplied this combined length by 2.

1 and 2 Student's own sketch and answer.
3 You would need to measure two sides, one long side (the length) and one short side (the width).

Discussions and practical activities with full answers

A 3-D shape can be described by the number of **faces, vertices** and **edges**.

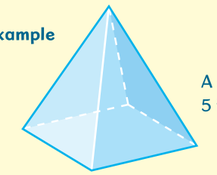


edge (where two faces meet)

face

vertex or corner (where edges meet)

Example



A **square-based pyramid** has 5 faces, 8 edges and 5 vertices.

Discussion

- A cuboid is sometimes called a rectangular prism. Why?
- How many faces, edges and vertices does a sphere have? What about a cylinder?
- A cylinder has two ends the same but it is NOT a prism. Why do you think this is?

Game

What 3-D shape am I?

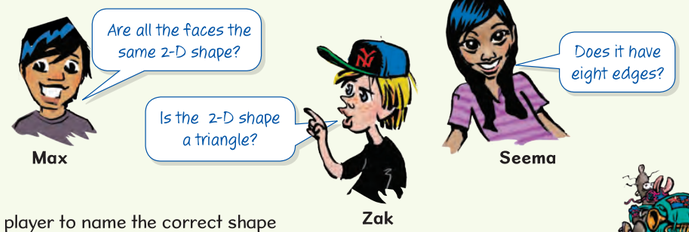
1 The leader is the person with the shortest hair.

2 The leader thinks of a 3-D shape from the opposite page.

Example Jess was the leader and she thought of this shape.

3 The rest of the group asks questions, one at a time, that must be able to be answered by 'yes' or 'no'.

Example



4 The first player to name the correct shape has the next turn as the leader.

FULL DETAILED ANSWERS

3 Student's own grouping.

Puzzles ..... page 253

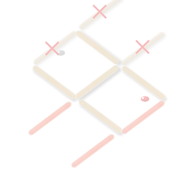
The ski jump

a 10 b 11

Moving toothpicks and ice-block sticks

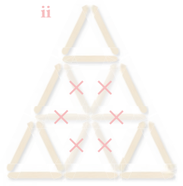
1

3



4 i

ii



iii

Discussion ..... page 254

- Radii could be drawn in any position from the centre of the circle to the circumference. There is an infinite number of radii.
  Each radius is the same length.
  The diameter is two times larger than the radius.

Practical - Round and round ..... page 255

1 Student's own drawings of circles.
Diameter of each drawn circle is:
a 10 cm b 16 cm c 9 cm d 7 cm

Discussion ..... page 257

- A prism is described by its cross section. A cuboid has a rectangle as its cross section so a cuboid is a rectangular prism.
- A sphere has one face, no edges and no vertices. A cylinder has three faces, two edges and no vertices.
- A prism has flat sides and a cross section that is a polyhedron. A cylinder has a curved side and its cross section is either a circle or an ellipse. So, a cylinder is not a prism.

1 b

Name of solid	Cuboid	square-based pyramid	tetrahedron or triangular-based pyramid	hexagonal prism
Number of faces	6	5	4	8
Number of vertices	8	5	4	12
Number of edges	12	8	6	18

c Frames 4 U needs to know how many metres of framing materials they will need to make each frame.

Activity 3 ..... page 258

1 a 8 faces, 12 vertices, 18 edges
b 7 faces, 10 vertices, 15 edges
c 2 faces, 1 vertex, 1 edge
d 7 faces, 10 vertices, 15 edges

2 a H b A c A
d A = pentagonal prism
B = sphere
C = cylinder
D = square-based pyramid
E = triangular prism
F = cuboid or rectangular prism
G = triangular-based pyramid or tetrahedron
H = octaghedron
I = triangular prism

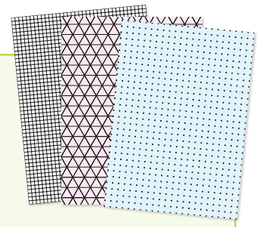
Discussions and practical activities with full answers

Drawing shapes

Practical

Different shapes, different paper

• squared paper, triangle paper, dotty paper

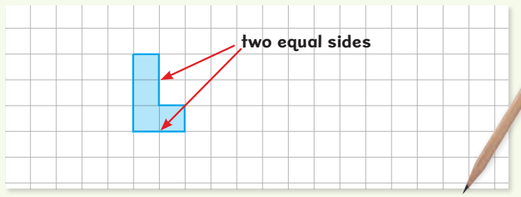


1 Draw each of the following shapes in as many ways as you can by shading squares or triangles, or joining dots on your paper.

a a quadrilateral with four equal sides on **squared, triangle** and **dotty** paper.

b a six-sided shape with at least one pair of equal sides on **squared** paper.

Example



c a four-sided shape made by shading three triangles on **triangle** paper.

Example

d On **triangle** paper draw

i a four-sided shape made by shading four triangles.

ii as many different shapes as you can by shading four triangles.

iii a triangle made by shading nine triangles.

e On **dotty** paper draw

i as many different four-sided shapes as you can.

ii as many different five-sided shapes as you can.

FULL DETAILED ANSWERS

Classify plane shapes and prisms by their spatial features.

2 a On Planet Zed. It is an equilateral triangle, a regular polygon, and all the shapes on Zed are regular polygons with all sides equal.

b On Planet Why. One of its sides is curved and all the shapes on Why have at least one curved side.

c On Planet Zed. It a regular pentagon with all sides equal.

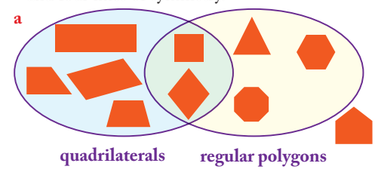
d On Planet Ex. It a polygon with all straight sides.

e On Planet Ex. It a polygon with all straight sides.

3 a A square

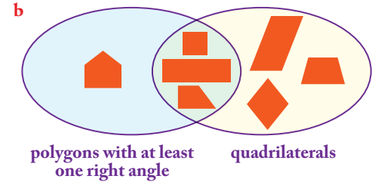
b The minimum information needed is four equal sides and four right angles or four equal sides and four lines of symmetry.

4 a



On this diagram the pentagon is missed out because it is neither a quadrilateral nor a regular polygon.

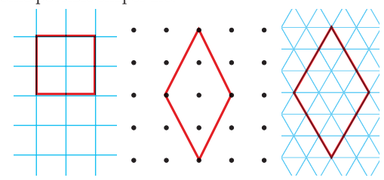
b



On this diagram the equilateral triangle, the octagon and regular hexagon are missed out because they do not have a right angle and they are not a quadrilateral.

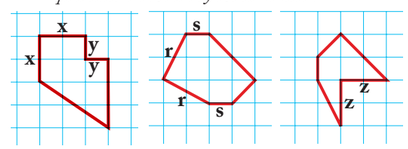
Practical - Different shapes, different paper.....page 248

a Some possible shapes are:

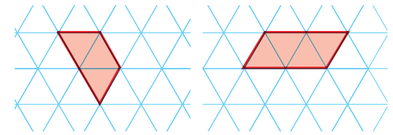


b Some possible shapes are:

Equal sides are shown by the same letter.

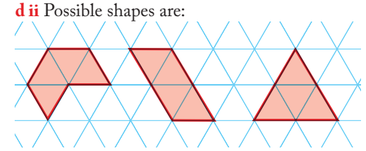


c

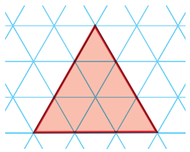


d i

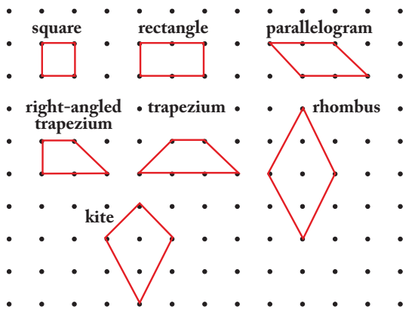
d ii Possible shapes are:



d iii



e i



e ii Some possible shapes are: