

Mathematics Level 4

Chapter 5 — Space

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Geometric properties of two-dimensional shapes and three-dimensional objects

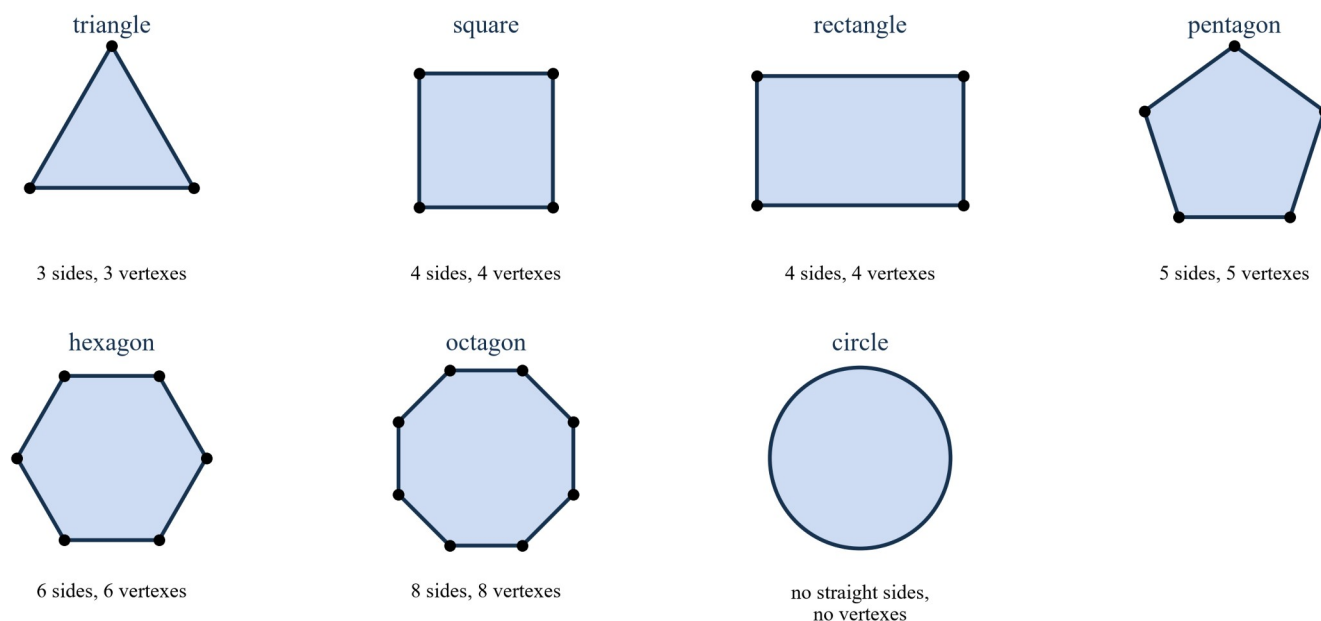
Code VC2M4SP01 (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): “explain and compare the geometric properties of two-dimensional shapes and three-dimensional objects”. This section draws on elaborations VC2M4SP01.E01 and VC2M4SP01.E02.

What you need to know

In Year 3 you made and compared objects. This section looks at shapes and objects again, and you describe and compare their properties.

Properties. The **properties** of a shape or object are the facts about it that you can see and count: how many sides it has, how many corners it has, and whether it is flat or takes up space.

Two-dimensional shapes. A **two-dimensional** shape, or **2D** shape, is completely flat, like a drawing on paper. A 2D shape has **sides** and **vertexes**. A **vertex** is a corner — the point where two sides meet.



Seven two-dimensional shapes. The top row shows a triangle, a square, a rectangle and a pentagon. The bottom row shows a hexagon, an octagon and a circle. Each shape has its name above it and a short note below it saying how many sides and vertexes it has. The circle is marked as having no straight sides and no vertexes.

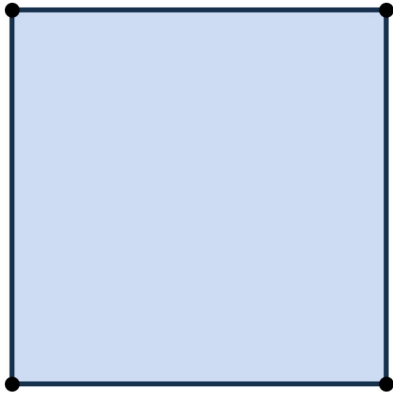
Here are the properties of the shapes in the picture. A **pentagon** is a shape with 5 sides and 5 vertexes.

Shape	Sides	Vertexes
triangle	3	3
square	4	4
rectangle	4	4
pentagon	5	5
hexagon	6	6
octagon	8	8
circle	no straight sides	0

A circle is different from the other shapes. It has no straight sides and no vertexes — it is round.

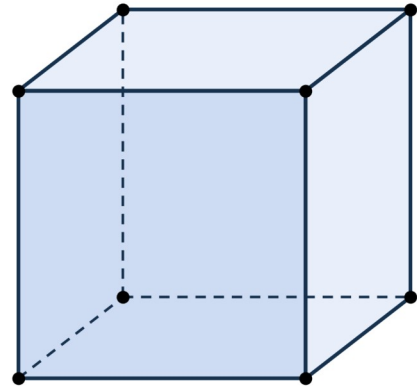
Three-dimensional objects. A **three-dimensional** object, or **3D** object, takes up space. You can hold a 3D object in your hand.

a square



flat — a 2-D shape
4 sides and 4 vertexes

a cube

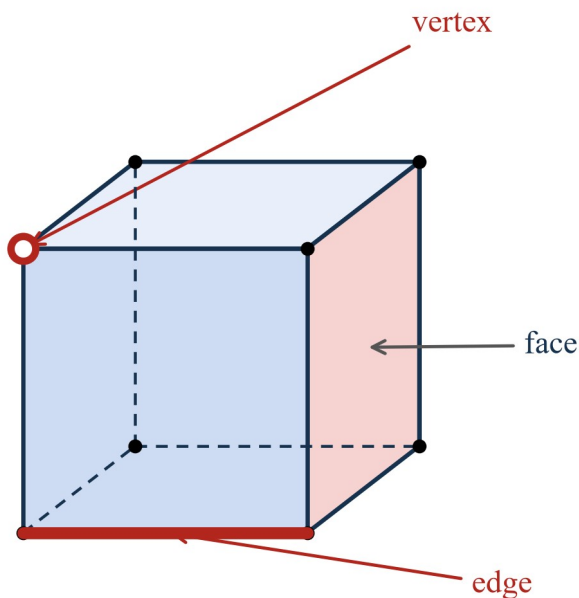


takes up space — a 3-D object
6 faces, 12 edges and 8 vertexes

A square beside a cube. The square is labelled “flat — a 2-D shape, 4 sides and 4 vertexes”. The cube is drawn in 3-D and labelled “takes up space — a 3-D object, 6 faces, 12 edges and 8 vertexes”.

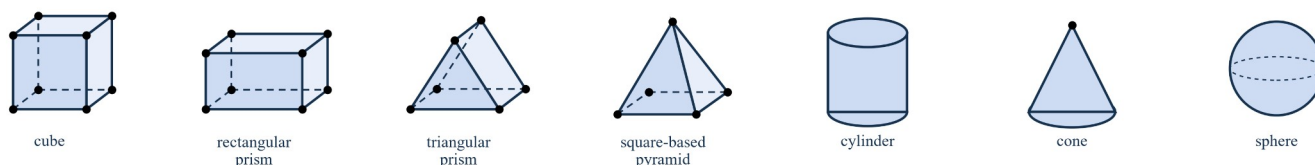
A 2D shape has sides and vertexes. A 3D object has **faces**, **edges** and **vertexes**.

- A **face** is a flat part of the object, like one side of a box.
- An **edge** is the line where two faces meet.
- A **vertex** is the point where edges meet.



A cube drawn in 3-D with its parts labelled. An arrow points to the top face, labelled “face”. A red arrow points to the bottom front edge, labelled “edge”. A red arrow points to the top left corner, labelled “vertex”. The hidden edges at the back are drawn dashed.

A line-up of 3D objects. Here are seven 3D objects and their properties.



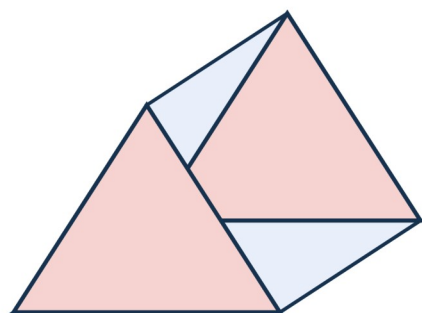
A row of seven three-dimensional objects, each with its name below it: a cube, a rectangular prism, a triangular prism, a square-based pyramid, a cylinder, a cone and a sphere. Hidden edges are drawn dashed.

Object	Properties
cube	6 square faces, 12 edges, 8 vertexes
rectangular prism	6 rectangle faces, 12 edges, 8 vertexes
triangular prism	5 faces: 2 triangles and 3 rectangles; 9 edges; 6 vertexes
square-based pyramid	5 faces: 1 square and 4 triangles; 8 edges; 5 vertexes
cylinder	2 flat circular faces and a curved surface; no vertexes
cone	1 flat circular face, a curved surface and 1 vertex
sphere	a curved surface only; no flat faces and no vertexes

Prisms. A **prism** is a 3D object with two ends that are the same shape and the same size. It is the same shape all the way through. A prism gets its name from the shape of its ends: a **triangular prism** has triangle ends, and a **rectangular prism** has rectangle ends. A cube is a prism with square ends.

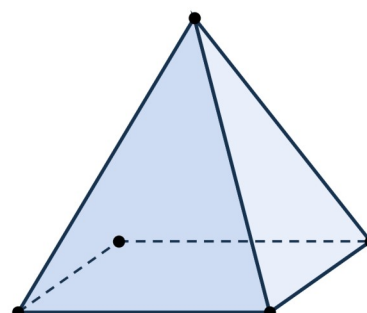
Pyramids. A **pyramid** has a 2D shape as its base. Its other faces are triangles, and they all meet at one vertex on top. A pyramid is named after its base: a **square-based pyramid** has a square base, and a **triangle-based pyramid** has a triangle base.

a triangular prism



two ends the same shape,
the same shape all the way through

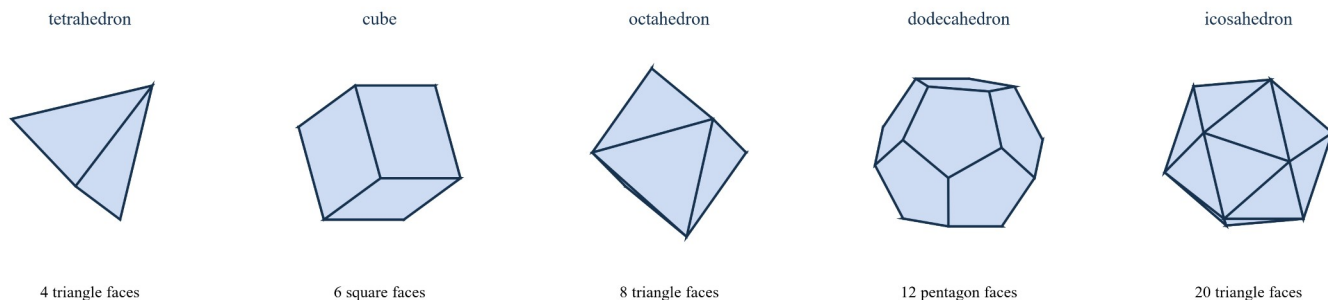
a square-based pyramid



a square base; triangle faces
meet at one vertex on top

A triangular prism beside a square-based pyramid. The triangular prism is labelled “two ends the same shape, the same shape all the way through”. The square-based pyramid is labelled “a square base; triangle faces meet at one vertex on top”.

The five platonic solids. There are just five 3D objects where every face is the same 2D shape and the same size. They are called the **platonic solids**.



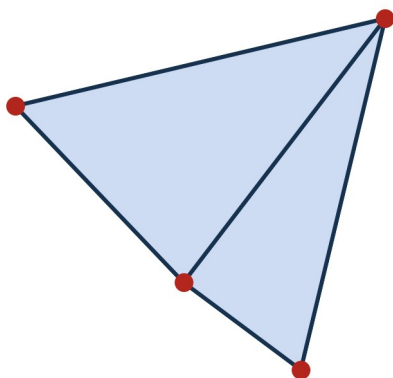
The five platonic solids in a row. Each one has its name above it and its faces described below it: tetrahedron, 4 triangle faces; cube, 6 square faces; octahedron, 8 triangle faces; dodecahedron, 12 pentagon faces; icosahedron, 20 triangle faces.

Name	Faces
tetrahedron	4 triangle faces
cube	6 square faces
octahedron	8 triangle faces
dodecahedron	12 pentagon faces
icosahedron	20 triangle faces

An **octahedron** is the platonic solid with 8 triangle faces. An **icosahedron** is the one with 20 triangle faces. The faces of a dodecahedron are pentagons, the 5-sided shapes from the start of this section.

A **tetrahedron** is a pyramid with a triangle base. It has 4 triangle faces, 6 edges and 4 vertexes.

a tetrahedron



4 triangle faces, 6 edges and 4 vertexes

A tetrahedron drawn in 3-D with a dot at each vertex. It is labelled “a tetrahedron” and “4 triangle faces, 6 edges and 4 vertexes”.

The faces of a 3D object are 2D shapes. Look at a 3D object one face at a time. Each flat face is a 2D shape. The flat faces of a cube are squares. The flat faces of a triangular prism are triangles and rectangles. The flat faces of a cylinder are circles.



Three rows, each with a 3-D object on the left, an arrow, and a 2-D shape on the right. A cube points to a square. A triangular prism points to a triangle, one of its triangle faces. A cylinder points to a circle, one of its flat faces.

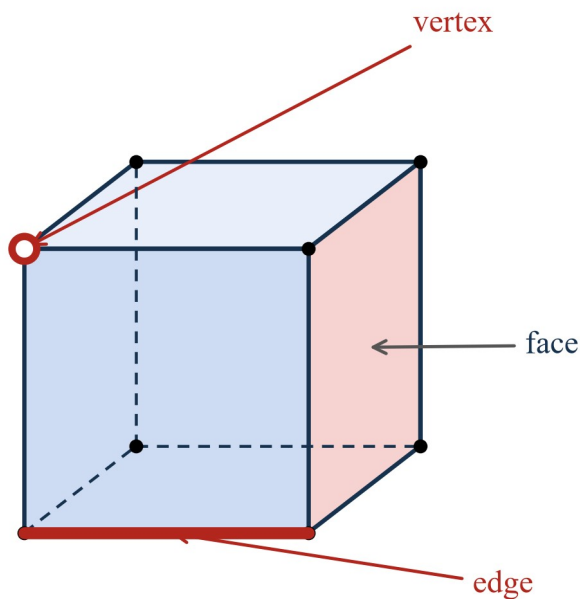
When you compare two 3D objects, one good way to start is to name the 2D shapes of their faces.

A word on Year 5. 3D objects come back in Year 5 with more ideas around them. In this section, naming and comparing faces, edges and vertexes is the whole job.

Worked examples

Example 1 — faces, edges and vertexes of a cube

Look at the cube and count its faces, edges and vertexes.



A cube drawn in 3-D with its parts labelled: face, edge and vertex.

Working

Comment

Faces: top and bottom, front and back, left and right: 3 pairs

Counting in pairs helps you get them all.

3 pairs of faces = 6 faces

Edges: 4 around the top face, 4 around the bottom face, 4 joining top to bottom

An edge is the line where two faces meet.

$4 + 4 + 4 = 12$ edges

Vertexes: 4 on the top face and 4 on the bottom face

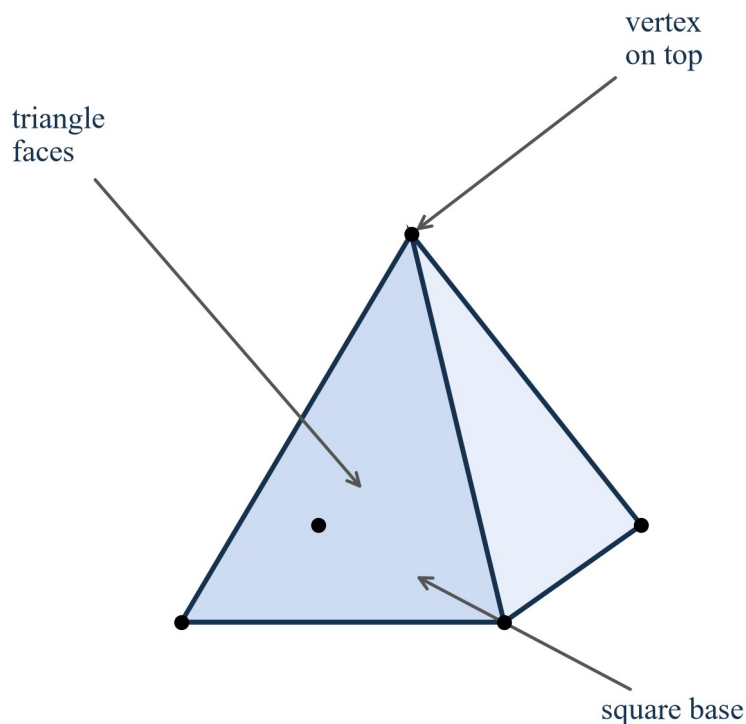
A vertex is the point where edges meet.

$4 + 4 = 8$ vertexes

A cube has **6 faces, 12 edges and 8 vertexes**.

Example 2 — the faces of a square-based pyramid

What 2D shapes are the faces of a square-based pyramid? Then count its faces, edges and vertexes.



A square-based pyramid drawn in 3-D with its parts labelled: square base, triangle faces, and the vertex on top.

Working	Comment
The face on the bottom is 1 square.	The base gives the pyramid its name.
The 4 faces going up to the top are triangles.	They meet at the vertex on top.
Faces: $1 + 4 = 5$	
Edges: 4 around the base and 4 going up to the top	
$4 + 4 = 8$ edges	
Vertexes: 4 on the base and 1 at the top	
$4 + 1 = 5$ vertexes	

The faces are **1 square and 4 triangles**. A square-based pyramid has **5 faces, 8 edges and 5 vertexes**.

Example 3 — comparing a cube and a cylinder

Compare a cube and a cylinder. Give one thing that is the same and two things that are different.

Working	Comment
Same: they are both 3D objects, and they both have flat faces.	The cube has 6 flat faces; the cylinder has 2 flat faces.
Different: every face of a cube is flat, but a cylinder also has a curved surface.	
Different: a cube has 8 vertexes and 12 edges, but a cylinder has no vertexes.	

Practice questions

Questions with help

Q1. A 2D shape is completely ____ . A 3D object takes up ____ .

Q2. How many sides and how many vertexes does a hexagon have? Use the picture of the shapes to help you.

Q3. Give the name of each part of a 3D object.

- (a) a flat part of the object
- (b) the line where two faces meet
- (c) the point where edges meet

Q4. Copy and fill in the blanks: A rectangular prism has ____ faces, ____ edges and ____ vertexes.

Q5. True or false?

- (a) A cone has one vertex.
- (b) A sphere has two flat faces.
- (c) A cylinder has no vertexes.

Q6. Give the name of the 2D shape of each face.

- (a) each face of a cube
- (b) each face of a tetrahedron
- (c) each face of a dodecahedron

Q7. Which 3D object has 2 triangle faces and 3 rectangle faces?

Q8. Look at the line-up picture of the seven 3D objects.

- (a) Which objects have no vertexes?
- (b) Which object has exactly one vertex?
- (c) Which objects have a curved surface?

Questions on your own

Q9. Copy this table and fill in the blanks.

Object	Faces	Edges	Vertexes
rectangular prism	_____	_____	_____
triangular prism	_____	_____	_____
square-based pyramid	_____	_____	_____

Q10. A tetrahedron has 4 triangle faces. Use the tetrahedron picture to count its edges and its vertexes.

Q11. Look at the octahedron in the platonic solids picture. It has 8 triangle faces. Count its vertexes.

Q12. How many faces does an icosahedron have? What 2D shape are they?

Q13. Give one thing that is the same, and one thing that is different, for a triangle and a triangular prism.

Q14. Sort these names into two lists: 2D shapes and 3D objects.

pentagon, sphere, octagon, cone, rectangle, cylinder, hexagon, cube

Q15. Which platonic solid has square faces? How many faces does it have?

Q16. A 3D object has 5 faces: 1 square face and 4 triangle faces. What is the object?

Q17. Ruby says a cube and a rectangular prism have the same number of faces, the same number of edges and the same number of vertexes. Is Ruby right? Explain your answer.

Q18. Which platonic solid has pentagon faces? How many faces does it have?

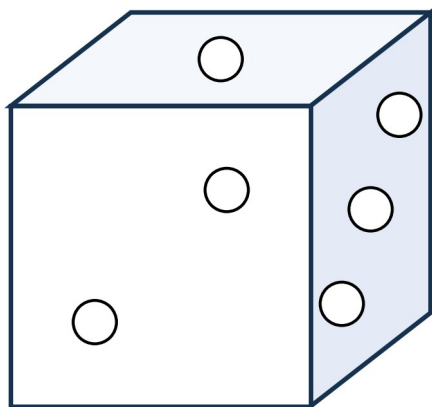
Q19. Explain why a sphere has no vertexes.

Q20. Draw a triangular prism in your book. Mark each vertex with a dot, then count them. How many vertexes does a triangular prism have?

Applied

Q21. Kai's family in Geelong has a games night every Friday. They play a game with standard dice. A standard die is a cube, with the numbers 1 to 6 on its faces. The numbers are put on so that the numbers on opposite faces add to 7.

Source: Wikipedia, *Dice*, en.wikipedia.org, retrieved 2026-08-20.



The faces we can see show 1, 2 and 3.

A die drawn in 3-D. It is a cube, and the three faces we can see show 1 on the top face, 2 on the front face and 3 on the side face.

- (a) A die is a cube. How many faces, edges and vertexes does it have?
 - (b) Kai rolls a die. It lands with 2 on top. What number is on the bottom face?
 - (c) Mia rolls her die. It lands with 4 on top. What number is on the bottom face?
 - (d) Mia says: "On a standard die, the two opposite faces could show 3 and 5." Is Mia right? Explain your answer.
-

Answers

Q1. flat; space. **Q2.** 6 sides and 6 vertexes. **Q3.** (a) face; (b) edge; (c) vertex. **Q4.** 6 faces, 12 edges, 8 vertexes. **Q5.** (a) true; (b) false; (c) true. **Q6.** (a) square; (b) triangle; (c) pentagon. **Q7.** A triangular prism. **Q8.** (a) the cylinder and the sphere; (b) the cone; (c) the cylinder, the cone and the sphere. **Q9.** See the table in the worked answers. **Q10.** 6 edges and 4 vertexes. **Q11.** 6 vertexes. **Q12.** 20 faces; they are triangles. **Q13.** See worked answers. **Q14.** 2D shapes: pentagon, octagon, rectangle, hexagon. 3D objects: sphere, cone, cylinder, cube. **Q15.** The cube; 6 faces. **Q16.** A square-based pyramid. **Q17.** Yes — see worked answers. **Q18.** The dodecahedron; 12 faces. **Q19.** See worked answers. **Q20.** 6 vertexes. **Q21.** (a) 6 faces, 12 edges, 8 vertexes; (b) 5; (c) 3; (d) no — see worked answers.

Worked answers

Q1. A 2D shape is completely **flat**, like a drawing on paper. A 3D object takes up **space** — you can hold it in your hand.

Q2. Count around the hexagon: it has **6 sides** and **6 vertexes**.

Q3. A flat part of a 3D object is a **face**. The line where two faces meet is an **edge**. The point where edges meet is a **vertex**.

Q4. A rectangular prism has **6 faces**, **12 edges** and **8 vertexes**. It has the same counts as a cube — the difference is the shapes of its faces.

Q5. (a) **True** — a cone has one vertex, the point at the top. (b) **False** — a sphere has no flat faces at all, only a curved surface. (c) **True** — a cylinder has no vertexes.

Q6. (a) Every face of a cube is a **square**. (b) Every face of a tetrahedron is a **triangle**. (c) Every face of a dodecahedron is a **pentagon**, a shape with 5 sides.

Q7. 2 triangle ends and 3 rectangle faces joining them: that is a **triangular prism**.

Q8. (a) The **cylinder** and the **sphere** have no vertexes. (b) The **cone** has exactly one vertex, the point at the top. (c) The **cylinder**, the **cone** and the **sphere** all have a curved surface.

Q9. From the line-up table:

Object	Faces	Edges	Vertexes
rectangular prism	6	12	8
triangular prism	5	9	6
square-based pyramid	5	8	5

Q10. Count along the edges of the tetrahedron: 3 around the bottom face and 3 going up to the top vertex, so **6 edges**. Count the vertexes: 3 around the bottom face and 1 at the top, so **4 vertexes**.

Q11. Count the points where edges meet on the octahedron: 1 at the very top, 1 at the very bottom, and 4 around the middle, so **6 vertexes**.

Q12. From the platonic solids table, an icosahedron has **20 faces**, and they are all **triangles**.

Q13. Same: they both have straight sides or edges — a triangle has 3 straight sides, and a triangular prism has triangle faces with straight edges. Different: a triangle is a flat 2D shape, but a triangular prism is a 3D object that takes up space. (You could also say: a triangle has 3 vertexes, but a triangular prism has 6.)

Q14. 2D shapes are flat: **pentagon, octagon, rectangle, hexagon**. 3D objects take up space: **sphere, cone, cylinder, cube**.

Q15. The **cube** is the platonic solid with square faces. It has **6 faces**.

Q16. A square base with 4 triangle faces meeting at a vertex on top: a **square-based pyramid**.

Q17. Ruby is **right**. A cube has 6 faces, 12 edges and 8 vertexes, and a rectangular prism has 6 faces, 12 edges and 8 vertexes too. The counts are the same. The difference is the shapes of the faces: every face of a cube is a square, but the faces of a rectangular prism are rectangles.

Q18. The **dodecahedron** has pentagon faces. It has **12 faces**.

Q19. A vertex is the point where edges meet. A sphere has no edges — its surface is all curved, with no flat faces — so there is no point where edges can meet. A sphere has **no vertexes**.

Q20. A triangular prism has 3 vertexes around one triangle end and 3 around the other end: $3 + 3 = \mathbf{6 \text{ vertexes}}$. Your drawing should have 6 dots.

Q21. (a) A die is a cube, so it has **6 faces, 12 edges and 8 vertexes**. (b) Opposite faces add to 7. $2 + 5 = 7$, so the bottom face shows **5**. (c) Opposite faces add to 7. $4 + 3 = 7$, so the bottom face shows **3**. (d) Mia is not right. On a standard die, opposite faces add to 7. But $3 + 5 = 8$, not 7. The face opposite 3 shows 4, because $3 + 4 = 7$. So 3 and 5 cannot be on opposite faces.

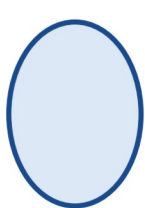
Composite shapes and objects in the environment

Code VC2M4SP02 (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): “represent and approximate composite shapes and objects in the environment, using combinations of familiar shapes and objects”. This section draws on VC2M4SP02.E01, .E02, .E03 and .E04.

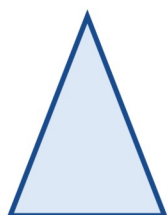
What you need to know

In Year 3 you drew flat pictures of a familiar environment — a street or a park where the house is a rectangle with a triangle on top. In 5A you named flat shapes and solid objects and their parts. This section puts those names to work on the messy real world: you will build shapes out of shapes, and you will approximate real objects with the shapes and objects you know.

Familiar shapes and objects. Here are the flat shapes and the solid objects this section uses.



circle



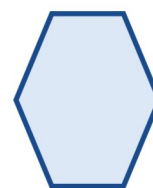
triangle



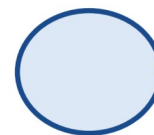
square



rectangle

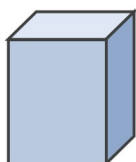


hexagon

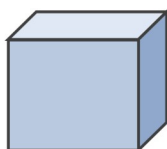


oval

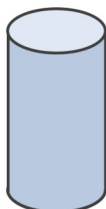
A row of six flat shapes, each with its name below it: circle, triangle, square, rectangle, hexagon and oval.



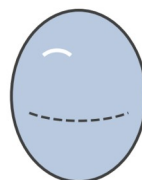
cube



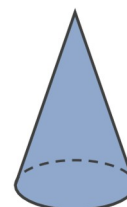
rectangular prism



cylinder



sphere



cone

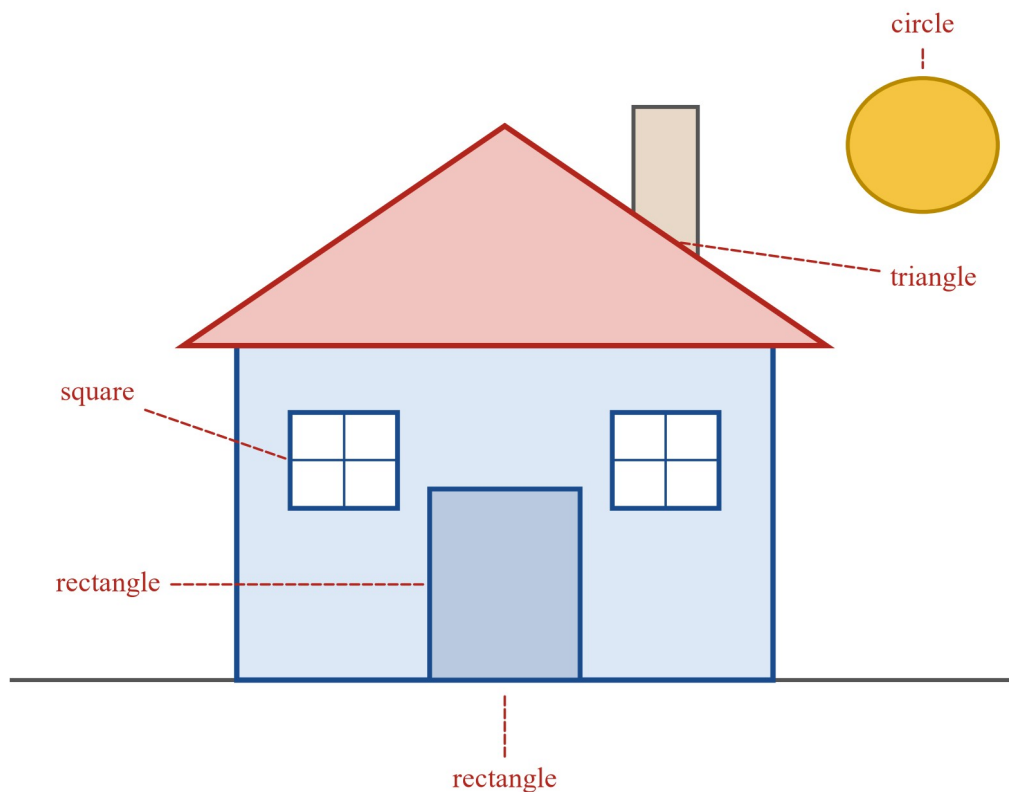


pyramid

A row of six solid objects, each with its name below it: cube, rectangular prism, cylinder, sphere, cone and pyramid.

A flat shape is completely flat, like a drawing on paper. A solid object takes up space — you can hold it in your hand. In 5A you met these solid objects and counted their faces, edges and corners. Here they become building blocks.

Composite shapes. A **composite shape** is a shape made by combining two or more familiar shapes. This house picture is a composite shape.



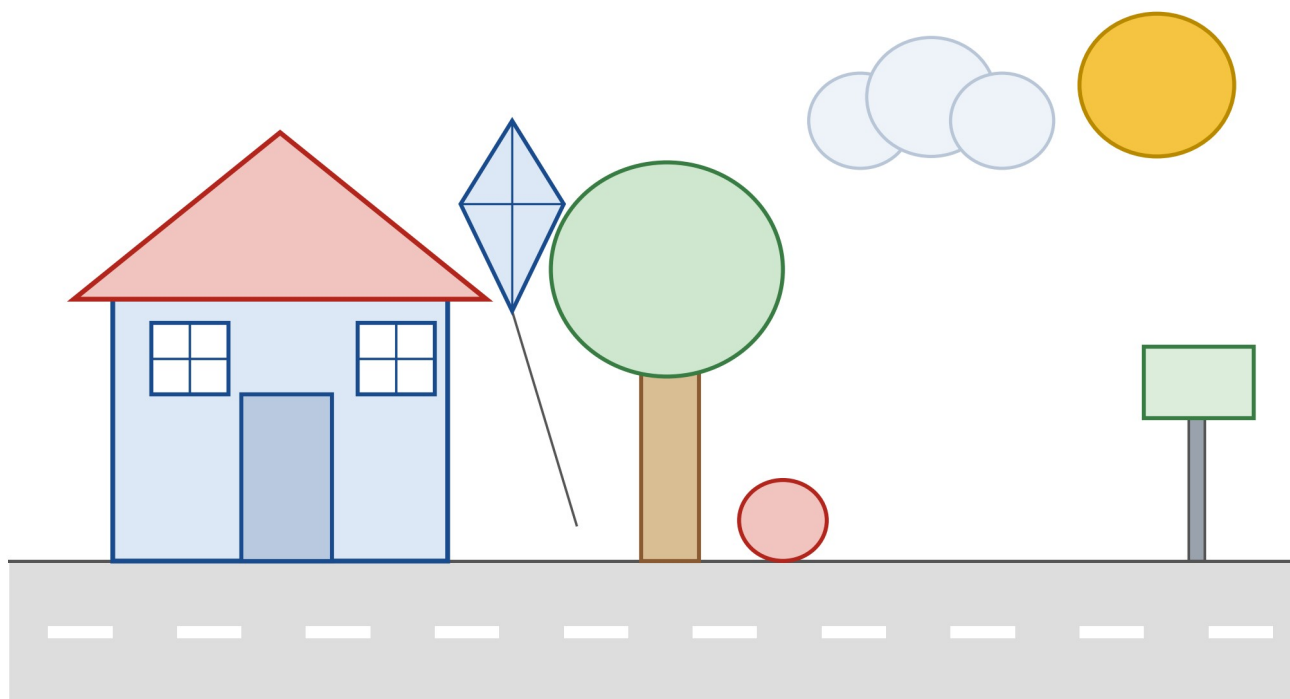
A house drawn from flat shapes, with each part named: the roof is a triangle, the walls are a rectangle, the door is a rectangle, each window is a square, and the sun is a circle.

The walls of the house are a rectangle, and the roof is a triangle. The door is a rectangle, the two windows are squares, and the sun is a circle. Each part is a familiar shape, and the parts together make the whole picture.

To break a composite shape into parts:

1. **Look** at the picture and find where one part ends and the next part starts.
2. **Name** each part shape.
3. **Check** that the parts, put together, make the whole picture.

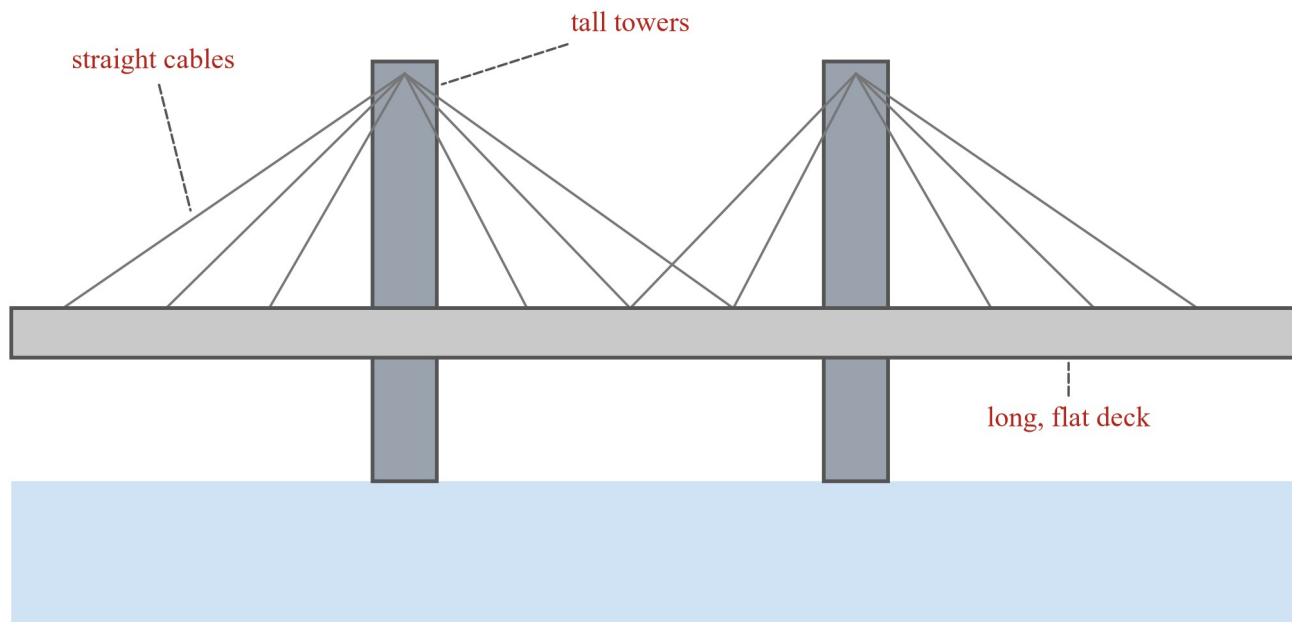
Shapes in the environment. The **environment** is the world around you — your street, your school, your park. In Year 3 you drew flat pictures of streets and parks. Now you look for the familiar shapes inside them.



A street scene drawn from flat shapes, with no labels: a house with a triangle roof, rectangle walls, rectangle door and two square windows; a tree with a rectangle trunk and circle leaves; a kite made of triangles with a straight string; a circle ball; a rectangle road with a dashed centre line; a cloud made of circles; a circle sun; and a rectangle sign on a rectangle post.

This street scene is built from familiar shapes: the house walls are a rectangle, the roof is a triangle, the windows are squares, the tree leaves, the ball, the sun and the cloud are circles, and the road is a long rectangle. Finding the shapes inside a picture is the first skill of this section.

Approximating with familiar shapes. Real objects are not exact shapes. The West Gate Bridge in Melbourne is not exactly a rectangle — but from the side, its deck is *close to* a long flat rectangle, and its two towers are close to tall rectangles. When you say a real object is close to a familiar shape, you are making an **approximation**. An approximation is not exact, but it is close enough to be useful.



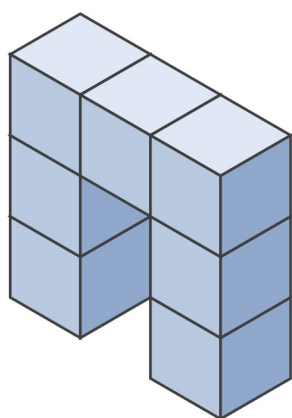
A side view of the West Gate Bridge over water, drawn with familiar shapes and the parts named: the cables are straight lines, the two towers are tall rectangles, and the deck is a long, flat rectangle.

Source: Wikipedia, *West Gate Bridge*, retrieved 2026-08-20.

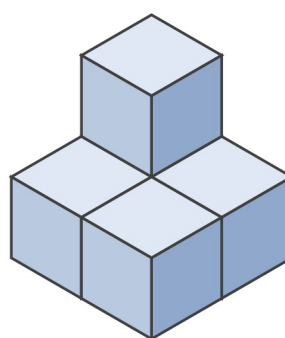
The drawing models the bridge with familiar shapes: the deck is a long flat rectangle, the towers are tall rectangles, and the cables are straight lines. Modelling a messy real object with familiar shapes is the big idea of this section — the same idea comes back in science, when a ball is drawn as a circle or the sun is drawn as a circle.

Cube models. Another way to approximate a real object is to build it from cubes.

a bridge built from cubes



a tower built from cubes



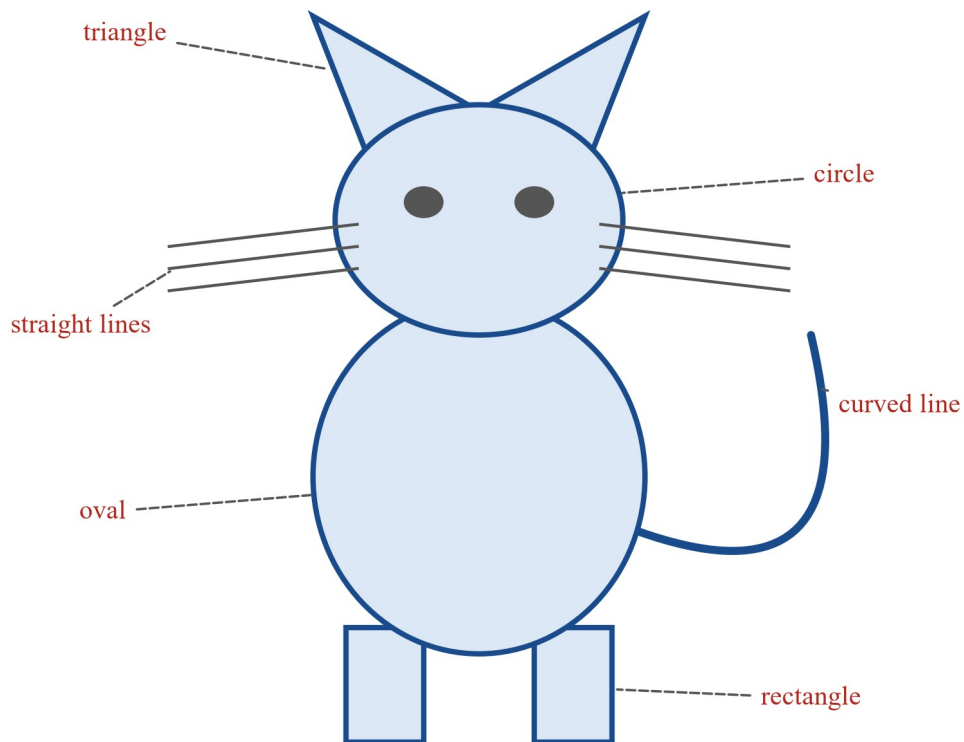
Two models built from unit cubes, drawn in 3-D: a bridge with two pillars and a deck across the top, and a tower with a two-by-two base and one cube on top of one corner.

The two models above approximate a bridge and a tower. The tower has a cube you cannot see: the top cube sits on a corner cube that is hidden behind the cubes in front. When you count the cubes in a model, count the hidden cubes too — a cube on top cannot float.

In a computer game such as Minecraft, you build objects out of cubes in a virtual world — the same idea on a screen.

Source: Wikipedia, *Minecraft*, retrieved 2026-08-20.

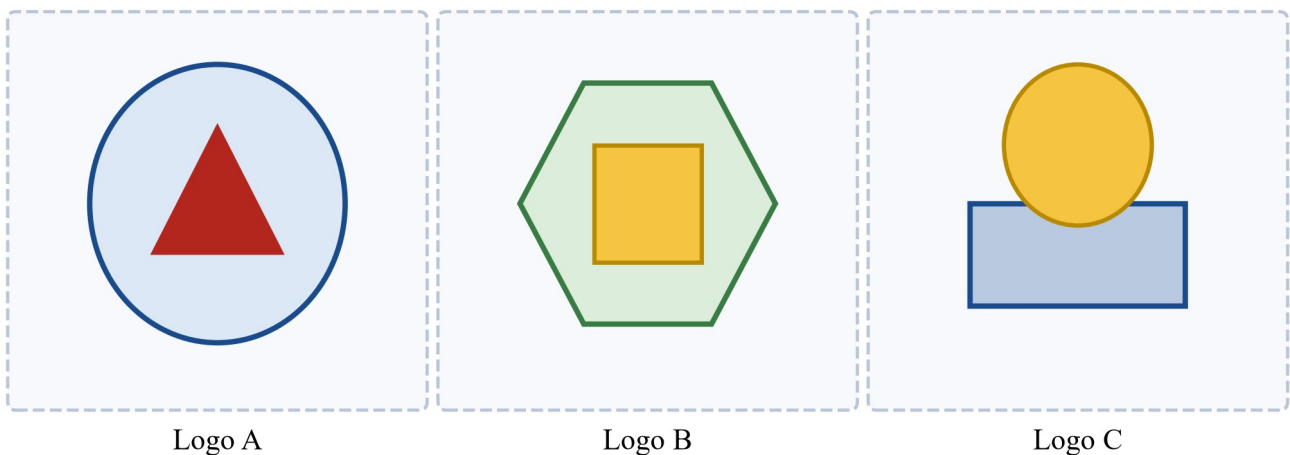
Cartoon animals from shapes. You can also draw a real thing as familiar shapes. This cat is a cartoon built from shapes.



A cartoon cat built from familiar shapes, with each part named: the ears are triangles, the head is a circle, the body is an oval, the legs are rectangles, the whiskers are straight lines, and the tail is a curved line.

The head is a circle, the ears are triangles, the body is an oval, the legs are rectangles, the whiskers are straight lines and the tail is a curved line. The drawing is an approximation — a real cat is not exactly these shapes — but the shapes are close enough that everyone sees a cat.

Logos. Designers combine familiar shapes too. A **logo** is a small picture that stands for a club, a team or a company. These three logos are each built from familiar shapes.



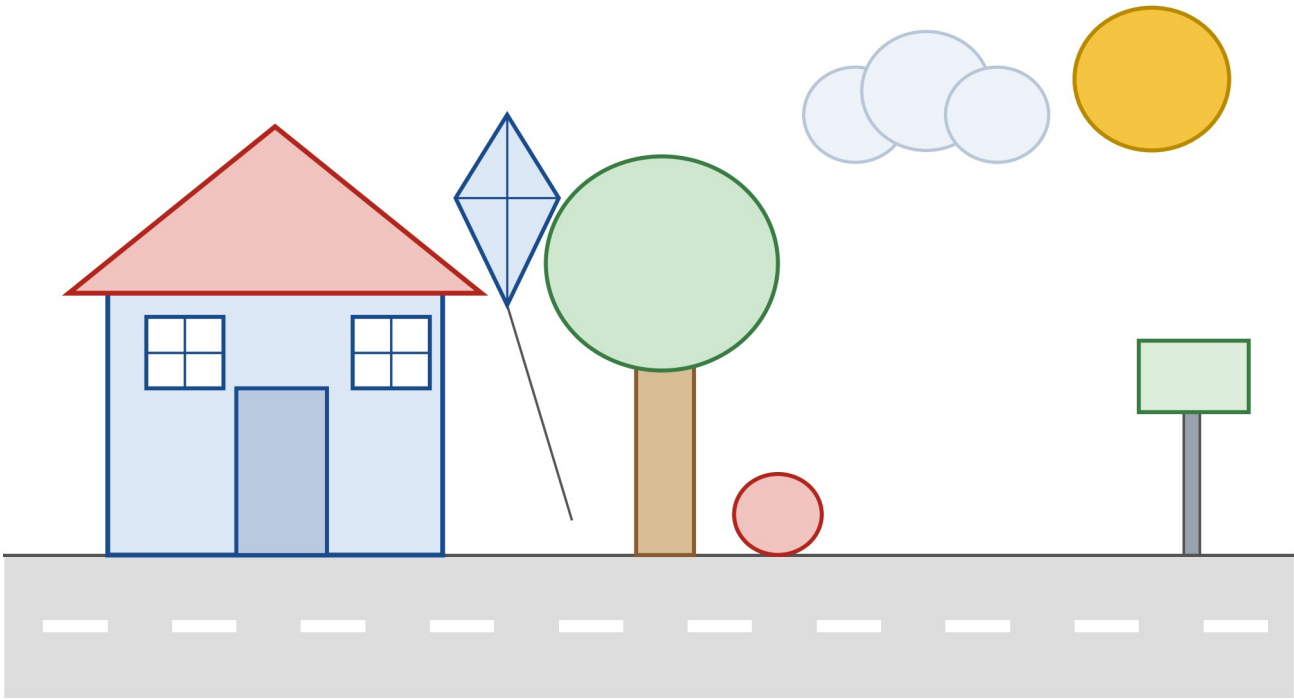
Three simple logos in dashed panels. Logo A is a red triangle inside a blue circle. Logo B is a yellow square inside a green hexagon. Logo C is a yellow circle above a blue rectangle.

Logo A combines a circle and a triangle. Logo B combines a hexagon and a square. Logo C combines a rectangle and a circle. Designers build logos like these with graphic design software such as Canva, an Australian design platform.

Worked examples

Example 1 — step by step: what shapes make the street scene?

Look again at the street scene. Name the shapes that make up the house, the tree and the kite.



A street scene drawn from flat shapes, with no labels: a house with a triangle roof, rectangle walls, rectangle door and two square windows; a tree with a rectangle trunk and circle leaves; a kite made of triangles with a straight string; a circle ball; a rectangle road with a dashed centre line; a cloud made of circles; a circle sun; and a rectangle sign on a rectangle post.

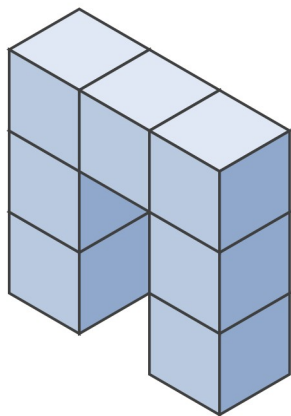
Working	Comment
House: the walls are a rectangle, the roof is a triangle, the door is a rectangle and the two windows are squares.	Straight sides only — name each part.
Tree: the trunk is a rectangle and the leaves are a circle.	Two parts, two shapes.
Kite: the cross inside splits it into 4 small triangles.	The string is a straight line.
Sun, ball and cloud: circles. Road and sign: rectangles.	The curved parts are circles.

The whole scene is a composite picture: every part is a familiar shape, and the parts put together make the picture.

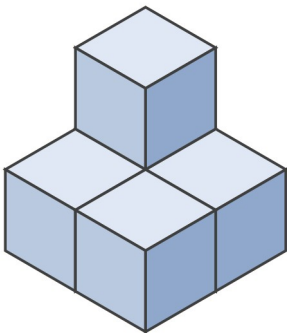
Example 2 — step by step: how many cubes in the tower?

Look at the tower model in the cube picture. Count all of its cubes, including the hidden cube.

a bridge built from cubes



a tower built from cubes



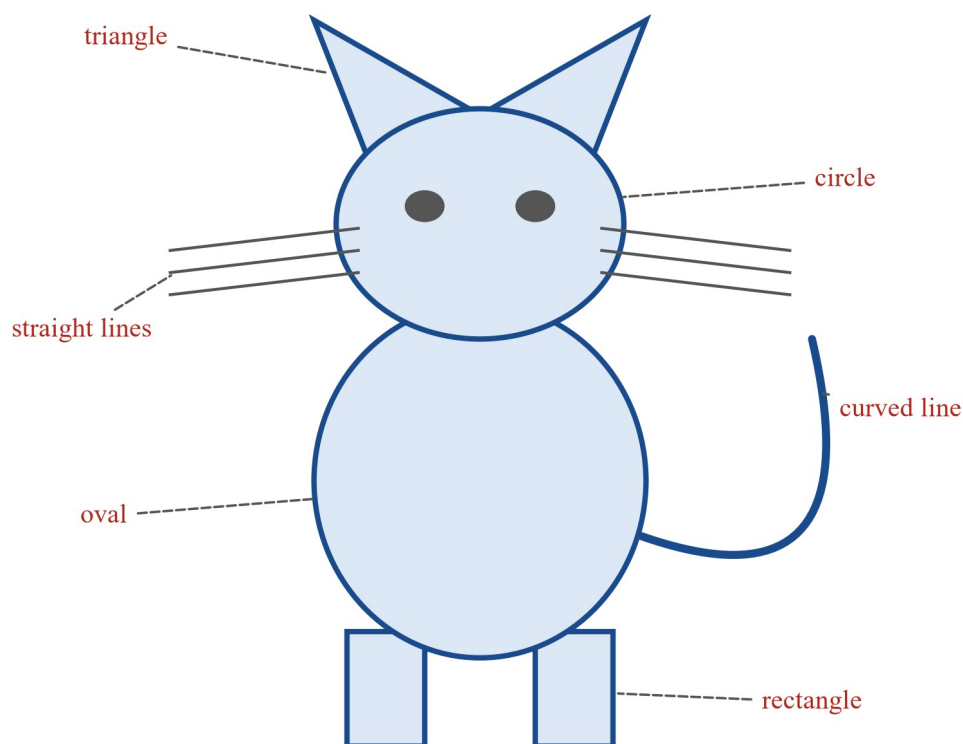
Two models built from unit cubes, drawn in 3-D: a bridge with two pillars and a deck across the top, and a tower with a two-by-two base and one cube on top of one corner.

Working	Comment
Top of the tower: 1 cube.	You can see it.
Base: 3 cubes you can see, around the hidden corner.	Left, front and right.
The top cube sits on 1 hidden cube.	A cube on top cannot float.
$1 + 3 + 1 = 5$ cubes.	Count the hidden cube too.

The tower is built from **5 cubes**. Four of them you can see; one of them you have to reason about.

Example 3 — step by step: what shapes make the cat?

Name the shape used for each part of the cartoon cat.



A cartoon cat built from familiar shapes, with each part named: the ears are triangles, the head is a circle, the body is an oval, the legs are rectangles, the whiskers are straight lines, and the tail is a curved line.

Working	Comment
Ears: 2 triangles.	The ears are the parts with three straight sides.
Head: 1 circle.	
Body: 1 oval.	Lines help the drawing read as a cat.
Legs: 2 rectangles.	
Whiskers: straight lines. Tail: a curved line.	

The cat is an **approximation**. No real cat is exactly circles and triangles, but the shapes are close enough that we all see a cat — that is what an approximation does.

Investigation activity — build a model and design a logo

Now build a model of your own and design a logo of your own.

Option A — a cube model.

1. Build a real object out of cubes — a bridge, a tower, a robot, a house. Use 8 or more cubes.
2. Draw your model on paper.
3. Count the cubes in your model, including any hidden cubes. Write the count down.
4. Swap drawings with a partner. Your partner counts the cubes from your drawing. Do the two counts match? If not, find the cube that was missed.

Option B — a logo.

1. Choose a team or a club, real or made up.
2. Draw a logo for it using 2 or 3 familiar shapes.
3. Label each shape in your drawing.

4. Write one sentence saying what your logo stands for.

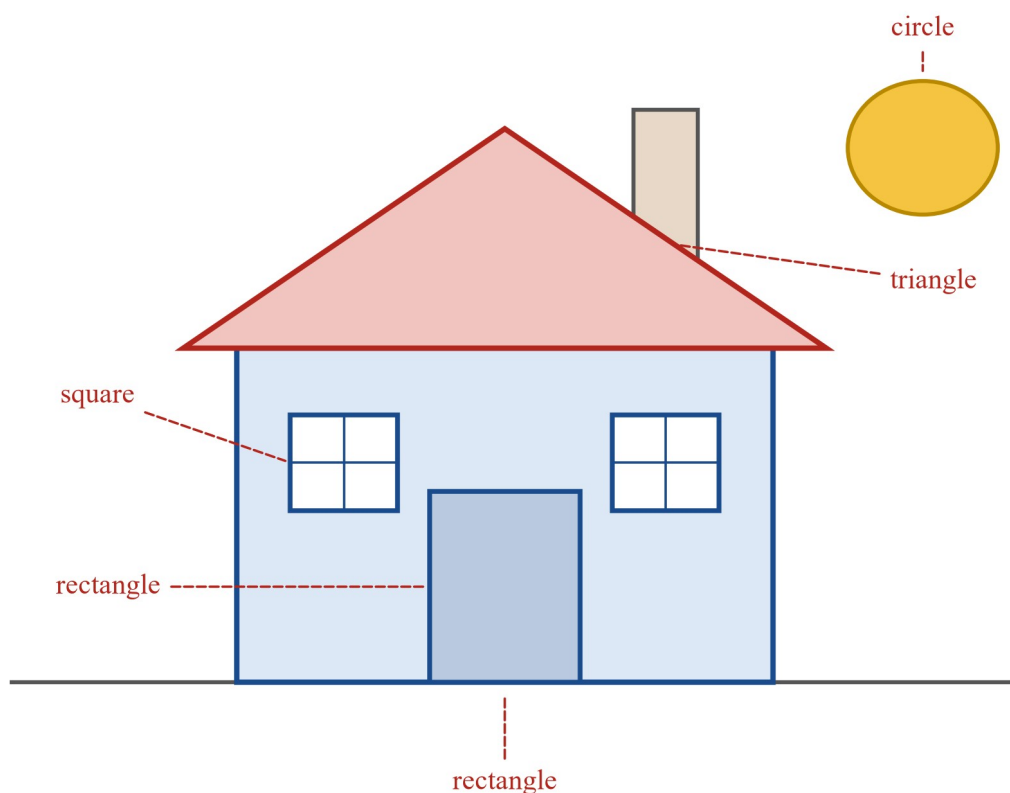
Write up your work: what you built or drew, the shapes you used, and your cube count or your shape labels. Your teacher may use this activity for the class practical task.

Practice questions

Questions with help

Q1. A shape made by combining two or more familiar shapes is called a _____ shape.

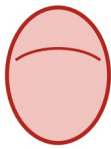
Q2. Look at the house picture.



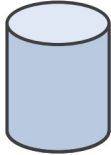
A house drawn from flat shapes, with each part named: the roof is a triangle, the walls are a rectangle, the door is a rectangle, each window is a square, and the sun is a circle.

- (a) What shape is the roof?
- (b) What shape are the walls?
- (c) What shape is each window?
- (d) What shape is the sun?

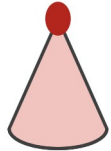
Q3. The picture below shows five objects on the left and five solid objects on the right. Draw a line from each object to the solid object it is closest to.



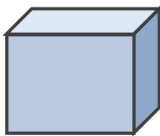
ball



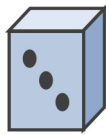
drum



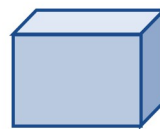
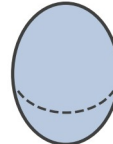
party hat



box



die



Two columns. The left column shows five objects with names: a ball, a drum, a party hat, a box and a die. The right column shows five solid objects with no names: a cube, a cone, a sphere, a rectangular prism and a cylinder.

Q4. Look at the cartoon cat. Name the shape used for each part.

- (a) the ears
- (b) the head
- (c) the body
- (d) the legs

Q5. Look at the two cube models.

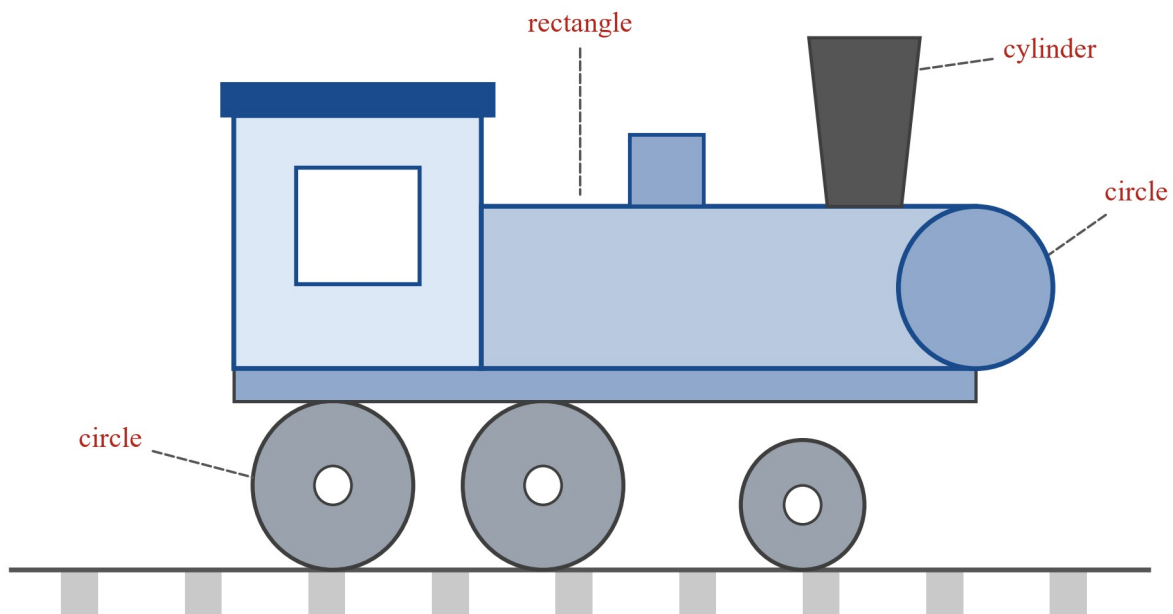
- (a) How many cubes can you see in the bridge model?
- (b) How many cubes can you see in the tower model?
- (c) How many hidden cubes does the tower model have?

Q6. Look at the three logos. List the shapes in each one.

- (a) Logo A
- (b) Logo B
- (c) Logo C

Q7. Look at the steam train picture.





A side view of a steam train on rails, with four labels: rectangle on the side of the boiler, circle on a rear wheel, cylinder on the chimney, and circle on the round front.

- (a) The long side of the engine is closest to which flat shape?
- (b) The wheels are which flat shape?
- (c) The chimney is closest to which solid object?

Q8. True or false?

- (a) A composite shape is made from familiar shapes.
- (b) An approximation is exact.
- (c) A model built from cubes can approximate a real object.

Questions on your own

Q9. Look at the street scene picture.

- (a) Name two circles in the scene.
- (b) Name two rectangles in the scene, other than the door.

Q10. Look at the street scene picture. Which objects are closest to a square?

Q11. Mia draws a rectangle and puts a triangle right on top of it. Name two things her picture could be.

Q12. Draw a composite shape that uses exactly 2 triangles and 1 square. Label the shapes in your drawing.

Q13. Look at the cube models picture. How many cubes make the bridge model? Show your counting.

Q14. In the tower model you can see only 4 cubes, but the model has 5. Explain why there must be a fifth cube.

Q15. Which solid object is each thing closest to? Choose from cube, rectangular prism, cylinder, sphere and cone.

- (a) a soccer ball
- (b) a drink can
- (c) a die
- (d) a shoebox

- (e) an ice-cream cone

Q16. A club wants a logo made from exactly a circle, a triangle and a square. Sketch a logo for the club and label the shapes.

Q17. Look at the cartoon cat. Which parts are made from straight lines, and which part is made from a curved line?

Q18. Look at the West Gate Bridge picture.

- (a) The deck is close to which flat shape?
- (b) The two towers are close to which flat shape?
- (c) The cables are close to what?

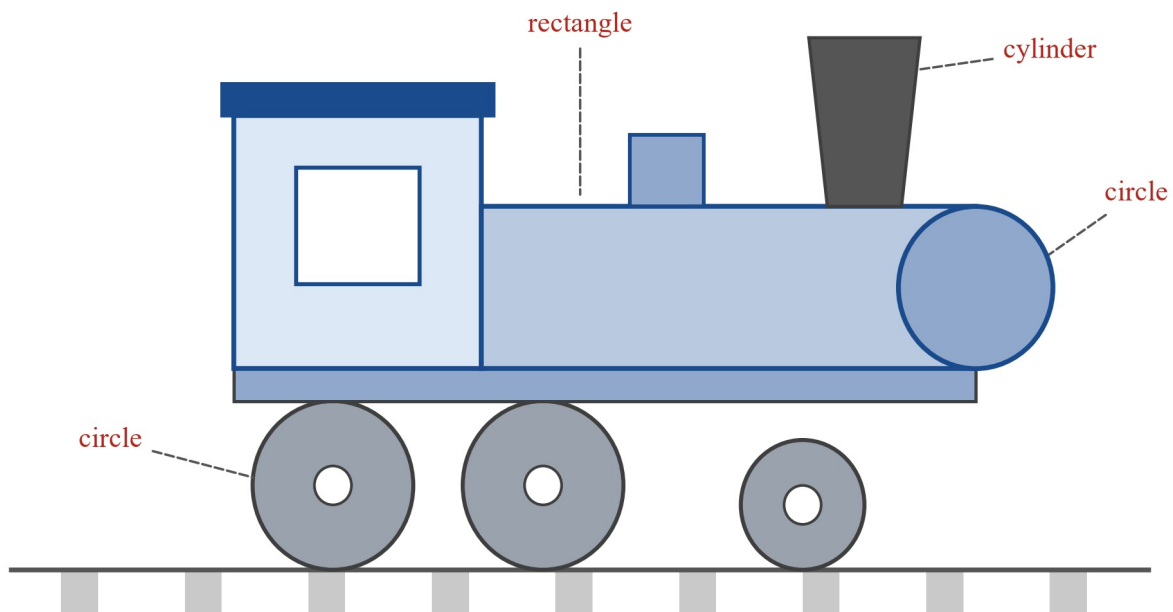
Q19. Is the deck of the West Gate Bridge exactly a rectangular prism? Explain why we say the deck is *close to* a rectangle, not *exactly* a rectangle.

Q20. Name three objects in your classroom and the solid object each one is closest to.

Applied

Q21. The Puffing Billy Railway is a real steam train in the Dandenong Ranges in Victoria. It runs between Belgrave and Gembrook, and its line is 25.1 km long.

Source: Wikipedia, *Puffing Billy Railway*, en.wikipedia.org, retrieved 2026-08-20.



A side view of a steam train on rails, with four labels: rectangle on the side of the boiler, circle on a rear wheel, cylinder on the chimney, and circle on the round front.

- (a) The long side of the engine is closest to which flat shape?
- (b) The chimney is closest to which solid object?
- (c) How many circle wheels can you see in the picture?
- (d) The train runs from Belgrave to Gembrook and back again. How many kilometres is that trip?
- (e) Explain why we say the chimney is *close to* a cylinder, not *exactly* a cylinder.

Answers

Q1. composite. **Q2.** (a) triangle; (b) rectangle; (c) square; (d) circle. **Q3.** ball → sphere; drum → cylinder; party hat → cone; box → rectangular prism; die → cube. **Q4.** (a) triangles; (b) circle; (c) oval; (d) rectangles. **Q5.** (a) 7; (b) 4; (c) 1. **Q6.** (a) a circle and a triangle; (b) a hexagon and a square; (c) a rectangle and a circle. **Q7.** (a) rectangle; (b) circle; (c) cylinder. **Q8.** (a) true; (b) false; (c) true. **Q9.** (a) any two of: the sun, the ball, the tree leaves, the cloud circles; (b) any two of: the house walls, the tree trunk, the road, the sign, the sign post. **Q10.** the two windows. **Q11.** Answers may vary; for example, a house or a pencil. **Q12.** Answers may vary; see the worked answers. **Q13.** 7 cubes. **Q14.** The top cube cannot float — a cube is under it. **Q15.** (a) sphere; (b) cylinder; (c) cube; (d) rectangular prism; (e) cone. **Q16.** Answers may vary; see the worked answers. **Q17.** straight lines: the whiskers and the sides of the ears and legs; curved line: the tail. **Q18.** (a) a long flat rectangle; (b) tall rectangles; (c) straight lines. **Q19.** No — see the worked answers. **Q20.** Answers may vary. **Q21.** (a) rectangle; (b) cylinder; (c) 3; (d) 50.2 km; (e) see the worked answers.

Worked answers

Q1. A **composite** shape is a shape made by combining two or more familiar shapes — like the house picture, made from a rectangle, a triangle, squares and a circle.

Q2. (a) The roof is a **triangle**. (b) The walls are a **rectangle**. (c) Each window is a **square**. (d) The sun is a **circle**.

Q3. A ball is round all over, like a **sphere**. A drum is the same circle all the way through, like a **cylinder**. A party hat comes to a point above a circle base, like a **cone**. A box has rectangle faces, like a **rectangular prism**. A die has square faces, like a **cube**.

Q4. (a) The ears are **triangles**. (b) The head is a **circle**. (c) The body is an **oval**. (d) The legs are **rectangles**.

Q5. (a) The bridge model shows all **7** cubes: 2 in each pillar and 3 in the deck. (b) You can see **4** cubes in the tower model: the top cube and 3 base cubes. (c) **1** cube is hidden, under the top cube.

Q6. (a) Logo A is a **circle** and a **triangle**. (b) Logo B is a **hexagon** and a **square**. (c) Logo C is a **rectangle** and a **circle**.

Q7. (a) The long side of the engine is closest to a **rectangle**. (b) The wheels are **circles**. (c) The chimney is closest to a **cylinder**.

Q8. (a) **True** — that is what a composite shape is. (b) **False** — an approximation is close, not exact. (c) **True** — the bridge and tower models approximate real objects.

Q9. (a) Any two of: **the sun, the ball, the tree leaves, the cloud circles**. (b) Any two of: **the house walls, the tree trunk, the road, the sign, the sign post**.

Q10. The two **windows** are closest to a square — each has 4 equal sides. (The sign and the door are rectangles.)

Q11. A **house** (rectangle walls, triangle roof) or a **pencil** (rectangle body, triangle point) both work. Any picture with a rectangle and a triangle on top is fine.

Q12. One correct answer: a house — a square with a triangle on top — and a small triangle above the roof as a flag. Check your drawing: exactly 2 triangles and 1 square, with every shape labelled. Other answers are fine too; for example, a square with a triangle on each side.

Q13. Count the pillars and the deck: 2 cubes in the left pillar, 2 cubes in the right pillar, 3 cubes in the deck. $2 + 2 + 3 = 7$ cubes.

Q14. The top cube rests on something. There is no cube you can see under it, so there must be a **hidden cube** in the back corner. $4 \text{ seen} + 1 \text{ hidden} = 5$.

Q15. (a) A soccer ball is round all over: a **sphere**. (b) A drink can is the same circle all the way through: a **cylinder**. (c) A die has square faces: a **cube**. (d) A shoebox has rectangle faces: a **rectangular prism**. (e) An ice-cream cone comes to a point above a circle: a **cone**.

Q16. One correct answer: a circle with a triangle inside and a square below it, like a badge on a stand. Check your sketch: exactly 3 shapes — a circle, a triangle and a square — and each one labelled.

Q17. The **whiskers** are straight lines, and the sides of the ears and legs are straight too. The **tail** is a curved line.

Q18. (a) The deck is close to a **long flat rectangle**. (b) The towers are close to **tall rectangles**. (c) The cables are close to **straight lines**.

Q19. No. The real deck has bumps, joins and edges, and it is not perfectly flat or perfectly straight. The rectangle is an **approximation** — close enough to be useful, but not exact. That is why we say *close to*.

Q20. Answers will vary. For example: a tissue box is close to a **rectangular prism**, a ball in the sports bag is close to a **sphere**, and a drink bottle is close to a **cylinder**.

Q21. (a) The long side of the engine is closest to a **rectangle**. (b) The chimney is closest to a **cylinder**. (c) **3** circle wheels: two big wheels and one small wheel. (d) $25.1 + 25.1 = \mathbf{50.2 \text{ km}}$. (e) The real chimney is wider at the top and is not a perfect cylinder. It is *close to* a cylinder, so a cylinder is a good approximation — but not exact.

Grid reference systems: locating positions and describing pathways

Code **VC2M4SP03** (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): “create and interpret grid reference systems using grid references and directions to locate and describe positions and pathways”. This section draws on `VC2M4SP03.E01`, `.E02`, `.E03` and `.E04`.

What you need to know

In Year 3 you drew maps of familiar places, like your classroom and the school oval. This section builds on that idea. You will learn how a **grid** laid over a map lets you name any square on it, and how to describe a **pathway** from one place to another.

What is a grid reference system? A **grid** is a set of squares laid out in even strips. The strips going down are called **columns**. The strips going across are called **rows**.

In this book, every grid follows the same three rules:

- **Letters name the columns**, from left to right: A, B, C, D, E, ...
- **Numbers name the rows**, from top to bottom: 1, 2, 3, 4, ...
- A **grid reference** is a letter and a number together, with the **letter first**: B3, C1, E4.

Here is a grid with 5 columns and 4 rows, before anything is put in it.

	A	B	C	D	E
1					
2					
3					
4					

An empty grid with five columns and four rows, with the letters A to E across the top and the numbers 1 to 4 down the left side

And here are the parts of a grid, labelled.

columns — letters, left to right

	A	B	C	D	E
1					
2					
3					
4					

rows — numbers, top to bottom

The same grid, with a blue label above the letters reading: columns, letters, left to right, and a red label beside the numbers reading: rows, numbers, top to bottom

How to read a grid reference. Take B3.

1. Find the letter **B** across the top. Follow it down.
2. Find the number **3** down the side. Follow it across.
3. The square where the two meet is **B3**.

	A	B	C	D	E
1					
2					
3		B3			
4					

follow the letter down

follow the number across

A grid with the square B3 shaded blue, a blue arrow following the letter B down, and a red arrow following the number 3 across, meeting at the shaded square

A grid reference names the **whole square**, not one exact spot. Anything inside that square “is at B3”. Here are two more squares on the same grid: C2 (blue) and E4 (red).

	A	B	C	D	E
1					
2			C2		
3					
4					E4

A grid with two shaded squares, C2 shaded blue and E4 shaded red

In Year 5 you will learn a way to name one exact point inside a square. At Level 4, naming the whole square is what you need.

Describing pathways. A **pathway** is a way of moving from one place to another on a map. On these maps, each move goes **left, right, up** or **down** — as you look at the page.

You can write a pathway in two ways:

- **List the squares you pass through**, in order: C2, D2, E2, E3.
- **Group the moves**: 2 to the right, then 1 down.

Both ways describe the same pathway below, from the blue start at C2 to the red finish at E3.

	A	B	C	D	E
1					
2			start at C2	2 to the right	
3					1 down
4					finish at E3

A grid with a blue dot at C2, a red arrow moving 2 squares to the right to E2, then a red arrow moving 1 square down to E3, where a red cross marks the finish

There can be **more than one pathway** between the same two places. Two pathways can start and finish at the same spots and still be different, because they pass through different squares.

Grids in spreadsheets. A **spreadsheet** on a computer is a grid reference system too. Each small box is called a **cell**, and every cell has a name that works just like a grid reference: a letter for its column and a number for its row. In the spreadsheet below, the number 9 sits in cell B5.

	A	B
1	Day	Birds
2	Monday	4
3	Tuesday	7
4	Wednesday	3
5	Thursday	9
6	Friday	

A spreadsheet with columns A and B and rows 1 to 6, with the days Monday to Friday in column A and bird counts in column B, and the cell B5 holding the number 9 marked with a thick blue line around it

Two real spreadsheet programs are **Microsoft Excel** and **Google Sheets**.

Source: Microsoft, *Microsoft Excel*, retrieved 2026-08-20. Source: Google, *Google Sheets*, retrieved 2026-08-20.

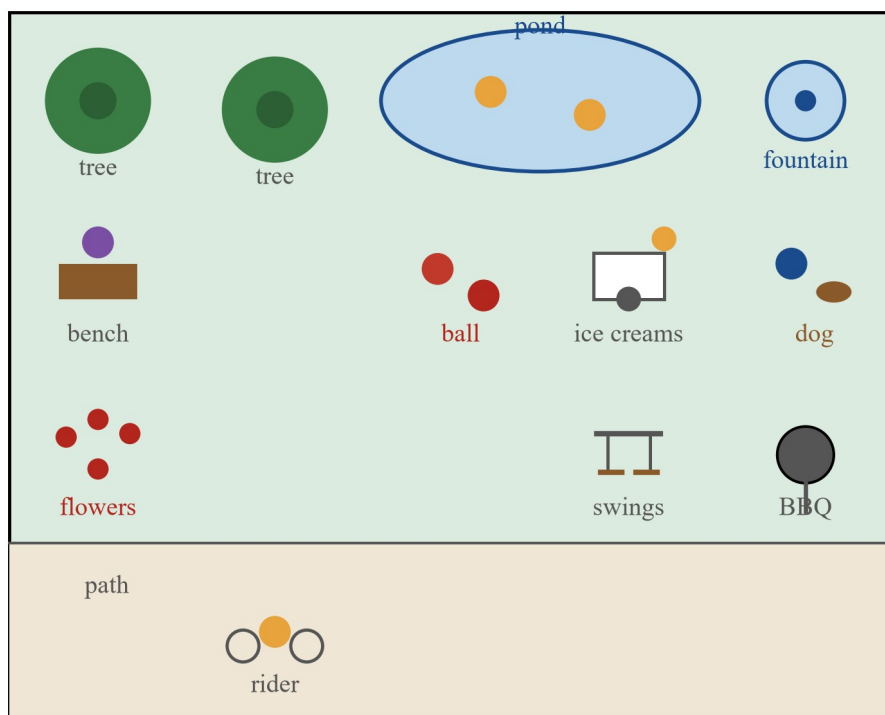
You can also draw a grid of cells on paper and use it the same way. Here is a blank one, with columns A to D and rows 1 to 4. Each white box is one cell.

	A	B	C	D
1				
2				
3				
4				

Each white box is a cell.

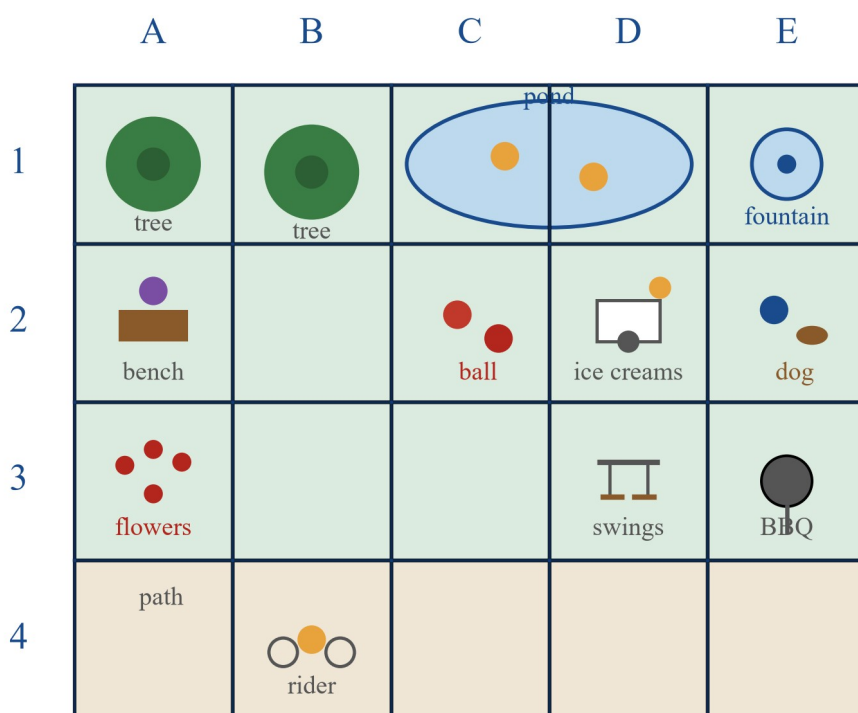
A blank spreadsheet grid with columns A to D and rows 1 to 4

Why grids help. Look at this bird’s-eye picture of a busy park. Without a grid, telling a friend where the swings are is hard — you can only say things like “near the pond”.



A bird’s-eye picture of a busy park with no grid, showing two trees, a pond with two ducks, a fountain, a bench with a person, a girl with a ball, an ice-cream cart, a person with a dog, a flower bed, swings, a BBQ, and a path with a rider

Now look at the same picture with a clear grid over the top. Now you can say: the swings are at D3, the pond takes up C1 and D1, and the rider is at B4. The grid lets you pinpoint things quickly and easily.



The same bird's-eye park picture with a blue grid over the top, columns A to E across and rows 1 to 4 down

Enlarging with a grid. Grids can also help you copy a picture at a larger size. Draw a grid over the small picture. Draw the same grid on the big paper. Then copy what is in each small square into the matching big square, one square at a time.

The small grid below shows a heart shape.

	A	B	C	D	E
1					
2					
3					
4					
5					

A five-by-five grid with red shaded squares making a heart shape

The big grid below has rows 1 and 2 of the heart copied already. Rows 3, 4 and 5 are left empty for you to finish.

	A	B	C	D	E
1					
2					
3					
4					
5					

Rows 1 and 2 are done. Finish the rest.

A larger five-by-five grid with rows 1 and 2 of the heart copied in red squares and rows 3 to 5 empty

Worked examples

Example 1 — step by step: finding places at the showgrounds

The Melbourne Showgrounds are at Ascot Vale in Melbourne. They are owned by the Royal Agricultural Society of Victoria, and the Melbourne Royal Show is held there every year.

Source: Wikipedia, Melbourne Showgrounds, retrieved 2026-08-20. Source: The Royal Agricultural Society of Victoria, Melbourne Royal Show, retrieved 2026-08-20.

Here is a simple map of the showgrounds, drawn for this book.

	A	B	C	D	E
1	gate	showbags	food stalls	rides	Grand Pavilion
2	Animal Nursery	main arena			Exhibition Pavilion
3	toilets			water	car park
4			first aid		

A simple map, drawn for this book.

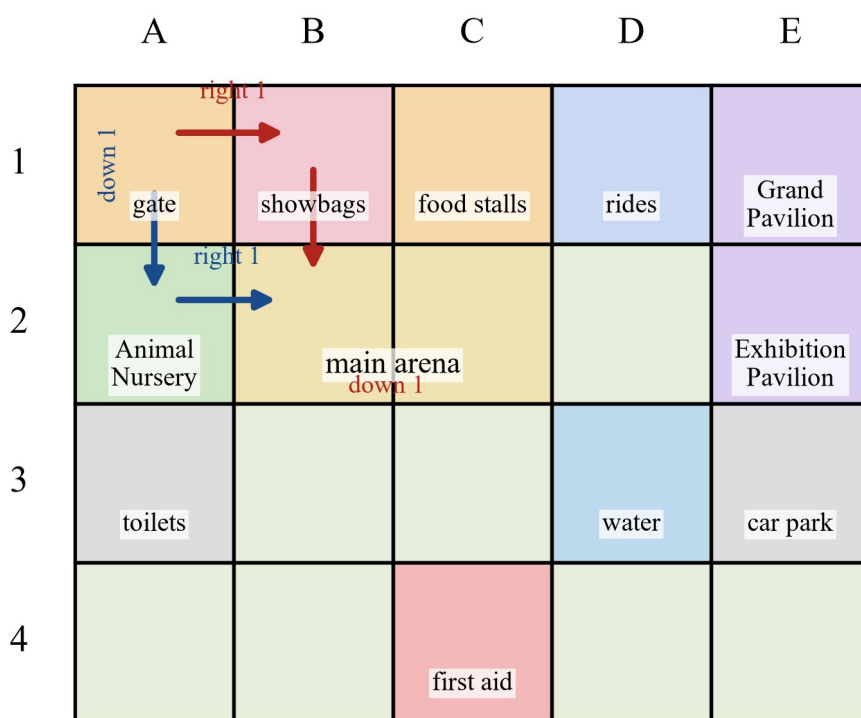
A simple map of the Melbourne Showgrounds on a grid with columns A to E and rows 1 to 4, showing the gate, showbags, food stalls, rides, the Grand Pavilion, the Animal Nursery, the main arena, the Exhibition Pavilion, toilets, water, the car park and first aid

- Give the grid reference of the food stalls.
- What is at E2?
- The main arena is a big feature. Which squares does it take up?
- What is at D3?

Working	Comment
(a) Food stalls: follow the letter C down and the number 1 across. They meet at C1.	Write the letter first, then the number.
(b) E2: column E, row 2 — the Exhibition Pavilion.	To read a grid reference, follow the letter down and the number across.
(c) The main arena takes up B2 and C2.	A big feature can take up more than one square.
(d) D3: column D, row 3 — water.	Some squares hold only small things.

Example 2 — step by step: two pathways to the same place

On the showgrounds map, find two different pathways from the gate to the main arena.



A simple map, drawn for this book.

The showgrounds map with two pathways from the gate to the main arena: a blue pathway going 1 down then 1 right, and a red pathway going 1 right then 1 down

Working	Comment
Blue pathway, as squares: A1, A2, B2.	List every square you pass through, in order.
Blue pathway, as moves: 1 down, then 1 right.	Count the moves one direction at a time.
Red pathway, as squares: A1, B1, B2.	This pathway passes through different squares.
Red pathway, as moves: 1 right, then 1 down.	Same start and same finish, different pathway.
Both pathways are correct.	There is often more than one pathway between the same two places.

Example 3 — step by step: cells in a spreadsheet

A class counts the birds it can see from the classroom window each day, and keeps the data in the bird-count spreadsheet shown in **What you need to know**.

- Which cell holds the number 9?
- On Friday the class counts its birds again. Which cell will the Friday count go in?

Working	Comment
(a) Find the 9. It sits in column B, row 5 — so it is in cell B5.	A cell's name is its grid reference: the letter comes first.
(b) 'Friday' is in row 6. The counts go down column B, so the Friday count goes in cell B6.	New data go in the next empty cell down the column.
'Day' is in cell A1 and 'Birds' is in cell B1.	The top row holds the headings, just like a table on paper.

Practice questions

Questions with help

Q1. Copy and fill in the blanks using the words **columns**, **rows** and **letter**. (a) The letters A, B, C, D and E name the .
(b) *The numbers 1, 2, 3 and 4 name the* . (c) In a grid reference, the ____ comes first.

Q2. Copy the blank grid below. Shade square C2 blue and square E1 red.

	A	B	C	D	E
1					
2					
3					
4					

An empty grid with five columns and four rows, with the letters A to E across the top and the numbers 1 to 4 down the left side

Q3. Use the park map with the grid, shown earlier in this section. (a) What is at D2? (b) Which square are the swings in? (c) The pond takes up two squares. Which squares?

Q4. Use the showgrounds map from Example 1. (a) What is at E1? (b) Give the grid reference of the food stalls. (c) Name one square that has nothing in it. (d) What is at D3?

Q5. On the showgrounds map, start at B3. Move 2 to the right, then 1 up. Which square are you in now?

Q6. Use the bird-count spreadsheet shown earlier in this section. (a) Which cell holds Wednesday's count? (b) The class counts 6 birds on Friday. Which cell should the 6 go in? (c) Which cell holds the biggest count?

Q7. True or false? (a) In this book, C2 means column C, row 2. (b) A grid reference names one exact spot on a map. (c) There can be two different pathways between the same two places. (d) In a spreadsheet, cell B5 is in column B, row 5.

Q8. The small grid in **Enlarging with a grid** shows a heart. The tip of the heart is square C5 on the small grid. On the big grid, which square matches it?

	A	B	C	D	E
1					
2					
3					
4					
5					

Rows 1 and 2 are done. Finish the rest.

A larger five-by-five grid with rows 1 and 2 of the heart copied in red squares and rows 3 to 5 empty

Questions on your own

Q9. Use the showgrounds map from Example 1. (a) List everything in row 1. (b) List everything in column A. (c) The main arena takes up two squares. Which two?

Q10. You are at the gate (A1). Write instructions for a friend to find you at the food stalls. Use a grid reference in your instructions.

Q11. Find a pathway from the gate (A1) to the car park (E3) on the showgrounds map. (a) List the squares you pass through, in order. (b) Write the same pathway using grouped moves.

Q12. Start at the Animal Nursery (A2). Move 1 right, 1 down, then 2 right. What do you reach?

Q13. Mia says the Animal Nursery is at B1. Is Mia right? Explain your answer.

Q14. On Friday the class counts 6 birds. (a) Which cell should the 6 go in? (b) Is 6 now the biggest count? Which cell holds the biggest count now?

Q15. Draw your own map of a park on a grid with 4 columns (A to D) and 4 rows (1 to 4). Put at least four things in your park, and write the grid reference of each one.

Q16. One map of a park uses 4 big squares. Another map of the same park uses 16 small squares. On which map is it easier to pinpoint a tiny ant? Why?

Q17. Look at the two park pictures in **Why grids help** — the one without a grid and the one with a grid. Write one thing the grid helps you do.

Q18. On the park grid, find a square that has two things in it. Give its grid reference, and name the two things.

Q19. The blue pathway from the gate to the main arena is: 1 down, then 1 right. Write a pathway back from the main arena to the gate.

Q20. Look at the big grid from Q8. Rows 1 and 2 of the heart are done. To finish the heart, which squares do you shade in rows 3, 4 and 5?

Applied

Q21. The Melbourne Royal Show is held at the Melbourne Showgrounds at Ascot Vale. In 2026 it runs from Thursday 24 September to Sunday 4 October. You go with your family on one of those days. You want to start at the gate, visit the Animal Nursery, the showbags and the food stalls in any order you like, and finish at the car park.

Source: Wikipedia, Melbourne Showgrounds, retrieved 2026-08-20. Source: The Royal Agricultural Society of Victoria, Melbourne Royal Show, retrieved 2026-08-20.

Use the showgrounds map from Example 1. (a) Give the grid references of the three places you will visit. (b) Write your pathway as a list of squares, starting at A1 and ending at E3. (c) Write the last part of your pathway — from the food stalls (C1) to the car park (E3) — using grouped moves. (d) Your friend chooses a different order of visits, and their pathway is also correct. Explain why two different pathways can both be correct.

Answers

Q1. (a) columns; (b) rows; (c) letter. **Q2.** C2 shaded blue; E1 shaded red. **Q3.** (a) the ice creams; (b) D3; (c) C1 and D1. **Q4.** (a) the Grand Pavilion; (b) C1; (c) example: B3 (also C3, D2, A4, B4, D4 or E4); (d) water. **Q5.** D2. **Q6.** (a) B4; (b) B6; (c) B5. **Q7.** (a) true; (b) false; (c) true; (d) true. **Q8.** C5 in the big grid. **Q9.** (a) the gate, showbags, food stalls, rides, the Grand Pavilion; (b) the gate, the Animal Nursery, the toilets; (c) B2 and C2. **Q10.** Example: “From the gate, walk 2 squares to the right. Find me at the food stalls — that is C1.” **Q11.** (a) A1, B1, C1, D1, E1, E2, E3; (b) 4 to the right, then 2 down. **Q12.** The water, at D3. **Q13.** No — B1 is the showbags. The Animal Nursery is at A2. **Q14.** (a) B6; (b) no — B5 still holds the biggest count, which is 9. **Q15.** Example answers will vary; each thing needs a letter-and-number reference. **Q16.** The map with 16 squares — its squares are smaller, so you can pinpoint the ant better. **Q17.** Example: you can tell a friend exactly where something is, like “the swings are at D3”. **Q18.** Example: C2 — the girl and the ball. (E2 — the person and the dog — also works.) **Q19.** 1 to the left, then 1 up. **Q20.** Row 3: A3, B3, C3, D3, E3. Row 4: B4, C4, D4. Row 5: C5. **Q21.** (a) Animal Nursery A2, showbags B1, food stalls C1; (b) example: A1, A2, A1, B1, C1, D1, E1, E2, E3; (c) 2 to the right, then 2 down; (d) there is often more than one pathway between the same two places.

Worked solutions

Q1. The letters A to E go across the top of the grid and name the strips going down — the **columns**. The numbers 1 to 4 go down the side and name the strips going across — the **rows**. Our rule is to write the **letter** first: B3, not 3B. See the labelled grid in **What you need to know**.

Q2. For C2, follow the letter C down and the number 2 across; shade the square where they meet. For E1, follow E down and 1 across. The blank grid is the one used in Q2 above.

Q3. On the park map with the grid: (a) D2 holds the ice creams (the ice-cream cart). (b) Follow the letter D down and the number 3 across: the swings are in D3. (c) The pond is big, so it takes up two squares: C1 and D1. A big feature can take up more than one square, just like the main arena does on the showgrounds map.

Q4. On the showgrounds map from Example 1: (a) E1 holds the Grand Pavilion. (b) The food stalls sit where column C meets row 1: C1. (c) Many answers work — B3, C3, D2, A4, B4, D4 and E4 all have nothing in them. (d) D3 holds the water.

Q5. Start at B3. Moving right moves you along row 3: 1 right lands on C3, 2 right lands on D3. Then 1 up moves you into row 2: you land on D2. On the showgrounds map, D2 is grass — some squares have nothing in them.

Q6. In the bird-count spreadsheet: (a) Wednesday is in row 4, and its count (3) sits in column B — cell B4. (b) Friday is in row 6, and the counts go down column B, so the 6 goes in cell B6. (c) The counts are 4, 7, 3 and 9. The biggest is 9, in cell B5.

Q7. (a) True — the letter names the column and the number names the row, letter first. (b) False — a grid reference names the whole square, not one exact spot inside it. (c) True — Example 2 showed two pathways from the gate to the main arena. (d) True — that is how spreadsheet cells are named: column B, row 5.

Q8. The matching square keeps the same grid reference: C5. Follow C down and 5 across on the big grid. It is the empty square at the bottom — you will shade it when you finish the heart in Q20.

Q9. On the showgrounds map from Example 1: (a) Row 1 holds the gate (A1), the showbags (B1), the food stalls (C1), the rides (D1) and the Grand Pavilion (E1). (b) Column A holds the gate (A1), the Animal Nursery (A2) and the toilets (A3). (c) The main arena is wide, so it takes up B2 and C2.

Q10. Your instructions must get your friend from A1 to C1 and say where to look. Example: “Start at the gate. Walk 2 squares to the right. Find me at the food stalls — that is C1.” Any wording that names C1 and gets your friend there is fine.

Q11. (a) One pathway stays along row 1 and then goes down column E: A1, B1, C1, D1, E1, E2, E3. (b) Count the moves: from A1 to E1 is 4 squares to the right, and from E1 to E3 is 2 squares down. So: 4 to the right, then 2 down. Other pathways also work, as long as they start at A1 and end at E3.

Q12. Start at A2. One right lands on B2. One down lands on B3. Two right lands on C3, then D3. D3 holds the water.

Q13. Mia is not right. On the showgrounds map, B1 holds the showbags. The Animal Nursery is where column A meets row 2 — at A2. Mia has named the wrong square.

Q14. (a) Friday is in row 6, and the counts go down column B, so the 6 goes in cell B6. (b) The counts are now 4, 7, 3, 9 and 6. The biggest is still 9, in cell B5 — Thursday stays the biggest day.

Q15. Your map needs a grid with columns A, B, C, D and rows 1, 2, 3, 4, and at least four things, each with its own square. Example: a pond at A1, swings at B2, a bench at C3 and a BBQ at D4. Example answers will vary — check that every thing has a letter-and-number reference.

Q16. The map with 16 squares. Its squares are smaller, so each square covers less of the park. That makes it easier to pinpoint a tiny thing like an ant. With only 4 big squares, the ant could be in any part of one big square.

Q17. The grid gives every square a name, so you can tell a friend exactly where something is — “the swings are at D3” — instead of “near the pond”. It lets you pinpoint things quickly and easily.

Q18. Two answers work on the park grid: * C2 holds the girl and the ball. * E2 holds the person and the dog.

Q19. The blue pathway out was 1 down, then 1 right (A1 → A2 → B2). To come back, undo the moves in the opposite order: 1 to the left, then 1 up (B2 → A2 → A1).

Q20. Compare with the small heart grid shown in **Enlarging with a grid**. The shaded squares left to finish are: * Row 3: A3, B3, C3, D3, E3. * Row 4: B4, C4, D4. * Row 5: C5. Each square keeps the same grid reference in the small grid and the big grid.

Q21. (a) Animal Nursery: A2. Showbags: B1. Food stalls: C1. (b) One pathway visits them in the order Animal Nursery, showbags, food stalls: A1, A2, A1, B1, C1, D1, E1, E2, E3. Passing through a square twice is allowed — you walk back past the gate. (c) From the food stalls (C1) to the car park (E3): C1 to E1 is 2 squares to the right, and E1 to E3 is 2 squares down — so 2 to the right, then 2 down. (d) There is often more than one pathway between the same two places, and the visits can be done in different orders. As long as your friend starts at the gate, visits all three places and finishes at the car park, their pathway is correct too.

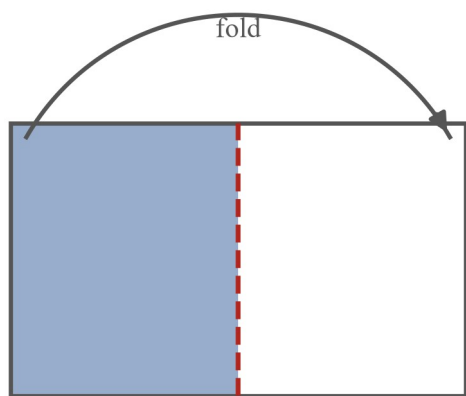
Line and rotational symmetry

Code VC2M4SP04 (Victorian Curriculum F–10 Version 2.0, Mathematics, Level 4; authority file `maths_4.json`): “recognise line and rotational symmetry of shapes and create symmetrical patterns and pictures, using dynamic geometry software where appropriate”. This section draws on VC2M4SP04.E01, .E02 and .E03. .E04 is not covered in this book; see the note at the front of the book about Aboriginal and Torres Strait Islander content.

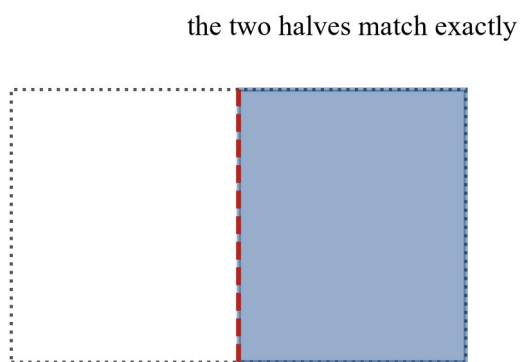
What you need to know

You have been folding and matching since the first years of school. When you fold a paper heart and the two halves match, you have already done the maths in this section. Here we put names to what you know how to do.

Line of symmetry. Fold a shape along a line. If the two halves match exactly, that line is a **line of symmetry** of the shape. The fold is called the *fold test*.



fold line

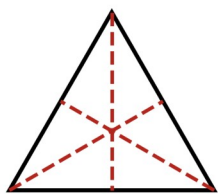


fold line

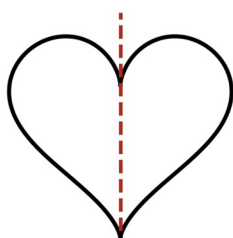
A rectangle with a red dashed fold line down its middle and its left half shaded blue, with an arrow showing that half folding across. After the fold, the blue half sits exactly on the other half, so the two halves match exactly.

The picture shows the fold test on a rectangle: fold along the red line and the two halves match exactly, so the red line is a line of symmetry. A line of symmetry always cuts the shape into two halves that are mirror images of each other — each half is the other half seen in a mirror.

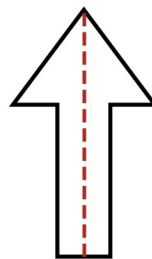
Here are more shapes with their lines of symmetry drawn in.



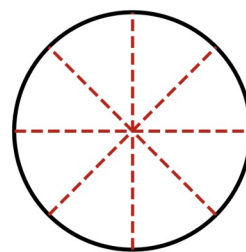
3 lines



1 line



1 line

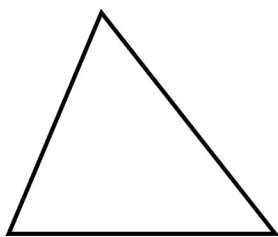


every line through the centre

Four shapes with their lines of symmetry drawn as red dashed lines: a triangle with three equal sides has 3 lines, a heart has 1 line, an arrow shape has 1 line, and a circle has every line through its centre.

Count the lines in each shape: the triangle with three equal sides has 3, the heart has 1, the arrow shape has 1. The circle is the special one: *every* line through its centre is a line of symmetry, so you can never finish counting its lines.

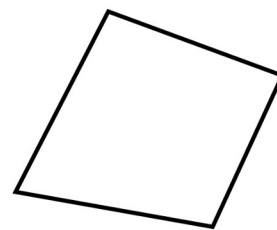
Some shapes have no line of symmetry at all — no fold makes the halves match.



no line of symmetry



no line of symmetry

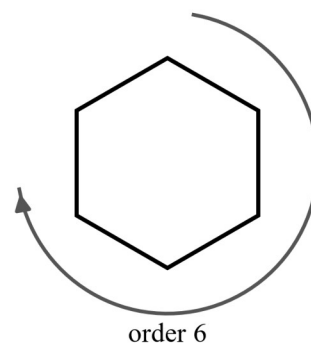
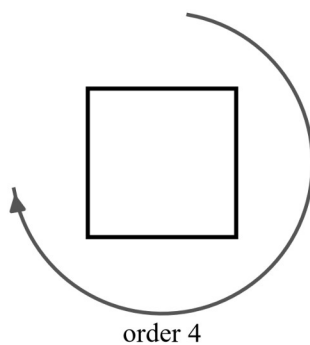
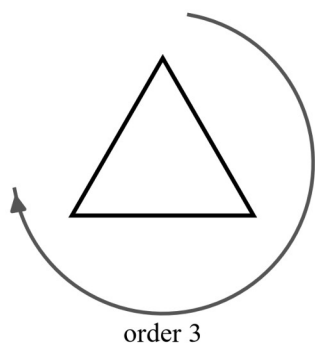


no line of symmetry

Three shapes with no line of symmetry: a triangle with all sides different, the capital letter R, and a shape with 4 sides and no equal sides.

Try the fold test on each shape in the picture and you will find no fold works.

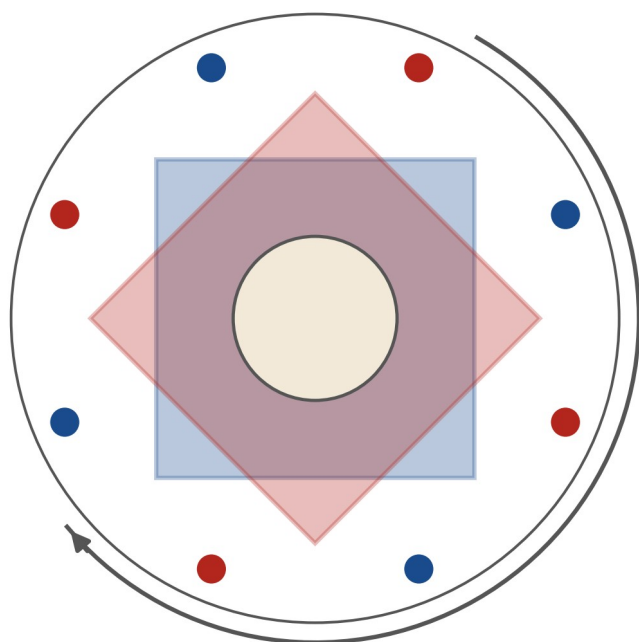
Rotational symmetry and order. Now turn shapes instead of folding them. First trace the outline of a shape onto tracing paper. Then turn the shape about its centre and watch when it fits its traced outline again. The number of times it fits in one full turn (counting the full turn, not counting the start) is called the **order** of its **rotational symmetry**.



Three shapes with arrows showing one full turn: a triangle with three equal sides fits 3 times, so order 3; a square fits 4 times, so order 4; and a regular hexagon fits 6 times, so order 6.

The triangle with three equal sides fits 3 times in one full turn, so it has rotational symmetry of order 3. The square fits 4 times — order 4. The regular hexagon fits 6 times — order 6.

Artists have used these ideas for a long time. Cloth patterns from Central Asia and flower designs from India, for example, are full of lines of symmetry and of designs that fit again and again when turned, like this one.

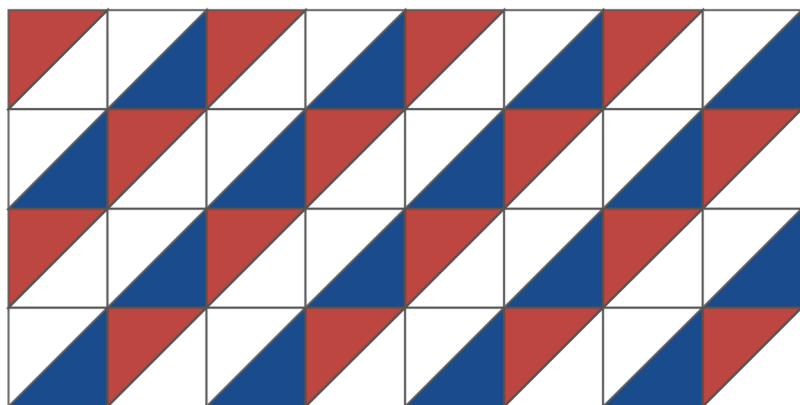


fits 8 times in one full turn — order 8

A flower-like design with 8 identical parts around its centre. Turning it through one full turn, the design fits 8 times, so it has rotational symmetry of order 8.

This design fits 8 times in one full turn — order 8.

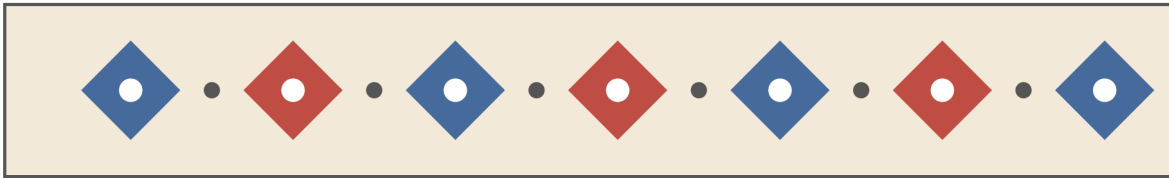
Symmetrical patterns. You can *create* symmetry too, not just find it. One way is to complete a half-drawn pattern across a line of symmetry. Another is a **tessellation**: a covering of a flat surface with shapes, with no gaps and no overlaps.



shapes cover the flat surface — no gaps, no overlaps

A flat surface covered with red, blue and white triangles, with no gaps and no overlaps — a tessellation.

A third way is a border pattern: one design, repeated again and again along a band.



one design, repeated again and again

A border pattern on a sand-coloured band: one diamond design with a white dot in its middle, repeated again and again in blue and red, with small dots between.

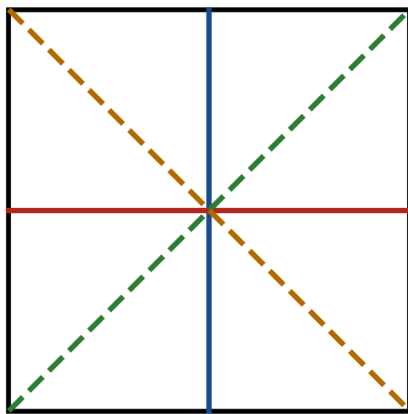
Dynamic geometry software. On a screen you can do all of this with *dynamic geometry software* — geometry software that moves with you: draw a shape, drag a point, and the software keeps the symmetry true. This book uses **GeoGebra Geometry**, which is free.

Source: GeoGebra, *GeoGebra Geometry*, geogebra.org, retrieved 2026-08-20.

Worked examples

Example 1 — step by step: counting the lines of symmetry of a square

Use the fold test to find every line of symmetry of a square.



4 lines of symmetry

A square with its four lines of symmetry drawn: a vertical blue line, a horizontal red line, and two dashed corner-to-corner lines in green and amber.

Working

Comment

Fold left edge onto right edge: the halves match.

The vertical blue line is a line of symmetry.

Fold top edge onto bottom edge: the halves match.

The horizontal red line is a line of symmetry.

Fold corner onto corner, both ways: the halves match.

The two dashed corner-to-corner lines are lines of symmetry.

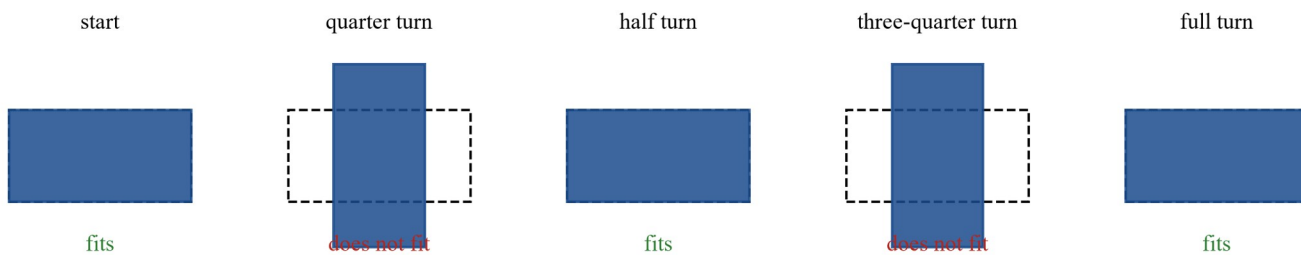
Try any other fold: the halves do not match.

No more lines.

A square has **4 lines of symmetry**: two edge-to-edge and two corner-to-corner.

Example 2 — step by step: the trace-and-turn test on a rectangle

Trace the outline of a rectangle. Turn the rectangle about its centre through one full turn and count the fits. The count is the order.



A rectangle turning inside its traced outline. At the start it fits; after a quarter turn it does not fit; after a half turn it fits; after a three-quarter turn it does not fit; after a full turn it fits again.

Working

Comment

Start: fits (not counted — it is the start).

Put a mark on the tracing so you know the start.

Quarter turn: does not fit.

The rectangle sticks out of its outline.

Half turn: fits. Count 1.

The mark is now at the bottom — but the shape fits.

Three-quarter turn: does not fit.

Sticks out again.

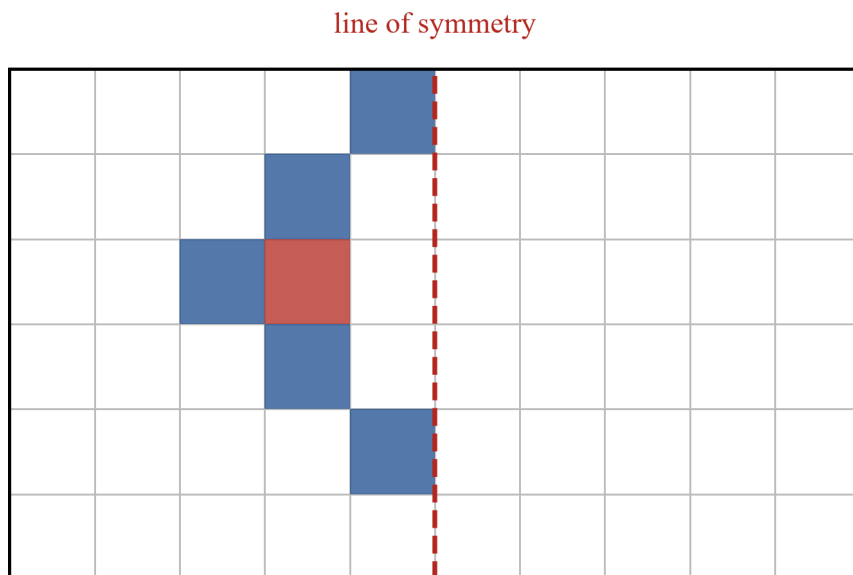
Full turn: fits. Count 2.

Back at the start, counted once.

The rectangle fits 2 times in one full turn, so it has rotational symmetry of **order 2**.

Example 3 — step by step: completing a symmetrical pattern

Half of a pattern is drawn on a grid. The red dashed line is the line of symmetry. Complete the pattern.



A grid with a vertical red dashed line of symmetry down the middle. The left half of a pattern is shaded: blue squares stepping down towards the line, with one red square. The right half is empty.

Every shaded square on the left has a twin on the right, the same number of steps from the line.

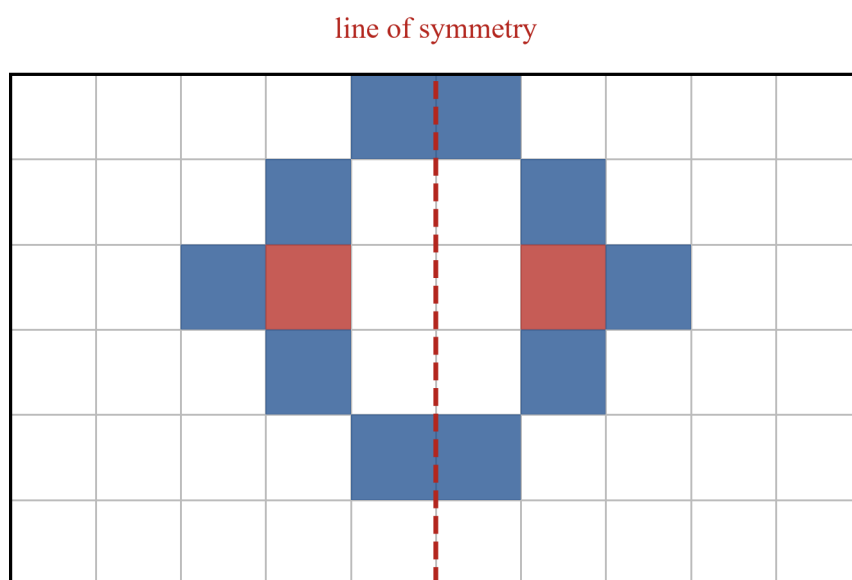
Working

Comment

Red square touching the line, middle row → shade its twin touching the line on the right.

Same distance from the line, other side.

Working	Comment
Blue square touching the line, top row → twin touching the line, top row, right side.	The line is the mirror: equal steps each side.
Blue square 1 step from the line → twin 1 step from the line, right side.	Keep the row the same; count steps across.
Blue square 2 steps from the line → twin 2 steps from the line, right side.	And the same again for the bottom two squares.
Shade the twins and the pattern is complete. Fold along the line and the two halves match exactly.	



The same grid with the pattern completed: the right half mirrors the left half across the line of symmetry, making one symmetrical design in blue and red.

Investigation activity

Trace and turn. You will need tracing paper and a pencil. This investigation finds the order of a shape by testing, the way artists and designers check their work.

1. Choose a shape from the table below and draw it on paper.
2. Trace its outline onto tracing paper, and draw a small arrow at the top of the tracing to mark the start.
3. Put the tracing back on the shape, arrow at the top.
4. Turn the tracing about the centre of the shape. Every time the tracing fits the shape exactly, count a fit. Do not count the start.
5. Stop when the arrow is back at the top — one full turn. Your count is the order.
6. Predict each order *before* you test it, then record what you find.

Shape	Predict: fits in one full turn	Order from your test
rectangle		
square		
triangle with 3 equal sides		
regular hexagon		

What you should find. The rectangle fits 2 times (order 2), the square 4, the triangle 3 and the hexagon 6 — matching the pictures earlier in the section. Now compare the order of each shape with its number of lines of symmetry. Do the two numbers always match? Keep your table — question 15 in the practice set comes back to it.

Practice questions

Questions with help

- Q1.** Look at the fold test picture at the start of the section. How many lines of symmetry does that rectangle have? Try both edge-to-edge folds and both corner-to-corner folds.
- Q2.** A square has 4 lines of symmetry. Name the two kinds of fold that find them.
- Q3.** How many lines of symmetry does a rectangle have? Use the fold test to check.
- Q4.** True or false: the capital letter R has a line of symmetry.
- Q5.** Which of these has no line of symmetry: a square, a heart, or a triangle with all sides different?
- Q6.** Trace a rectangle and do the trace-and-turn test, like Example 2. What is its order?
- Q7.** What is the order of a square? Think: how many quarter turns fit before you are back at the start?
- Q8.** Predict the order of a triangle with 3 equal sides, then test it by turning a tracing.

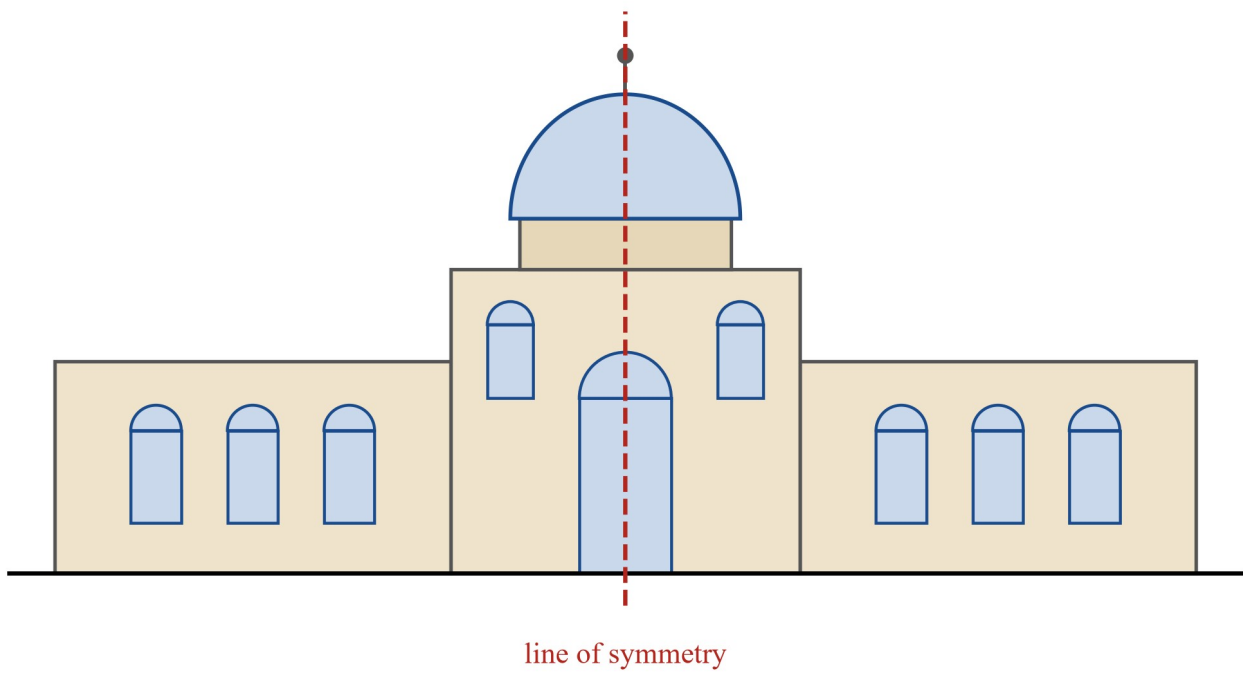
Questions on your own

- Q9.** How many lines of symmetry does a regular hexagon have? Count the folds through opposite corners and the folds through opposite sides.
- Q10.** What is the order of a regular octagon?
- Q11.** Which of these capital letters have at least one line of symmetry: A, F, M, S, T?
- Q12.** Which of these capital letters look the same after a half turn: H, N, A, Z?
- Q13.** Which of these digits have a line of symmetry: 0, 2, 3, 8?
- Q14.** Mia says: “A rectangle has 4 lines of symmetry because it has 4 sides.” Is Mia right? Explain.
- Q15.** Which of these has order 2 but no line of symmetry: the letter S, the letter A, a heart, or a square?
- Q16.** Turn a circle about its centre by any amount you like and it fits its outline. What does that mean for counting fits in one full turn?
- Q17.** Three flat surfaces are covered with tiles. On the first, there are gaps between some tiles. On the second, some tiles overlap. On the third, there are no gaps and no overlaps. Which covering is a tessellation?
- Q18.** A pattern on a grid has a vertical line of symmetry. The left half is drawn: in the top row, a shaded square touching the line; in the middle row, two shaded squares touching the line and next to each other; in the bottom row, one shaded square two steps left of the line. Describe the right half of the pattern.
- Q19.** This section named a free piece of dynamic geometry software. Write its name and where to find it.
- Q20.** Create your own border pattern, like the band picture in the section: choose one design with a line of symmetry and repeat it along a band. Then use the fold test to check one repeat of your design.

Applied

- Q21.** The Royal Exhibition Building is in Melbourne. It was finished in 1880 for an international exhibition, and its front is famous for looking the same on both sides.

Source: Wikipedia, *Royal Exhibition Building*, en.wikipedia.org, retrieved 2026-08-20.



A simple front view of the Royal Exhibition Building: a central dome above an arch, with two identical wings, one on each side, so the left and right halves match.

- (a) Does the front of the building have a line of symmetry? If yes, say where it is.
 - (b) If one wing had been built longer than the other, would the front still have that line of symmetry? Why?
 - (c) The dome is half of a circle sitting on top of the building. A full circle fits its outline at every turn. What does that tell you about the lines of symmetry of a full circle?
-

Answers

Q1. 2. **Q2.** Edge-to-edge folds and corner-to-corner folds. **Q3.** 2. **Q4.** False. **Q5.** The triangle with all sides different. **Q6.** Order 2. **Q7.** Order 4. **Q8.** Order 3. **Q9.** 6. **Q10.** Order 8. **Q11.** A, M, T. **Q12.** H, N, Z. **Q13.** 0, 3, 8. **Q14.** No — see worked answers. **Q15.** The letter S. **Q16.** Every turn is a fit, so the count never stops — see worked answers. **Q17.** The third (no gaps, no overlaps). **Q18.** Top row: a shaded square touching the line; middle row: two shaded squares touching the line; bottom row: one shaded square two steps right of the line. **Q19.** GeoGebra Geometry, free at geogebra.org. **Q20.** Answers vary — see worked answers. **Q21.** (a) Yes — a vertical line through the middle of the dome and arch; (b) no — see worked answers; (c) every line through the centre is a line of symmetry — see worked answers.

Worked answers

Q1. Fold left onto right: match. Fold top onto bottom: match. Fold corner onto corner: the halves do not match (the rectangle sticks out). So a rectangle has **2** lines of symmetry.

Q2. The two edge-to-edge folds (left onto right, top onto bottom) and the two corner-to-corner folds. On a square all four folds match; on a rectangle only the edge-to-edge folds match.

Q3. The two edge-to-edge folds match and the corner-to-corner folds do not, so a rectangle has **2** lines of symmetry.

Q4. False. No fold makes the two halves of R match — top onto bottom fails and left onto right fails, so R has no line of symmetry.

Q5. A square has 4 lines and a heart has 1. The **triangle with all sides different** has no line of symmetry: with no equal sides, no fold can make the halves match.

Q6. The rectangle fits at the half turn and at the full turn, and at no other stop, so its order is **2** — the same result as Example 2.

Q7. A square fits at every quarter turn: quarter, half, three-quarter and full turn. That is 4 fits, so the order is **4**.

Q8. The triangle fits after a third of a turn, after two thirds, and at the full turn — 3 fits, so the order is **3**. (A tracing with an arrow at the top makes this easy to see.)

Q9. Three folds join opposite corners and three folds join opposite sides, and every one matches: **6** lines of symmetry.

Q10. Turn a regular octagon from one corner position to the next and it fits again: corner to corner around the shape gives 8 fits in one full turn, so the order is **8**.

Q11. A, M and T. A and M fold left onto right; T folds left onto right too. F and S have no fold that matches.

Q12. H, N and Z look the same after a half turn: the top swaps with the bottom and the letter still looks the same. A does not — after a half turn its top is at the bottom, so it looks different.

Q13. 0, 3 and 8. The 0 folds top onto bottom and left onto right; the 3 folds top onto bottom; the 8 folds both ways. The 2 has no fold that matches.

Q14. Mia is **not** right. The number of sides does not decide the number of lines. A rectangle has 4 sides but only 2 lines of symmetry: the edge-to-edge folds match, and the corner-to-corner folds do not — the halves stick out. (A square has 4 lines, but that is because all four sides are equal, not because there are four sides.)

Q15. The letter A and the heart each have a line of symmetry, and the square has 4 lines. The **letter S** has no line of symmetry — but turn it a half turn and it looks the same, so it has order 2. That is the answer to the investigation's last question: the order and the number of lines of symmetry do not always match.

Q16. For a circle, *every* turn gives a fit, so the count of fits in one full turn never stops — it is more than any number you write down. The circle is the special case, just as it is special for lines of symmetry (every line through the centre).

Q17. A tessellation has no gaps and no overlaps, so only the **third** covering is a tessellation. The first has gaps and the second has overlaps.

Q18. Mirror each square across the line, the same number of steps on the other side: top row, a shaded square touching the line; middle row, two shaded squares touching the line; bottom row, a shaded square two steps **right** of the line. Fold along the line and the halves match.

Q19. GeoGebra Geometry, which is free; it is found at [geogebra.org](https://www.geogebra.org) (source line at the start of the section). With it you can draw half a pattern and let the software show the mirror half, or drag a shape and watch the symmetry stay true.

Q20. Check three things in your pattern: (1) your one design passes the fold test, so it has a line of symmetry; (2) the design is repeated along the band — the same design again and again; (3) the repeats are identical copies with the same gap between each one. A pattern like that is symmetrical, just like the band picture in the section.

Q21. (a) Yes. A vertical line straight down the middle — through the centre of the dome and the arch — is a line of symmetry: the two wings are identical, so folding left onto right makes them match. (b) No. If one wing were longer, the two halves would not match on the fold, so the middle line would not be a line of symmetry. Symmetry needs the two sides to be identical. (c) Every line through the centre of a full circle is a line of symmetry — as many lines as you can draw. That is why the circle can never be finished being counted, for lines or for turns.

Test

Chapter 5 test — Space (T5)

This test covers Chapter 5 — Space: 5A, 5B, 5C and 5D. The questions are about VC2M4SP01, VC2M4SP02, VC2M4SP03 and VC2M4SP04.

Total marks	20
Guidance time	25 minutes
You may use	pencil, eraser, ruler, tracing paper, grid paper

This is a classroom check, not an exam. It is not timed. Write your answers in your book, and show your working where you can.

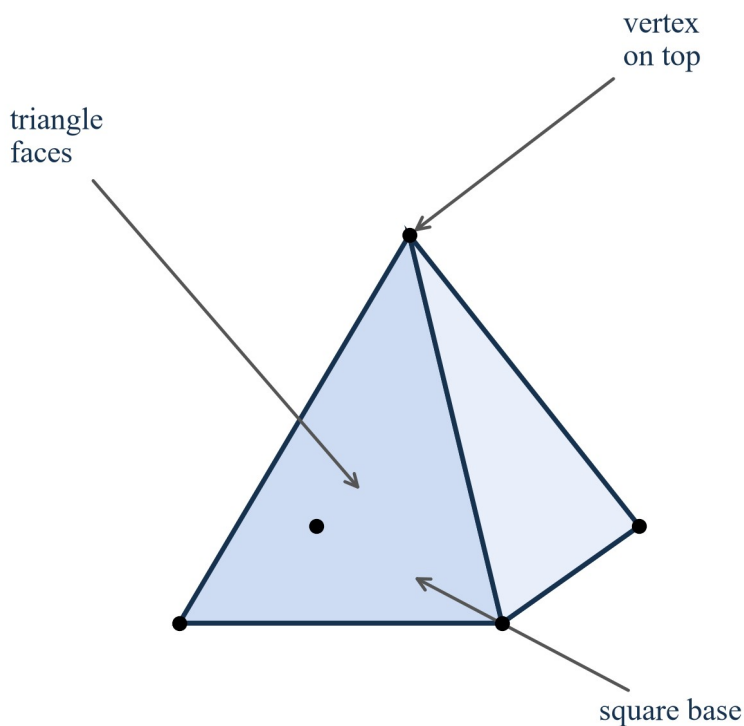
Name: _____ Date: _____

5A — geometric properties of two-dimensional shapes and three-dimensional objects

Q1. Which 3D object has 6 square faces? Circle the correct answer. [1 mark]

A. Sphere B. Cube C. Cone D. Cylinder

Q2. Look at the square-based pyramid.



A square-based pyramid drawn in 3-D with its parts labelled: square base, triangle faces, and the vertex on top.

- (a) How many faces does it have? [1 mark]
- (b) How many edges does it have? [1 mark]
- (c) How many vertexes does it have? [1 mark]

Q3. Give one thing that is the same, and one thing that is different, for a square and a cube. [2 marks]

5B — composite shapes and objects in the environment

- Q4.** A shape that looks like a house is made from a square with a triangle on top. Which two shapes make up this house shape? Circle the correct answer. [1 mark]
- A. A square and a triangle B. Two triangles C. A shape with 5 sides D. A circle and a triangle
-
- Q5.** An orange is closest to which solid object? Choose from: cube, rectangular prism, cylinder, sphere, cone. [1 mark]
- Q6.** A club wants a logo made from exactly 2 triangles and 1 circle.
- (a) Draw a logo like this in your book. [1 mark]
- (b) Label each shape in your drawing. [1 mark]
-

5C — grid reference systems

Use this map of the Melbourne Showgrounds for Q7 and Q8. The Melbourne Showgrounds are at Ascot Vale in Melbourne.

	A	B	C	D	E
1	gate	showbags	food stalls	rides	Grand Pavilion
2	Animal Nursery	main arena			Exhibition Pavilion
3	toilets			water	car park
4			first aid		

A simple map, drawn for this book.

A simple map of the Melbourne Showgrounds on a grid with columns A to E and rows 1 to 4, showing the gate, showbags, food stalls, rides, the Grand Pavilion, the Animal Nursery, the main arena, the Exhibition Pavilion, toilets, water, the car park and first aid

- Source: Wikipedia, Melbourne Showgrounds, retrieved 2026-08-20. Source: The Royal Agricultural Society of Victoria, Melbourne Royal Show, retrieved 2026-08-20.
- Q7.**
- (a) What is at D1? [1 mark]
- (b) Give the grid reference of the Animal Nursery. [1 mark]

Q8. You start at the gate at A1. You walk 3 squares to the right, then 2 squares down.

- (a) Which square do you land on? [1 mark]
 - (b) What is in that square? [1 mark]
 - (c) Write your pathway as a list of squares, in order. [1 mark]
-

5D — line and rotational symmetry

Q9. How many lines of symmetry does a rectangle have? Circle the correct answer. [1 mark]

- A. 4 B. 2 C. 1 D. 0
-

Q10. What is the order of rotational symmetry of each shape? [2 marks]

- (a) a triangle with 3 equal sides
- (b) a regular hexagon

Q11. Jack says: “A circle has exactly 1 line of symmetry.” Is Jack right? Explain your answer. [2 marks]

Solutions

Answer key

Question	Answer	Marks
Q1	B (cube)	1
Q2	(a) 5 (b) 8 (c) 5	3
Q3	Example: same — the faces of a cube are squares; different — a square is flat, a cube takes up space	2
Q4	A (a square and a triangle)	1
Q5	sphere	1
Q6	A drawing that uses exactly 2 triangles and 1 circle, with each shape labelled	2
Q7	(a) the rides (b) A2	2
Q8	(a) D3 (b) the water (c) A1, B1, C1, D1, D2, D3	3
Q9	B (2)	1
Q10	(a) order 3 (b) order 6	2
Q11	No — every line through the centre of a circle is a line of symmetry	2
Total		20

Fully worked solutions

Q1 — 1 mark. B. A cube has 6 faces, and every face is a square. A sphere has only a curved surface, a cone has 1 flat circle face and a curved surface, and a cylinder has 2 flat circle faces and a curved surface — not one of them has 6 square faces. (Multiple-choice item drawn from the question bank, VC2M4SP01.E01.S01.D1.V05.)

Q2 — 3 marks.

- (a) **5 faces** — 1 square base and 4 triangle faces going up to the top. 1 mark.
- (b) **8 edges** — 4 around the base and 4 going up to the top vertex. 1 mark.
- (c) **5 vertexes** — 4 around the base and 1 at the top. 1 mark.

Q3 — 2 marks. 1 mark for any true thing that is the same, and 1 mark for any true thing that is different. Example: Same — each face of a cube is a square, so the square's 4 sides and 4 vertexes turn up on every face of the cube. Different — a square is a flat 2D shape, but a cube is a 3D object that takes up space. (Also accept: a square has sides, but a cube has faces, edges and vertexes.)

Q4 — 1 mark. A. The part under the roof is a square, and the roof is a triangle, so the house shape is made from **a square and a triangle**. (Multiple-choice item drawn from the question bank, VC2M4SP02.E01.S01.D1.V01.)

Q5 — 1 mark. An orange is round all over, so it is closest to a **sphere**.

Q6 — 2 marks. 1 mark for a drawing that uses exactly 2 triangles and 1 circle — no more and no fewer. 1 mark for labelling each shape in the drawing. Example: two triangles side by side like mountains, with a circle sun above them. You can put the shapes where you like, as long as they are the shapes asked for.

Q7 — 2 marks. On the showgrounds map:

- (a) Follow the letter D down and the number 1 across: D1 holds **the rides**. 1 mark.

(b) The Animal Nursery is where column A meets row 2: **A2**. 1 mark. Write the letter first, then the number.

Q8 — 3 marks. From A1, moving right keeps you in row 1: 1 right lands on B1, 2 right lands on C1, 3 right lands on D1. Then moving down keeps you in column D: 1 down lands on D2, 2 down lands on D3.

(a) You land on **D3**. 1 mark.

(b) D3 holds **the water**. 1 mark.

(c) **A1, B1, C1, D1, D2, D3**. 1 mark for the squares in order. Also accept the list that leaves out the start (B1, C1, D1, D2, D3), as long as no square is skipped and the order is right.

Q9 — 1 mark. B. A rectangle has **2** lines of symmetry: the two edge-to-edge folds (left onto right, top onto bottom) match, and the corner-to-corner folds do not. (Multiple-choice item drawn from the question bank, VC2M4SP04.E01.S01.D1.V02.)

Q10 — 2 marks. The order is the number of times a shape fits its outline in one full turn, not counting the start.

(a) A triangle with 3 equal sides fits 3 times in one full turn, so its order is **3**. 1 mark.

(b) A regular hexagon fits 6 times in one full turn, so its order is **6**. 1 mark.

Q11 — 2 marks. No — Jack is not right. 1 mark for saying no. Fold a circle along any line through its centre and the two halves match exactly, so **every line through the centre** is a line of symmetry — you can never finish counting them. 1 mark for the explanation.

Reporting against the achievement standard

Each content description is reported in the words of its achievement-standard extract from the authority file (maths_4.json).

Questions	Marks	CD	Achievement-standard wording
Q1–Q3	6	VC2M4SP01	“Students represent and approximate shapes and objects from their environment.”
Q4–Q6	4	VC2M4SP02	“Students represent and approximate shapes and objects from their environment.”
Q7–Q8	5	VC2M4SP03	“Students create and interpret grid references.”
Q9–Q11	5	VC2M4SP04	“They identify line and rotational symmetry in plane shapes and create symmetrical patterns.”