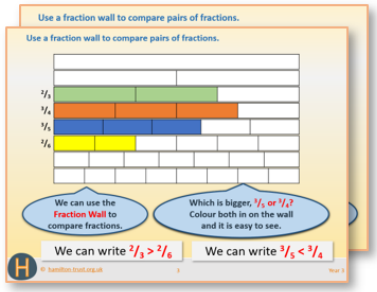
Year 5: Week 5, Day 5

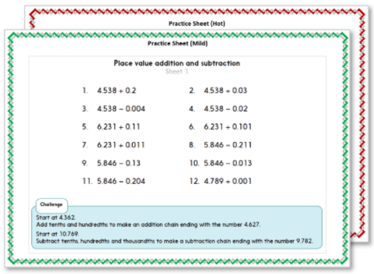
Describe properties of prisms and pyramids.

Each day covers one maths topic. It should take you about 1 hour or just a little more.

1. Start by reading through the **Learning Reminders**.
   They come from our *PowerPoint* slides.

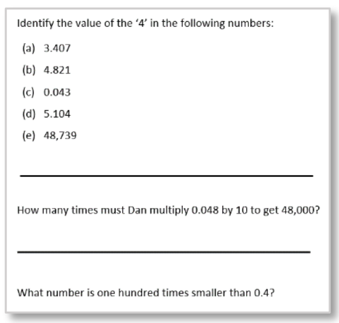


2. Tackle the questions on the **Practice Sheet**.
   There might be a choice of either Mild (easier) or Hot (harder)!
   Check the answers.



3. Finding it tricky? That's OK… have a go with a grown-up at **A Bit Stuck?**

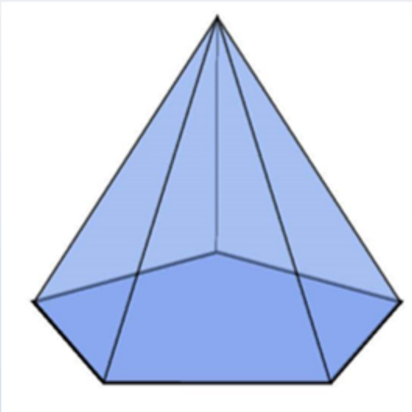
4. Have I mastered the topic? A few questions to **Check your understanding**.
   Fold the page to hide the answers!

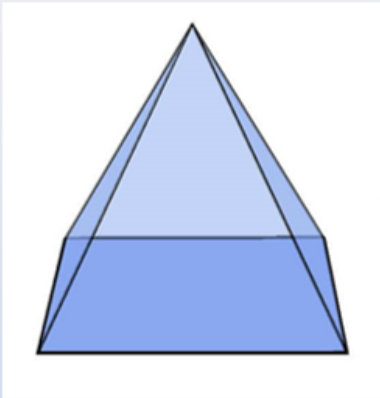


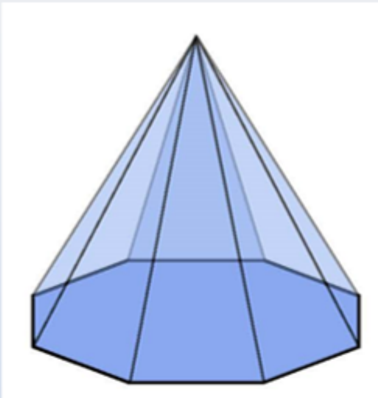
Learning Reminders

Describe properties of prisms and pyramids.

There are lots of types of *pyramid*, with different 2-D shapes on their bases.







What do pyramids have in common?

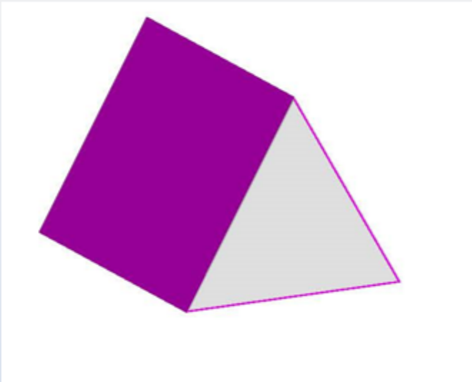
They have a polygon as one face, and triangles as the other faces.

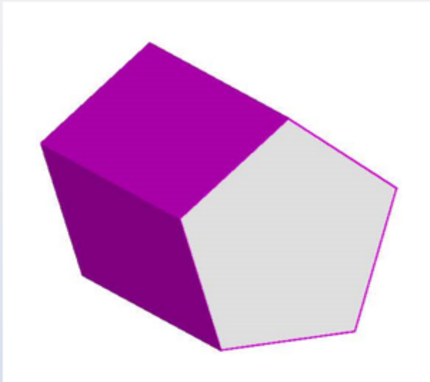
So a cone (circular base) is not a pyramid!

Learning Reminders

Describe properties of prisms and pyramids.

There are lots of types of *prisms*, with different 2-D shapes at each 'end'.





What do prisms have in common?

The two faces on either end are the same type of polygon (they have straight sides).
These faces are joined by rectangles (which could include squares).

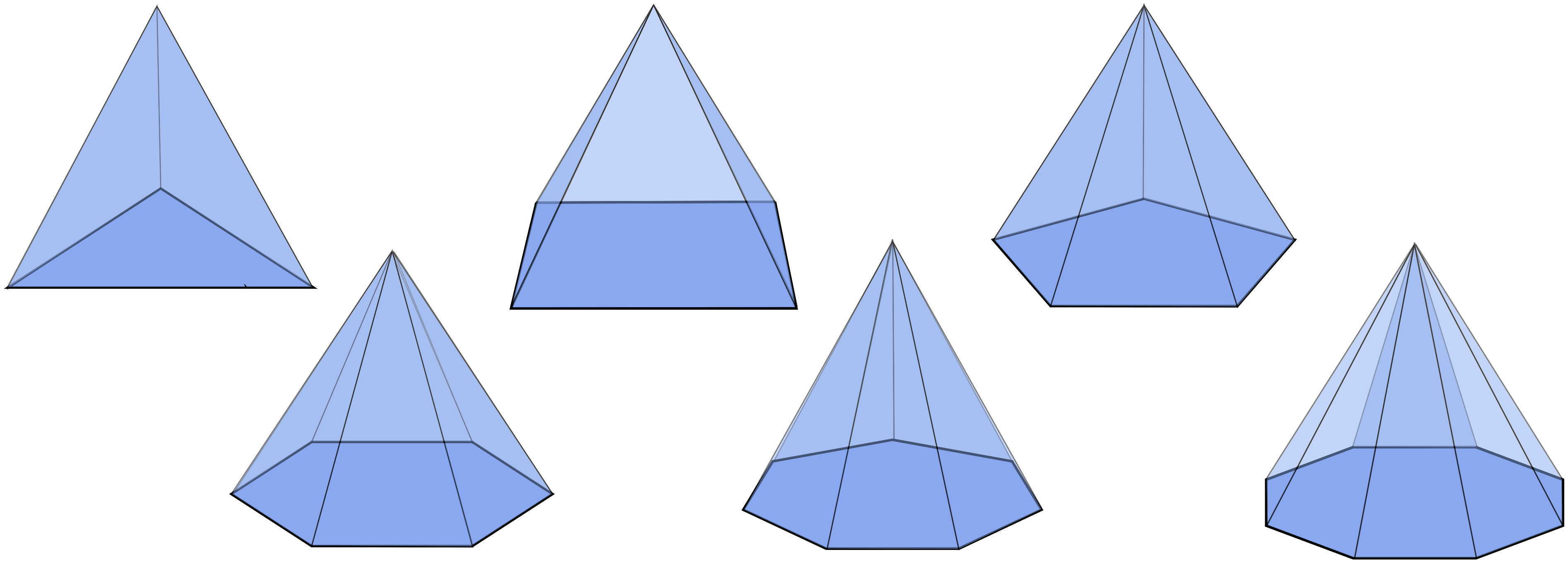
So a cylinder is not a prism!

What type of prism is a cuboid?
Is a cube a prism?

Practice Sheet Mild

Pyramids

- For each pyramid, record, in a table, the name of the base shape, the number of faces and the number of vertices.
- Do you notice any patterns in the lists of numbers? Describe them…
- Can you explain the patterns?
  [HINT – compare the number of faces to the number of sides of the 2-D 'base' shape.]



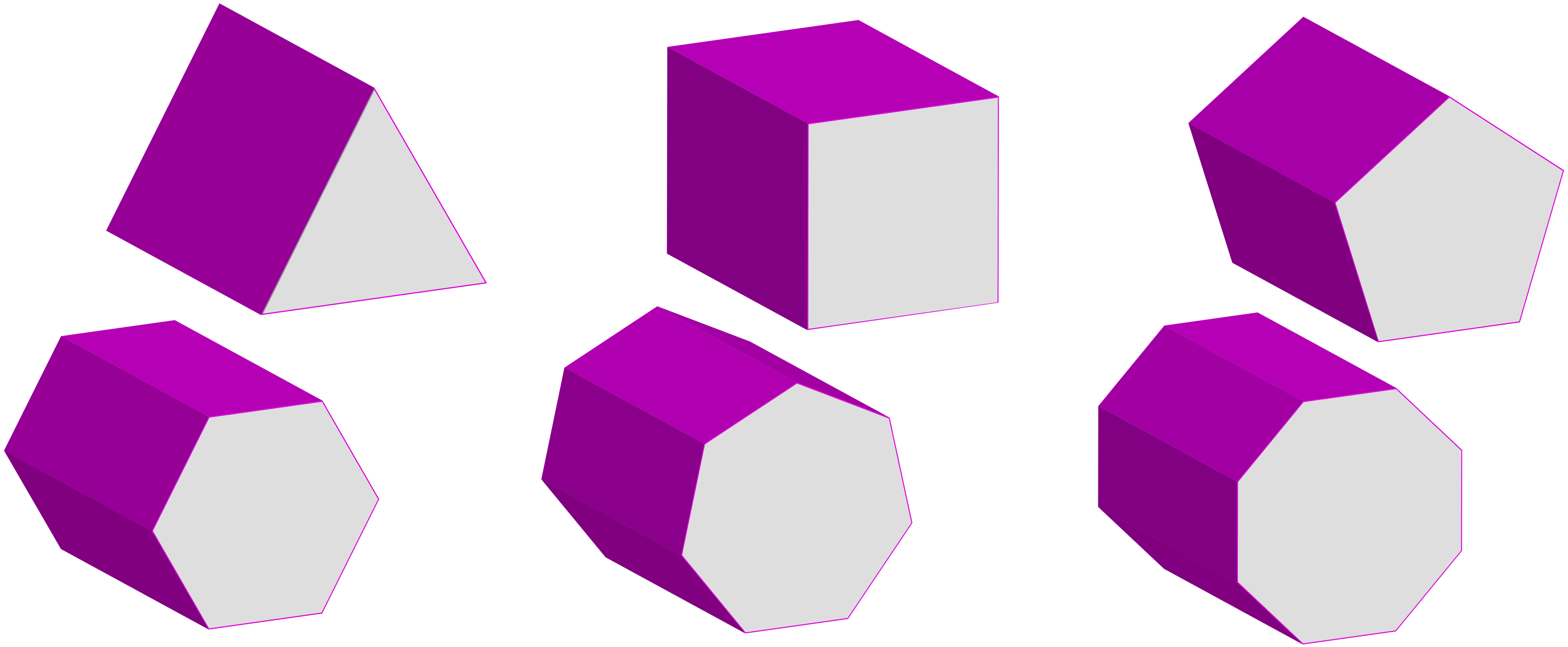
Challenge

Can you predict the number of faces and vertices for a pyramid with a 10-sided base?

Practice Sheet Hot

Prisms

- Draw and complete a table for each 3-D shape, showing the shape of the two 'end' faces, the total number of faces, and the number of vertices.
- Do you notice any patterns in the lists of numbers? Describe them...
- Can you explain the patterns?



Challenge

Can you predict the number of faces and vertices for a prism with 9- sided 'end' faces? 10-sided 'end' faces? 100-sided 'end' faces?!

Practice Sheets Answers

Pyramids (mild)

Base shape	Total number of Faces	Number of Vertices
Triangle	4	4
Square	5	5
Pentagon	6	6
Hexagon	7	7
Heptagon	8	8
Octagon	9	9

The number of faces is equivalent to the number of sides of the 2-D non-triangular face, plus 1. This is because a triangular face is attached to each side of the non-triangular face. So, for example, the square-based pyramid has four triangular faces plus the 1 square base. The number of vertices is equivalent to the number of vertices on the 2-D base shape, plus the vertex at the 'top' of the pyramid (the apex).

Challenge

A pyramid with a 10-sided base will have 11 faces and 11 vertices.

Prisms (hot)

'End' shape	Total number of Faces	Number of Vertices
Triangle	5	6
Square	6	8
Pentagon	7	10
Hexagon	8	12
Heptagon	9	14
Octagon	10	16

The number of faces is equivalent to the number of sides of the 2-D shape at each end, plus 2. This is because a rectangular face joins the corresponding sides of the 2-D shapes at each end, so it is the number of those rectangles plus the 2 'end' faces.
The number of vertices is twice the number of sides of the 2-D shape at each end. The vertices of the 3-D shape can be seen as being double the number of vertices of the 2-D shape at each end.

Challenge

A shape with 9-sided 'end' faces has 11 faces and 18 vertices; a shape with 10-sided 'end' faces has 12 faces and 20 vertices; a shape with 100-sided 'end' faces has 102 faces and 200 vertices.

We could make generalisations, using some letters to represent numbers, as follows:

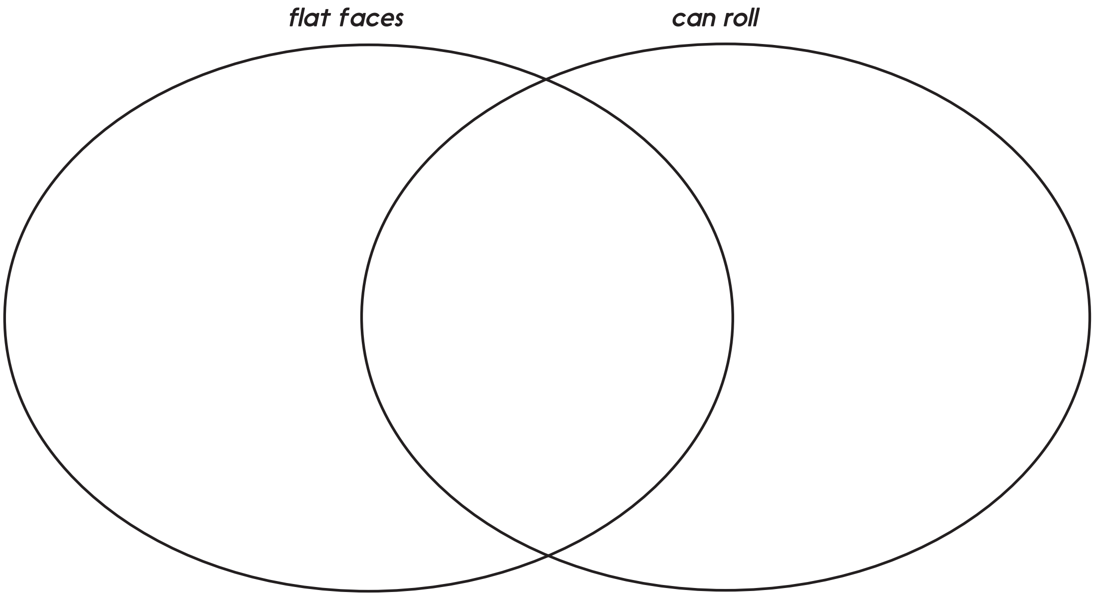
'End' shape	Number of sides on 'end'shape	Total number of Faces	Number of Vertices
e.g. triangle	3	5	6
e.g. square	4	6	8
n-sided polygon	n	n + 2	double n or 2 x n or 2n

A Bit Stuck?

Sorting 3-D shapes

Write the shape names in the right place in each Venn diagram.

1.



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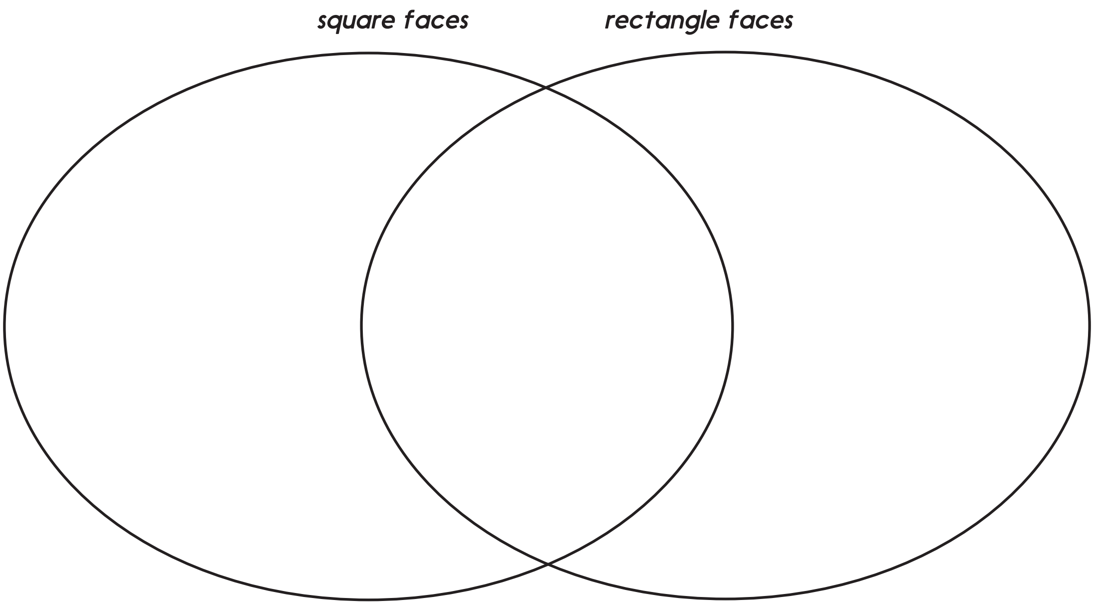
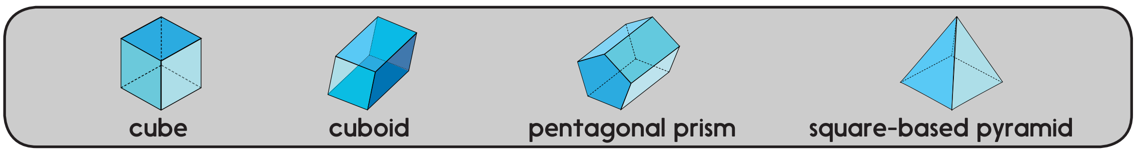
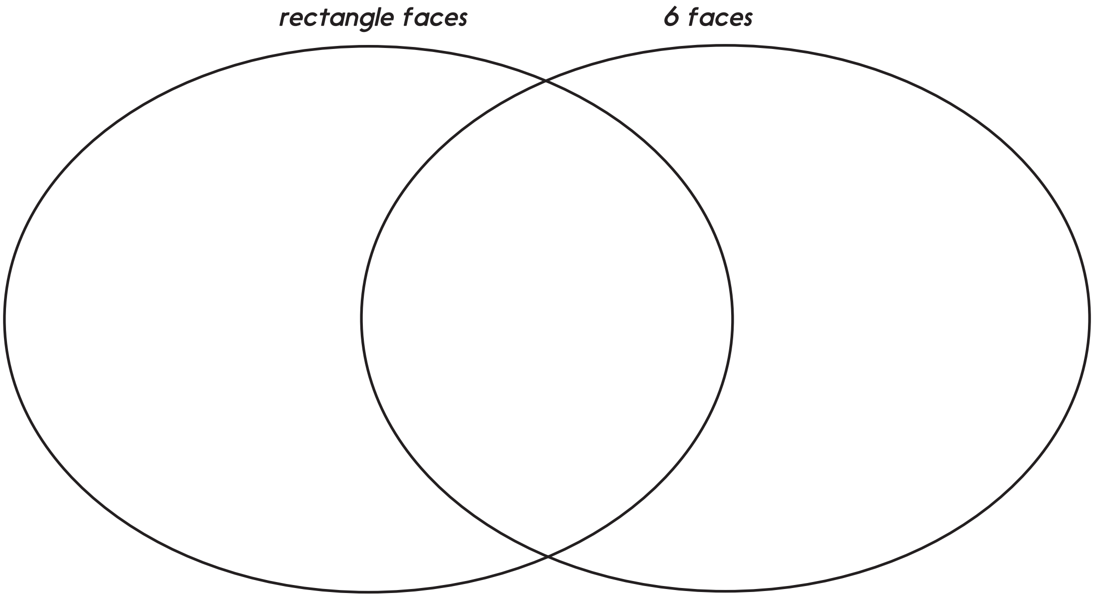




A Bit Stuck?
Sorting 3-D shapes

3.



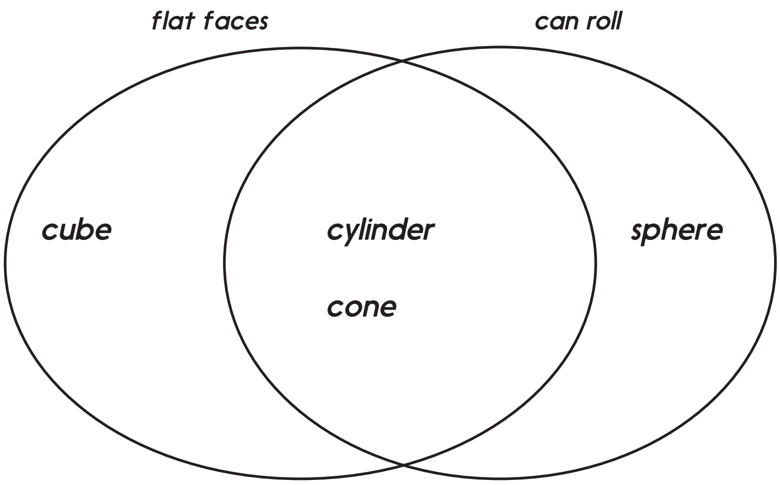
Challenge

Create your own Venn diagram to sort these shapes: cone, cylinder, sphere, hemisphere.

A Bit Stuck? Answers

Sorting 3-D shapes

1.



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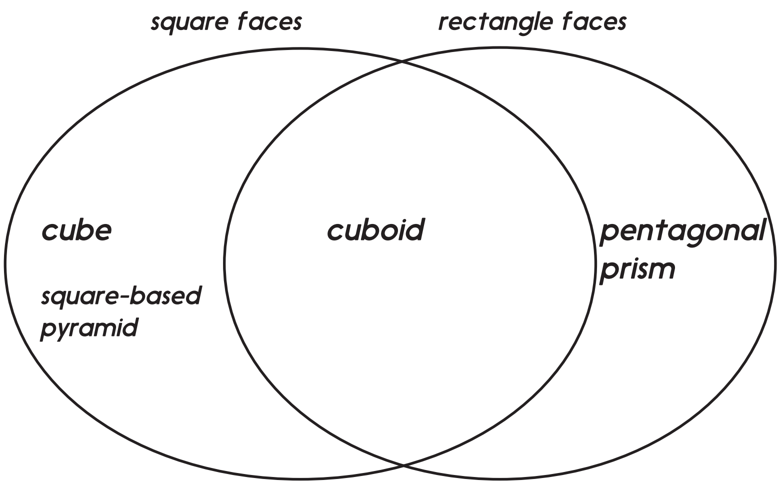

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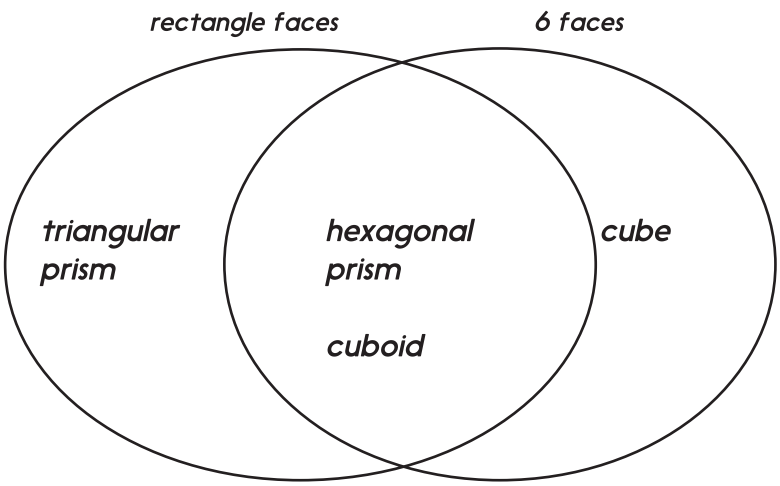

Check your understanding

Questions

Always true, sometimes true or false?

- A cube is a type of cuboid
- Pyramids have 5 faces
- Prisms have a cross-section that is always the same, so a cylinder is a prism
- Cubes and cuboids have the same number of vertices

How many edges has a…

(a) Cuboid?

(b) Square-based pyramid?

(c) Cylinder?

(d) Triangular prism?

Fold here to hide answers

Check your understanding

Answers

Always true, sometimes true or false?

- A cube is a type of cuboid

True: it is a special case of a cuboid where all faces are squares.

- Pyramids have 5 faces

Sometimes, if it is square-based. Other pyramids can have fewer (a tetrahedron) or more (e.g. a pentagon-based pyramid) faces.

- Prisms have a cross-section that is always the same, so a cylinder is a prism

False - since a prism must have all flat faces.

- Cubes and cuboids have the same number of vertices

True, see the first statement above.

How many edges has a…

(a) Cuboid? 12

(b) Square-based pyramid? 8

(c) Cylinder? 2

(d) Triangular prism? 9

If struggling to visualise these, children could check by referring to, or constructing, the 3-D shapes.