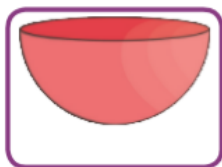# Maths Task
Week 2 – 30.03.2020

<u>3D Shapes</u>

Work through the challenges starting at the beginning. Each challenge gets harder.
Although the investigation is a 'Beat the Challenge', have a go and see what you can do!

Start with the match up cards to refresh your memory of 3D Shapes – you will have seen all these shapes before.
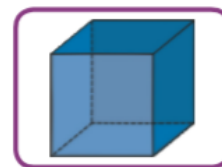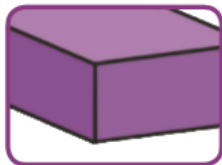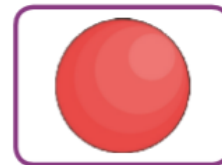
Properties of 3D Shapes

Curved	Straight	Round	Solid
Vertices	Point	Corner	Surface
Face	Edge	End	

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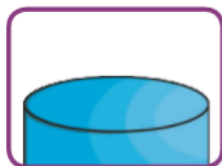
Challenge

3D shapes are shapes which you are able to pick up. They have faces (sides), edges and vertices (corners).

Complete the table below, identifying the different properties each 3D shape has.

Name	Surfaces		Edges		Vertices	Picture
	Flat	Curved	Straight	Curved		
sphere						
cube						
cuboid						
cone						
cylinder						
square-based pyramid						
tetrahedron						
triangular prism						
pentagonal prism						
hexagonal prism						
octagonal prism						
octahedron						

An Amazing Fact a Day

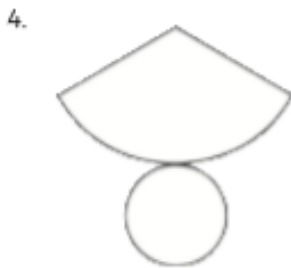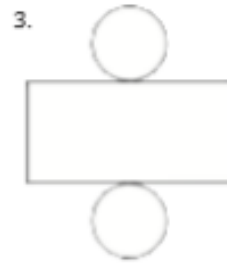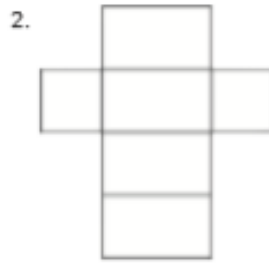The shape of a Pringle is called a hyperbolic paraboloid.

You could also try to find out:
- how they are made;
- how many ordinary packets of crisps a tube of Pringles would fill;
- about other unusual mathematical names for 3D shapes.

Can you match the correct net with the 3D shape?

1.

2.

3.

4.

5.

6.

A   B   C   D   E   F
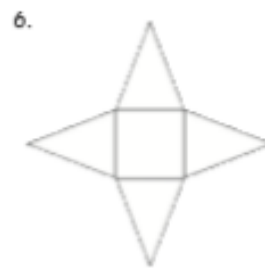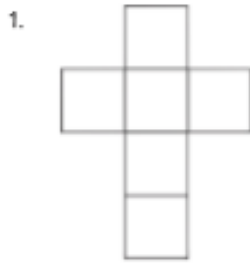
Net	Shape

Have a go at making some nets of your own – what 3D shapes can you make?

An octahedron is a polyhedron with eight faces.

Investigate the different nets of octahedron you can draw that will fold into an irregular octahedron.

Irregular Octahedron	Description	Net
	Four hexagonal faces with four triangular faces.	
	Three pentagonal faces with five triangular faces.	
	One heptagonal face with seven triangular faces.	
	One hexagonal face with three square faces and four triangular faces.	
	Two hexagonal faces with six rectangular faces.	
	Four square faces with four triangular faces.	

There are various answers for this.
The best way to test out your nets is to build them!

Euler's Rule Investigation

Can you find a rule that links the number of faces, edges and vertices on a 3D shape?

Count the number of faces, edges and vertices for different 3D shapes and write the results in the table below.

Can you see any patterns in the results?

Hint
Add together the number of faces and vertices. How does this relate to the number of edges?

3D Shape	Number of Faces	Number of Vertices	Number of Edges

Explain the pattern that you can see between the shape's faces, edges and vertices.

_____

_____

_____

_____

Answers

Name	Surfaces		Edges		Vertices	Picture
	Flat	Curved	Straight	Curved		
sphere	0	1	0	0	0	
cube	6	0	12	0	8	
cuboid	6	0	12	0	8	
cone	1	1	0	1	0*	
cylinder	2	1	0	2	0	
square-based pyramid	5	0	8	0	5	
tetrahedron	4	0	6	0	4	
triangular prism	5	0	9	0	6	
pentagonal prism	7	0	15	0	10	
hexagonal prism	8	0	18	0	12	
octagonal prism	10	0	24	0	16	
octahedron	8	0	12	0	6	

* 1 Vertex is also an acceptable answer.

Net	Shape
1	a - cube
2	e - cuboid
3	d - cylinder
4	f - cone
5	c - triangular prism
6	b - square based pyramid

Explain the pattern that you can see between the shape's faces, edges and vertices.

The number of edges that a 3D shape has can be calculated by adding together the number of faces and the number of vertices, then, subtracting two.

The number of faces add the number of vertices subtract the number of edges will always equal two.