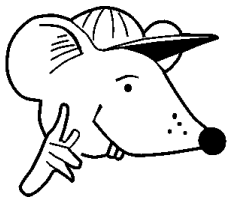
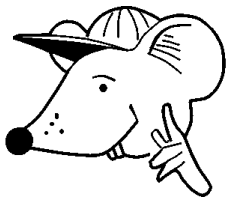
Back to Previous Menu



MATHEMATICS



N.S. Yr. 4 P.102

Describe and visualise 3-D and 2-D shapes and classify them according to their properties.

Equipment

Paper, pencil, ruler

MathSphere

Concepts

Children should be able to use, read and write the following words:

pattern, shape, 2-D, two-dimensional, 3-D, three dimensional, line, side, edge, face, surface, base, point, angle, vertex, vertices, centre, radius, diameter, net, make, build, construct, draw, sketch, curved, straight, regular, irregular, concave, convex, closed, open, circular, triangular, hexagonal, cylindrical, spherical, square-based, right-angled.

They should be able to name, classify and describe the following 2-D and 3-D shapes:

circle, semi-circle, triangle, equilateral triangle, isosceles triangle, quadrilateral, rectangle, oblong, square, pentagon, hexagon, heptagon, octagon, polygon, cube, cuboid, pyramid, sphere, hemisphere, cylinder, cone, prism, tetrahedron, polyhedron.

Most of these words are included in the MathSphere Dictionary. Some of those that may cause confusion are:

Oblong - some dictionaries and textbooks define this as another word for a rectangle, some as a rectangle that is twice as long as it is wide (in other words, two squares put next to each other).

Radius, diameter and circumference - the easy way to remember which is which, is that the shortest distance (from centre to circle) has the shortest word (radius) and the longest distance (distance around circle) has the longest word (circumference). (N.B. Strictly speaking, 'circumference' is not introduced until year 6, but why wait?)

Regular polygon - a shape that has all the sides the same length and all the angles the same value.

Regular polyhedron (a solid shape whose faces are polygons) has all the faces the same shape. All the edges are the same length and all the angles have the same value. (A cube is therefore a regular polyhedron, but a cuboid is not, as not all its edges are the same length.)

Concepts

Children should be becoming familiar with the idea that shapes belong to groups or classes. For example, there is a group of shapes called polygons. These are flat (2-D) shapes that have straight sides. The names of many of these end in **'agon'** such as pentagon, hexagon, heptagon, but there are other names that do not, such as square, rectangle, quadrilateral. There is a similar group of 3-D shapes (polyhedra - plural of polyhedron) that end in **'hedron'** such as octahedron, dodecahedron, but not all names of polyhedra end this way, for example cube, cuboid and pyramid.

They also need to be aware that groups of shapes are often subsets of other shapes. For example, squares are part of the group of rectangles, rectangles are part of the group of parallelograms, cylinders and cuboids are part of the group of prisms.

Children also need to know that in a polyhedron:

the faces are flat and polygonal and surrounded by edges
an edge is a straight line between two faces
a vertex is a point where three or more edges meet

and that a polygon is a 2-D shape that is closed (i.e. no gaps in its perimeter), and has three or more sides. Also that a regular polygon has equal sides and equal angles.

They should also know the properties of isosceles and equilateral triangles.

Much of this work should initially be oral. Children need to discuss these ideas over and over again before they become established in their minds. Keep practising the language at every opportunity and watch out for geometrical shapes in everyday life (e.g. The human body can be thought of as a sphere for the head, four cylinders for the arms and legs - or eight allowing for the joints - and a larger cylinder for the torso. Houses are often cuboids with triangular prisms for roofs. Swimming pools are normally prisms.)

When sorting shapes, it is sometimes a good idea to put them on a Carroll or Venn diagram. Blank diagrams are provided on page 11 - print out as many as you need. If you do not have any plastic shapes, children may easily cut out shapes of their own. Regular shapes are provided at the end of this module.

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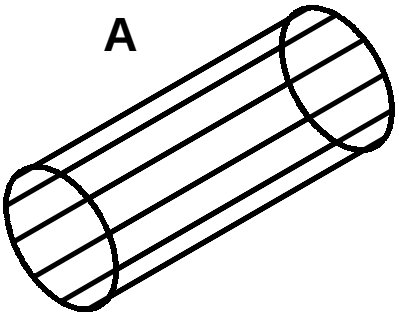
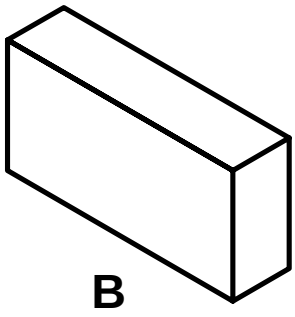
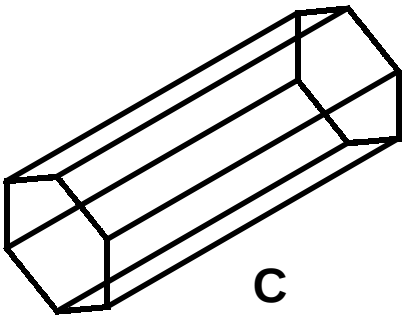
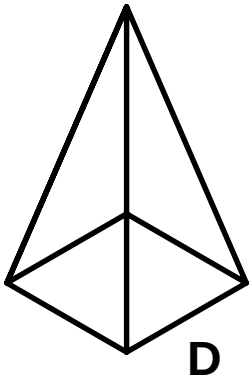
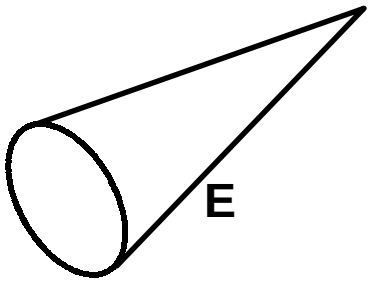
Can you identify each of these 3-D shapes? Join the shape to the name.

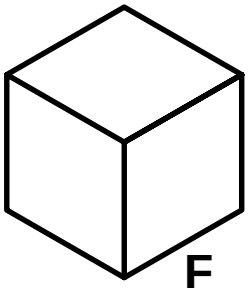


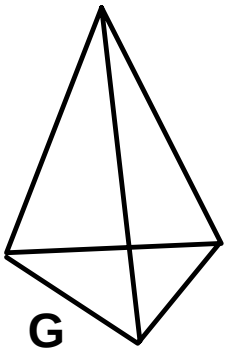


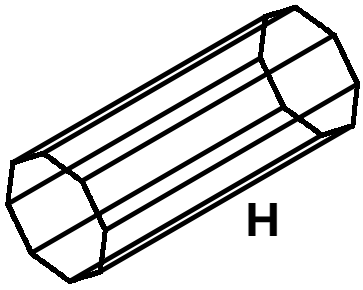












Cube

Cuboid

Square based Pyramid

Cone

Cylinder

Tetrahedron

Octagonal Prism

Hexagonal Prism

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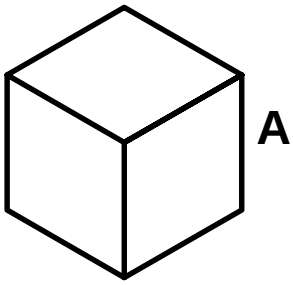
Can you identify each of these 3-D shapes? Write the name under the shape.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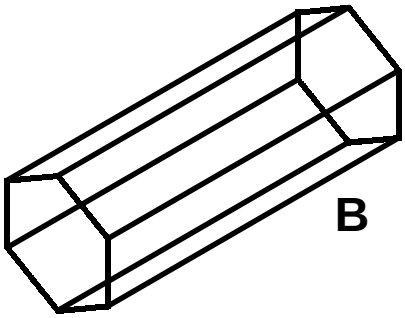
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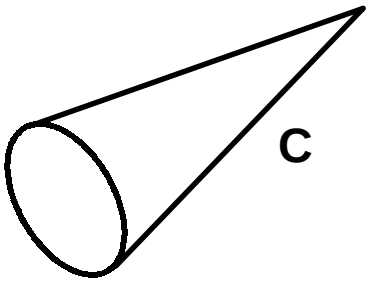
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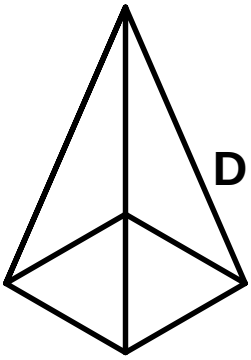
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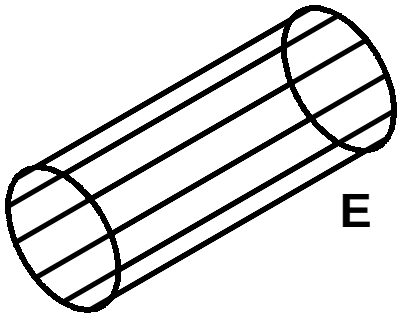
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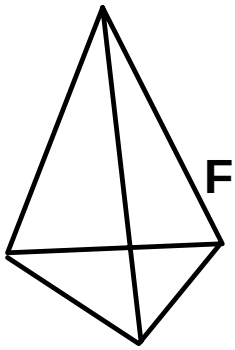
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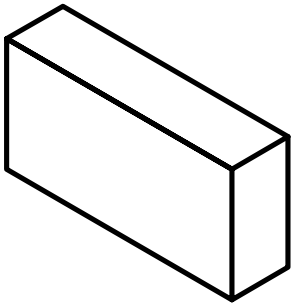
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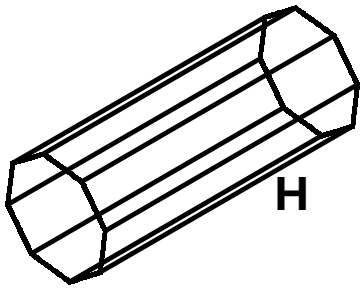
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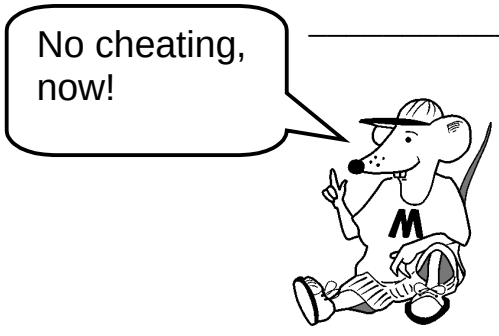

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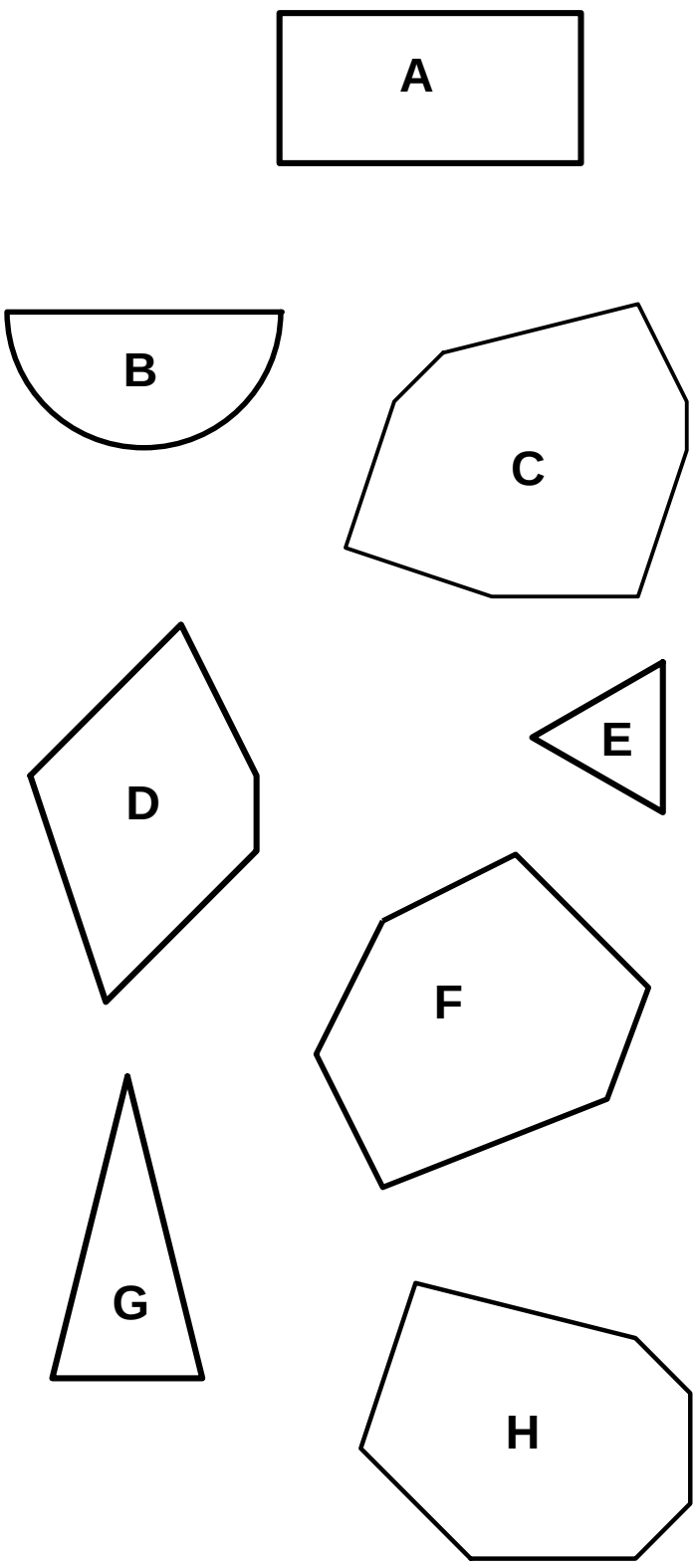
Can you identify each of these 2-D shapes? Join the shape to the name.



Semicircle

Equilateral Triangle

Isosceles Triangle

Rectangle

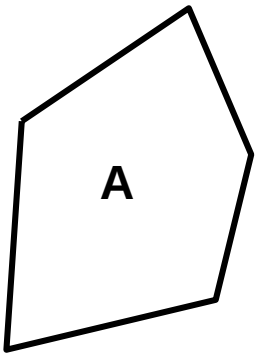
Pentagon

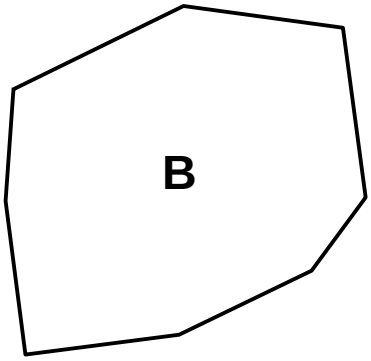
Hexagon

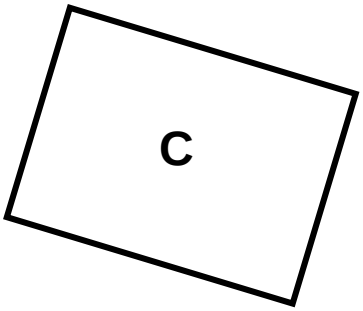
Heptagon

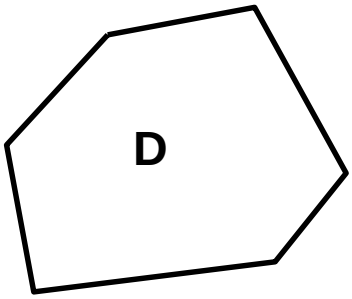
Octagon

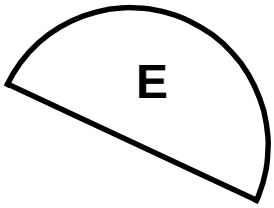
Can you identify each of these 2-D shapes? Write the name under the shape

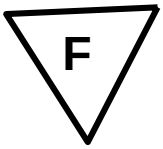


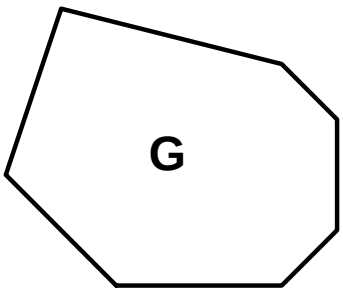


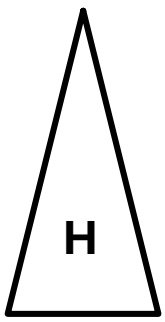


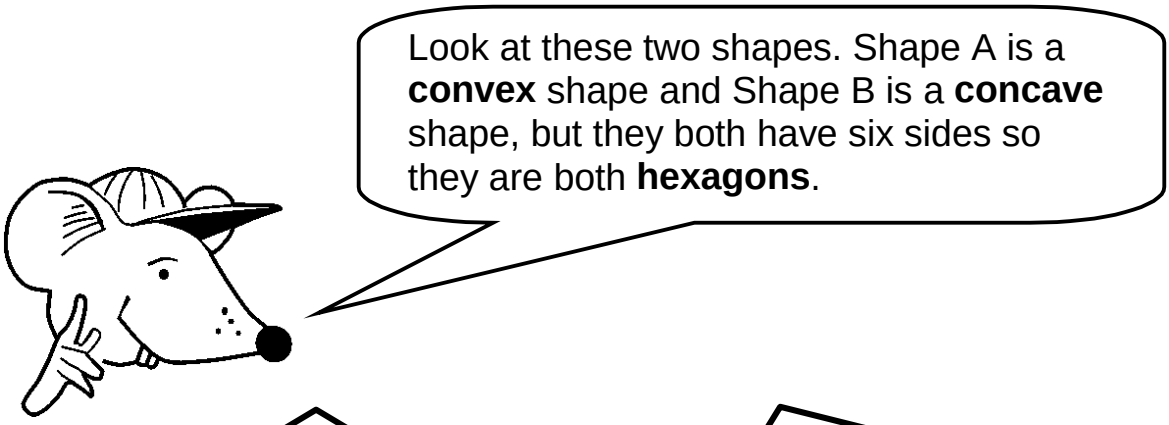


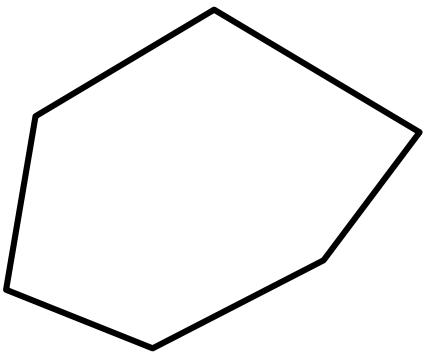




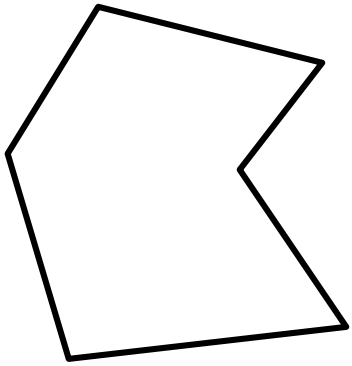






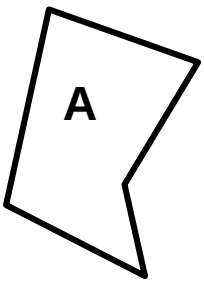


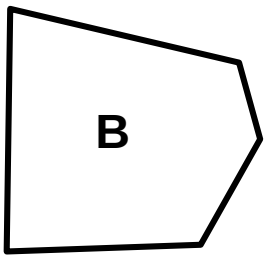
Shape A

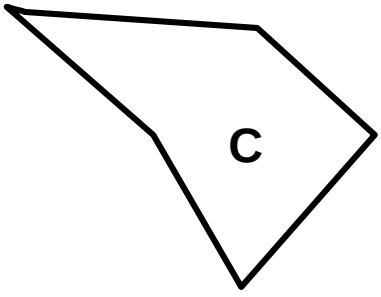


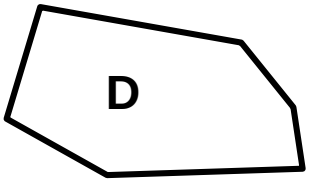
Shape B

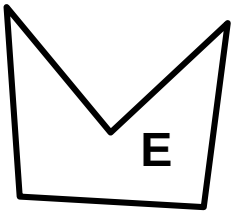
Which of the shapes below are concave pentagons?

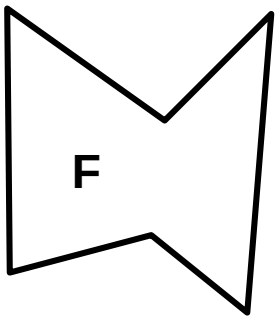




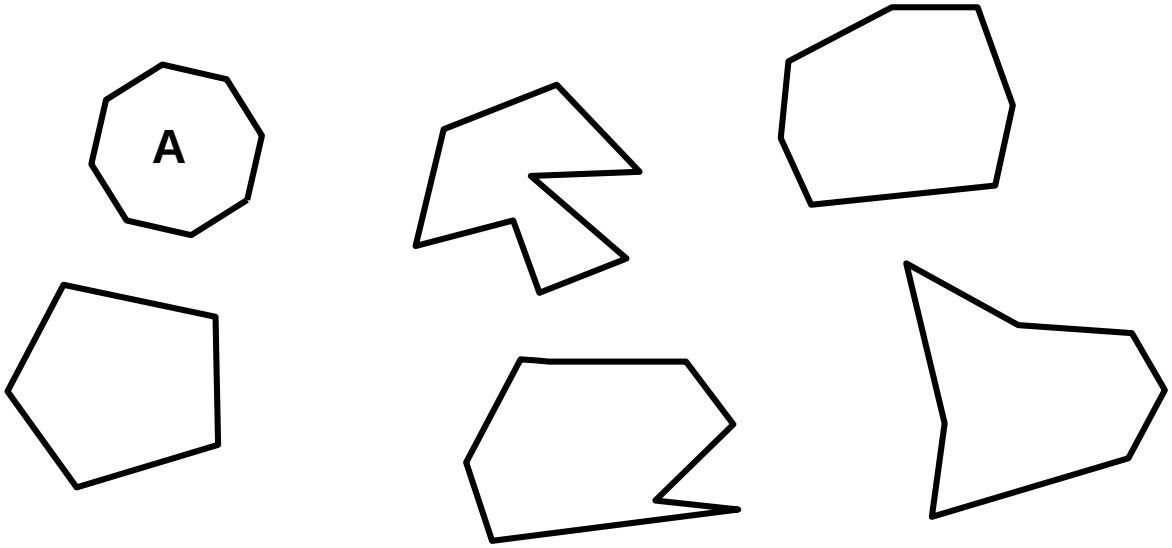




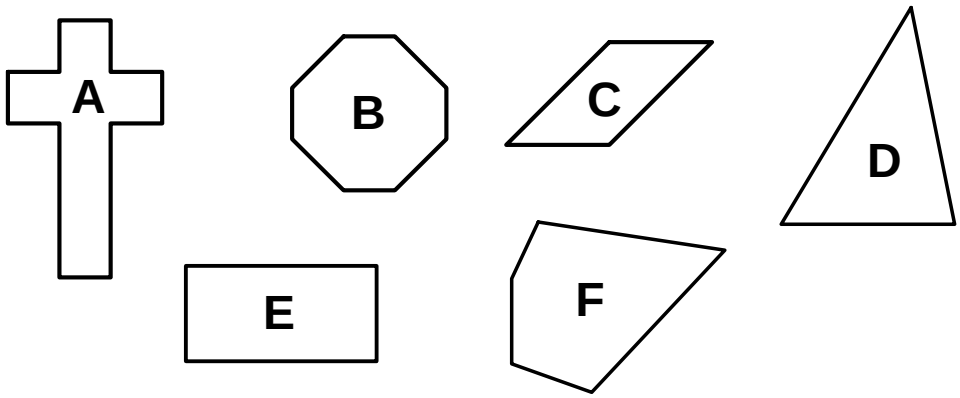




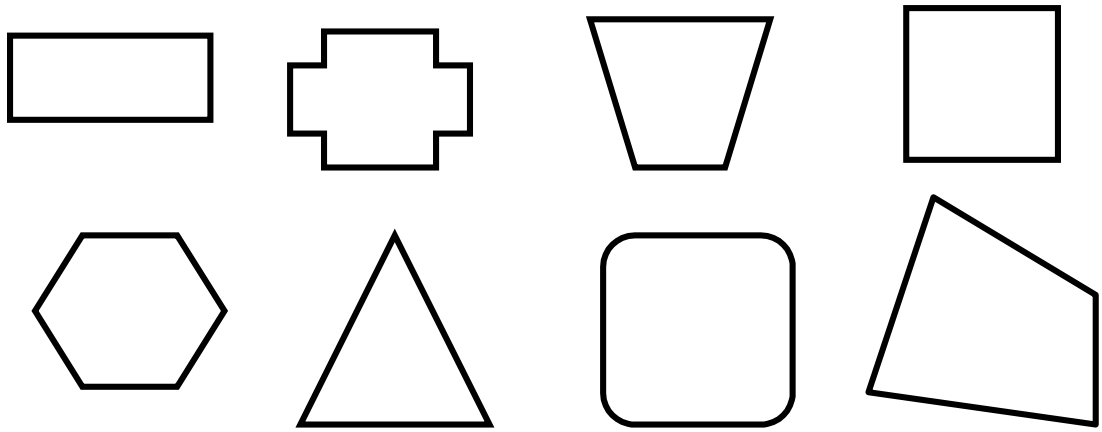
a) Which of these shapes are convex octagons?



b) Which of these shapes are irregular polygons?



c) Which of these shapes are quadrilaterals?



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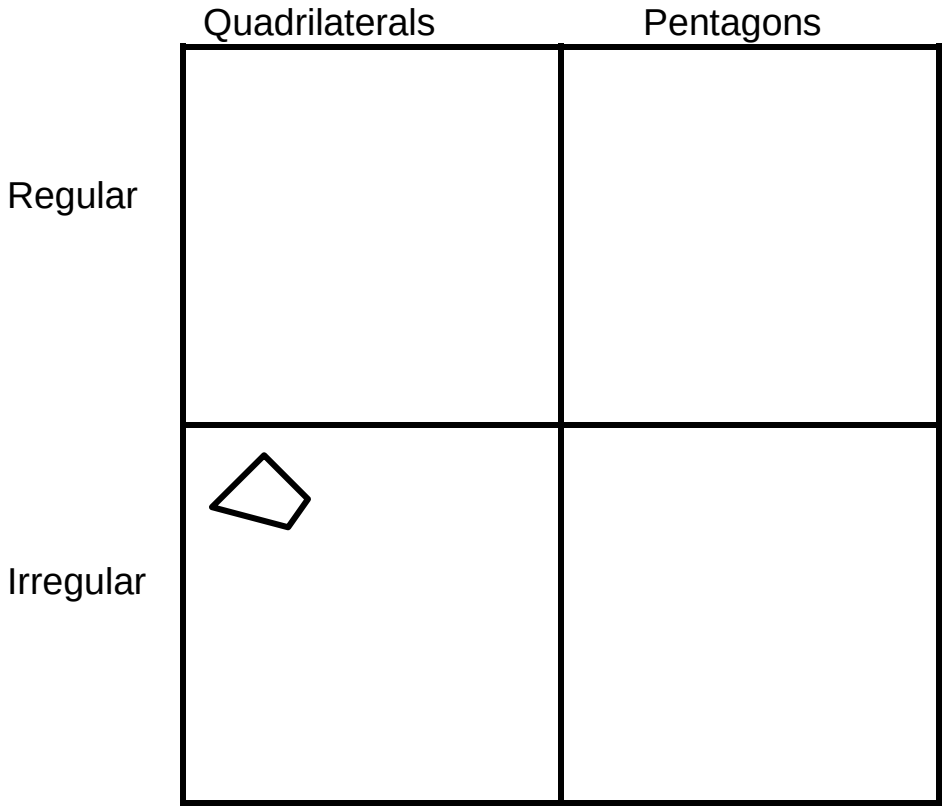
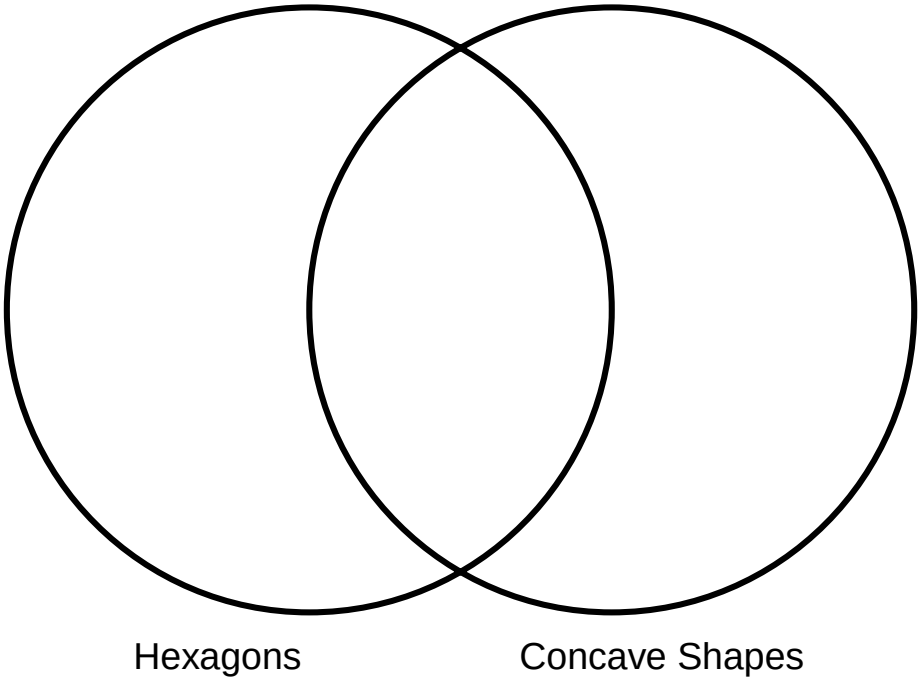
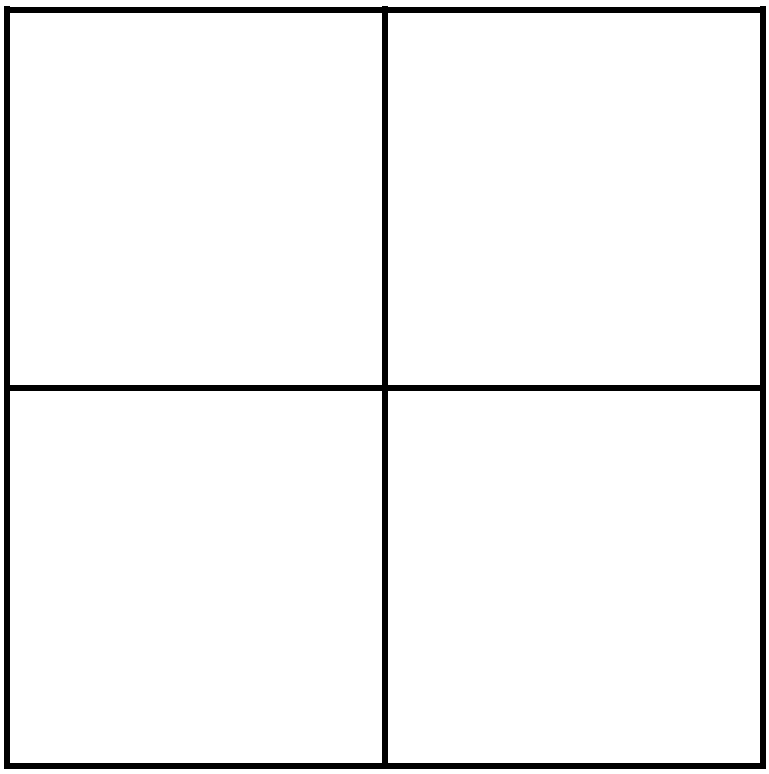
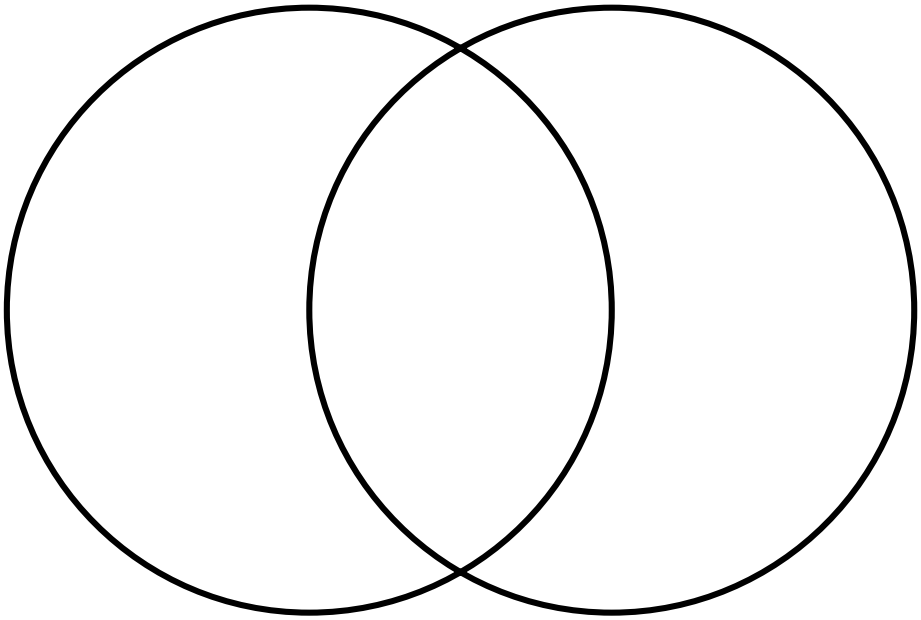
Draw some of your own shapes in the Venn and Carroll diagrams. One shape has been drawn for you.





Draw some of your own shapes in the Venn and Carroll diagrams. First write down what your sets are going to be. For an example, see page 10.





Answers

Page 4
A) Cylinder
B) Cuboid
C) Hexagonal Prism
D) Square based pyramid
E) Cone
F) Cube
F) Tetrahedron
G) Octagonal Prism

Page 5
A) Cube
B) Hexagonal Prism
C) Cone
D) Square Based Pyramid
E) Cylinder
F) Tetrahedron
G) Cuboid
H) Octagonal Prism

Page 6
A) Rectangle
B) Semicircle
C) Octagon
D) Pentagon
E) Equilateral Triangle
F) Hexagon
G) Isosceles Triangle
H) Heptagon

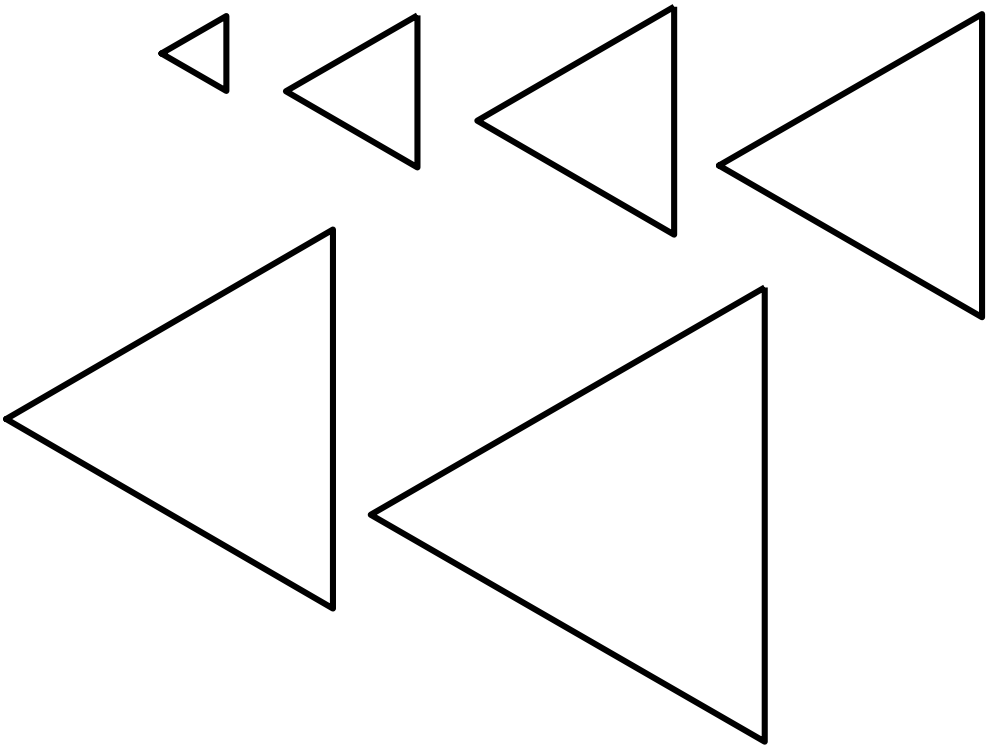
Page 7
A) Pentagon
B) Octagon
C) Rectangle
D) Hexagon
E) Semicircle
F) Equilateral Triangle
G) Heptagon
H) Isosceles Triangle

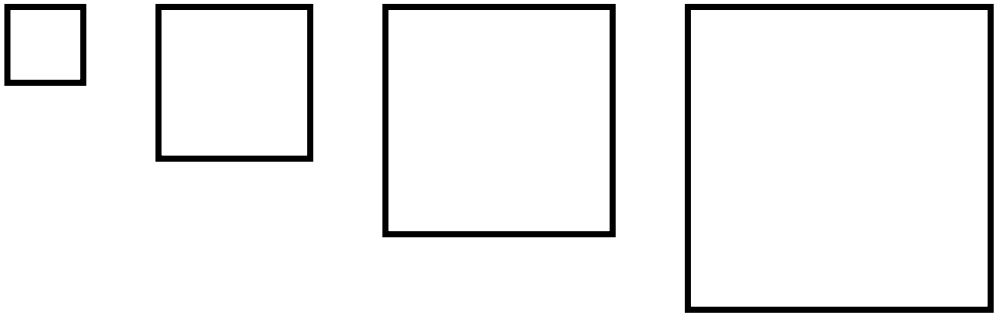
Page 8
A) C) and E)

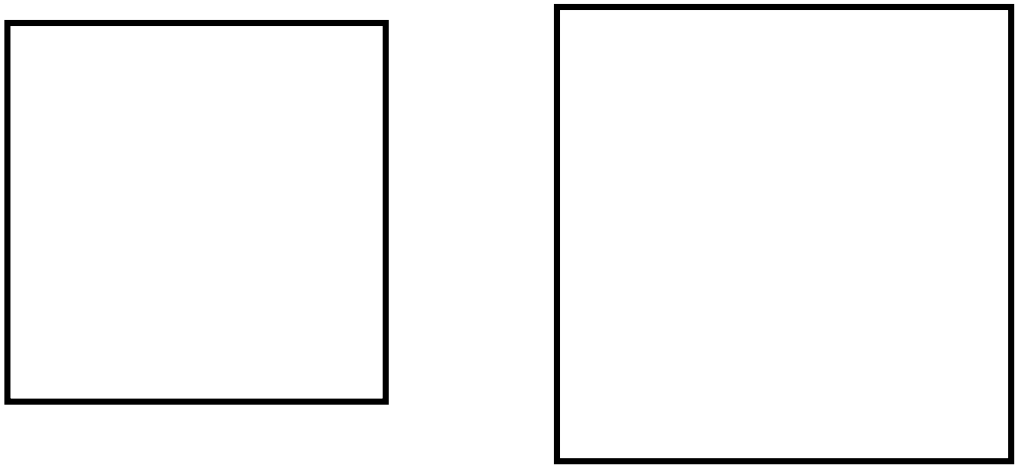
Page 9
a) A)
b) All of them!
c) A) C) D) H)

Page 10
Top left - One square or several of different sizes
Top right - One regular pentagon or several of different sizes
Bottom left - Any four sided shapes except squares
Bottom right - Any five sided shapes except regular ones.

Regular Polygons







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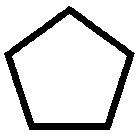
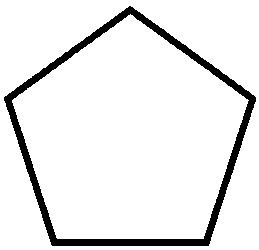
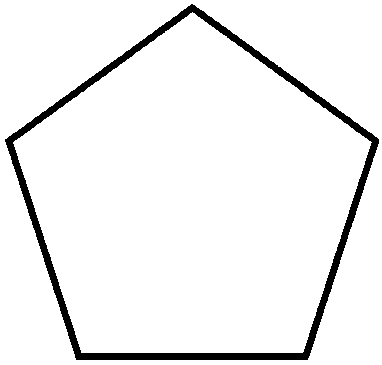
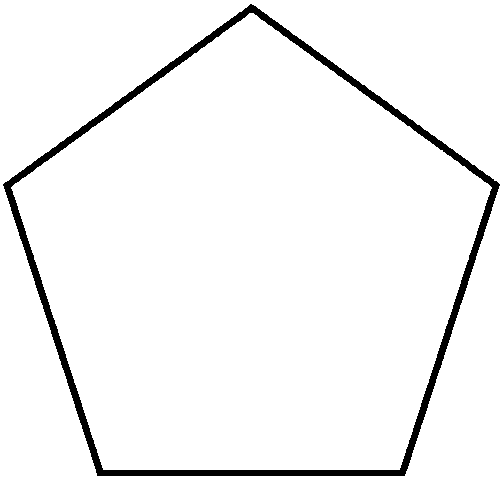
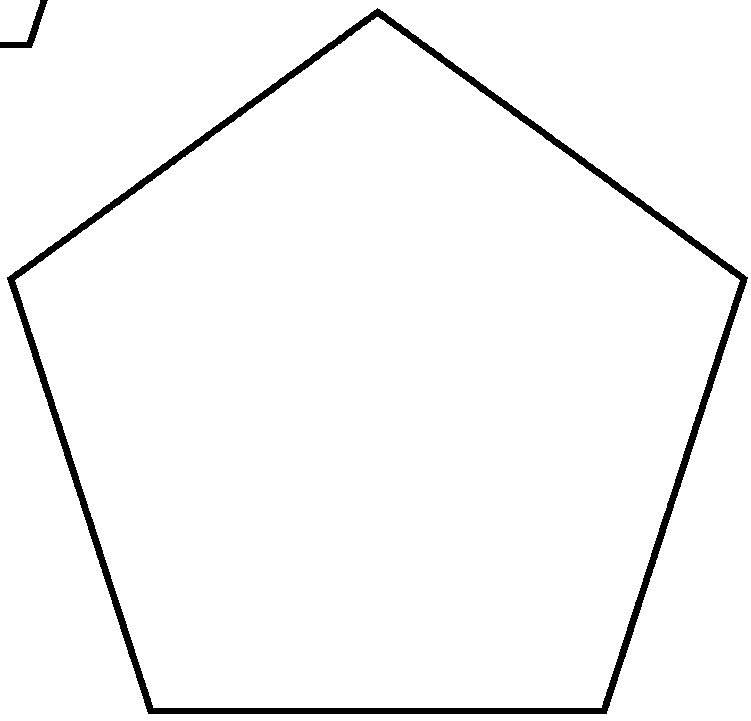
Regular Polygons











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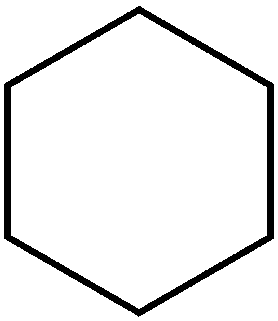

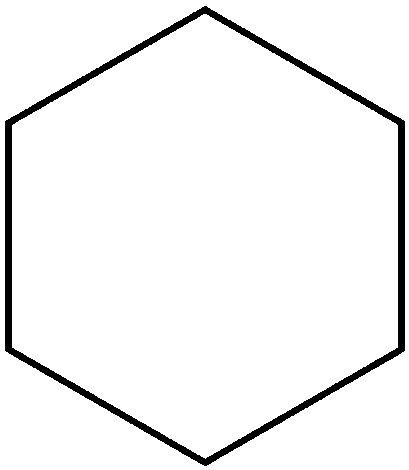

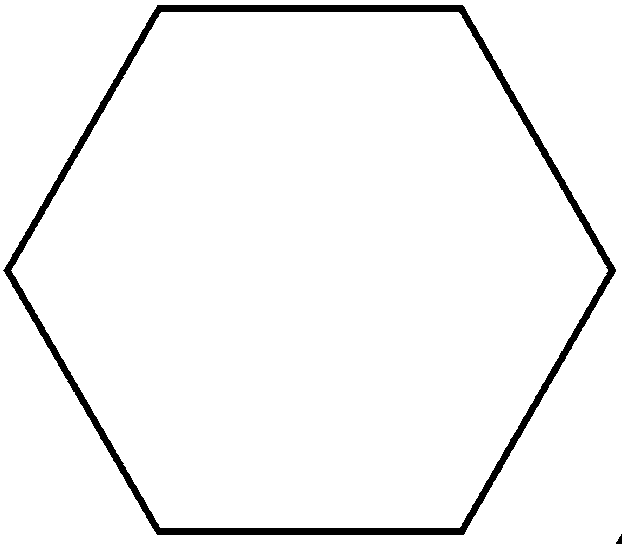

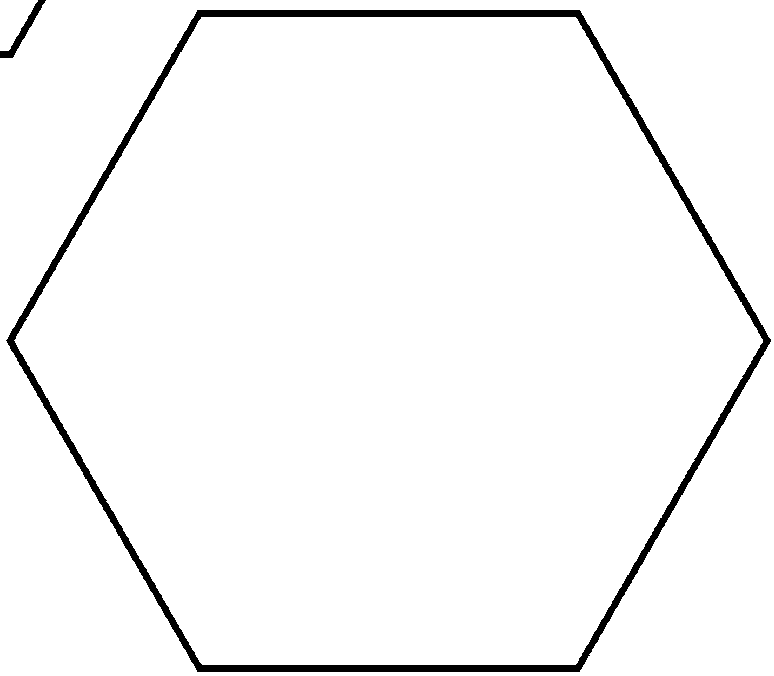

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