Unit 17: Scale Drawings & Bearings

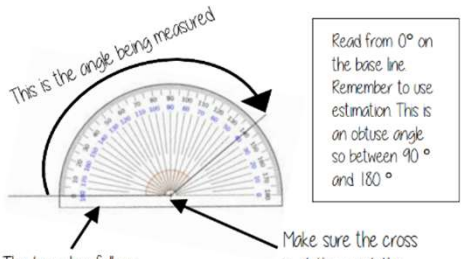
Shaw Education Trust | The Ormiston Academy

Knowledge Organiser - Mathematics

Key Words

- ***Bearing*** **– the angle in degrees measured clockwise from North.**
- ***Clockwise*** **– moving in the direction of the hands on a clock.**
- ***Construct*** **– to draw accurately using a compass, protractor, and/or a ruler or straight edge.**
- ***Parallel*** **– straight lines always the same distance apart and never touching; they have the same gradient.**
- ***Perpendicular*** **– where two lines meet at 90°**
- ***Protractor***- **an instrument used in measuring or drawing angles.**
- ***Scale*** **– the ratio of the length of a drawing to the length of the real thing.**

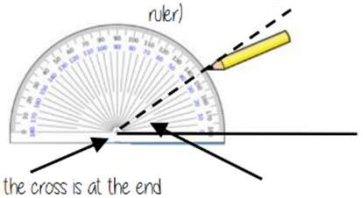
Measuring & Drawing Angles to 180°



Read from 0° on the base line. Remember to use estimation. This is an obtuse angle so between 90° and 180°

Draw a 35° angle

Make a mark at 35° with a pencil and join to the angle point (use a ruler)

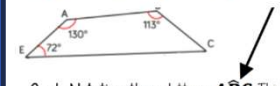


Scale Drawings

1:20 means for every 1 unit on a model/map there are 20 units in real life.
Scale drawings only change lengths and distances; angles remain the same.

Angle Notation

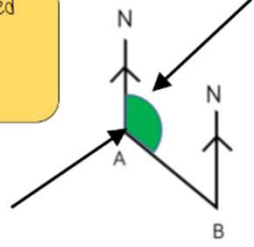
The letter in the middle is the angle
The arc represents the part of the angle



Angle Notation: three letters $A\hat{B}C$ This is the angle at B = 113°
$\angle ABC$ is also used to represent the angle at B

Bearings

- A bearing is always measured from NORTH
- It is always given as three figures



The angle indicated starts from the North line at A and joins the path connecting A to B

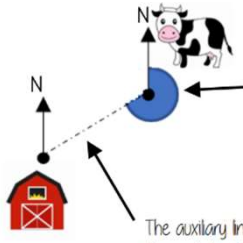
This angle shows the bearing of B from A

The bearing of B from A is calculated by measuring the highlighted angle

The sentence... "Bearing of ____ from _____" is really important in identifying the bearing being represented

Using estimation it is clear this angle is between 090° and 180°

Measuring & Reading Bearings



The bearing of the cow to the barn

This angle is measured from NORTH
It is measured in a clockwise direction
Estimation indicates this angle is between 180° and 270°
Use a protractor to measure accurately
Remember: bearings are written as three figures

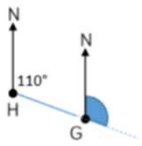
The auxiliary line is drawn to help you measure and draw the angle that is measured to represent the bearing

Directions

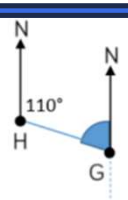
Clockwise Anti-Clockwise

Bearings with Angle Facts

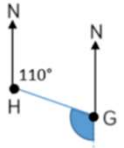
Since two North lines will be parallel to one another...



They form corresponding angles and therefore are the same size



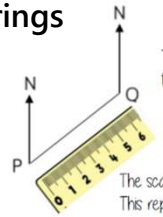
They form co-interior angles and add up to 180°



They form alternate angles and therefore are the same size

Scale Drawings Using Bearings

Remember – angles DO NOT change size in scaled drawings



The bearing measurements do not change from "real life" to images

The units in the ratio scale are the same

The scale may need to be calculated from the image
This represents 30km from P to Q

6cm = 30km
6:3,000,000

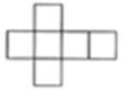
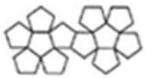
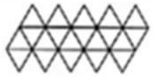
Unit 18: Plans & Elevations

Knowledge Organiser - Mathematics

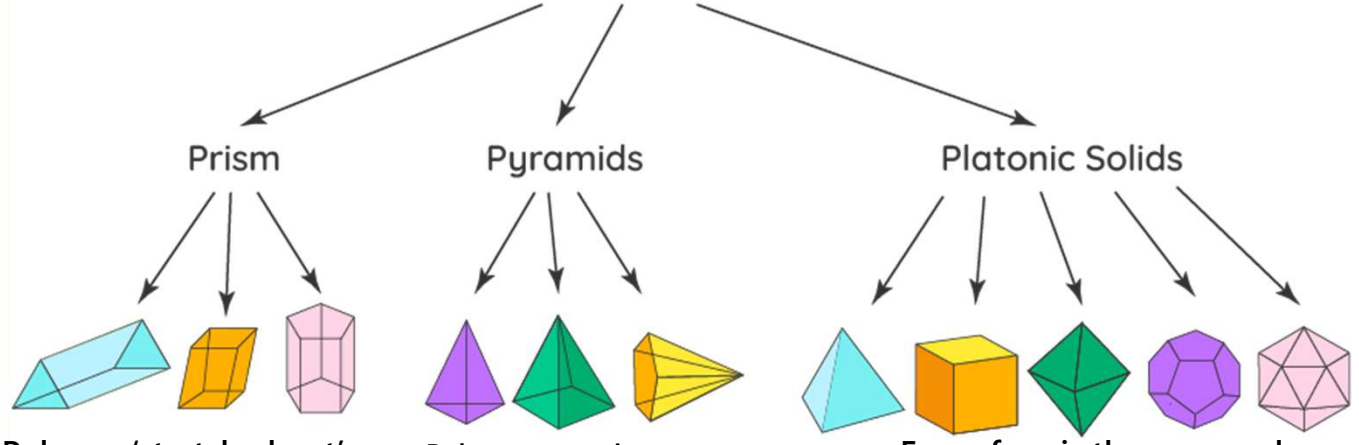
Key Words

- *Apex* – the top of a shape, especially one forming at a point
- *Edges* – the line segments that join one vertex to another
- *Elevation* – a scale drawing showing a 3D shape when it is looked at from either the side or the front.
- *Face* – the flat surface of a 3D shape
- *Plan* – a scale drawing showing a 3D shape when it is looked at from above (a 'bird's eye view')
- *Polygon* – a closed, straight-sided 2D shape (e.g., rectangle, triangle)
- *Polyhedron* – a 3D shape made from combining polygons together
- Vertices- corners (vertex if singular [1] and vertices if plural [multiple])

Identifying Edges, Faces, & Vertices (not a Complete List!)

	NAME	FACES	EDGES	VERTICES	PLANE NET
	tetrahedron	4	6	4	
	cube	6	12	8	
	octahedron	8	12	6	
	dodecahedron	12	30	20	
	icosahedron	20	30	12	

Polyhedrons

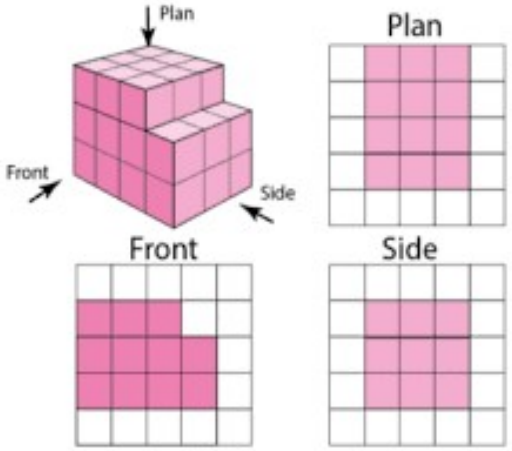


Polygon 'stretched out'

Polygons meeting at an apex

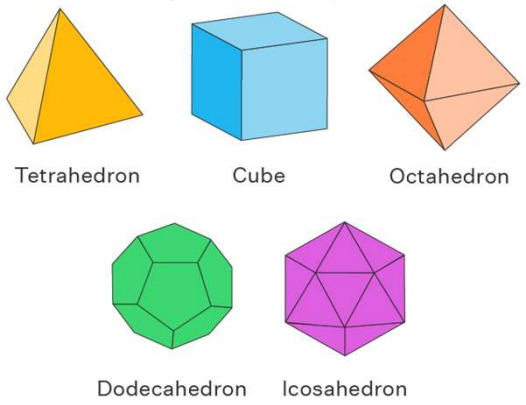
Every face is the same polygon

Plan & Elevations



When an architect designs a building, they will draw the plan and elevations of said building.

Platonic Solid Names



Unit 19&20 : Transformations, Similarity, & Congruence - Red indicates higher tier

Shaw Education Trust | The Ormiston Academy

Knowledge Organiser - Mathematics

Key Words

- *Congruent* – the same size and shape
- *Enlargement* – to change the size of a shape by a given scale factor
- *Invariance* – a property of a shape that remains unchanged following a transformation
- *Parallel* – straight lines that never meet (equal gradients)
- *Rotation* – to change the orientation of a shape
- *Reflection* – to create a flipped image of a shape along a line
- *Scale Factor* – the multiplier of an enlargement
- *Similarity* – two otherwise identical shapes differently sized
- *Transformations* – ways of changing shapes (i.e., enlargements, rotations, reflections, and translations)
- *Translation* – to change the position of a shape on a grid
- *Vector* – a coordinate-based expression for the distance moved during a translation

Transforming Graphs

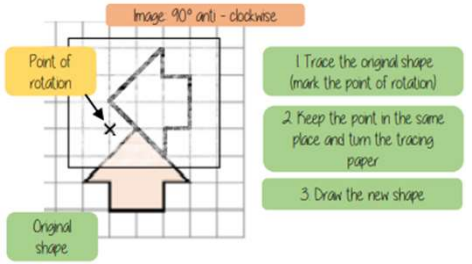
y = -f(x) is a reflection of y = f(x) in the x-axis (y-axis as mirror line).

y = f(-x) is a reflection of y = f(x) in the y-axis (x-axis as mirror line).

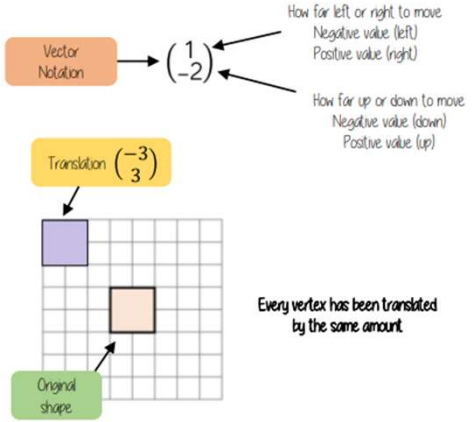
y = f(x) + b translates y = f(x) b squares upwards.

y = f(x + b) translates y = f(x) b squares to the left [counter-intuitive].

Rotation

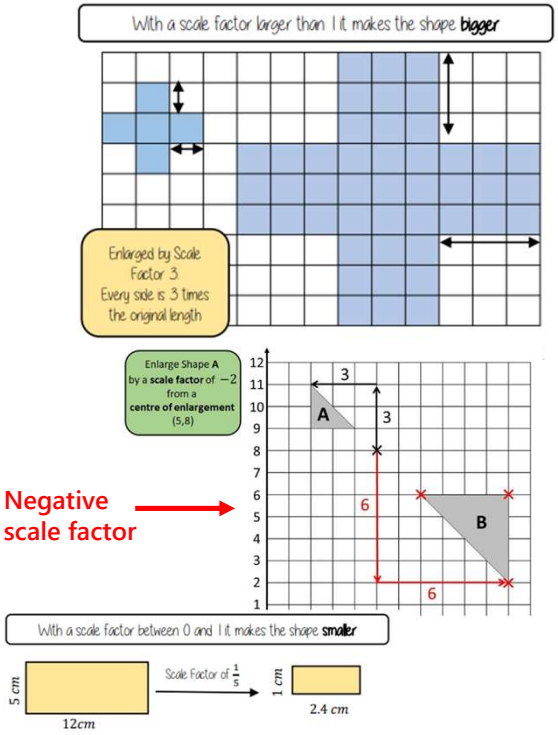


Translations



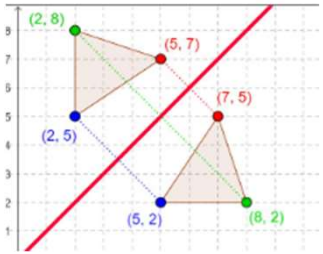
Ratio & Scale

Enlargement



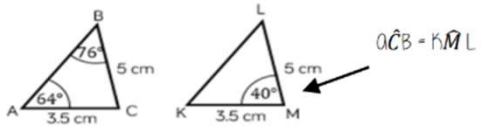
Reflection

Reflected along y = x

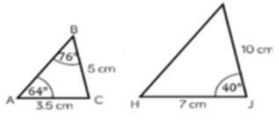


Congruence & Similarity

Congruent shapes are identical – all corresponding sides and angles are the same size



Because all the angles are the same and AC=KM BC=LM triangles ABC and KLM are **congruent**



Because all angles are the same, but all sides are enlarged by 2 ABC and HIJ are **similar**

Congruence in Triangles

Triangles are congruent if they satisfy any of the following conditions

Side-side-side

All three sides on the triangle are the same size

Angle-side-angle

Two angles and the side connecting them are equal in two triangles

Side-angle-side

Two sides and the angle in-between them are equal in two triangles (it will also mean the third side is the same size on both shapes)

Right angle-hypotenuse-side

The triangles both have a right angle, the hypotenuse and one side are the same

Angle Facts

Angles along a straight line add to 180°
Angles along a point add to 360°
Angles in a triangle add to 180°
Angles in quadrilaterals add to 360°
Vertically opposite angles add to 180°
a = c & b = d