

## Y10 Unit 2 Overview-Shape: Angles, construction and Measures

Test Window: 5<sup>th</sup> February 2018- 9<sup>th</sup> February 2018

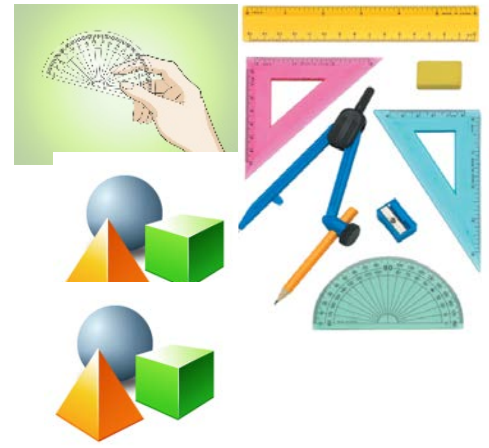
Target grade for tests:

You will learn about:

- 2D and 3D shapes.
- Angles.
- Reflection, rotation and translation.
- Units of measurement.
- Perimeter, Area and Volume.

You will be able to:

- Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries.
- Use the standard conventions for labelling and referring to the sides and angles of triangles.
- Draw diagrams from written description.
- Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres.
- Derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language
- Calculate angles at a point, angles at a point on a straight line, vertically opposite angles.
- Communicate your methods verbally, using a range of mathematical vocabulary.
- Rotate, reflect and translate shapes.
- Use and change between standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)
- Calculate perimeters of shapes.
- Know and apply formulae to calculate area of triangles, parallelograms and trapezia.
- Calculate surface area and volume of cuboids.



### Lesson Overview

#### VISUALISING AND CONSTRUCTING

- Know the meaning of faces, edges and vertices.
- Use notation for parallel lines.
- Know the meaning of 'perpendicular' and identify perpendicular lines.
- Know the meaning of 'regular' polygons.
- Identify line and rotational symmetry in polygons.
- Use AB notation for describing lengths.
- Use  $\angle ABC$  notation for describing angles.
- Use ruler and protractor to construct triangles from written descriptions.
- Use ruler and compasses to construct triangles when all three sides known.

#### INVESTIGATING ANGLES

- Identify fluently angles at a point, angles at a point on a line and vertically opposite angles.
- Identify known angle facts in more complex geometrical diagrams.
- Use knowledge of angles to calculate missing angles in geometrical diagrams.
- Know that angles in a triangle total  $180^\circ$ .
- Find missing angles in triangles.
- Find missing angles in isosceles triangles.
- Explain reasoning using vocabulary of angles.

### Key Words

Refer to <http://studymaths.co.uk/glossary.php> for definitions of the key words

Edge, Face, Vertex (Vertices)

Plane

Parallel

Perpendicular

Regular polygon

Rotational symmetry

#### Notation

The line between two points A and B is AB

The angle made by points A, B and C is  $\angle ABC$

The angle at the point A is  $\hat{A}$

Arrow notation for sets of parallel lines

Dash notation for sides of equal length

Angle/ Degrees/ Protractor

Right angle/ Acute angle/ Obtuse angle

Reflex angle

Vertically opposite

Geometry, geometrical

#### Notation

Right angle notation/ Arc notation for all other angles

The degree symbol ( $^\circ$ )

## TRANSFORMATIONS

- Write the equation of a line parallel to the x-axis or the y-axis
- Draw a line parallel to the x-axis or the y-axis given its equation
- Identify the lines  $y = x$  and  $y = -x$
- Draw the lines  $y = x$  and  $y = -x$
- Carry out a reflection in a diagonal mirror line ( $45^\circ$  from horizontal)
- Find and name the equation of the mirror line for a given reflection
- Describe a translation as a 2D vector
- Understand the concept and language of rotations
- Carry out a rotation using a given angle, direction and centre of rotation
- Describe a rotation using mathematical language

## MEASURING AND UNITS

- Use a ruler to accurately measure line segments to the nearest millimetre
- Use a protractor to accurately measure angles to the nearest degree
- Convert fluently between metric units of length
- Convert fluently between metric units of mass
- Convert fluently between metric units of volume / capacity
- Convert fluently between units of time
- Convert fluently between units of money
- Solve practical problems that involve converting between units
- State conclusions clearly using the units correctly

## CALCULATING PERIMETER AREA AND VOLUME

- Recognise that the value of the perimeter can equal the value of area
- Use standard formulae for area and volume
- Find missing lengths in 2D shapes when the area is known
- Know that the area of a trapezium is given by the formula  $\text{area} = \frac{1}{2} \times (a + b) \times h$   
 $= \left(\frac{a+b}{2}\right)h = \frac{(a+b)h}{2}$
- Calculate the area of a trapezium
- Understand the meaning of surface area
- Find the surface area of cuboids (including cubes) when lengths are known
- Find missing lengths in 3D shapes when the volume or surface area is known

(Cartesian) coordinates

Axis, axes, x-axis, y-axis

Origin

Quadrant

Translation, Reflection, Rotation

Transformation

Object, Image

Congruent, congruence

Mirror line

Vector

Centre of rotation

### Notation

Cartesian coordinates should be separated by a comma and enclosed in brackets (x, y)

Vector notation  $\begin{pmatrix} a \\ b \end{pmatrix}$  where a = movement right and b = movement up

Length, distance

Mass, weight

Volume

Capacity

Metre, centimetre, millimetre

Tonne, kilogram, gram, milligram

Litre, millilitre

Hour, minute, second

Inch, foot, yard

Pound, ounce

Pint, gallon

Line segment

### Notation

Abbreviations of units in the metric system: m, cm, mm, kg, g, l, ml

Abbreviations of units in the Imperial system: lb, oz

Perimeter, area, volume, capacity, surface area

Square, rectangle, parallelogram, triangle, trapezium (trapezia)

Polygon

Cube, cuboid

Square millimetre, square centimetre, square metre, square kilometre

Cubic centimetre, centimetre cube

Formula, formulae

Length, breadth, depth, height, width

### Notation

Abbreviations of units in the metric system: km, m, cm, mm, mm<sup>2</sup>, cm<sup>2</sup>, m<sup>2</sup>, km<sup>2</sup>, mm<sup>3</sup>, cm<sup>3</sup>, km<sup>3</sup>

## Suggested reading or support/ challenge available

Support is available from a Maths teacher in 'MORALE' in M1 daily from 1:30pm -1:45pm

[www.mymaths.co.uk](http://www.mymaths.co.uk)

login: penryn

password:

[www.doddlelearn.co.uk](http://www.doddlelearn.co.uk)

See your teacher for your personal login details

## Cross curricular

SMSC:

- 1.1 Exploring, understanding and respecting cultural diversity e.g. exploration of different methods of multiplication (Chinese, Russian).
- 3.1 Developing personal qualities and using social skills (regular paired/ group work communication).
- 3.2 Participating, cooperating and resolving conflicts (paired/group activities).
- 4.2 Experiencing fascination, awe and wonder of mathematics.
- 4.4 Using imagination and creativity in learning.

**Mathswatch App (video clips and worksheets)**

school id: penryn

login: school username

password: octagon

**Use your revision guide**

Use the code in the front of your guide to access your free online revision

**[www.justmaths.co.uk/online](http://www.justmaths.co.uk/online)**

login: PenrynStudent

password: Penryn

*Literacy:*

Verbal communication of understanding using key words in the correct context. Development of written communication of methods and strategies to problem solve.

*NAC:*

**Science** – Mathematical names of 3-D shapes. Make simple 3-D models from nets. Recognise 2-D representations of 3-D shapes. Use co-ordinates in the first quadrant. Understand angle as a measure of turn. Measure and draw angles. Know and use the formula for the area of a rectangle.

**Technology**- Make simple 3-D models from nets.

**Art** – Mathematical names of 3-D shapes. Identify all the symmetries of 2-D shapes.