

## Y11 Unit 2 Overview-**Algebra and Shape**:

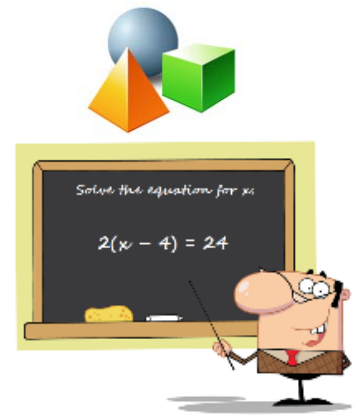
### Target grade for tests:

### You will learn about:

- Algebraic inequalities
- Construction
- Circles
- Pythagoras' theorem
- Trigonometry

### You will be able to:

- Understand and use the concepts and vocabulary of inequalities and solve inequalities.
- Represent the solution set to an inequality on a number line.
- Use a ruler and compasses to construct: perpendicular bisector of a line segment, perpendicular to a given line from/at a given point, angle bisector and use these to solve loci problems.
- Construct plans and elevations of 3D shapes.
- Identify and apply circle definitions and properties, including: tangent, arc, sector and segment.
- Calculate arc lengths, angles and areas of sectors of circles.
- Calculate surface area of right prisms (including cylinders).
- Calculate exactly with multiples of  $\pi$ .
- Use Pythagoras' theorem.



### Lesson Overview

#### SOLVING EQUATIONS AND INEQUALITIES

- Understand the meaning of the four inequality symbols
- Choose the correct inequality symbol for a particular situation
- Represent practical situations as inequalities
- Recognise a simple linear inequality
- Find the set of integers that are solutions to an inequality
- Use set notation to list a set of integers
- Use a formal method to solve an inequality
- Use a formal method to solve an inequality with unknowns on both sides
- Use a formal method to solve an inequality involving brackets
- Know how to deal with negative number terms in an inequality
- Know how to show a range of values that solve an inequality on a number line
- Know when to use an open circle or filled circle at the end of a range of values shown on a number line
- Use a number line to find the set of values that are true for 2 inequalities

#### VISUALISING AND CONSTRUCTING

- Use compasses to construct clean arcs
- Use ruler and compasses to construct the perpendicular bisector of a line segment
- Use ruler and compasses to bisect an angle
- Use a ruler and compasses to construct a perpendicular to a line from a point (at a point)
- Understand the meaning of locus (loci)
- Know how to construct the locus of points a fixed distance from a point (from a line)
- Identify when to use the locus of points a fixed distance from a point (from a line)

### Key Words

#### Refer

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

(Linear) inequality  
Unknown  
Manipulate  
Solve  
Solution set  
Integer

#### Notation

The inequality symbols: < (less than), > (greater than),  $\leq$  (less than or equal to),  $\geq$  (more than or equal to)  
The number line to represent solutions to inequalities. An open circle represents a boundary that is not included. A filled circle represents a boundary that is included.  
Set notation; e.g.  $\{-2, -1, 0, 1, 2, 3, 4\}$

Compasses  
Arc  
Line segment  
Perpendicular  
Bisect  
Perpendicular bisector  
Locus, Loci  
Plan  
Elevation

#### Notation

- Identify when a perpendicular bisector is needed to solve a loci problem
- Identify when an angle bisector is needed to solve a loci problem
- Choose techniques to construct 2D shapes; e.g. rhombus
- Combine techniques to solve more complex loci problems
- Know how to deal with a change in depth when dealing with plans and elevations
- Construct a shape from its plans and elevations
- Construct the plan and elevations of a given shape

#### INVESTIGATING PROPERTIES OF SHAPES

- Appreciate that the ratio of corresponding sides in similar triangles is constant
- Label the sides of a right-angled triangle using a given angle
- Choose an appropriate trigonometric ratio that can be used in a given situation
- Understand that sine, cosine and tangent are functions of an angle
- Establish the exact values of  $\sin\theta$  and  $\cos\theta$  for  $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$  and  $90^\circ$
- Establish the exact value of  $\tan\theta$  for  $\theta = 0^\circ, 30^\circ, 45^\circ$  and  $60^\circ$
- Know how to select the correct mode on a scientific calculator
- Use a calculator to find the sine, cosine and tangent of an angle
- Know the trigonometric ratios,  $\sin\theta = \text{opp/hyp}$ ,  $\cos\theta = \text{adj/hyp}$ ,  $\tan\theta = \text{opp/adj}$
- Set up and solve a trigonometric equation to find a missing side in a right-angled triangle
- Set up and solve a trigonometric equation to find a missing angle in a right-angled triangle
- Use trigonometry to solve problems involving bearings
- Use trigonometry to solve problems involving an angle of depression or an angle of elevation

#### CALCULATING SPACE

- Know the vocabulary of circles
- Know how to find arc length
- Calculate the arc length of a sector when radius is given
- Know how to find the area of a sector
- Calculate the area of a sector when radius is given
- Calculate the angle of a sector when the arc length and radius are known
- Know how to find the surface area of a right prism (cylinder)
- Calculate the surface area of a right prism (cylinder)
- Calculate exactly with multiples of  $\pi$
- Know Pythagoras' theorem
- Identify the hypotenuse in a right-angled triangle
- Know when to apply Pythagoras' theorem
- Calculate the hypotenuse of a right-angled triangle using Pythagoras' theorem
- Calculate one of the shorter sides in a right-angled triangle using Pythagoras' theorem

Bearings are always given as three figures; e.g.  $025^\circ$ .

Coordinates: separated by a comma and enclosed by brackets

Circle, Pi

Radius, diameter, chord, circumference, arc, tangent, sector, segment

(Right) prism, cylinder

Cross-section

Hypotenuse

Pythagoras' theorem

Similar

Opposite

Adjacent

Hypotenuse

Trigonometry

Function

Ratio

Sine

Cosine

Tangent

Angle of elevation, angle of depression

#### **Notation**

$\pi$

Abbreviations of units in the metric system:

km, m, cm, mm,  $\text{mm}^2$ ,  $\text{cm}^2$ ,  $\text{m}^2$ ,  $\text{km}^2$ ,  $\text{mm}^3$ ,

$\text{cm}^3$ ,  $\text{km}^3$

$\sin\theta$  stands for the 'sine of  $\theta$ '

$\sin^{-1}$  is the inverse sine function, and not  $1 \div \sin$

$\sin$

<p><b>Suggested reading or support/ challenge available</b></p> <p>Support is available from a Maths teacher in 'MORALE' in M1 daily from 1:30pm -1:45pm</p> <p><b>Pixl Maths App</b>  login: PY2415  username: surname followed by first initial  password: first name</p> <p><a href="http://www.doddlelearn.co.uk">www.doddlelearn.co.uk</a>  See your teacher for your personal login details</p> <p><b>Mathswatch App (video clips and worksheets)</b>  school id: penryn  login: school username  password: octagon</p> <p><a href="http://www.corbettmaths.com">www.corbettmaths.com</a>  Perfect for revision. Including practice exam questions on specific topics and the "5-a-day"</p> <p><b>Use your revision guide</b>  Use the code in the front of your guide to access your free online revision</p> <p><a href="http://www.justmaths.co.uk/online">www.justmaths.co.uk/online</a>  login: PenrynStudent  password: Penryn</p>	<p><b>Cross curricular</b></p> <p><b>SMSC:</b>  1.1 Exploring, understanding and respecting cultural diversity e.g. exploration of different methods of calculation.  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.</p> <p><b>Literacy:</b>  Verbal communication of understanding using key words in the correct context.  Development of written communication of methods and strategies to problem solve.</p> <p><b>NAC:</b>  <b>Science</b> – Use formulae involving fractions, decimals or negative numbers (Y10, 11). Transform formulae. Be aware of common scientific formulae. Use simple formulae. Understand angle as a measure of turn. Measure and draw angles. Recognise 2-D representations of 3-D shapes. Make simple 3-D models from nets. Know and use the formula for the area of a rectangle. Calculate areas of sectors. Calculate lengths and areas in plane shapes. Use the formulae for the volume of a cuboid. Determine the locus of a moving object.  <b>Business</b> – Use formulae involving fractions, decimals or negative numbers (Y10, 11). Use simple formulae (Y11).  <b>Technology</b>- Make simple 3-D models from nets.</p>