

Year 10 stage 9.5 Unit 2 Overview- Algebra and Shape:

Test Date: WB 20th January, 2020.

Target grade for tests:

You will learn about:

- Compound measures.
- Algebraic manipulation.
- Algebraic inequalities
- Construction
- Circles
- Pythagoras' theorem

You will be able to:

- use compound units such as density and pressure
- change freely between compound units (e.g. density, pressure) in numerical and algebraic contexts
- know the difference between an equation and an identity
- simplify and manipulate algebraic expressions by expanding products of two binomials and factorising quadratic expressions of the form $x^2 + bx + c$, *EXTENSION: Factorise an expression involving the difference of two squares and factorise a quadratic expression of the form $ax^2 + bx + c$*
- argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments
- translate simple situations or procedures into algebraic expressions or formulae
- 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 π .
- Use Pythagoras' theorem.



Lesson Overview

PROPORTIONAL REASONING (cont from unit 1)

- Know the meaning of congruent (similar) shapes
- Identify congruence (similarity) of shapes in a range of situations
- Identify the info required to solve a problem involving similar shapes
- Finding missing lengths in similar shapes
- Understand why speed, density & pressure are known as compound units
- Know the definition of density (pressure, population density, speed)
- Solve problems involving density (pressure, speed)
- Convert between units of density

ALGEBRAIC PROFICIENCY: TINKERING

- Understand the meaning of an identity
- Multiply two linear expressions of the form $(x + a)(x + b)$
- Multiply two linear expressions of the form $(x \pm a)(x \pm b)$
- Expand the expression $(x \pm a)^2$
- Simplify an expression involving 'x²' by collecting like terms
- Identify when it is necessary to remove factors to factorise a quadratic expression
- Identify when it is necessary to find two linear expressions to factorise a quadratic expression
- Factorise a quadratic expression of the form $x^2 + bx + c$

Key Words

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

Key Words

Congruent, Congruence
Similar, Similarity
Compound unit
Density, Population density
Pressure

Notation

Kilograms per metre cubed is written as kg/m^3

Key Words

Inequality
Identity
Equivalent
Equation
Formula, Formulae
Expression
Expand
Linear
Quadratic
Algebraic Fraction

EXTENSION:

- Factorise an expression involving the difference of two squares
- Factorise a quadratic expression of the form $ax^2 + bx + c$
- Identify when it is necessary to find two linear expressions to factorise a quadratic expression

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 no. 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)
- 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

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 π
- 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

Difference of two squares

Binomial

Notation

The equals symbol '=' and the equivalency symbol '≅'

Key Words

Compasses

Arc

Line segment

Perpendicular

Bisect

Perpendicular bisector

Locus, Loci

Plan

Elevation

Notation

Bearings are always given as three figures; e.g. 025° .

Coordinates: separated by a comma and enclosed by brackets

Key Words

Circle, Pi

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

(Right) prism, cylinder

Cross-section

Hypotenuse

Pythagoras' theorem

Notation

π

Abbreviations of units in the metric system: km, m, cm, mm, mm^2 , cm^2 , m^2 , km^2 , mm^3 , cm^3 , km^3

Suggested reading or support/challenge available

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

Pixl Maths App

login: PY2415
username: surname followed by first initial
password: first name

www.mymaths.co.uk

login: penryn
password: octagon

www.corbettmaths.com

Perfect for revision. Including practice exam questions on specific topics and the "5-a-day"

<https://vle.mathswatch.co.uk/vle>

login eg 17jbloggs@penryn-college
password Penryn2016

Use your revision guide

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

www.hegartymaths.co.uk

See your teacher for your personal login details

<https://trockstars.com/login>

school: Penryn College

login: 1st 3letters 1st 3 letters

password: penryn

Cross curricular

SMSC:

- 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.

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 – Estimation. Round whole numbers and decimals. Order, add and subtract negative numbers. Use significant figures. Use standard form. Use formulae involving negative numbers. Use indices. Identify possible minimum and maximum values of an amount. Use a calculator efficiently. Rearranging formulae. Direct proportion. Compound measures.

Business – Use formulae involving negative numbers.

MFL – Mental and written calculations with whole numbers and decimals.

RE - Estimation.

PE - Round whole numbers and decimals. **Geography** - Estimation. Round whole numbers and decimals.

Research	
Note-making	
Group work & discussion	
Memorisation	
Precision & accuracy	
Independence	
Reflection	