

Y11 st 10.5 Unit 1 Overview

Test Date:

Target grade for tests:

You will learn about:

- Presenting and analysing data
- Solving Equations
- Congruency

You will be able to:

- Solve simultaneous equations
- Use graphs to solve equations
- Solve problems involving simultaneous equations
- Understand and use the concepts and vocabulary of inequalities
- Solve linear inequalities in one variable and represent the solution set on a number line
- Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)
- Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' Theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs



<p>Lesson Overview</p> <p><u>ANALYSING STATISTICS (cont from y10)</u></p> <ul style="list-style-type: none">• Know the meaning of the lower quartile and upper quartile• Find the quartiles for discrete data sets• Calculate and interpret the interquartile range• Construct and interpret a box plot for discrete data• Use box plots to compare distributions• Understand the meaning of cumulative frequency• Complete a cumulative frequency table• Construct a cumulative frequency curve• Use a cumulative frequency curve to estimate the quartiles for grouped continuous data sets• Use a cumulative frequency curve to estimate properties of grouped continuous data sets <p><u>SOLVING EQUATIONS</u></p> <ul style="list-style-type: none">• Understand that there are an infinite number of solutions to the equation $ax + by = c$ ($a \neq 0$, $b \neq 0$)• Understand the concept of simultaneous equations• Understand the concept of solving simultaneous equations by elimination*• Target a variable to eliminate• Decide if multiplication of one equation is required• Decide whether addition or subtraction of equations is required• Add or subtract pairs of equations to eliminate a variable• Find the value of one variable in a pair of simple simultaneous equations• Find the value of the second variable in a pair of simple simultaneous equations• Solve two linear simultaneous equations in two variables in very simple cases (no multiplication required)• Solve two linear simultaneous equations in two variables in simple cases (multiplication of both equations)• Derive and solve two simultaneous equations• Interpret the solution to a pair of simultaneous equations	<p>Key Words</p> <p>Refer to http://studymaths.co.uk/glossary.php for definitions of the key words</p> <p>Categorical data, Discrete data Continuous data, Grouped data Axis, axes Population Sample Cumulative frequency Box plot, box-and-whisker diagram Central tendency Mean, median, mode Spread, dispersion, consistency Range, Interquartile range Skewness</p> <p>Notation</p> <p>Correct use of inequality symbols when labelling groups in a frequency table</p> <p>Equation Simultaneous equation Variable Manipulate Eliminate Solve Derive Interpret</p>
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- Introduce to solving graphically (links to previous unit-plotting straight line graphs)

CONJECTURING

- Know the criteria for triangles to be congruent (SSS, SAS, ASA, RHS)
- Identify congruent triangles
- Use known facts to form conjectures about lines and angles in geometrical situations
- Use known facts to derive further information in geometrical situations
- Test conjectures using known facts
- Know the structure of a simple mathematical proof
- Use known facts to create simple proofs
- Explain why the base angles in an isosceles triangle must be equal
- Explain the connections between Pythagorean triples

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°
- Establish the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°
- 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 formula for the surface area of a sphere (curved surface area of a cone)
- Use Pythagoras' theorem to find lengths in a pyramid
- Find the surface area of a sphere (cone, pyramid)
- Identify how to find the surface area of a composite solid
- Solve practical problems involving the surface area of solids
- Know the formula for, and find the volume of a sphere (cone, pyramid)
- Identify how to find the volume of a composite solid
- Solve practical problems involving the volume of solids

EXPLORING FRACTIONS, DECIMALS AND PERCENTAGES

- Understand and use notation for recurring decimals
- Interpret a calculator display involving a recurring decimal
- Convert a fraction to a recurring decimal
- Recall the recurring decimal equivalents of ninths
- Convert a recurring decimal of the form $0.\dot{x}$, $0.\dot{x}\dot{y}$, $0.\dot{x}y\dot{z}$ to a fraction
- Convert a recurring decimal of the form $0.0\dot{x}$, $0.0\dot{x}\dot{y}$ to a fraction
- Use multipliers to calculate percentage increase and decrease.
- Calculate the original amount before a percentage increase or decrease.
- Recognise when a situation involves compound interest
- Set up a compound interest problem

Congruent, congruence
 Similar (shapes), similarity
 Hypotenuse
 Conjecture
 Derive
 Prove, proof
 Counterexample

Notation

Notation for equal lengths and parallel lines
 SSS, SAS, ASA, RHS
 The 'implies that' symbol (\Rightarrow)

Similar
 Opposite
 Adjacent
 Hypotenuse
 Trigonometry
 Function
 Ratio
 Sine
 Cosine
 Tangent
 Angle of elevation, angle of depression

Notation

$\sin\theta$ stands for the 'sine of θ '
 \sin^{-1} is the inverse sine function, and not $1 \div \sin$

(Composite) solid
 Sphere, Pyramid, Cone
 Perpendicular (height), (slant height)
 Surface area
 Volume

Notation

π
 Abbreviations of units in the metric system: km, m, cm, mm, mm², cm², m², km², mm³, cm³, km³

Fraction
 Mixed number
 Top-heavy fraction
 Percentage change, percentage increase, percentage increase
 Compound interest, Simple interest
 Terminating decimal, Recurring decimal

Notation

Dot notation for recurring decimals; e.g. $0.\dot{x}y\dot{z} = 0.xzyxzyxzyx \dots$ and $0.x\dot{y} = 0.xyyy \dots$

- Calculate the result of a repeated percentage change, including compound interest
- Set up a growth or decay problem
- Solve problems involving growth and decay

CONJECTURING WITH CIRCLE THEOREMS

- Know the conditions for creating a right angle with three points on the circumference of a circle
 - Know that 'the angle in a semicircle is a right angle' (and others – see pedagogical notes)
 - Form a conjecture from a geometrical situation
 - Set up a proof
 - Create a chain of logical steps to create a proof in a geometrical situation
 - Identify when a circle theorem can be used to help solve a geometrical problem
 - Use a combination of known and derived facts to solve a geometrical problem
- Justify solutions to geometrical problems

Note that other notations for recurring decimals are used, for example the vinculum, $0.\dot{x}y\dot{z} = 0.\overline{xyz}$ (USA); parentheses, $0.\dot{x}y\dot{z} = 0.(xyz)$ (parts of Europe); the letter 'R', $0.x^R$ (upper or lower case)

Radius, radii
Tangent
Chord
Theorem
Conjecture
Derive
Prove, proof
Counterexample
Notation
Notation for equal lengths and parallel lines
The 'implies that' symbol (\Rightarrow)

Suggested reading or support/ challenge available

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

Pixel Maths App

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

www.hegartymaths.com

Go to student login at the top... find your school, enter your details and then set up your password...

www.corbettmaths.com

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

<https://vle.mathswatch.com/vle/>

login: school username followed by @penryn-college
password: Penryn2016

Use your revision guide

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

www.justmaths.co.uk/online

login: PenrynStudent
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 – Solve problems using intersections or gradients of graphs. Plot graphs of quadratic (cubic, reciprocal) functions. Use relative frequency to estimate probability.

Geography – Use relative frequency to estimate probability.

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