

Year 10 stage 9.5 Unit 1 Overview-Number and Algebra:

Test window: 12th November 2018- 16th November 2018

Target grade for tests:

You will learn about:

- Powers, roots and positive and negative indices.
- Standard form.
- Rounding and accuracy.
- Compound measures.
- Direct and inverse proportion.
- Algebraic manipulation.

You will be able to:

- calculate with powers, roots, and with positive and negative indices
- *EXTENSION: calculate with integer and fractional indices and surds*
- calculate with standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer
- use inequality notation to specify simple error intervals due to rounding
- apply and interpret limits of accuracy *EXTENSION: including upper and lower bounds*
- solve problems involving direct and inverse proportion including graphical and algebraic representations
- *EXTENSION: interpret equations that describe direct and inverse proportion*
- apply the concepts of congruence and similarity, including the relationships between lengths in similar figures
- 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
- *EXTENSION: simplify and manipulate algebraic expressions involving algebraic fractions*



Lesson Overview

CALCULATING

- Calculate with positive indices (roots) using written methods
- Calculate with negative indices in the context of standard form
- Use a calculator to evaluate numerical expressions involving powers

EXTENSION:

- *Estimate squares and cubes of numbers up to 100; square roots to 150*
- *Estimate powers of numbers up to 10; cube roots of numbers up to 20*
- *Know that $a^0 = 1$*
- *Know that $a^{-n} = 1/a^n$*
- *Know that $a^{1/n} = \sqrt[n]{a}$*
- *Calculate with negative powers*
- *Calculate with fractional powers*
- *Calculate exactly with surds*
- *Use a scientific calculator when calculating with roots and powers*

- Interpret a number written in standard form
- Add (subtract) numbers written in standard form
- Multiply (divide) numbers written in standard form
- Convert a 'near miss' into standard form; e.g. 23×10^7
- Enter a calculation written in standard form into a scientific calculator
- Interpret the standard form display of a scientific calculator

Key Words

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

Power
Root
Index, Indices
Standard form
Inequality
Truncate
Round
Minimum, Maximum, Bound
Interval
Decimal place
Significant figure
Surd
Limit

Notation

Standard form: $A \times 10^n$, where $1 \leq A < 10$ and n is an integer
Inequalities: e.g. $x > 3$, $-2 < x \leq 5$

- Identify the minimum and maximum values of an amount that has been rounded (to nearest x, x d.p., x s.f.)
- Use inequalities to describe the range of values for a rounded value
- Solve problems involving the maximum and minimum values of an amount that has been rounded

EXTENSION:

- Calculate the upper and lower bounds in a given situation

PROPORTIONAL REASONING

- Know the difference between direct and inverse proportion
- Recognise direct (inverse) proportion in a situation
- Know the features of a graph that represents a direct (inverse) proportion situation

EXTENSION:

- Recognise a graph that illustrates direct or inverse proportion
- Interpret a graph that illustrates direct or inverse proportion
- Know the features of an expression (or formula) that represents a direct (inverse) proportion situation
- Understand the connection between the multiplier, the expression and the graph

EXTENSION:

- Understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$
- Interpret equations that describe direct or inverse proportion
- Solve problems which include finding the multiplier in a situation involving direct or inverse proportion

- 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 $x^2 + bx + c$

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
- Expand the product of two binomials involving surds

- Know how to set up a mathematical argument
- Work out why two algebraic expressions are equivalent
- Create a mathematical argument to show that two algebraic expressions are equivalent

Key Words

Direct proportion
Inverse proportion
Multiplier

Notation

\propto - 'proportional to'

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
Difference of two squares
Binomial

Notation

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

- Identify variables in a situation
 - Distinguish between situations that can be modelled by an expression or a formula
 - Create an expression or a formula to describe a situation
- EXTENSION:**
- Add (subtract, multiply, divide) algebraic fractions
 - Simplify an algebraic fraction
 - Identify when it is necessary to factorise the numerator and/or denominator in order to simplify an algebraic fraction
 - Simplify an algebraic fraction that involves factorisation

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

www.corbettmaths.com

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

Use your revision guide

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

Mathswatch App (video clips and worksheets)

school id: penryn
login: school username

www.justmaths.co.uk/online

login: PenrynStudent

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.