

## Year 11 Unit 1 Overview-Number and Algebra:

### 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.

### You will be able to:

- calculate with powers, roots, and with positive and negative indices
- 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
- solve problems involving direct and inverse proportion including graphical and algebraic representations
- 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  $x^2 + bx + c$
- 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



### 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
- 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.  $23 \times 10^7$
- Enter a calculation written in standard form into a scientific calculator
- Interpret the standard form display of a scientific calculator
- 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

#### 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
- 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
- Know the meaning of congruent (similar) shapes

#### Lesson Overview Continued

#### PROPORTIONAL REASONING

### 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  
Interval  
Decimal place  
Significant figure

#### **Notation**

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

#### **Key Words**

Direct proportion  
Inverse proportion  
Multiplier  
Linear  
Congruent, Congruence  
Similar, Similarity  
Compound unit  
Density, Population density  
Pressure

#### **Notation**

Kilograms per metre cubed is written as  $\text{kg/m}^3$

- 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 'x<sup>2</sup>' 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  $x^2 + bx + c$
- Know how to set up an mathematical argument
- Work out why two algebraic expressions are equivalent
- Create a mathematical argument to show that two algebraic expressions are equivalent
- 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

**Key Words**

- Inequality
- Identity
- Equivalent
- Equation
- Formula, Formulae
- Expression
- Expand
- Linear
- Quadratic

**Notation**

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

**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.hegartymaths.com](http://www.hegartymaths.com)

**[www.corbettmaths.com](http://www.corbettmaths.com)**

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

[vle.mathswatch.com/vle](http://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](http://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** –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 and accuracy	Independence	Reflection

