Belfairs Academy
Mathematics Fundamentals Year 10

H – denotes studied by Higher Tier Students only

General Skills
Cognitive skills ● Non-routine problem solving – expert thinking, metacognition, creativity. ● Systems thinking – decision making and reasoning. ● Critical thinking – definitions of critical thinking are broad and usually involve general cognitive skills such as analysing, synthesising and reasoning skills. ● ICT literacy - access, manage, integrate, evaluate, construct and communicate.
Interpersonal skills ● Communication – active listening, oral communication, written communication, assertive communication and non-verbal communication. ● Relationship-building skills – teamwork, trust, intercultural sensitivity, service orientation, self-presentation, social influence, conflict resolution and negotiation. ● Collaborative problem solving – establishing and maintaining shared understanding, taking appropriate action, establishing and maintaining team organisation
Intrapersonal skills ● Adaptability – ability and willingness to cope with the uncertain, handling work stress, adapting to different personalities, communication styles and cultures, and physical adaptability to various indoor and outdoor work environments. ● Self-management and self-development – ability to work remotely in virtual teams, work autonomously, be self-motivating and self-monitoring, willing and able to acquire new information and skills related to work.

Knowledge
Ratio and fractions • Use ratios, including with mixed units • Fractions in ratios • Combining ratios • Unit pricing ("best buys") • Currency conversions • **Revise area and volume ratios (H)**
Percentages and interest • Convert fractions, decimals and percentages • Find percentages and percentage changes • Find one number as a percentage of another • Calculate simple and compound interest • Evaluate exponential change e.g. depreciation • Find original values • **Use iterative methods (H)**
Probability • Review of single event probability – comparing theoretical and experimental • Understand and work with mutually exclusive and independent events • Construct and interpret tree diagrams • Find probabilities from frequency trees, tables and Venn diagrams • **Calculate and interpret conditional probabilities (H)**
Congruence, similarity and enlargement • Understand the difference between congruence and similarity • Enlarge a shape about a given point; understand and use similarity • Find missing sides in similar shapes including pairs of similar triangles • Understand and use the conditions for a pair of congruent triangles • **Area and volume of similar shapes (H)** • **Formal proof of congruency of triangles (H)** • **Enlarge a shape by a negative scale factor (H)**
Pythagoras and Trigonometry • Calculate the missing sides in right angled triangles • Understand trigonometric ratios • Work out missing lengths and angles in right-angled triangles • Know and use the exact values of key angles • **3D Pythagoras (H)** • **Use trigonometry in 3-D shapes (H)** • **Derive and use the sine and cosine rules (H)** • **Use the formula ½ absinC to find the area of non-right angled triangles (H)**

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Representing solutions of equations and inequalities
- Form and solve equations and inequalities in a variety of contexts, including with unknowns on both sides
- Represent solutions to inequalities on a number line
- Represent solutions to equations graphically
- **Use set notation for solutions (H)**
- **Solve inequalities in two variables, identifying regions (H)**
- **Solve quadratic equations and inequalities (by factorisation only) (H)**

Simultaneous equations
- Understand the meaning of a solution, appreciating that some equations have multiple solutions
- Form and solve a pair of simultaneous equations graphically
- Form and solve a pair of simultaneous equations algebraically
- **Solve simultaneous equations with one linear and one quadratic (H)**

Index laws
- Understand and apply index laws for algebraic expressions.
- Evaluate values using index laws

Angles and bearings
- Review Year 7 to 9 angles rules
- Understand and use bearings

Working with circles
- Review area and circumference
- Name parts of a circle and perform related calculations
- Find areas and volumes related to circles – cylinder, cone, sphere etc.
- **Derive, use and prove the first four circle theorems (the rest taught in Y11) (H)**
- **Understand and use the equation of a circle (H)**

Vectors
- Understand vector notation
- Vector arithmetic – addition, subtraction and multiplication by a scalar
- Vectors and translations
- **Construct geometric proofs with vectors (H)**

Collecting, representing and interpreting data
- Understand sampling, including the possible limitations
- Construct and interpret tables and line graphs for time series data
- Understand and represent with grouped data
- Understand and identify correlation
- Use lines of best fit, understanding the dangers of extrapolation
- Construct and interpret frequency polygons
- Evaluate measures of location and dispersion
- Use statistical diagrams and measures to compare distributions
- **Construct and interpret cumulative frequency diagrams, box-plots and histograms (H)**
- **Understand quartiles; use and interpret the inter-quartile range (H)**

Standard Form and Surds
- Convert between ordinary numbers and standard form
- Calculate in standard form
- **Calculate with surds (H)**

Number
- Use factors, multiples, primes and prime factorisation
- Operations with fractions
- Operations with decimals
- **Error intervals and bounds (H)**

Types of sequences
- Recognise arithmetic sequences
- Recognise and use other sequences (e.g. Fibonacci or geometric)
- **Find the rule for the nth term of a quadratic sequence (H)**
- **Use rule for geometric sequences (H)**

Compound Measures
- Work with speed, distance, time
- Solve problems involving density
- Work with compound units
- **Converting compound measures (H)**