

GCSE Linear

Targeting Grade A*

Notes

- This scheme of work relates to the [AQA GCSE Specification 8300](#).
- It is aimed at classes that will fast-track their GCSE, completing the course contact by the November of Year 11. The GCSE examination will be sat in the summer of Year 11.
- The changes required to incorporate the new GCSE are shown in blue.

Update History

Date	Author	Details
July 2013	ACH	Document first written.
July 2014	ACH	GCSE grades included for each topic. Additional resources added, such as maths loop cards and further problem cards. Overview updated to include a link to the AQA GCSE specification and to reflect that the examination has to be sat at the end of Year 11.
August 2014	ACH	Moved some harder Year 11 topics to the start of Year 10 (3D Pythagoras & trig) and moved some harder Year 10 topics to earlier in the Year 10 (Lower & upper bound, Proportionality).
June 2015	ACH	Include solving quadratic/linear simultaneous equations that had been left out.
June 2015	ACH	Topics for new GCSE incorporated. <i>New topics are shown in blue.</i> Stem & leaf, linear sequences (from Year 9), measuring scales, estimating measures, dimensional analysis, questionnaires removed and Yr10 grade 3 / 4 review topics removed or condensed. In addition, types of quadrilaterals & symmetry, velocity/time graphs, density, linear inequalities, sequences, histograms moved. Add new grades to each topic where identified.
August 2016	ACH	Include the new National Curriculum.

The National Curriculum

The National Curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately,
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language,
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

GCSE Grade Conversion

The table below shows how the new GCSE grades will relate to the current GCSE grades:

Current GCSE Grade	New GCSE Grade	Notes
A*	9	Grade 9 is the top 20% of students getting grades 7, 8, 9.
	8	
A	7	The bottom of grade 7 is equivalent to the bottom of grade A.
B	6	Grade 5 is equivalent to the bottom third of grade B and the top third of grade C.
	5	
C	4	The bottom of grade 4 is equivalent to the bottom of grade C.
D	3	The new benchmark for an acceptable GCSE in mathematics is likely to be grade 5.
E	2	
F		
G	1	The new Foundation paper will go from grades 5 down to 1.

Order of Topics

		Topic
**		**START OF GCSE COURSE** **START OF YEAR 9**
1Y9	N4.1 N4.2 N5.1 N5.6	Algebraic Expressions (B/C/D) Being able to use algebraic notation (3). Distinguish the meaning of ‘expression’, ‘identify’, ‘equation’ and formula (3). Simplifying algebraic expressions (3), expanding single (3), double brackets (4) and factorising into a single bracket (4). Algebraic substitution (3/4).
2Y9	N1.6	Multiples, factors and powers (C/D) Understand multiples, factors, primes, powers (3). Use prime factor decomposition (4). Find the HCF and LCM of numbers (5). Apply systematic listing strategies including use of the product rule for counting.
3Y9	N1.5 N2.1 N2.2 N2.6 N2.7	Fractions (C/D) Finding a fraction of a quantity, ordering fractions and simplifying fractions (3). Adding, subtracting & multiplying fractions (4). Understanding reciprocals and dividing fractions (4).
4Y9	N2.3 N1.5 N2.4	Fractions, decimals, percentages (A/C/D) Converting fractions, decimals, percentages (3). Ordering fractions, decimals, percentages (4). Converting recurring decimals to fractions (7).
5Y9	N1.2 N1.1 N1.3	Mental and written calculations (C/D) Add, subtract, multiply and divide both integers and decimals. Add, subtract, multiply & divide negative numbers (3). Use a known calculation to work out related calculations, including inverse operations.

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		Topic
6Y9	N5.4	Solving linear equations (B/C/D) Solving equations with unknowns on one side, unknowns on both sides (3), brackets (4) and fractions (5). Forming, then solving linear equations (4).
**		**HALF TERM **
7Y9	N5.6	Changing the subject (B/C) Re-arranging equations where the new subject appears once (5).
8Y9	S3.3 S3.2 S4.1	Distributions (C/D) Calculate averages and range of discrete data (3). Calculate averages from frequency table (4) and grouped frequency table (5). Construct frequency polygon for continuous data. Being able to interpret and construct pie charts.
9Y9	N2.5 N2.6 N2.7	Percentage Increase and decrease (B/C/D) Finding a percentage of a quantity and one quantity as a percentage of another (3). Calculate percentage increase and decrease (4), profit & loss, compound interest (5) and reverse percentages (5).
10Y9	G4.1 G4.3 G4.4 G3.7 G3.4	Area, perimeter and volume (A/B/C/D) Area & perimeter of parallelograms (3), triangles (3), trapeziums (4), circles (4) and compound shapes (4). Calculating the length of an arc and the area of a sector (6). Volume (4) and surface area (5) of prisms. Converting between different metric units of length, area and volume (4).
11Y9		Compound Measures Calculate compound measures, including density and pressure (4).

		Topic
12Y9	G1.4 G1.6	Quadrilaterals and Symmetry (D) Identifying and using the properties of quadrilaterals (3). Reflective symmetry and order of rotational symmetry.
**		**CHRISTMAS YEAR 9**
13Y9	N1.3 N1.14 N1.4	Using a calculator and approximations (C/D) Using BODMAS for order of operations (3). Using a calculator for complex calculations. Rounding to decimal places (3) and significant figures (3), and estimating calculations (4). Use inequality notation to specify simple error intervals due to truncation or rounding. Estimating square roots (5).
14Y9	G1.1 G1.2 G1.3 G3.8	Angle rules (C/D) Use basic angle rules; angles on straight line, angles at a point, vertically opposite angles (3). Identify angles on parallel lines (3). Interior and exterior angles of polygons (3).
15Y9	G2.1 G1.8 G2.2	Pythagoras, similarity & trigonometry (B/C) Use Pythagoras Theorem to find the lengths of unknown sides in right-angled triangles (4). Find the mid-point and length of a line segment (5). Understanding properties of similar shapes. Using similar triangles to calculate lengths of unknown sides (6). Calculating unknown sides and angles of right-angled triangles using sine, cosine and tangent. (6/7). Know the exact values of $\sin\theta$ and $\cos\theta$ and $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° (7).

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		Topic
16Y9	N6.12	<p>Speed, distance, time, real graphs, rates (C/D) Calculating using speed, distance and time (3). Constructing and interpreting (gradient gives velocity) distance, time graphs for constant velocity (3). Constructing and interpreting other real life graphs, including rate being the gradient of a linear graph (5). Solving problems involving rate of change.</p>
**		**HALF TERM**
17Y9	N5.2 N5.5	<p>Removing brackets and factorising (A/B) Factorising quadratic expressions, of the form ax^2+bx+c, including the difference of two squares (5/7). Solving quadratic equations by factorising (5/7).</p>
18Y9	N5.8	<p>Trial & Improvement (C) Solve equations by trial & improvement.</p>
19Y9	N1.8 N1.9	<p>Indices (A*/A/B/C) Understanding index notation. Multiplying, dividing and raising one power to another power (5). Understanding and using negative indices (7). Being able to evaluate fractional indices (7).</p>

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		Topic
20Y9	N1.10	Standard Form (B) Writing very large and small numbers in standard form (4). Performing calculations with numbers in standard form (5).
21Y9	N6.3 N6.4 N6.5 N6.6	Gradient and equations (A/B/C) Draw graphs of functions by plotting co-ordinates. Calculate and use gradient (3). Determine equation of straight line graphs (4). Equation of parallel (5) and perpendicular lines (7). Equation of line between two points (5).
**		**EASTER YEAR 9**
22Y9	N6.7 N5.4	Simultaneous equations (B) Solving simultaneous equations graphically. Solving simultaneous equations by elimination and substitution (5). Forming, then solving simultaneous equations (5).
23Y9	S5.1 S5.3 S5.4 S5.2 S5.7 S5.8 S5.9	Basic Probability (C/D) Understanding the language of probability and calculating probability using equally likely outcomes (3/4). Estimating probability using relative frequency and compare experimental probability to theoretical probability (4). Understand impact of different sample sizes. Record, describe and analyse probability experiments using tables and frequency trees (4).

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		Topic
24Y9	S5.5 S5.6	Combining Probabilities / Tree Diagrams (A*/A/B) Calculating probability for mutually exclusive, independent and dependent events (6). Representing probabilities, including conditional probabilities, using tree diagrams (7), two-way tables, sets and Venn diagrams (7) .
**		**HALF TERM ** **YEAR 9 EXAMS**
25Y9	G3.1 G3.6	Maps and plans (C/D) Use and construct scale drawings. Understanding and using bearings (3).
26Y9	G3.9 G3.10 G3.11	Loci and constructions (C/D) Constructing triangles using protractor, compass & ruler (3). Performing compass and straight edge constructions, including an angle of 60° (4) . Know that the perpendicular distance from a point to a line is the shortest distance to the line.
**		**END OF YEAR 9 **

		Topic
**		**START OF YEAR 10**
1Y10	<p>G2.1</p> <p>G1.8</p> <p>G2.2</p>	<p>Similarity & trigonometry (B/C) <i>Understanding properties of similar shapes. Using similar triangles to calculate lengths of unknown sides (6). Calculating unknown sides and angles of right-angled triangles using sine, cosine and tangent (6/7).</i></p> <p><i>Know the exact values of $\sin\theta$ and $\cos\theta$ and $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°.</i></p>
2Y10	<p>G2.2</p>	<p>Pythagoras & trigonometry in 3 dimensions (A*/A) Use Pythagoras and Trigonometry to solve problems in three dimensions (7/8).</p>
3Y10	<p>N4.1</p> <p>N4.2</p> <p>N5.6</p> <p>N5.4</p>	<p>Basic Algebra Review (B/C/D) <i>Simplifying algebraic expressions (3), expanding single (3) & double brackets (4) and factorising into a single bracket (4). Solving equations with unknowns on one side, unknowns on both sides (3), brackets (4) and fractions (5).</i></p>
4Y10		<p>Expand Triple Brackets Be able to expand triple brackets (7).</p>
5Y10	<p>N2.3</p> <p>N1.5</p> <p>N2.4</p>	<p>Fractions, decimals, percentages Review (A/C/D) <i>Converting fractions, decimals, percentages (3). Ordering fractions, decimals, percentages (4). Converting recurring decimals to fractions (7).</i></p>

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		Topic
6Y10	N2.6 N2.7	Percentage Increase and decrease Review (B/C/D) <i>Calculate percentage increase and decrease (4), profit & loss, compound interest (5) and reverse percentages (5).</i>
7Y10	G1.7	Transformations (A/C/D) Perform and fully describe translations, reflections and rotations (3). Enlarge shapes using centre of enlargement and both positive (4) and negative scale factors (6). <i>Describe the changes and invariance achieved by combinations of rotations, reflections and translations.</i>
**		**HALF TERM**
8Y10	G2.4	3D-Vision (C/D) Representing 3D shapes using isometric drawings, nets and 2D front, side and plan views (3). Identifying planes of symmetry in 3D solids (3).
9Y10	N3.1 N3.2 N3.3	Ratio and the unitary method (C/D) Simplifying ratios and converting between ratios, fractions and percentages (3). Sharing quantities in a given ratio (4). Solving problems using the unitary method, including value for money comparisons (4).
10Y10	N3.3	Direct and inverse proportion (A/B) Identify direct and indirect proportion. Perform calculations involving direct and inverse proportionality (7). <i>Recognise and interpret proportionality graphs (7).</i>

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		Topic
11Y10	N1.3	Accuracy (A/B) Finding the lower and upper bound of rounded numbers (5). Calculating using the lower and upper bound (7). Calculate absolute and percentage error.
12Y10	S3.3 S3.2	Distributions Review (C/D) <i>Calculate averages and range of discrete data (3).</i> <i>Calculate averages from frequency table (4) and grouped frequency table (5).</i> <i>Construct frequency polygons for continuous data.</i>
13Y10		Time Series Calculate moving averages (6).
14Y10	S3.2 S4.4	Cumulative Frequency (B) Constructing a cumulative frequency table for continuous data and drawing cumulative frequency graphs (6). Finding the median and quartiles for both discrete and continuous data (6). Constructing and comparing box & whisker plots (6).
**		**CHRISTMAS YEAR 10**
15Y10	S3.2 S4.2 S4.3	Scatter Diagrams (C/D) Constructing scatter graphs for paired data (3). Identifying types of correlation and possible pieces of ‘rogue’ data (3). Draw a line of best fit and using it for predicting data values (4).

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16Y10	N6.12	<i>Speed, distance, time Review (C/D)</i> <i>Calculating using speed, distance and time (3).</i> <i>Constructing and interpreting (gradient gives velocity) distance, time graphs for constant velocity (3).</i>
17Y10	N6.12	<i>Velocity Time, real graphs, rates Review Graphs (A)</i> Constructing and interpreting velocity, time graphs for both constant & non-constant acceleration - gradient gives acceleration (6), area under curve gives displacement (9). <i>Solving problems involving rate of change.</i> <i>Interpret the gradient of a straight-line graph as a rate of change. Interpret the gradient at a point on a curve as the instantaneous rate of change (8) and apply the concepts of average rate of change to the gradient of the chord to a curve (7).</i>
18Y10	G4.1 G4.3 G4.4 G3.7 G3.4	<i>Area, perimeter and volume Review (A/B/C/D)</i> <i>Area & perimeter of parallelograms (3), triangles (3), trapeziums (4), circles (4) and compound shapes (4).</i> <i>Calculating the length of an arc and the area of a sector (6).</i> <i>Volume (4) and surface area (5) of prisms.</i> <i>Converting between different metric units of length, area and volume (4).</i>
19Y10		<i>Compound Measures Review</i> <i>Calculate compound measures, including density and pressure (4).</i>

		Topic
20Y10	G4.5	<p>Length, area volume and enlargement (A/B) Calculating the volume and surface area of pyramids (including frustums-6), cones (5) and spheres (5). Calculate rates of flow in/out of containers (8). Using scale factors for surface area and volume for enlargement of similar solids.</p>
**		**HALF TERM**
21Y10	N6.5 N6.6	<p>Gradient and equations Review (A/B/C) Determine equation of straight line graphs (4). Equation of parallel and perpendicular lines (7). Equation of line between two points (5).</p>
22Y10	N6.8 N6.13 N6.7	<p>Graphs and further graphs (A*/A/B/C) Recognise quadratic (5), cubic (5), reciprocal (6) and exponential (7) graphs. Draw graphs of quadratic functions and use them to solve quadratic equations, identify and interpret roots, intercepts and turning points (7). Calculate or estimate gradients of graphs and areas under graphs.</p>
23Y10	G1.1 G1.2 G1.3 G3.8	<p>Angle rules Review (C/D) Use basic angle rules; angles on straight line, angles at a point, vertically opposite angles (3). Identify angles on parallel lines (3). Interior and exterior angles of polygons (3).</p>
24Y10	G1.5 G2.3	<p>Angles in circles (A/B) Identifying the different parts of a circle. Understand and prove the special rules for angles in circles (8). Finding missing angles using angle in circle rules and using them as part of geometric proofs (8).</p>

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		Topic
25Y10	G1.8 G2.3	Congruent triangles (B/C) Identifying triangles are congruent (6). Using congruent triangles for geometric proofs (7).
26Y10	N5.2 N5.5	Removing brackets and factorising Review (A/B) <i>Factorising quadratic expressions including the difference of two squares (5/7).</i> <i>Solving quadratic equations by factorising (5/7).</i>
27Y10	N6.7 N5.4	Simultaneous equations Review (B) <i>Solving simultaneous equations graphically (5).</i> <i>Solving simultaneous equations by elimination and substitution (5).</i>
**		**EASTER YEAR 10**
28Y10	N5.5	Brackets and quadratic equations 2 (A*/A) Solving quadratic equations by completing the square (8/9) and using the quadratic formula (7). Deduce turning points and the symmetrical property of a quadratic by completing the square (9). Solve problems by first forming quadratic equations. Solve simultaneous equations consisting of one quadratic and one linear equation (8).
29Y10	S1 S2.1 S2.3 S2.4 S2.2 S2.5	Sampling & secondary data (A/C/D) Understanding the handling data cycle and carrying out effective data collection (4). Identifying different types of data including qualitative, quantitative, discrete, continuous, primary and secondary data (4). Understanding different sampling methods and identifying possible bias (4). Calculating stratified samples.

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		Topic
30Y10	S3.2	Histograms (A) Drawing and interpreting histograms (8). Calculating frequency density (7).
31Y10	N5.7	Linear and Quadratic Inequalities (B/C) Understanding and writing inequalities (4). Solving 'linear' inequalities (5). Representing and interpreting inequalities on graphs. Solve quadratic inequalities (8/9) .
32Y10	N5.9	Algebraic Proof (A*/A/C) Use algebra to prove number statements (7/8) and disprove number statements using a counter example (4).
33Y10	N2.2 N2.6 N2.7	Fractions Review (C/D) <i>Adding, subtracting (4) & multiplying (3) fractions.</i> <i>Understanding reciprocals and dividing fractions (4).</i>
34Y10	N5.3	Algebraic fractions (A*/A/B) Add (8), subtract (8), multiply (6) and divide algebraic (8) fractions. Solve equations involving fractions with algebraic denominators (8/9).
**		**HALF TERM ** **YEAR 10 EXAMS**

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		Topic
35Y10	N1.8 N1.9	Indices Review (A*/A/B) <i>Understanding index notation.</i> <i>Multiplying, dividing and raising one power to another power (5).</i> <i>Understanding and using negative indices (7).</i> <i>Being able to evaluate fractional indices (7).</i>
36Y10	N6.1	Sequences (C/D) Recognise and use rules for number and pattern sequences, including triangular, square, cube & Fibonacci-type numbers, arithmetic sequences, quadratic sequences and geometric sequences (3/4) Finding the nth term for linear (4) and quadratic sequences (7).
37Y10	N5.6	Changing the subject Review (B/C) <i>Re-arranging equations where the new subject appears once (4/5).</i>
38Y10	N5.6	Changing the subject 2 (A*/A) Re-arranging equations where the new subject appears more than once (6).
**		**END OF Y10**

		Topic
**		**START OF Y11**
1Y11		<p>Equation of a Circle Recognise and use the equation of a circle with centre at the origin (7). Find the equation of a tangent to a circle at a given point (9).</p>
2Y11	N6.3	<p>Coordinates in 3 dimensions (A) Use co-ordinates in three dimensions.</p>
3Y11	G5.1	<p>Vectors (A*/A) Use vector notation (6). Express positions and lines in terms of vectors (6). Solve geometric problems using vectors (8).</p>
4Y11	N6.8	<p>Trigonometric graphs (A*/A) Be able to calculate sine, cosine and tangent of angles greater than 90° (8). Be able to draw graphs sine, cosine and tangent (8).</p>
5Y11	G2.2 G4.2	<p>Further trigonometry (A) Use the sine and cosine rules to find unknown lengths and angles of any triangle (7). Find the area of any triangle (7).</p>
6Y11		<p>Inverse and Composite Functions Interpret the reverse process as the ‘inverse function’ and the succession of two functions as a ‘composite function’ (8). Be able to use of $f(x)$, $fg(x)$ and $f^{-1}(x)$ notation (6/8).</p>
7Y11		<p>Iterative Processes Find approximate solutions to equations numerically using iteration, including the use of suffix notation in recursive formulae (7).</p>

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		Topic
8Y11	G6.9	Transforming graphs (A*) Be able to use function notation. Sketch graphs of $y=af(x)$, $y=f(ax)$, $y=f(x)+a$, $y=f(x+a)$ given the graph of $y=f(x)$ (7/8).
**		**HALF TERM**
9Y11	N1.11 N1.12	Rational and irrational numbers (A*/A) Writing exact answers using π and surds. Understand the difference between rational and irrational numbers. Simplify surds (7/8) and rationalise their denominator (9).
**		**END OF GCSE COURSE **