

# Year 11 guideline of work

This is a list of topics to be covered with foundation tier students in preparation for the new GCSE. It has been made by taking the extensive scheme of work from AQA, plus all specimen papers and boiling this down to topics with key points.

## Overview

- This guideline is deliberately not prescriptive in terms of when topics should be taught. Pupils will probably have had exposure to the majority of topics here at some point during their education in Y7 – 10. Because of this it is important that the class teacher uses their experience to assess how much time to spend on each topic or even whether to teach a topic at all (for example, it will not benefit low sets to try and teach them how to sketch quadratic curves). Different groups will have different strengths and weaknesses.
- It is written with a rough logical order in mind (e.g. solving equations comes before solving inequalities) but this doesn't need to be completely adhered to. What we are doing should reflect the groups we have.
- The main things to ensure are:
  - 1) That key ideas/topics are being constantly revised through starter activities.
  - 2) That pupils are given the opportunity to revise topics in different contexts.
  - 3) **That all topics that are aimed to be taught are taught within 3-4 weeks of the terminal exam to allow time for past paper revision.**

## Topics for new specification foundation tier

The objective should be to leave at least one month for booklet revision.

- **Fractions: add, subtract, divide, multiply, fractions of amounts (Including mixed fractions)**
  - Simplify fractions, change from improper to mixed and reverse
  - Find a fraction of an amount (using 'bus stop' division where needed)
  - Add and subtract fractions by finding LCD (include mixed fractions within questions and answers)
  - Multiply and divide fractions **using the method of cross cancelling** (include mixed fractions within questions and answers)
  - Finding one number as a fraction of another
  - Worded questions including the need for the above skills
- **Multiplying decimals**
  - Including worded questions and questions which require conceptual understanding of place value e.g.  $2.4 \times 3.1 = 7.44$ . Hence find  $24 \times 310$
- **Long division**
  - Including decimals
  - Worded questions (knowing **when** to divide)
- **Solving linear equations**
  - Unknowns only on one side
  - Unknowns on both sides
  - Including fractional and negative answers
- **Expanding and simplifying single brackets**
  - Including difficult work with negatives e.g.  $-2(x - 4) - 5(x + 1)$
- **Expanding and simplifying double brackets**
  - Including difficult work with negatives e.g.  $(3x - 2)(x + 4)$
- **Factorising into single brackets (only when expanding into single brackets is completely secure)**
  - Including removal of 2 factors e.g.  $2ab - 4a$
- **Product of prime factors/ HCF/LCM**
- **Stem and leaf diagrams**
  - Drawing an ordered stem and leaf diagram when given a set of data
  - Use your stem and leaf diagram to answer simple questions (e.g. the median or the probability of something)

- **Basic probability**
  - Knowing that probabilities add up to 1
  - Calculating probabilities from two way tables
  - Using probabilities to make simple estimates (e.g. The probability of a red ball being picked is 0.35. Estimate the number of reds if 500 balls are picked)
- **Pythagoras**
  - Finding the short side and long side
  - Included conceptual questions that require the final answer to be used in context. E.g. calculating the area or perimeter
  - Saying whether a triangle is R.A (e.g. does  $a^2 + b^2 = c^2$ ?)
- **Loci and construction**
  - Draw a perpendicular bisector
  - Bisect an angle
  - Construct a triangle (e.g. equilateral or a triangle with given side lengths)
  - Simple loci as per original GCSE
- **Drawing linear graphs**
  - Including harder equations such as  $y = 3 - 4x$
  - Pupils should be encouraged to use full layout and draw tables and axes themselves
- **Forming an equation/expression**
  - Using mathematical principles already known to calculate an unknown (for example, angles on a straight line =  $180^\circ$ , angles in a quadrilateral =  $360^\circ$ )
- **Basic percentages**
  - Must be in context (for example wages increasing by 22.5%)
  - Reverse percentages
- **Basic substitution**
  - Substituting into a simple expression
  - Substituting into a simple equation and then solving the equation
- **Factorising a basic quadratic ( $a = 1$ ) into double brackets (only when expanding double brackets is completely secure)\***
  - Pupils should be encouraged to expand their answer to check as this forms links in understanding)
  - Simple difference of two squares e.g.  $x^2 - 9$
- **Solving a quadratic equation by factorising**

- Pupils should be encouraged to form linear equations from resulting factors.  
E.g.  $x - 3 = 0$  OR  $x + 2 = 0$  (not just 'change the sign')
- **Simultaneous equations (only when linear equations is completely secure)\***
  - Including answers that are negative numbers and simple fractions
- **Inequalities**
  - Solving inequalities
  - Representing inequalities on number lines
  - Using a number line to represent an inequality
- **Angles**
  - All basic angle facts (angles in a triangle, straight line etc.)
  - Alternate and corresponding angles
  - Interior and exterior angles
- **SOHCAHTOA**
  - Finding unknown sides
  - Finding unknown angles (An algebraic approach is preferable here to link this topic to others)
  - Students are expected to know all trig ratios for angles on  $0^\circ$ .  $30^\circ$ .  $45^\circ$   $60^\circ$   $90^\circ$
- **Averages from a table and mean of grouped data**
  - Possibly omitting finding the median class as this is conceptually the most difficult
- **Index laws (including negative powers and to the power of zero)**
- **Speed/distance/time**
  - Not just 'Draw a formula triangle'
  - Be able to use the formula (preferably by rearranging it)
  - Have a good understanding of speed (e.g units and the basic concept of 60 mph meaning one mile per minute etc)
- **Standard form**
  - Including simple calculations such as multiplying and worded problems
- **Tree diagram (basic only)**
  - Not entirely clear on Edexcel SOW. Probably only with replacement.
- **nth term of a linear sequence (using an expression and generating one)**
  - Plus recognition of 'special sequences' (Edexcel SOW not clear on what these are)
- **Area and perimeter of compound shapes**
- **Surface area and volume of prisms, cylinders, cones, pyramids and spheres**
- **Drawing more difficult graphs by plotting points (only when drawing linear graphs is completely secure)**

- Must be covered with and without a calculator (appropriate written layout if no calculator is used)
- Drawing simple reciprocal graphs with and without a calculator e.g.  $y = 6/x$
- Sketching parabolas (note: this seems very ambitious for most foundation groups)
- **Ratio**
  - Splitting into a given ratio
  - Simplifying ratios
  - Simple problems involving ratio (Singapore bar method)
  - Taking ratios and expressing them in the form 1:n
- **Scatter graphs**
  - Plotting coordinates
  - Lines of best fit
  - Interpretation
  - Estimating values
- **Compound interest/simple interest/growth/decay**
  - Increasing and decreasing using difficult multipliers such as 1.035
- **Basic understanding of the equation Density = mass/volume**
- **Basic comprehension of how to use the formula pressure = force/area when given it**
- **Area/Circumference of circles\***
  - Including questions in context (e.g. length of fence needed around a circular garden)
  - Including area and perimeter of sectors
- **Transformations**
  - Students are not required to find the centre of enlargement or enlarge by negative scale factors
- **Rearranging formula**
  - Simple ones only (no need to factorise terms)
- **Simple bearings**
  - Accurately drawing a bearing
  - Calculating a bearing from a diagram which is not to scale
- **Estimates**
  - Including estimation questions where the denominator is a decimal
- **Similar shapes**
  - Must be covered with and without a calculator
- **Understanding (in context)of the links between  $\text{cm}^3$ , ml and litres**

- E.g. How many 330 ml cans of drink can be poured from a 20 litre tank?
- **Basic vectors**
  - Add and subtract vectors
  - Multiplying vectors by a scalar
  - Recognising vectors as being parallel
- **$y = mx + c$  (note: this seems very ambitious for most foundation groups)**
  - Sketch straight lines from an understanding of gradient and y-intercept
  - Find the equation of a straight line when given information such as the gradient of a parallel line and known points
- **Set theory and Venn diagrams (seems very similar to old style IGCSE)**
  - Using the basic language of set notation
  - Constructing simple Venn diagrams and using them to give information
- **Direct and inverse proportion**
  - No squares and cubes

## Topics for new specification higher tier

Higher tier pupils need to have had a firm exposure to all of the foundation topics. On top of this they need to have had firm exposure to the following topics

**The objective should be to leave at least one month for booklet revision.**

- **Surds**
  - Calculate approximate values from surds
  - Simplifying surds
  - Confidence in completing calculations/equations involving surds
  - Rationalise the denominator
- **Upper and lower bounds**
  - Giving upper and lower bounds
  - Simple calculations including upper and lower bounds
  - Questions in context
- **Simple bearings**
  - Accurately drawing a bearing
  - Calculating a bearing from a diagram which is not to scale
  - Working out 'The bearing of A from B' when given 'The bearing of B from A'
- **Convert recurring decimals to fractions**
- **More advanced algebra**
  - Factorising and solving with a coefficient of  $x^2$  which is other than 1
  - Adding and simplifying algebraic fractions
  - Completing the square
  - 'Show that' algebra
  - Solving quadratic inequalities (brand new to GCSE)
  - Use iterative methods to solve equations (brand new to GCSE)
  - To apply a combination of equation techniques and a graphical approach to solve equations
  - Solving quadratic simultaneous equations
  - Expand triple brackets
- **Circle theorems**
  - Clear descriptions of the rules **must** be memorised
- **Sequences**
  - As for foundation tier plus generating quadratic sequences
- **Histograms**
  - Understanding of principle is vital for top groups (not just  $f.d = f/c.w$ )
- **Sin rule, cosine rule and  $0.5ab\sin C$**

- Using these rules in simple questions
- Working backwards to find angles when using cosine rule or given the area
- Questions involving a mix of rules e.g. initially using SOHCAHTOA and then cosine rule
- **Transformations**
  - As per foundation tier but including negative scale factors and finding the centre of enlargement
- **Graph transformations**
  - Including link to completion of the square for top groups
- **Probability**
  - With and without replacement
  - Questions that include the phrase 'given that'
- **Cumulative frequency**
  - Draw a cumulative frequency curve from a given table
  - Use the curve to find the median IQR and answer basic questions
  - Box plots
- **Pythagoras**
  - As per foundation tier but including Pythagoras in 3 dimensions
- **$y = mx + c$** 
  - Finding the equation once given two points
  - Understanding the link to perpendicular and parallel lines
  - Understanding how to find where a straight line crosses the y and x axis
- **Rearranging formulae**
  - Including equations which need to be factorised in order to 'make x the subject'
- **Circle geometry**
  - Recognise and be able to give the equation of a circle that has the origin as its centre
  - Be able to find the equation of a line that is a tangent to circle by understanding  $y = mx + c$  topic plus linking this to circle theorems
- **Area and volume scale factors**
  - Understanding the link between length, volume and area scale factors.
  - Solving problems on this topic without a calculator (thus requiring very clear appreciation of indices and fractions)
- **Regions**
  - Have a clear understanding of drawing straight line graphs to identify finite regions

- **Vectors**
  - Giving simple vectors
  - Calculating more complicated vectors involving ratios and fractions
  - Showing lines are parallel/are straight
- **Trig graphs**
  - Including link to graph transformations and basic appreciation of symmetry of the graphs
- **Direct and inverse proportion**
  - Basic questions and in context
  - Including squares and cubes
- **Transformations of functions**
  - Be able to make changes to functions when given equations (e.g.  $y = af(x)$ ,  $y = f(-ax)$ )
  - Be able to be given original graphs and new graphs and write the equation of the new graph in the form  $y = af(bx)$
- **Further understanding of curves**
  - To calculate the gradient at a point on a curve and to identify this as a rate of change.
  - To calculate the area under a curve by splitting into trapezia
- **Functions**
  - Find  $f^{-1}$  (the inverse function)
  - Understand and be able to work with composite functions e.g.  $y = fg(2)$
- **Reciprocal graphs**
  - Recognise and be able to draw
- **Compound interest/simple interest/growth/decay**
  - As per foundation tier but also have a knowledge of the formula  $y = a(1-r)^n$

