

## Edexcel Modular GCSE - Higher Unit 3

### Calculations

Add or subtract fractions using common denominators

D

### Calculator Methods

Find minimum and maximum values

C

Find the upper and lower bounds of simple calculations involving quantities given to a particular degree of accuracy

B

Find the upper and lower bounds of more difficult calculations with quantities given to a various degrees of accuracy

A

### Decimals

Convert decimals to fractions and fractions to decimals

D

Convert recurring decimals to fractions and fractions to recurring decimals

B

### Formulae

Substitute numbers into more complicated formulae; ie  $c = \frac{(A + 1)D}{9}$

D

Rearrange linear formulae such as  $p = 3q + 5$

C

Rearrange formulae that include brackets, fractions and square roots

B

Rearrange formulae where the variable appears twice

A

### Graphs of Linear Functions

Draw lines such as  $y = 2x + 3$

D

Solve problems involving straight lines

D

Solve problems involving graphs, such as finding where the line  $y = x + 2$  crosses the line  $y = 1$

D

Find the equation of the line of best fit

C

Recognise the equations of straight-line graphs such as  $y = -4x + 2$

C

Find the gradients of straight-line graphs

C

Explore the gradients of parallel straight-line graphs

B

Explore the gradients of perpendicular straight-line graphs

A

### Inequalities

Solve inequalities such as  $3x < 9$  and  $12 \leq 3n < 20$

C

Solve linear inequalities such as  $4x - 3 < 10$  and  $4x < 2x + 7$

C

Represent sets of solutions on the number line

C

Solve linear inequalities such as  $x + 13 > 5x - 3$

B

### Interpreting Graphs

Calculate simple average speeds from distance–time graphs

D

Draw graphs of simple quadratic functions such as  $y = 3x^2$  and  $y = x^2 + 4$

D

Calculate complex average speeds from distance–time graphs

C

Draw graphs of harder quadratic functions such as  $y = x^2 - 2x + 1$

C

Find the points of intersection of quadratic graphs with lines

C

Use graphs to find the approximate solutions of quadratic equations

C

Interpret velocity–time graphs

B

Discuss and interpret graphs modelling real situations

B

### Linear Equations

Solve equations such as  $3x - 4 = 5 + x$

D

Solve equations such as  $2(5x + 1) = 28$

D

Solve equations such as  $3x - 12 = 2(x - 5)$

C

Solve equations with negative answers

Solve equations such as  $\frac{7-x}{3} = 2$  or  $\frac{x}{4} = 5$

Find a solution to a problem by forming an equation and solving it

Solve equations such as  $\frac{2x-1}{6} + \frac{x+3}{3} = \frac{5}{2}$

C   
C   
C   
B

**Loci**

Solve simultaneous equations graphically, such as  $y = 2x - 1$  and

Construct the graphs of loci, including the circle

Solve simultaneous equations graphically, such as  $y = x - 1$  and  $x^2 + y^2 = 16$

A+   
A   
A

**Number Operations**

Increase or decrease a quantity by a given percentage

Divide a quantity in a given ratio

D   
C

**Numerical Methods**

Form and solve equations such as using trial and improvement methods

C

**Other Functions**

Complete tables for, and draw graphs of cubic functions

Use cubic graphs to solve equations

Complete tables for, and draw graphs of reciprocal functions

Use reciprocal graphs to solve equations

Understand the graphs of trigonometric functions for angles of any size

Solve cubic equations by drawing appropriate lines on graphs

Plot and sketch graphs of exponential functions

Recognise the shapes of graphs of functions

Sketch and draw trigonometric graphs

B   
B   
B   
B   
A+   
A+   
A+   
A+   
A

**Powers & Roots**

Use index notation and index laws for positive and negative powers

Use index notation and index laws for fractional powers such as  $16^{\frac{3}{4}}$

Use index notation and index laws for fractional powers such as  $16^{\frac{1}{2}}$

C   
A+   
A

**Quadratic Equations**

Write quadratic expressions in forms like  $(x + a)^2 + b$ ; ie complete the square

Use completing the square to solve equations and find maximum and minimum values

Use the points of intersection of a quadratic graph such as  $y = x^2 - 2x - 4$  with lines such as  $y = 2x + 1$  to solve equations like  $x^2 - 2x - 4 = 2x + 1$

and simplify this to  $x^2 - 4x - 5 = 0$

Use the quadratic formula to solve equations such as

A+   
A+   
A   
A

**Simultaneous Eqns**

Solve a pair of simultaneous equations in two unknowns such as  $2x + y = 5$  and  $3x - 2y = 4$

Know that each equation can be represented by a line on a graph and that the point of intersection of the lines is the solution

Solve a set of linear inequalities in two variables and represent the solution as a region of a graph

Solve a pair of simultaneous equations, where one is linear and one is non-linear such as  $x + 5y = 13$  and  $x^2 + y^2 = 13$

B   
B   
B   
A+

Solve a pair of simultaneous equations where one is linear and one is non-linear such as  $y = 3x - 2$  and  $y = x^2$  A

### Transforming Functions

Transform the graphs of  $y = f(x)$ , such as linear, quadratic, cubic, sine and cosine functions, using the transformations  $y = f(x) + a$ ,  $y = f(x + a)$ ,  $y = af(x)$  and  $y = f(ax)$ . A+

### Written Methods

Express one quantity as a percentage of another D   
Work out answers to circle questions without a calculator, leaving them in terms of  $\pi$  C   
Do calculations with mixed numbers C   
Work out a percentage increase or decrease C   
Understand how to use successive percentages B   
Work out compound interest B   
Work out reverse percentage problems B   
Calculate proportional changes using a multiplier B   
Solve direct proportion problems B   
Solve inverse proportion problems B   
Simplify surds, such as  $(3\sqrt{5})^2$  in the form  $a\sqrt{b}$  A+   
Rationalise the denominator of a surd such as  $\frac{2}{\sqrt{5}}$  A   
Solve direct and inverse proportion problems involving powers A   
Interpret the graphs of direct and inverse proportion relationships A

### 3D Shapes

Find the surface area and volume of frutums A+   
Solve problems involving areas and volumes of pyramids, cones and spheres A   
Find the area of a segment of a circle. A

### Construction

Understand that giving the lengths of two sides and a non-included angle may not produce a unique triangle D   
Construct the perpendicular bisector of a line C   
Construct the bisector of an angle C   
Construct the perpendicular from a point to a line C   
Construct the perpendicular from a point on a line C   
Construct angles of  $60^\circ$  and  $90^\circ$  C

### Coordinates

Find the midpoint of a line segment C   
Use and understand coordinates in three dimensions C

### Loci

Understand the idea of a locus D   
Construct accurately loci, such as those of points equidistant from two fixed points C   
Solve loci problems, such as identifying points less than 3 cm from a point P C

### Measures

Distinguish between formulae for perimeter, area and volume by considering dimensions B

### Mensuration

Calculate the circumference of a circle to an appropriate degree of accuracy	D	<input type="text"/>
Calculate the area of a circle to an appropriate degree of accuracy	D	<input type="text"/>
Find the perimeter of a semicircle	C	<input type="text"/>
Find the area of a semicircle	C	<input type="text"/>
Convert between measures of volume	C	<input type="text"/>
Convert between measures of area	C	<input type="text"/>
Calculate the lengths of arcs	A	<input type="text"/>
Calculate the area of sectors	A	<input type="text"/>

**Properties of Circles**

Solve problems involving surface areas of prisms and cylinders	C	<input type="text"/>
Use the angle properties of a circle	B	<input type="text"/>
Use the tangent / chord properties of a circle	B	<input type="text"/>
Prove the angle properties of a circle	A	<input type="text"/>
Prove the tangent / chord properties of a circle	A	<input type="text"/>
Use and prove the alternate segment theorem	A	<input type="text"/>

**Properties of Shapes**

Calculate exterior and interior angles of a regular polygon	C	<input type="text"/>
Match one side and one angle of congruent triangles, given some dimensions	C	<input type="text"/>
Use Pythagoras' theorem to find the hypotenuse of a right-angled triangle	C	<input type="text"/>
Use Pythagoras' theorem to find any side of a right-angled triangle	C	<input type="text"/>
Use Pythagoras' theorem to find the height of an isosceles triangle	C	<input type="text"/>
Use Pythagoras' theorem in practical problems	C	<input type="text"/>
Use sine, cosine and tangent to calculate a side in a right-angled triangle	B	<input type="text"/>
Use sine, cosine and tangent to calculate an angle in a right-angled triangle	B	<input type="text"/>
Match sides and angles of similar triangles, given some dimensions	B	<input type="text"/>
Find the distance between two points from their coordinates	B	<input type="text"/>
Use trigonometry to find sides and angles in three dimensions	A+	<input type="text"/>
Find the angle between a line and a plane	A+	<input type="text"/>
Prove that two triangles are congruent using SSS, SAS, ASA, RHS	A	<input type="text"/>
Use the sine rule to find the missing sides and missing angles in any triangle	A	<input type="text"/>
Use the cosine rule to find the missing sides and missing angles in any triangle	A	<input type="text"/>
Use the formula for the area of a non right-angled triangle	A	<input type="text"/>
Use Pythagoras' theorem in 3-D problems	A	<input type="text"/>

**Transformations**

Reflect shapes in lines such as $x = 2$ or $y = -1$	D	<input type="text"/>
Describe fully reflections and rotations about the origin	D	<input type="text"/>
Identify reflection symmetry in 3-D solids	D	<input type="text"/>
Translate a shape using a description such as 4 units right and 3 units down	D	<input type="text"/>
Enlarge a shape by a positive scale factor from a given centre	D	<input type="text"/>
Reflect shapes in the lines $y = x$ and $y = -x$	C	<input type="text"/>
Rotate shapes about any point	C	<input type="text"/>
Describe fully reflections and rotations about any point	C	<input type="text"/>
Find the centre of a rotation and describe it fully	C	<input type="text"/>
Combine reflections and rotations	C	<input type="text"/>
Translate a shape by a vector such as $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$	C	<input type="text"/>
Transform shapes by a combination of translation, reflection and rotation	C	<input type="text"/>

Compare the area of an enlarged shape with the original shape

Enlarge a shape by a fractional scale factor

Enlarge a shape by a negative scale factor

Compare areas and volumes of enlarged shapes

Find the area of a 2-D shape, given the area of a similar shape and the ratio

Find the volume of a 3-D solid, given the volume of a similar solid and the ratio

C	<input type="checkbox"/>
C	<input type="checkbox"/>
A	<input type="checkbox"/>
A	<input type="checkbox"/>
A	<input type="checkbox"/>
A	<input type="checkbox"/>

**Vectors**

Solve more difficult vector geometry problems

Add, subtract and multiply vectors to solve vector geometry problems

Understand the relationship between parallel and perpendicular vectors

A+	<input type="checkbox"/>
A	<input type="checkbox"/>
A	<input type="checkbox"/>

