- [ ] I can find the points of intersection with the x-axis
- [ ] I can find the maximum and minimum values and corresponding values of x

7.5 *page 58*

- [ ] I can use graphs of the form $y = \sin(x + r)^\circ + s$ or $y = \cos(x + r)^\circ + s$
- [ ] I can find the equation from the graph
- [ ] I can find the point of intersection with the y-axis
- [ ] I can find the maximum and minimum values and corresponding values of x

7.6 *page 61*

- [ ] I can use graphs of the form $y = p\sin(x + r)^\circ + s$ or $y = p\cos(x + r)^\circ + s$
- [ ] I can find the equation from the graph
- [ ] I can find the maximum and minimum values and corresponding values of x
- [ ] I can find the point of intersection with the y-axis

Trigonometry

8.1 *page 63*

- [ ] I can use the four-quadrant diagram to find angles with a given sine, cosine or tangent
- [ ] I can rearrange an equation to find the sine, cosine or tangent of an angle
- [ ] I can find the points of intersection of a trigonometric graph and a straight line by solving an appropriate equation

8.2 *page 64*

- [ ] I can use the four-quadrant diagram to find angles with a given sine, cosine or tangent, and hence solve an equation
- [ ] I can rearrange an equation to find the sine, cosine or tangent of an angle
- [ ] I can find the points of intersection of a trigonometric graph and a straight line by solving an appropriate equation

8.3 *page 66*

- [ ] I can use the exact values for the sine, cosine and tangent of 30°, 45° and 60° to find exact values for the sine, cosine and tangent of negative angles and angles greater than 90°
- [ ] I can use exact values to simplify expressions

8.4 *page 67*

- [ ] I can use exact values for the sine, cosine and tangent of 30°, 45° and 60° to solve equations

8.5 *page 68*

- [ ] I can find the sine, cosine and tangent of an angle in a right-angled triangle, using Pythagoras' theorem where necessary
- [ ] I can calculate the value of other trigonometric ratios from the value of one ratio

8.6 *page 69*

- [ ] I can use the identities $\sin^2 x + \cos^2 x \equiv 1$ and $\tan x \equiv \dfrac{\sin x}{\cos x}$

8.7 *page 70*

- [ ] I can solve quadratic trigonometric equations
- [ ] I can solve a trigonometric equation by using the identity $\sin^2 x + \cos^2 x \equiv 1$ to form a quadratic equation in $\sin x$ or $\cos x$

8.8 *page 71*

- [ ] I can use graphs of the form $y = p\sin(x + r)^\circ + s$ or $y = p\cos(x + r)^\circ + s$
- [ ] I can find the maximum and minimum values and corresponding values of x
- [ ] I can find the points of intersection with the x-axis
- [ ] I can find the point of intersection with the y-axis

Algebra

9.1 *page 73*

- [ ] I can use functional notation

9.2 *page 75*

- [ ] I can construct an expression from given information
- [ ] I can use one expression in the construction of a second

9.3 *page 77*

- [ ] I can form and solve linear equations
- [ ] I can form and solve quadratic equations
- [ ] I can solve word problems

9.4 *page 80*

- [ ] I can multiply, divide and simplify expressions involving surds and indices
- [ ] I can rewrite an expression involving surds into one involving indices
- [ ] I can rewrite a fractional expression as a sum of separate terms, by dividing each term in the numerator by the denominator

Arbelos

Progress to Higher Mathematics

Checklist of Learning Outcomes

Preliminaries

1.1 *page 1*

- [ ] I can rewrite an expression with brackets, by expanding the brackets and collecting like terms

1.2 *page 2*

- [ ] I can solve linear equations with brackets, by expanding the brackets and then collecting terms together on one side of the equation
- [ ] I can solve linear equations with fractions, by multiplying each term by the same expression and then collecting terms together on one side of the equation

1.3 *page 2*

- [ ] I can solve simultaneous equations given in various formats, using the method of substitution or the method of elimination

1.4 *page 3*

- [ ] I can rewrite an expression with fractional terms in brackets, by expanding the brackets and collecting like terms
- [ ] I can rewrite a compound fractional expression as a simple fraction, by multiplying every term in the numerator and the denominator by the same expression

1.5 *page 4*

- [ ] I can simplify expressions containing surds
- [ ] I can simplify an expression by division or by rationalising the denominator

1.6 *page 5*

- [ ] I can evaluate fractional and negative indices
- [ ] I can simplify expressions containing indices

1.7 *page 6*

- [ ] I can find exact values for the sine, cosine and tangent of 30°, 45° and 60°
- [ ] I can use exact values in simple problems
- [ ] I can find the exact value of the area of a triangle

Solving equations

2.1 *page 8*

- [ ] I can solve equations where the unknown occurs in a denominator
- [ ] I can remove the denominators by multiplying each term by the same expression

2.2 *page 8*

- [ ] I can solve quadratic equations by factorising into the form $(x - a)(x - b)$
- [ ] I can solve quadratic equations not in standard form by rearranging the terms

2.3 *page 9*

- [ ] I can solve quadratic equations of the form $ax^2 + bx + c = 0$ by factorising
- [ ] I can solve quadratic equations not in standard form by rearranging the terms

2.4 *page 10*

- [ ] I can use a substitution in order to convert a more general equation into a quadratic equation
- [ ] I can solve the resulting quadratic equation and hence solve the original equation

2.5 *page 10*

- [ ] I can solve equations of the form $k(x - p)^2 = q$ by finding the square root of each side
- [ ] I can solve similar equations with a higher power by taking the appropriate root of each side

2.6 *page 11*

- [ ] I can solve a cubic equation given in factorised form
- [ ] I can solve a cubic equation by factorising
- [ ] I can solve a cubic equation by rearranging and factorising

Lines and circles

3.1 *page 12*

- [ ] I can find the gradient of the line joining two points
- [ ] I can find the gradient m of a line by converting the equation to the form $y = mx + c$
- [ ] I can find the equation of a line through a given point with a given gradient, or through two given points
- [ ] I can find the points of intersection of a line with the x- and y-axes
- [ ] I can convert the equation of a line into a different form

3.2 *page 13*

- [ ] I can find and use equations of the form $x = k$ for lines parallel to the y-axis
- [ ] I can find and use equations of the form $y = l$ for lines parallel to the x-axis

3.3 *page 14*

- [ ] I can use the fact that parallel lines have equal gradients or that lines with equations of the form $ax + by + c_1 = 0$ and $ax + by + c_2 = 0$ are parallel
- [ ] I can find the equation of a line through a given point parallel to a given line

3.4 *page 15*

- [ ] I can find the midpoint of a line segment
- [ ] I can find the length of a line segment
- [ ] I can solve problems involving midpoints and lengths of line segments

3.5 *page 16*

- [ ] I can determine whether given points are collinear
- [ ] I can use properties of collinear points

3.6 *page 17*

- [ ] I can use the equation $m = \tan\theta$ connecting the gradient m of a line and the angle θ between the line and the positive x-axis

3.7 *page 20*

- [ ] I can use circle diagrams plotted in the coordinate plane
- [ ] I can use diameter and tangent properties of a circle

3.8 *page 21*

- [ ] I can calculate the distance between circles

Graph sketching

4.1 *page 23*

- [ ] I can sketch the graph of a parabola with equation given in the form $y = k(x - a)(x - b)$
- [ ] I can use the sign of k to find the shape of the curve
- [ ] I can label the y-intercept
- [ ] I can label the zeros
- [ ] I can sketch the graph of a parabola by factorising into the form $y = k(x - a)(x - b)$

4.2 *page 24*

- [ ] I can sketch the graph of a parabola with equation given in the form $y = k(x - p)^2 + q$
- [ ] I can use the sign of k to find the shape of the curve
- [ ] I can label the turning point
- [ ] I can label the y-intercept
- [ ] I can label the zeros

4.3 *page 26*

- [ ] I can sketch the graph of a cubic curve using the sign of the coefficient of x^3 to find the shape of the curve
- [ ] I can label the y-intercept
- [ ] I can label the zeros

Equations of curves

5.1 *page 28*

- [ ] I can find an equation of a parabola in the form $y = kx^2 + q$ from a graph
- [ ] I can find q from the y-intercept or by moving the curve $y = kx^2$ in a direction parallel to the y-axis
- [ ] I can find k by substituting the coordinates of a point on the curve into the equation
- [ ] I can check the sign of k from the shape of the curve

5.2 *page 30*

- [ ] I can find an equation of a parabola in the form $y = k(x - a)(x - b)$ from a graph
- [ ] I can find a and b from the zeros
- [ ] I can find k from the y-intercept or by substituting the coordinates of a point on the curve into the equation
- [ ] I can check the sign of k from the shape of the curve

5.3 *page 32*

- [ ] I can write down the coordinates of the turning point of a parabola given in the form $y = k(x - p)^2 + q$
- [ ] I can use the sign of k to determine the nature of the turning point

5.4 *page 32*

- [ ] I can find an equation of a parabola in the form $y = k(x - p)^2 + q$ from a graph
- [ ] I can find p and q from the turning point
- [ ] I can find k from the y-intercept or by substituting the coordinates of a point on the curve into the equation
- [ ] I can check the sign of k from the shape of the curve

5.5 *page 34*

- [ ] I can find an equation of a parabola from the information given in a graph
- [ ] I can use the form $y = k(x - a)(x - b)$ when the zeros are given
- [ ] I can use the form $y = k(x - p)^2 + q$ when the turning point is given
- [ ] I can find an equation of the form $y = ax^2 + bx + c$ by expanding brackets and collecting like terms

5.6 *page 35*

- [ ] I can change the equation of a parabola from the form $y = k(x - a)(x - b)$ to the form $y = k(x - p)^2 + q$
- [ ] I can use the axis of symmetry of a parabola
- [ ] I can find p and q from the turning point

5.7 *page 38*

- [ ] I can find an equation of a cubic curve in the form $y = k(x - a)(x - b)(x - c)$ from a given graph
- [ ] I can find a, b and c from the zeros
- [ ] I can find k from the y-intercept or by substituting the coordinates of a point on the curve into the equation
- [ ] I can check the sign of k from the shape of the curve

Intersecting lines and curves

6.1 *page 40*

- [ ] I can find the point of intersection of two straight lines

6.2 *page 43*

- [ ] I can find the points of intersection of a straight line and a parabola

6.3 *page 46*

- [ ] I can find the points of intersection of two parabolas

6.4 *page 49*

- [ ] I can find the points of intersection of a straight line and a cubic curve

Trigonometric graphs

7.1 *page 51*

- [ ] I can sketch the graphs $y = \sin x$, $y = \cos x$ and $y = \tan x$
- [ ] I can use a sketch graph to solve simple trigonometric equations

7.2 *page 52*

- [ ] I can use graphs of the form $y = p\sin qx^\circ$ or $y = p\cos qx^\circ$
- [ ] I can find the equation from the graph
- [ ] I can find the points of intersection with the x-axis
- [ ] I can find the maximum and minimum values and corresponding values of x

7.3 *page 54*

- [ ] I can use graphs of the form $y = p\sin x^\circ + s$ or $y = p\cos x^\circ + s$
- [ ] I can find the equation from the graph
- [ ] I can find the y-intercept (the point of intersection with the y-axis)
- [ ] I can find the maximum and minimum values and corresponding values of x

7.4 *page 56*

- [ ] I can use graphs of the form $y = p\sin(x + r)^\circ$ or $y = p\cos(x + r)^\circ$
- [ ] I can find the equation from the graph