Baldragon Academy

Mathematics

Course Plan

Seniors (S4-S6)

National 5

(1 Year)

Term 1a - June

16 Periods (based on 4 weeks at 4 periods per week)

Surds and Indices

Learning Intention To be able to –	Periods

Work with surds
    ♦ Simplification
    ♦ Rationalising denominators
	6

Simplify an expression using the laws of indices
    ♦ Multiplication and division using positive and negative indices including fractions
    ♦ $(ab)^m = a^m b^m$
    ♦ $(a^m)^n = a^{mn}$
    ♦ $a^{m/n} = \sqrt[n]{a^m}$
    ♦ Calculations using scientific notation
	6

Expansion of Brackets

Learning Intention To be able to –	Periods

Work with algebraic expressions involving expansion of brackets
This is revision from S3
    ♦ $a(bx+c)+d(ex+f)$
    ♦ $ax(bx+c)$
    ♦ $(ax+b)(cx+d)$
    ♦ $(ax+b)(cx^2+dx+e)$
where $a,b,c,d,e,f \in \mathbb{Z}$
	2

Factorising

Complete the square in a quadratic expression with unitary x^2 coefficient ♦ Writing quadratics of the form x^2+bx+c in the form $(x+p)^2+q$ where $b,c \in \mathbb{Z}$ and $p,q \in \mathbb{Q}$	2

Term 1b

August – October

40 Periods (based on 8 weeks at 5 periods per week)

Fractions – Include this all topics below

Learning Intention. To be able to -	Periods
Working with fractions Operations and combinations of operations on fractions including mixed numbers (addition, subtraction, multiplication, division)	

Factorising

Learning Intention. To be able to -	Periods
Factorise an algebraic expression - Common factor - Difference of squares $p^2 x^2 - a^2$ - Trinomials with unitary and non-unitary x^2 coefficient - Combinations of the above	5

Complete Qu 1-5 of Expressions & Formulae assessment	4

Algebraic Fractions

Learning Intention. To be able to -	Periods
Reduce an algebraic fraction to its simplest form $\frac{a}{b}$ where a, b are of the form $(mx + p)^n$ or $(mx + p)(nx + q)$ and $b \neq 0$	2
Apply the four operations to algebraic fractions $\frac{a}{b} * \frac{c}{d}$ where a, b, c, d can be simple constants, variables or expressions; * can be add, subtract, multiply or divide; and $b \neq 0, d \neq 0$	2

Rounding

Learning Intention. To be able to -	Periods
Rounding ♦ To a given number of significant figures	1

*** Rounding to a given number of significant figures to be incorporated in the following topics.

Volume

Learning Intention. To be able to -	Periods
Calculate the volume of a standard solid (include composite) ♦ Sphere, cone, pyramid	3

Circle

Learning Intention. To be able to -	Periods

Use circle geometry
    ♦ Calculating the length of an arc
    ♦ Calculating the area of a sector
	3

Straight Line

Learning Intention. To be able to -	Periods
Determine the gradient of a straight line, given two points ♦ $m = \dfrac{y_2 - y_1}{x_2 - x_1}$	2

Complete Qu 6-10 of Expressions & Formulae assessment	4
Work Experience	5

Straight Line

Learning Intention. To be able to -	Periods

Determine the equation of a straight line
     ◆ Use the formula $y - b = m(x - a)$ or equivalent to find the equation of a straight line, given two points or one point and the gradient of the line
     ◆ Use functional notation, $f(x)$
     ◆ Identify gradient and y-intercept from various forms of the equation of a straight line
	4

Algebra

Learning Intention. To be able to -	Periods

Work with linear equations and inequations
     ◆ Where numerical coefficients are rational numbers, $\mathbb{Q}$
     ◆ Where numerical solutions are rational numbers, $\mathbb{Q}$
	4

Term 2

October – December

40 Periods (based on 8 weeks at 5 periods per week)

Algebra

Learning Intention. To be able to -	Periods

Work with simultaneous equations
 	
    ♦ Construct from text
    ♦ Graphical solution
    ♦ Algebraic solution
	5

Change the subject of a formula
    ♦ Linear formula
    ♦ Formula involving a simple square or square root
	3

Quadratics

Learning Intention. To be able to -	Periods

Recognise and determine the equation of a quadratic function from its graph
 	
    ♦ Equations of the form $y = kx^2$ and
    $y = k(x+p)^2 + q$
    where $k, p, q \in \mathbb{Z}$
	2

Sketch a quadratic function
    ♦ Equations of the form $y = (ax - m)(bx - n)$
    where $a, b, m, n \in \mathbb{Z}$
    ♦ Equations of the form $y = k(x+p)^2 + q$
    where $k, p, q \in \mathbb{Z}$
	4

Identify features of a quadratic function
Identify:
 	
    ♦ the nature and coordinates of the turning point
    ♦ the equation of the axis of symmetry
 	
of a quadratic of the form $y = k(x+p)^2 + q$
where $k, p, q \in \mathbb{Z}$
	3

Solve a quadratic equation (include quadratic formula)	4
♦ Solving from factorised form ♦ Solving having factorised first ♦ Graphical treatment	
Use the discriminant to determine the number of roots	2
♦ Know and use the discriminant ♦ Determine the number and describe the nature of roots using the language 'two real and distinct roots', 'one repeated real root', 'two equal real roots' and 'no real roots'	

Complete Qu 1-12 of Relationships assessment	4

Pythagoras

Learning Intention. To be able to -	Periods
Apply Pythagoras' theorem	3
♦ Using Pythagoras' theorem in complex situations including converse and three dimensions	

Similarity

Learning Intention. To be able to -	Periods
Use similarity	4
♦ Interrelationship of scale — length, area and volume	

Properties of Shapes

Learning Intention. To be able to -	Periods
Apply the properties of shapes to determine an angle involving at least two steps	6
♦ Quadrilaterals/triangles/polygons/circles ♦ Relationship in a circle between the centre, chord and perpendicular bisector	

Term 3

January – March

55 periods (based on 11 weeks at 5 periods a week)

<u>Trigonometry</u>

Learning Intention. To be able to -	Periods
Work with the graphs of trigonometric functions ◆ Basic graphs ◆ Amplitude ◆ Vertical translation ◆ Multiple angle ◆ Phase angle	6
Work with trigonometric relationships in degrees ◆ Sine, cosine and tangent of angles from $0°$ to $360°$ ◆ Period ◆ Related angles ◆ Solve basic equations ◆ Use the identities $\cos^2 x° + \sin^2 x° = 1$ and $\tan x° = \dfrac{\sin x°}{\cos x°}$	6

Complete Qu 13-18 of Relationships assessment	4

Using Trigonometry

Learning Intention. To be able to -	Periods
Calculate the area of a triangle using trigonometry ♦ Area $= \frac{1}{2}ab\sin C$	2
Use the sine and cosine rules to find a side or angle in a triangle ♦ Sine rule for side and angle ♦ Cosine rule for side and angle	4
Use bearings with trigonometry	2

Vectors

Learning Intention. To be able to -	Periods
Work with two-dimensional vectors ♦ Adding or subtracting two-dimensional vectors using directed line segments	2
Work with three dimensional coordinates ♦ Determining coordinates of a point from a diagram representing a three-dimensional object	2
Use vector components ♦ Adding or subtracting two- or three-dimensional vectors using components	2
Calculate the magnitude of a vector ♦ Magnitude of a two- or three-dimensional vector	2

Complete Qu 1-7 of Applications assessment	4

Percentages

Learning Intention. To be able to -	Periods
Work with reverse percentages ♦ Use reverse percentages to calculate an original quantity	2

Work with appreciation/depreciation
 	
    ♦ Appreciation including compound interest
    ♦ Depreciation
	3

Fractions

Learning Intention. To be able to -	Periods
Working with fractions ♦ Operations and combinations of operations on fractions including mixed numbers (addition, subtraction, multiplication, division)	3

Statistics

Learning Intention. To be able to -	Periods

Compare data sets using statistics
 	
Compare data sets using calculated/determined:
 	
    ♦ semi-interquartile range
    ♦ standard deviation
	3

Form a linear model from a given set of data ♦ Determine the equation of a best-fitting straight line on a scattergraph and use it to estimate y given x	2

Complete Qu 8-12 of Applications assessment	4