



Overview

The Math Syllabus at GEMS Wesgreen International Secondary School aims to support students in building competency, confidence and fluency in their use of techniques and mathematical understanding. Throughout the year we recover and extend objectives as the focus is to develop in students their reasoning, problem-solving and analytical skills from a variety of abstract and real-life contexts.

Learning Outcomes

The aims of all subjects state what a teacher may expect to teach and what a student may expect to experience and learn. These aims suggest how the student may be changed by the learning experience.

The aims of the Math Syllabus are to encourage and enable students to:

- 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.

Unit Overviews

Term 1

Unit 6

Approximate length: 1 week

Number 6

In this unit the children will learn Direct proportion, Inverse proportion, Fractional indices and Negative indices.

Specific National Curriculum Objectives Covered:

We are learning to recognise and use direct and inverse proportion.

- I can recognise direct proportion.
- I can recognise inverse proportion.
- I can solve problems involving direct and inverse proportion.

We are learning to apply the laws of indices to simplify numerical expressions.

- I can simplify indices using basic index laws.
- I can apply the basic index laws to numerical expressions.
- I can combine the index laws in one expression.

Unit 6

Approximate length: 1 week

Algebra 6

In this unit the children will about Proportion and Indices.

Specific National Curriculum Objectives Covered:

We are learning to calculate direct and inverse proportion.

- I can find set up an equation to find the constant, k.
- I can solve problems involving direct proportion.
- I can solve problems involving inverse proportion.

We are learning to apply the laws of indices to algebraic expressions.

- I can simplify indices using basic index laws.
- I can apply the basic index laws to algebraic expressions.
- I can combine the index laws in one expression.
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Unit 7 and 8

Approximate length: 1 week

Number 7 and 8

In these units the children will learn in Number 7: Recurring decimals Advanced calculator problems and in Number 8: Converting between units of length, converting between units of area converting between units of volume compound measures.

Specific National Curriculum Objectives Covered:

We are learning to convert recurring decimals to fractions.

- I can differentiate terminating and non-terminating decimals.
- I can write down fractions that produce terminating decimals.
- I can change recurring decimals to a fraction.

We are learning to use a calculator for more complex calculations.

- I can use the calculator to solve complex problems.
- I can write correct to given significant figures.

We are learning to convert metric units.

- I can convert between units of length.
- I can convert between units of area.
- I can convert between units of volume.

We are learning to solve problems involving compound measures.

- I can calculate compound measure speed.
- I can calculate compound measure density.
- I can calculate compound measure pressure.

Unit 9 and 10

Approximate length: 1 week

Number 9 and 10

In this unit the children will learn **Number 9**: Comparative Costs, Taxation, salaries and income tax and foreign currency. **Number 10**: Rational and irrational numbers surds.

Specific National Curriculum Objectives Covered:

We are learning solve real-life problems involving percentages and money.

- I can decide which service is better value for money.
- I carry out calculations involving money.
- I convert between currencies.

We are learning to solve problems involving irrational numbers.

- I can understand the difference between rational and irrational numbers.
- I can simplify surds.
- I can rationalise the denominator of a fraction.

Unit 7

Approximate length: 1 week

Algebra 7

In this unit the children will learn Solving quadratic equations by factorizing, by completing square, by quadratic formula problems leading to quadratic equations solving quadratic inequalities.

Specific National Curriculum Objectives Covered:

We are learning to solve quadratic equations by factorisation.

- I can factorise quadratic expressions.
- I can solve quadratic equations through factorisation.
- I can solve quadratic equations by taking common factor.

We are learning to develop an understanding of how to complete the square.

- I can expand expressions in the form $(x + p)^2 + q$.
- I can find the turning point by completing the square.
- I can complete the square when fractions are involved.
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We are learning to solve quadratic equations using quadratic formula.

- I can find the values of a, b and c.
- I can solve quadratic equations by quadratic formula.
- I can solve problems leading to quadratic equations.

We are learning to solve quadratic inequalities.

- I can use identify numbers that satisfy and inequality.
- I can show inequalities on a number line.
- I can solve an inequality and represent on the graph.

Unit 8

Approximate length: 1 week

Algebra 8

In this unit the children will learn Functions, Domain and range composite functions and inverse function.

Specific National Curriculum Objectives Covered:

We are learning to Use function notation and substitute into $f(x)$ given x and describe mappings.

- I can understand function notation in the form $f(x)$.
- I can substitute into $f(x)$ given x .
- I can describe mappings and the resulting domain and range.

We are learning to find the composition of functions

- I can substitute one function into another.
- I can expand a function.
- I can solve a function.

We are learning to represent an inverse function.

- I can understand the inverse and use the notation.
- I can write the inverse function by rearranging.
- I can use an inverse function and solve.

Unit 9 and 10**Approximate length: 1 week****Algebra 9 and 10**

In this unit the children will be Solving 2 simultaneous equations 1 linear and one nonlinear, Proof, simplifying algebraic fractions, Adding and subtracting Algebraic fractions, Multiplying and dividing algebraic fractions and Solving equations with algebraic fractions.

Specific National Curriculum Objectives Covered:

We are learning simultaneous equations with one equation being quadratic.

- I can solve simultaneous equations algebraically.
- I can show solutions of equations graphically.
- I can problems leading to simultaneous equations.

We are learning prove the statements.

- I can prove the statement through substitution.
- I can prove numbers are even or odd
- I can prove the solution through completing square method.

Unit 6**Approximate length: 1 week****Sequences**

In this unit the children will learn Counting sequences Formula for sequences , The difference method, Finding a formula for a sequence Arithmetic sequences and Sum of an arithmetic sequence.

Specific National Curriculum Objectives Covered:

We are learning to find the Nth term of arithmetic sequence

- I can next term of the sequence.
- I can find the nth term of the sequence.
- I can determine whether a particular number is a term of a given AP.

We are learning find the sum of an arithmetic series.

- I can find the sum of an arithmetic sequence.
- I can solve problems leading to arithmetic series.

Unit 7 and 8**Approximate length: 1 week****Graph 6 and 7**

In this unit the children will learn *GRAPHS 6: Cubic graphs reciprocal graphs*, *GRAPHS 7: Using graphs to solve quadratic equations, using graphs to solve other equations and using graphs to solve nonlinear simultaneous equations.*

Specific National Curriculum Objectives Covered:

We are learning to recognise, draw cubic and reciprocal graphs

- I can substitute values into cubic expressions
- I can draw cubic graphs given the equations
- I can identify, draw exponential and reciprocal graphs.

We are learning to use graphs to solve quadratic and cubic equations.

- I can solve quadratic equations using graphs.
- I can solve cubic equations using graphs.
- I can solve word problems based on quadratic and cubic equations.

We are learning to find graphical solutions to equations

- I can draw a graph from a table of values.
- I can find solutions of a quadratic and a linear graph in the $x=a$ and $y=a$
- I can find solutions of a quadratic and all linear graphs.

Unit 9 and 10**Approximate length: 1 week****Graphs 8 and 9**

In this unit the children will *GRAPHS 8: Gradient of a curve at a point translating graphs reflecting graphs stretching graphs. GRAPHS 9: The gradient of a function Differentiation stationary points Motion of a particle in a straight line*

Specific National Curriculum Objectives Covered:

We are learning to use tangents to calculate the gradient of curves.

- I can draw quadratic and cubic graphs given the equations.
- I can find gradients of tangents to a curve.
- I can solve and find turning points using tangents.

We are learning to translate graphs.

- I can translate graphs vertically.
- I can translate graphs horizontally.
- I can sketch the graph of the given function.

Term 2

Unit 6 and 7

Approximate length: 1 week

Shape and Space 6 and 7

In this unit the children will learn SHAPE AND SPACE: 6 Circle theorems 2 Alternative segment theorem Intersecting chords theorem. SHAPE AND SPACE: 7 circles, solids and similar shapes.

Specific National Curriculum Objectives Covered:

We are learning to solve problems using circle theorem.

- I can understand and use the alternate segment theorem.
- I can understand and use the internal and intersecting chord properties.
- I can solve angle problems using circle theorem.

We are learning to calculate the area and circumference.

- I can calculate perimeter of circle, perimeter of semicircles and quarter circles.
- I can calculate the area of circle.
- I can solve word problems based on circles.

We are learning to calculate arc lengths, angles and areas of sectors of circles

- I can calculate arc length
- I can find the measure of angles.
- I can calculate the areas of sectors of circle.

We are learning to calculate the volume and surface area of 3-D shapes

- I can calculate the Volume of 3D shapes
- I can calculate surface area of 3D shapes.
- I can solve problems leading to volume and surface area.

We are learning to problems involving the areas and volumes of similar shapes.

- I can find missing the sides of similar shapes.
- I can calculate areas of similar shapes.
- I can calculate volumes of similar shapes.

Unit 8 and 9**Approximate length: 1 week****Shape and Space 8 and 9**

In this unit the children will learn SHAPE AND SPACE 8: Vectors and vector notation multiplication of a vector by a scalar vector geometry SHAPE AND SPACE 9:3D trigonometry.

Specific National Curriculum Objectives Covered:

We are learning to use algebraic rules, ratio and fractions to write vectors

- I can use algebraic rules to write vectors.
- I can use ratio and fractions to write vectors in simplest form.
- I can show 2 vectors are parallel.

We are learning to add, subtract, calculate the magnitude of a vector and identify parallel vectors

- I can add and subtract vectors.
- I can calculate the magnitude of a vector.
- I can identify parallel vectors.

We are learning to calculate the magnitude of a vector and identify parallel vectors

- I can add and subtract vectors.
- I can calculate the magnitude of a vector.
- I can identify parallel vectors.

We are learning solve geometric problems in two dimensions using vector method.

- I can calculate the resultant of two or more vectors.
- I can solve geometric problems in two dimensions using vector method.
- I can apply vector methods for simple geometric proofs.

Unit 10**Approximate length: 1 week****Shape and Space 10**

In this unit the children will learn Graphs of sine cosine and a tangent sign rule cosine rule area of a triangle.

Specific National Curriculum Objectives Covered:

We are learning to calculate the value of Sine, Cosine and Tangent and plot the graphs

- I can recognise the graphs of sine, cosine and tangent
- I can use a graph of trigonometric functions to solve equations.
- I can use the graph to identify multiple solutions for sin, cos and tan.

We are learning to apply the sine rule to calculate missing lengths and angles

- I can know the Sine rule formula and rearrange.
- I can apply the sine rule to find missing lengths.
- I can apply the sine rule to find missing angles.

We are learning to apply the cosine rule to calculate missing lengths and angles

- I can know the cosine rule formula and rearrange.
- I can apply the cosine rule to find missing lengths.
- I can apply the cosine rule to find missing angles.

We are learning to use trigonometry to solve problems

- I can sketch bearings and identify angles
- I can apply trigonometry to solve problems.
- I can calculate the trigonometry rule to find the area of a triangle.

Unit 6 and 7

Approximate length: 1 week

Sets 2 and 3

In this unit the children will learn Sets 2: 3 set problems practical problems shading sets set builder notation. Sets 3: Probability conditional probability using Venn diagrams.

Specific National Curriculum Objectives Covered:

We are learning to apply set notation to Venn diagrams.

- I can apply the set theory to find possible solutions in a Venn diagram.
- I can use knowledge of sets to shade regions in Venn diagrams.
- I can draw Venn diagrams from given set notation.

We are learning to solve logical problems using Venn diagrams

- I can Use Venn diagrams to solve simple problems.
- I can express sentences in set language/set-builder method.
- I can interpret statements from set language and Venn diagrams.

We are learning to calculate the probability from Venn diagrams

- I can construct a Venn diagram.
- I can calculate the probability of an event using Venn diagram.
- I can calculate from Venn diagrams using set notation.

We are learning to calculate conditional probability

- I can construct a Venn diagram.
- I can calculate the probability of an event using Venn diagram.
- I can calculate independent events using Venn diagrams.

Unit 8 and 9**Approximate length: 1 week****Handling Data 5 and 6**

In this unit the children will learn handling data 5 laws of probability combined events independent events and three diagrams conditional probability. Handling data 6 drawing histograms interpreting histograms.

Specific National Curriculum Objectives Covered:

We are learning to use fractions, decimals and percentages to describe the probability of events.

- I can use words to describe the probability of events.
- I can use fractions, decimals and percentages to describe the probability of events.
- I can use a sample space diagram to find a probability.

We are learning to use relative frequency to calculate probability

- I can calculate a probability using fractions.
- I can use relative frequency to calculate probability.
- I can use probability to calculate relative frequency.

Unit 10**Approximate length: 1 week****Handling Data 7**

In this unit the children will learn more compound probability, more tree diagram, more conditional probability.

Specific National Curriculum Objectives Covered:

We are learning to differentiate between exclusive and independent events

- I can understand difference between exclusive and independent events.
- I can calculate probabilities using the 'and' and 'or' rules.
- I can use of the combination of the rules to calculate the probability.

We are learning to draw a probability tree for dependent and independent events

- I can draw a probability tree for independent events.
- I can draw a probability tree for dependent events.
- I can calculate probabilities using the 'and' and 'or' rules.

Learning

Throughout this year we will be using multiple teaching methods in order to help our students learn more effectively. Students will use Phoenix, Sparxmaths, myimaths and GCSE Pod. Each lesson begins with a set of clearly stated objectives and an explanation of its place in the overall IGCSE syllabus. Effective learning is encouraged through frequent activities and self-assessment questions.

Links for solving past papers and links related to concepts covered to reinforce classroom learning followed will be available to students. Students will have access to worksheets with progression of difficulty, online assessments, tasks/open ended questions and fun activities through online platforms.

Assessment

Formative:

Throughout the units, the children will complete graded work, quizzes and problem-solving activities which allows the teacher to assess the students' attainment and inform their planning.

For each unit the students complete written quizzes, online quizzes as well as Chapter-wise tests (Topic Tests). Quizzes are taken based on 1-chapter assessment, where Tests are combined as per the requirement i.e., 2 to 3 chapters/topics - sections. This allows us to see progress across the units and align our planning.

Summative:

At the end of each term, we complete internal and standardized tests. This allows us to measure the students' progress throughout the term and year. Nearing the end of the academic year, the students appear for their **MOCK EXAMINATIONS**. This is to check and gauge their readiness / preparation for their final IGCSE examinations. At the end of the 2-year course, students appear for their final IGCSE examination for Syllabus - Edexcel IGCSE® Mathematics.

Hyperlink to the Edexcel IGCSE syllabus:

<https://qualifications.pearson.com/content/dam/pdf/International%20GCSE/Mathematics%20A/2016/Specification%20and%20sample%20assessments/international-gcse-in-mathematics-spec-a.pdf>