Year 11 Autumn T1 - Topic: Bearings and Scale Drawings

Prior learning:

Understand congruence and identifying congruent shapes
Draw and measure lines and angles
Construct circles
Understand equidistance

Objectives

End Points

- Find bearings from diagrams and worded questions
- Use and interpret scale factors, scale drawings and maps
- (H) Bearings with Pythagoras and Trigonometry

Learning Steps

Foundation

- Know the three rules of bearings
- Find the bearing between two points
- Draw a point on a fixed bearing from another point
- Given a bearing, find the reverse bearing
- Use and interpret map scales
- Draw and interpret scaled diagrams in real-life contexts

Crossover

- Bearings with Pythagoras

Higher

- Bearings with Trigonometry

Where will we use these ideas again:

Bearings will be revisited again with trigonometry and angles in parallel lines and scale drawings as a concept is revisited within enlargement.

Higher: Bearings with sine rule and cosine rule

Year 11 Autumn T1 - Topic: Handling Data 2

Prior learning:

Average and range from a list
Averages and range from a frequency table
Frequency polygons

Objectives

End Points

- Recap: frequency polygons
- Construct cumulative frequency diagrams
- Construct and interpret box plots
- Compare box plots
- Construct and interpret histograms

Learning Steps

Foundation	Crossover
○ Recap – Prior knowledge of averages and range and frequency polygons	○ Construct and interpret cumulative frequency diagram (excluding IQR and median) ○ Use a cumulative frequency diagram to estimate the median and interquartile range ○ Construct and interpret a box plot ○ Compare two or more distributions (median, range, IQR) and make a contextual statement ○ Calculate estimates of statistical measures from graphical representations of grouped data
	Higher
	○ Construct histogram with unequal class intervals ○ Interpret histogram with unequal class intervals ○ Problem solving with histograms

Where will we use these ideas again:

Year 11 Autumn T1 - Topic: Non-Linear Graphs - HIGHER

Prior learning:

Draw and interpret linear graphs
Draw quadratic graphs
Identify turning points and roots of quadratic graphs
Sketch quadratics
Substitution and solving
Completing the square

Objectives

End Points

- Interpret real life graphs
- Draw and interpret cubic graphs
- Draw and interpret reciprocal graphs
- Draw and interpret exponential graphs
- (H) Recap: completing the square
- (H) Use completing the square to sketch quadratic graphs
- (H) Equation of a circle
- (H) Tangent of a circle

Learning Steps

Foundation

- Recap – drawing linear and quadratic graphs
- Recognise graphs from real life scenarios (e.g. filling different flasks)
- Plot and draw a cubic graph
- Recognise and sketch simple cubic functions
- Recognise non-linear graphs and their equations
- Plot and draw a reciprocal graph
- Recognise and sketch simple reciprocal functions

Crossover

- Recognise and sketch the exponential graph
- Plot and draw an exponential graph
- Solve problems involving the exponential function
- Recap - Complete the square by rewriting quadratics
- Recap - Use completing the square to solve equations
- Use completing the square to find maximum and minimum values

Higher

- Sketch a more complex quadratic graph, finding the turning points by completing the square
- Know and use the equation of a circle
- Find the equation of a circle
- Find the equation of a tangent to a circle

Where will we use these ideas again:

Year 11 Autumn T1 - Topic: Non-Linear Graphs

Prior learning:

Re-arrange formula
Represent inequalities on a number line
Solve linear inequalities
Drawing linear and quadratic graphs

Objectives

End Points

- (H) Solve inequalities graphically
- (H) Solve quadratic inequalities graphically

Learning Steps

Foundation

- Recap – solving and representing linear inequalities

Crossover

Higher

- Solve a set of linear inequalities in two or more variables and represent solution as a region of a graph
- Solve quadratic inequalities graphically
- Solve quadratic inequalities
- Identify the set of values that satisfy two or more quadratic inequalities or a quadratic inequality and linear inequality

Year 11 Autumn T2 - Topic: Combined Events and Probability Trees

Prior learning:

Express a probability as fraction, decimal or percentage
Mutually exclusive events
'OR' rule in probability
Systematic listing
Relative and theoretical probability
Estimate outcomes

Objectives

End Points

- Interpret and draw Venn diagrams
- Use set notation
- Probability and Venn diagrams
- Draw and interpret tree diagrams with replacement
- Draw and interpret tree diagrams without replacement
- Successive probabilities
- Algebra and probabilities

Learning Steps

Foundation

- Recognise and define the universal set
- Sort data into a Venn diagram
- Find the intersection from a Venn diagram
- Find the union from a Venn diagram
- Complete and use Venn diagrams to find frequencies
- Recognise and use the notation for intersection, union and complement
- Design a Venn diagram to solve multi-step problems
- Use a Venn diagram to calculate probability
- Understand of Venn Diagrams to three regions
- Complete a probability tree diagram involving independent events
- Find probabilities of successive independent events from a tree diagram
- Understanding how probabilities change in experiments without replacement
- Complete a probability tree diagram involving dependent events (e.g. without replacement)
- Find the probability of an event occurring given information as ratios
- Understand the concept of conditional probability

Crossover

- Find probabilities of dependent events from a tree diagram
- Find conditional probability from a table, Venn diagram or tree diagram
- Find probabilities of successive independent events without a tree diagram
- Find the probability of a combination of mutually exclusive events from a tree diagram

Higher

- Find probabilities of successive dependent events without a tree diagram
- Extend understanding of Venn Diagrams to three regions
- Forming equations with dependent and independent events

Year 11 Spring T1 - Topic: Trigonometry 2

Prior learning:

Know exact values of trigonometric values
Find missing lengths using trigonometry
Find missing angles using trigonometry
3D Trigonometry
Pythagoras and Trigonometry

Objectives

End Points

- Understand and apply the sine rule
- Understand and apply the cosine rule
- Area of non-right angle triangle
- 3D trigonometry

Learning Steps

Foundation

- Recap – trigonometry to find lengths and angles
- Recap – exact values of trigonometry
- Use trigonometry to calculate angles of elevation

Crossover

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Higher

- Use the sine rule to find missing sides and angles in non-right angled triangles
- Use the cosine rule to find missing sides and angles in non right angled triangles
- Find the area of triangles using ½absinC
- Solve 3D problems involving trigonometry
- Trigonometry and Bearings

Year 11 Spring T1 - Topic: Fractions and Algebraic Proof

Prior learning:

Algebraic Expressions
Changing the subject
Substitution
Plotting Graphs

Objectives

End Points

- Prove and counter example statements
- Algebraic proof
- Substitute into basic and composite functions
- Find inverse functions

Learning Steps

Foundation

- Use mathematical reasoning (e.g. counter-example) to prove or disprove arithmetic statements

Crossover

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Higher

- Complete algebraic proofs
- F(x) notation
- Evaluate functions by substituting values of x
- Find the inverse of a basic function where x appears only once
- Find the inverse of a basic function where x appears more than once
- Define a composite function
- Evaluate a composite function by substituting values of x
- Solve equations involving functions and composite functions
- Evaluating functions with indices

Year 11 Spring T1 & 2- Topic: Vectors

Prior learning:

Simplify expressions
Expand expressions
Factorise expressions

<table>
<tr><th colspan="4">Objectives</th></tr>
<tr><th>End Points</th><th rowspan="2">Learning Steps</th><th>Foundation</th><th>Crossover</th></tr>
<tr><td rowspan="2">○ Represent vectors in 2D
○ Calculate with vectors in 2D
○ Vector problems including ratios</td><td rowspan="2"></td><td>○ Represent a two-dimensional vector as a column vector
○ Multiply and divide vectors by scalars
○ Add and subtract vectors and/or multiples of vectors</td></tr>
<tr><td>Higher</td><td>○ Understand that parallel vectors are multiples of each other
○ Solve simple geometric problems in 2-D using vector methods
○ Combined questions of vectors and ratio</td></tr>
</table>

Year 11 Spring T2- Topic: Iteration, Geometric and Complex Sequences

Prior learning:

Special sequences
Fibonacci sequences

Recognise geometric sequences

Objectives			
End Points		Foundation	Higher
○ Geometric sequences ○ Iteration ○ Approximate solutions with iteration ○ Quadratic sequences ○ Sequences and algebra	**Learning Steps**	○ Generate a geometric progression given a and r ○ Write and use the formula for a geometric progression ○ Find a given term of a geometric progression	○ Understand the meaning of iteration and use iterative processes ○ Generate a sequence using an iterative rule ○ Solve equations such as $x^3 + x = 12$ using trial and improvement ○ Solve equations using an iteration formula ○ Show a solution lies in an interval using change of signs ○ Find the next term of a quadratic sequence ○ Find the nth term of quadratic sequences ○ Geometric sequences and algebra

Year 11 Spring T2 and Summer T1 - Topic: Trig Graphs and Graph Transformations

Prior learning:

Drawing velocity time graphs

Exact values of trigonometry

Objectives			
End Points		Foundation	Higher
○ Recap – velocity time graphs ○ Acceleration ○ Distance from velocity time graph ○ Gradient of tangents ○ Area under a curve ○ Drawing and using trigonometric graphs ○ Transformation of graphs	**Learning Steps**	○ Recap – drawing velocity time graphs	○ Calculate acceleration from a velocity-time graph ○ Calculate the distance travelled from a velocity-time graph ○ Estimate the gradient of a tangent to a curve ○ Find the gradient to a tangent of a curve ○ Find the area under a graph made up of straight lines ○ Find the area under a curve using rectangles ○ Find the area under a curve using trapezia ○ Recognise and draw the graphs of sine and cosine ○ Recognise and draw the graph of tangent ○ Evaluate the sine, cosine and tangent of angles greater than 90° ○ Solve simple trig equations using graphs ○ Transform the graphs of polynomial functions ○ Transform graphs of trigonometric functions ○ Transform a function, f(x) ○ Use completing the square as a transformation of x^2 to sketch a graph