Year 10 Autumn T1 - Topic: Standard Form

Prior learning:

Use place value to multiply and divide numbers by powers of 10
Understand the effect of place value when multiplying and dividing

<table>
<tr><th colspan="4">Objectives</th></tr>
<tr><th>End Points</th><th rowspan="4">Learning Steps</th><td>Foundation</td><td>Higher</td></tr>
<tr><td rowspan="3">o Interpret standard form
o Use standard form in calculations</td><td>o Understand the rules of standard form
o Convert between numbers in ordinary and standard form
o Calculate in standard form with a calculator
o Calculate in standard form without a calculator</td><td rowspan="3"></td></tr>
<tr><td>Crossover</td></tr>
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Where will we use these ideas again:
This topic will be implemented within geometry and data handling topics.

Higher: Standard form often gets included in Bounds and Limits calculations as well as applying to geometry questions. Converting between metric units and can be needed when looking at frequency densities in histograms

Year 10 Autumn T1 - Topic: Probability

Prior learning:

Understand and use vocabulary of probability
Understand and use a probability scale
Addition and subtraction with decimals, fractions and percentages
Represent decimals, fractions and percentages on a number line

Objectives

End Points

- Express Probabilities
- Calculate probabilities
- Understand and find relative frequencies and experimental probabilities
- Listing outcomes
- Two-way tables
- Frequency trees
- Introduction to probability trees
- (H) successive independent events

Learning Steps

Foundation

- Express a probability as a fraction, decimal or percentage
- Use the fact that the probabilities of mutually exclusive outcomes add up to 1 and complete a probability table
- Use the fact that the probabilities of mutually exclusive outcomes add up to calculate other probabilities (the OR rule)
- Understand and use relative frequency / experimental probability
- Use probability to estimate outcomes for a population
- List outcomes systematically
- Write all the combinations from a list
- Identify permutations from a list
- Draw and use a sample space to find probability of two events happening
- Draw and use a two-way table to find a probability
- Design and use frequency trees

Crossover

- Solve equations from probability problems
- Introduction to probability trees - complete a probability tree diagram involving independent events

Higher

- Find probabilities of successive **independent** events without a tree diagram
- Find the probability of a combination of mutually exclusive events from a tree diagram (the OR rule)
- Form and solve equations from probability tables, frequency trees
- More complex problems with frequency trees and two way tables

Where will we use these ideas again:

This topic will be included in combined probabilities and tree diagrams and handling data

Year 10 Autumn T1 - Topic: Linear Sequences and Graphs

Prior learning:

Understand the terms 'perpendicular lines' and 'parallel lines'
Use coordinates in all four quadrants
Perform calculations involving negatives
Solve equations
Substitution

Use coordinates in all four quadrants
Perform calculations involving negatives
Solve equations
Rearrange formulae
Generate a sequence

Objectives

End Points

- Find values in a linear sequence
- Find the nth term of a sequence
- Use a linear sequence
- Work with coordinates
- Find midpoint
- Plot linear graphs
- Identify gradients and intercepts of straight line graphically and algebraically
- Find the equation of a linear graph
- Find the equation of a straight line give coordinates
- Identify and use parallel lines
- (H) Identify and use perpendicular lines
- Identify the gradient of a straight line graph as a rate of change.
- Use graphs to solve problems involving distance, speed and acceleration.

Learning Steps

Foundation

- Find the next term in a numerical or pictorial sequence
- Find the nth term of a sequence or a series of diagrams
- Find a particular term in a sequence
- Justify whether a number is a term of a sequence
- Find coordinates of points determined by geometrical information
- Find midpoints of two coordinates
- Plot the graphs of horizontal lines such as y=4 and vertical lines such as x=3
- Draw the graph for equations such as y = 2x + 3 and recognise these are linear
- Understand the equation of a straight line, interpreting the gradient and intercept
- Using ratio to find the gradient base:height
- Find the gradient of a straight-line graph
- Sketch a linear function from its equation
- Interpret a straight line graph in a real life context (gradient and y intercept)
- Draw and interpret distance-time graphs

Crossover

- Find the gradient of a line given two coordinates
- Find the equation of a straight line from a graph
- Find the equation of a straight line given two coordinates
- Find the equation of a straight line given a parallel line and a point
- Work out an average speed from a distance-time graph

Higher

- Find the gradients of perpendicular straight-line graphs
- Prove two lines are parallel or perpendicular
- Find the equation of a straight line given a perpendicular line and a point

Where will we use these ideas again:

The skills used within this topic will be used within non-linear graphs

Higher: the skills used within the sequence's topic are used for non-linear sequences

Year 10 Autumn T2 - Topic: Percentage and Ratio

Prior learning:

Representing ratio
Simplifying ratios
Percentage of amounts

Objectives

End Points

- Writing in ratio form
- Divide a quantity into a ratio
- Using a ratio in context
- Combined and equivalent ratio
- Express values as percentages
- Calculate percentage increase and decrease
- Solve problems involving percentage change
- Reverse percentage
- Simple and compound interest

Learning Steps

Foundation

- Recap – Percentage of an amount with and without a calculator
- Express one quantity as a percentage of another with and without a calculator
- Increase or decrease a quantity by a given percentage
- Calculate a percentage increase or decrease using a multiplier
- Work out reverse percentage problems
- Work out the percentage change
- Calculate simple interest & depreciation
- Write ratios in the form 1:n or n:1
- Share a quantity into a given ratio
- Dividing line segments using ratios
- Calculate parts of a ratio given one quantity
- Solve recipe problems involving ratio
- Write a fraction or percentage from a given ratio and vice versa
- Convert a ratio into an equation
- Recognise the relationships derived from equivalent ratios – comparing and combing ratios

Crossover

- Work out compound interest and depreciation
- Understand how to use successive percentages in other situations

Higher

- Harder ratio and equations including worded problems

Where will we use these ideas again:

This topic will be revisited again throughout the course as fractions, ratio and percentages will be incorporated into all other topics such as probability, solving equations, areas and volumes.

Year 10 Autumn T2 - Topic: Handling Data

Prior learning:

Design and use a tally chart
Construct and interpret pictogram
Group data into class intervals
Stratified sampling
Product rule for counting
Finding average and range from a list

Objectives

End Points

- Recap of averages
- Complete frequency tables and find averages from tables
- Estimated mean
- Combined mean
- Construct and interpret bar charts
- Construct and interpret vertical line charts
- Construct and interpret pie charts
- Construct and interpret scatter graphs
- Construct and interpret time series graphs
- Recognise bias and misleading graphs
- Construct and interpret stem-and-leaf diagrams
- Construct and interpret frequency polygons

Learning Steps

Foundation

- Recap – Prior learning skills if required depending of class
- Recap – Find the mode for a set of numbers and graph
- Recap – Find the median for a set of numbers
- Recap – Calculate the mean for a set of numbers
- Solve complex mean problems
- Recap – Work out the range for a set of numbers
- Compare the averages and range of two sets of data
- Find the total from a frequency table
- Find the modal value from a discrete frequency table
- Find the modal class for grouped data
- Find the median and quartiles from a discrete or grouped frequency table
- Find the mean from a frequency table
- Construct and interpret bar charts
- Construct and interpret a composite or dual bar chart
- Construct and interpret a vertical line chart
- Construct a pie chart
- Interpret a pie chart
- Draw a scatter graph by plotting points on a graph
- Identify the type and strength of correlations
- Draw a line of best fit on the scatter graph
- Interpret scatter graphs (excluding correlation)

Foundation continued

- Complete a time series graph
- Interpret a time series graph using trend lines
- Recognising when and why graphs can be misleading
- Construct and interpret a stem-and-leaf diagram
- Construct a frequency polygon

Crossover

- Find an estimate of the mean for grouped data

Where will we use these ideas again:

This topic will be revisited in year 11 with further data handling and within fraction, decimals and percentages, algebra and ratio problem solving

Year 10 Autumn T2 and Spring T1 - Topic: Circles

Prior learning:

Area and perimeter of 2D Shapes (excluding circles)
Fraction of an amount
Substitution

Objectives

End Points

- Recap – area and perimeter of 2D Shapes
- Identify and apply circle definitions and properties
- Find the area and circumference of a circles
- Area and perimeter of composite shapes involving circles
- Area and perimeter of semi and quarter circles
- Arc lengths and perimeter of sectors
- Area of sector
- (H) Area of segment

Learning Steps

Foundation

- Recap – area and perimeter of 2D Shapes
- Know the definition of a circle and identify the, centre, radius, diameter and circumference
- Recognise complex parts of circle such as tangents, arcs, sectors, chords and segments
- Calculate the circumference of a circle to an appropriate degree of accuracy
- Find the perimeter of a semicircle and quarter circle
- Calculate the area of a circle to an appropriate degree of accuracy
- Find the area of a semicircle or quarter circle
- Compound shapes with areas – perimeter and area

Crossover

- Find the lengths of arcs and perimeters of sectors of a circle
- Find the area of a sector of a circle

Higher

- Find the area of segments of circles (with Pythagoras as this will be revisited after trigonometry topic in year 11)

Where will we use these ideas again:

All if of these objectives will be revisited when studying 3D shapes – surface areas and volumes

Higher: Students will revisit properties of circles when learning about circle theorems and equations of circles

Year 10 Spring T1 - Topic: Simultaneous Equations and Plotting Graphs

Prior learning:

Use coordinates in four quadrants
Calculations with negatives
Solve equations
Rearrange linear equations
Substitution

Objectives

End Points

- Plot linear graphs and quadratic graphs
- Use quadratic graphs
- Sketch quadratics
- Solve linear simultaneous equations
- Solve linear equations graphically
- (H) Solve non-linear simultaneous equations

Learning Steps

Foundation

- Plot the graphs of horizontal and vertical lines
- Draw the graph for linear equations and recognise these are linear
- Solve problems involving graphs, such as find the intersect of $y = x + 2$ and $y = 1$
- Solve linear simultaneous equations graphically
- Draw graphs of quadratic functions such as $y = 3x^2$ and $y = x^2 + 4$ using a table of values
- Use graphs to find the approximate solutions of quadratic equations

Crossover

- Solve a pair of simultaneous linear equations algebraically
- Identify the roots and intercepts from a quadratic graph
- Identify the turning points of a quadratic graph
- Using symmetry, identify the turning points of a quadratic graph
- Sketch a simple quadratic function such as $y = x^2 + 4$

Higher

- Algebraically solve a pair of simultaneous equations with one is linear and one is quadratic

Where will we use these ideas again:

This topic will be used when reviewing further non-linear graphs and as part of revision in year 11

Year 10 Spring T1 - Topic: Transformations

Prior learning:

Recognise symmetry
Draw lines of symmetry
Reflection in mirror line
Rotational symmetry
Recognise shapes

Objectives

End Points

- Describe and transform shapes using reflections, rotations, translation and enlargement
- Identify invariant points
- (H) Enlargement with negative scale factors

Learning Steps

Foundation

- Translate a shape using a description such as 4 units right and 3 units down
- Translate a shape by a vector
- Describe a translation by a vector
- Reflect shapes in the axes of a graph and line parallel to axes
- Reflect shapes in lines such as y=x and y=-x
- Describe fully reflections in a horizontal or vertical line
- Describe fully reflections in diagonal lines
- Rotate shapes about the origin
- Rotate shapes about any point
- Describe fully rotations about any point
- Draw the enlargement of a shape by a positive scale factor
- Enlarge a shape by a positive scale factor from a given centre
- Enlarge a shape by a fractional scale factor from a given centre
- Find the scale factor of an enlarged shape

Foundation Continued

- Find the centre of enlargement given a shape and its image
- Describe fully an enlargement from a given point
- Describe a single transformation using correct mathematical language
- Draw a vector given a column vector
- Add and subtract column vectors

Higher

- Enlarge a shape by a negative scale factor from a given centre
- Draw a sequence of transformations
- Describe a series of transformations as one single transformation
- Describe points which are invariant

Where will we use these ideas again:

Introducing vector notation in translation will lead to the unit on vectors. The concept of enlargement and scale factors links to previous topics of scales and topics of similar shapes

Higher: the understanding of transformations will be revisited when transforming graphs

Year 10 Spring T2 - Topic: Trigonometry

Prior learning:

Recognise symmetry
Draw lines of symmetry
Reflection in mirror line
Rotational symmetry
Recognise shapes

Objectives

End Points

- Understand sine, cosine and tangent ratios
- Use trigonometry to find the missing lengths and angles of a right-angle triangle
- Calculate angles of elevation
- Recall exact values of trigonometry

Learning Steps

Foundation

- Label the vertices and sides of a triangle
- Understand that sine, cosine and tangent are ratios
- Use trigonometry to find missing side lengths in right angled triangles
- Use trigonometry to find missing angles in right angled triangles

Crossover

- Use trigonometry to calculate angles of elevation
- Know the exact trigonometric values for (30°, 45°, 60°, 90°)

Higher

- Pythagoras and Trigonometry
- 3D Trigonometry

Where will we use these ideas again:

Trigonometry is often linked to areas and perimeters of shapes

Higher: Will be revisiting trigonometry when looking at cosine and sine rules. These topics will also be linked to bearings, linear and circle graphs, circle theorems

Year 10 Spring T2 - Topic: Units and Proportionality

Prior learning:

Solve questions involving best value for money
Solve simple direct proportion
Unitary method
Understand and use compound measures
Conversion of units and money
Decide metric units for everyday measures

Objectives

End Points

- Solve proportion problems including exchanging money
- Draw and use conversion graphs
- Compound unit conversions
- Solve indirect proportion
- Graphs of direct and indirect proportion
- (H) Solve direct and indirect proportion using equations

Learning Steps

Foundation

- Recap – unit conversion
- Solve proportion problems
- Solve proportion questions relating to exchanging money
- Draw and/or use conversion graphs, including for temperature and currency conversion
- Solve indirect proportion questions involving work rate (e.g. how many man-hours)
- Recognise graphs showing direct and inverse proportions

Crossover

- Convert between different units of compound measures

Higher

- Understand and solve simple problems involving direct proportion ($y \propto x$)
- Understand and solve simple problems involving indirect proportion ($y \propto 1/x$)
- Understand and solve more complex problems involving direct and indirect proportion ($y \propto x^2$)

Where will we use these ideas again:

Year 10 Summer T1 - Topic: Working in 3D

Prior learning:

Name and state properties of 3D Shapes
Identify basic 3D Shapes
Find the volume of a shape by counting cubes
Find the area of 2D Shapes
Find the perimeter of 2D Shapes

Objectives

End Points

- Draw and interpret plans and elevations
- Find the volume of various 3D shapes
- Find missing heights, lengths, width from various 3D shape
- Calculate the surface area of various 3D shapes
- Use formula to find more complex 3D volumes and surface area Find the volumes of spheres

Learning Steps

Foundation	Higher
○ Recognise nets of 3-D shapes, e.g. Cube, triangular prism, square based pyramid etc ○ Draw the net of a cuboid ○ Draw and interpret plans and elevations of 3-D solids ○ Draw a 3-D solid given its plan and elevations ○ Draw 3D shapes on isometric paper ○ Find the volume of a cube/cuboid ○ Find the height of a cuboid, given volume, length and breadth ○ Calculate volumes of prisms ○ Calculate volumes of cylinders ○ Solve boxing problems involving volume calculations ○ Calculate the surface area of a cuboid ○ Calculate the surface areas of cylinders ○ Calculate the surface areas of a triangular prism ○ Calculate the surface area of more complex prisms	○ Distinguish between formulae for perimeter, area and volume by considering dimensions ○ Find the surface area and volume of composite solids ○ Form and solve equations related to 3D shapes ○ Compare the surface area and volume of solid shapes, using ratios where appropriate ○ Find the volume of a frustum – using similarity of lengths

Crossover

- Find the volumes of spheres
- Find the volume of a pyramid
- Find the volume of cones
- Find the volume of a frustum
- Find the surface area of spheres
- Find the surface area of cones
- Find the surface area of a pyramid
- Solve algebraic problems involving the surface area/volume of complex shapes

Convert between square and cubic metric units (mm^2 to m^2 or cm^3 to litres)

Where will we use these ideas again:

Volume and surface are used within various other topics including similarity, bounds and ratio

Year 10 Summer T1 – Foundation – Topic: Congruence and Similarity

Prior learning:

Understand the word congruent
Measure lines
Estimate and measure angles
Draw angles

Objectives

End Points

- Congruence
- Similarity

Learning Steps

Foundation

- Recap - Understand the word "similar" and be able to identify similar shapes
- Recap - Find the lengths in similar shapes
- Recap - Understand and apply mathematical similarity
- Understand the word "congruent" and be able to identify congruent shapes

Crossover

- Use angle facts to prove triangles are congruent in more complex questions
- Given two triangles are congruent, state the reason (SAS, ASA, SSS, RHS)
- Prove that two triangles are congruent

Higher

Where will we use these ideas again:

Trigonometry

Higher: Circle Theorems

Year 10 Summer T1 – Foundation – Topic: Construction and Angles Review

Prior learning:

Understand the word congruent
Measure lines
Estimate and measure angles
Draw angles

Objectives

End Points	Learning Steps	Foundation	Crossover
○ Construction of angles and bisects ○ Drawing specific triangles with a compass and/or protractor		○ Construct a circle using a pair of compasses given a centre and circumference ○ Construct the perpendicular bisector of a line ○ Construct the angle bisector ○ Construct the perpendiculars to and from a point ○ Construct the angles of 60º and 90º with a ruler and compass ○ Draw an SAS triangle with ruler and protractor ○ Draw an ASA triangle with ruler and protractor ○ Draw an SSS triangle with ruler and compasses	

Recap of Angles: Objectives

End Points	Learning Steps	Foundation	Crossover
○ Deduce and use the angle sum in any polygon ○ Calculate interior and exterior angles for regular polygons ○ Describe and apply the properties of angles ○ Angles within parallel lines. ○ Derive and apply the properties and definitions of special types of triangles and quadrilaterals ○ Derive and use the sum of angles in a triangle		○ Calculate the sum of angles in any polygon ○ Calculate interior angles of a regular and irregular polygon ○ Calculate exterior angles of a regular and irregular polygon ○ Problem solving including interior and exterior angles of polygons ○ Angle and polygon notation ○ Estimate angles, measure and draw them accurately ○ Use properties of opposite angles, angles at a point and angles on a straight line to find missing angles ○ Recognise corresponding, alternate and co-interior angles ○ Use angle properties of isosceles, equilateral and right-angled triangles ○ Use properties of triangles to find missing angles	○ Reasoning question including angles in polygons, angles facts and angles in parallel Higher