Cornwallis Academy
Ambitions for All

SMILE
SUCCESSFUL | MOTIVATED | INSPIRED | LEARNING | EXCITED & ENGAGED

Year 11 Mathematics (Foundation)

Angles in polygons

Learning Objectives

- Solve angle problems using equations
- Solve geometrical problems showing reasoning
- Calculate the interior and exterior angles of regular polygons

What previous knowledge is required?

- Use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries.
- Use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written descriptions.

Common Misconceptions

- Confusing Interior and Exterior Angles
- Thinking the Interior-Angle Sum Formula Works for Exterior Angles
- Believing All Polygons Have Equal Angles

National Curriculum / Specification

- Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles
- Understand and use alternate and corresponding angles on parallel lines
- Derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)

Angles in triangles/parallel lines

Learning Objectives

- Understand and use angle properties of parallel lines
- Find missing angles using corresponding and alternate angles
- Solve angle problems in triangles
- Understand angle proofs about triangles

What previous knowledge is required?

- Solve geometric problems using side and angle properties of special quadrilaterals

Common Misconceptions

- Thinking all equal-looking angles are equal
- Mixing up corresponding and alternate angles
- Forgetting that parallel lines are required
- Assuming co-interior angles are equal

National Curriculum / Specification

- Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles
- Understand and use alternate and corresponding angles on parallel lines
- Derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)

Bearings

Learning Objectives

- Find and use three-figure bearings.
- Use angles at parallel lines to work out bearings.
- Solve problems involving bearings and scale diagrams.

What previous knowledge is required?

- Measuring angles, compass directions, angles of turn

Common Misconceptions

- Bearings can be written with one or two digits
- Drawing the angle from the wrong point
- Forgetting North lines are parallel

National Curriculum / Specification

- Measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings

Area of compound shapes

Learning Objectives

- Calculate the perimeter and area of shapes made from triangles and rectangles
- Calculate areas in hectares, and convert between ha and m^2

What previous knowledge is required?

- Area of basic shapes
- Basic geometry vocabulary
- The difference between area and perimeter

Common Misconceptions

- Forgetting to Split the Shape Correctly
- Using Incorrect Dimensions
- Not Finding Missing Measurements

National Curriculum / Specification

- Use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)

Volume/surface area

Learning Objectives

- Work out the volume and surface area of cylinders.
- Work out the volume of a pyramid.
- Work out the surface area of a pyramid.
- Work out the volume of a cone.
- Work out the surface area of a cone.
- Work out the volume and surface area of a sphere.
- Work out the volume and surface area of composite solids.

What previous knowledge is required?

- Solve problems involving areas and perimeters of 2D shapes.

Common Misconceptions

- Confusing Surface Area with Volume
- Forgetting Hidden Faces in Surface Area
- Adding Dimensions Instead of Multiplying for Volume

National Curriculum / Specification

- Know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)

Drawing/interpreting scale diagrams

Learning Objectives

- Draw diagrams to scale.

- Use scales on maps and diagrams to work out lengths and distances.
- Solve problems involving scales.

What previous knowledge is required?

- Use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate

Common Misconceptions

- Reversing the scale ratio
- Assuming diagrams are always drawn to scale

National Curriculum / Specification

- Use scale factors, scale diagrams and maps

Interpreting graphs of quadratic functions

Learning Objectives

- Solve quadratic equations a ‘x^(2)’ + bx + c = 0 using a graph.
- Solve quadratic equations a ‘x^(2) + bx + c = k using a graph.

What previous knowledge is required?

- Understanding of Coordinate Graphs
- Basic Algebra Skills
- Function Notation
- Recognizing Quadratic Functions

Common Misconceptions

- Assuming every parabola crosses the x-axis twice

National Curriculum / Specification

- Recognise, sketch and interpret graphs of linear functions and quadratic functions

Quadratic graphs

Learning Objectives

- Plot graphs of quadratic functions.
- Recognise a quadratic function.
- Use quadratic graphs to solve problems

What previous knowledge is required?

- Cartesian Coordinates
- Linear Graphs
- Graphing straight lines such as *y=2x+1y = 2x + 1*y=2x+1
- Understanding slope (gradient) and intercepts
- Substitution and Evaluation
- Finding function values by substituting numbers for *x*

Common Misconceptions

- Mixing up roots and the y-intercept

National Curriculum / Specification

- Recognising, sketching and interpreting quadratic functions.
- Identifying roots, intercepts and turning points graphically.
- Using graphs to find approximate solutions to quadratic equations.
- The Key Stage 4 specification explicitly states that students should:
- Recognise, sketch and interpret graphs of quadratic functions
- Plot and interpret graphs in a variety of contexts.

Equations of straight lines

Learning Objectives

- Find the gradient of a line
- Identify and interpret the gradient from an equation
- Understand that parallel lines have the same gradient
- Understand what m and c represent in y=mx+c
- Find the equations of straight-line graphs
- Sketch graphs given the values of m and c

What previous knowledge is required?

- Coordinates and plotting points
- Basic algebra
- Gradient between two points
- Meaning of the y-intercept

Common Misconceptions

- Reversing the gradient calculation
- Assuming every equation must be written as y=mx+c

National Curriculum / Specification

- Recognise and use the form y=mx+c
- Find equations of straight lines from graphs
- Find equations from two points
- Find equations from a point and a gradient
- Interpret gradient and intercepts

Pie charts

Learning Objectives

- Draw and interpret pie charts

What previous knowledge is required?

- Fractions (e.g., 1/2, 1/4, 3/4)
- Percentages (e.g., 25%, 50%, 75%)
- The idea that percentages and fractions describe parts of a whole

Common Misconceptions
• Because the angle of a slice in one pie chart is larger than another this does not necessarily mean it represents more
National Curriculum / Specification
• Construct and interpret pie charts for categorical data • Use pie charts alongside bar charts, pictograms, and frequency tables • Interpret and compare data represented in different graphical forms