Properties of Shapes

Maths I Year 6 I Steps to Progression Overview

The aim of this overview is to support teachers using PlanIt Maths to show the most logical sequence to teach each area of maths. We also want to fully support teachers who use the **White Rose Maths** scheme of learning to make full use of the resources available within PlanIt Maths. Whenever possible, lesson packs have been matched to each of the small steps on the **White Rose Maths** scheme of learning.

Y6 Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value		Number – Addition, Subtraction, Multiplication and Division				Fractions				Geometry – Position and Direction	Consolidation
Spring	Number – Decimals		Number – Percentages		Number – Algebra		Measurement Converting units	Measurement Perimeter, Area and Volume		Number – Ratio		Consolidation
Summer	Geometry – Properties of Shapes		Problem Solving			Statistics		Investigations				Consolidation

Teacher Note:

This unit also covers the White Rose small step 'Circles' from Summer Block 3 – Statistics.

Introduction

In this unit, the children will draw 2D shapes to exact measurements, continue to find missing angles by measuring and calculating, and also compare and classify 2D shapes based on their properties. They revisit recognising, describing, comparing and classifying a range of 3D shapes and related shape nets and then further develop their skills by drawing and constructing their own shape nets including tabs. In addition, they consolidate being able to recognise and calculate angles around a point and on a straight line and are introduced to recognising vertically opposite angles. It also includes a brand new objective that has been introduced to KS2 relating to illustrating and naming the parts of a circle and knowing the relationship between radius and diameter.

Starter Ideas

Challenge Cards

Display Pack

Home Learning

Assessment Statements

By the end of this unit...

...all children should be able to:

- use a ruler to draw a 2D shape to a given measurement;
- construct a 3D shape from a given shape net;
- compare and classify geometric shapes;
- recognise different types of angle;
- draw circle using a pair of compasses.

...most children will be able to:

- draw 2D shapes to given dimensions of length and angle;
- draw their own net of a simple 3D shape including construction tabs;
- measure and calculate unknown angles in 2D shapes and around a point or on a straight line;
- label the parts of a circle including radius and diameter.

...some children will be able to:

- confidently use a protractor to accurately draw 2D shapes to within 1° of the given dimension;
- draw their own net of more complex 3D shapes including construction tabs;
- use more complex reasoning to work out missing angles in 2D shapes and around a point or on a straight line;
- understand the relationship between radius and diameter using algebraic representation.

Angles of 2D Shapes: Expert 2D Shape Drawing

NC Statement: Draw 2-D shapes using given dimensions and angles.

White Rose Maths Small Step:

Description: Children are reminded how to accurately use a ruler and a protractor. The teacher models how to use a protractor and pairs practise both measuring and drawing lines and angles. Groups then rehearse the properties of common 2D shapes by playing a yes/no game to identify them, before independently following instructions involving measuring cm and degrees to draw 2D shapes.

Children   and ruler to

Find Missing Angles at a Point: Angles at a Point

NC Statement: Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

hs Small Step:

Description: Children recap types of angles and that there are 360° at a point (a whole turn). Pairs match angles to total 360° before the class are shown how to label an angle. Children complete an individual task to find missing angles on a point where one side is known.

Children   at a point.

Find Missing Angles on a Straight Line: Angles on a Straight Line

NC Statement: Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

White Rose Maths Small Step:

Description: Children are shown facts about degrees on a straight line, or in a half-turn. Pairs match angles which would total 180° in a dominoes game before children independently find missing angles on a straight line, where one or more angle is provided.

Children   on a straight line.

Vertically Opposite Angles: Vertically Opposite Angles

NC Statement: Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Description: The teacher introduces intersecting, straight lines totalling 360° and that pairs of angles opposite each other on these lines are always equal. They apply this fact to a selection of practice examples and work independently to identify vertically opposite angles in a written task. There is a challenge in the plenary where six lines intersect around a single point.

Children calculate

Problem Solving with Angles: Angle Reasoning

NC Statement: Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

tep:

Description: The teacher guides children, working in pairs, through a set of reasoning questions shown on the Lesson Presentation and activity sheets. Children independently apply the same methods to solving a set of reasoning questions, involving recognising and finding angles (including angles at a point, on a line and vertically opposite), and self-assess their work using the answers on the Presentation.

                              at a point, on a line and

Classify and Find Angles in Triangles: Triangles

NC Statement: Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.

White Rose Maths Small Step:

Description: Pairs discuss similarities and differences between a set of triangles and the teacher introduces different types of triangles and their properties. Pairs investigate angles in a triangle before the whole class is shown how to work out a missing angle when two are known. In the written activity, children identify types of triangles and work out missing angles. Children work out   from their knowledge of

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Classify and Find Angles in Quadrilaterals: Quadrilaterals

NC Statement: Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.

Description: Pairs discuss similarities and differences between a set of quadrilaterals and the teacher introduces different types of quadrilaterals and their properties. Pairs investigate angles in a quadrilateral before the whole class is shown how to work out a missing angle when three are known. In the written activity, children identify types of four-sided shape and work out missing angles.
Children find

Classify and Find Angles in Polygons: Polygons

NC Statement: Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.

White Rose Maths Small Step:

Description: Children are introduced to a formula for working out the sum of the angles inside any polygon then work in pairs to apply the formula to find the interior angles of irregular polygons. The whole class is shown how to work out a missing angle when the rest are known. In the written activity, children work out missing angles of polygons.
Children find missing   and irregular   .

Polygon Reasoning Questions: Polygon Reasoning

NC Statement: Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.

White Rose Maths Small Step:

Description: The teacher guides children, working in pairs, through a set of reasoning questions shown on the Lesson Presentation and activity sheets. Children apply the same methods to solving a set of reasoning questions, involving angles in a polygon, independently and self-assess their work using the answers on the Presentation.
Children find and classify

Measuring and Drawing Angles: Champion 2D Shape Drawing

NC Statement: Draw 2D shapes using given dimensions and angles.

White Rose Maths Small Step:

Description: Children recap reading measurements on protractors and rulers. The teacher models drawing a 2D shape from a set of instructions involving measuring angles and lengths; children independently draw three different 2D shapes by following similar instructions. In the plenary, children are tested on their knowledge of angle facts.
Children

2D Shape Reasoning Questions: 2D Shape Reasoning

NC Statement: Draw 2D shapes using given dimensions and angles.

Small Step:

Description: The teacher guides children, working in pairs, through a set of reasoning questions shown on the Lesson Presentation and activity sheets. Children apply the same methods to solving a set of reasoning questions, involving drawing 2D shapes, independently and self-assess their work using the answers on the Presentation.
Children   .

Properties of 3D Shapes: All Things 3D Shapes

NC Statement: Recognise, describe and build simple 3D shapes, including making nets.

White Rose Maths Small Step:

Description: The whole class identifies the number of faces on a series of given 3D shapes and partners try to name and describe as many 3D shapes as possible shown on the Lesson Presentation. Pairs then play dominoes requiring them to match a net to a 3D shape and discuss 3D solids where the faces are all identical. In the independent task, children identify faces, vertices and edges of 3D shapes.
Children describe and identify 3D shapes and

Properties of 3D Shapes: Drawing Shape Nets

NC Statement: Recognise, describe and build simple 3D shapes, including making nets.

White Rose Maths Small Step:

Description: The class identify possible 3D shapes from a 2D face. The teacher introduces equipment for drawing nets and shows an example of an accurately drawn net. Pairs become familiar with nets by identifying correct and incorrect examples. In a differentiated, individual activity, children draw a net for a given shape.
Children draw

3D Shape Reasoning Questions: 3D Shape Reasoning

NC Statement: Recognise, describe and build simple 3D shapes, including making nets.

White Rose Maths Small Step:

Description: The teacher guides children, working in pairs, through a set of reasoning questions shown on the Lesson Presentation and activity sheets. Children independently apply the same methods to solving a set of reasoning questions, involving nets and properties of 3D shapes, and self-assess their work using the answers on the Presentation.
Children describe properties and   .

Radius, Diameter and Circumference: Clever Circles

NC Statement: Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.

White Rose Maths Small Step:

Description: The teacher introduces the terms radius, diameter and circumference on a labelled circle. Pairs match circles to descriptions to check their understanding of the new vocabulary. The teacher models how to use a pair of compasses to draw a circle where they are given the radius.
Children draw   from a known radius.

Calculating Radius and Diameter: Circle Algebra

NC Statement: Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. **White Rose Maths Small Step:**	**Description:** Children recap the measurements of a circle and are tasked with finding links between the radius, circumference and diameter of a circle. They are shown that the radius is exactly half of the diameter and vice versa, and are given formulas to show this. They are shown that the circumference is about three times the diameter (they are not introduced to Pi at this stage). Independently, children apply d=r×2 and r=d÷2 to find measurements of circles. Children calculate diameters and radii of

Radius and Diameter Problem Solving: Circle Reasoning

NC Statement: Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. **White Rose Maths Small Step:**	**Description:** The teacher guides children, working in pairs, through a set of reasoning questions shown on the Lesson Presentation and activity sheets. Children independently apply the same methods to solving a set of reasoning questions, involving calculating radii and diameters of circles, and self-assess their work using the answers on the Presentation. Children calculate radii and diameters of