



**Berlin British School - Primary School**

# **Mathematics Curriculum**

## Number

Conceptual Understanding: Numbers are used to interpret information, make decisions and solve problems. For example, the operations of addition, subtraction, multiplication and division are related to one another and are used to process information in order to solve problems. The degree of precision needed in calculating depends on how the result will be used.

### Phase One

Learners will understand that numbers are used for many different purposes in the real world. They will develop an understanding of one-to-one correspondence and conservation of number, and be able to count and use number words and numerals to represent quantities.

### Phase Two

Learners will develop their understanding of the base 10 place value system and will model, read, write, estimate, compare and order numbers to hundreds or beyond. They will have automatic recall of addition and subtraction facts and be able to model addition and subtraction of whole numbers using the appropriate mathematical language to describe their mental and written strategies. Learners will have an understanding of fractions as representations of whole-part relationships and will be able to model fractions and use fraction names in real-life situations.

### Nursery

### Reception

### Year One

### Year Two

Students will:

#### Whole Number & Place Value

- Show awareness of the language of number
- Join in the singing of number songs and rhymes
- Understand mathematical language; same, different, more, fewer, less, how many
- Count and model numbers to 5
- Show awareness of numerals in their environment
- Understands 1 to 1 correspondence up to 3 then 5 when counting objects in play or real-life situations
- Carry out a request to share objects in a social sense and distribute items or portions, possibly not equally

Students will:

#### Whole Number & Place Value

- Understand mathematical language: same, different, more, fewer, less, how many
- Count with one to one correspondence to 10
- Understand conservation of number up to 5
- At a glance, see how many are in a small collection and attach correct number
- Read, write, match, count and model numbers to 10
- Compare and order numbers to 20
- Introduced to concept of 1st, 2nd and 3rd

Students will:

#### Whole Number & Place Value

- Use mathematical language: more than, less than, number names, total, etc.
- Count by 1s, 5s and 10s to 100, and 2s to 20, forwards and backwards
- Recognise a group of objects, up to 6, without counting
- Count on from any number to 100
- Read, write and model numbers to 100

#### Addition & Subtraction

- Understand commutative properties of addition e.g.  $3+5 = 5+3$
- Model and draw number stories to 10
- Show familiarity with operation symbols, +, -, =

Students will:

#### Whole Number & Place Value

- Read, write, count, compare and model numbers to 100
- Count on from any number by 1s, 2s, 5s and 10s forwards and backwards to 120
- Understand place value using ones and tens
- Recognise and understand ordinal numbers beyond 1st, 2nd, 3rd
- Using a number line and manipulatives, round to the nearest ten on a number line

#### Addition & Subtraction

- Read, write and model addition and subtraction to 100
- Understand commutative properties of addition e.g.  $3+5 = 5+3$

<p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Identify more and less, longer shorter, fatter/thinner</li> </ul>	<p><u>Addition &amp; Subtraction</u></p> <ul style="list-style-type: none"> <li>Count two sets of objects together</li> <li>Count a set of objects after some items have been removed</li> <li>Model number relationships to 5</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Estimate quantities to 10</li> <li>Use manipulatives to solve problems</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Recognise half and whole</li> <li>Use fraction names half and whole</li> <li>Recognise coins</li> </ul>	<p><u>Multiplication &amp; Division</u></p> <ul style="list-style-type: none"> <li>Share numbers into equal groups up to 12 with manipulatives</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Estimate the reasonableness of answers</li> <li>Estimate the number in a set up to 20 objects</li> <li>Begin to select and explain an appropriate method for solving a problem</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Use fraction names half and whole</li> <li>Recognise quarters</li> <li>Count and organise sets of 1c, 2c, 5c and 10c coins</li> <li>Be exposed to 50c, 1€ and 2€</li> </ul>	<ul style="list-style-type: none"> <li>Use two stage calculations with addition and subtraction</li> <li>Add three single digit numbers using manipulatives</li> <li>Decide whether addition or subtraction best suits a given situation</li> </ul> <p><u>Multiplication &amp; Division</u></p> <ul style="list-style-type: none"> <li>Show a beginning understanding of multiplication as repeated addition</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Estimate quantities to 100 mentally or visually</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Identify and use fraction names e.g. one half, third, and quarter</li> <li>Identify the fraction of a number e.g. half of 6</li> <li>Count 1c, 2c, 5c, 10c, 20c, 50c, €1 and €2 coins</li> </ul>
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## Number

Conceptual Understanding: Numbers are used to interpret information, make decisions and solve problems. For example, the operations of addition, subtraction, multiplication and division are related to one another and are used to process information in order to solve problems. The degree of precision needed in calculating depends on how the result will be used.

### Phase Three

Learners will develop the understanding that fractions and decimals are ways of representing whole-part relationships and will demonstrate this understanding by modelling equivalent fractions and decimal fractions to hundredths or beyond. They will be able to model, read, write, compare and order fractions, and use them in real-life situations. Learners will have automatic recall of addition, subtraction, multiplication and division facts. They will select, use and describe a range of strategies to solve problems involving addition, subtraction, multiplication and division, using estimation strategies to check the reasonableness of their answers.

### Phase Four

Learners will understand that the base 10 place value system extends infinitely in two directions and will be able to model, compare, read, write and order numbers to millions or beyond, as well as model integers. They will develop an understanding of ratios. They will understand that fractions, decimals and percentages are ways of representing whole-part relationships and will work towards modelling, comparing, reading, writing, ordering and converting fractions, decimals and percentages. They will use mental and written strategies to solve problems involving whole numbers, fractions and decimals in real-life situations, using a range of strategies to evaluate reasonableness of answers.

### Year Three

### Year Four

### Year Five

### Year Six

Students will:

#### Whole Number & Place Value

- Read, write, compare, order, and model numbers to 1,000
- Count by 1s, 2s, 5s, 10s and 100s forwards and backwards
- Round 2- and 3-digit numbers to the nearest 10
- Recognise and understand ordinal numbers beyond 1st, 2nd, 3rd
- Count coins in multiples of 5c, 10c, 20c, 50c, 1€ and 2€
- Read whole money amounts to 100 euro and show the amount with coins and bills in different ways
- Decide whether they have more or less money than the price and whether to expect change
- Calculate change in whole numbers

Students will:

#### Whole Number & Place Value

- Read, write, compare, order and model numbers to 10,000
- Say a number that is 1, 10, 100 or 1,000 more or less than a given number
- Round 4-digit numbers to the nearest 10 or 100

#### Addition & Subtraction

- Add and subtract 2- and 3-digit numbers with regrouping

#### Multiplication & Division

- Know multiplication tables 2,3,4,5,6,7,8, 9 and 10
- Model and use the identity and commutative properties for multiplication e.g.  $7 \times 3 = 3 \times 7$

Students will:

#### Whole Number & Place Value

- Read, write, compare, order and model numbers up to 100,000
- Show how the value of the digit changes by powers of 10 to 1,000
- Round 4-digit numbers and decimals to a given place value

#### Addition & Subtraction

- Add and subtract numbers up to 5 digits

#### Multiplication & Division

- Recall multiplication tables to 10
- Multiply and divide a 3-digit numbers by a 1-digit number
- Multiply and divide by 1,000

Students will:

#### Whole Number & Place Value

- Read, write, compare, order and model whole numbers up to 1,000,000 and decimal numbers to the thousandths
- Demonstrate an understanding of place value in whole numbers and decimals
- Round a 6-digit numbers to a given place value and decimal numbers to the nearest tenth and hundredth

#### Addition & Subtraction

- Add and subtract numbers up to 6 digits to include decimals

<p><u>Addition &amp; Subtraction</u></p> <ul style="list-style-type: none"> <li>Show quick mental recall of addition and subtraction to 100 using strategies such as number bonds to ten, doubling and halving</li> <li>Solve missing number equations to 100</li> <li>Add and subtract a 2-digit number to/from any 2-digit number with and without regrouping</li> <li>Add 3 single digit numbers</li> </ul> <p><u>Multiplication &amp; Division</u></p> <ul style="list-style-type: none"> <li>Understand multiplication and division through a variety of strategies such as repeated addition/subtraction and arrays</li> <li>Know multiplication facts of 2, 3, 4, 5 and 10</li> <li>Recall 2, 5 and 10</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Begin to estimate quantities to 1,000</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Use manipulatives to model fractions up to tenths</li> <li>Know that simple fractions are part of a whole</li> <li>Begin to see, describe and record simple fractions in words</li> </ul>	<ul style="list-style-type: none"> <li>Multiply and divide 2 digits by 1 digit with and without remainders</li> <li>Understand the value of zero in multiplications</li> <li>Multiply and divide by 10 and 100</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Estimate quantities to 1,000 and compare with the actual number</li> <li>Select and explain an appropriate method for solving a word problem</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Compare, order and describes simple fractions using manipulatives</li> <li>Separate objects and collections into equal parts to compare unit fractions</li> <li>Add and subtract whole numbers and fractions with like denominators</li> <li>Read and write numbers to 2 decimal places in the context of money and measurement</li> <li>Solve addition and subtraction problems using money</li> </ul>	<ul style="list-style-type: none"> <li>Solve multi-step word problems involving addition, subtraction, multiplication and division</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Use estimation to determine a reasonable answer before solving a problem</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Model equivalent fractions</li> <li>Simplify fractions</li> <li>Add and subtract whole numbers and fractions with like denominators</li> <li>Demonstrate the division of a whole number using fractions</li> <li>Explore the connection between fractions, decimals and percentages</li> <li>Read, write, compare, order, model, add and subtract decimals up to the hundredths place</li> <li>Round to the nearest integer (whole number)</li> </ul>	<p><u>Multiplication &amp; Division</u></p> <ul style="list-style-type: none"> <li>Multiply and divide by powers of 10 up to 10,000 and show how the value of the digit changes</li> <li>Multiply 2-digit by 2-digit numbers and apply to larger numbers</li> <li>Recall multiplication tables up to 12</li> <li>Recognise square numbers</li> <li>Solve simple equations using brackets</li> <li>Divide by a 2-digit divisor with and without remainders</li> </ul> <p><u>Estimation &amp; Problem Solving</u></p> <ul style="list-style-type: none"> <li>Use estimation to determine a reasonable answer before solving a problem</li> <li>Select and defend the most appropriate and efficient method of solving a multistep problem using addition, subtraction, multiplication and division</li> </ul> <p><u>Fractions &amp; Decimals</u></p> <ul style="list-style-type: none"> <li>Compare and order fractions on a number line</li> <li>Find common denominators</li> <li>Convert mixed numbers to improper fractions and vice versa</li> <li>Add and subtract fractions with unlike denominators using the concept of equivalent fractions</li> <li>Understand that fractions are relative to particular wholes</li> <li>Demonstrate the connection between fractions, decimals and percentages</li> </ul>
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			<ul style="list-style-type: none"><li>• Read, write, compare, order, model, add and subtract decimals up to the thousandths place</li><li>• Round decimal numbers to the nearest tenth and hundredth</li><li>• Model multiplication and division of decimals with reference to money</li></ul>
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## Data Handling

Conceptual Understanding: Data can be collected, organised, represented and summarized in a variety of ways to highlight similarities, differences and trends; the chosen format should illustrate the information without bias or distortion. Probability can be expressed quantitatively by using terms such as “unlikely”, “certain” or “impossible”. It can be expressed quantitatively on a number scale.

Phase One		Phase Two	
<p>Learners will develop an understanding of how the collection and organisation of information helps to make sense of the world. They will sort, describe and label objects by attributes and represent information in graphs including pictographs and tally marks. The learners will discuss chance in daily events.</p>		<p>Learners will understand how information can be expressed as organised and structured data and that this can occur in a range of ways. They will collect and represent data in different types of graphs, interpreting the resulting information for the purpose of answering questions. The learners will develop an understanding that some events in daily life are more likely to happen than others and they will identify and describe likelihood using appropriate vocabulary.</p>	
Nursery	Reception	Year One	Year Two
<p>Students will:</p> <p><u>Data</u></p> <ul style="list-style-type: none"> <li>Sort familiar objects in real life and play situations</li> <li>Graph real life objects (led by teacher)</li> <li>Sort real objects into sets by attributes</li> </ul>	<p>Students will:</p> <p><u>Data</u></p> <ul style="list-style-type: none"> <li>Sort and label real objects into sets by teacher-specified attributes – colour, darkness etc.</li> <li>Create a pictograph of real objects and compares quantities using number words</li> <li>Help create class graphs</li> </ul>	<p>Students will:</p> <p><u>Data</u></p> <ul style="list-style-type: none"> <li>Sort and label objects into sets by one or more student-specified attributes</li> <li>Read and compare data represented in teacher-generated diagrams</li> <li>Read and discuss data from bar graphs and pictographs – compare frequencies</li> <li>Understand how collecting and graphing data can answer questions</li> <li>Use own diagrams to organise information</li> </ul> <p><u>Probability</u></p> <ul style="list-style-type: none"> <li>Discuss and identify outcomes that will happen, won't happen and might happen</li> <li>Make predictions related to familiar things</li> </ul>	<p>Students will:</p> <p><u>Data</u></p> <ul style="list-style-type: none"> <li>Identify, sort and compare objects</li> <li>Collect, display and interpret data for the purposes of finding information</li> <li>Read and compare data from bar graphs, tally marks and diagrams using manipulatives and records on paper</li> <li>Create own pictograph and simple bar graph from a graph of real objects and interpret data by comparing quantities: more, fewer, less than, greater than</li> <li>Describe the results of their data collection</li> </ul> <p><u>Probability</u></p> <ul style="list-style-type: none"> <li>Discuss, identify, predict and place outcomes in order of likelihood: impossible, unlikely, likely and certain</li> </ul>

## Data Handling

Conceptual Understanding: Data can be collected, organised, represented and summarized in a variety of ways to highlight similarities, differences and trends; the chosen format should illustrate the information without bias or distortion. Probability can be expressed quantitatively by using terms such as “unlikely”, “certain” or “impossible”. It can be expressed quantitatively on a number scale.

### Phase Three

Learners will continue to collect, organise, display and analyse data, developing an understanding of how different graphs highlight different aspects of data more efficiently. They will understand that scale can represent different quantities in graphs and that mode can be used to summarise a set of data. The learners will make the connection that probability is based on experimental events and can be expressed numerically.

### Phase Four

Learners will collect, organise and display data for the purposes of valid interpretation and communication. They will be able to use the mode, median, mean and range to summarize a set of data. They will create and manipulate an electronic database for their own purposes, including setting up spreadsheets and using simple formulas to create graphs. Learners will understand that probability can be expressed on a scale (0–1 or 0%–100%) and that the probability of an event can be predicted theoretically.

### Year Three

### Year Four

### Year Five

### Year Six

Students will:

#### Data

- Collect, sort, organise and display data in a bar, pictograph, or tally marks with correct labelling
- Read and compare data from pictographs, bar graphs, Venn and Carroll diagrams

#### Probability

- Discuss, identify, predict and place outcomes in order of likelihood: impossible, unlikely, likely and certain

Students will:

#### Data

- Collect, sort, organise and display data in a variety of ways including bar graphs, line-plot graphs, charts, Venn and Carroll diagrams (with 2 features) with varying scales
- Read and interpret graphs and charts
- Show an awareness of using software to create simple databases and graphs such as line-plot and bar graphs to supplement projects

#### Probability

- Discuss, justify, identify, predict and place outcomes in order of likelihood: impossible, unlikely, likely and certain
- Describe and justify the probability of chance events
- Predict the probability of outcomes of simple experiments and test the predictions

Students will:

#### Data

- Collect, sort, organise and display data in a variety of ways including bar graphs, line-plot graphs, charts and Triple Venn diagrams for two features
- Collect and represent data in graphs using an appropriate scale
- Compare data from pie graphs
- Read and interpret graphs and charts
- Infer and answer questions based on represented information
- Find the mean, median and mode of a set of data
- Create and use a spreadsheet to organise information

#### Probability

- Discuss, justify, identify, predict and place outcomes in order of likelihood: impossible, unlikely, likely and certain

Students will:

#### Data

- Solve a problem by interpreting data in tables, graphs, charts and diagrams
- Choose the clearest way to represent different types of data
- Construct graphs in varying scales with appropriate labelling
- Find the mean, median, mode and range of a set of data
- Create and use spreadsheets to organise information

#### Probability

- Describe probability in reference to everyday happenings
- Describe probability in different ways
- Understand the difference between experimental and theoretical probability



		<ul style="list-style-type: none"><li>• Describe and justify the probability of chance events using fractions and percentages</li><li>• Predict the probability of outcomes of simple experiments and test the predictions</li></ul>	<ul style="list-style-type: none"><li>• Comment on their predictions in light of the results of their own data collection</li></ul>
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## Pattern and Function

Conceptual Understanding: To identify pattern is to begin to understand how mathematics applies to the world in which we live. The repetitive features of patterns can be identified and described as generalised rules called “functions”. This builds a foundation for the later study of algebra.

### Phase One

Learners will understand that patterns and sequences occur in everyday situations. They will be able to identify, describe, extend and create patterns in various ways.

### Phase Two

Learners will understand that whole numbers exhibit patterns and relationships that can be observed and described, and that the patterns can be represented using numbers and other symbols. As a result, learners will understand the inverse relationship between addition and subtraction, and the associative and commutative properties of addition. They will be able to use their understanding of pattern to represent and make sense of real-life situations and, where appropriate, to solve problems involving addition and subtraction.

### Nursery

### Reception

### Year One

### Year Two

Students will:

- Copy simple patterns
- Find and describe simple patterns
- Create own patterns during creative activities
- Continue simple patterns
- Notice patterns in daily activities, sound, counting stories and movement

Students will:

- Copy, continue and create two-part patterns in a variety of ways e.g. music, body parts, manipulatives, etc.
- Copy, continue and create whole patterns using manipulatives
- Use simple language to describe patterns
- Notice patterns in daily activities, sound, counting stories and movement

Students will:

- Copy, continue and create 3 part-patterns
- Transfer patterns to a different medium, e.g. red, blue, red, blue - A, B, A, B
- Copy, continue and create whole number patterns using manipulatives
- Use a sequence of numbers to represent repeating pattern

Students will:

- Use patterns to continue sequences and sort by one or more attributes and identify the rule
- Use narrative problems with manipulatives to show patterns in problem solving
- Recognise, describe and extend patterns in numbers
- Find and explain patterns in the 100 chart

### Pattern and Function

Conceptual Understanding: To identify pattern is to begin to understand how mathematics applies to the world in which we live. The repetitive features of patterns can be identified and described as generalised rules called “functions”. This builds a foundation for the later study of algebra.

#### Phase Three

Learners will analyse patterns and identify rules for patterns, developing the understanding that functions describe the relationship or rules that uniquely associate members of one set with members of another set. They will understand the inverse relationship between multiplication and division, and the associative and commutative properties of multiplication. They will be able to use their understanding of pattern and function to represent and make sense of real-life situations and, where appropriate, to solve problems involving the four operations.

#### Phase Four

Learners will understand that patterns can be represented, analysed and generalised using algebraic expressions, equations or functions. They will use words, tables, graphs and, where possible, symbolic rules to analyse and represent patterns. They will develop an understanding of exponential notation as a way to express repeated products, and of the inverse relationship that exists between exponents and roots. The students will continue to use their understanding of pattern and function to represent and make sense of real-life situations and to solve problems involving the four operations.

#### Year Three

#### Year Four

#### Year Five

#### Year Six

Students will:

- Use patterns to continue numerical sequences and identify the rule
- Sort by more than one attribute and describe rules used
- Solve simple logic problems
- Define and continue rules for geometric patterns

Students will:

- Continue sequences beyond memorised or modelled numbers
- Write a pattern of numbers to fit a given pattern
- Describe and demonstrate patterns in numeric sequences, such as skip counting and multiplication
- Model, with manipulatives, the relationships between addition and multiplication, and subtraction and division
- Identify the starting number and the constant multiplier needed to generate a number sequence

Students will:

- Predict and calculate further data to complete a number pattern
- Recognise inverse functions
- Use pattern in sequences of related addition and subtraction problems to generate new equations
- Analyse patterns when increasing and decreasing the size of 2D shapes
- Identify and follow a rule based on addition, subtraction, multiplication or division to generate a sequence

Students will:

- Identify and follow a rule based on addition, subtraction, multiplication and division to generate a sequence, including sequences with decimals
- Represent the rules of a pattern using simple formulae

## Shape and Space

Conceptual Understanding: The regions, paths and boundaries of natural space can be described by shape. An understanding of the interrelationships of shape allows us to interpret, understand and appreciate our two-dimensional (2D) and three-dimensional (3D) world.

### Phase One

Learners will understand that shapes have characteristics that can be described and compared. They will understand and use common language to describe paths, regions and boundaries of their immediate environment.

### Phase Two

Learners will continue to work with 2D and 3D shapes, developing the understanding that shapes are classified and named according to their properties. They will understand that examples of symmetry and transformations can be found in their immediate environment. Learners will interpret, create and use simple directions and specific vocabulary to describe paths, regions, positions and boundaries of their immediate environment.

### Nursery

### Reception

### Year One

### Year Two

Students will:

#### Shape

- Begin to notice shapes in the environment
- Recognize and name common 2D shapes
- Play with 3D and 2D shapes

#### Space

- Understand positional language
- Be aware of space in relation to the size of an object

Students will:

#### Shape

- Recognise and name common 2D and 3D shapes
- Describe some properties of 2D and 3D shapes
- Begin to make 2D shapes with manipulatives
- Through play, use 2D shapes to create patterns and pictures
- Sort and compare shapes by attributes
- Begin looking for symmetry

#### Space

- Explore the paths, regions and boundaries of their immediate environment and their position

Students will:

#### Shape

- Recognise common 2D and 3D shapes
- Describe, draw and make 2D shapes
- Describe 3D shapes
- Make symmetrical pictures using a variety of means
- Informally describe the symmetry of a figure or arrangement

#### Space

- Describe and represent the paths, regions and boundaries of their immediate environment and their position

Students will:

#### Shape

- Recognise and name common 2D and 3D shapes
- Sort and label 2D and 3D shapes using appropriate mathematical vocabulary
- Use manipulatives to create shapes

#### Space

- Recognise symmetrical designs by folding or using a mirror
- Create and explain simple symmetrical designs
- Find and explore symmetry in their immediate environment
- Interpret, use and create key features of a simple map

## Shape and Space

Conceptual Understanding: The regions, paths and boundaries of natural space can be described by shape. An understanding of the interrelationships of shape allows us to interpret, understand and appreciate our two-dimensional (2D) and three-dimensional (3D) world.

### Phase Three

Learners will sort, describe and model regular and irregular polygons, developing an understanding of their properties. They will be able to describe and model congruency and similarity in 2D shapes. Learners will continue to develop their understanding of symmetry, in particular reflective and rotational symmetry. They will understand how geometric shapes and associated vocabulary are useful for representing and describing objects and events in real-world situations.

### Phase Four

Learners will understand the properties of regular and irregular polyhedra. They will understand the properties of 2D shapes and understand that 2D representations of 3D objects can be used to visualize and solve problems in the real world, for example, through the use of drawing and modelling. Learners will develop their understanding of the use of scale (ratio) to enlarge and reduce shapes. They will apply the language and notation of bearing to describe direction and position.

### Year Three

### Year Four

### Year Five

### Year Six

Students will:

#### Shape

- Describe, draw and make quadrilaterals, triangles, circles, hexagons and pentagons
- Sort and name plane shapes according to attributes
- Sort and name solid shapes according to attributes using appropriate vocabulary
- Make models of rectangular- and triangular-based shapes, cones, cylinders and spheres
- Relate 3D shapes to 2D shapes
- Explore 2D shapes using tangrams and tessellation games of regular shapes
- Given a net, can construct a cube

#### Space

- Recognise symmetrical shapes by folding or using a mirror
- Find one line of symmetry

Students will:

#### Shape

- Describe and classify polygons using the terminology of angles and sides
- Apply symmetry, translations and reflections using concrete materials and drawings
- Observe and describe geometry in the environment, including tessellating shapes
- Given a net, construct 3D shapes

#### Angles

- Recognise and use the eight compass directions and anti-clockwise turns
- Understand that a right angle is  $90^\circ$ ; whole turn is  $360^\circ$
- Understand an angle as a measure of rotation by comparing and describing rotation
- Know that angles are measured in degrees

Students will:

#### Shape

- Classify triangles according to sides and angles
- Recognise equilateral and isosceles triangles
- Recognise and draw congruent shapes
- Identify and create a reflection of a 2D shape
- Find axes of symmetry in 2D shapes
- Complete missing half of a more complex geometrical pattern
- Recognise perpendicular and parallel lines on 2D shapes
- Create tessellating patterns
- Describe and classify 2D and 3D shapes using mathematical terminology
- Create 3D shapes using nets
- Create nets for 3D shapes

Students will:

#### Shape

- Identify and name parallel and perpendicular lines and planes in figures and objects
- Use the symbols representing perpendicular and parallel lines
- Know basic properties of a circle (radius, diameter and circumference) and know that the diameter is twice the radius
- Solve real life problems involving shape and area
- Identify and create rotation and reflection of a 2D shape
- Recognise, describe and build simple 3D shapes
- Create nets for 3D shapes

#### Angles

- Calculate complementary and supplementary angles

<p><u>Angles</u></p> <ul style="list-style-type: none"> <li>• Recognise the eight compass points</li> <li>• Using compass directions, make and describe right angle turns</li> <li>• Interpret maps and use simple directions to describe paths of movement e.g. north, south, east, west, right angle, quarter turn and half turns</li> </ul> <p><u>Coordinates</u></p> <ul style="list-style-type: none"> <li>• Use coordinates to locate items on a simple map</li> </ul>	<p><u>Coordinates</u></p> <ul style="list-style-type: none"> <li>• Use coordinates to find objects on a grid</li> </ul>	<p><u>Angles</u></p> <ul style="list-style-type: none"> <li>• Identify relationship of angles to compass points</li> <li>• Estimate angles</li> <li>• Measure and draw angles to the nearest degree</li> <li>• Identify obtuse, acute, straight and reflex angles</li> </ul> <p><u>Coordinates</u></p> <ul style="list-style-type: none"> <li>• Read and plot coordinates in all four quadrants</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate and demonstrate the characteristics of triangles and quadrilaterals</li> <li>• Measure and draw acute, obtuse and right angles to the nearest degree</li> </ul> <p><u>Coordinates</u></p> <ul style="list-style-type: none"> <li>• Read and plot coordinates in all four quadrants</li> <li>• Understand rotation, reflection and translations</li> </ul>
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## Measurement

Conceptual Understanding: To measure is to attach a number to a quantity using a chosen unit. Since the attributes being measured are continuous, ways must be found to deal with quantities that fall between numbers. It is important to know how accurate a measurement needs to be or can ever be.

### Phase One

Learners will develop an understanding of how measurement involves the comparison of objects and the ordering and sequencing of events. They will be able to identify, compare and describe attributes of real objects as well as describe and sequence familiar events in their daily routine.

### Phase Two

Learners will understand that standard units allow us to have a common language to measure and describe objects and events, and that while estimation is a strategy that can be applied for approximate measurements, particular tools allow us to measure and describe attributes of objects and events with more accuracy. Learners will develop these understandings in relation to measurement involving length, mass, capacity, money, temperature and time.

### Nursery

### Reception

### Year One

### Year Two

Students will:

#### Nonstandard & Standard Measurement

- Play with appropriate materials to explore measurement
- Be exposed to descriptive language such as fast/slow, heavy/light, full/empty, long/short, big/small in real life situations
- Understand some language of measurement e.g. longer, shorter, bigger, biggest, smallest, shortest, tallest, etc
- Recognise significant events in the school day
- Be aware of the days of the week and months of the year through daily calendar activities

Students will:

#### Nonstandard & Standard Measurement

- Show awareness of a variety of non-standard systems of measurement
- Use a balance to say which is heavier of two visually similar-sized objects
- Use indirect methods to arrange objects that can be directly compared by length
- Identify, compare and describe attributes of real objects and situations
- Identify, compare and sequence events in their daily routine
- Recognise a clock face and name the hands and place numbers in correct position
- Read a clock to the hour
- Know the days of the week
- Be aware of the months and seasons

Students will:

#### Nonstandard & Standard Measurement

- Use a variety of non-standard systems of measurement – use body parts and familiar objects repeatedly to match the length of things and count
- Count informal units of capacity and say how many will fit in a container
- Show awareness that there are standard systems of measurement
- Count informal units of mass
- Use language of comparisons
- Name and sequence the days of the week, months and seasons
- Understand how the hands on the clock show different times
- Recognise digital and analogue clocks to the hour and half past

Students will:

#### Nonstandard & Standard Measurement

- Vary use of non-standard systems of measurement appropriate to context
- Link non-standard to standard measurement
- Show awareness of and use appropriate tools for measuring
- Use and read standard units of measurement to measure classroom objects
- Consolidate sequencing of the days of the week, months and seasons
- Read and write digital and analogue clocks to the hour, half hour, quarter past the hour
- Estimate, identify and compare lengths of time
- Estimate the number of times a unit of length will fit along an object
- Show improvement in their estimates as a result of testing
- Explore capacity

## Measurement

Conceptual Understanding: To measure is to attach a number to a quantity using a chosen unit. Since the attributes being measured are continuous, ways must be found to deal with quantities that fall between numbers. It is important to know how accurate a measurement needs to be or can ever be.

### Phase Three

Learners will continue to use standard units to measure objects, in particular developing their understanding of measuring perimeter, area and volume. They will select and use appropriate tools and units of measurement, and will be able to describe measures that fall between two numbers on a scale. The learners will be given the opportunity to construct meaning about the concept of an angle as a measure of rotation.

### Phase Four

Learners will understand that a range of procedures exists to measure different attributes of objects and events, for example, the use of formulas for finding area, perimeter and volume. They will be able to decide on the level of accuracy required for measuring and using decimal and fraction notation when precise measurements are necessary. To demonstrate their understanding of angles as a measure of rotation, the learners will be able to measure and construct angles.

### Year Three

### Year Four

### Year Five

### Year Six

Students will:

#### Standard Measurement

- Select and justify appropriate tool for measuring
- Use and read standard units of measurement to measure classroom objects
- Know the basic relationship between metric units
- Read and write digital and analogue 12 hour clock to nearest quarter hour
- Understand clockwise/ anticlockwise and the concept of 1 minute
- Demonstrate quarter past, half past, and quarter to on clock faces

#### Capacity & Volume

- Use standard units to estimate, and compare, capacity

Students will:

#### Standard Measurement

- Estimate length and mass using of real objects
- Recognise relationship between metric units of measurement
- Read and write digital and analogue clock times to the nearest 5 minutes
- Recognise relationship between units of time
- Describe measures that fall between numbers on a measure scale
- Solve measurement word problems and explains the solutions
- Estimate Celsius temperatures and relates temperature to everyday situations
- Identify freezing and boiling points
- Read and interpret calendars and simple timetables

Students will:

#### Standard Measurement

- Convert between different metric units including measurements with fractions and decimals
- Calculate elapsed time in problem solving situations using 12- and 24-hour clock
- Choose the most appropriate standard unit when measuring
- Decide on the level of accuracy needed for a given task

#### Area & Perimeter

- Calculate the perimeter and area of quadrilaterals

#### Capacity & Volume

- Estimate and measure capacity using appropriate tools and units

Students will:

#### Standard Measurement

- Interpret actual distance from a scale model
- Use prefixes in the metric system and notation correctly
- Solve, create and explain multiple step word problems using measurement, temperature and time
- Compare and order length, capacity and mass measurements provided in common standard units

#### Area & Perimeter

- Calculate the perimeter and area of triangles, generalise rules and develop formulae
- Apply understanding of perimeter and area rules to more complex polygon

#### Capacity & Volume

- Investigate formula for the volume of a cuboid



	<p><u>Area &amp; Perimeter</u></p> <ul style="list-style-type: none"><li>• Introduce standard units of area and perimeter</li><li>• Use manipulatives to show squared units of an area</li><li>• Using squared paper, estimate and measure the area and perimeter of regular quadrilaterals using standard units</li></ul> <p><u>Capacity &amp; Volume</u></p> <ul style="list-style-type: none"><li>• Estimate and measure capacity using appropriate tools and units</li></ul>		
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