MATHEMATICS
SCOPE AND SEQUENCE

NEXUS
INTERNATIONAL
SCHOOL
SINGAPORE

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Learning Continuum for Number

Overall Expectations for Phase 1 - Number

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.

Conceptual Understanding A: Numbers are a naming system, *and* numbers can be used in many ways for different purposes in the real world.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand one-to-one correspondence.	connect number names and numerals to the quantities they represent.	count to determine the number of objects in a set use number words and numerals to represent quantities in real-life situations.
K	understand that, for a set of objects, the number name of the last object counted describes the quantity of the whole set.	connect number names and numerals to the quantities they represent.	count to determine the number of objects in a set use number words and numerals to represent quantities in real-life situations.

Conceptual Understanding B: Numbers are connected to each other through a variety of relationships, *and* making connections between our experiences with number can help us to develop number sense.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	use the language of mathematics to compare quantities, for example, more, less, first, second recognize groups of zero to five objects without counting (subitizing) understand that numbers can be constructed in multiple ways, for example, by combining and partitioning.		use the language of mathematics to compare quantities in real-life situations, for example, more, less, first, second subitize in real-life situations.
K	use the language of mathematics to compare quantities, for example, more, less, first, second recognize groups of zero to five objects without counting (subitizing) understand conservation of number understand that numbers can be constructed in multiple ways, for example, by combining and partitioning understand whole-part relationships		use the language of mathematics to compare quantities in real-life situations, for example, more, less, first, second subitize in real-life situations use simple fraction names in real-life situations.

	understand the relative magnitude of whole numbers.		

Overall Expectations for Phase 2 - Number

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.

Conceptual Understanding A: The base 10 place value system is used to represent numbers and number relationships.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	model numbers to hundreds using the base 10 place value system.	read and write whole numbers up to hundreds read, write, compare and order cardinal and ordinal numbers.	use whole numbers up to hundreds in real-life situations use cardinal and ordinal numbers in real-life situations.
2	model numbers to hundreds or beyond using the base 10 place value system.	read and write whole numbers up to hundreds or beyond read, write, compare and order cardinal and ordinal numbers.	use whole numbers up to hundreds or beyond in real-life situations use cardinal and ordinal numbers in real-life situations.

Conceptual Understanding B: Fractions are ways of representing whole- part relationships.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	model simple fraction relationships.		use fractions in real-life situations.
2	model simple fraction relationships. **model addition and subtraction of fractions with the same denominator. (not in text)**		use fractions in real-life situations.

Conceptual Understanding C: The operations of addition, subtraction, multiplication and division are related to each other and are used to process information to solve problems, *and* these number operations can be modelled in a variety of ways. There are many mental methods that can be applied for exact and approximate computations.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	use the language of addition and subtraction, for example, add, take away, plus, minus, sum, difference model addition and subtraction of whole numbers develop strategies for memorizing addition and subtraction number facts estimate sums and differences understand situations that involve multiplication and division.		use mental and written strategies for addition and subtraction of two- digit numbers or beyond in real-life situations use strategies to evaluate the reasonableness of answers.

2	use the language of addition and subtraction, for example, add, take away, plus, minus, sum, difference model addition and subtraction of whole numbers estimate sums and differences develop strategies for memorizing addition and subtraction number facts understand situations that involve multiplication and division estimate quantities to 100 or beyond develop strategies for memorizing addition and subtraction number facts estimate sums and differences use the language of addition and subtraction, for example, add, take away, plus, minus, sum, difference.	describe mental and written strategies for adding and subtracting two-digit numbers.	use fast recall of addition and subtraction number facts in real-life situations use mental and written strategies for addition and subtraction of two- digit numbers or beyond in real-life situations select an appropriate method for solving a problem, for example, mental estimation, mental or written strategies, or by using a calculator.

Overall Expectations for Phase 3 - Number

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.

Conceptual Understanding A: The base 10 place value system can be extended to represent magnitude.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	model numbers to thousands or beyond using the base 10 place value system.	read, write, compare and order whole numbers up to thousands or beyond.	use whole numbers up to thousands or beyond in real-life situations.
4	model numbers to thousands or beyond using the base 10 place value system.	read, write, compare and order whole numbers up to thousands or beyond.	use whole numbers up to thousands or beyond in real-life situations.

Conceptual Understanding B: Fractions and decimals are ways of representing whole-part relationships.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	use the language of fractions, for example, numerator, denominator.	read, write, compare and order fractions.	
4	model equivalent fractions use the language of fractions, for example, numerator, denominator model decimal fractions to hundredths or beyond.	read, write, compare and order fractions read and write equivalent fractions read, write, compare and order fractions to hundredths or beyond.	use decimal fractions in real-life situations.

Conceptual Understanding C: The operations of addition, subtraction, multiplication and division are related to each other and are used to process information to solve problems, *and* even complex operations can be modelled in a variety of ways, for example, an algorithm is a way to represent an operation.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	model multiplication and division of whole numbers model addition and subtraction of whole numbers.	develop strategies for memorizing addition, subtraction, multiplication and division number facts describe mental and written strategies for multiplication and division describe mental and written strategies for addition and subtraction.	use whole numbers up to thousands or beyond in real-life situations use fast recall of multiplication and division number facts in real-life situations use mental and written strategies for multiplication and division in real-life situations select an efficient method for solving a problem, for example, mental estimation,

			mental or written strategies, or by using a calculator use strategies to evaluate the reasonableness of answers add and subtract decimals in real-life situations, including money.
4	model addition and subtraction of whole numbers model multiplication and division of whole numbers use the language of multiplication and division, for example, factor, multiple, product, quotient, prime numbers, composite number. **model addition and subtraction of fractions with related denominators (not in text)** **model addition and subtraction of decimals. (not in text)**	describe mental and written strategies for addition and subtraction describe mental and written strategies for multiplication and division develop strategies for memorizing addition, subtraction, multiplication and division number facts.	use fast recall of multiplication and division number facts in real-life situations use mental and written strategies for multiplication and division in real-life situations select an efficient method for solving a problem, for example, mental estimation, mental or written strategies, or by using a calculator add and subtract decimals in real-life situations, including money **add and subtract fractions with related denominators in real-life situations (not in text)** **estimate sum, difference, product and quotient in real-life situations, including fractions and decimals. (not in text)**

Overall Expectations for Phase 4 - Number

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.

Conceptual Understanding A: The base 10 place value system extends infinitely in two directions.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	model numbers to millions or beyond using the base 10 place value system.	read, write, compare and order whole numbers up to millions or beyond.	use whole numbers up to millions or beyond in real-life situations.
6	model numbers to millions or beyond using the base 10 place value system model integers in appropriate contexts.	read, write, compare and order whole numbers up to millions or beyond read and write integers in appropriate contexts.	use whole numbers up to millions or beyond in real-life situations use integers in real-life situations.

Conceptual Understanding B: Fractions, decimal fractions and percentages are ways of representing whole-part relationships, *and* ratios are a comparison of two numbers or quantities.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	model decimal fractions to thousandths or beyond model percentages understand the relationship between fractions, decimals and percentages.	read, write, compare and order decimal fractions to thousandths or beyond read, write, compare and order percentages convert between fractions, decimals and percentages.	use fractions, decimals and percentages interchangeably in real- life situations select an efficient method for solving a problem: mental estimation, mental computation, written algorithms, by using a calculator use strategies to evaluate the reasonableness of answers.
6	simplify fractions using manipulatives model decimal fractions to thousandths or beyond understand the relationship between fractions, decimals and percentages model ratios.	simplify fractions in mental and written form read, write, compare and order decimal fractions to thousandths or beyond convert between fractions, decimals and percentages read and write ratios.	convert improper fractions to mixed numbers and vice versa in real-life situations use fractions, decimals and percentages interchangeably in real- life situations use ratios in real-life situations.

Conceptual Understanding C: For fractional and decimal computation, the ideas developed for whole-number computation can apply.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	model improper fractions and mixed numbers model addition, subtraction, multiplication and division of fractions.	convert improper fractions to mixed numbers and vice versa.	convert improper fractions to mixed numbers and vice versa in real-life situations use mental and written strategies for adding, subtracting, multiplying and dividing fractions and decimals in real-life situations select an efficient method for solving a problem: mental estimation, mental computation, written algorithms, by using a calculator use strategies to evaluate the reasonableness of answers.
6	model improper fractions and mixed numbers simplify fractions using manipulatives model addition, subtraction, multiplication and division of fractions model addition, subtraction, multiplication and division of decimals.	convert improper fractions to mixed numbers and vice versa simplify fractions in mental and written form.	simplify fractions in computation answers estimate and make approximations in real-life situations involving fractions, decimals and percentages use strategies to evaluate the reasonableness of answers use mental and written strategies for adding, subtracting, multiplying and dividing fractions and decimals in real-life situations select an efficient method for solving a problem: mental estimation, mental computation, written algorithms, by using a calculator select and use an appropriate sequence of operations to solve word problems.

Learning Continuum for Pattern and Function

Overall Expectations for Phase 1 - Pattern and Function

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.

Conceptual Understanding A: Patterns and sequences occur in everyday situations, *and* patterns repeat and grow.

	Constructing Meaning	**Transferring Meaning into Symbols**	**Applying with Understanding**
N	understand that patterns can be found in everyday situations, for example, sounds, actions, objects, nature.	describe patterns using words, drawings, symbols, materials, actions or numbers.	create a pattern.
K	understand that patterns can be found in everyday situations, for example, sounds, actions, objects, nature.	describe patterns in various ways for example, using words, drawings, symbols, materials, actions, numbers.	extend and create patterns.

Overall Expectations for Phase 2 - Pattern and Function

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.

Conceptual Understanding A: Whole numbers exhibit patterns and relationships that can be observed and described, *and* patterns can be represented using numbers and other symbols.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand that patterns can be found in numbers, for example, odd and even numbers, skip counting.	describe number patterns, for example, odd and even numbers, skip counting.	extend and create patterns in numbers, for example, odd and even numbers, skip counting use number patterns to represent and understand real-life situations.
2	understand the inverse relationship between addition and subtraction understand the associative and commutative properties of addition.	represent patterns in a variety of ways, for example, using words, drawings, symbols, materials, actions, numbers.	use the properties and relationships of addition and subtraction to solve problems.

Overall Expectations for Phase 3 - Pattern and Function

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.

Conceptual Understanding A: Functions are relationships or rules that uniquely associate members of one set with members of another set, *and* by analysing patterns and identifying rules for patterns it is possible to make predictions.

	Constructing Meaning	**Transferring Meaning into Symbols**	**Applying with Understanding**
3	understand that patterns can be analysed and rules identified understand that multiplication is repeated addition and that division is repeated subtraction understand the inverse relationship between multiplication and division understand the associative and commutative properties of multiplication.	describe the rule for a pattern in a variety of ways represent rules for patterns using words, symbols and tables identify a sequence of operations relating one set of numbers to another set.	select appropriate methods for representing patterns, for example using words, symbols and tables use number patterns to make predictions and solve problems use the properties and relationships of the four operations to solve problems.
4	understand that patterns can be analysed and rules identified understand that multiplication is repeated addition and that division is repeated subtraction understand the inverse relationship between multiplication and division understand the associative and commutative properties of multiplication.	describe the rule for a pattern in a variety of ways represent rules for patterns using words, symbols and tables identify a sequence of operations relating one set of numbers to another set.	select appropriate methods for representing patterns, for example using words, symbols and tables use number patterns to make predictions and solve problems use the properties and relationships of the four operations to solve problems.

Overall Expectations for Phase 4 - Pattern and Function

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.

Conceptual Understanding A: Patterns can often be generalised using algebraic expressions, equations or functions, *and* exponential notation is a powerful way to express repeated products of the same number.

	Constructing Meaning	**Transferring Meaning into Symbols**	**Applying with Understanding**
5	understand that patterns can be generalized by a rule understand that patterns can be represented, analysed and generalized using tables, graphs, words, and, when possible, symbolic rules. understand exponents as repeated multiplication	represent the rule of a pattern by using a function analyse pattern and function using words, tables and graphs, and, when possible, symbolic rules.	select appropriate methods to analyse patterns and identify rules use functions to solve problems.
6	understand that patterns can be generalized by a rule understand that patterns can be represented, analysed and generalized using tables, graphs, words, and, when possible, symbolic rules understand exponents as repeated multiplication understand the inverse relationship between exponents and roots model exponents and square roots.	represent the rule of a pattern by using a function analyse pattern and function using words, tables and graphs, and, when possible, symbolic rules read and write exponents and square roots	select appropriate methods to analyse patterns and identify rules use functions to solve problems select and use an appropriate sequence of operations to solve word problems. *(order of operations)*

Learning Continuum for Measurement

Overall Expectations for Phase 1 - Measurement

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.

Conceptual Understanding A: Measurement involves comparing objects, *and* objects have attributes that can be measured using non-standard units.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that attributes of real objects can be compared and described, for example, longer, shorter, heavier, empty, full, hotter, colder	identify, compare and describe attributes of real objects, for example, longer, shorter, heavier, empty, full, hotter, colder	
K	understand that attributes of real objects can be compared and described, for example, longer, shorter, heavier, empty, full, hotter, colder	identify, compare and describe attributes of real objects, for example, longer, shorter, heavier, empty, full, hotter, colder compare the length, mass and capacity of objects using non-standard units	describe observations about objects in real-life situations use non-standard units of measurement to solve problems in real-life situations involving length, mass and capacity

Conceptual Understanding B: Events can be compared, ordered and sequenced.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that events in daily routines can be described and sequenced, for example, before, after, bedtime, storytime, today, tomorrow.	identify, describe and sequence events in their daily routine, for example, before, after, bedtime, storytime, today, tomorrow.	
K	understand that events in daily routines can be described and sequenced, for example, before, after, bedtime, storytime, today, tomorrow.	identify, describe and sequence events in their daily routine, for example, before, after, bedtime, storytime, today, tomorrow.	describe observations about events in real-life situations

Overall Expectations for Phase 2 - Measurement

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.

Conceptual Understanding A: Standard units allow us to have a common language to identify, compare, order and sequence objects, *and* we use tools to measure the attributes of objects.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand the use of standard units to measure, for example, length, mass, capacity, money and temperature understand that tools can be used to measure.	estimate and measure objects using standard units of measurement: length, mass, capacity, money and temperature.	use standard units of measurement to solve problems in real-life situations involving length, mass, capacity, money and temperature.
2	understand the use of standard units to measure, for example, length, mass, capacity, money and temperature understand that tools can be used to measure.	estimate and measure objects using standard units of measurement: length, mass, capacity, money and temperature.	use standard units of measurement to solve problems in real-life situations involving length, mass, capacity, money and temperature.

Conceptual Understanding B: Standard units allow us to have a common language to identify, compare, order and sequence events, *and* we use tools to measure the attributes of events.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand that time is measured using universal units of measure, for example, years, months, days, hours, minutes and seconds.	read and write the time to the hour, half hour and quarter hour.	use measures of time to assist with problem solving in real-life situations.
2	understand that calendars can be used to determine the date, and to identify and sequence days of the week and months of the year understand that time is measured using universal units of measure, for example, years, months, days, hours, minutes and seconds.	read and write the time to the hour, half hour and quarter hour estimate and compare lengths of time: second, minute, hour, day, week and month.	use measures of time to assist with problem solving in real-life situations.

Overall Expectations for Phase 3 - Measurement

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.

Conceptual Understanding A: Objects have attributes that can be measured using appropriate tools, *and* relationships exist between standard units that measure the same attributes.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand the use of standard units to measure perimeter, area and volume understand that measures can fall between numbers on a measurement scale, for example, 3½ kg, between 4 cm and 5 cm understand relationships between units, for example, metres, centimetres and millimetres understand an angle as a measure of rotation.	estimate and measure using standard units of measurement: perimeter, area and volume describe measures that fall between numbers on a scale.	use standard units of measurement to solve problems in real-life situations involving perimeter, area and volume select appropriate tools and units of measurement.
4	understand the use of standard units to measure perimeter, area and volume understand that measures can fall between numbers on a measurement scale, for example, 3½ kg, between 4 cm and 5 cm understand relationships between units, for example, metres, centimetres and millimetres understand an angle as a measure of rotation.	estimate and measure using standard units of measurement: perimeter, area and volume describe measures that fall between numbers on a scale.	use standard units of measurement to solve problems in real-life situations involving perimeter, area and volume select appropriate tools and units of measurement.

Conceptual Understanding B: Events have attributes that can be measured using appropriate tools, *and* relationships exist between standard units that measure the same attributes.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand relationships between units, for example, seconds, minutes, hours, weeks, months, years.	read and write digital and analogue time on 12-hour and 24-hour clocks.	select appropriate tools and units of measurement.
4	understand relationships between units, for example, seconds, minutes, hours, weeks, months, years.	read and write digital and analogue time on 12-hour and 24-hour clocks.	select appropriate tools and units of measurement use timelines in units of inquiry and other real-life situations.

Overall Expectations for Phase 4 - Measurement

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.

Conceptual Understanding A: A range of procedures exists to measure different attributes of objects, *and* the conversion of units and measurements allows us to make sense of the world we live in.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand procedures for finding area, perimeter and volume understand the relationships between area and perimeter, between area and volume, and between volume and capacity understand unit conversions within measurement systems (metric or customary).	develop and describe formulas for finding perimeter, area and volume read and interpret scales on a range of measuring instruments carry out simple unit conversions within a system of measurement (metric or customary) measure and construct angles in degrees using a protractor.	select and use appropriate units of measurement and tools to solve problems in real-life situations determine and justify the level of accuracy required to solve real-life problems involving measurement use decimal and fractional notation in measurement, for example, 3.2 cm, 1.47 kg, 1½ miles.
6	understand procedures for finding area, perimeter and volume understand the relationships between area and perimeter, between area and volume, and between volume and capacity understand unit conversions within measurement systems (metric or customary).	develop and describe formulas for finding perimeter, area and volume use decimal and fraction notation in measurement, for example, 3.2 cm, 1.47 kg, 1½ miles read and interpret scales on a range of measuring instruments carry out simple unit conversions within a system of measurement (metric or customary) measure and construct angles in degrees using a protractor.	select and use appropriate units of measurement and tools to solve problems in real-life situations use decimal and fractional notation in measurement, for example, 3.2 cm, 1.47 kg, 1½ miles determine and justify the level of accuracy required to solve real-life problems involving measurement.

Conceptual Understanding B: A range of procedures exists to measure different attributes of events, *and* the conversion of units of time allows us to make sense of the world we live in.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand unit conversions within measurement systems (time).	read and interpret time on a range of measuring instruments carry out simple unit conversions within a system of measurement (time).	use timetables and schedules (12-hour and 24-hour clocks) in real-life situations determine times worldwide.
6	understand unit conversions within measurement systems (time).	read and interpret time on a range of measuring instruments carry out simple unit conversions within a system of measurement (time).	use timetables and schedules (12-hour and 24-hour clocks) in real-life situations determine times worldwide.

Learning Continuum for Shape and Space

Overall Expectations for Phase 1 - Shape and Space

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.

Conceptual Understanding A: Shapes can be described and organized according to their properties.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that 2D and 3D shapes have characteristics that can be described and compared	sort, describe and compare 2D and 3D shapes	
K	understand that 2D and 3D shapes have characteristics that can be described and compared	sort, describe and compare 2D and 3D shapes	

Conceptual Understanding B: Objects in our immediate environment have a position in space that can be described according to a point of reference.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that common language can be used to describe position and direction, for example, inside, outside, above, below, next to, behind, in front of, up, down.	describe position and direction, for example, inside, outside, above, below, next to, behind, in front of, up, down.	
K	understand that common language can be used to describe position and direction, for example, inside, outside, above, below, next to, behind, in front of, up, down.	describe position and direction, for example, inside, outside, above, below, next to, behind, in front of, up, down.	explore and describe the paths, regions and boundaries of their immediate environment (inside, outside, above, below) and their position (next to, behind, in front of, up, down). **Coding Application** - Learners explore and apply simple instructions to develop the language of movement (Forward, Backwards, Left, Right). - Learners use and create simple visual scripts and symbols to design 2 or 3 step movement, direction and distance (using non standard units e.g. steps). - Learners explore the procedural sequence of instructions needed to map different pathways. - Learners explore distance (units of movement) using non standard units of measurement (eg. steps)

Overall Expectations for Phase 2 - Shape and Space

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.

Conceptual Understanding A: Shapes are classified and named according to their properties.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand that there are relationships among and between 2D and 3D shapes understand that 2D and 3D shapes can be created by putting together and/or taking apart other shapes understand that geometric shapes are useful for representing real-world situations	sort, describe and label 2D and 3D shapes analyse and describe the relationships between 2D and 3D shapes represent ideas about the real world using geometric vocabulary and symbols, for example, through oral description, drawing, modelling, labelling	analyse and use what they know about 3D shapes to describe and work with 2D shapes
2	understand that there are relationships among and between 2D and 3D shapes understand that 2D and 3D shapes can be created by putting together and/or taking apart other shapes understand that geometric shapes are useful for representing real-world situations	sort, describe and label 2D and 3D shapes analyse and describe the relationships between 2D and 3D shapes represent ideas about the real world using geometric vocabulary and symbols, for example, through oral description, drawing, modelling, labelling	analyse and use what they know about 3D shapes to describe and work with 2D shapes

Conceptual Understanding B: Specific vocabulary can be used to describe an object's position in space.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand that directions can be used to describe pathways, regions, positions and boundaries of their immediate environment.	interpret and create simple directions, describing paths, regions, positions and boundaries of their immediate environment.	interpret and use simple directions, describing paths, regions, positions and boundaries of their immediate environment.
2	understand that directions can be used to describe pathways, regions, positions and boundaries of their immediate environment.	interpret and create simple directions, describing paths, regions, positions and boundaries of their immediate environment.	interpret and use simple directions, describing paths, regions, positions and boundaries of their immediate environment. **<u>Coding Application (Y1 and Y2)</u>** - Learners apply simple instructions to develop the language of movement (Forward, Backwards, Left, Right, half turn, quarter turn). - Learners explore the procedural sequence of instructions needed to map different pathways or design simple shapes (squares and rectangles), around the pod and wider school.

			- Learners use a wider range of scripts / symbols to design movement direction and distance. - Learners apply the above outcomes to draw shapes (squares / rectangles / triangles) or create a pathway for coding bots. - Learners can create and test their own pathways, as well as using another learners set of instructions (analogue coding)

Conceptual Understanding C: Some shapes are made up of parts that repeat in some way.

	Constructing Meaning	**Transferring Meaning into Symbols**	**Applying with Understanding**
1	understand that examples of symmetry and transformations can be found in their immediate environment	create and describe symmetrical patterns	recognize and explain simple symmetrical designs in the environment
2	understand that examples of symmetry and transformations can be found in their immediate environment	create and describe symmetrical and tessellating patterns identify lines of reflective symmetry	recognize and explain simple symmetrical designs in the environment apply knowledge of symmetry to problem-solving situations

Overall Expectations for Phase 3 - Shape and Space

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.

Conceptual Understanding A: Geometric shapes and vocabulary are useful for representing and describing objects and events in real-world situations.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand the common language used to describe shapes understand the properties of regular and irregular polygons understand that visualization of shape and space is a strategy for solving problems.	sort, describe and model regular and irregular polygons describe and/or represent mental images of objects..	analyse and describe 2D and 3D shapes, including regular and irregular polygons,
4	understand the common language used to describe shapes understand the properties of regular and irregular polygons understand congruent or similar shapes understand that visualization of shape and space is a strategy for solving problems.	sort, describe and model regular and irregular polygons describe and model congruency and similarity in 2D shapes describe and/or represent mental images of objects..	analyse and describe 2D and 3D shapes, including regular and irregular polygons, using geometrical vocabulary identify, describe and model congruency and similarity in 2D shapes

Conceptual Understanding B: Changing the position of a shape does not alter its properties.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand an angle as a measure of rotation understand that visualization of space is a strategy for solving problems.	analyse angles by comparing and describing rotations: whole turn; half turn; quarter turn; north, south, east and west on a compass describe and/or represent mental images of paths.	
4	understand an angle as a measure of rotation understand that directions for location can be represented by coordinates on a grid understand that visualization of shape and space is a strategy for solving problems.	analyse angles by comparing and describing rotations: whole turn; half turn; quarter turn; north, south, east and west on a compass locate features on a grid using coordinates describe and/or represent mental images of paths.	apply knowledge of transformations to problem-solving situations. **<u>Coding Application (Y3 and Y4)</u>** - Learners apply instructions to develop the language of movement (Using Angles up to 180^0 in conjunction with left and right turn). - Learners explore the procedural sequence of instructions needed to map different pathways or design different shapes, around the pod and

			wider school. - Learners use a wide range of application specific scripts to design movement direction and distance. These are to include repeating patterns. - Learners apply the above outcomes to draw shapes (squares / rectangles / triangles/ regular polygons) and create orienteering/pathway instructions. - Learners can create and test their own pathways, as well as using another learners set of instructions. - Learners can describe direction using compass points (N,S,E,W)

Conceptual Understanding C: Shapes can be transformed in different ways.

	Constructing Meaning	**Transferring Meaning into Symbols**	**Applying with Understanding**
3	understand that lines and axes of reflective and rotational symmetry assist with the construction of shapes understand that visualization of shape is a strategy for solving problems.	describe and/or represent mental images of patterns.	recognize and explain symmetrical patterns, including tessellation, in the environment
4	understand that lines and axes of reflective and rotational symmetry assist with the construction of shapes understand that visualization of shape and space is a strategy for solving problems.	describe and/or represent mental images of patterns	recognize and explain symmetrical patterns, including tessellation, in the environment apply knowledge of transformations to problem-solving situations.

Overall Expectations for Phase 4 - Shape and Space

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 visualise 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.

Conceptual Understanding A: Consolidating what we know of geometric concepts allows us to make sense of and interact with our world.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand the common language used to describe shapes understand the properties of regular and irregular polyhedra understand that 2D representations of 3D objects can be used to visualize and solve problems	analyse, describe, classify and visualize 2D (including circles, triangles and quadrilaterals) and 3D shapes, using geometric vocabulary describe lines and angles using geometric vocabulary create and model how a 2D net converts into a 3D shape and vice versa explore the use of geometric ideas and relationships to solve problems in other areas of mathematics.	use geometric vocabulary when describing shape and space in mathematical situations and beyond Use 2D representations of 3D objects to visualize and solve problems, for example using drawings or models.
6	understand the common language used to describe shapes understand the properties of regular and irregular polyhedra understand the properties of circles understand that 2D representations of 3D objects can be used to visualize and solve problems	analyse, describe, classify and visualize 2D (including circles, triangles and quadrilaterals) and 3D shapes, using geometric vocabulary describe lines and angles using geometric vocabulary create and model how a 2D net converts into a 3D shape and vice versa explore the use of geometric ideas and relationships to solve problems in other areas of mathematics.	use geometric vocabulary when describing shape and space in mathematical situations and beyond Use 2D representations of 3D objects to visualize and solve problems, for example using drawings or models.

Conceptual Understanding B: Manipulation of shape and space takes place for a particular purpose.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand how scale (ratios) is used to enlarge and reduce shapes understand that geometric ideas and relationships can be used to solve problems in other areas of mathematics and in real life. *(Symmetry)*	identify and use scale (ratios) to enlarge and reduce shapes	use scale (ratios) to enlarge and reduce shapes
6	understand how scale (ratios) is used to enlarge and reduce shapes understand that geometric ideas and relationships can be used to solve problems in other areas of	identify and use scale (ratios) to enlarge and reduce shapes	use scale (ratios) to enlarge and reduce shapes

	mathematics and in real life. *(Symmetry)*		

Conceptual Understanding C: Geometric tools and methods can be used to solve problems relating to shape and space.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand systems for describing position and direction understand that geometric ideas and relationships can be used to solve problems in other areas of mathematics and in real life.	identify and use the language and notation of bearing to describe direction and position describe angles using geometric vocabulary	apply the language and notation of bearing to describe direction and position use geometric vocabulary when describing shape and space in mathematical situations and beyond *(Location)*
6	understand systems for describing position and direction understand that geometric ideas and relationships can be used to solve problems in other areas of mathematics and in real life	identify and use the language and notation of bearing to describe direction and position describe angles using geometric vocabulary	apply the language and notation of bearing to describe direction and position use geometric vocabulary when describing shape and space in mathematical situations and beyond *(Location)* **<u>Coding Application (Y5 and Y6)</u>** - Learners apply instructions to develop the language of movement (Using Angles up to 360^0/ Bearings/ 8 point compass points). - Learners explore the procedural sequence of instructions needed to map different pathways or design different shapes, around the pod and wider school. - Learners use a wide range of application specific scripts to design movement direction and distance. These are to include repeating patterns. - Learners apply the above outcomes to draw shapes (squares / rectangles / triangles/ regular and irregular polygons / quadrilaterals) and create orienteering/ pathway instructions. - Learners can create and test their own pathways, as well as using another learners set of instructions. - Learners can explore pattern and function using nth term e.g Using n (number of sides) to describe the external angles of polygons.

Learning Continuum for Data Handling

Overall Expectations for Phase 1 - Data Handling

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.

Conceptual Understanding A: We collect information to make sense of the world around us.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that information about themselves and their surroundings can be obtained in different ways.		
K	understand that information about themselves and their surroundings can be obtained in different ways.	represent information through pictographs and tally marks.	create pictographs and tally marks create living graphs using real objects and people.

Conceptual Understanding B: Organising objects and events helps us to solve problems.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	understand that sets can be organized by different attributes. *(shape, size, colour, texture)*	sort and label real objects by attributes.	
K	understand that sets can be organized by different attributes. *(shape, size, colour, texture)*	sort and label real objects by attributes.	describe real objects and events by attributes.

Conceptual Understanding C: Events in daily life involve chance.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
N	discuss chance in daily events. *(impossible, maybe, certain)*		
K	discuss chance in daily events. *(impossible, not likely, maybe, likely, certain)*		

Overall Expectations for Phase 2 - Data Handling

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.

Conceptual Understanding A: Information can be expressed as organised and structured data, *and* objects and events can be organised in different ways.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	understand that sets can be organized by different attributes understand that information about themselves and their surroundings can be obtained in different ways.	represent information through pictographs and tally marks sort and label real objects by attributes.	create pictographs and tally marks create living graphs using real objects and people describe real objects and events by attributes.
2	understand that sets can be organized by one or more attributes understand that information about themselves and their surroundings can be collected and recorded in different ways	collect and represent data in different types of graphs, for example, tally marks, bar graphs represent the relationship between objects in sets using tree, Venn and Carroll diagrams	collect, display and interpret data for the purpose of answering questions create a pictograph and sample bar graph of real objects and interpret data by comparing quantities (for example, more, fewer, less than, greater than) use tree, Venn and Carroll diagrams to explore relationships between data

Conceptual Understanding B: Some events in daily life are more likely to happen than others.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
1	discuss chance in daily events. *(impossible, maybe, certain)*		
2	understand the concept of chance in daily events (impossible, less likely, maybe, most likely, certain).	express the chance of an event happening using words or phrases (impossible, less likely, maybe, most likely, certain).	identify and describe chance in daily events (impossible, less likely, maybe, most likely, certain).

Overall Expectations for Phase 3 - Data Handling

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.

Conceptual Understanding A: Data can be collected, organised, displayed and analysed in different ways, *and* different graph forms highlight different aspects of data more efficiently.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand that data can be collected, displayed and interpreted using simple graphs, for example, bar graphs, line graphs understand that scale can represent different quantities in graphs understand that the mode can be used to summarize a set of data understand that one of the purposes of a database is to answer questions and solve problems.	collect, display and interpret data using simple graphs, for example, bar graphs, line graphs identify, read and interpret range and scale on graphs identify the mode of a set of data.	design a survey and systematically collect, organize and display data in pictographs and bar graphs select appropriate graph form(s) to display data interpret range and scale on graphs.
4	understand that data can be collected, displayed and interpreted using simple graphs, for example, bar graphs, line graphs understand that scale can represent different quantities in graphs understand that the mode can be used to summarize a set of data understand that one of the purposes of a database is to answer questions and solve problems.	collect, display and interpret data using simple graphs, for example, bar graphs, line graphs identify, read and interpret range and scale on graphs identify the mode of a set of data.	design a survey and systematically collect, organize and display data in pictographs and bar graphs select appropriate graph form(s) to display data interpret range and scale on graphs.

Conceptual Understanding B: Probability can be based on experimental events in daily life, *and* probability can be expressed in numerical notations.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
3	understand that probability is based on experimental events.	use tree diagrams to express probability using simple fractions.	use probability to determine mathematically fair and unfair games and to explain possible outcomes.
4	understand that probability is based on experimental events.	use tree diagrams to express probability using simple fractions.	use probability to determine mathematically fair and unfair games and to explain possible outcomes express probability using simple fractions.

Overall Expectations for Phase 4 - Data Handling

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 summarise 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.

Conceptual Understanding A: Data can be presented effectively for valid interpretation and communication, *and* range, mode, median and mean can be used to analyse statistical data.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand that different types of graphs have special purposes.	collect, display and interpret data in circle graphs (pie charts) and line graphs.	
6	understand that different types of graphs have special purposes understand that the mode, median, mean and range can summarize a set of data.	collect, display and interpret data in circle graphs (pie charts) and line graphs identify, describe and explain the range, mode, median and mean in a set of data set up a spreadsheet using simple formulas to manipulate data and to create graphs.	design a survey and systematically collect, record, organize and display the data in a bar graph, circle graph, line graph identify, describe and explain the range, mode, median and mean in a set of data create and manipulate an electronic database for their own purposes.

Conceptual Understanding B: Probability can be represented on a scale between 0-1 or 0%-100%, *and* the probability of an event can be predicted theoretically.

	Constructing Meaning	Transferring Meaning into Symbols	Applying with Understanding
5	understand that probability can be expressed in scale (0–1) or per cent (0%–100%) understand the difference between experimental and theoretical probability.	express probabilities using scale (0–1) or per cent (0%–100%).	determine the theoretical probability of an event and explain why it might differ from experimental probability.
6	understand that probability can be expressed in scale (0–1) or per cent (0%–100%) understand the difference between experimental and theoretical probability.	express probabilities using scale (0–1) or per cent (0%–100%).	determine the theoretical probability of an event and explain why it might differ from experimental probability.