



Mathematical Development Continuum

Phase 1 - EY 1, EY 2, PYP 1

Data Handling	Measurement	Shape and Space	Pattern and Function	Number
<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ We collect information to make sense of the world around us. ❖ Organizing objects and events helps us to solve problems. ❖ Events in daily life involve chance. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Measurement involves comparing objects and events. ❖ Objects have attributes that can be measured using non-standard units. ❖ Events can be ordered and sequenced 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Shapes can be described and organized according to their properties. ❖ Objects in our immediate environment have a position in space that can be described according to a point of reference. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Patterns and sequences occur in everyday situations. ❖ Patterns repeat and grow. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Numbers are a naming system. ❖ Numbers can be used in many ways for different purposes in the real world. ❖ Numbers are connected to each other through a variety of relationships. ❖ Making connections between our experiences with number can help us to develop number sense.
<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will develop an understanding of how the collection and organization 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>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will understand that shapes (2D and 3D) 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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.
<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> • understand that sets can be organized by different attributes • understand that information about themselves and their surroundings can be obtained in different ways • discuss chance in daily events 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> • understand that attributes of real objects can be compared and described, for example, longer, shorter, heavier, empty, full, hotter, colder. • understand that events in daily routines can be 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> • understand that 2D and 3D shapes have characteristics that can be described and compared • understand that common language can be used to describe position and direction, for example, inside, 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> • understand that patterns can be found in everyday situations, for example, sounds, actions, objects, nature. 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> • understand one-to-one correspondence • understand that, for a set of objects, the number name of the last object counted describes the quantity of the whole set • understand that numbers can



<p>(impossible, maybe, certain).</p> <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none">represent information through pictographs and tally markssort and label real objects by attributes. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">create pictographs and tally markscreate living graphs using real objects and people*describe real objects and events by attributes.	<p>described and sequenced, for example, before, after, bedtime, storytime, today, tomorrow</p> <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none">identify, compare and describe attributes of real objects, for example, longer, shorter, heavier, empty, full, hotter, coldercompare the length, mass and capacity of objects using nonstandard unitsidentify, describe and sequence events in their daily routine, for example, before, after, bedtime, storytime, today, tomorrow. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">describe observations about events and objects in real-life situationsuse non-standard units of measurement to solve problems in real-life situations involving length, mass and capacity	<p>outside, above, below, next to, behind, in front of, up, down.</p> <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none">sort, describe and compare 3D shapesdescribe position and direction, for example, inside, outside, above, below, next to, behind, in front of, up, down. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">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).	<p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none">describe patterns in various ways, for example, using words, drawings, symbols, materials, actions, numbers. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">extend and create patterns	<p>be constructed in multiple ways, for example, by combining and partitioning</p> <ul style="list-style-type: none">understand conservation of number*understand the relative magnitude of whole numbersrecognize groups of zero to five objects without counting (subitizing)understand whole-part relationshipsuse the language of mathematics to compare quantities, for example, more, less, first, second. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none">connect number names and numerals to the quantities they represent. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">count to determine the number of objects in a setuse number words and numerals to represent quantities in real-life situationsuse the language of mathematics to compare quantities in real-life situations, for example, more, less, first, secondsubitise in real-life situationsuse simple fraction names in real-life situations.
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Mathematical Development Continuum

Phase 2 - PYP 2, PYP 3

Data Handling	Measurement	Shape and Space	Pattern and Function	Number
<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Information can be expressed as organized and structured data. ❖ Objects and events can be organized in different ways. ❖ Some events in daily life are more likely to happen than others. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Standard units allow us to have a common language to identify, compare, order and sequence objects and events. ❖ We use tools to measure the attributes of objects and events. ❖ Estimation allows us to measure with different levels of accuracy. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Shapes are classified and named according to their properties. ❖ Some shapes are made up of parts that repeat in some way. ❖ Specific vocabulary can be used to describe an object's position in space. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Whole numbers exhibit patterns and relationships that can be observed and described. ❖ Patterns can be represented using numbers and other symbols. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ The base 10 place value system is used to represent numbers and number relationships. ❖ Fractions are ways of representing whole- part relationships. ❖ The operations of addition, subtraction, multiplication and division are related to each other and are used to process information to solve problems. ❖ Number operations can be modelled in a variety of ways. ❖ There are many mental methods that can be applied for exact and approximate computations.
<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will understand how information can be expressed as organized 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>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will understand that standard units allow us 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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



			and subtraction.	situations.
<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> 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 understand the concept of chance in daily events (impossible, less likely, maybe, most likely, certain). <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> 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 express the chance of an event happening using words or phrases (impossible, less likely, maybe, most likely, certain). <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> 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 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand the use of standard units to measure, for example, length, mass, money, time understand that tools can be used to measure 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 <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> estimate and measure objects using standard units of measurement: length, mass, capacity, and money 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. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> use standard units of measurement to solve problems in real-life situations involving length, 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> 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 examples of symmetry and transformations can be found in their immediate environment understand that geometric shapes are useful for representing real-world situations understand that directions can be used to describe pathways, regions, positions and boundaries of their immediate environment. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> sort, describe and label 2D and 3D shapes analyse and describe the relationships between 2D and 3D shapes create and describe symmetrical patterns identify lines of reflective symmetry represent ideas about the real world using geometric vocabulary and symbols, for example, through oral description, drawing, 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand that patterns can be found in numbers, for example, odd and even numbers, skip counting understand the inverse relationship between addition and subtraction understand the associative and commutative properties of addition. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> represent patterns in a variety of ways, for example, using words, drawings, symbols, materials, actions, numbers describe number patterns, for example, odd and even numbers, skip counting. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> extend and create patterns in numbers, for example, odd and even numbers, skip counting use number patterns to represent and understand real- life situations use the properties and relationships of addition and subtraction to solve problems. 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> model numbers to hundreds or beyond using the base 10 place value system** and ordering and compare them estimate quantities to 100 or beyond model simple fraction relationships 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 model simple addition and subtraction of fractions with the same denominator. E.g. $\frac{1}{2} + \frac{1}{2} = 1$. $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> read and write whole numbers up to hundreds or beyond read, write, compare and order cardinal and ordinal numbers describe mental and written strategies for adding and subtracting two-digit numbers.



<p>diagrams to explore relationships between data</p> <ul style="list-style-type: none">• identify and describe chance in daily events (impossible, less likely, certain)	<p>mass, capacity, and money</p> <ul style="list-style-type: none">• use measures of time to assist with problem solving in real-life situations	<p>modelling, labelling</p> <ul style="list-style-type: none">• interpret and create simple directions, describing paths, regions, positions and boundaries of their immediate environment. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">• analyse and use what they know about 3D shapes to describe and work with 2D shapes• recognize and explain simple symmetrical designs in the environment• apply knowledge of symmetry to problem-solving situations• interpret and use simple directions, describing paths, regions, positions and boundaries of their immediate environment.		<p>When applying with understanding, learners:</p> <ul style="list-style-type: none">• use whole numbers up to hundreds or beyond in real-life situations• use cardinal and ordinal numbers in real-life situations<ul style="list-style-type: none">• use fast recall of addition and subtraction number facts in real-life situations• use fractions 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• use strategies to evaluate the reasonableness of answers.
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Mathematical Development Continuum

Phase 3 - PYP 4, PYP 5

Data Handling	Measurement	Shape and Space	Pattern and Function	Number
<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Data can be collected, organized, displayed and analysed in different ways. ❖ Different graph forms highlight different aspects of data more efficiently. ❖ Probability can be based on experimental events in daily life. ❖ Probability can be expressed in numerical notations. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Objects and events have attributes that can be measured using appropriate tools. ❖ Relationships exist between standard units that measure the same attributes. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Changing the position of a shape does not alter its properties. ❖ Shapes can be transformed in different ways. ❖ Geometric shapes and vocabulary are useful for representing and describing objects and events in real-world situations. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Functions are relationships or rules that uniquely associate members of one set with members of another set. ❖ By analysing patterns and identifying rules for patterns it is possible to make predictions. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ The base 10 place value system can be extended to represent magnitude. ❖ Fractions and decimals are ways of representing whole-part relationships. ❖ The operations of addition, subtraction, multiplication and division are related to each other and are used to process information to solve problems. ❖ Even complex operations can be modelled in a variety of ways, for example, an algorithm is a way to represent an operation.
<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will continue to collect, organize, 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 summarize a set of data. ❑ Learners will make the connection that probability is based on experimental events and can be expressed numerically. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. ❑ Learners will be given the opportunity to construct meaning about the concept of an angle as a measure of rotation. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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.
<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand that relevant 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 understand that probability is based on experimental events. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> 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 • use tree diagrams to express probability using simple fractions. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> design a survey and systematically collect, record, 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand the use of standard units to measure perimeter, area and volume, use vocabulary and abbreviations understand that measures can fall between numbers on a measurement scale, for example, 3 1/2 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 <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> estimate and measure using standard units of measurement: perimeter, area and volume describe measures that fall between numbers on a scale to the nearest tenth of a unit read and write digital and analogue time on 12-hour and 24-hour clocks and use timetables and calendars <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> use standard units of measurement to solve problems in real-life situations involving 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand the common language used to describe shapes understand the properties of regular and irregular polygons understand congruent or similar shapes understand that lines and axes of reflective and rotational symmetry assist with the construction of shapes 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. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> sort, describe and model regular and irregular polygons describe and model congruency and similarity in 2D shapes Identify and name points, line segments, parallel and intersecting lines on shapes analyse angles by comparing and describing rotations: whole turn; half turn; quarter turn; identify right angles; 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand that patterns in numbers and shapes 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. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> 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. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> 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. 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> model numbers to thousands or beyond using the base 10 place value system model equivalent fractions use the language of fractions, for example, numerator, denominator model decimal fractions to hundredths or beyond model multiplication and division of whole numbers and addition & subtraction. Multiply and divide by 10, 100 and 1000 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*** identify pairs of fractions that total 1 model addition and subtraction of decimals. Model doubling and halving Recognize and continue number sequences, counting on and back Partitioning/rounding <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> read, write, compare and order whole numbers up to thousands or beyond and negative numbers



<p>organize and display the data in a bar graph, circle graph, line graph</p> <ul style="list-style-type: none">• 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• determine the theoretical probability of an event and explain why it might differ from experimental probability.	<p>perimeter, area and volume and temperatures</p> <ul style="list-style-type: none">• select appropriate tools and units of measurement• use timelines in units of inquiry and other real-life situations using timetables and calendars	<ul style="list-style-type: none">• Recognise and use north, south, east and west on a compass• locate features on a grid using coordinates• Identify and name points, line segments, parallel and intersecting lines on shapes <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">• 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• recognize and explain symmetrical patterns also in the environment		<ul style="list-style-type: none">• develop strategies for memorizing addition, subtraction, multiplication and division number facts• read, write, compare and order fractions• read and write equivalent fractions• read, write, compare and order fractions to hundredths or beyond• describe mental and written strategies for multiplication and division. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">• 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 decimal fractions 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 fractions with related denominators in real-life situations• add and subtract decimals in real-life situations, including money• estimate sum, difference, product and quotient in real-life situations, including fractions and decimals.
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				<ul style="list-style-type: none">• Use a calculator to carry out one step and two step calculations
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Mathematical Development Continuum

Phase 4 - PYP 5, PYP 6

Data Handling	Measurement	Shape and Space	Pattern and Function	Number
<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Data can be presented effectively for valid interpretation and communication. ❖ Range, mode, median and mean can be used to analyse statistical data. ❖ Probability can be represented on a scale between 0–1 or 0%–100%. ❖ The probability of an event can be predicted theoretically. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Accuracy of measurements depends on the situation and the precision of the tool. ❖ Conversion of units and measurements allows us to make sense of the world we live in. ❖ A range of procedures exists to measure different attributes of objects and events. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Manipulation of shape and space takes place for a particular purpose. ❖ Consolidating what we know of geometric concepts allows us to make sense of and interact with our world. ❖ Geometric tools and methods can be used to solve problems relating to shape and space. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ Patterns can often be generalized using algebraic expressions, equations or functions. ❖ Patterns repeat and grow. 	<p>Conceptual Understandings</p> <ul style="list-style-type: none"> ❖ The base 10 place value system extends infinitely in two directions. ❖ Fractions, decimal fractions and percentages are ways of representing whole-part relationships. ❖ For fractional and decimal computation, the ideas developed for whole-number computation can apply. ❖ Ratios are a comparison of two numbers or quantities.
<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will collect, organize 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ Learners will understand that patterns can be represented, analysed and generalized 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. ❑ 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. 	<p>Overall Expectations</p> <ul style="list-style-type: none"> ❑ 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 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.
<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand that different types of graphs have special purposes understand that the mode, median, mean and range can summarize a set of data understand that probability can be expressed in scale (0–1) or per cent(0%–100%) understand the difference between experimental and theoretical probability. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> collect, display and interpret data in circle graphs (pie charts) in ICT 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 express probabilities using scale (0–1) or per cent (0%–100%). <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> 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 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> 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) understand how to work out problems with time. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> 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, 11/2 miles read and interpret scales on a range of measuring instruments measure and construct angles in degrees using a protractor carry out simple unit conversions within a system of measurement (metric or customary) <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> select and use appropriate units of measurement and tools to solve problems in real-life situations 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> understand the common language used to describe shapes understand the properties of regular and irregular polyhedra understand systems for describing position and direction understand that 2D representations of 3D objects can be used to visualize and solve problems (plans and nets) understand that geometric ideas and relationships can be used to solve problems in other areas of mathematics and in real life. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> analyse, describe, classify and visualize 2D (including circles, triangles and quadrilaterals) and 3D shapes, using geometric vocabulary describe lines and angles using geometric vocabulary identify and use the language and notation of bearing to describe direction and position create and model how a 2D net converts into a 3D shape and vice versa explore the use of geometric ideas and relationships to 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> 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. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> represent the rule of a pattern by using a function analyse pattern and function using words, tables and graphs, and, when possible, symbolic rules. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none"> select appropriate methods to analyse patterns and identify rules use functions to solve problems. 	<p>Learning Outcomes</p> <p>When constructing meaning, learners:</p> <ul style="list-style-type: none"> model numbers to millions or beyond using the base 10 place value system model integers in appropriate contexts model exponents and square roots model improper fractions and mixed numbers simplify fractions using manipulatives model decimal fractions to thousandths or beyond model percentages understand the relationship between fractions, decimals and percentages model addition, subtraction, multiplication and division of fractions model addition, subtraction, multiplication and division of decimals. <p>When transferring meaning into symbols, learners:</p> <ul style="list-style-type: none"> read, write, compare and order whole numbers up to millions or beyond read and write integers in appropriate contexts convert improper fractions to mixed numbers and vice versa simplify fractions in mental and written form read, write, compare and order decimal fractions to thousandths or beyond



<p>mean in a set of data</p> <ul style="list-style-type: none">● determine the theoretical probability of an event and explain why it might differ from experimental probability.	<ul style="list-style-type: none">● 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, 11/2 miles● use timetables and schedules (12- hour and 24-hour clocks) in real-life situations● determine times worldwide	<p>solve problems in other areas of mathematics.</p> <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">● use geometric vocabulary when describing shape and space in mathematical situations and beyond● apply the language and notation of bearing to describe direction and position● use 2D representations of 3D objects to visualize and solve problems, for example using drawings or models.		<ul style="list-style-type: none">● read, write, compare and order percentages● convert between fractions, decimals and percentages. <p>When applying with understanding, learners:</p> <ul style="list-style-type: none">● use whole numbers up to millions or beyond in real-life situations● use integers in real-life situations● convert improper fractions to mixed numbers and vice versa in real-life situations● simplify fractions in computation answers● use fractions, decimals and percentages interchangeably in real life situations● select and use an appropriate sequence of operations to solve word problems● 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 ● use mental and written strategies for adding, subtracting, multiplying and dividing fractions and decimals in real-life situations● estimate and make approximations in real-life situations involving fractions, decimals and percentages.
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