

# Primary Years Programme Mathematics Curriculum



Adapted from the *Primary Years Programme Mathematics scope and sequence*. Publication. Cardiff: IBO, 2009. Print

***The following document seeks to lay out the minimum requirement to be taught in Mathematics for each grade level in each of the areas of Number, Pattern and Function, Measures, Shape and Space and Data Handling. During the construction of this Curriculum Document every effort has been made to ensure the alignment all the elements of the Austrian National Curriculum and the IB PYP Scope and Sequence for Mathematics.***

***Across Mathematics learning and teaching in the Primary Years Programme students within the same age range may be working at different levels and therefore teachers will consider a range of phases during the planning process. With this in mind we have included the overall expectations and conceptual understandings for each phase and then a more detailed specific list of minimum requirements of what we think each grade should cover by the end of each year.***

## Learning continuum for Mathematics PYP 1 to PYP 5

### Number

#### Phase 1:

##### Overall expectations:

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 Understandings:

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.

#### Phase 2:

##### Overall expectations

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 Understandings:

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.

#### Phase 3:

##### Overall Expectations

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

<b>Number</b>	<p>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> <p><b>Conceptual understandings:</b>  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> <p><b>Phase 4:</b>  <b>Overall expectations:</b>  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.</p> <p><b>Conceptual understandings:</b>  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>
	<b>MINIMUM REQUIREMENTS</b>
	<b>By the end of PYP 1 students will:</b>
	<p><b>Number and Place Value</b></p> <ul style="list-style-type: none"> <li>● be able to read and write whole, cardinal, and ordinal numbers to 100</li> <li>● count in multiples of twos, fives and tens</li> </ul>

## Number

- compare and order numbers from 0 up to 100, use  $<$ ,  $>$  and  $=$  signs, and use the language of: equal to, more than, less than (fewer), first, second
- demonstrate understanding of one-to-one correspondence by counting to determine the number of objects in a set.
- connect number names and numerals to the quantities they represent.
- recognise the place value of each digit in a two-digit number up to 99 (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- recognise groups of 0 to 5 objects without counting

### Addition and Subtraction

- use the language of addition and subtraction, for example, add, take away, plus, minus, sum, difference
- know addition facts within 20: add 1, add 2, doubles, add 10, add 9.
- know subtraction facts within 20: subtract 1, subtract 2, subtract  $n - n$ , subtract 10, subtract 9.
- read, write and interpret mathematical statements involving addition (+), subtraction, (-) and equals (=) signs
- add and subtract without exchange to 50
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as  $7 = \underline{\quad} + 4$ .

### Fractions

- introduce the concept of a half as one of two equal parts and a quarter as one of four equal parts of an object, shape or quantity.
- use simple fraction names in real-life situations

### *By the end of PYP 2 students will:*

### Number and Place Value

- be able to read and write whole, cardinal, and ordinal numbers to 1000
- count from 0 in multiples of 2, 5, 10, 50 and 100
- model numbers to thousands or beyond using the base 10 place value system
- recognise the place value of each digit in a three-digit number to 999 ( hundreds, tens, ones)
- compare and order numbers up to 1,000 and beyond, use  $<$ ,  $>$  and  $=$  signs
- find 1 or 10 or 100 more/less than a given number
- identify, represent and estimate numbers using different representations

**Number**

- estimate quantities to 1,000 or beyond
- round to the nearest 10 or 100 with any given number 0-999.

**Addition and Subtraction**

- use the language of addition and subtraction, for example, add, take away, plus, minus, sum, difference
- use number sentences, drawings, and manipulatives to model addition and subtraction of whole numbers to 999 and beyond.
- know all the addition and subtraction facts within 20
- continue to develop strategies for memorizing addition and subtraction facts to 100
- round to the nearest 10 and 100 and estimate sums and differences
- add and subtract numbers up to, but not limited to 100, using formal written methods of columnar/vertical addition and subtraction with and without exchanging/regrouping
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

**Fractions**

- develop the concept of fractions by modeling, drawing.... simple fraction relationships
- develop the language of fractions
- recognise and show equivalent fractions in pictures with halves and quarters
- use fractions in real-life situations

**Multiplication and Division**

- understand situations that involve multiplication and division
- recall and use multiplication facts for the 0, 1, 2, 3, 4, 5 and 10 multiplication tables
- write and calculate mathematical statements for multiplication using the multiplication tables that they know
- begin to see division as sharing or grouping and investigate the link between division and multiplication.

**Number**

*By the end of PYP 3 students will:*

## Number

### Number and Place Value

- be able to read and write whole, cardinal, and ordinal numbers to 10 000 and beyond
- count from 0 in multiples of 2, 5, 10, 25, 50, 100, 250, 500 etc
- model numbers to a thousand using the base 10 place value system
- recognise the place value of each digit in a 4-digit number to 9999 ( thousands, hundreds, tens, ones) and moving on to 5-digit numbers
- compare and order numbers up to 10 000 and beyond, use <, > and = signs
- find 10, 100 or 1000 more/less than a given number
- identify, represent and estimate numbers using different representations
- estimate quantities to 10 000 or beyond
- round to the nearest 10, 100 or 1000 with any given number 0-9999.

### Addition and Subtraction

- know all the addition and subtraction facts within 30
- continue to develop strategies for memorizing addition and subtraction facts to 100
- round to the nearest 10, 100 and 1000 and beyond and estimate sums and differences
- add and subtract numbers up to, but not limited to 1000, using formal written methods of columnar/vertical addition and subtraction with and without exchanging/regrouping
- understand use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
- use written strategies for addition and subtraction of three- digit numbers or beyond in real-life situations

### Multiplication and Division

- develop strategies for memorizing multiplication number facts up to 10 x 10
- describe mental and written strategies for multiplication and division.
- develop strategies for memorizing multiplication and division number facts
- use mental and written strategies for multiplication and division of two- digit numbers or beyond in real-life situations
- be able to multiply and divide whole and decimal numbers by 10

### Fractions and Decimals

- model equivalent fractions: halves, quarters and eighths and thirds, sixths and twelfths

<b>Number</b>	<ul style="list-style-type: none"> <li>● use the language of fractions, for example, numerator, denominator</li> <li>● model decimal fractions to 10ths</li> <li>● model addition and subtraction of decimals</li> <li>● be able to multiply and divide whole and decimal numbers by 10</li> </ul>
	<b><i>By the end of PYP 4 students will</i></b>
	<p><b>Number and Place Value</b></p> <ul style="list-style-type: none"> <li>● model, read, write, compare and order whole numbers up to millions and beyond and use them in real-life situations.</li> <li>● understand the base 10 place value system and that the place of a digit indicates its value.</li> <li>● be able to read and write whole, cardinal, and ordinal numbers to 10 000 and beyond</li> <li>● count from 0 in multiples of 15, 25, 45 , 75, etc</li> <li>● model numbers to a thousand using the base 10 place value system and discuss further modelling to 10 000, 100 000 and beyond</li> <li>● recognise the place value of each digit in a 6-digit number to 999 999 (hundred thousands, ten thousands, thousands, hundreds, tens, ones) and moving on to 7-digit numbers</li> <li>● compare and order numbers up to 1 000 000 and beyond, use &lt;, &gt; and = signs</li> <li>● find 10, 100 or 1000, 10 000 more/less than a given number</li> <li>● identify, represent and estimate numbers using different representations</li> <li>● estimate quantities to 1 000 000 or beyond</li> <li>● round to the nearest 10, 100, 1000, 10 000 or 100 000 with any given number 0- 1 000 000.</li> </ul> <p><b>Addition and Subtraction</b></p> <ul style="list-style-type: none"> <li>● continue to develop strategies for memorizing addition and subtraction facts to 100 and beyond</li> <li>● round to the nearest 10, 100, 1000 and 10 000 and beyond and estimate sums and differences</li> <li>● add and subtract numbers up to, but not limited to 10 000, using formal written methods of columnar/vertical addition and subtraction with and without exchanging/regrouping</li> <li>● understand use inverse operations to check answers</li> <li>● solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</li> <li>● use written strategies for addition and subtraction of up to and beyond 5- digit numbers in real-life situations</li> <li>● evaluate the reasonableness of an answer</li> <li>● use a calculator to check for accuracy</li> </ul>

**Multiplication and Division**

- continue to develop quick recall of multiplication and division facts and apply these to real-life situations.
- be able to use written strategies for up to 4- digit by 2- digit multiplication
- use the language of multiplication and division, such as product and quotient
- identify factors and multiples of a number
- be able to recognise all prime numbers less than 50
- understand divisibility rules for 2, 3, 5 and 10
- be able to estimate and evaluate the reasonableness of an answer
- select an appropriate and efficient method for solving a problem including using a calculator
- be able to multiply and divide whole and decimal numbers by 10 and 100

**Fractions and Decimals.**

- model, read, write and draw equivalent fractions
- compare and order fractions.
- add and subtract fractions with related denominators in real-life situations
- read, write, compare and order decimal fractions to hundredths or beyond
- add and subtract decimals to hundredths and beyond in real-life situations, including money
- be able to multiply and divide whole and decimal numbers by 10 and 100

***By the end of PYP 5 students will:*****Number and Place Value**

- model, read, write, compare and order whole numbers up to billions and beyond and use them in real-life situations.
- understand the base 10 place value system and that the place of a digit indicates its value.
- be able to read and write whole, cardinal, and ordinal numbers to 100 000 000 and beyond
- count from 0 in multiples of 15, 25, 45, 75, 250, 750, 7500, 25 000, etc
- recognise the place value of each digit in numbers up to a billion and beyond
- compare and order numbers up to 1 000 000 and beyond, use <, > and = signs
- find 10, 100, 1000, 10 000, 100 000, etc more/less than a given number
- identify, represent and estimate numbers using different representations
- estimate quantities to 1 000 000 000 or beyond
- round to the nearest 10, 100, 1000, 10 000, 100 000, etc with any given number 0- 1000 000 000 and beyond



- read and write exponents and square roots
- use exponents to rename numbers
- write numbers in expanded notation

**Addition and Subtraction**

- continue to develop strategies for memorizing addition and subtraction facts
- round to the nearest 10, 100, 1000 and 10 000 and beyond and estimate sums and differences
- add and subtract numbers up to, but not limited to 1000 000, using formal written methods of columnar/vertical addition and subtraction with and without exchange/regrouping
- understand use inverse operations to check answers
- solve and design word problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
- use written strategies for addition and subtraction in real-life situations
- evaluate the reasonableness of an answer
- use a calculator to check for accuracy

**Multiplication and Division**

- continue to develop quick recall of multiplication and division facts and apply these to real-life situations.
- be able to use written strategies for up to 4- digit by 2- digit multiplication including decimals
- use the language of multiplication and division
- be able to estimate and evaluate the reasonableness of an answer
- select an appropriate and efficient method for solving a problem including using a calculator
- define and classify prime, composite and square numbers
- identify factors and multiples of a number
- use and apply divisibility rules in real-life situations
- read, write and use ratios in real-life situations
- read, write and use negative numbers in real-life situations
- read and write exponents and square roots
- use exponents to rename numbers
- write numbers in expanded notation

**Fractions, Decimals and Percentages**

- model, read, write and draw equivalent fractions
- compare and order fractions.

- add and subtract fractions with different denominators
- convert improper fractions to mixed numbers and vice-versa in real-life situations
- simplify fractions in mental and written form
- read, write and compare percentages
- use fractions, decimals and percentages interchangeably in real-life situations
- select and use an appropriate sequence of operations to solve word problems
- be able to multiply and divide whole and decimal numbers by 10, 100 and 1000

## Shape and Space

### Phase 1:

#### Overall expectations:

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 Understandings:

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.

### Phase 2:

#### Overall expectations

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 Understandings:

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.

### Phase 3:

#### Overall Expectations

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

<b>Shape and Space</b>	<p>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> <p><b>Conceptual understandings:</b>          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> <p><b>Phase 4:</b>  <b>Overall expectations:</b>          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> <p><b>Conceptual understandings:</b>          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>
	<b>MINIMUM REQUIREMENTS</b>
	<p><b>By the end of PYP 1 students will:</b></p> <ul style="list-style-type: none"> <li>● be able to sort a variety of 2D and 3D shapes in different ways</li> <li>● begin to identify and describe the properties of the following 2-D shapes: circle, square, rectangle, triangle, pentagon and hexagon</li> <li>● begin to identify and describe the properties of the following 3-D shapes: rectangular prism, cylinder, pyramid, cone, cube and sphere</li> <li>● compare the characteristics of 2D and 3D shapes, for example, by identifying 2D shapes on the surface of 3D shapes</li> <li>● describe positions using language such as inside, outside, above, below, next to, behind, in front of</li> <li>● develop language to help with giving and following directions such as forward, backward, up, down, across etc</li> <li>● understand that geometric shapes are useful for representing real-world situations.</li> </ul>

## Shape and Space

### ***By the end of PYP 2 students will:***

- be able to sort a variety of 2D and 3D shapes in different ways
- draw 2D shapes and make 3D shapes using modelling materials
- begin to recognise 3D shapes in different orientations
- identify and describe the properties of the following 2-D shapes: circle, semi-circle, oval, square, rectangle, triangle, pentagon, hexagon, octagon and kite
- identify and describe the properties of the following 3-D shapes: rectangular prism, cylinder, pyramid, cone, cube and sphere
- understand that there are relationships among and between 2D and 3D shapes that can be analyzed and described, for example 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.
- identify horizontal, vertical lines and parallel lines.
- understand that examples of symmetry and transformations can be found in their immediate environment.
- create and describe symmetrical and tessellating patterns and recognize lines of reflective symmetry.
- recognise angles as a property of shape or a description of a turn.
- identify right angles.
- understand that directions can be used to describe pathways, regions, positions and boundaries of their immediate environment.
- be able to follow, give, and create simple directions, directions include, but are not limited to, North, South, East, West, left, right, up, down, straight, backwards, on top of, below, under, between, next to, beside, behind, etc.

### ***By the end of PYP 3 students will:***

- recognise 3D shapes in different orientations
- identify and describe the properties of 2-D shapes already taught and be introduced to parallelogram and rhombus
- identify and describe the properties of the following 3-D shapes already taught focusing on the properties of faces, edges and vertices
- continue to recognise 3D shapes in different orientations
- sort 2D and 3D shapes according to their properties.
- draw 2D shapes and make 3D shapes using modelling materials

## Shape and Space

- understand that there are relationships among and between 2D and 3D shapes that can be analyzed and described, for example that 2D and 3D shapes can be created by putting together and/or taking apart other shapes.
- identify lines of reflective symmetry
- create and describe symmetrical patterns
- identify shapes which tessellate
- create and describe tessellating patterns
- recognize and explain simple symmetrical and tessellating designs and patterns in the environment
- realise that geometric shapes and vocabulary are useful for representing and describing objects and events in real-world situations.
- understand an angle as a measure of rotation
- identify right and straight line angles
- analyse angles by comparing and describing rotations: whole turn; half turn; quarter turn;
- compare turns and angles with the compass points north, south, east and west
- know how many degrees are in a full, a half and a quarter turn
- understand that directions for location can be represented by coordinates on a grid
- interpret and create simple directions, describing paths, regions, positions and boundaries of their immediate environment.
- locate features on a grid using coordinates

### ***By the end of PYP 4 students will:***

- sort, name, recognise and describe regular and irregular 2-D shapes.
- revise shapes already taught and also trapezium, right-angled, isosceles, scalene and equilateral triangles.
- explore 3-D shapes – revise shapes already taught and investigate the concept of prism and square/triangular-based pyramid.
- tessellate shapes – as before – and parallelograms, rhombus, trapezium
- investigate and draw the number of lines of symmetry in a variety of shapes.
- classify 3 and 4 sided shapes in practical situations
- begin to make and draw 2-D shapes using a variety of materials – e.g. geoboards, squared/dotted paper.

## Shape and Space

- identify, model and describe congruency
- investigate 3-D shapes through nets and skeletons – cubes and cuboids, square/cylinder prisms, pyramids
- be able to model, identify, draw and estimate acute, obtuse, right, straight and reflex angles.
- use a 180 degree protractor
- draw 2-D shapes defined in terms of co-ordinates
- draw, write and read co-ordinates in the first quadrant
- draw horizontal, vertical, parallel and perpendicular lines
- begin to measure and construct angles using a protractor.
- extend compass points to include to NE, SE, SW, and NW. and explore angles of 45 degrees.
- follow instructions for movement and turning through the eight compass points.

### ***By the end of PYP 5 students will:***

- sort, name, recognise and describe a variety of regular and irregular polygons
- make, draw and explore a variety of regular and irregular polygons using a variety of materials – e.g. geoboards, squared/dotted paper.
- sort, name, recognise and describe a variety of polyhedra
- explore and classify polyhedra according to the number of faces, edges and vertices
- tessellate shapes – as before – and parallelograms, rhombus, trapezium
- investigate and draw the number of lines of symmetry in a variety of shapes.
- classify 3 and 4 sided shapes in practical situations
- continue to make and draw 2-D shapes using a variety of materials – e.g. geoboards, squared/dotted paper.
- use ratio and scale to reduce and enlarge shapes
- investigate 3-D shapes through nets and skeletons – cubes and cuboids, square/cylinder prisms, pyramids
- be able to model, identify, draw and estimate acute, obtuse, right, straight and reflex angles
- investigate the sum of the angles of a variety of shapes
- use understanding of angles to find missing angles
- use a 180 and 360 degree protractor
- draw 2-D shapes defined in terms of co-ordinates
- draw, write and read co-ordinates in all four quadrants
- reflect shapes across a variety of axes
- draw horizontal, vertical, parallel and perpendicular lines
- measure and construct angles using a 180 and a 360 protractor.
- extend compass points to include to NE, SE, SW, and NW. and explore angles of 45 degrees.

- follow instructions for movement and turning through the eight compass points.
- use the language and notation of bearings to describe direction and position

<p><b>Measurement</b></p>	<p><b>Phase 1:</b>  <b>Overall expectations:</b>  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.  <b>Conceptual Understandings:</b>  Measurement involves comparing objects and events.  Objects have attributes that can be measured using non-standard units.  Events can be ordered and sequenced.</p> <p><b>Phase 2:</b>  <b>Overall expectations</b>  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.  <b>Conceptual Understandings:</b>  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> <p><b>Phase 3:</b></p>
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<b>Measurement</b>	<p><b>Overall Expectations</b> 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.</p> <p><b>Conceptual understandings:</b> Objects and events have attributes that can be measured using appropriate tools. Relationships exist between standard units that measure the same attribute</p> <p><b>Phase 4:</b> <b>Overall expectations:</b> 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> <p><b>Conceptual understandings:</b> 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>
	<b>MINIMUM REQUIREMENTS</b>
	<p><b>By the end of PYP 1 students will:</b></p> <p><b>In the area of Length</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems using non- standard units to measure and eventually recognise the need for standard units.</li> <li>● use the language of “longer, shorter, taller, smaller, higher, lower” etc.</li> <li>● understand that tools can be used to measure</li> <li>● be able to choose measuring tools appropriate to the length</li> <li>● be able to order three or more objects with respect to length</li> <li>● begin to measure using standard units of measurement and begin to record using cm and m.</li> </ul>



<b>Measurement</b>	<p><b>In the area of Weight</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems using non- standard units to measure and eventually recognise the need for standard units.</li> <li>● use the language of “heavy, light, heavier than, lighter than, the same as”, etc.</li> <li>● understand that scales can be used to measure weight</li> <li>● be able to order three or more objects with respect to weight</li> <li>● begin to measure using standard units of measurement and begin to record using g and kg.</li> </ul> <p><b>In the area of Capacity and Volume</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems for using non- standard units to measure and eventually recognise the need for standard units.</li> <li>● use the language of “full, empty, more than, less than, half, half full, bigger and smaller than” etc.</li> <li>● understand that containers can be used to measure</li> <li>● be able to order three or more objects with respect to capacity and volume</li> <li>● begin to measure using standard units of measurement and begin to record using l.</li> </ul> <p><b>In the area of Area</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems for using non- standard units to measure and eventually recognise the need for standard units.</li> <li>● cover surfaces using non-standard unit shapes which leave gaps, do not leave gaps.</li> <li>● explore and investigate pictures, objects, surfaces to determine which has a greater/smaller surface area.</li> </ul> <p><b>In the area of Time</b></p> <ul style="list-style-type: none"> <li>● sequence events in chronological order using language “before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening”etc</li> <li>● recognise and use language relating to dates, including days of the week, weeks, months and years</li> <li>● become familiar with the 12 hour clock – language and representation – leading on to telling the time to the hour and half past the hour and draw the hands on a clock face to show these times.</li> <li>● convert analogue times of o’clock into digital and vice-versa</li> <li>● tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.</li> </ul>
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<b>Measurement</b>	<b><i>By the end of PYP 2 students will:</i></b>
	<p><b>In the area of Length</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems using non- standard units to measure.</li> <li>● understand the need for standard units.</li> <li>● estimate, measure, and compare standard units of measurement for length using m, cm and mm.</li> <li>● be able to choose measuring tools appropriate to the length</li> </ul> <p><b>In the area of weight</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems using non- standard units to measure.</li> <li>● understand the need for standard units.</li> <li>● estimate, measure, and compare standard units of measurement for length using g and kg</li> <li>● be able to use scales and balances to compare and measure weight</li> </ul> <p><b>In the area of capacity and volume</b></p> <ul style="list-style-type: none"> <li>● compare, describe and solve practical problems using non- standard units to measure.</li> <li>● understand the need for standard units.</li> <li>● estimate, measure, and compare standard units of measurement for capacity and volume using l and ml</li> <li>● be able to choose measuring containers appropriate to the capacity</li> <li>● be able to use a variety of measuring jugs and containers</li> </ul> <p><b>In the area of Time</b></p> <ul style="list-style-type: none"> <li>● sequence events in chronological order</li> <li>● recognise and use language relating to dates, including days of the week, weeks, months and years and read a calendar</li> <li>● estimate, read and write time with increasing accuracy to the hour, half and quarter hour and to the nearest five minutes</li> <li>● draw the hands on a clock face to show these times.</li> <li>● convert analogue times into digital and vice-versa</li> <li>● record and compare time in terms of seconds, minutes and hours</li> <li>● use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight</li> <li>● know the relationship between seconds and minutes and minutes and hours</li> </ul> <p><b>In the area of Money</b></p>

<b>Measurement</b>	<ul style="list-style-type: none"> <li>● recognise coins and use them in practical situations</li> <li>● understand different amounts of coins can make up the same amount of money</li> <li>● add and subtract amounts of money to give change, using both Euro and cents in practical contexts</li> </ul>
	<b><i>By the end of PYP3</i></b>
	<p><b>In the area of length:</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – metres, centimetres and millimetres</li> <li>● estimate and measure with metres and centimetres.</li> <li>● appreciate and use the relationship between metres and centimetres and kilometres and metres – e.g.: 1m = 100 cm and 1cm = 10mm</li> <li>● describe measures that fall between numbers on a scale</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving length.</li> </ul> <p><b>In the area of Weight:</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – 1 kg and 1g</li> <li>● estimate and weigh with kilograms and grams using a variety of weighing instruments.</li> <li>● appreciate and use, in practical situations, the relationship between kilograms and grams, e.g. 1 kg = 1000g</li> <li>● describe measures that fall between numbers on a scale</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving weight.</li> </ul> <p><b>In the area of Capacity</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – 1l and 1 ml</li> <li>● estimate and measure with litres and millilitres using a variety of containers and jugs.</li> <li>● appreciate and use, in practical situations, the relationship between litres and millilitres, e.g. 1 l = 1000ml</li> <li>● describe measures that fall between numbers on a scale</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving capacity.</li> </ul> <p><b>In the area of Volume</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – 1 cubic centimetre</li> <li>● measure volume by counting centimetre cubes.</li> </ul>

## Measurement

- appreciate the conservation of volume through practical experiences e.g. building, dismantling and re-assembling 3D shapes in a variety of forms using base 10 centimetre cubes
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving volume.
- be introduced to “cubic centimetre”, “centimetre cubed” and “cm<sup>3</sup>”

### In the area of Area

- understand the use of and need for standard units – squared centimetres
- measure area by counting squares.
- appreciate the conservation of area through practical experiences e.g. drawing different 2D shapes with the same amount of squares.
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving area
- be introduced to and be able to use the term square centimetre – (cm<sup>2</sup>) in practical situations

### In the area of Time

- 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 digital and analogue time on 12-hour clock in hours, half hours, quarter hours, 5 minute intervals and 1 minute intervals.
- carry out practical activities to appreciate duration by estimating 30 seconds, 60 seconds, etc
- record and compare time in terms of seconds, minutes and hours
- use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- know the number of days in each month, year and leap year
- convert analogue times into digital and vice-versa
- read and interpret scale on a range of instruments
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving time.

### In the area of measuring Angles

- begin to understand an angle as a measure of rotation.

<b>Measurement</b>	<ul style="list-style-type: none"> <li>● be introduced to degrees as the unit of measurement for angles, and that an angle measuring 90 degrees is a “right angle”</li> </ul>
	<p><b><i>By the end of PYP 4 students will:</i></b></p>
	<p><b>In the area of Length:</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – metre, <math>\frac{1}{2}</math> metre, centimetres, kilometres</li> <li>● estimate and measure with metres, centimetres and millimetres</li> <li>● be introduced to the kilometre for measurements of long distances.</li> <li>● appreciate and use the relationship between: Metres and centimetres – e.g. 1m and 25cm = 125cm, and 345cm = 3m and 45cm Kilometres and metres – e.g. 2km and 350 m = 2350m, and 8765m = 8km and 765m</li> <li>● record measurements using decimal notation.</li> <li>● be introduced to the concept of perimeter and find by measuring the perimeter of simple shapes.</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving length.</li> </ul> <p><b>In the area of Weight:</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units – 1 kg, <math>\frac{1}{2}</math> kg, <math>\frac{1}{4}</math> kg, 100g, 10g</li> <li>● estimate and weigh with kilograms and grams using a variety of weighing instruments.</li> <li>● appreciate and use, in practical situations, the relationship between kilograms and grams, e.g. 1 kg and 256g = 1256g      1234g = 1 Kg and 234g</li> <li>● record measurements using decimal notation.      1 kg 500g = 1.5kg</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving weight.</li> </ul> <p><b>In the area of Capacity</b></p> <ul style="list-style-type: none"> <li>● understand the use of and need for standard units - 1 litre, <math>\frac{1}{2}</math> litre, <math>\frac{1}{4}</math> litre, 100ml, 10ml</li> <li>● explore the capacity of smaller containers to introduce the 10ml</li> <li>● estimate and measure capacity in 10ml and levels of 10ml, e.g. 40ml, 70ml</li> <li>● read capacity in a calibrated container.</li> <li>● estimate, measure and record capacity in millilitres and litres</li> <li>● appreciate and use in practical situations, the relationship between litres and millilitres, e.g. 1L and 256ml = 1256ml      1234ml – 1L and 234ml</li> </ul>

## Measurement

- record measurements using decimal notation e.g. 1L and 500ml = 1.5L
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving capacity.

### In the area of Volume

- appreciate the conservation of volume through practical experiences e.g. solid built from cubes can be dismantled and re-assembled in a variety of forms
- compare volume by using the same number of centimetre cubes
- appreciate the need for a standard unit of volume.
- measure volume by counting centimetre cubes.
- be introduced to “cubic centimetre”, “centimetre cubed” and “cm<sup>3</sup>”
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving volume.

### In the area of Area

- be introduced to and be able to use the term square centimetre – (cm<sup>2</sup>) in practical situations
- investigate through practical experiences, the development of a formula for calculating area
- calculate area of 2D shapes – squares, rectangles, triangles and parallelograms
- explore larger areas to introduce the square metre (m<sup>2</sup>)
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving area.

### In the area of Time

- tell the time in hours, half hours, quarter hours, 5 minute intervals, 1 minute intervals.
- carry out practical activities to appreciate duration by estimating 1 min, 3 mins, 5 mins, etc
- know relationship between minutes and hours and use to perform simple mental calculations involving adding on time.
- understand and use 24 hour clock through contexts meaningful to pupils.
- perform calculations involving hours and minutes
- use timelines in units of inquiry and other real-life situations.
- calculate the passage of time across more than one month.
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving time.

***By the end of PYP 5 students will:***

## Measurement

### In the area of Length:

- understand the use of and need for standard units – millimetres, centimetres, metres and kilometres
- estimate and measure with metres, centimetres and millimetres
- understand the use of kilometres for measurements of long distances.
- appreciate and use the relationship between all the units of measurement
- record measurements using decimal notation to three decimal places, 1.245km =1245m
- use the concept of scale to represent distances
- calculate the passage of time across more than one month.
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving length.

### In the area of Area:

- understand, develop and describe formulas for finding perimeter and area of 2-D shapes.
- understand, develop and describe formulas for finding the surface area of prisms.
- use formulas to find the area of geometric solids.
- investigate and apply a formula for finding the area of a circle.
- select and use appropriate units of measurement and tools to solve problems in real-life situations.
- conversions within the metric system
- use decimal and fraction notation in measurement.
- read and interpret scales on a range of measuring instruments.
- calculate the passage of time across more than one month.
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving area.

### In the area of volume:

- understand, develop and describe formulas for finding volume of prisms.
- use formulas to find the volume of geometric solids.
- select and use appropriate units of measurement and tools to solve problems in real-life situations.
- use decimal and fraction notation in measurement.
- read and interpret scales on a range of measuring instruments.
- investigate relationships and conversions between units of capacity and volume.
- use appropriate standard units of measurement and tools, to solve problems in real-life situations involving volume.

### In the area of angles:

	<ul style="list-style-type: none"> <li>● measure angles in degrees using a 180 and 360 degrees protractor.</li> <li>● draw angles using a 180 and 360 degrees protractor.</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving angles.</li> </ul> <p><b>In area of time:</b></p> <ul style="list-style-type: none"> <li>● determine times worldwide.</li> <li>● calculate the passage of time across more than one month.</li> <li>● use timetables and schedules (12-hour and 24-hour clocks) in real-life situations.</li> <li>● use appropriate standard units of measurement and tools, to solve problems in real-life situations involving time.</li> </ul>
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<p><b>Data Handling</b></p>	<p><b>Phase 1:</b>  <b>Overall expectations:</b>  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> <p><b>Conceptual Understandings:</b>  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> <p><b>Phase 2:</b>  <b>Overall expectations</b>  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> <p><b>Conceptual Understandings:</b>  Information can be expressed as organized and structured data.  Objects and events can be organized in different ways.</p>
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<b>Data Handling</b>	<p>Some events in daily life are more likely to happen than others.</p> <p><b>Phase 3:</b>  <b>Overall Expectations</b>  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. The learners will make the connection that probability is based on experimental events and can be expressed numerically.</p> <p><b>Conceptual understandings:</b>  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> <p><b>Phase 4:</b>  <b>Overall expectations:</b>  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> <p><b>Conceptual understandings:</b>  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>
	<b>MINIMUM REQUIREMENTS</b>
	<p><b>By the end of PYP 1 students will:</b></p> <ul style="list-style-type: none"> <li>● understand that sets of objects can be organized using different criteria</li> <li>● begin to use diagrams to represent objects sorted for two criteria</li> <li>● begin to describe and discuss diagrams to represent objects sorted for two criteria</li> </ul>

## Data Handling

- understand that information can be obtained in different ways
- collect, display and interpret data using tally charts, simple tables and pictograms
- discuss chance in daily events (impossible, likely, certain)
- create living graphs using real objects and people
- collect, display and interpret data for the purpose of answering questions

### ***By the end of PYP 2 students will:***

- understand that sets of objects can be organized using different criteria
- use diagrams such as Tree, Venn and Carroll to represent objects sorted for two criteria
- describe and discuss data presented in Tree, Venn and Carroll diagrams
- understand that information can be obtained in different ways
- collect and display data using tally charts, pictograms and bar graphs
- interpret and discuss data presented in a range of charts, diagrams and tables
- create living graphs using real objects and people
- understand the concept of chance in daily events (impossible, less likely, maybe, most likely, certain)
- continue to collect, display and interpret the data for the purpose of answering questions

### ***By the end of PYP 3 students will:***

- understand that data can be collected, organized, displayed and analysed in different ways
- understand that data can be collected, displayed and interpreted using simple graphs, for example, pictograms and bar graphs
- be able to construct and label bar charts with simple scales, e.g. 2, 5 and 10
- understand that the mode can be used to summarize a set of data
- design a survey and systematically collect, organize and display data in tally charts, pictographs and bar graphs
- understand that probability is based on experimental events
- express the chance of an event happening using words or phrases (impossible, less likely, maybe, most likely, certain)
- use probability to determine mathematically fair and unfair games and to explain possible outcomes

### ***By the end of PYP 4 students will:***

<b>Data Handling</b>	<ul style="list-style-type: none"> <li>● further develop the understanding that data can be collected, displayed and interpreted using a variety of graphs, charts and tables</li> <li>● continue to construct and label pictograms and bar graphs and discuss and interpret results</li> <li>● design a survey and use data collection sheets for a specific use and discuss its effectiveness</li> <li>● select an appropriate type of graph to use to display information</li> <li>● draw, label, identify, read and interpret a graph paying particular attention to the scale</li> <li>● be introduced to the terms range, mean, mode and median</li> <li>● design and use a Decision Tree diagram to sort or identify objects.</li> <li>● use opportunities in the classroom to explore doubt and certainty.</li> <li>● extend the vocabulary from everyday language to include words such as “might, certain, likely, could happen, impossible, definitely, definitely not, fair.”</li> <li>● use opportunities in the classroom to give an opinion on the outcome of a particular event.</li> <li>● express probability using simple fractions</li> </ul>
	<b><i>By the end of PYP 5 students will:</i></b>
	<ul style="list-style-type: none"> <li>● understand that different types of graphs have special purposes</li> <li>● understand that the mode, median, mean and range can summarize a set of data</li> <li>● design a survey and systematically collect, record, organize and display the data in a bar graph, pie chart or line graph</li> <li>● identify, describe and explain the range, mode, median and mean in a set of data</li> <li>● set up a spreadsheet using simple formulas to manipulate data and to create graphs</li> <li>● create and manipulate an electronic database for their own purposes</li> <li>● expressing probabilities using scale (0 - 1) or per cent (0% - 100%)</li> <li>● determine the theoretical probability of an event and explain why it might differ from experimental probability</li> </ul>

<b>Pattern and Function</b>	<p><b>Phase 1:</b>  <b>Overall expectations:</b>  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> <p><b>Conceptual Understandings:</b></p>
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## Pattern and Function

Patterns and sequences occur in everyday situations.  
Patterns repeat and grow.

### **Phase 2:**

#### **Overall expectations**

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 Understandings:**

Whole numbers exhibit patterns and relationships that can be observed and described.  
Patterns can be represented using numbers and other symbols.

### **Phase 3:**

#### **Overall Expectations**

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 understandings:**

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.

### **Phase 4:**

#### **Overall expectations:**

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. The students will continue to use their

<b>Pattern and Function</b>	<p>understanding of pattern and function to represent and make sense of real-life situations and to solve problems involving the four operations.</p> <p><b>Conceptual understandings:</b>  Patterns can often be generalized using algebraic expressions, equations or functions.  Exponential notation is a powerful way to express repeated products of the same number.</p>
	<b>MINIMUM REQUIREMENTS</b>
	<p><b><i>By the end of PYP 1 students will:</i></b></p> <ul style="list-style-type: none"> <li>● understand that patterns can be found in everyday situations, for example, sounds, nature and in numbers.</li> <li>● skip count forwards to 30 in odd and even numbers</li> <li>● skip count forward to 50 in 5s</li> <li>● skip count forward to 100 in 10s</li> <li>● Use number patterns to represent and understand real-life situations</li> <li>● describe and represent patterns in various ways for example, using words, drawings, symbols, materials, actions, numbers</li> <li>● extend and create patterns</li> </ul>
	<p><b><i>By the end of PYP 2 students will:</i></b></p> <ul style="list-style-type: none"> <li>● investigate the patterns that are found in everyday situations, for example, sounds, nature and in numbers.</li> <li>● investigate patterns found in number</li> <li>● skip count in odd and even numbers to 30 forwards and backward.</li> <li>● count in 5s and 10s forwards and backwards.</li> <li>● count in 2s to 20 and 3s to 30.</li> <li>● create and extend these patterns.</li> <li>● represent patterns in a variety of ways, for example, using words, drawings, symbols, materials, actions and numbers</li> <li>● describe number patterns, for example, odd and even numbers, skip counting.</li> <li>● begin to investigate the inverse relationship between addition and subtraction</li> <li>● begin to investigate the associative and commutative properties of addition, using these patterns to solve problems</li> </ul>

<b>Pattern and Function</b>	<ul style="list-style-type: none"> <li>● use number patterns to represent and understand real-life situations</li> </ul>
	<b><i>By the end of PYP 3 students will:</i></b>
	<ul style="list-style-type: none"> <li>● understand that patterns can be represented using numbers and other symbols.</li> <li>● understand that patterns can be found in numbers, for example, odd and even numbers and multiples</li> <li>● count in 2s, 3s, 4s, 5s and 10s.</li> <li>● understand that multiplication is repeated addition and that division is repeated subtraction</li> <li>● understand the inverse relationship between multiplication and division</li> <li>● represent patterns in a variety of ways, for example, using words, drawings, symbols, materials, actions, numbers</li> <li>● describe number patterns, for example, odd and even numbers, skip counting.</li> <li>● use number patterns to make predictions and solve problems</li> <li>● use the properties and relationships of the four operations to solve problems.</li> </ul>
	<b><i>By the end of PYP 4 students will:</i></b>
	<ul style="list-style-type: none"> <li>● continue to investigate and understand how patterns can be represented using numbers and other symbols.</li> <li>● understand that patterns can be found in numbers, for example, odd and even numbers and multiples</li> <li>● use the understanding of the inverse relationship between multiplication and division to solve problems</li> <li>● investigate the patterns within factors and multiples</li> <li>● investigate prime numbers</li> <li>● begin to investigate squared, triangular and cubed numbers</li> <li>● describe and extend number patterns</li> <li>● use number patterns to make predictions and solve problems</li> </ul>

- continue to use the properties and relationships of the four operations to solve problems.

***By the end of PYP 5 students will:***

- continue to investigate patterns within number
- understand that patterns can be generalized by a rule.
- represent the rule of a pattern by using a function.
- select appropriate methods to analyse patterns and identify rules.
- analyse pattern and function using words, tables and graphs, and, when possible, symbolic rules.
- use functions to solve problems.
- begin to write algebraic expressions to model rules.
- investigate and apply a formulae
- solve equations with one variable.
- be introduced to exponential notation
- begin to understand exponents as repeated multiplication.
- begin to understand the inverse relationship between exponents and roots.