

# Maths

## Data Handling

### Emergent Skills

#### P1 - 3

Tolerate and show reflex responses to a range of sensory experiences.

Turn head to a sound making toy or light source.

Track sound making auditory objects.

Respond to sound by looking in the correct direction.

Observe objects of the same color.

Match objects.

Put similar objects together with assistance.

Begin to place objects in groups with assistance.

Attend to adult performing actions which are invisible to the performer – patting own head / sticking tongue out.

Relate 2 objects correctly unaided e.g. drum/stick, cup/spoon.

Anticipate routine events through photos and symbols.

Combine two activities.

Begin to recognize familiar sounds.

Begin to recognize familiar places.

#### P4 - 5

Indicate "the same" object/picture as one shown.

Select an object/picture from a small set and find another to match it.

Match a photograph to a person/object.

Group or sort sets of objects for a single attribute i.e. colour, size, shape e.g., coins & money notes or function.

Select an object from a range to match a given category or function.

Order objects in rows so that they can be compared/quantified.

Solve functional problems of quantity by making a small number of sets equal in size.

## P6 - 7

Sort objects/pictures by given categories.

Sort objects randomly into a group from one larger group and identify/name the criteria chosen.

Match one object to one picture to record simple sets to the value of 5.

Record simple sorting activities or data e.g. circle sets, charts.

Collect information through purposeful enquiries that can be recorded (with adult support).

Identify when an object is different and does not belong i.e. identify a coin does not belong to the group of buttons.

## P8 - ESF Phase 1 & 2

Respond to information that is clearly recorded (pictorial information) by answering simple questions.

Organise/record pictorial data on simple charts/tables where one symbol represents one unit e.g. pictograms, block graphs.

Record simple sorting activities using pictorial representation on simple diagrams e.g. Venn, Carroll.

Understand the use of lists (pictorial) within practical contexts e.g. use money to shop in the supermarket.

Use the collecting and organising of information to solve simple problems.

Respond to the information they have collected by answering simple questions.

## Level -1

### IB Phase 1

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.

### Conceptual Understandings IB1

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.

## Learning outcomes

### Data Handling

Understand that information can be collected in different ways

Answer yes/no questions to interpret data

## Probability

Discuss familiar events involving chance using everyday language such as, will happen, won't happen, might happen

## Level 0

### IB Phase 1

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.

### Conceptual Understandings IB1

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.

### Learning outcomes

#### Data Handling

Collect, organize and represent data (including pictograms, tally marks)

Answer direct/closed questions to interpret data, for example how many people celebrate their birthday in January?

#### Probability

Discuss familiar events involving chance using everyday language such as, will happen, won't happen, might happen

## Level 1

### IB Phase 1

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.

### IB Phase 2

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.

### Conceptual Understandings IB1

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.

### Conceptual Understandings IB2

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.

## Learning outcomes

### Data Handling

Collect, organize and represent data (including pictograms, tally marks and living graphs using real objects and people)

Interpret data where one object or drawing represents one value

Interpret data by comparing quantities for example, more, fewer, less than, greater than

### Probability

Identify familiar events involving chance and describe them using everyday language such as 'will happen', 'won't happen' or 'might happen'

## Level 2

### IB Phase 2

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.

### Conceptual Understandings IB2

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.

## Learning outcomes

### Data Handling

Collect, organize and represent data (including pictograms, bar graphs, Venn Diagrams, tally charts and living graphs using real objects and people)

Interpret data and draw conclusions where one object or symbol can represent many data values for example, one dot equals 10 votes

### Probability

Identify activities and familiar events that involve chance and describe them using appropriate vocabulary for example 'likely' or 'unlikely'

## Level 3

### IB Phase 2

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.

### IB Phase 3

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. The learners will make the connection that probability is based on experimental events and can be expressed numerically.

### Conceptual Understandings IB2

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.

### Conceptual Understandings IB3

Data can be collected, organized, displayed and analysed in different ways.  
Different graph forms highlight different aspects of data more efficiently.

## Learning outcomes

### Data Handling

Collect, organize and represent data (including bar graphs, pictograms, Venn diagrams and tally charts)

Interpret and draw conclusions by comparing more than one data representation

### Probability

Describe likelihood of activities and events using appropriate vocabulary for example 'likely', 'unlikely', 'certain', 'impossible'

Identify and describe possible outcomes and recognise variation in results of chance experiments

## Level 4

### IB Phase 3

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. The learners will make the connection that probability is based on experimental events and can be expressed numerically.

### Conceptual Understandings IB3

Data can be collected, organized, displayed and analysed in different ways.  
Different graph forms highlight different aspects of data more efficiently.

## Learning outcomes

### Data Handling

Collect, organize and represent data (including bar and line graphs, 3 ring Venn diagrams and Carroll diagrams) where one object or symbol can represent many data values

Interpret data and draw conclusions using a variety of scales

Describe the advantages and disadvantages of data representation forms

### Probability

Describe and order likelihood of activities and events using appropriate vocabulary for example 'likely', 'unlikely', 'certain', 'impossible'

Identify familiar events that are dependent and independent of the occurrence of the other

## Level 5

### IB Phase 3

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. The learners will make the connection that probability is based on experimental events and can be expressed numerically.

### IB Phase 4

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.

### Conceptual Understandings IB3

Data can be collected, organized, displayed and analysed in different ways.  
Different graph forms highlight different aspects of data more efficiently.

### Conceptual Understandings IB4

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.

## Learning outcomes

### Data Handling

Collect, organize and represent data (including bar and line graphs, 3 ring Venn diagrams, pie charts, Carroll diagrams and tree diagrams) where one object or symbol can represent many data values

Interpret and draw conclusions from data using range, scale and mode on graphs

Describe the advantages and disadvantages of data representation from answering and suggesting questions that can be answered

### Probability

Represent probabilities ranging from 0-1 using fractions

Identify outcomes of chance experiments including equally likely outcomes

Identify situations that are mathematically fair or unfair

## Level 6

### IB Phase 4

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.

### Conceptual Understandings IB4

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.

## Learning outcomes

### Data Handling

Collect, organize and represent statistical data (including bar, pie, line graphs and tree diagrams)

Interpret and draw conclusions from statistical data using range, mode, median and mean and scale on graphs

Interpret and compare a range of data displays, including side-by-side column graphs

Identify potentially misleading data representations with consideration of purpose

### Probability

Describe and order probability using fractions, decimals and percentages

Explain why the theoretical probability of an event might differ from experimental probability through conducting a chance experiment

Understands that a situation with limited options will result in a finite number of possible outcomes (possible combinations, tree diagram)

Understands mathematical fairness and identifies fair and unfair situations

## Pattern and Function

### Emergent Skills

#### P1 - 3

Encounter objects that require an adult to activate e.g. pull cord /wind-up toy.

Respond to objects / adults / actions by intensifying movements.

Respond to noise from others.

Move body / limb placed on different materials to cause effect.

Relate 2 objects together simply e.g. bangs together, puts 1 inside other.

Release objects and mediums independently.

Repeat an action in order to gain a response.

Search for objects that are totally hidden with adult help.

Begin to reach out for and explore objects.

Select and shake objects deliberately to make sounds.

Search following more complex hiding.

Use hands in a variety of ways in order to produce a response.

Obtain objects that are out of reach by pulling item on a string / pulling cloth to get item placed on it.

Remember what has disappeared prior to it reappearing.

Explore the use of objects in water play.

#### P4 - 5

Demonstrate an understanding of cause and effect through interacting with objects in the environment e.g. press switches to operate objects.

Anticipate the next action in a number rhyme/song.

Aware of the use of objects e.g., draw with a pencil, look for spoon and fork when given a meal.

Select appropriate tools for the task i.e. money for shopping.

Relate familiar objects e.g., gloves for hands, shoes for feet.

Complete simple inset puzzles.

Complete a sequence of actions/activities that creates a pattern.

**P6 - 7**

Copy a simple pattern/sequence of two elements using one criterion e.g. colour, shape, rhythm.

Recognise a sequence/pattern in a familiar situation and use object or items to respond appropriately.

Copy a simple sequence/pattern of two elements using one criterion i.e. colour, shape, size, and rhythm.

Continue a simple ABAB pattern.

Use a range of construction material.

Use a range of tools appropriately e.g., use money to buy from tuck shop.

**P8 - ESF Phase 1 & 2**

Create a simple pattern using a range of given resources.

Continue 3 step sequence pattern.

Play games using dice with spots.

Complete a 10 piece puzzle.

Name objects as same or different.

Use number labels to the value of 10 to count objects/actions within everyday situations.

Estimate that they need more/less of an object/material in order to match a given quantity.

Identify if 1 object costs more than another using and recognising simple coins Describe orally how a problem was solved using practical exemplars of addition and subtraction for instance.

Identify the common elements of patterns, for instance all flat.

Begin to use comparative language.

Use ordinal numbers in a range of activities.

Use mathematical vocabulary in role play.

Find different ways to tackle a task.

Use drawing to represent information.

**Level -1****IB Phase 1**

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

## Conceptual Understandings IB1

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

## Learning outcomes

### Pattern and Function

Sort familiar objects.

Recognise, describe and create simple patterns in everyday situations.

## Level 0

### IB Phase 1

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

### Conceptual Understandings IB1

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

### Learning outcomes

#### Pattern and Function

Sort and classify familiar objects and explain the basis for these classification.

Create, describe and extend patterns in everyday situations using objects and drawings.

## Level 1

### IB Phase 1

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.

### IB Phase 2

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

### Conceptual Understandings IB1

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

### Conceptual Understandings IB2

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

## Learning outcomes

### Pattern and Function

Sort and classify familiar objects and explain the basis for these classification.

Copy, extend, create and describe patterns with objects and drawings

Recognise patterns in the number system

Investigate and describe number patterns formed by skip counting

## Level 2

### IB Phase 2

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

### Conceptual Understandings IB2

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

### Learning outcomes

#### Pattern and Function

Investigate, describe and represent patterns using numbers and other symbols

Recognise patterns in the number system and describe number patterns formed by skip counting

Identify and describe the inverse relationship between addition and subtraction

Identify and describe patterns in odd and even numbers

## Level 3

### IB Phase 2

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

### Conceptual Understandings IB2

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

### IB Phase 3

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

### Conceptual Understandings IB3

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.

## Learning outcomes

### Pattern and Function

Investigate, describe and represent patterns with numbers and other symbols

Identify missing elements in patterns

Explore and describe number patterns in multiplication facts

Identify and describe the inverse relationship between addition and subtraction

Identify and describe patterns in odd and even numbers (including even + even = even)

## Level 4

### IB Phase 3

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

### Conceptual Understandings IB3

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.

## Learning outcomes

### Pattern and Function

Investigate and represent patterns using words, symbols, numbers and tables

Identify rules for patterns to predict future terms

Explore and describe patterns in multiplication and division facts including their inverse relationship

Identify and describe properties of prime and composite numbers

Solve equivalent number sentences involving addition and subtraction to find unknown quantities

## Level 5

### IB Phase 3

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

### Conceptual Understandings IB3

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.

### IB Phase 4

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. The students will continue to use their understanding of pattern and function to represent and make sense of real-life situations and to solve problems involving the four operations.

### Conceptual Understandings IB4

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

## Learning outcomes

### Pattern and Function

Investigate and represent patterns using words, symbols, numbers, tables and graphs

Identify rules for patterns to predict future terms

Identify and describe factors and multiples of whole numbers

Solve equivalent number sentences involving multiplication and division to find unknown quantities

## Level 6

### IB Phase 4

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. The students will continue to use their understanding of pattern and function to represent and make sense of real-life situations and to solve problems involving the four operations.

### Conceptual Understandings IB4

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.

## Learning outcomes

### Pattern and Function

Investigate and represent patterns using words, symbols, numbers, tables and graphs

Use algebraic expressions to record the rules for patterns

Continue and create sequences involving whole numbers, fractions and decimals

Identify and describe properties of square and triangular numbers

Explore the use of brackets and order of operations to write number sentences

## Shape and Space

### Emergent Skills

#### P1 - 3

- Encounter objects that have visual / tactile interest placed on their body.
- Bring closed hand up to object.
- Take a given object.
- Reach for and grasp object.
- Use several strategies to explore objects e.g. look, mouth, feel, bang, smell.
- Place and remove objects into/out of container with help.
- Approximate stacking one object on top of another.
- Experience 2-D shapes in a range of practical situations.
- Experience 3-D shapes in a range of practical situations.
- Experience movements up, down, forward.

#### P4 - 5

- Begin to search for objects that have gone out of sight, hearing or touch.
- Handle a range of objects of different shapes.
- Match 2-D shapes in a range of practical situations i.e. coins.
- Match 3-D shapes in a range of practical situations.
- Match objects by size.
- Place objects into containers and takes them out independently.
- Post items according to their shape by trial and error.
- Put large round pegs in pegboard.
- Line up objects.
- Aware of objects normal place.
- Place objects where asked e.g., in/out.
- Build / stacks at least 2 objects.
- Assemble simple construction materials.

## P6 - 7

Search for objects not found in their usual place.

Put shapes in shape sorter.

Traces large shapes.

Begin to explore the properties of 2-D and 3-D shapes eg. corners, straight, flat, curved, solid with adult prompts.

Begin to pick out named shapes from a collection.

Begin to understand words, signs and symbols that describe positions e.g. between, in front of, in the middle, next to, on, under, off, bottom.

Begin to respond to instructions containing direction and movement words, signs, symbols

## P8 - ESF Phase 1 & 2

Name the 2-D shapes square, circle, triangle, rectangle.

Begin to describe the properties of shapes e.g. flat, curved, solid.

Identify shapes in the environment / real life activities e.g. my plate is round, the one dollar coin is a circle.

Create pattern / pictures using 2-D shapes

Construct with 3-D shapes

Sort 3-D objects.

Sort shapes according to properties e.g. has more than 3 corners.

Make shapes from pliable material.

Identify and describe 3D shapes in the environment e.g. "The washing machine is a cuboid with circle door".

Use vocabulary "between, in front of, in the middle, next to" to describe position.

## Level -1

### IB Phase 1

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

### Conceptual Understandings IB1

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.

## Learning outcomes

### 2D and 3D Shape

Sort, describe and name familiar two-dimensional shapes and objects in the environment.

### Location

Develop an understanding and begin to use simple vocabulary to describe position, for example, in, out, on under, up, down

## Level 0

### IB Phase 1

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

### Conceptual Understandings IB1

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.

### Learning outcomes

#### 2D and 3D Shape

Sort, describe and name familiar two- and three-dimensional shapes and objects in the environment.

#### Location

Develop an understanding and begin to use simple vocabulary to describe position, direction and movement, for example, inside, outside, above, below, next to.

Can follow and give simple directions describing paths, regions, positions and boundaries of their immediate environment.

## Level 1

### IB Phase 1

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

### IB Phase 2

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

### Conceptual Understandings IB1

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.

### Conceptual Understandings IB2

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.

## Learning outcomes

### 2D and 3D Shape

Sort, describe, construct and name familiar two-dimensional shapes and objects in the environment

### Location

Describe position and direction in a practical context for example, inside, outside, above, below, next to, behind, in front of, up, down

## Level 2

### IB Phase 2

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

### Conceptual Understandings IB2

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.

### Learning outcomes

#### 2D and 3D Shape

Sort, describe, construct and label familiar two-dimensional shapes and three-dimensional objects in the environment using appropriate vocabulary

#### Transformation and symmetry

Identify and record examples of symmetry in the environment

#### Location

Describe position and direction using mathematical vocabulary for example, left, right, forwards, backwards

## Level 3

### IB Phase 2

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.

### IB Phase 3

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

### Conceptual Understandings IB2

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.

### Conceptual Understandings IB3

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.

## Learning outcomes

### 2D and 3D Shape

Sort, describe, compare and label regular and irregular two-dimensional shapes and three-dimensional objects using appropriate vocabulary

Construct three-dimensional objects and recognize them in different orientations

### Transformation and symmetry

Create and describe symmetrical patterns, pictures and shapes

Identify and draw lines of reflective symmetry in patterns, pictures and shapes

### Location

Describe direction and position using mathematical language for example describing rotations: whole turn; half turn; quarter turn; clockwise and anti-clockwise

Create and interpret simple grid references to show position and pathways (e.g. A4)

## Level 4

### IB Phase 3

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

### Conceptual Understandings IB3

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.

### Learning outcomes

#### 2D and 3D Shape

Sort, draw, describe and classify regular and irregular two-dimensional shapes and three-dimensional objects using appropriate vocabulary

Connect three-dimensional objects with their nets and other two-dimensional representations

#### Transformation and symmetry

Identify and record order of rotational symmetry

Describe translations, reflections and rotations of two-dimensional shapes

#### Location

Describe direction using the four compass points

Locate and record features on a grid using coordinates in the first quadrant

## Level 5

### IB Phase 3

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.

### IB Phase 4

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.

### Conceptual Understandings IB3

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.

### Conceptual Understandings IB4

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

## Learning outcomes

### 2D and 3D Shape

Identify, describe, classify and visualize properties of triangles, quadrilaterals and polyhedrons using mathematical vocabulary

Construct three-dimensional objects from given dimensions

### Transformation and symmetry

Transform, reduce and enlarge two-dimensional shapes

Describe and model congruency and similarity in two-dimensional shapes

### Location

Describe direction using the eight compass points

Locate and record features on a grid using coordinates in two quadrants

## Level 6

### IB Phase 4

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.

### Conceptual Understandings IB4

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

## Learning outcomes

### 2D and 3D Shape

Identify, describe, classify and visualize properties of circles using mathematical vocabulary

Visualise, describe, draw and model two-dimensional representations of three-dimensional objects and vice versa

### Transformation and symmetry

Identify and use scale (ratio) to reduce and enlarge 2D shapes

Transform, reduce and enlarge 3D objects

Describe and model congruency and similarity in 3D objects

### Location

Describe position using the language and notation of bearing

Locate and record features on a grid using coordinates in all four quadrants

## Measurement

### Emergent Skills

#### P1 - 3

Experience the weight of objects that have been placed on their body.

Place objects in a specific place.

Place and remove objects into/out of container with help.

Explore objects with marked difference in overall size.

Expose to objects bigger or smaller than oneself.

Show an awareness of events related to times of the day.

Recognize familiar routine.

Respond if routine is changed.

Experience working with an adult filling and emptying a variety of containers with a range of materials.

Experience working with an adult lifting a range of objects / materials with clear contrast in weight/length/volume

Experience working with an adult to explore a variety of lengths/weight/volume.

Experience working with adult carrying out activities/ performing actions quickly and slowly and starting and stopping abruptly.

Experience carrying out activities according to simple time vocabulary 'fast / slow, go / stop / wait', with adult

#### P4 - 5

Fill and empty a variety of containers with a range of materials e.g., fill a piggy bank with coins.

Demonstrate early understanding of volume when there is a clear contrast e.g. chooses full glass of preferred drink.

Lift a range of objects / materials with clear contrast in weight.

Demonstrate early understanding of weight e.g. braces self to lift a heavy item.

Match objects with a clear contrast in size/length/volume.

Select a requested object from 2 where there is a clear contrast in size/length/volume.

Begin to carry out activities/ performing actions quickly and slowly and starting and stopping abruptly.

Begin to carry out activities according to simple time vocabulary 'fast / slow, go / stop / wait', with adult

#### P6 - 7

Compare 2 different weights using balance scales with adult support.

Select a requested object from 2 where there is a clear contrast in weight.

Begin to use non-standard measures of volume with adult support - scoopfuls, spoonfuls, cupfuls etc.

Begin to use non-standard units to measure length and height.

Begin to use non-standard measures of time e.g. hand claps.

Compare contrasting volumes and describes as "full / empty / the same".

Select bigger and smaller of two objects where the difference is not great e.g., 10 cents coin and one dollar coins.

Make an object longer, and shorter on request.

Carry out activities for a length of time measured by non-standard measures.

Join in sequencing symbols / photos in time order.

Choose the appropriate word to compare sizes/weights/lengths e.g. heavy, light, long, short.

## P8 - ESF Phase 1 & 2

Use a range of apparatus to measure weight with adult support.

Begin to use standard measures of volume with adult support e.g. ounces, liters, cups.

Begin to use standard units to measure length and height.

Begin to use standard measures of time e.g. digital and analog clocks.

Use familiar words in practical situations when comparing sizes/weights/lengths e.g. heavy, light, long, short.

Compare the capacity of two containers using the vocabulary of volume – more, less, the same.

Compare two everyday objects by size i.e. uses vocabulary bigger, smaller, the same.

Begin to order objects by height using direct comparison.

Use simple time vocabulary e.g. playtime, dinner time, home time.

Use simple money vocabulary e.g. how much, coin and note names, pay, buy, cheaper, expensive.

Order events in their day on a visual daily timetable.

Understand and use names of the days of the week.

## Level -1

## IB Phase 1

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

## Conceptual Understandings IB1

Measurement involves comparing objects and events.  
Objects have attributes that can be measured using non-standard units.  
Events can be ordered and sequenced.

## Learning outcomes

### Measurement of shape and space

Compare, describe and begin to measure the length, mass and capacity of objects using nonstandard units

### Measurement of time

Identify, describe and sequence events in their daily routine, for example, before, after, bedtime, storytime, today, tomorrow

## Level 0

### IB Phase 1

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

### Conceptual Understandings IB1

Measurement involves comparing objects and events.  
Objects have attributes that can be measured using non-standard units.  
Events can be ordered and sequenced.

### Learning outcomes

#### Measurement of shape and space

Compare, describe and begin to measure the length, mass and capacity of objects using nonstandard units

#### Measurement of time

Identify, describe and sequence events in their daily routine, for example, before, after, bedtime, storytime, today, tomorrow

## Level 1

### IB Phase 1

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.

### IB Phase 2

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

### Conceptual Understandings IB1

Measurement involves comparing objects and events. Objects have attributes that can be measured using non-standard units. Events can be ordered and sequenced.

### Conceptual Understandings IB2

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.

## Learning outcomes

### Measurement of shape and space

Estimate, compare, describe and measure the length, mass and capacity of objects using nonstandard units

### Measurement of time

Read and write the time to the hour

Name and order the days of the week

Compare and order the duration of events using the every day language of time

Connect days of the week to familiar events and actions

## Level 2

### IB Phase 2

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

### Conceptual Understandings IB2

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.

## Learning outcomes

### Measurement of shape and space

Estimate, compare and measure the length with standard units

Estimate, compare and measure mass, capacity and volume of objects using nonstandard units

### Measurement of time

Read and write the time to the hour and half hour

Name and order the months of the year and seasons

Describe duration using months, weeks, days, hours and minutes

Identify and record dates of events on a calendar

## Level 3

### IB Phase 2

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

### IB Phase 3

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

### Conceptual Understandings IB2

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.

### Conceptual Understandings IB3

Objects and events have attributes that can be measured using appropriate tools.

Relationships exist between standard units that measure the same attributes.

## Learning outcomes

### Measurement of shape and space

Estimate, compare and measure objects using standard units of measurement: length, mass, volume and capacity

Estimate, compare and measure area of objects nonstandard units

Identify and describe relationships between units of measure (eg: 10mm is the same as 1cm)

### Measurement of time

Read and write the time to the quarter-hour and 5 minute intervals (past, to)

Estimate and compare lengths of time: second, minute, hour, day, week, months and years

Connect times to events in a day

### Angle

Identify angles as measures of turn and compare angle sizes in everyday situations

## Level 4

### IB Phase 3

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

### Conceptual Understandings IB3

Objects and events have attributes that can be measured using appropriate tools.  
Relationships exist between standard units that measure the same attributes.

## Learning outcomes

### Measurement of shape and space

Estimate, compare and measure objects using standard units of measurement:

Convert between units using whole numbers (e.g. 1 metre to 100 centimetres)

### Measurement of time

Read and write the time to the minute and investigate the relationship between units of time

Convert between units of time

Describe time and duration using am and pm

### Angle

Compare and classify angles using the language of right angle, acute and obtuse

## Level 5

### IB Phase 3

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

### IB Phase 4

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

### Conceptual Understandings IB3

Objects and events have attributes that can be measured using appropriate tools.  
Relationships exist between standard units that measure the same attributes.

### Conceptual Understandings IB4

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.

## Learning outcomes

### Measurement of shape and space

Estimate, compare and measure objects using standard units of measurement: length, perimeter, mass, capacity, area, volume and temperature

Calculate and develop rules for determining area and perimeter of rectangles

Identify and describe the relationships between area and perimeter

Convert between units using decimals to at least one place (e.g. change 2.6 kg to 2600 g)

### Measurement of time

Read, write and compare 12 and 24 hour time systems and convert between them

Connect 12 and 24 hour time to timetables

Solve problems involving difference in time

### Angle

Estimate, compare, classify, measure and construct angles

## Level 6

### IB Phase 4

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

### Conceptual Understandings IB4

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.

## Learning outcomes

### Measurement of shape and space

Estimate, compare and measure objects using standard units of measurement: length, perimeter, mass, capacity, area, volume and temperature

Calculate and develop rules for determining area and perimeter of triangles

Calculate and develop rules for determining volume of cubes and cuboids

Identify and describe the relationships between area and volume, and between volume and capacity

Convert between units using decimals to at least two places (e.g. change 2.75 litres to 2750 ml, or vice versa)

### Measurement of time

Calculate time across time zones

Solve problems involving difference in time

### Angle

Estimate, compare, measure and construct angles within shapes

Calculate and develop rules to find unknown angles within shapes, around a point and on a straight line

## Number

### Emergent Skills

#### P1 - 3

Encounter vision being drawn between 2 visually presented objects.

Briefly touch an object with adult support.

Locate an attractive object visually & touch then grasp with adult help.

Track moving objects.

Begin to participate with adult in reciprocal games using familiar actions or own sounds.

Take part in action rhymes.

Opportunity to hear numbers and counting.

Show an interests in hand tapped numbers.

Find an object they have watched being hidden in 2 identical places e.g. under cups.

#### P4 - 5

Communicate gone or all gone appropriately.

Enjoy helping to count objects.

Follow counting sequence.

Join in with number rhymes.

Ask for more.

Respond to "give me more".

Take 'one' in learned situations – e.g. a biscuit.

Demonstrate understanding the concept of 'many' and 'few' i.e. chooses many crisps rather than one or two.

Experience 1:1 correspondence in everyday situations.

Indicate one object on request.

Makes sets with one and with lots of objects.

Begin to match two equal sets.

Indicate two items s on request.

Recognize number names in everyday situations i.e. value on coins and notes.

**P6 - 7**

Demonstrate an understanding of 1:1 correspondence in everyday situations.

Aware there are too few/many for complete 1:1 matching.

Join in rote count to 5.

Count 3 objects correctly.

Count five objects by touching one at a time, arranged in a line and randomly.

Match numerals to 5.

Put out objects to 3.

Use counting in play situations e.g., counting coins and notes in shopping game.

Join in rote count to 10.

Put out objects to 5.

Recognize numerals to 5

order numerals to 5.

Match numerals to quantities.

Point out numbers in the environment.

Begin to count objects when asked "how many".

Add one more object and count how many to 5.

Take away one object and count how many to 5.

Compare two sets of objects to 5 and point to the set that is bigger/smaller.

**P8 - ESF Phase 1 & 2**

Join in rote counting to 15.

Count objects reliably to 10 including objects placed

randomly e.g., coins, sweets.

Recognise 0 as "none".

Recognise numbers 0-10 1-9.

Order numerals to 10.

Put out objects to 10.

Write numbers to 5.

Estimate objects with a degree of accuracy.

Combine two small sets and count the total with adult prompts.

Take away a number of objects from a set and count the remainder with adult prompts.

Begin to use ordinal numbers e.g. 1st 2nd 3rd.

From a given number to 5, find the number before/after.

Begin to record numbers 0 - 10.

Begin to use the vocabulary "add" and "take away" in practical situations.

Compare two sets of objects to 10 and point to the set that is bigger/smaller.

Join in rote counting to 20.

Recognise that the number of objects in a set is not affected by their size or position.

Use objects to do addition and subtraction to 10.

## Level -1

### IB Phase 1

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

### Conceptual Understandings IB1

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.

## Learning outcomes

### Place Value

Count by naming numbers in sequences, initially to and from 10.

Apply one to one- correspondence when counting up to 10 objects.

Recognise, model, read, and order numbers to at least 10

Use the language of mathematics to compare quantities, for example, more, less.

Subitise ordered patterns in real life situations e.g. dots on a dice

## Four Operations

Understand simple addition and subtraction using concrete materials in situations

## Level 0

### IB Phase 1

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

### Conceptual Understandings IB1

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.

### Learning outcomes

#### Place Value

Count by naming numbers in sequence to and from 20

Apply one to one- correspondence when counting up to 20 objects

Recognise, model, read, and order numbers to at least 20

Write numbers to 10

Use mathematical language for example more, less (cardinal) first, second (ordinal)

Subitise small collections of objects in real life situations

#### Four Operations

Solve simple addition and subtraction problems up to ten using concrete material

Solve problems, including doubling, halving and sharing

## Level 1

### IB Phase 1

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.

### IB Phase 2

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

### Conceptual Understandings IB1

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.

### Conceptual Understandings IB2

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.

## Learning outcomes

### Place Value

Count by naming numbers in sequences, to 100,

Apply place value to partition and rename two-digit numbers

Skip count in tens starting from zero

Recognise, model, read, and order numbers to

Use the language of mathematics to compare quantities, for example, more, less.

Estimate and subitise groups of up to ten objects

### Four Operations

Recall addition facts for single-digit numbers and related subtraction facts

Solve simple addition and subtraction problems using concrete material

Solve simple addition and subtraction problems using part/whole strategies

## Fractions

Share collections into equal parts

Divide objects into equal parts

## Level 2

### IB Phase 2

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

### Conceptual Understandings IB2

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.

## Learning outcomes

### Place Value

Count by naming numbers in sequences, to and back from 1000, moving from any starting point

Apply place value to partition and rename three-digit numbers

Skip count by twos, fives and tens starting from zero

Recognise, model, read, write and order three-digit numbers

Round numbers to the nearest 10

Estimate up to 20 objects

### Four Operations

Recall addition facts for numbers at least to at least 20.

Model addition and subtraction of whole numbers

Represent and solve addition problems (including real life and word) involving 2 digit numbers, using appropriate strategies

Represent and solve subtraction problems (including real life and word) involving 2 digit numbers, using appropriate strategies

Model multiplication and division using groups and/or arrays

Recognise and represent division as grouping into equal sets and solve simple problems using these representations

Use estimation to check reasonableness of answers to calculations

## Fractions

Find equal parts of shapes and collections

Use the language of fractions, for example, half, whole, equal

## Level 3

### IB Phase 2

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

### IB Phase 3

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

### Conceptual Understandings IB2

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.  
Number operations can be modelled in a variety of ways.

### Conceptual Understandings IB3

The base 10 place value system can

## Learning outcomes

### Place Value

Apply place value to partition and rename four-digit numbers

Skip count by twos, fives, tens and hundreds starting from a number other than zero

Recognise, model, represent and order four-digit numbers

Round numbers to the nearest 10 or 100

### Four Operations

Recall addition facts of multiples of ten to at least 100 and related subtraction facts

Model addition and subtraction of whole numbers

Solve addition problems (including real life and word) using appropriate written and mental strategies

Solve subtraction problems (including real life and word) using appropriate written and mental strategies

Model multiplication and division using groups and/or arrays

Recall multiplication and division facts to at least two, five, three and ten times tables.

Solve multiplication problems (including real life and word) using appropriate written and mental strategies

Solve division problems (including real life and word) using written and mental strategies for division without remainders

Use estimation and rounding to check the reasonableness of answers to calculations

## Fractions

Model, represent, compare and order fractions in a practical context

Use the language of fractions, for example, numerator, denominator

Find fractions of shapes and quantities

Model equivalent fractions

Add and subtract fractions with the same denominator using concrete material and pictorial representations

## Level 4

### IB Phase 3

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

### Conceptual Understandings IB3

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.

## Learning outcomes

### Place Value

Apply place value to partition and rename five-digit numbers

Recognise, represent and order five-digit numbers

Round numbers to the nearest 10, 100, 1000

### Four Operations

Model addition and subtraction of whole numbers

Solve addition problems (including real life and word) using a range of efficient mental and written strategies

Solve subtraction problems (including real life and word) using appropriate efficient mental and written strategies

Model multiplication and division using groups and/or arrays

Recall multiplication facts up to  $10 \times 10$  and related division facts

Solve multiplication problems (including real life and word) using efficient mental and written strategies

Solve division problems (including real life and word) involving division by a one digit number, including those with remainders

Use estimation and rounding to check the reasonableness of answers to calculations

## Fractions

Read, write, compare and order fractions

Use the language of fractions, for example, numerator, denominator

Find fractions of shapes, numbers and quantities

Investigate equivalent fractions used in context

Model addition and subtraction of fractions with related denominators

Model and compare improper fractions and mixed numbers

Count in quarters halves and thirds, including mixed numbers

## Level 5

### IB Phase 2

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.

### IB Phase 3

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

### Conceptual Understandings IB2

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.

### Conceptual Understandings IB3

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.

## Learning outcomes

### Place Value

Apply place value to partition and rename numbers to tenths and hundredths.

Recognise and order numbers to millions or beyond

Recognise, model and order decimal fractions to hundredths or beyond.

Round decimal fractions to the nearest whole number

### Four Operations

Model addition and subtraction of decimal fractions up to hundredths

Solve addition problems including decimals in the form of money and measurement.

Solve subtraction problems including decimals in the form of money and measurement.

Uses known times tables facts to mentally multiply any 2 digit number by a 1 digit number

Solve problems (including real life and word) involving multiplication of large numbers by one- or two-digit numbers using efficient mental and written strategies

Use efficient mental and written strategies for division

Use estimation and rounding to check the reasonableness of answers to calculations

## Fractions

Read, write, compare and order common fractions and decimal fractions to hundredths or beyond

Understand the relationship and convert between common fractions and decimal fractions

Simplify fractions to the lowest common denominator

Model, read, write and compare improper fractions and mixed numbers

Model, read, write and compare percentages understanding them as the number of parts in every 100

Model and solve simple problems involving ratio and proportion

Model and solve simple problems involving fractions

## Level 6

### IB Phase 4

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

### Conceptual Understandings IB4

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.

## Learning outcomes

### Place Value

Apply place value to partition and rename numbers to thousandths

Recognise, and order integers (including negative integers)

Recognise, model and order decimal fractions to thousandths or beyond.

Round decimal fractions to the nearest tenth or whole number

### Four Operations

Use efficient mental and written strategies to add integers and decimals

Use efficient mental and written strategies subtract integers and decimals

Model multiplication and division of decimals by a single digit integer

Use efficient mental and written strategies to multiply decimal fractions by a one digit integer

Use efficient mental and written strategies for division representing remainders as fractions

### Fractions

Understand the relationship and convert between common fractions, decimal fractions and percentages

Find percentages of numbers or quantities with and without a calculator

Simplify fractions in mental and written form

Solve problems involving addition and subtraction of common fractions with the same or related denominators

Convert improper fractions to mixed numbers and vice versa

Read, write and solve problems involving ratio