

# Maths

## Data Handling

### 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



## Pattern and Function

### 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.

#### 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 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.

#### 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

## Shape and Space

### 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



## Measurement

### 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

## Number

### 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