

ISL PYP Mathematics Learning Outcomes R3-R4

BIG IDEAS: Students are expected to understand the following...

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| Numbers can be used in many ways for different purposes in the real world | Processes and strategies can be used to solve mathematical problems. | Patterns can be found in the environment and everyday life. | Things in the environment, and moments in our lives, can be measured and described. | Information can be sorted and organized to help solve problems and make predictions. |
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Learning Standards

| PYP Strand | Knowledge Content Students are expected to know the following... | Concepts | Curricular Competencies Students are expected to do the following... |
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| Reasoning and analysing Understanding and solving | Children begin to develop processes and strategies for solving mathematical problems. | Strategies, reasoning | <ul style="list-style-type: none"> Try to solve problems in their daily lives using mathematics (e.g., how many napkins are needed). Generate new problems from everyday mathematical situations and use current knowledge and experience to solve them (e.g., distribute crackers). Begin to develop and use various approaches to problem solving based upon their trial and error experiences. Begin to talk about the processes and procedures they used to solve concrete and simple mathematical situations. Begin to generate problems that involve predicting, collecting, and analyzing information and using simple estimation. |
| Communicating and representing Connecting and reflecting | Children begin to use the language of mathematics by applying emerging skills in representing, discussing, reading, writing, and listening (e.g., by translating a problem or activity into a new form; a picture, diagram, model, symbol, or words). | Representation, reflection, relationship, symbols, exploration | <ul style="list-style-type: none"> Participate regularly in informal conversations about mathematical concepts and number relationships. Begin to record their work with numbers in a variety of simple concrete and pictorial formats, moving toward some use of number and other mathematical symbols. Begin to use symbols to represent real objects and quantities. Make progress from matching and recognizing number symbols to reading and writing numerals. Talk about their own mathematical explorations and discoveries using simple mathematical language and quantity-related words. Begin to recognize that information comes in many forms and can be organized and displayed in different ways. |

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| | | | <ul style="list-style-type: none"> ● Begin to describe comparative relationships (e.g., more/less/same number of objects or quantities). |
| Data Handling | <p>Children begin to develop skills of sorting and organizing information, seeing patterns, and using information to make predictions and solve new problems.</p> <ul style="list-style-type: none"> ● Recognize that the same group can be sorted and classified in more than one way and describe why they would group or sequence in a particular way. ● Begin to understand that simple concrete and representational graphs are ways of collecting, organizing, recording, and describing information. | Form, information, data, representation, organisation | <ul style="list-style-type: none"> ● Begin to develop the ability to solve problems involving joining, separating, combining, and comparing amounts when using small quantities of concrete materials. ● Can generate problems that involve predicting, collecting, and analyzing information. ● Use simple estimation to make better guesses. ● Identify likenesses and differences. ● Can place objects or events in order, according to a given criterion (e.g., color, shape, size, time). |
| Measurement | <p>Children explore and discover simple ways to measure.</p> <ul style="list-style-type: none"> ● Begin to understand concepts of weight. ● Begin to understand that tools (e.g., rulers, scales, counters) can be used to measure properties of objects and amounts. | measurement, time, comparison, estimation, accuracy | <ul style="list-style-type: none"> ● Show awareness that things in their environment can be measured. ● Find the longer, shorter, heavier, lighter, and more/less full of two items ● Use beginning estimation skills in solving everyday measurement problems (e.g., about how many cookies are needed for a small group of children). ● Begin to use non-standard measures (e.g., length of hand) for length and area of objects. ● Show an awareness of the concept of time, beginning with the recognition of time as a sequence of events and how time plays a role in their daily life (e.g., breakfast, snack, lunch, dinner). ● Show an awareness of temperature as it affects their daily lives. |
| Shape and Space | <p>Children build their visual thinking skills through explorations with shape and the spaces in their classrooms and neighbourhoods.</p> | comparison, form, attributes, relationships | <ul style="list-style-type: none"> ● Can make models, draw, name, and/or classify common shapes and verbally describe them in simple terms. ● Combine and partition shapes to make new shapes with 2D & 3D shapes ● Begin to recognize and appreciate geometric shapes in their environment. |

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| | | | <ul style="list-style-type: none"> ● Begin to build an understanding of directionality, order, and positions of objects through the use of words (e.g., up, down, over, under, top, bottom, inside, outside, in front of, behind). ● Respond to and use the language of position and direction |
| Pattern and Function | Children begin to develop skills of recognizing, comparing and classifying objects, relationships, events and patterns in their environment and in everyday life. | pattern, form, sequence, function | <ul style="list-style-type: none"> ● Recognize, describe, copy, extend, and create simple patterns with real objects and through pictures. ● Identify patterns in their environment. ● Investigate patterns and describe relationships. ● Recognize patterns in various formats (e.g., things that can be seen, heard, felt). ● Explore and adds to simple linear patterns of 2-3 repeating items |
| Number | <p>Children extend their understanding of numbers and their relationship to one another and things in the environment.</p> <ul style="list-style-type: none"> ● Develop an increasing interest and awareness of numbers and counting as a means for determining quantity and solving problems. ● Make progress in moving beyond rote counting to an understanding of conceptual counting (e.g., one-to-one correspondence). ● Show growth in understanding that number words and numerals represent quantities. ● Understand how numbers can be used to label various aspects of their lives (e.g., | organisation, symbol, number, communication | <ul style="list-style-type: none"> ● Match, build, compare, and label amounts of objects and events (e.g., birthdays in the week) in their daily lives. ● Show progress in linking number concepts, vocabulary, quantities and written numerals in meaningful ways. ● Use cardinal (e.g., one, two) and ordinal (e.g., first, second) numbers in daily home and classroom life. ● Develop an increasing ability to count in sequence up to ten and beyond, typically referred to as "counting on." ● Recognize and match number symbols for small amounts with the appropriate amounts (e.g., subitizing). <p>Number & Place Value:</p> <ul style="list-style-type: none"> ● recognize the composition of numbers to ten ● subitise up to five ● Begin to understand that numbers are composed of smaller numbers ● Begin to recognise that each counting number is one more than the one before <p>Number Patterns:</p> <ul style="list-style-type: none"> ● compare quantities by using the phrases 'greater than', 'less than', or 'the same as' ● recognise odd and even numbers ● talk about whether amounts have been shared equally |

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| | house number, phone number, ages of classmates). | | <ul style="list-style-type: none"> recognise the pattern when doubling numbers <p>Addition & Subtraction:</p> <ul style="list-style-type: none"> Say number bonds up to five and being to recognize some number bonds to ten (including subtraction facts) Know some doubles facts count beyond twenty Separate a group of 3 or 4 objects in different ways, beginning to recognise that the total is still the same |
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Curricular Competencies - Elaborations

Year R3-R4

Mathematical experiences involving interactions with the environment, materials, peers and supportive adults give children opportunities to build, modify, and integrate simple mathematical concepts—primarily ideas about whole numbers, shapes and space.

Of critical importance is the support of teachers in helping children adopt these attitudes and practices in their early exploration of mathematics in their daily lives:

- Making sense of problems and persevere in solving them.
- Reasoning abstractly and quantitatively.
- Constructing viable arguments and critique the reasoning of others.
- Modelling with mathematics.
- Using appropriate tools strategically.
- Attending to precision.
- Looking for and making use of structure.
- Looking for and expressing regularity in repeated reasoning.

Mathematics Practices:

- Deliberately use problem-solving vocabulary in their conversations with children in the classroom and outdoors; e.g., asking “Can we predict ... , change ... , observe ... ”, etc.
 - Engage children in conversations about quantity, properties of objects, use of measurement tools as children interact with materials in learning centers or class activities across all areas of the curriculum.
 - Deliberately model the process of solving everyday problems; e.g., asking “Let’s decide what to do?”; “How many children want to go on a walk?”
 - Help families understand that problem-solving can be a positive experience and not always a crisis and help them identify such opportunities in everyday family life.
- Give families examples of how to extend children’s thinking by asking relevant questions and being supportive of inquiry.
- Recognize that children are developing the ability to solve math problems and talk with them non-judgmentally and with encouragement as they experience correct and incorrect responses; e.g., guide them as they analyze “errors” and develop alternative processes for solving problems.
 - Pace and organize the classroom to encourage problem solving across the curriculum.
 - Assure that children with differing learning styles and abilities are given opportunities to solve problems of increasing complexity.

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- Draw attention to new situations and problem solving opportunities in the daily working of the classroom.
- Establish practices to encourage children to view objects and ideas from multiple perspectives and across learning domains.

Mathematical Literacy:

- Emphasize verbalization of thinking and concepts and encourage children follow the example.
- Make liberal use of concrete materials to help children understand mathematical language, especially children learning English and children with special learning needs.
- Establish the practice of reflection to better understand concepts.
- Observe children and listen to their conversations to better understand their progress in mathematical understanding.
- Use visual examples to assist children in understanding concepts; e.g., objects of all kinds, especially items from the natural world (seed pods, small rocks, fallen leaves), charts, number lines.

Counting and Cardinality (number):

- Through the provision of many activities in math and in linking math across the curriculum, take advantage of children's natural interest in number concepts by engaging them with mathematical ideas and exploring ideas about numbers.
 - Create circumstances to engage children in counting and using numbers and practice using number words or finger patterns.
 - Build on children's prior number knowledge by building on experience and knowledge related to their family, linguistic, cultural, and community backgrounds.
 - Help children use their natural interest in mathematics and their disposition to use it to make sense of their physical and social worlds.
 - Create a classroom learning environment that is safe for trial and error and help families to understand the importance of such an approach.
- Find ways to make sure children see both female and male role models routinely engaged in solving problems.

Simple Operations and Beginning Algebraic Thinking (Number):

- Model frequently, especially for children learning English.
- Promote social interactions in the classroom, learning from peers, small group play and time for discussing their understandings.
- Ask questions to understand children's thinking, observe their actions and listen to their explanations; observe their approach when using the computer to understand their thinking.
- Design activities and math concepts to children's interests and daily activities.
- Emphasize math concepts outside of the math context; in music notations, board games, puzzles, clapping rhythms.

Measuring:

- Use descriptive language regarding measurement, size, comparisons and attributes in children's first language and in English; e.g., much longer; barely red.
- Involve and inform families about the classroom activities and learning related to measurement and collecting data that can be extended at home.
- Provide many activities that help children move from non-standard to standards units of measure; e.g., from as long as my foot to a 12-inch measurement tool, from how much juice fits in my glass to how much in a cup measure.
- Identify experiences to relate measurement to additive and subtractive concepts; e.g., "How many children had milk for lunch every day this week?"

Geometry (Shape and Space):

- Assure that children have opportunities to explore both two and three dimensional objects.
- Vary the size of all geometric shapes with representation of fat, skinny, long, small, etc.

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- Describe increasingly complex shapes and how those shapes are represented in the environment of the classroom and beyond.
- Demonstrate how shapes can be combined to create new forms.
- Use digital tools only after children have had many opportunities to internalize concepts of space and shape through direct and concrete experience.
- Help children develop a sense of spatial understanding; e.g., location, direction, distance.
- Encourage families to help children explore math in their everyday environments and experiences.