Robotics Links to ACARA

MATHEMATICS FOUNDATION

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Shape** Sort, describe and name familiar two-dimensional shapes and three-dimensional objects in the environment. (ACMMG009)	Sorting and describing squares, circles, triangles, rectangles, spheres and cubes.	**Robot creates familiar two-dimensional shapes (pre-programmed) students classify, sort, name and describe basic properties of the shapes.**	Build a robot using pen attachment and program basic shapes. Group shapes based on common characteristics.
			Identify and describe shapes in playground and use shapes to draw own playground.	Build playground equipment using WeDo kit. (see Science activity) Group shapes based on common characteristics.
	Location and transformation Describe position and movement. (ACMMG010)	Interpreting the everyday language of location and direction, such as 'between', 'near', 'next to', 'forwards', 'towards'.	**Robot travels around the classroom while students describe robots path and location using everyday language.**	Program robot to travel around the classroom stopping at various locations. Use appropriate language to describe location.
		Following and giving simple directions to guide a friend around an obstacle path and vice versa.	**Students act as robots and are directed around classroom by peers using simple directions.**	One student acts as the 'robot' and one student as the 'programmer'. The programmer directs the robot student around the classroom. Use appropriate language to describe location.

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MATHEMATICS GRADE 1

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Shape** Recognise and classify familiar two-dimensional shapes and three-dimensional objects using obvious features. (ACMMG022)	Focusing on geometric features and describing shapes and objects using everyday words such as 'corners', 'edges' and 'faces'.	**Robot creates familiar two-dimensional shapes (pre-programmed) students classify, sort, name and describe basic properties of the shapes.**	Build a robot using pen attachment and program basic shapes. Group shapes based on common characteristics. Identify and use knowledge and understandings of two-dimensional shapes to draw a robot that meets a design brief. Explore the way two-dimensional shapes can be used to create or enhance designs.
	Location and transformation Give and follow directions to familiar locations. (ACMMG023)	Understanding that people need to give and follow directions to and from a place, and that this involves turns, direction and distance.	**Robot travels around classroom and students describe with directional language (e.g. forward, left, right) how the robot moves to different locations around the class.**	Build and program robot to travel around class. Use appropriate language to describe location.
		Understanding the meaning and importance of words such as 'clockwise', 'anticlockwise', 'forward' and 'under' when giving and following directions.	**Students act as robots and are directed around classroom by peers using directions One student acts as the 'robot' and one student as the 'programmer'.**	One student acts as the 'robot' and one student as the 'programmer'. The programmer directs the robot student around the classroom.
		Interpreting and following directions around familiar locations.		

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MATHEMATICS GRADE 2

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Using units of measurement** Compare and order several shapes and objects based on length, area, volume and capacity using appropriate uniform informal units. (ACMMG037)	Comparing lengths using finger length, hand span or a piece of string.	**Measure the distance a robot travels using different units of measurements (i.e. Hand span, length of string).**	Compare using informal units for different lengths.
	Shape Describe and draw two-dimensional shapes, with and without digital technologies. (ACMMG042)	Identifying key features of squares, rectangles, triangles, kites, rhombuses and circles, such as straight lines or curved lines, and counting the edges and corners.	**Use a pre-programmed robot with pen attachment to create two dimensional shapes.**	Classify, sort, name and describe properties of the shapes.
	Location and transformation Interpret simple maps of familiar locations and identify the relative positions of key features. (ACMMG044)	Understanding that we use representations of objects and their positions, such as on maps, to allow us to receive and give directions and to describe place.	**Create own map of the school and using map describe with directional language (e.g. forward, left, right) how a robot moves from class to different parts of the school.**	Program robot to travel around map.

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MATHEMATICS GRADE 3

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Using Unit of Measurement** Measure, order and compare objects using familiar metric units of length, mass and capacity. (ACMMG061)	Recognising the importance of using common units of measurement. Recognising and using centimetres and metres.	**Follow directions to program a robot car to travel forward.**	Predict, test and measure the distance the robot travels using formal units for measuring (i.e. centimetres and metres).
	Location and transformation Create and interpret simple grid maps to show position and pathways. (ACMMG065)	Creating a map of the classroom or playground.	**Draw a map using 'birds-eye view' showing robots route around school. Use positional language to construct a set of directions for a peer to follow to navigate the robot through the map.**	

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MATHEMATICS GRADE 4

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Using Unit of Measurement** Use scaled instruments to measure and compare lengths. (ACMMG084)	Reading and interpreting the graduated scales on a range of measuring instruments to the nearest graduation	**Predict how long a robot car will take to travel a given distance (see Data ad Statistics Activity -Don't hit the LEGO person).**	Predict, test and measure the distance the robot travels using formal units for measuring (i.e. centimetres and metres).
			Using a 'birds-eye view' of a maze drawn to scale, students calculate the measurements of a maze. Students construct a set of directions, for a peer to follow to navigate the robot through the maze, specifying the distance for each step.	Students program the robot to complete the maze according to the instructions.
			Make water bottle insulator to maintain temperature of water. Measure temperature changes using a sensor (see Data and Statistics Activity -Water Bottle Insulator)	Record results of investigation.
	Location and transformation Use simple scales, legends and directions to interpret information contained in basic maps. (ACMMG090)	Identifying the scale used on maps.	**Draw a map using 'birds-eye view' showing robots route around school. Use positional language to construct a set of directions for a peer to follow to navigate the robot through the map.**	

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MATHEMATICS GRADE 4

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Statistics and Probability	**Data representation and interpretation** Construct suitable data displays, with and without the use of digital technologies, from given or collected data. (ACMSP096)	Choosing the most effective way to collect data for a given investigation.	**Collect and record data from multiple trials (Don't hit the LEGO person activity) in a table.**	Use data table to estimate how far a robot car needs to travel to reach a LEGO person placed at a distance determined by the teacher (Don't hit the LEGO person).
		Exploring ways of presenting data and showing the results of investigations.	**Collect and record data from trials (see Measurement and Geometry Water Bottle Insulator activity).**	Present result of investigation and evaluate data collection and representation methods.

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MATHEMATICS GRADE 5

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Using Unit of Measurement** Choose appropriate units of measurement for length, area, volume, capacity and mass. (ACMMG108)	Recognising that some units of measurement are better suited for some tasks than others, for example kilometres rather than metres to measure the distance between two towns.	**Predict how long a robot car will take to travel a given distance. Measure distance travelled.**	Use data table to estimate how far a robot car needs to travel to reach a LEGO person placed at a distance determined by the teacher. (See Data and Statistics - Don't hit the LEGO person activity)
	Location and transformation Use a grid reference system to describe locations. Describe routes using landmarks and directional language. (ACMMG113)	Creating a grid reference system for the classroom and using it to locate objects and describe routes from one object to another.	**Write a set of directions for the robot, using compass points or grid coordinates, to the location of a hidden treasure on the map. Follow the directions to find the treasure.**	Draw a treasure island map of the classroom, creating a scale and compass rose, and imposing a grid and coordinates (grid references).
	Geometric reasoning Estimate, measure and compare angles using degrees. Construct angles using a protractor. (ACMMG112)	Measuring and constructing angles using both 180° and 360° protractors. Recognising that angles have arms and a vertex, and that size is the amount of turn required for one arm to coincide with the other.	**Estimate the angle at which the robot turns x rotations, positioning the robot at 0° before program run. Draw the angle the robot turned, measure the correct angle of turn and compare this to estimation. Repeat for numerous angles, measuring and comparing angles in degrees, e.g. difference in degrees, acute vs. obtuse.**	Build basic robot and use pen attachment to draw different angles. Students identify the vertex and arms of the angels understand how the start and end of the program represents each arm and the construction of the angle.

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MATHEMATICS GRADE 5

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Number and Algebra	**Number and place value** Use estimation and rounding to check the reasonableness of answers to calculations. (ACMNA099)	Recognising the usefulness of estimation to check calculations.	**Predict how long a robot car will take to travel a given distance. Measure distance travelled.**	Use data table to estimate how far a robot car needs to travel to reach a LEGO person placed at a distance determined by the teacher. (See Data and Statistics - Don't hit the LEGO person activity)
		Applying mental strategies to estimate the result of calculations.		
	Number and place value Use efficient mental and written strategies and apply appropriate digital technologies to solve problems. (ACMNA291)	Using calculators to check the reasonableness of answers.		
Statistics and Probability	**Data representation and interpretation** Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies. (ACMSP119)	Identifying the best methods of presenting data to illustrate the results of investigations and justifying the choice of representations.	**Predict how long a robot car will take to travel a given distance – Don't hit the LEGO person.**	Trial robot car, measure distance travelled, collect and record data from trials (See Number and Algebra - Don't hit the LEGO person activity). Present result of investigation identifying best methods to present data.

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MATHEMATICS GRADE 6

Strand	Content Descriptions	Elaborations	LEGO Education	Teacher notes
Measurement and Geometry	**Using units of measurement** Convert between common metric units of length, mass and capacity. (ACMMG136)	Identifying and using the correct operations when converting units including millimetres, centimetres, metres.	**Design and construct a robot car and program varying lengths of travel in time. Record and plot data to determine duration of a robot to stop before a placed LEGO figure.**	Using data determine time needed to travel between current location and distant locations, i.e. 1cm = 1km.
		Recognising the significance of the prefixes in units of measurement.		
		Measuring, estimating and comparing angles in degrees and classifying angles according to their sizes.	**Build basic robot and use pen attachment to draw different angles.** **Estimate the angle at which the robot turns x rotations, positioning the robot at 0° before program run. Draw the angle the robot turned, measure the correct angle of turn and compare this to estimation.**	This is repeated for numerous angles, measuring and comparing angles in degrees, i.e. difference in degrees, acute vs. obtuse.
Number and Algebra	**Number and place value** Select and apply efficient mental and written strategies and appropriate digital technologies to solve problems involving all four operations with whole numbers. (ACMNA123)	Applying a range of strategies to solve realistic problems and commenting on the efficiency of different strategies.	**Explore how changing the size of the gears/wheels on a robot affects how far it travels and how fast it moves.**	Use degrees of wheel rotations to calculate distance robot needs to travel.

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