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mTiny Curriculum Guide

Teacher's Book

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Developing Early Literacy and Numeracy through Tangible Programming

mTiny Curriculum Guide

Makeblock Co., Ltd.
www.makeblock.com

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Welcome!

Developing Early Literacy and Numeracy through Tangible Programming has been developed for Makeblock's first screen-free robot, mTiny. This curriculum guide has been designed to help educators learn, plan, and implement joyful robotics activities in early years settings.

At Makeblock, we understand that early childhood educators' schedules are busy and it can be challenging to introduce cutting-edge technology into the classroom for preschoolers. However, technology education leverages trends of the future of education and mTiny makes implementation easy.

This guide is suitable for educators with or without experience of programming or computer science. It is adaptable, flexible, and easy to use. The guide not only explains some of the basic programming concepts but also offers example learning activities to facilitate your learning and teaching.

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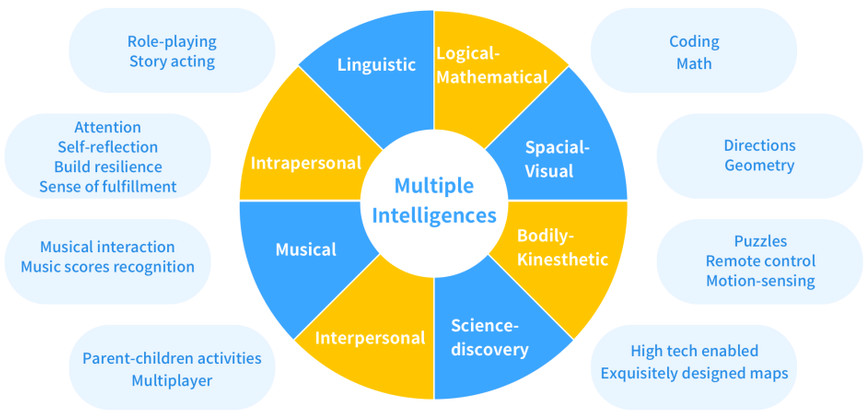
Education Values and Pedagogy

mTiny is a programmable robot for preschool children growing up in the digital age. It is a toolkit to nurture children's 21st century skills–in particular, literacies that go beyond reading and writing skills. Information literacy, media literacy, technology literacy, and numeracy are key focuses in this curriculum. Moreover, mTiny's tangible programming blocks and jigsaw-puzzle-based map blocks are fun for children, but also help develop their higher-order thinking skills, bridging the concrete and abstract thinking with scaffolding instructions.

Logic and Computational Thinking
Pattern Recognition
Abstraction
Algorithms
Evaluating Solutions

Visual and Spatial Thinking
Orientation
Mental Rotation
Route Planning
Navigation

Theoretical Underpinning



Connection to Child Development

With mTiny, preschool children will not only learn about focus, concentration, and memory by following instructions and guide during the activities but also enjoy a lot of developmental benefits.

Physical Development
Hand-eye Coordination
Gross Motor Skills
Fine Motor Skills

Language Arts and Literacy
Vocabulary and Concepts
Computational Concepts
Spatial Concepts
Signs and Symbols
Communication
Creative Storytelling

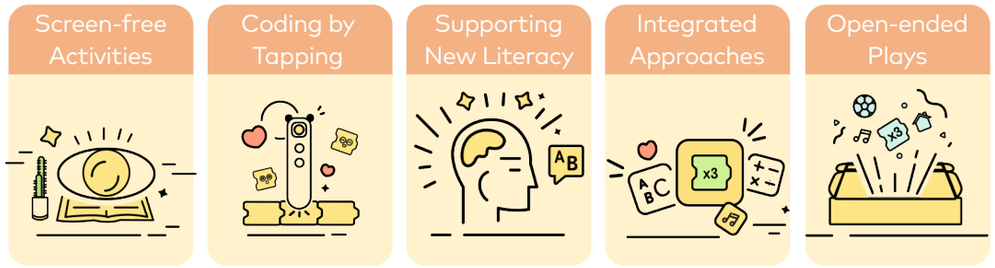
Mathematics
Number Sense and Counting
One-to-one Correspondence
Symbols and Numbers
Spatial Sense
Shapes and Patterns
Parts and Wholes
Sets and Groups
Sorting, Categorizing, and Classifying
Sequencing
Comparison

Cognitive Development
Focus and Concentration
Memory
Representation
Self-reflection
Imagination
Logic and Analytical Thinking

Socio-emotional Development
Listening and Responding
Self-management
Independence
Collaboration and Leadership
Confidence
Persistence and Resilience

An Introduction to mTiny

mTiny is a programmable robot kit for children growing up in the digital age. It can be operated by tangible programming language, i.e., writing codes without the screen.
The preschooler-friendly tangible programming interface allows children to use touchable coding cards (instead of graphical programming blocks in software) to create various human-machine interactive effects. It is an easy way to learn to code and practice computational thinking skills for both younger children and early childhood educators.



Tangible Programming at a Glance

Tangible programming language is a set of physical programming blocks that enables children without prior coding skills. A huge advantage of coding this way is that being literate is not a requirement. By assembling and connecting physical blocks with image graphics and signs, children can create a tangible representation of abstract concepts, ideas, and even stories that they can communicate and share with peers.
The mTiny robot kit includes the following coding cards, which are a form of tangible programming language that is used in the activities.

There are seven types of basic coding cards:

Facial Expression Cards:

Happy Silly Angry Sad Scared Dizzy Sleepy

Tapping a facial expression card can make mTiny produce interactive effects. Children can use Facial Expression Cards to have mTiny put on an expression. They can also combine Facial Expression Cards with other coding cards (e.g. action cards) to get immediate feedback while executing a set of codes.
To introduce the First In First Out (FIFO) rule, for instance, you can ask children to combine a facial expression card and a forward card in the first place. Then ask children to combine the forward card and the facial expression card.

Have children observe and compare the two effects, and answer the following questions:
(1) In the first case, what did mTiny do first? Laugh or move forward?
(2) In the second case, what did mTiny do first? What makes the difference?

Note: What is First In First Out (FIFO)?
First In First Out rule means the command of the coding card that goes in first is the command that comes out first. Suppose that you were queuing outside the theater, you would be at the front of the queue if you arrived early. Accordingly, you would enter the theater first if you were at the front of the queue.

To conclude, using Facial Expression Cards can help gain the understanding of the relations between the robot and coding cards, i.e. the fundamental rule of programming mTiny.
Furthermore, Facial Expression Cards can also be used as the "signal block" to get immediate feedback when children explore the concepts of events and sequence. It is important to understand the relations between the sequence of coding cards and the sequence of mTiny's actions, in particular when children want to create complex interactive effects or to execute a long set of code.

Action Cards:

Forward Card: To make mTiny move a specific distance of one map block (28mm) forward.

Turn Right Card: To make mTiny turn to its right-hand side by 90 degrees in the clockwise direction.

Turn Left Card: To make mTiny turn to its left-hand side by 90 degrees in the counter-clockwise direction.

Input Card:

To help mTiny remember the set of commands that you would like to execute later.

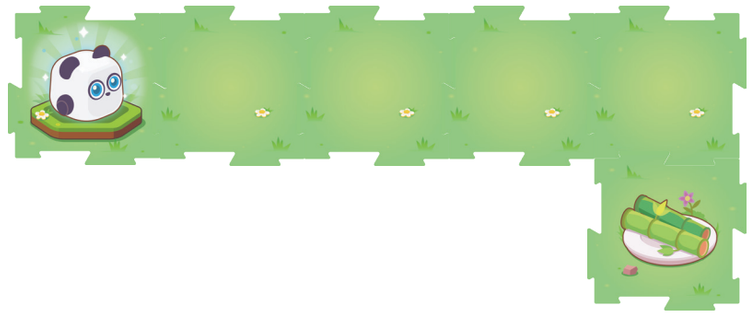
Remind children that the Input Card is to make mTiny record the commands rather than execute them, and that the Go! Card is the one to make the robot run the code.

Go! Card:

When you tap the Go! Card, mTiny will execute the set of commands.

Repeat Cards:

The Repeat Card is a control programming block, which essentially causes mTiny to run the same code several times. Using a ×5 Repeat Card after one Forward Card will cause mTiny to move forward five steps. In other words, the command "move forward" is repeated five times.

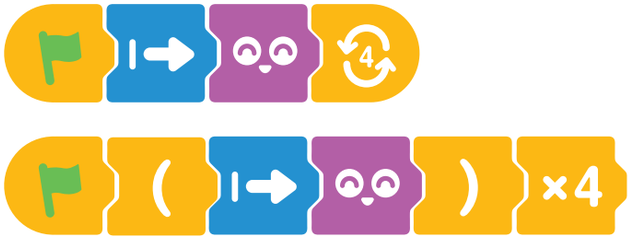


Loop Cards:

The function of Loop Cards is similar to the Repeat Card. However, notably, the shape of Loop Cards indicates that it is intended to be placed at the end of a series to repeat numerous commands in a loop. A loop card with a number can make a series of commands execute repeatedly by a specific number of times. The Loop Card without any number can execute the commands over and over.

Loop Parentheses:

Loop Parentheses should be used in pairs and combined with a Repeat Card. It is useful to create more complex interactive effects and extend the functioning because of its open-end shape.
Since adding a Loop Card indicates the end of a sequence, no other coding cards can be added after the Loop Card. However, due to the open-end function of the Loop Parentheses, other coding cards cam be added after them and the said code included in the parentheses will be executed.



Have children execute and compare the two sets of code shown on the left.
What is the same and the difference between them?

It is important to note that the use of loop parentheses is not appropriate for children ages 4 to 6 targeted in this curriculum guide. Advanced learners with primary mathematical knowledge are welcome to try this more challenging aspect of mTiny.

Classroom Activity Preparation

Make sure each child knows how to:
(1) turn on and off mTiny the robot;
(2) Pair the robot with Tap Pen Controller.

Individual Play	Group Play
1 mTiny toolkit for each child	1 mTiny toolkit for each group of 2 to 4 children
1 set of map blocks for each child	Children may share map blocks and coding cards in the group
1 set of coding cards for each child	
Duration: 30 to 45 minutes	Duration: 30 minutes to 1 hour

Curriculum and Activity Plans

mTiny curriculum was developed with children ages 4 to 6 and early childhood educators in mind. The curriculum is made up of 14 activities at three levels.

Beginner's Level	Intermediate Level	Advanced Level
What Is a Robot?	Little Road Mender	mTiny's Weekend
Red Light, Green Light	Ring Road Itinerary	Patrol Officer
Captain's Order	Little Bus Driver	
Forest Party	Help Me, Please!	
What's the Time, Mr. Wolf?		
Zig-zag Bridge		
Number Puzzles		
Where's My Bamboo?		

Outline and Activity Description

Activity Name	Description	Key Concept
What Is a Robot? (Robot-free Activity)	Children will understand the concept of robots by reading picturebook stories about robots that mimic animals.	Robotics
Red Light, Green Light	Children will explore the use of mTiny the robot and its Joystick Control mode, and understand the relations between mTiny and the Tap Pen Controller.	Human-robot Interaction

Activity Name	Description	Key Concept
Captain's Order	Children will explore the hidden effects found within the map blocks with an object by making mTiny reach those map blocks.	Human-robot Interaction
Forest Party	Building on the hands-on understanding of the interaction between the robot and the map blocks with an object, children will role-play help find favorite foods.	Human-robot Interaction
What's the Time, Mr. Wolf?	This activity aims to introduce the use of the Forward Card and the Tap-to-Code Control mode. Children need to compare the two control modes during the game.	Events
Zig-zag Bridge	Children will explore the Turn Left and the Turn Right Cards. This activity sets challenges related to spatial thinking as children need to make decisions and recognize mTiny's right-left orientation.	Sequencing
Number Puzzles	Building on the understanding of the use of the Action Cards, children will sharpen their coding skills by making mTiny move on the Number Puzzle in sequence. This activity consolidates children's existing numeracy skills.	Sequencing
Where's My Bamboo?	Children will explore the use of two kinds of triggering programming blocks: the Input Card and the Go! Card. Children can cause mTiny to execute a set of commands continuously by using them.	Events

Activity Name	Description	Key Concept
Little Road Mender	This activity aims to introduce the Road-and-Wall Mechanism in **A Journey to the Town**. Children need to compare the two maps in the robot kit with a focus on the different effects of the border.	Conditionals
Ring Road Itinerary	The ring road is used as a representation of the concept of loops. Children need to understand the use of ring roads in daily life. By assembling different shapes of Road Map Blocks, children will recognize the pattern and make mTiny move through a circuit back to the departure point.	Loops
Little Bus Driver	In this activity, children will continue the ring road itinerary with mTiny in a more complex Ring Road Map. Children need to act as a driver to pick up passengers in different places multiple times.	Loops
Help Me, Please!	There are two kinds of the Role-playing Map Blocks in the robot kit: the Hospital Map Blocks–the A Passer-by Hits His Head Map Block, and the Police Station Map Blocks–the Thief Map Block. The departure point will determine which the role-play of mTiny will engage in. The robot should stop on the map block that corresponds with the scene.	Conditionals

Activity Name	Description	Key Concept
mTiny's Weekend	Children will help mTiny plan its weekend activities. Children will create a scenario and direct mTiny to visit the map blocks with an object.	Algorithm
Patrol Officer	Children and the robots will play the role of the patrol officer. Based on the four assigned scenes, children will help mTiny plan the route with the shortest time.	Algorithm

Examples of Learning Activities

Activity 01 What Is a Robot?

Beginner's Level | 4~8 persons

This is a robot-free introductory activity. The aim of this activity is to introduce the concept of robots by using picturebooks as a read-aloud and generating more discussion on the possible use of robots at present and in the future. Children are encouraged to share their ideas about robots and their contribution to human society.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the concept of robots and the possible applications in daily life;
(2) Interpret the use of various robots in different situations;
(3) Create and narrate stories about robots in the future society.

Key Competencies

Cognitive	Socio-emotional
Focus and Concentration	Listening to Your Teacher
Memory	Responding to Your Teacher
Imagination	Communication
Creative Storytelling	Confidence

Resources

Two picturebooks are recommended and considered in this activity:
Minwalla, S. & Ghosh, A. (2018) *Are You a Fish?*. Pratham Books. Available from: storyweaver.org.in/stories/47816-are-you-a-fish.
Minwalla, S. & Ghosh, A. (2018) *Are You an Insect?*. Pratham Books. Available from: storyweaver.org.in/stories/47970-are-you-an-insect.
You can choose one of the above stories to present. You are welcome to choose any other children's text that you think it is appropriate and suitable for your planning and teaching.

Educator-Led Instructions

Main Activity

1. Ask children: "What is a robot? Do you know any kind of robots in your life?"
2. Read and share the picturebook on robots with children.

Note: Children may come across difficult words in the picturebook. It is not necessary for children to understand everything, grasping the concept is of much more importance.

3. Ask children to discuss the following questions:
(1) What can robots do? Is there anything else you think they could do?
(2) Which was your favorite robot in the story? Why?
(3) If you were a robot scientist, what kind of robot would you create? Why?
4. Invite children to draw their robots and present to their peers.

Activity 02　Red Light, Green Light

Beginner's Level　4~8 persons

The aim of this activity is to introduce how mTiny and the Tap Pen Controller function. Children will learn to use the Joystick on the Tap Pen Controller and explore one of the control modes of mTiny's movements. The Joystick Control mode is fundamental to the understanding of robot locomotion and the representation of mTiny's movements in the Coding Cards. This activity is also a good game for improving children's focus.

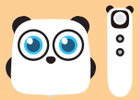
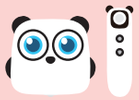
Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the relations between the robot and the Tap Pen Controller;
(2) Use the Joystick to make mTiny move or stop according to the instructions.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Focus and Concentration	Listening to Your Teacher
Fine Motor Skills	Spatial Sense	Responding to Your Teacher
	Spatial Concepts	Self-management

Resources

For Child	For Educator		
			
mTiny Toolkit × 1	mTiny Toolkit × 1	Red Light × 1	Green Light × 1

* Red Light and Green Light are not included in the package, and therefore, you need to prepare them by yourself.

Setting-up

You and children will need a reasonably spacious playing area for the robots to move.

The playing area should be defined by a designated starting line and finish line.

Educator-Led Instructions

Main Activity

1. Introduce mTiny toolkit.

Note: It is crucial that children understand the Tap Pen Controller is used to make mTiny move. The relationship between the robot and the Tap Pen Controller lays the basis for understanding the relations between the input device and the output device.

2. Instruct children to use the Joystick to make the robot move freely.
3. Explain the rules: "Today, let's play Red Light, Green Light with mTiny. When you see the Red Light, you should make mTiny stand still; when you see Green Light, you should make mTiny move forward."

(1) Have children line up their robots at the starting line. Make sure their robots face the teacher, who sits at the finish line.
(2) Children look at the teacher and decide whether to make mTiny stand still or move forward according to the lights.

Variations

You can also set challenges by:

1. Adding the Orange Light and the Forward Card. When the Orange Light is displayed, children should make mTiny move step by step by using the Tap-to-Code Control mode (i.e. use the Tap Pen Controller to tap the Forward Card).
2. Adding 1 Forward Card and 1 Turn Right Card (or 1 Turn Left Card) to each child. Children need to use Action Cards instead of the Joystick to make mTiny move back and return to the starting line.

Activity 03 Captain's Orders

Beginner's Level | 4~8 persons

Children will play the role of the Captain and direct mTiny who will play the Crew to gather get different things displayed on the map blocks. Children need to make mTiny move on the Lawn Map Blocks and reach the map blocks with an object. As each object is reached and identified by mTiny, different interactive effects will occur. Each child will have the chance to play the Captain and make decisions.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the relations between the robot and the map blocks with an object;
(2) Use the Joystick to make mTiny move or stop according to instructions.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Focus and Concentration	Listening to Your Peers
Fine Motor Skills	Memory	Responding to Your Peers
	Decision-making	Leadership

Resources

For Child

mTiny Toolkit × 1

For Educator

Lawn × 27

mTiny × 4

Carousel × 3

Clown × 3

Ghost × 3

Bamboo × 3

Corn × 3

Fish × 3

Meat × 3

Football × 3

Bathtub × 3

* The example activity provided assumes that four children will participate in the game, therefore, four mTiny Robot Kits are necessary.

Setting-up

You and children will need a reasonably spacious playing area for mapping the map blocks and operating the robots.

The map blocks can be assembled in various ways, for example:

The gathering point could be either the four Lawn Map Blocks in the center or mTiny Map Blocks in the corners.

Educator-Led Instructions

Main Activity

1. Introduce the below map blocks:

Note: Some of the objects may not be familiar to some children. It is necessary to name each of the objects on the map block so that children will become familiar with them and be able to react to the Captain's order.

2. Choose one child to be the Captain. All other children play the Crew.
3. The Captain will choose and call out an object on the map block.
4. The Crew should then make mTiny move towards the specified map blocks with the named object and occupy that map block.
5. The one whose robot reaches the object first should then play the Captain the next.

Variations

To build on this activity, you could introduce sorting and categorizing by creating some new categories. Define several groups of daily objects–for example, Category 1 Food (Meat, Fish, Corn, etc.); Category 2 Toy (Clown, Puppet, Doll, etc.); etc.
The Captain should call out a category, and the Crew should then recognize the map blocks with an object that match this category and make mTiny move onto one of the relevant objects.

Activity 04　Forest Party

Beginner's Level　4~8 persons

Fairies and elves love forest parties! In this activity, children will be invited to have a role-playing adventure with mTiny. Children will help "transform" mTiny into another kind of "animal" by using a costume and a map block with an animal character. Children will match the animal robot and its favorite food. The activity helps children make sense of the hidden interactive effects within the map blocks with an object, as well as the interaction between the robot and the map blocks.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the possible interaction between the robot and the map blocks;
(2) Use appropriate ways to trigger different interactive effects of mTiny.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Focus and Concentration	Listening to Your Teacher
Fine Motor Skills	One-to-one Correspondence	Responding to Your Teacher
	Comparison	
	Creative Storytelling	

Resources

For Child


mTiny Toolkit × 1


Costume (Choose 1 from 3)

For Educator


Toby the Puppy × 2


Milo the Kitten × 1


Chicka the Chicken × 1


mTiny × 2


Lawn × 14


Meat × 2


Fish × 2


Corn × 2

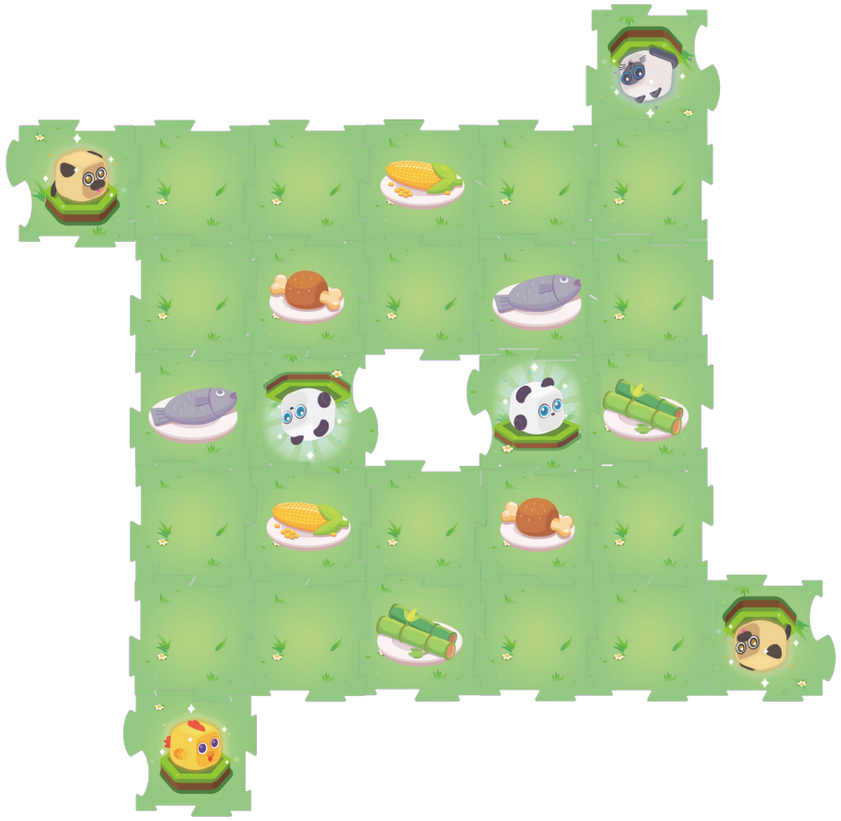

Bamboo × 2

* The example activity provided assumes that four children will participate in the game, therefore, four mTiny Robot Kits are necessary.

** Please note that the two mTiny Map Blocks are not necessary–they merely act as the reference for children who would like to compare the effects among mTiny, Toby the Puppy, Milo the Kitten, and Chicka the Chicken.

Setting-up

Please prepare and design the Forest Party Map. You may assemble the map blocks in the way shown below:



You can also add other map blocks to generate more interactive effects, for example:

Educator-Led Instructions

Main Activity

1. Introduce the three map blocks with a character and the attached costumes below:

2. Explain to the children: "Today we will hold a forest party with mTiny. Could you please help mTiny choose one costume for the party? Which animal do you think mTiny would prefer to be?"
3. Instruct children to help mTiny dress up and to put the robot on the map block that corresponds with the costume: wait and see what happens.

Note: Some children may need your assistance to put a costume on their robots.
You can also encourage children to imagine and narrate stories on this forest party. Ask children to think about these questions:
(1) Why, when and where was the forest party held?
(2) Why did you transform mTiny into other kinds of animals?
(3) What would happen at the forest party?

4. Instruct children to help Toby the Puppy/ Milo the Kitten/ Chicka the Chicken identify their favorite foods.
5. Hand out other map blocks with an object (or blocks and toys in the classroom), and have children reassemble and design the map blocks and continue their scenarios.

Activity 05 What's the Time, Mr. Wolf?

Beginner's Level | 4~8 persons

The aim of this activity is to introduce the use of mTiny and its two control modes–Joystick Control and Tap-to-Code. Children will explore how to make the robot move by using different control modes. Moving forward is the basic movement, which can attest to children's capability of distinguishing between the front and back of an object. This activity is also a good game for improving children's focus.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the use of the Tap Pen Controller and the Coding Cards;
(2) Use appropriate coding tools to make mTiny move or stop according to instructions.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Focus and Concentration	Listening to Your Teacher
Fine Motor Skills	Memory	Responding to Your Teacher
	Spatial Awareness	Self-management

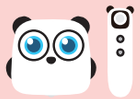
Resources

For Child

mTiny Toolkit × 1

Forward Card × 1

For Educator



mTiny Toolkit × 1

Setting-up

You and children will need a reasonably spacious playing area for the robots to move.

The playing area should be defined by a designated starting line and finish line.

Starting Line

Finish Line

Educator-Led Instructions

Main Activity

1. Hand out the mTiny toolkit.
2. Introduce the Forward Card.
3. Explain the rules: "Today, let's play What's the Time, Mr. Wolf."
(1) The teacher's robot plays the role of Mr. (/Ms.) Wolf, standing at the finish line with its back to the children and their robots.
(2) Have children's robots line up and stand at the starting line, facing Mr. Wolf.
(3) Children ask all together: "What's the Time, Mr. Wolf?"
(4) Answer by calling out an o'clock time between 1 and 12.
(5) Children identify the number of the o'clock time and then make the robot move the required number of steps towards Mr. Wolf by tapping the Forward Card the required number of times.
(6) When children's robots are getting close to the finish line, answer children's calls: "12 o'clock!" and then direct Mr. Wolf the robot to turn around and "catch" children's robots.
(7) When hearing "12 o'clock!", children should then make their robots move back and return to the starting line by using the Joystick; otherwise, their robots would be "caught" by the teacher's.

Variations

You can also set challenges by:

1. Adding Facial Expression Cards. Children can have mTiny make a face at Mr. Wolf after moving the required number of steps. In other words, children first tap the Forward Card the required number of times and then tap one of the seven Facial Expression Cards.

Happy Silly Angry Sad Scared Dizzy Sleepy

2. Adding Action Cards. Handing out 1 Forward Card and 1 Turn Right Card (or 1 Turn Left Card) to each child. Children need to use Action Cards to make mTiny move back and return to the starting line instead.

Activity 06　Zig-zag Bridge

Beginner's Level　4~8 persons

Children will be invited to build a zig-zag bridge and find out what is special about its shape. Children will then use the Actions Cards to make mTiny turn right, turn left, and move forward. To decide when (and whether) to give "turn right" or "turn left" command when mTiny approaches a corner, children should recognize how the zig-zag bridge takes a left turn or right turn.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the representation of the right and left from different points of view;
(2) Use the appropriate Action Cards to make mTiny turn right or left at the corner.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Focus and Concentration	Self-reflection
Fine Motor Skills	Spatial Representation	Persistence and Resilience
	Orientation	

Resources

For Child


mTiny Toolkit × 1


Forward Card × 1


Turn Right Card × 1


Turn Left Card × 1

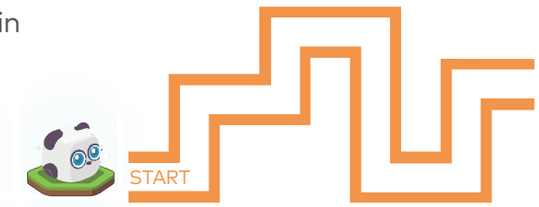
For Educator


Wooden Blocks Plenty

* You need to put wooden blocks on the two sides to set up the Zig-zag Bridge.

Setting-up

The Zig-zag Bridge can be set up in various shapes, for example:



The length of each straight part of the bridge is recommended to be 28cm (or a multiple of 28cm), since mTiny moves 28cm each time when the Forward Card is tapped. The width of the bridge could be slightly broader than that of mTiny.

Educator-Led Instructions

Main Activity

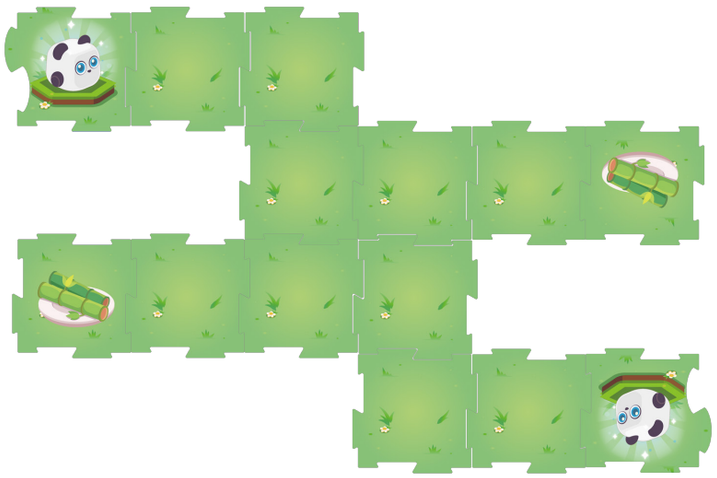
1. Introduce the Zig-zag Bridge and encourage children to observe and discuss the shape of the bridge.
2. Ask children: "How many turns does the bridge have? Imagine that you were a passer-by walking on the bridge, would you turn right or turn left when coming to these turns?"
3. Invite children to the game: "Can you please tell mTiny whether to turn right or turn left when it encounters these turns?"
4. Introduce the three types of Action Cards.

Note: Rotate Action Cards by 90 degrees in the counterclockwise direction so that children can make sense of the representation of the arrow easily.

5. Instruct children to use different coding tools to direct mTiny's movements.
(1) Have children line up their robots one by one at the Starting Point.
(2) For the first time, children can use Joystick to operate the robot.
(3) For the second time, children should use Actions Cards to give commends by tapping the appropriate Action Cards.
(4) Children make the robot move one after another.

Variations

You can also set challenges on children's spatial scene abilities by inviting them to work in pairs and figure the point of view of other's right-left orientation.



Help assemble the above map, invite children to work in pairs and share the map blocks. Instruct children to direct their robots to the destination on the opposite side (either Bamboo Map Block or mTiny Map Block):
(1) Children should observe and mirror the commands their partners have done, making their robots do the same actions; or
(2) Child A calls out a command ("Turn right", "Turn left", or "Move forward"). When receiving the command, Child B should then pick up the corresponding Action Card and give it to Child A. Child A taps the Action Card to make the robot move and sees whether the card is a correct choice.

Activity 07 Number Puzzle

Beginner's Level | 4~8 persons

Children need to make mTiny move from Dot 1 to Dot 5 (or Dot 1 to Dot 10 for advanced learners) in sequence. Children should be able to count the number of dots from 1 to 5 (or from 1 to 10). Meanwhile, they should also be able to demonstrate the understanding of the sequence of numbers ranged from 1 to 5 (or from 1 to 10). For more challenges, you can ask them to make mTiny first move from Dot 1 to Dot 5 (or from Dot 1 to Dot 10) and then back from Dot 5 to Dot 1 (or from Dot 10 to Dot 1).

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the sequence (or relations) of numbers;
(2) Perceive the concept of sequence through first-hand coding practice.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Decomposition	Confidence
Gross Motor Skills	Comparison	Independence
Fine Motor Skills	Decision-making	Self-reflection
	Route Planning	

Resources

For Child


mTiny Toolkit × 1


Forward Card × 1


Turn Right Card × 1


Turn Left Card × 1

For Educator

Number Mat

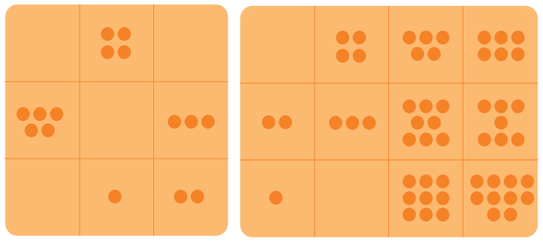
* For beginners, they can still use the Joystick to make mTiny move. Advanced players can try to use the Tap Pen Controller and a single Action Card to make the robot move.

** Please note that the number mat is not included in the toolkit, and therefore, you need to make the number mat by yourself.
You can find some mats, and print and paste the representational images of the numbers on the mats.

Educator-Led Instructions

Main Activity

1. Introduce the Number Mat:



Note: It is not necessary to use dots to represent numbers.
You can use images of animals, fruits, candies, toys or other things that related to children's life experience to represent the numbers.

2. Children make mTiny move from Dot 1 to Dot 5 (or Dot 10) in sequence, and then back from Dot 5 (or Dot 10) to Dot 1.
3. Emphasize the following points:
(1) mTiny should move only on the number mat. Walking outside is not allowed.
(2) mTiny should not skip or repeat any of the numbers on the mat.
(3) Children should not use their hands to touch or push mTiny.
4. Invite children to assemble and create their own number mats.

Note: You can design the number mat for the first player. When s/he finishes the turn, ask s/he to swap a piece with a blank one to rearrange the map. Invite the next player to continue the game.

Activity 08 Where's My Bamboo?

Beginner's Level | 4~8 persons

The aim of this activity is to help introduce the use of the Input Card and the Go! Card, the two triggering tangible programming blocks in this robot kit. Children will explore how to make mTiny execute a set of the commends of Coding Cards continuously. Meanwhile, they need to identify the mathematical correlation between the number of Coding Cards and the number of used map blocks when they make decisions on coding.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the concept of events and the use of triggering blocks;
(2) Execute a set of commands to make the robot take actions continuously;
(3) Identify the correlation between the number of the map blocks and that of the Action Cards.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	One-to-one Correspondence	Listening to Your Teacher
Gross Motor Skills	Decomposition	Responding to Your Teacher
Fine Motor Skills	Abstraction	Communication

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


mTiny Toolkit × 1


Lawn × 4


mTiny × 1


Bamboo × 1

For Educator


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


mTiny Toolkit × 1


Lawn × 4


mTiny × 1


Bamboo × 1

Educator-Led Instructions

Main Activity

1. Hand out the map blocks and the Action Cards: each child should have 4 Lawn Map Blocks, 1 mTiny Map Block, 1 Bamboo Map Block, 4 Forward Cards, 4 Turn Right Cards, and 4 Turn Left Cards.
2. First, have children line up the five map blocks as shown below–the leftmost Lawn Map Block as the Starting Point and the rightmost Bamboo Map Block as the End Point.

3. Ask children: "How many steps should mTiny move from the Starting Point to the End Point? Please line up the appropriate number of Forward Cards to give your answer."
4. Hand out mTiny Toolkits. Ask children to test their answers by commanding the robot's movement through the Tap-to-Code Control mode.

Note: Children line up four Forward Cards and then tap each card for once time (rather than tap one for several times). It is necessary to be aware that they should tap one Coding Card for once time while using the Tap Pen Controller to tap the cards.

5. Introduce the Input Card and the Go! Card.

Note: The Input Card and Go! Card are triggering programming blocks. When the Input Card is tapped, the robot stands still (rather than executes the commend immediately) to wait for and remember what it needs to do (execute a set of command) next.

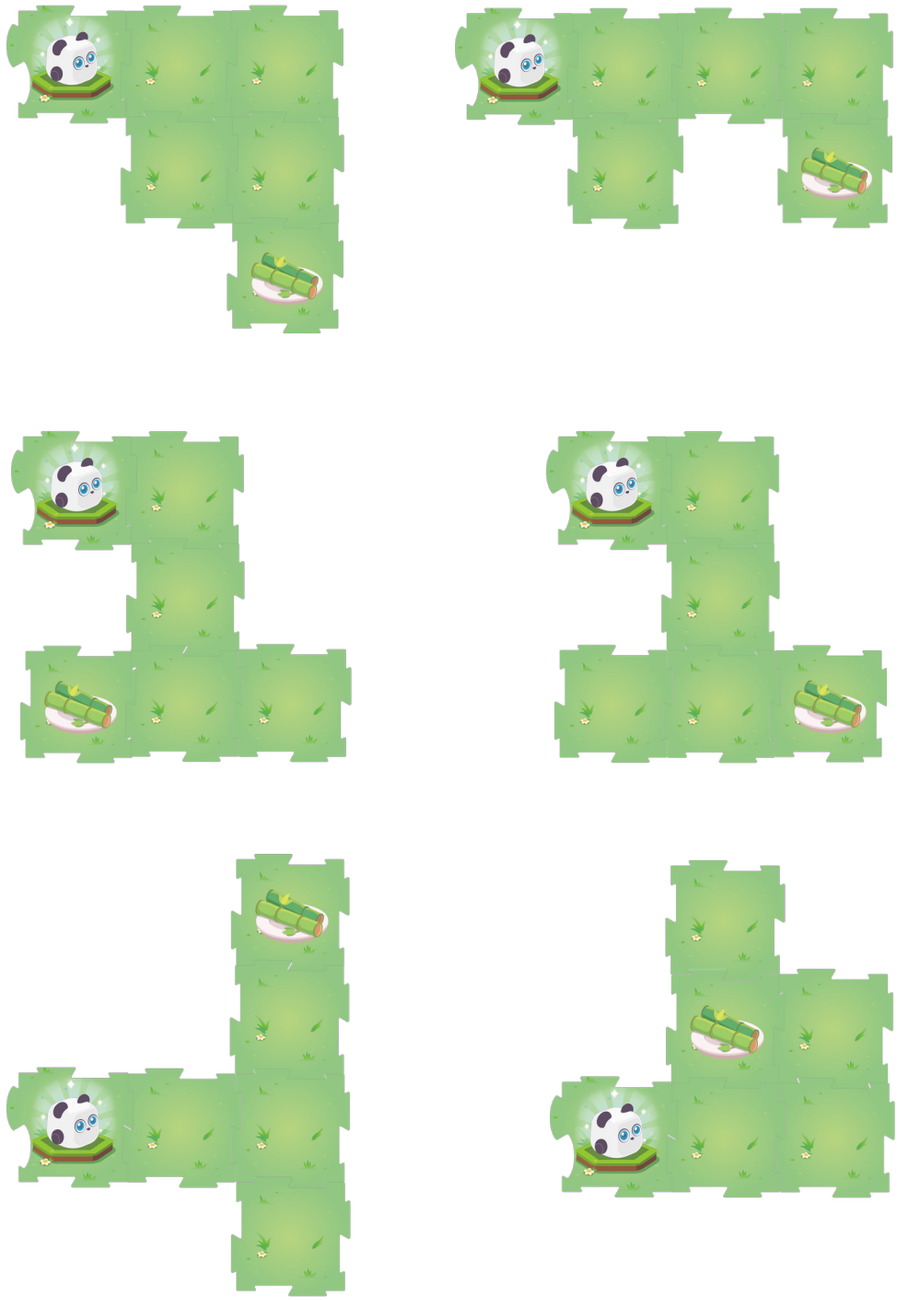
6. Hand out the Input Cards and the Go! Cards. Instruct children to execute them with the Forward Cards.
7. Invite children to design and assemble the route from the mTiny Map Block to the Bamboo Map Block. Explain the rule:
(1) The mTiny Map Block should be the Starting Point while the Bamboo Map Block should be the End Point this time.
(2) The shape of the route is open to design.
(3) Children should use the Input Card, the Action Cards, and the Go! Card together when they implement the set of commends.
8. You can show children some examples to inspire their ideas (please see the Attachment).

Variations

1. You can also prioritize the route-planning session in the activity:
(1) Give children enough Lawn Map Blocks to build the road that bridges the Starting Point and the End Point.
(2) Ask children first to draw the arrows to indicate all the possible routes, and then to use appropriate Actions Cards to examine their planning.
(3) Give children enough Action Cards. However, if you want to set challenges, you can require children to consider and use the limited number of Action Cards while planning the route.
2. For advanced learners, you can offer them Repeat Cards and encourage them to replace the repeatedly-used commands of Action Cards with a Repeat Card. The number of Repeat Cards given to children depends on children's mathematical knowledge.

Attachment

Here below are some examples of the assembling:



Activity 01　Little Road Mender

Intermediate Level　4~8 persons

The aim of this activity is to introduce the Map *A Journey to the Town*. Unlike the Map *mTiny and His Friends*, this map involves a mechanism of roads and walls. mTiny can walk freely on any road but a wall will block its way. When it hits a wall, it will stop moving. This Road-and-Wall Mechanism requires children to check and adjust the way they assemble Road Map Blocks.

Intended Learning Outcomes

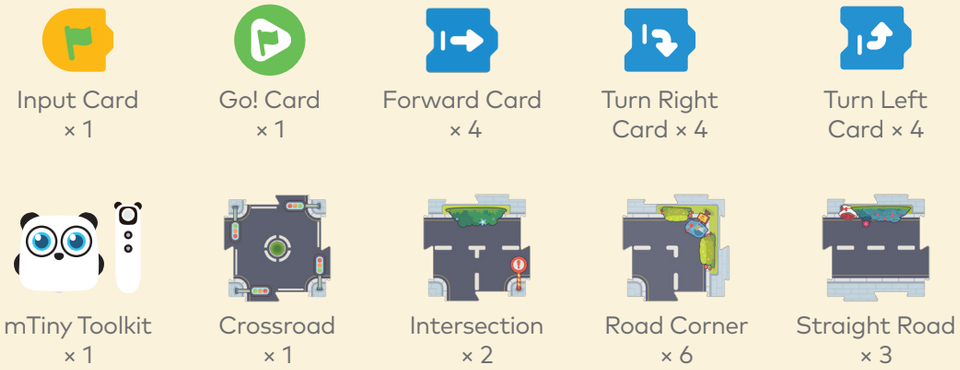
By the end of this activity, children will be able to:
(1) Understand the Road-and-Wall Mechanism in *A Journey to the Town*;
(2) Distinguish between the four types of Road Map Blocks in terms of the shape and the ways of assembling.

Key Competencies

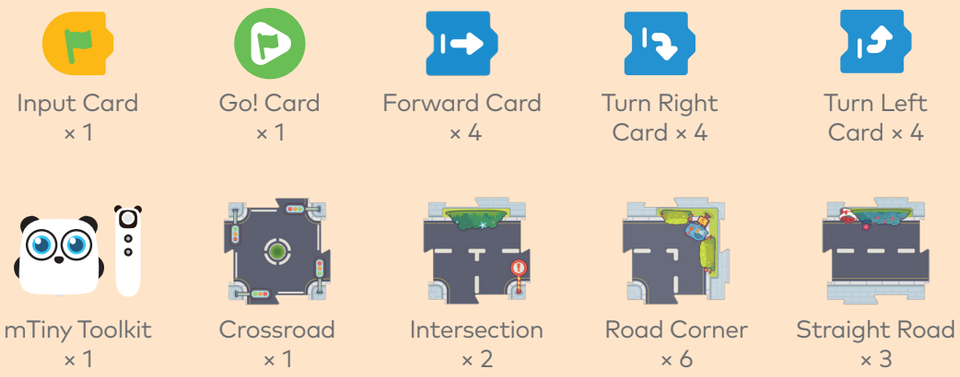
Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Shape Recognition	Contextualizing Needs
Gross Motor Skills	Pattern Recognition	Empathy
Fine Motor Skills	Comparison	Communication
	Route Planning	

Resources

For Child



For Educator



Educator-Led Instructions

Introduction

1. Introduce the four types of Roads:

2. Encourage children to discuss the shapes and possible connection ways.

Main Activity

1. Hand out copies of Interrupted Roads Map as shown below:

2. Hand out the Map Blocks: each child should have 1 Crossroad Map Block, 2 Three-Way Intersection Map Blocks, 6 Road Corner Map Blocks, and 3 Straight Road Map Blocks.
3. Have children assemble the Road Map Blocks as Interrupted Roads Map shows.
4. Ask children to think about the following questions, for example:
(1) Why the roads on Interrupted Roads Map are interrupted?
(or "Why do you think this 'Roads Map' is named in this way?")
(2) Could mTiny be able to move from the Start Point to the End Point? Why?

Note: While discussing Interrupted Roads Map with children, invite them to have mTiny move on Interrupted Roads Map in the first place. Encourage children to test and observe the result (esp. while mTiny hits a wall) and then to give their answers.

5. Instruct children to draw a possible route connecting the Start and the End, and then to find out all the interrupted positions that hinder them.
6. Children act as road menders and rotate the map blocks at these positions to get the roads interconnected in all directions.

An Example of Interconnected Roads

7. Hand out mTiny Toolkits, Coding Cards, and blocks (or flag toys): each child should have 4 Forward Cards, 4 Turn Right Cards, 4 Turn Left Cards, 1 Input Card, and 1 Go! Card.
8. Instruct children to make mTiny Robot move from the Start to the End on the map blocks, and examine whether the roads are interconnected or not.

Recap

1. Summarize the features of different types of Road Map Blocks and Road-and-Wall Mechanism.
2. Encourage children to work together to assemble a more complex Road Map.

Note: Instruct children to work in pairs (or group of three to four) to share their twelve Road Map Blocks. Encourage them to think about and create a special shape of Interconnected Roads Map.

Attachment

Here below is the printable Interrupted Roads Map:

Activity 02 Ring Road Itinerary

Intermediate Level | 4~8 persons

The aim of this activity is to introduce the concept of loops. A mock-up of the ring road, as the representation of loops, helps embody this abstract concept and its effects through making mTiny move on the ring roads. First, children will assemble different types of Road Map Blocks to build various kinds of ring roads. Children will then learn to use the Repeat Cards to make mTiny move in circles.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand that a loop is meant by doing the same things repeatedly and give real-life examples of loops;
(2) Understand the use of Repeat Cards for repeating one action (or sequence) for the assigned number of times;

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Shape Recognition	Contextualizing Needs
Gross Motor Skills	Pattern Recognition	Empathy
Fine Motor Skills	Comparison	Communication
	Analysis	

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 1


×4 Repeat Card × 2


×5 Repeat Card × 1


mTiny Toolkit × 1


Crossroad × 1


Intersection × 2


Road Corner × 6


Straight Road × 3

For Educator


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4

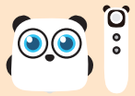

Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 1


×4 Repeat Card × 2


×5 Repeat Card × 1


mTiny Toolkit × 1


Crossroad × 1


Intersection × 2


Road Corner × 6


Straight Road × 3

Educator-Led Instructions

Introduction

1. Introduce the ring road by showing some photos.

Note: The ring road is a series of connected roads encircling one location.
In daily life, ring roads help reduce traffic volumes, in particular in the metropolitan areas, such as Hong Kong, Shanghai, and Tokyo. Moreover, ring roads also encircle the mountainous areas in island countries, such as Iceland and Singapore.

2. Ask children if there is any ring road they have seen before and discuss the use of ring roads.

Main Activity

1. Hand out the Map Blocks: each child should have 1 Crossroad Map Block, 2 Three-Way Intersection Map Blocks, 3 Straight Road Map Blocks, and 6 Road Corner Map Blocks. Have children assemble Road Map Blocks to build a ring road.
2. Invite children to share their ring roads and discuss the shapes of ring roads.

Note: You can ask children to think about the following questions, for example:
(1) How many rings does your ring road have?
(2) How many and what types of Road Map Blocks have you used?
(3) How do different types of Road Map Blocks connect with each other?
(4) Could you give a name for your ring road? Why do you name it in this way? How do you get the idea?

3. Hand out mTiny Toolkits, Coding Cards, and blocks (or flag toys): each child should have 4 Forward Cards, 4 Turn Right Cards, 4 Turn Left Cards, (and the three types of Repeat Cards for advanced learners).
4. Instruct children to make mTiny move on their Ring Roads Map Blocks by using Coding Cards.
5. Ask them to observe and think about the following questions:
(1) How many times does mTiny turn around on your ring roads?
(2) Does mTiny turn right or turn left when it moves on the Road Corner?

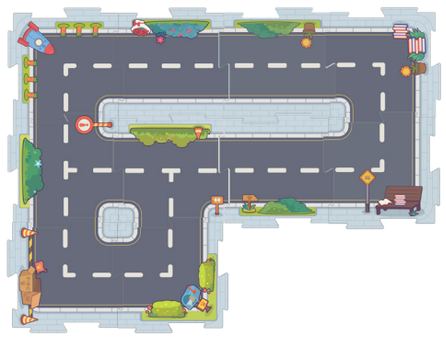
Recap

1. Have children discuss and comment on each other's ring roads.

Attachment

Here below are some examples of ring roads:
A simple ring road can be made up of four pieces of Road Corner Map Blocks:

Adding another two pieces of Three-Way Intersection Map Blocks, a road with two rings can be created.
There are various ways to utilize and assemble different types of Road Map Blocks to create different kinds of ring roads.



Activity 03 Little Bus Driver

Intermediate Level 4~8 persons

Children will continue their ring road itinerary with mTiny. This time, however, they will play the role of the bus driver and direct Bus mTiny to different places. This activity will also introduce some new road map blocks which have some hidden interactive effects. Children will utilize route planning and reasoning abilities to figure out the best route.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the use of the Repeat Cards which can repeat one action (or sequence) for the assigned number of times;
(2) Understand the benefits of using Repeat Cards during coding.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	Decomposition	Contextualizing Needs
Gross Motor Skills	Analysis	Communication
Fine Motor Skills	Spatial Reasoning	Collaboration
	Route Planning	Leadership

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 2


×4 Repeat Card × 2


×5 Repeat Card × 2


mTiny Toolkit × 1

For Educator

(Example Map 1 for Advanced Learners)


Crossroad × 2


Intersection × 6


Road Corner × 6


Straight Road × 5


Road with Scenes × 5

(Example Map 2 for Intermediate Learner)


Crossroad × 1


Intersection × 1


Road Corner × 6


Straight Road × 5


Road with Scenes × 5

* **Scene Cards:** The selected scene cards should be the same as Road with Scenes Map Blocks. There are five Road with Scenes Map Blocks in the two example maps:

** Four mTiny Robot Kits are needed to assemble the two maps shown below.

Setting-up

Educator-Led Instructions

Introduction

1. Introduce the following road map blocks with additional interactive effects:

2. Have children discuss the above map blocks, for example:
(1) What do the characters do in the pictures?
(2) Can you create a scenario based on some of these pictures? Please work in pair to develop a story for the above pictures.

Main Activity

1. Divide children into groups of two to four.
2. Explain the rule: "You are now a bus driver and need to pick up passengers at different steps."
3. Have each child draw one scene cards at a time and do it twice:
(1) Shuffle the scene cards beforehand and then ask one child from one group to draw one card at random and remember the scene.
(2) The child should then put the scene card back and ask one of his or her peers from the same group to draw the next one.
(3) Children should also count the number of times that each scene card has been drawn.
(4) Remember to shuffle the scene cards whenever a child is going to draw one.

Note: You can give children some stickers to record the number of times when a scene card is drawn. Children can paste a sticker on the Map Blocks that correspond with the scenes.

4. Children need to make Bus mTiny depart from the Starting Point and pass through the scenes on the map blocks and then back to the Starting Point.

5. Each group should direct mTiny Bus to pass through the scenes in order.

Recap

1. Discuss the use of Repeat Cards with children, ask them to think about what are the benefits of using Repeat Cards.

Attachment

Scene Cards (You can print and cut them out for the activity):

Activity 04 Help Me, Please!

Intermediate Level 4~8 persons

This is a role-playing activity in which children need to judge whether mTiny the Nurse and mTiny the Policeman should stop on the map blocks to fulfill their duties. If the robot departs from the Hospital Map Blocks, then it should play the role of the nurse and help the injured passer-by; if it departs from the Police Station Map Blocks, it should play the role of the policeman to catch the thief.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Understand the concept of conditionals by matching the role and the scene;
(2) Plan the appropriate route between the two corresponding map blocks;
(3) Understand the roles and duties of different careers.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	One-to-one Correspondence	Contextualizing Needs
Gross Motor Skills	Decomposition	Empathy
Fine Motor Skills	Abstraction	Communication
	Comparison	Leadership

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4

×2 Repeat Card × 2

×3 Repeat Card × 2

×4 Repeat Card × 2

×5 Repeat Card × 2


mTiny Toolkit × 1

For Educator


Hospital × 1

Police Station × 1


Crossroad × 1


Intersection × 2


Road Corner × 4


Straight Road × 3


Road with Scenes × 7

Setting-up

Prepare and assemble the map blocks beforehand. With regard to the Starting Point, you can decide it with your children during the game.

Educator-Led Instructions

Introduction

1. Introduce the following pairs of Role-playing Map Blocks:


Hospital — Help! Someone hits his head!


Police Station — Help! Catch the thief!

2. Have children discuss the roles of the characters appeared in the map blocks.

Main Activity

1. Introduce the topic of the scenario: "Today, mTiny will act as the nurse or the policeman, and you need to help direct the way to where it could help."
2. Explain the rule: "However, whether mTiny plays the role of the nurse or the policeman depends upon its Starting Point–whether mTiny departs from Hospital Map blocks or Police Station Map blocks."
3. Instruct children to plan the route:
(1) Children select either the Hospital Map blocks or the Police Station Map blocks as the Starting Point;
(2) According to mTiny's role, children then write code to give commands.
(3) Instruct children to think about which map block with scene should be the End Point while planning the route and making the decision.

Note: The concept of conditionals is embodied in two ways during this activity:
(1) The separated pair of role-playing map blocks should be the start and the end.
(2) There are other map blocks with scenes in the route, and children need to judge whether it is the right one that corresponds with mTiny's role.

5. Encourage children to create another scenario on other mTiny's roles which may match the situation appeared in the below map blocks (e.g. mTiny the Fireman).





Recap

1. Have children share their scenarios with peers and teachers.
2. Summarize the concept of conditionals in the context of the role-playing.

Activity 01　mTiny's Weekend

Advanced Level　4~8 persons

Children will be invited to help mTiny plan its weekend activities. Children need to create a scenario in the first place and assemble different kinds of map blocks with an object to create mTiny's activity route. Children will make mTiny move on the map blocks to tell a story about what mTiny would do on weekends. Children will also be encouraged to draw a pictorial activity log.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Describe mTiny's weekend activities according to the map blocks;
(2) Assemble map blocks in order based on the scenario of the weekend plan;
(3) Use appropriate Coding Cards to make mTiny move following the route.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	One-to-one Correspondence	Contextualizing Needs
Gross Motor Skills	Decomposition	Empathy
Fine Motor Skills	Abstraction	Communication
	Comparison	Leadership

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 2


×4 Repeat Card × 2


mTiny Toolkit × 1


Lawn × 7


Book × 1


Bathtub × 1


Bed × 1


Bamboo × 1


Cake × 1


Carousel × 1


Football × 1

For Educator


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 2


×4 Repeat Card × 2


mTiny Toolkit × 1

Educator-Led Instructions

Introduction

1. Ask children: "What do you usually do at the weekend?"
2. Introduce the map blocks below:

3. Instruct children to recognize and describe the pictures of the map blocks that may be related to their weekend activities (or their favorite or preferred one).

Main Activity

1. Invite children to help plan mTiny's weekend activities

Note: You can give an example–"If I were mTiny, I would like to eat some bamboos and then take a nap at home." (Show and connect the map blocks.)


or

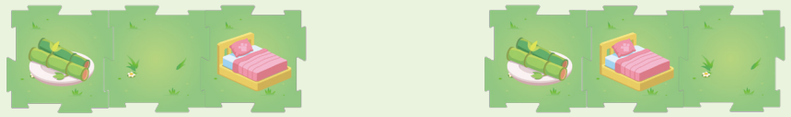
or


2. Instruct children to choose at least three map blocks with an object in order to create a scenario (or a story) about mTiny's possible weekend plan.

Note: Children can choose three from the map blocks below:

3. Explain the rules and instruct children to implement their scenarios:
(1) The map block with an object should NOT be connected directly to another block with an object, no matter they are put together horizontally or vertically.

Note:



Right

Wrong

(2) There must be at least one Lawn Map Block in between the map blocks with an object.
(3) Children can decide one of the Lawn Map Blocks as the Starting Point.
(4) Children should make mTiny move across the three map blocks with an object in sequence, following the planned weekend activity route.

Recap

1. Encourage children to imagine and talk about mTiny's weekend experience.

Note: You can ask questions, for example: "What did you play with mTiny at the weekend?" "Did mTiny (and you) enjoy the weekend? Why?"

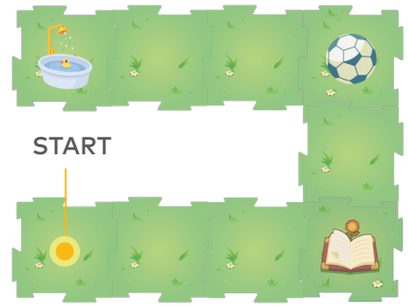
Attachment

Here below are some sample scenarios of mTiny's possible weekend activities:

First Activity

Second Activity

Third Activity



First Activity

Second Activity

Second Activity

Activity 02　Patrol Officer

Advanced Level　4~8 persons

Children will act as patrol officers, who drive around the town to prevent crime or help citizens. Children will draw four scene cards in the first place, and locate these scenes onto the Town Map. Children then need to find out how to direct mTiny to the assigned scenes within the shortest time and without missing any of the four scenes.

Intended Learning Outcomes

By the end of this activity, children will be able to:
(1) Describe mTiny the Patrol Officer's duties according to the assigned scenes;
(2) Locate the corresponding scenes on the map and plan the patrol route;
(3) Use appropriate Coding Cards to make mTiny move following the route.

Key Competencies

Physical	Cognitive	Socio-emotional
Hand-eye Coordination	One-to-one Correspondence	Contextualizing Needs
Gross Motor Skills	Analysis	Empathy
Fine Motor Skills	Route Planning	Communication
	Spatial Reasoning	Collaboration

Resources

For Child


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 2


×4 Repeat Card × 2


mTiny Toolkit × 1

For Educator


Input Card × 1


Go! Card × 1


Forward Card × 4


Turn Right Card × 4


Turn Left Card × 4


×2 Repeat Card × 2


×3 Repeat Card × 2


×4 Repeat Card × 2


mTiny Toolkit × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1


Scene Cards × 1

Setting-up

Prepare and assemble the Town Map beforehand; or invite children to help you assemble the map.

* Two mTiny Robot Kits are needed to assemble the two maps shown below.

Educator-Led Instructions

Introduction

1. Introduce the role of the patrol officer in the real life and show the relevant photos.
2. Ask children: "If you are a patrol officer, what do you need to do?"

Main Activity

1. Divide children into group of two to four.

2. Hand out the map blocks and instruct children to assemble the map blocks in the first place.
3. Have each group draw four scene cards out of the eight.

Note: Make sure each group should have four kinds of different scene cards in hands. If any group has identical scenes, tell them to put one back and draw another one.

4. Explain the rules and instruct children to implement their scenarios:
(1) Children should take a good look at the scene cards and locate the scenes onto the Town Map.
(2) Children should then discuss in the group to plan the best route to patrol all the four scenes.
(3) Based on the planned patrol route, children need to direct mTiny to move by using appropriate Coding Cards.
(4) If time permits, children can also narrate a story about the day of mTiny the Patrol Officer.

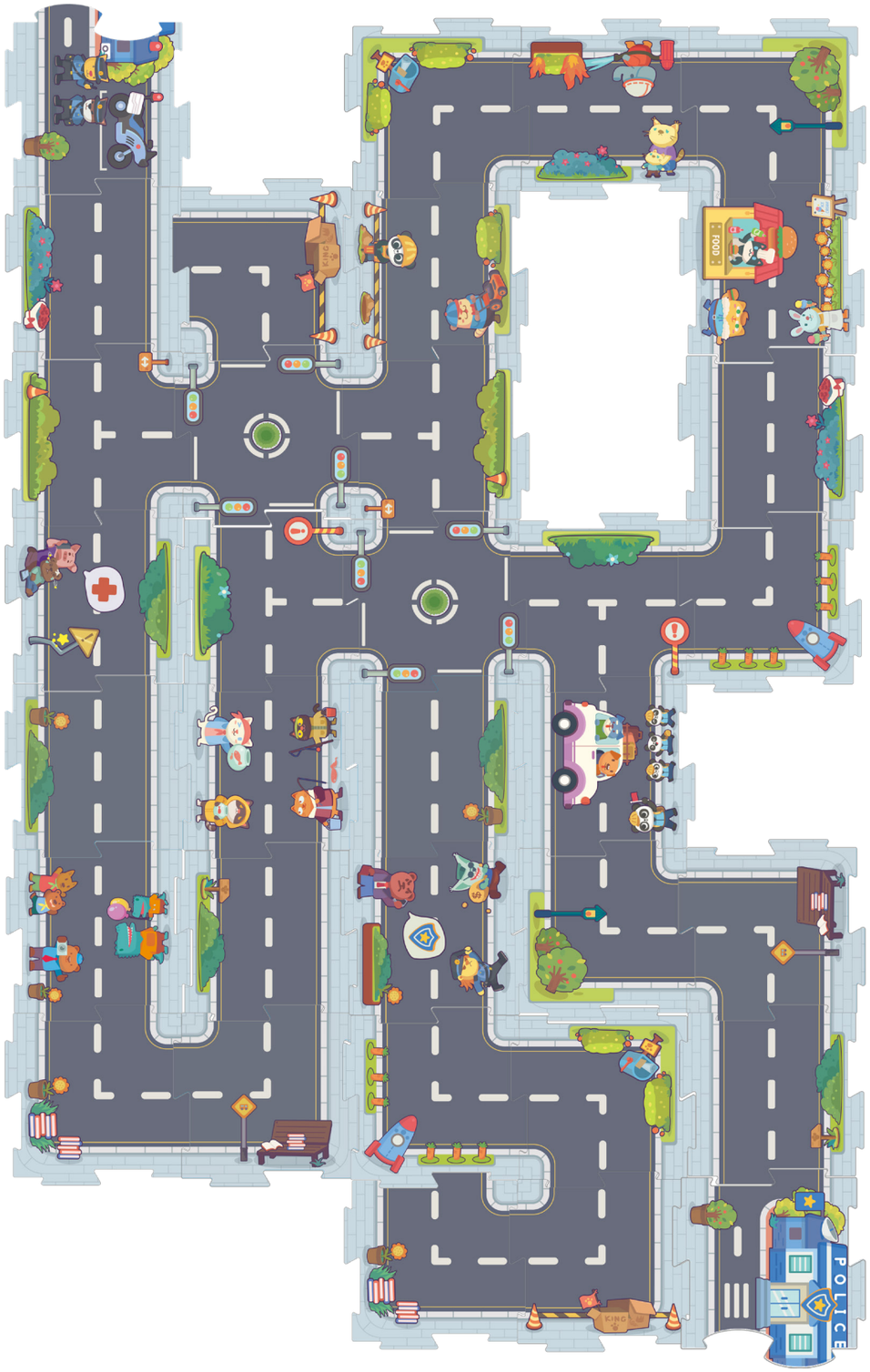
Note: Remind children that while planning mTiny's patrol route, they do not have to follow the sequence in which those scene cards were drawn.
The best patrol route should reduce the repeated time of moving through the same place.

Recap

1. Invite children to talk about what their mTiny the Patrol Officers have done in the Town.
2. Invite children to draw a pictorial activity log of the day of mTiny the Patrol Officer.

Attachment

Scene Cards (you can print and cut them out for the activity) and Town Map:



Extension Activity 01 What's My Favorite Food?

4~8 persons

There are lots of delicious food in the dining hall. What is mTiny's favorite food? Can you help mTiny find its favorite food? First, assemble the map blocks to construct the Dining Hall Map. Then make mTiny have a taste on every dish in the dining hall and write down whether mTiny like the dish or not.

Resources

Coding Tools

mTiny Toolkit × 1 | Input Card × 1 | Go! Card × 1 | Forward Card × 4 | Turn Right Card × 4 | Turn Left Card × 4

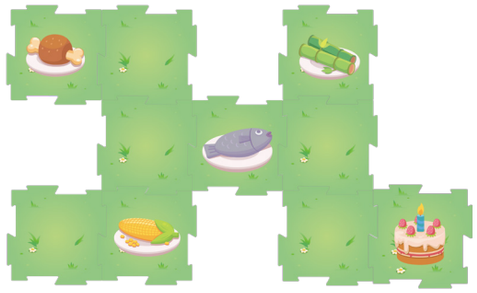
Map Blocks

Lawn × 7 | Bamboo × 1 | Corn × 1 | Fish × 1 | Meat × 1 | Cake × 1

Main Activity

1. Have children discuss their favorite food and the reasons.
2. Introduce the Food Map Blocks below:

3. Hand out the map blocks and instruct children to assemble them to make a Dining Hall Map (example map see below).

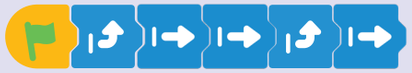


4. Explain: "Can you help mTiny find its favorite food?"
(1) Children should make mTiny move from the Starting Point to the nearest Food Map Block to trigger the interactive effect.
(2) Departing from the Food Map Block, children should then make the robot move onto another Food Map Block.
(3) Children only need to write the code for one act of eating each time.

Note: Based on the example Dining Hall Map, code can be written in the following way:

(1) Starting Point to Corn:

(2) Corn to Meat:



(3) Meat to Fish:

(4) Fish to Bamboo:

(5) Bamboo to Cake:

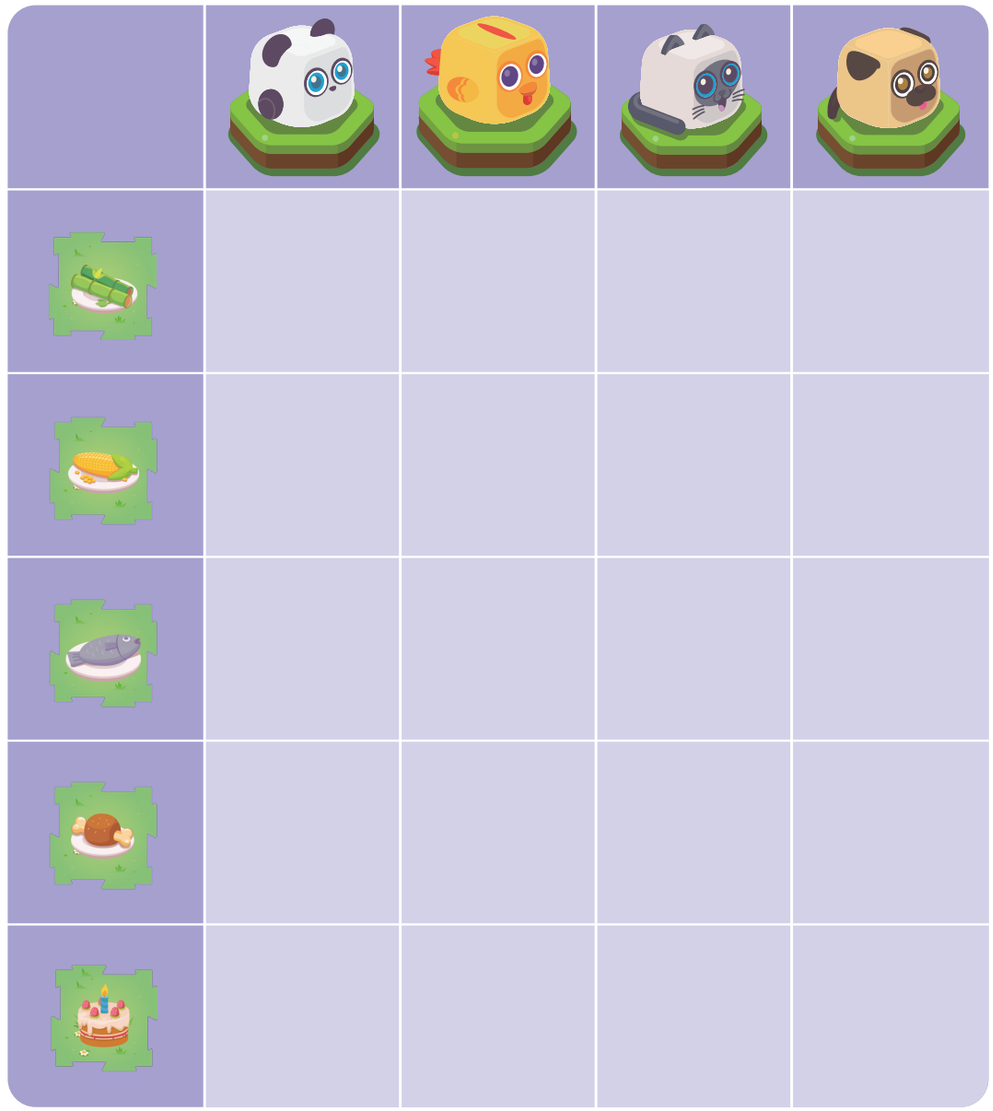
For advanced learners, set simple challenges and encourage them to use Repeat Cards when appropriate.

(4) Hand out copies of Record Form and instruct children to draw a smiley face on the column if mTiny like this food.

Variations

Add the four map blocks with a character and record their favorite food:

Attachment: Record Form



Extension Activity 02　mTiny, Run Faster!

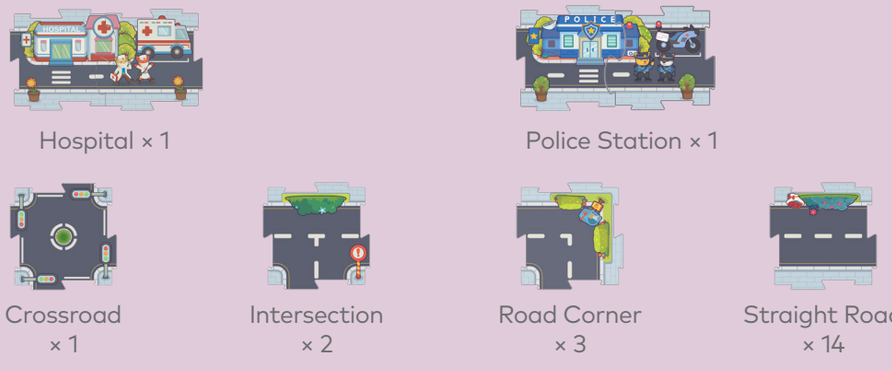
4~8 persons

There is a relay race between two relay groups: mTiny the Nurse and mTiny the Policeman. To help your robots win the race, you need to collaborate with your group members and utilize appropriate Coding Cards to save time. One of the challenges is how to make the best of the Repeat Cards (or the Loop Cards).

Resources

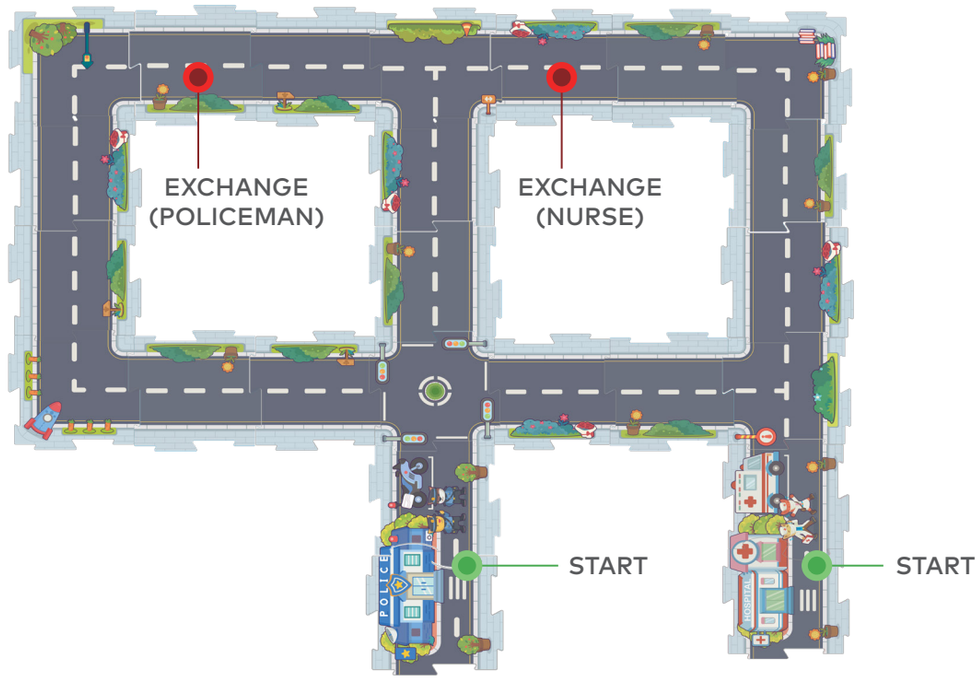
Coding Tools

Map Blocks



Setting-up

You and children will need a reasonably spacious playing area for assembling the map blocks and operating the robots.



Main Activity

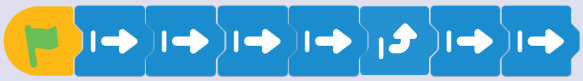
1. Divide children into two relay groups: the mTiny Nurse Group and the mTiny the Policeman Group (keep the number of the group members equal). The two groups make their robots have a relay race.
2. Within the group, have children work in pair collaboratively:
(1) Child A codes and makes first-leg mTiny the Nurse (or mTiny the Policeman) move from the Hospital (or the Police Station) to the Exchange Point.
(2) When A's mTiny reaches the Exchange Point, Child B should place his or her mTiny on the Exchange Point.
(3) Child B codes and makes second-leg mTiny depart from the Exchange Point, heading for Hospital Map Blocks (or Police Station Map Blocks).

(4) When A and B finish the first round, the other two children take their turns to continue the second round.

3. The group which uses the least time to complete all the rounds will win.

Note: The following examples are code used in this relay race:

(1) Starting Point to Exchange Point:



(2) Exchange Point to End Point (i.e. Starting Point):