Ready, Set, Go!

Grades K - 3

60 mins

In Ready, Set, Go!, students will be able to allow the MatataBot to wait until certain colours are detected before moving using the sensor controller attached to the top of MatataBot. By "sensing" a particular colour, MatataBot will be able to successfully navigate through the Nature Map set up to their liking using colour cards and/or obstacles.

Big ideas & essential questions

As a result of going through this lesson, you will understand how to transform the controller into a sensor by waiting to sense certain colours in front of MatataBot. You will also understand how MatataBot will move in certain ways due to the certain colours sensed and learn how MatataBot will find its way around a map.

The ideas that will last with you beyond the classroom is how well you have transformed the sensor controller into a colour sensor allowing MatataBot to wait as it senses colours in front of it. In addition, you will have a lasting impression of how well you have coded MatataBot to find its way around the Nature Map through the opportunity of working in a team.

Learning outcomes

TSWBAT : the students will be able to:

1) Use the **Wait Until** coding block correctly to transform the sensor controller into a colour sensor using the **Green**, **Yellow** or **Red** coding blocks placed under it.

2) Use their own creativity to set up the Nature Map using colour cards from the Pro Set that MatataBot could sense and navigate around, moving in different ways when sensing different colours.

3) Use critical thinking and coding skills to determine the most strategic way to navigate MatataBot around the Nature Map.

What you'll do

Using the **Green**, **Yellow** and **Red** coding tiles and colour cards, set up the Nature Map for MatataBot to navigate through. Add a start and end flag to your path and use **Wait Until** block as well as the sensor controller to help MatataBot navigate through the map successfully by waiting until it detects certain colours in front of it.

What you'll need

> Class set of Matatalab Pro Set
> Class set of Sensor add-on set
> Projector/Display Screen
> Nature Map

> Coloured cards or objects (specifically green, yellow and green)
> Animation Add-on set (optional for extension activities)

Prior to lesson

> Update Command Tower, MatataBot and Controller sets with latest software
> Download example programs and prepare to show to class

Introduction

5 mins

1) Welcome students to the course and introduce the rules of the class: Mutual Respect, Safety and Have Fun.

2) Ask, "What are the 3 colours of a traffic light?" "What do the 3 colours of the traffic light mean for drivers?" Say, "MatataBot loves driving around the city! Today, you will code your MatataBot to navigate around the Nature Map and use its colour sensors to find its way around. Have fun!"

3) Introduce how to use the **Wait Until** coding block in order for MatataBot to "sense" various colours in front of it by having the sensor controller placed on top of the MatataBot.

   a) First, connect the Controller to MatataBot by switching to the "Sensor Mode" on the Controller, turning on Both controller and MatataBot and wait to establish a connection (Both blue lights on controller and MatataBot will flash, then stop flashing and remain on when connection is established). In order to establish this connection, press the power button 3 times on the controller, finally hearing a connection sound.

b) Next, connect the Command Tower the same way by turning it on using the power button, attaching it to the Control Board, then pressing the power button 3 times to connect Both MatataBot and Controller to the Command Tower.

4) Next, allow students to place some movement coding blocks (**Move Forward**, **Move Backward**, **Left Turn 90°**, **Right Turn 90°**) followed by the **Wait Until** coding block on the Control Board with a **Green**, **Yellow** or **Red** coding block placed under it. Students may also choose to use the smaller **Number** blocks to place under the movement coding blocks in order to determine the number of times MatataBot will move.

5) Once students have a rough idea of where MatataBot is moving on the Nature Map, ask them to place green, yellow or red objects (or colour cards if accessible) around the Map. They should then test out their code to see if their MatataBot is sensing colours and moving around accurately.

Guided practice

5 mins

1) Together with you, create a sample program with the students using the **Wait Until** coding block and discuss how this could be used with the sensor controller placed on top of MatataBot to sense coloured objects placed on the Nature Map. Encourage the use of various movement blocks before and after the **Green**, **Yellow** and **Red** coding blocks are placed to allow MatataBot to move around the map, detecting different coloured objects or cards.

2) Ask students to place 2 flags on the Nature Map. One flag somewhere at the beginning of the map and another flag somewhere near the end.

3) Then, together with you, ask students to creatively design a path on the Nature Map where they will place their coloured cards or objects for MatataBot to sense and navigate around. Discuss what makes a good path (e.g. has a beginning and an end).

Independent practice

45 mins

1) Before students can start coding, encourage them to come up with a rough sketch of how their path will look on a blank sheet of paper or chart paper.

2) Once the rough sketch has been created, students can start placing their coloured objects on the Nature Map and start coding to use their controller sensor (placed on top of MatataBot) as a means of sensing and maneuvering along their path.

3) Once complete, students may choose to complete some extension activities from the Extensions section.

Wrap up

5 mins

1) Have students pack up their Pro and Sensor add-on sets and clean up the area they were working in.

2) Ask the following questions:

   a) "What was the most exciting part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

   b) "What was the most challenging part of today's coding lesson?" (Field student responses and answer any questions about the controller or MatataBot's movements).

   c) "How did you transform the sensor controller into a robot that senses colours?

   d) "How did you code for it on the Control Board and use the Command Tower?"

   e) "How did you move MatataBot around the map?"

   f) "Was your group able to get to the end of the path successfully?"

Interdisciplinary & 21st century connections

This lesson can be used in Mathematics to help teach topics within Geometry and Spatial sense (describing location using positional language) as well as Science and Technology. This lesson could also be co-taught with another content area teacher.

21st Century Skills include:

> Critical thinking
> Creativity
> Collaboration
> Communication

> Flexibility
> Leadership
> Initiative
> Productivity

> Social Skills
> Technology Literacy

Modifications

As students are challenged to code for the sensing of coloured cards or objects in a path, consider stopping after 10 minutes and use a successful group's code to demonstrate/model the critical thinking involved in determining the code.

Accommodations

> If students have a difficult time drawing their concept for their path, in 1-2 classes prior to this lesson, come up with this rough sketch in advance on chart paper.

> Pair students to optimize co-teaching of prior knowledge.

> Pair students in groups of 3 to encourage positive social interactions.

Extension activities:

> Students may choose to change Both eyes on the MatataBot to match the colour of the object sensed (use Animation Add-on).

> Additionally, students may choose to create a celebration dance or play music through MatataBot when it reaches the end of the path.

Supporting files & links

An example sketch of a path showing the use of coloured cards/objects on the Nature Map with a flag at the beginning and end of the path.

How to Connect Sensor Controller to MatataBot [0:00 - 3:34]:
Youtube- *http://bit.ly/connect-sensor-1*

How to Connect Sensor Controller to MatataBot and Tower (along with blocks descriptions):
Youtube- *http://bit.ly/connect-sensor-2*

Firmware Upgrade:
Matatalab- *http://bit.ly/upgrade-firmware*

Assessment

Student work will be assessed in the following manner:

> Students, in their groups, were able to successfully come up with a rough sketch for their path using various coloured cards/objects in their sketch.

> Students have correctly transformed the controller into an obstacle sensor using the **Wait Until** button as well as the **Green**, **Yellow** and **Red** blocks placed under it.

> Students were able to successfully code and exit their created path on the Nature Map by navigating their MatataBot through it.

> Students were able to complete any extension activities (time permitting).

> Students were able to successfully work in pairs or teams throughout the lesson.

Category/Level Criteria	Level 1 Poor performance	Level 2 Needs improvement	Level 3 Adequate	Level 4 Excellent
Computational Thinking	Demonstrates limited ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates some ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates considerable ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)	Demonstrates exceptional ability to: • Break a complex problem down into smaller problems. (Decomposition) • Create a simple set of steps to solve the problem. (Algorithms) • Describe the solution and apply lessons to future solutions. (Abstraction)
Communication	Demonstrates limited ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates some ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates considerable ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.	Demonstrates exceptional ability to: • Share thoughts and ideas with co-workers in order to solve problems. • Share with the teacher their learning through explanation and demonstration.
Collaboration	Demonstrates limited ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group due to disruptive behavior.	Demonstrates some ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group (some disruptive behavior).	Demonstrates considerable ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Friendly and is somewhat a leader.	Demonstrates exceptional ability to: • Work with other group members. • Share materials, devices, and time appropriately. • Complete tasks in a group • Extremely friendly and acts as a leader.
Coding challenges	Demonstrates limited ability to: • Complete identified coding challenges. • Stay on task (cannot stay on task). • Complete extension activities as time permits.	Demonstrates some ability to: • Complete identified coding challenges. • Stay on task most of the time. • Complete extension activities as time permits.	Demonstrates considerable ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges.	Demonstrates exceptional ability to: • Complete identified coding challenges. • Stay on task • Complete extension activities as time permits. • Find other ways to complete challenges. • Going over and beyond, creatively, in completing challenges.
Independent Practice	Demonstrates limited ability to: • Work with their partner (very disruptive behaviour). • Stay focused on completing tasks (cannot focus).	Demonstrates some ability to: • Work with their partner (some disruptive behaviour). • Stay focused on completing tasks (some focus).	Demonstrates considerable ability to: • Work with their partner (little disruptive behaviour). • Focus on completing tasks. Somewhat engaged in tasks.	Demonstrates exceptional ability to: • Work with their partner (no disruptive behaviour). • Focus on completing tasks. Fully engaged in tasks.