




The National Theatre for Children

TEACHER GUIDE

BEFORE THE PERFORMANCE

1. Go to BeeOnTheTeam.com.au
2. Select 'Educator Resources' in the top menu.
3. Watch the 'Educator Preview' video.
4. Review the student workbook to identify the appropriate level activities for your class.
5. Talk to your students about the 'Words to Know' and plot of the story. Discuss the LEGO® Education WeDo 2.0 kits your school has received and the in-school STEM/Science Expo. Encourage students to form a team and participate.

AFTER THE PERFORMANCE

1. Go to heyteachers.org  and enter the code you received from our actors.
2. Evaluate the program for your chance to win **\$250** for your class.
3. Distribute the student workbooks and have your students complete their activities.
4. Go to BeeOnTheTeam.com.au and make use of the games and activities.
5. Use the LEGO® Education WeDo 2.0 kits and complete the projects in your classroom.
6. Remind your students to form a team and start to prepare for your in-school STEM/Science Expo.



TEACHERS,

Your school has received FREE LEGO® Education WeDo 2.0 robotic kits to be shared across your classrooms. Encourage your students to join together and form a team to participate at your upcoming in-school STEM/Science Expo.

For more information go to:
www.BeeOnTheTeam.com.au



Stockland
it's your place

How to Use this Program

Welcome to the *Bee On the Team* Program, educating students and their families about STEM, robotics, programming and teamwork. Participating in this program is easy and integrates with the Australian Curriculum and your teaching methods.

The Student Workbook, as well as this Teacher Guide, have activities that emphasise the Four Cs of 21st Century Education Skills - Collaboration, Communication, Creativity and Critical Thinking. Suggested Grade Levels, Purpose of Activities and General Capabilities for each activity are listed on each page, allowing you to tailor the learning to meet the needs and abilities of your entire class.

Educational Standards:

LEARNING AREAS

Science, Technologies, Mathematics, English, The Arts

GENERAL CAPABILITIES

Numeracy, ICT Capability, Critical and Creative Thinking, Personal and Social Capability, Ethical Understanding

Visit www.BeeOnTheTeam.com.au and in the top menu click on 'Educator Resources'. In here you will find:

- WeDo 2.0 Preparation including teacher guides
- WeDo 2.0 Curriculum Pack including Australian Curriculum links

Educational Concepts:

- ASKING QUESTIONS is the first step to solving problems
- Creating and testing your ideas is called EXPERIMENTATION
- TEAMWORK is an important tool for learning
- SHARING YOUR IDEAS contributes to knowledge

The National Theatre for Children
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WORDS TO KNOW

Build	To put pieces together to make a larger object
Collaboration	Working together and sharing ideas
Colony	A group of bees living together in a hive
Create	To make something that wasn't there before
Design	To plan how you are going to make something
Engineer	A scientist who designs and builds new things
Experiment	To create new ideas and test them
Program	A set of instructions that a computer follows
Prototype	A model version of something; used for practice before making the real thing
Robot	A device used to complete a specific task on its own
Shakespeare	A famous man who wrote many plays over 500 years ago
Share	To use equally
Team	A group of people trying to reach a similar goal
Test	In science, to try out an idea or invention



You've Seen The Show!
Now evaluate the program and have a chance to win \$250 for your classroom!

1. Log on to: www.HeyTeachers.org
2. Enter the code from the hand-out you received from the actors
3. Fill out the evaluation

What is this program all about?

Bee on the Team is a FREE comprehensive program designed to engage and encourage primary school students to have fun while learning about teamwork and STEM.

This program includes:

- A live performance of *Bee on the Team*
- Print and digital educational materials for your entire school
- A minimum of 8 WeDo 2.0 Educational sets for your school (to be shared for grades 2-6)
- An in-school STEM/Science Expo for your students to showcase their LEGO® robotics alongside their *Show What You Know* poster



What is the *Bee on the Team* live performance?

This is a 25-minute quirky comedy from The National Theatre for Children that follows worker bee Beatrice Drone, Queen Bee, Ali the Butterfly, Archimedes the Ant and Bearrymore, a bear who fancies himself a “Shakesbearian” actor. Beatrice must collaborate with friends Ali the Butterfly and Archimedes the Ant to ask questions, test ideas, and solve problems so they can rebuild the hive and make honey once more! Every student and teacher will be able to use the *Bee on the Team* student workbook and teacher guide, as well as online games and activities to reinforce the learning.

What are LEGO® Education WeDo 2.0 Sets?

Bee on the Team provides your school with a minimum of 8 WeDo 2.0 Educational sets from LEGO® Education. The WeDo 2.0 sets are specifically intended for grades 2-6 classrooms. The sets and curriculum can be rotated through your grade level classrooms at your convenience. There are enough sets so that groups of 3-4 students can have an in-depth, hands-on experience. WeDo 2.0 gives you more than 40 hours of teaching material over 17 projects that capture motivation and engagement across key science topics, including: physical sciences, life sciences, earth and space sciences, and engineering.

What is the In-School STEM/Science Expo?

The culminating event for the *Bee On The Team* program is an in-school STEM/Science Expo. An Expo provides student teams with an opportunity to showcase what they have learned with their families, friends, and the school community in a fun, non-competitive event. Expos generally last one to two hours, depending on how many teams are participating. At an Expo, team members share their personal experiences with the project topic and what they learned by working as members of a team. All teams showcase their LEGO® model, *Show What You Know* poster and research with each other and the Expo audience. Every team member will receive a participation certificate!

Go to www.BeeOnTheTeam.com.au for more information.

All About Robots

What is a “robot”? A robot can be defined as, “a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer.” Put a bit more simply, a robot is a machine that works automatically and can be programmed. What a robot is instructed to do can also be changed.

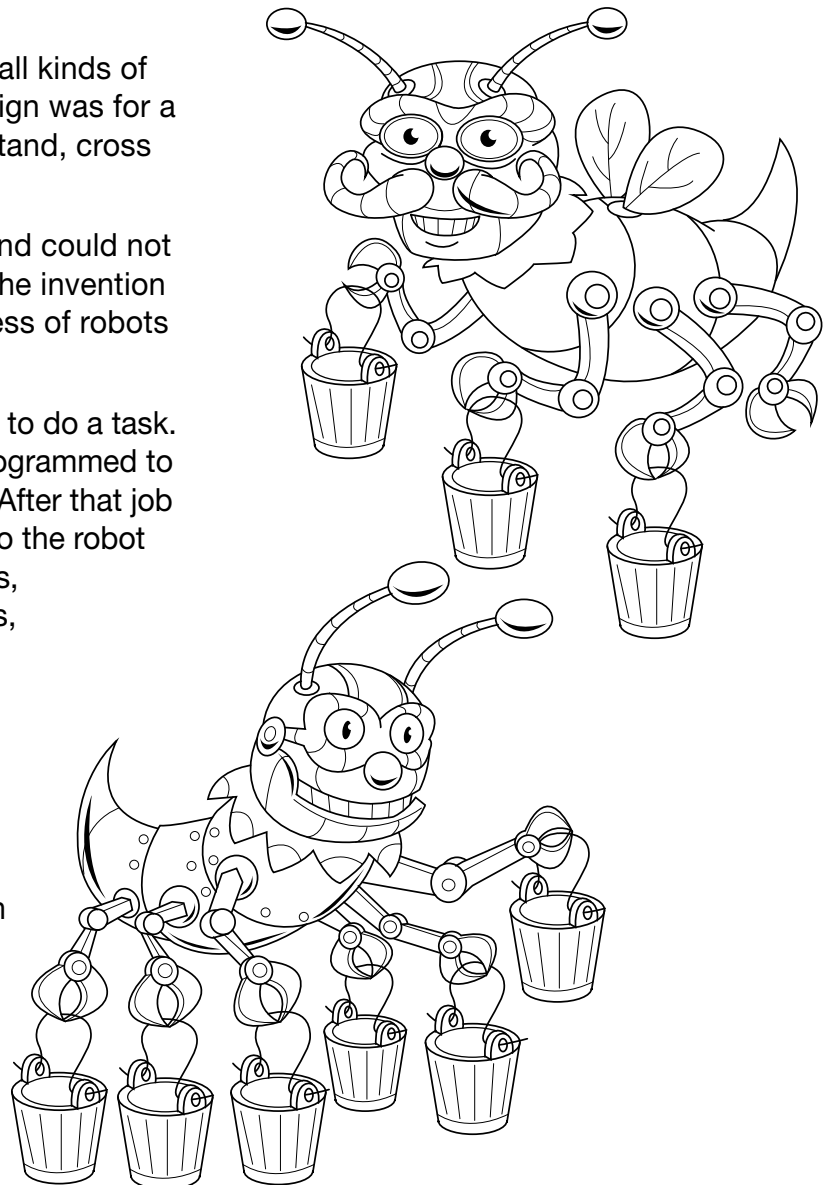
The quest for a machine that can be used to accomplish difficult or dangerous tasks has been around nearly as long as humans have been on earth.

- Archytas of Tarentum was a Greek mathematician who allegedly built a wooden, steam-powered dove that could flap its wings and fly.
- Arabic polymath and engineer Ismail Al-Jazari, invented a robotic drink-serving waitress, an automated hand-washing station and a mechanical band.
- Leonardo DaVinci drew many plans for all kinds of automated inventions. One notable design was for a fully automated knight who could, sit, stand, cross its arms and turn its head.

Most of these “robots” were built as toys and could not perform tasks on their own. It wasn’t until the invention of programming that the complete usefulness of robots came to be.

With a “program,” a robot can be instructed to do a task. In an automobile factory, a robot may be programmed to weld a car roof to the main body of the car. After that job is complete, the program can be changed so the robot can weld something else. With modifications, the robot might even be able to tighten bolts, pick up windshields and test car doors.

We now have robots in our homes and businesses everyday, vacuuming carpets, checking on patients or assisting shoppers in a store. The next phase of robotics will explore an even more exciting frontier: medicine. Robots can now be shrunk down to a size that lets them enter the human body. They can even be designed to enter human cells! This technology can lead to major breakthroughs that will help cure diseases, as well as improve human life as we know it.



Critical Thinking Activity

Patterns

Objective

The students will be able to define a pattern as things that are arranged according to a rule. They will also be able to create their own patterns and explain the rule defining the pattern.

Purpose of Activity

Collaborate, Communicate, Create

General Capabilities

Numeracy, ICT Capability, Critical and Creative Thinking, Personal and Social Capability

Class Time

15-30 minutes

Materials

- Whiteboard
- Coloured markers
- Paper

Procedure

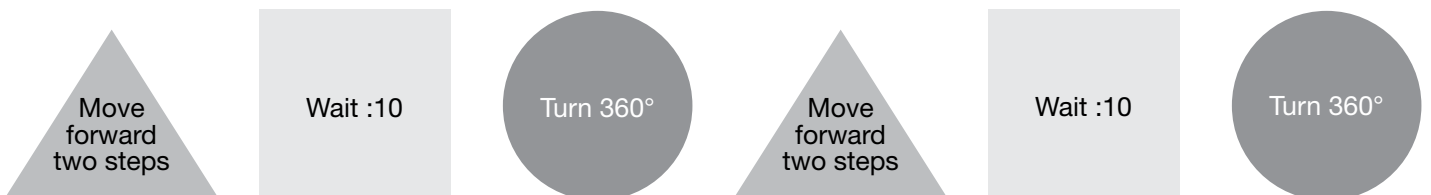
Define a pattern for the class by explaining that patterns are things that are arranged according to a rule. For example, a pattern of “triangle, square, circle, triangle, square, circle” would be, “first there is a triangle, then a square, then a circle.” Use the whiteboard to create a pattern.

Next, have the students make their own patterns on paper. Divide into groups of three and have them decide what the rule will be for their pattern. Make sure to have the groups repeat the pattern.

Choose one person from each group to come to the whiteboard and explain their pattern and rule. Have them draw it on the whiteboard. Repeat these steps, encouraging the students to make more and more complex patterns with more challenging rules.



You can explain to your students that robots follow instructions called programs. The WeDo 2.0 sets use graphical programming. Knowledge of patterns will be a great help when programming the WeDo 2.0 sets.



Critical Thinking Questions

Which group had the most complex pattern?

- Answers will vary

What was the rule that defined the hardest and the easiest patterns?

- Answers will vary

Now that you've completed the explore phase, you can continue this lesson by completing the create and share phases of the **Milo A** lesson using the **LEGO® Education WeDo 2.0** sets in your classroom.

What is a Program?

A **program** is a set of instructions that the robot's computer uses to move the robot. Many other devices use programs to function: computers, smart phones, coffee makers, cars, apps – the list is nearly endless.

A program is written in a **programming language**. Some programs use **text** as their language. Others, like **WeDo 2.0**, use what is called a **graphical programming language**. That means that the instructions the computer (and the robot) has to follow are represented as “graphics” or “icons.” Some look like this:



Each icon represents a different action, state or relationship. One icon might mean “move forward.” Another might mean “wait 20 seconds.” Another might mean “if this happens, then do that.”

There is a deeper level of programming that lies beneath graphical or textual code. This is called **binary code**. Binary code uses a set of “ones” and “zeros” to represent numbers and letters. Here's how it works:

Across the top of a binary series (a **byte**) are the following values:

64	32	16	8	4	2	1
-----------	-----------	-----------	----------	----------	----------	----------

Underneath each value is either a “one” or a “zero.” Ones represent an “on” state while zeros represent an “off” state (These ones and zeros are called **bits**).

For this example lets say our byte is 0 0 1 0 0 1 1, which would look like this:

64	32	16	8	4	2	1
0	0	1	0	0	1	1

To get the number represented by the byte, simply add up the corresponding values that are above the “on” bits.

64	32	16	8	4	2	1
0	0	1	0	0	1	1

 = 19

Computers can add, subtract, multiply and divide a binary series very quickly. This is called **processing** and is done by a **computer processing unit** or CPU. There are also binary series which represent letters and other characters. In this way, a computer can be made to process all kinds of information: numbers, words, graphics, etc.

Collaborative Activity

We're Number Zero

Objective

You can have some student volunteers actually be binary numbers and have the rest of the class decipher the arrangement of “ones” and “zeros” and call out what numbers they represent.

Purpose of Activity

Review, Identify Details, Remember, Apply Skills, Define

General Capabilities

Numeracy, ICT Capability, Critical and Creative Thinking

Class Time

15-30 minutes

Procedure

Arrange the chairs in a row under the whiteboard. Above each chair, from left to right, write on the whiteboard the binary places:

16	8	4	2	1
----	---	---	---	---

Explain the method of representing binary numbers using ones and zeros to the class. You can write a few examples beneath the place holders if you wish. Erase the examples and ask for five volunteers to be the “ones” and “zeros.” Each student will be a “bit.” “Ones” stand in front of their chair, while “zeros” sit down. Ask the students to choose whether to sit or stand. Then have the rest of the class add up the place holders of the standing “ones.” That is the number represented by the students. Then have each volunteer choose whether to remain sitting, remain standing or switch. Then have the class read the new number.

You can repeat this with a new set of volunteers so everyone gets a chance to be a bit.

If you have more time; you could give a number to the students and have them work out which volunteers will stand up or sit down to represent it.

If there was a “one” in every place holder, the largest number that could be represented by the 5 “bits” is 31.

*Now that you've completed the explore phase, you can continue this lesson by completing the create and share phases of the **Milo B** and **C** lessons using the **LEGO® Education WeDo 2.0** sets in your classroom.*

Critical Thinking Questions

How can you represent a number greater than 31?

- You would need an additional place holder (32).

Now what is the maximum number that can be represented?

- 63

Your place for future learning and innovation

Stockland understands the importance of creating sustainable and vibrant communities that can thrive into the future.

We are providing an opportunity to educate children through our partnership with The National Theatre for Children, who specialise in creating educational and curriculum-aligned programs nationwide.

This year, we are offering students a FREE, exciting STEM (Science Technology, Engineering, Mathematics) comprehensive education program, including a live theatrical in-school production, curriculum-aligned materials and delivery of LEGO® Education sets. Students will use the LEGO® Education sets to create and demonstrate sustainable outcomes, culminating in a science expo at each school to share their experiences and knowledge with their community. Together we will teach, entertain and inspire future generations to become the leaders of tomorrow.

Visit beeontheteam.com.au to learn more about how Stockland is supporting education in our communities.

