COMPUTING WITH MINECRAFT 3: PARKS AND RECREATION

Educator guide

education.minecraft.net

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OVERVIEW

Unit summary

In this unit, students will expand their knowledge of MakeCode as they code their Agent to build a park in their Minecraft city. They'll use loops to code a fence border and water feature more efficiently, then use math as a part of coding to randomly plant flowers throughout the park.

Lessons

All the following lessons are approximately 45-60 minutes, depending on how much time you give students to explore the coding activities.

Lesson 1: Code a park fence
Lesson 2: Code a water feature
Lesson 3: Plant some flowers

Learning goals

By the end of this unit, students will be able to:

- Use loops to code more efficiently.
- Describe how loops affect code and in-game actions.
- Merge mathematics with code to create calculated in-game actions.
- Use block code and/or JavaScript as a coding language to change their Minecraft world.

REQUIRED EDUCATOR PREPARATION

Preparing to lead the unit

Complete the following tasks:

- ☐ Review all materials thoroughly and become confident with content.
- ☐ Practice all coding activities.

Required skills

To lead the activities in this unit successfully, you need to be able to:

- ☐ Demonstrate the use of the following new blocks:
  - pick random [0] to [10] from the MATH drawer.

Recommended resources

If you would like additional support to master the concepts and skills covered in this unit, please review the following resources:

- Learn more about AGENT blocks at minecraft.makecode.com/reference/agent.
- Learn more about LOOPS at minecraft.makecode.com/blocks/loops.
- Learn more about MATH blocks and number operations at minecraft.makecode.com/blocks/math.
- For assistance on a variety of topics, search the Minecraft: Education Edition knowledge base at aka.ms/meekb.
- For support with Minecraft: Education Edition, contact the support team at aka.ms/meesupport and engage with the educator community at education.minecraft.net/conversations/.

Educator notes

LESSON 1: CODE A PARK FENCE

Lesson plan

1. Lead the Code a park fence coding activity.

Outline

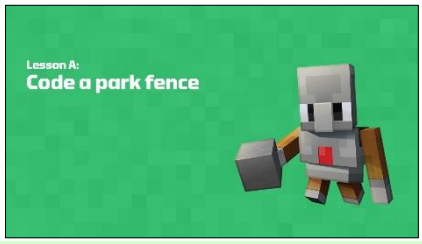
Section 1: Introduce the lesson	
Introduction	Introduce the learning goals
Section 2: Lead the coding activity	
Coding activity	Code a park fence
Knowledge check	Check for understanding
Section 3: Wrap-up	
Review	Review what students accomplished

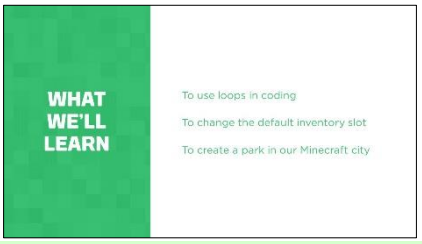
Before the lesson

- ☐ Review the unit extension activities (found in the Unit extension section) to identify potential options if you finish the featured coding activity early or need something to challenge more advanced students.

Lesson details

Introduce the lesson



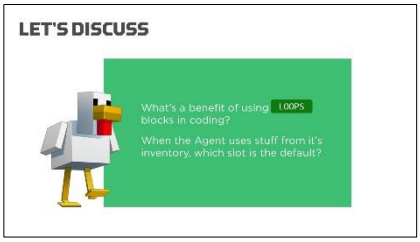


Educator notes

1. Write the warm-up on the board for students to think about as they arrive:
   - What's an example of an activity you do over and over each day? **Answer:** Responses such as: i.e. breathe, sleep, eat, walk, get ready for school, walk the dog, etc.
2. Introduce the lesson and learning goals.
3. Discuss responses to the warm-up.
4. Ensure students are properly set up to begin coding in MakeCode and Minecraft.

Section 2: Lead the coding activity

Slides 4-5



Educator notes

1. Follow the instructions to lead the coding activity. Do the activity on your device connected to the projector or presentation screen, and have students follow along as you complete each step.
2. Pause after each step to ensure everyone is with you and take questions as needed.
3. If you have time, complete one of the extension activities you identified before the lesson.
4. After the activity, use the knowledge check questions to check understanding.

Knowledge check questions

1. What's a benefit of using LOOPS blocks in coding? **Answer:** Responses such as: i.e. it's more efficient, fewer lines of code, simplifies the program, etc.
2. When the Agent uses stuff from its inventory, which slot is the default? **Answer:** Slot 1 in the upper-left corner

Coding activity: Code a park fence

Let's learn more code and reinforce what you already know to create a small park and fountain in your city. We'll add the use of LOOPS blocks to the AGENT skills you've already learned.

1. In Minecraft, ensure your player is at the following coordinates: **67, 69, -557**. If needed, use the slash command to teleport your player to the position by typing **/tp 67 69 -557** and selecting **Enter**.
2. Press **E** to access your inventory and select **Iron Bars**. Place them in your own inventory.

3. Right click on your Agent and transfer the **Iron Bars** to its inventory.

4. Position your Agent at the place you wish to start building the fence. In our example, we have marked this with **Yellow Wool**.

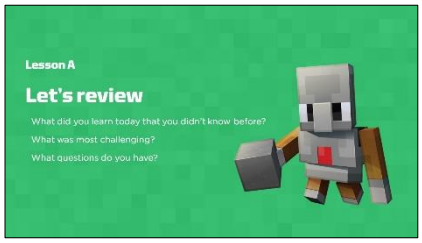
5. Count the number of blocks you want your Agent to move and place fencing and note this in the space in your workbook. In our example, we have used **Yellow Wool** to mark every second space, allowing us to calculate it clearly and without error. We can replace these blocks with grass again once this is done. In our example, this is 25.

6. Assuming your park is made up of four straight sides (as is our example park), measure the second side, immediately adjoining the end of the first you measured. In our example, this is 23. Our park is 23 x 25 bocks. Mark this information in the space in your workbook.

7. Test your code. Place your Agent on the starting block and run your code by pressing **T** to open the chat box and type **park_fence.**

You will notice that the last block, on the second loop, isn't placed by the Agent. This is because it is technically blocked by the very first block you placed, so it's in the way of the last block to be placed. You may wish to place this manually or use it as the entrance to the park.

Wrap-up



Lesson 1 assessments

Warm-up

Format: Written on the board at the start of the lesson.

What's an example of an activity you do several times each day or day after day?

Answer: Responses such as: i.e. breathe, sleep, eat, walk, get ready for school, walk the dog, etc.

Knowledge check questions and answers

Format: Q&A discussions during the lesson.

Coding activity (slide 5)	Answers
What's a benefit of using LOOPS blocks in coding?	Responses such as: it's more efficient, fewer lines of code, simplifies the program, etc.
When the Agent uses stuff from its inventory, which slot is the default?	Slot 1 in the upper-left corner

LESSON 2: CODE A WATER FEATURE

Lesson plan

1. Lead the Code a water feature coding activity.

Outline

Section 1: Introduce the lesson	
Introduction	Introduce the learning goals
Section 2: Lead the coding activity	
Coding activity	Code a water feature
Section 3: Wrap-up	
Review	Review what students accomplished

Before the lesson

- ☐ Review the unit extension activities (found in the Unit extension section) to identify potential options if you finish the featured coding activity early or need something to challenge more advanced students.

Lesson details

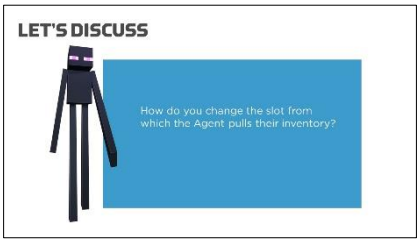
Introduce the lesson

Educator notes

1. Write the warm-up on the board for students to think about as they arrive:
   - What sorts of things do you see in a park? **Answer:** Responses will vary
2. Introduce the lesson and learning goals.
3. Discuss responses to the warm-up.
4. Ensure students are properly set up to begin coding in MakeCode and Minecraft.

Section 2: Lead the coding activity

Slides 10-11



Educator notes

1. Follow the instructions to lead the coding activity. Do the activity on your device connected to the projector or presentation screen, and have students follow along as you complete each step.
2. Pause after each step to ensure everyone is with you and take questions as needed.
3. If you have time, complete one of the extension activities you identified before the lesson.
4. After the activity, use the knowledge check questions to check understanding.

Knowledge check questions

1. How do you change the slot the Agent pulls from their inventory? **Answer:** Change the number in the agent set active slot block

Coding activity: Code a water feature

In this activity, we'll code our Agent to build a water fountain in the park.

We'll tackle this in six phases:

1. Give your Agent inventory
2. Dig the fountain boundary
3. Fill with Cobblestone
4. Dig inside the fountain
5. Code the water feature
6. Add the water

Give your Agent inventory

1. In Minecraft, ensure your player is at the following coordinates: **67, 69, -557**. If needed, use the slash command to teleport your player to the position by typing **/tp 67 69 -557** and selecting **Enter.**
2. Let's give our Agent some inventory. Press **E** to enter your Inventory and select the materials you would like Agent to build with. In our example, we will use:

Slot 1: **Cobblestone**—found in the **Construction** tab.

Slot 2: **Water Bucket**—found in the **Items** tab.

3. Approach your Agent and put the items into its inventory in **slots 1** and **2**.

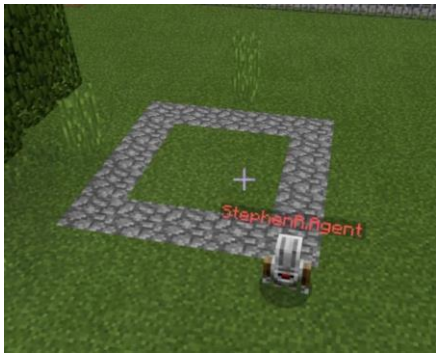
4. If you wish, you can test your code now. You will see your Agent dig out the ground in a 4 x 4 frame.

Fill with Cobblestone

Now we need to fill this newly formed hole with **Cobblestone** as a frame for the fountain.

Complete code

5. Now test your code once more. Note that this time, the Agent digs out the ground and then replaces it with **Cobblestone**. This forms the frame for the fountain.

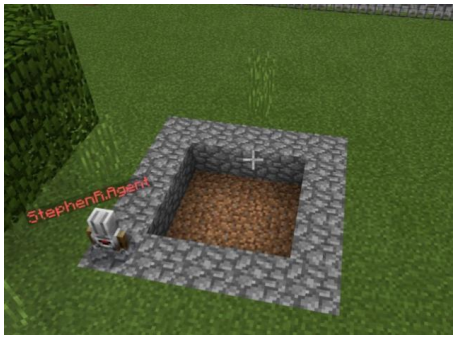


Dig inside the fountain

Now, we need to code the Agent to clear the ground away inside the fountain, so the water doesn't flood the park.

This will place your Agent at the start of the next set of three blocks to be removed, and the **outer** loop will ensure this is repeated three times.

6. Test your code and watch your Agent dig out the inside of the fountain frame.



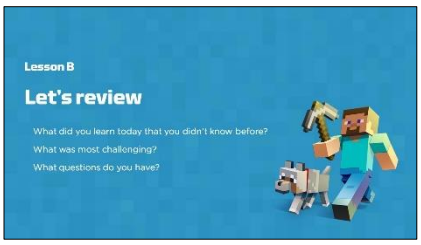
Code the water feature

Next, we can code the water feature itself. Let's start by getting the Agent into the right position.

Add the water

7. Now check and test your code before placing your fountain somewhere in the park.

Wrap-up



Lesson 2 assessments

Warm-up

Format: Written on the board at the start of the lesson.

What sorts of things do you see in a park?

Answer: Responses will vary

Knowledge check questions and answers

Format: Q&A discussions during the lesson.

Coding activity (slide 11)	Answers
How do you change the slot from which the Agent pulls their inventory?	Change the number in the agent set active slot block

LESSON 3: PLANT SOME FLOWERS

Lesson plan

1. Lead the Plant some flowers coding activity.

Outline

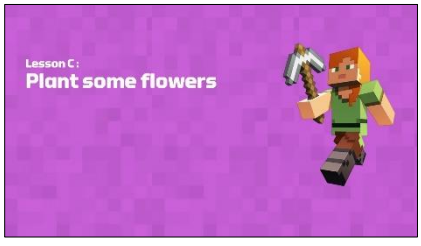
Section 1: Introduce the lesson	
Introduction	Introduce the learning goals
Section 2: Lead the coding activity	
Coding activity	Plant some flowers
Section 3: Wrap-up	
Review	Review what students accomplished

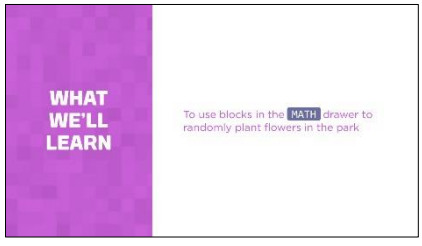
Before the lesson

- ☐ Review the unit extension activities (found in the Unit extension section) to identify potential options in case you finish the featured coding activity early or need something to challenge more advanced students.

Lesson details

Introduce the lesson

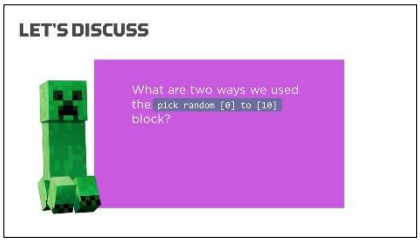




Educator notes

1. Write the warm-up on the board for students to think about as they arrive:
   - What's your favorite flower? **Answer:** Responses will vary
2. Introduce the lesson and learning goals.
3. Discuss responses to the warm-up.
4. Ensure students are properly set up to begin coding in MakeCode and Minecraft.

Lead the coding activity



Educator notes

1. Follow the instructions to lead the coding activity. Do the activity on your device connected to the projector or presentation screen, and have students follow along as you complete each step.
2. Pause after each step to ensure everyone is with you and take questions as needed.
3. If you have time, complete one of the extension activities you identified before the lesson.
4. After the activity, use the knowledge check questions to check understanding.

Knowledge check questions

1. What are two ways we used the `pick random [0] to [10]` blocks? **Answer:** To randomly choose the slot in the Agent's inventory and to move the Agent to random places in the park

Coding activity: Plant some flowers

Let's add some plants to the park. This will require the use of some new tools and coding options.

We'll tackle this in four phases:

1. Give your Agent an inventory of flowers
2. Code to randomly pull inventory
3. Code your Agent to randomly move
4. Position your Agent and run the code

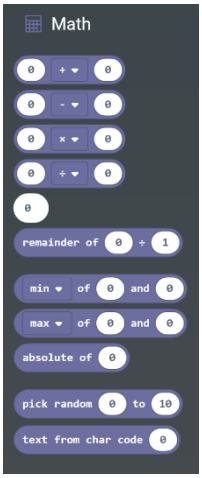
Give your Agent an inventory of flowers

1. In Minecraft, ensure your player is at the following coordinates: **67, 69, -557**. If needed, use the slash command to teleport your player to the position by typing **/tp 67 69 -557** and selecting **Enter**.
2. Press **E** to enter your inventory and select the plants you would like your Agent to build with. In our example, we will use a selection of flowers. You can choose these yourself from the **Nature** tab in your inventory under **Flowers**.

3. Place the flowers in **slots 1-5** of your Agent's Inventory.

Code to randomly pull inventory

4. Now visit a new toolbox drawer in the left menu, called the MATH drawer.



The blocks in this drawer allow you to use mathematics to create a ***variable*** in your code.

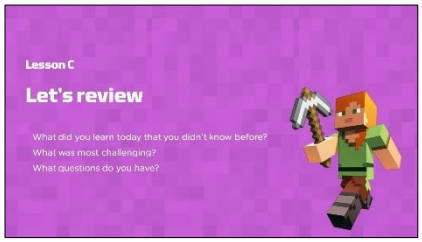
You can think of a variable as box that holds information or data that can change as you code.

Position your Agent and run the code

5. Position your Agent at one corner of your park, with the Agent facing the bulk of the park and with the main body of the park to the left. We have marked this in the image below with **Yellow Wool**.

6. Test your code. Your Agent should now move forward to a random location, plant two randomly selected flowers, move backward, do the same and move left to start again. This will create a random meadow of flowers.

Wrap-up



Lesson 3 assessments

Warm-up

Format: Written on the board at the start of the lesson.

What's your favorite flower?

Answer: Responses will vary

Knowledge check questions and answers

Format: Q&A discussions during the lesson.

Coding activity (slide 17)	Answers
What are two ways we used the `pick random [0] to [10]` blocks?	To randomly choose the slot in the Agent's inventory and to move the Agent to random places in the park

UNIT EXTENSIONS

These optional coding activities are tailored to this unit's theme and are intended to help students apply what they've learned in the lesson coding activities in new ways. The coding steps are purposefully not included to challenge students thinking. Remind students about the characteristics of a coding mindset and that there can be different ways to code to solve any problem. Even when they can't figure out how to code in a given timeframe, learning what doesn't work is progress.

Consider using the extensions in one of the following ways:

- If you finish the lesson early, have the class do an extension coding activity as a group.
- Alternatively, you could assign one to individuals or small groups to work on during class. Reserve time before the wrap-up section for students or groups to share their coding progress with the rest of the class.
- If you have students who are excelling with the coding skills of the featured coding activity and seem disengaged during a featured coding activity, assign one of the extensions to challenge them. Reserve time at the end of class for them to share their coding progress with the rest of the class.
- Assign to students as a homework or computer lab assignment before starting the next unit.

Extensions

Extension activity 1

Code seasons, showing the park differing in winter and summer weather.

Extension activity 2

Animate the water fountain using the **fill** or **place** code features.

Extension activity

Design and code a park statue or art sculpture instead, or as well as, a water feature.

Extension activity 4

Code a park event for the appointment of a mayor, or a city marathon, or a festival.