

Educator Guide

3 Lessons

Single Student

Computing with Minecraft: 3- Parks & Recreation

EDUCATION.MINECRAFT.NET

THEME OVERVIEW

This third unit in Computing with Minecraft provides students with the opportunity to expand their knowledge of coding as they program their Agent to build a park in their Minecraft City. Students will use loops to code a fence border and a water feature. Then, students will use the math functions to randomly plant flowers throughout the park.

LESSONS OVERVIEW

All of the following lessons are intended to be completed in 60-75 minutes, depending on how much time is given to students to explore coding activities.
Lesson 1: Code a Park Fence
Lesson 2: Code a Water Feature
Lesson 3: Plant Some Flowers

LESSON OBJECTIVES

- Use loops to code more efficiently
- Describe how loops affect code and in-game actions
- Utilize mathematics in code to create specific in-game actions
- Use block code to change their Minecraft world

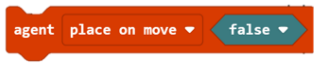
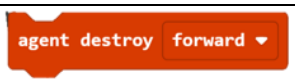
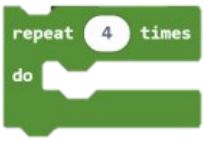
THINGS TO KEEP IN MIND

- Students are given a whistle in the first slot of their hotbar. This item allows students to call the Agent directly to them (i.e., instead on having students to code the Agent to teleport to them). The student will need to be standing and facing in the direction they would like the Agent to teleport to.
- Students are given a compass in the second slot of their hotbar. This item points to the world spawn point.
- Remind students that there may be more than one solution for each of the activities.

MINECRAFT MECHANICS

C	**C** Summons the Agent and opens the MakeCode interface
T	**T** Opens chat panel in Minecraft for commands to be typed
ESC	**ESC** When a student wants to leave the game, leave chat, or pause the game

CODING BLOCKS

	**On chat command** Runs the code when the student types the chosen text in the chat window
	**Agent Teleport to Player** Tells the Agent to turn left or right
	**Agent Move** Tells the Agent to move in a certain direction by a defined amount
	**Agent Turn** Tells the Agent to turn left or right
	**Agent Place on Move** Tells the Agent whether to place a block (if set to true) or not to place a block (if set to false)
	**Agent Place** Tells the Agent where to place a block
	**Agent Destroy** Tells the Agent to break a block in a specific direction
	**Agent Set Active Slot** Sets the agent's active inventory slot; Slots are counted from left to right and then top to bottom, starting at the top-left corner of the agent's inventory
	**Repeat** Creates a loop (which repeats a section of code until a specific condition is met)
	**Pick Random** Make up any number from a minimum value to some maximum value

KEY VOCABULARY

Minecraft – game-based learning platform with endless creativity and possibilities
Controls – provides the ability to move during game play (will differ based on devices)
MakeCode – the coding editor program used in-game to create algorithms

Agent – your own personal Robot you can program to complete tasks for you in the game
Loops – repeats code a certain number of times until a condition is met
Math – specific blocks that use numbers, number operators, and math functions

ADDITIONAL RESOURCES

If you would like additional support about the concepts and skills covered in these lessons, review the following resources:

- PLAYER blocks: https://minecraft.makecode.com/reference/player
- AGENT blocks: https://minecraft.makecode.com/reference/agent
- LOOPS blocks: https://minecraft.makecode.com/blocks/loops
- MATH blocks: https://minecraft.makecode.com/blocks/math
- For additional support with Minecraft: Education Edition, contact the support team at aka.ms/meesupport or engage with the educator community at https://educommunity.minecraft.net/hc/community/topics

LESSON ACTIVITIES

LESSON 1: CODE A PARK FENCE

Direction Instruction (Teacher-Led; "I Do")

We are going to continue to work on Computing with Minecraft (**slide 1**). Today's lesson is called "Code a Park Fence" (**slide 2)**.

Review the objectives on **Slide 3**.

The first thing we are going to do is prepare for our build. We need to make some calculations about how much space we have for our park. (**slide 4**)

For this task, you are going to have students log into Minecraft: Education Edition. (**slide 6;** you will only use **Slide 5** {which is a hidden slide} if someone has never worked in Computing with Minecraft before and needs to start a new world. Otherwise, all students should keep adding to their existing world)

Once students are logged in, students should automatically start where they left off after the last session. If they are not in the same location, you will guide them through the beginning of the world. Go through the Teleport Hub to navigate into

the third area—Parks and Recreation. Parks and Recreation can be accessed through the orange portal. They will return to the Minecraft City (**slide 7**).

Once they are in the area, students should find an open area where they could build their park. (**slide 8**)

Now, students will need to count how many available spaces there are within the green space. The code is going to use the example of 25—so it's ideal if they can find an area where they can build a 25x25 fence. Use this visual on **Slide 9** to demonstrate this idea.
NOTE: Students at this age group/grade level are not expected to understand how to multiply to calculate length x width or even figure the volume of a shape. The focus should just be on counting how many squares so we can place one side of our fence at a time.

After students have located an area large enough, provide them with a copy of the "Code a Park Fence" handout (**slide 10**). You will find a copy of this handout at the end of this document.

Guided Instruction (Teacher Modeling; "We Do")

Activity: Code a Park Fence (Slides 11-18)
Return to the NPC to begin the lesson (**slide 11**). Talk to the NPC (**slide 12**) and then select the "tutorial" button to begin coding (**slide 13**).

Now, it is time to begin creating the code for the coding task (**slides 14-17**).

Step 1: Rename the on chat command block to **park_fence**
Step 2: Drag a repeat block into the on chat command block; change the value from [4] to **[25]**
Step 3: Drag the agent move code block inside of the repeat [25] times loop
Drag the agent place [forward] block into the loop, under the agent move [forward] block. Change the forward to **back**.
Step 4: Drag the agent move code block into your on chat command block after the loop. For our example, we are going to set the direction to **left**.

Now, we are going to test our code. Move into the correct position, where you previously identified an open patch of grass large enough for your Minecraft park (**slide 18**).

Coding Solution:



Independent Work (Teacher Support; "You Do")

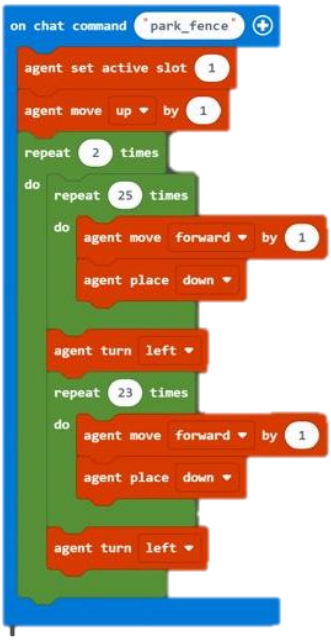
Students will now be responsible for completing the park fence on their own (slides 19-21). They should use the same code they just created. After they finish the 2nd side of the park fence, they will need to request more blocks from the NPC.



NOTE: The final part of the fence will remain open as the Agent cannot place a block where he is standing. This can be the "entrance" into the park.

CHALLENGE ACTIVITY: Allow students to go into Creative Mode. Provide the Agent with materials. Challenge students to create one program to build the entire fence (i.e., not build in multiple programs like we did in the coding activity). They should type in one command and the Agent should build a fence from start to finish.

Possible Coding Solution:



LESSON 1 CONCLUSION

Upon completion of this lesson, students should be able to answer the following questions: (**slide 22**)

1. What's the benefit of using LOOPS blocks in coding?
   Answer: It completes the task much quicker; saves time, more efficient, etc.
2. When the Agent uses materials from its inventory, which slot if the default?
   Answer: Slot 1 in the upper-left corner

These questions can also be used as a formative assessment. The formative assessments can be found at the end of this document and can be printed out.

Allow students to reflect and share on their experience. (**slide 23**)

LESSON 2: CODE A BUILDING

Direction Instruction (Teacher-Led; "I Do")

"We are going to work on Lesson 2 today. It is called 'Code a Water Feature'." (**slide 24**)

Review the objectives on **Slide 25**.

In this lesson, students will create a water fountain. There are several steps to the design for this water feature. (**slide 26**)

At the time, have all students log into Minecraft: Education Edition. **(slide 27)**

Guided Instruction (Teacher Modeling; "We Do")

Activity: Code a Water Feature (Slides 28-62)

Once students are logged in, students should begin in the same location they left off in (i.e., if they successfully completed previous lesson, "Code a Park Fence"). If not, they will need to teleport to the Parks and Recreation area.

Return to the Unit 3, Lesson 2 NPC. Press on the NPC to see the dialog box (**slide 28**). Select the tutorial button to launch Code Builder (**slide 29**). Then, demonstrate the following steps and have students follow along, step-by-step. (**slides 30-34**)

Step 1: Rename the on chat command block to **park_fountain**

Step 2: Drag and drop a repeat 4 times block into the on chat command ; leave it set to [4]

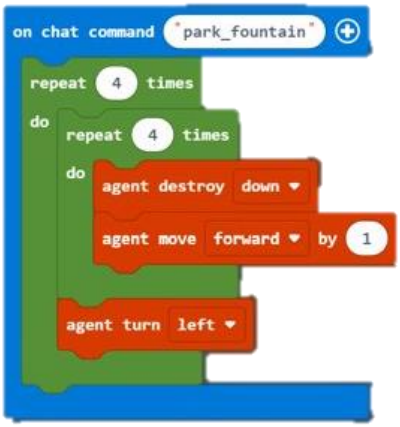
Step 3: Place another repeat 4 times block into your on chat command. Place it directly inside the first loop. Add an agent destroy [forward] block into the loop. Use the drop-down menu to set it to **down**.

Step 4: Drag the agent move [forward] block into the repeat [4] times after the agent destroy [forward] block.

Step 5: Add an agent turn [left] block into the first or outer repeat [4] times , but outside of the second or inner repeat [4] times loop.

Move to a grassy area and then test out the first part of your park fountain—the first part (if done correctly) should dig a perimeter for the foundation (i.e., the Agent will dig out the grass blocks to make the foundation). (**slide 35**)

Coding Solution: (for digging the foundation)

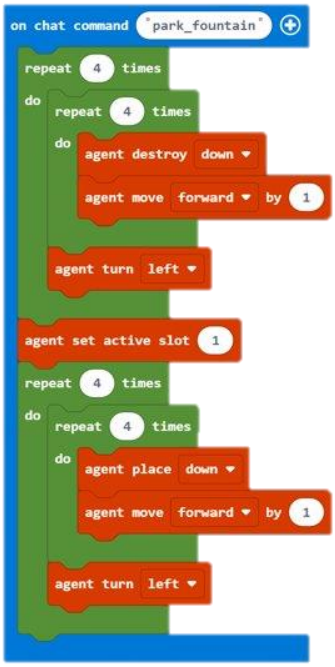




Independent Work (Teacher Support; "You Do")

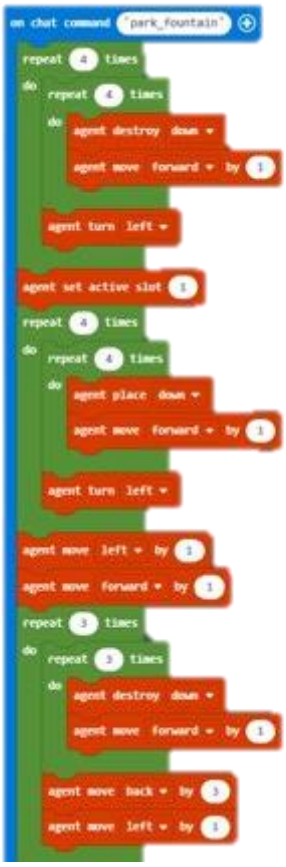
Now, it is the students turn to finish the foundation on their own (**slide 36**). They next part of the code will have the Agent fill the foundation with cobblestone. Then, they will have to dig up the grass in the middle. Finally, they will need to place the stones in the middle of the fountain and then use the water bucket to fill the fountain (**slide 37**). Students should place a their water fountain in the middle of their Minecraft park. (**slide 38**)

Coding Solution: (for filling with cobblestone)



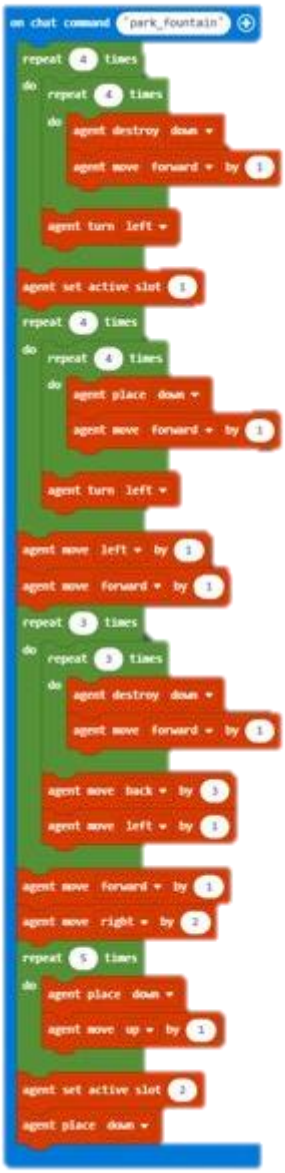


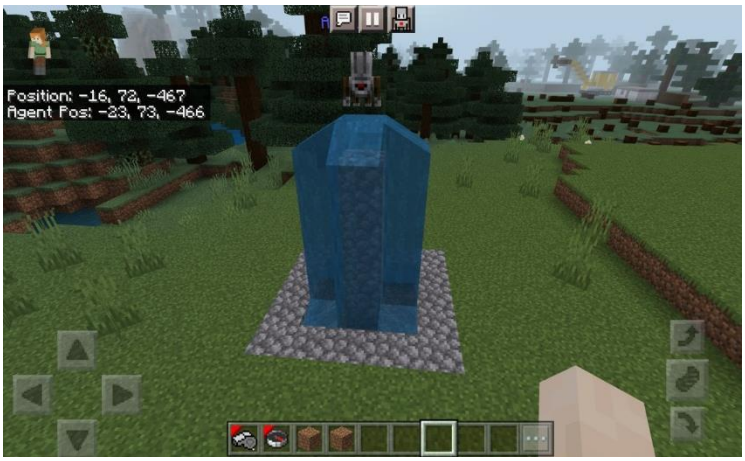
Coding Solution: (for digging up the middle area)





Coding Solution: (to build the fountain, from start to finish)
(shown on next page)





LESSON 2 CONCLUSION

Upon completion of this lesson, students should be able to answer the following questions: (**slide 39**)

1. How do you change the slot the Agent pulls from their inventory?
   Answer: Change the number in the agent set active slot block
2. List two different kinds of drawers in the toolbox in Code Builder. Explain what they are used for.
   Answer: (Responses will vary)

These questions can also be used as a formative assessment. The formative assessments can be found at the end of this document that can be printed out.

Allow students to reflect and share on their experience. (**slide 40**)

LESSON 3: PLANT SOME FLOWERS

Direction Instruction (Teacher-Led; "I Do")

We are going to work on Lesson 3 today. It is called "Plant Some Flowers". (**slide 41**)

Review the objectives on **Slide 42**.

In this lesson, you will have your Agent plant flowers for you. You will use a new kind of block from a new toolbox drawer to help you. You will code your Agent to pull random inventory and move randomly to place the inventory. **(slide 43)**

Guided Instruction (Teacher Modeling; "We Do")

Activity: Plant Some Flowers

At the time, have all students log into Minecraft: Education Edition. **(slide 44)** Once students are logged in, students should begin in the same location they left off in (i.e., if they successfully completed Lesson 2).

Return to the Unit 3, Lesson 3 NPC. Press on the NPC to see the dialog box (**slide 45**). Select the tutorial button to launch Code Builder (**slide 46**). Then, demonstrate the following steps and have students follow along, step-by-step. (**slides 47-55**)

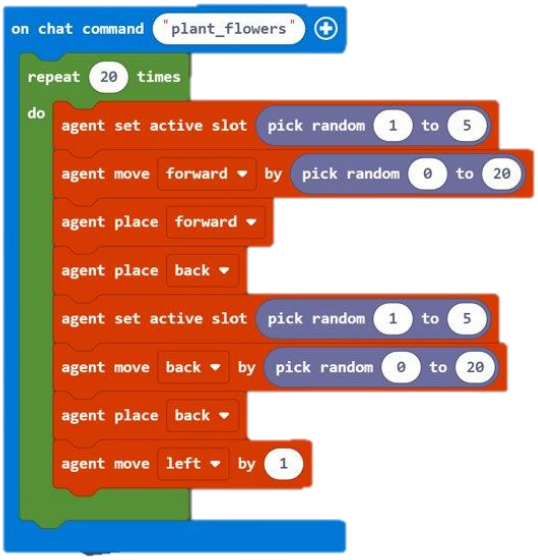
- **Step 1**: Rename the run element of the on chat command block to **plant_flowers**. Drag the repeat [4] times block into your on chat command and set the number to the number of blocks you have along one side of your park fence.
- **Step 2**: Drag the agent set active slot code block inside the repeat loop.
- **Step 3**: Drag and drop the pick random [0] to [10] code block into your on chat command and use it as the replacement for the number element in the agent set active slot.

    - This is a new toolbox drawer for us! The MATH blocks allow us to use mathematics to create a **variable** in our code. You can think of a ***variable*** as a box that holds information or data that can change as you code.
- **Step 4**: Set the first number to **1** and the second number to **5**.
- **Step 5-6**: Place an agent move [forward] block under the agent set active slot block. Add another pick random [0] to [10] code block into the agent move [forward] block. Change the second number in the block to **20**.
- **Step 7**: Drag two agent place [forward] block into the Coding workspace. Change the second one to **back** with the drop-down menu.
- **Step 8**: Drag another agent set active slot block. Revisit the MATH drawer and add another pick random [0] to [10 code block into the agent set active slot block. Change the numbers to 1 and 5.
- **Step 9**: Select an agent move [forward] block to coding workspace, setting it to **back** with the drop-down menu. Select another pick random [0] to [10] and add it to your agent move [back] block. Set the numbers to **0** and **20**.
- **Step 10**: Drag two more agent place [forward] blocks to coding workspace, setting the second one to **back** with the drop-down menu. Finally, drag an agent move [left] block to finish the code!

Independent Work (Teacher Support; "You Do")

Students should test their code (**slide 56**). The Agent should now move forward to a random location, plant two randomly selected flowers, move backwards, do the same and move left to start again. They should have flowers scattered throughout their park! (**slide 57**)

Coding Solution:



LESSON 3 CONCLUSION

Upon completion of this lesson, students should be able to answer the following questions: (**Slide 58**)

1. What are two ways we used the pick random [0, 0, 0] coding block? Write and draw about the two examples.
   Answer: We used these blocks to randomly choose the slot in the Agent's inventory and to move the Agent to random places in the park

These questions can also be used as a formative assessment. The formative assessments can be found at the end of this document that can be printed out.

Allow students to reflect and share about their experiences. (**slide 59**)

EDUCATIONAL STANDARDS

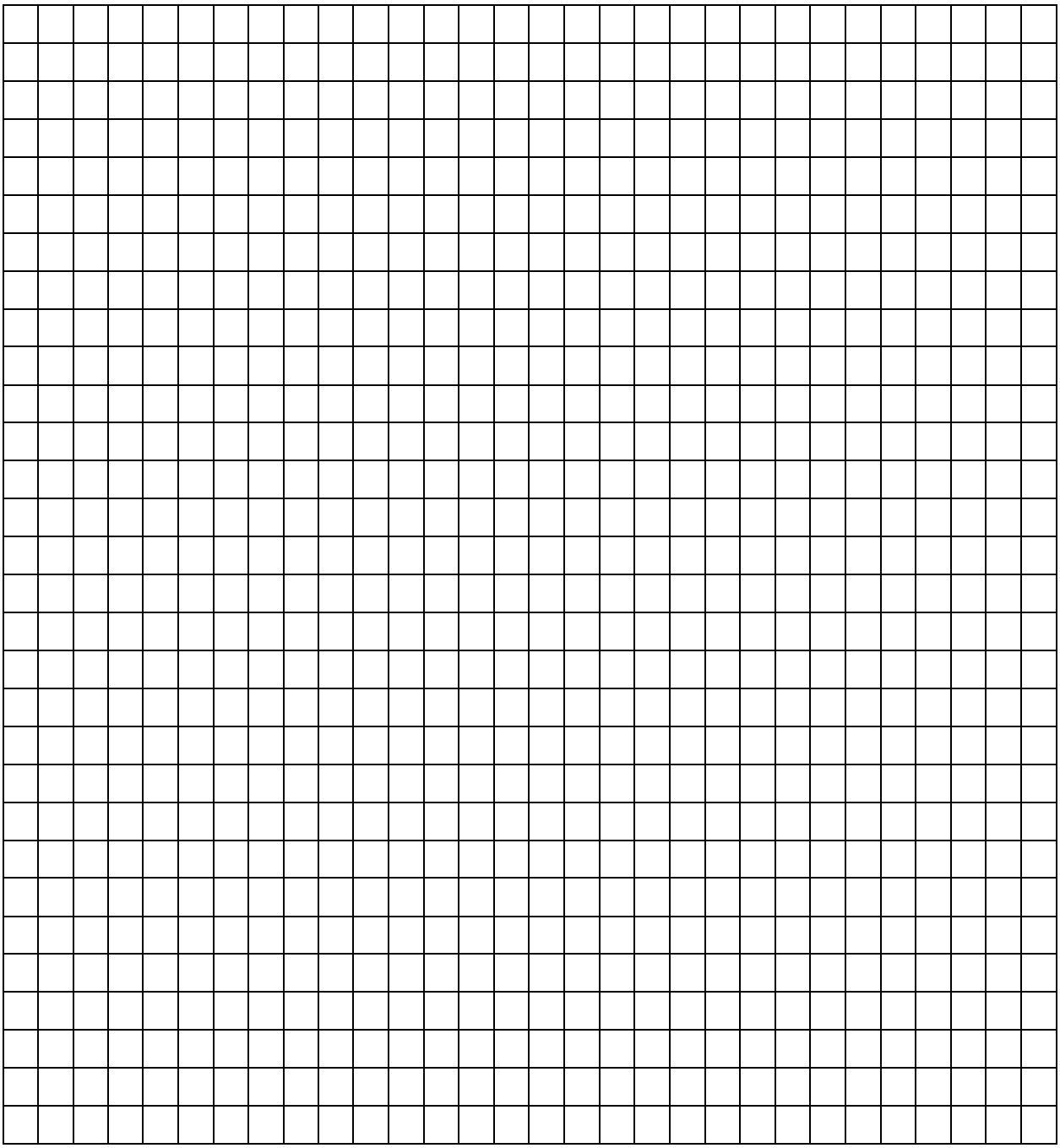
UNITED STATES	AUSTRALIA	UNITED KINGDOM
DEVELOP PROGRAMS WITH SEQUENCES AND SIMPLE LOOPS, TO EXPRESS IDEAS OR ADDRESS A PROBLEM. CSTA 1A-AP-10	WRITING AND ENTERING A SIMPLE SET OF INSTRUCTIONS JOINTLY TO SEQUENCE EVENTS AND INSTRUCTIONS FOUNDATION TO YEAR 2 ACTDIP004	UNDERSTAND WHAT ALGORITHMS ARE; HOW THEY ARE IMPLEMENTED AS PROGRAMS ON DIGITAL DEVICES; AND THAT PROGRAMS EXECUTE BY FOLLOWING PRECISE AND UNAMBIGUOUS INSTRUCTIONS COMPUTING KEY STAGE 1
MODEL THE WAY PROGRAMS STORE AND MANIPULATE DATA BY USING NUMBERS OR OTHER SYMBOLS TO REPRESENT INFORMATION. CSTA 1A-AP-09	USING COMMON SOFTWARE TO PRESENT DATA CREATIVELY FOUNDATION TO YEAR 2 ACTDIP003	CREATE AND DEBUG SIMPLE PROGRAMS COMPUTING KEY STAGE 1
STUDENTS BREAK DOWN PROBLEMS INTO COMPONENT PARTS, EXTRACT KEY INFORMATION, AND DEVELOP DESCRIPTIVE MODELS TO UNDERSTAND COMPLEX SYSTEMS OR FACILITATE PROBLEM-SOLVING. ISTE 5C		
STUDENTS UNDERSTAND HOW AUTOMATION WORKS AND USE ALGORITHMIC THINKING TO DEVELOP A SEQUENCE OF STEPS TO CREATE AND TEST AUTOMATED SOLUTIONS. ISTE 5D		

Computing with Minecraft: Unit 3, Lesson 1

Code a Park Fence

In this lesson, you are going to create a park fence for your Minecraft city. We are going to practice the design of the park fence on the grid paper before coding in the game.

Each of these squares represent a block in Minecraft. Our fence will be square shape. A square has equal sides. Each of the sides of our fence is going to be 25 blocks. Draw the design in the space.



NAME: _____ **DATE:** _____

PARKS AND RECREATION: LESSON 1 FORMATIVE ASSESSMENT

What's the benefit of using LOOPS blocks in coding?	
When the Agent uses materials from its inventory, which slot is the default?	

NAME: _____ **DATE:** _____

PARKS AND RECREATION: LESSON 2 FORMATIVE ASSESSMENT

How do you change the slot the Agent pulls from their inventory?	
List two different kinds of drawers in the toolbox in Code Builder. Explain what they are used for.	

NAME: _____ **DATE:** _____

PARKS AND RECREATION: LESSON 3 FORMATIVE ASSESSMENT

What are two ways we used the pick random [0, 0, 0] coding block? Write and draw about the two examples.	EXAMPLE 1:
	EXAMPLE 2: