

MINECRAFT

EDUCATION EDITION



CODING WITH MINECRAFT

Assessment guide

education.minecraft.net

CONTENTS

Overview	3
Coding with Minecraft 1: Introduction.....	4
Lesson A: Minecraft and Microsoft MakeCode.....	4
Coding with Minecraft 2: Events.....	7
Lesson A: Introduction to events	7
Lesson B: Coding with events	9
Lesson C: Linking events	11
Lesson D: Get creative with events	13
Coding with Minecraft 3: Coordinates	15
Lesson A: Introductions to coordinates	15
Lesson B: Coding with coordinates	18
Lesson C: Automating actions with coordinates.....	20
Lesson D: Get creative with coordinates	22
Coding with Minecraft 4: Variables	24
Lesson A: Introduction to variables	24
Lesson B: Coding with variables	26
Lesson C: Combining variables.....	28
Lesson D: Get creative with variables	30
Coding with Minecraft 5: Conditionals.....	32
Lesson A: Introduction to conditionals.....	32
Lesson B: Coding with conditionals.....	34
Lesson C: Get creative with conditionals	38
Coding with Minecraft 6: FUNCTIONS	40
Lesson A: Introduction to variables	40
Lesson B: Coding with variables	42
Lesson C: Combining variables.....	44
Lesson D: Get creative with variables	46
Coding with Minecraft 7: Iteration.....	48
Lesson A: Introduction to iteration	48
Lesson B: Coding with iteration	51
Lesson C: Debugging with iteration.....	53
Lesson D: Get creative with iteration.....	55

Coding with Minecraft 8: Arrays	57
Lesson A: Introduction to arrays.....	57
Lesson B: Build a Zoo with Arrays	59
Lesson C: Teleport with Arrays	61
Lesson D: Blocks with Arrays	63
Lesson E: Get creative with arrays.....	65
Coding with Minecraft 9: Artificial intelligence	67
Lesson A: Introduction to artificial intelligence	67
Lesson B: Explore Intelligent Code	69
Lesson C: Code an Intelligent Agent.....	71
Lesson D: Code a Tree Hunting Agent	73
Lesson E: Get creative with AI	75

OVERVIEW

This document includes all assessment answer keys and printer-friendly versions of any assessments to be distributed to students. These assessments are provided with the curriculum for your convenience. Feel free to use those that are most helpful to you, or to tweak them for your class. The following types of assessments are included in this course:

- **“Do now”** – Prompts to write on the board for students to think about as they arrive and get settled before class starts. They are intended to reinforce concepts, encourage students to link prior knowledge to the day’s concepts, and/or preview the day’s lesson.
- **Knowledge check questions** – Discussion questions to quickly assess students’ learning after relevant activities during the lesson. They are also included in slides in each unit PowerPoint presentation.
- **Exit ticket** – Printable half-sheets for students to complete before they leave class (their “ticket” to exit the room). Students’ responses to the exit ticket questions help you assess if they have grasped the day’s lesson, which will help you plan for the next one. Printer-friendly versions are included in this guide.
- **Quiz** – A low-stakes formative assessment tool for each unit. Quizzes have an average of five questions and are intended to take about 10 minutes. The results will help you establish whether students are prepared to take on the unit’s independent coding project. Printer-friendly versions are included in this guide.
- **Independent project scoring rubric** – An assessment tool to help you objectively evaluate the independent coding projects and Minecraft diary entries students complete at the end of each unit. Printer-friendly versions are included in this guide. Grading criteria are also included in the student workbook to set expectations.

CODING WITH MINECRAFT 1: INTRODUCTION

Lesson A: Minecraft and Microsoft MakeCode

“Do now”

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

Think of examples to fill in the blanks of this sentence: If _____, then _____.

Answer: Responses will vary

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Learn about Minecraft	Answers
How do you use your mouse so your player can look around?	Move the mouse in the direction you want to see
What are two keyboard controls to move your player?	Any of the following: W=forward, A=left, D=right, S=back, Space bar = jump
How do you open the chat command field in Minecraft?	Type T on the keyboard
Do you like using the mouse or keyboard controls better?	Responses will vary
What's one thing you discovered by playing?	Responses will vary
Learn about Microsoft MakeCode	Answers
What's an on chat command ?	Code that is triggered or happens when you type the appropriate command in the chat window of Minecraft
How do you get to the coding Workspace in MakeCode?	Start a new project or open a saved project
How do you add a block to the coding Workspace?	Select a block from the Toolbox drawer

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What is one reason learning computer science and coding are important?	Any of the following: <ul style="list-style-type: none">• Teaches us important skills, like creativity, problem solving, critical and flexible thinking, working with others.• It's changing everything about the way we communicate, learn, live and work.• It will help us be more successful in our future job or career.
2. What are you most excited about learning in this course?	Responses will vary

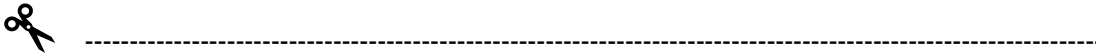
Coding with Minecraft 1: Introduction, Lesson A: Exit ticket

Name:

Date:

1. What is one reason learning computer science and coding are important?

2. What are you most excited about learning in this course?



Coding with Minecraft 1: Introduction, Lesson A: Exit ticket

Name:

Date:

1. What is one reason learning computer science and coding are important?

2. What are you most excited about learning in this course?

CODING WITH MINECRAFT 2: EVENTS

Lesson A: Introduction to events

“Do now”

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

What is one thing that happened in your day?

What, if anything, happened as a result?

Knowledge check questions and answers

Format: Q&A discussions during the lesson.

Understanding and coding events questions	Answers
What is an event?	Something that happens outside a program (like a screen tap or mouse click) that the program can respond to
What is a real-life example of an event?	Responses will vary
Describe an example of an event from your coding project.	Responses will vary
How did you sink the blocks into the ground to make your yellow brick road?	By modifying the Y coordinate so that the bottoms of the bricks were one level down

Exit ticket

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

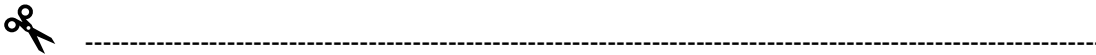
Question	Answer
1. Name a real-life event that happened in class that caused an action.	Responses will vary

Coding with Minecraft 2: Events, Lesson A: Exit ticket

Name:

Date:

1. Name a real-life event that happened in class that caused an action?



Coding with Minecraft 2: Events, Lesson A: Exit ticket

Name:

Date:

1. Name a real-life event that happened in class that caused an action?

Lesson B: Coding with events

“Do now”

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

What is an event in real life?

Answer: Responses will vary

What is an event in computer programming?

Answer: Something that happens outside a program (like a screen tap or mouse click) that the program can respond to

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with events questions	Answers
What is an event handler?	An event handler is a routine that is used to deal with the event, allowing a programmer to write code that will be executed when the event occurs
What is the coding workspace in Minecraft?	Where you organize your coding blocks

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

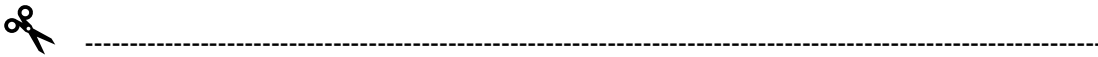
Question	Answer
1. What did you add to make the game your own unique world?	Responses will vary

Coding with Minecraft 2: Events, Lesson B: Exit ticket

Name:

Date:

1. What did you add to make the game your own unique world?



Coding with Minecraft 2: Events, Lesson B: Exit ticket

Name:

Date:

1. What did you add to make the game your own unique world?

Lesson C: Linking events

“Do now”

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

What is something you do that requires a series of steps to make something happen?

Answer: Responses will vary

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What is an event?	Something that happens outside a program (like a screen tap or mouse click) that the program can respond to.
2. What is an event handler?	An event handler is a routine that is used to deal with the event, allowing a programmer to write code that will be executed when the event occurs.
3. Where do you add a block to an event handler?	In the coding workspace.
4. What did exponential growth mean when coding for zombies?	It meant that when one zombie was killed, more were created
5. Describe a block-based visual programming language?	Block-based visual programming uses visuals to represent lines of code

Coding with Minecraft 2: Events, Lesson C: Quiz

Name:

Date:

1. What is an event?
2. What is an event handler?
3. Where do you add a block to an event handler?
4. What did exponential growth mean when coding for zombies?
5. Describe a block-based visual programming language.

Lesson D: Get creative with events

“Do now”

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

What most excites you about coding?

What kind of world would you like to make in Minecraft?

Answer: Responses will vary

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Coding with Minecraft 2: Events

Minecraft diary

Compose a diary entry addressing the following:

- What did you decide to build? Why?
- Describe each of your three functions and what each of them does.
- What kinds of building tasks did you decide needed to be done by hand? Why?
- Include at least one screenshot of your finished building or piece of architecture.

NOTE: If you decided to improve one of this lesson’s activities, please talk about the new code you wrote in addition to what was already provided in the lesson.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students’ unit independent coding projects. (Please see the next page for a printer-friendly version.)

Coding with Minecraft 2: Events

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Project Use one or more of the following event handler blocks: <ul style="list-style-type: none">• On chat command• On player died• On player walk/run/jump/swim/etc.• On arrow shot• On block broken• On block placed• On animal killed• On monster killed	Project lacks all of the required elements.	Project uses at least one event handler block OR causes an intentional effect or solves a problem BUT code is ineffective or flawed.	Project uses at least one event handler block OR causes an intentional effect or solves a problem.	Project uses at least one event handler block AND causes an intentional effect or solves a problem.
Diary <ul style="list-style-type: none">• How did you come up with this idea? What problem are you trying to solve and why?• What did you decide to alter in the landscape?• What does your program do?• Describe how your program alters the landscape.• Include at least one screenshot of the result of your program.	Minecraft diary entry is missing four or more of the required prompts.	Minecraft diary entry is missing two or three of the required prompts.	Minecraft diary entry is missing one of the required prompts.	Minecraft diary addresses all prompts.

CODING WITH MINECRAFT 3: COORDINATES

Lesson A: Introductions to coordinates

“Do now”

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

What are examples of how we used coordinates in the last unit?

Potential responses include:

- Where we placed a flower or gold block when walking in the game
- Where we spawned animals
- Random positions to spawn zombies
- Where we built the wall with linked events

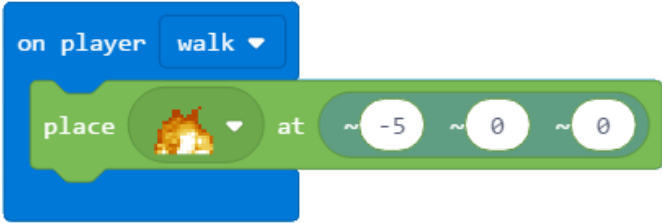
Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Understanding coordinates questions	Answers
What are the values for X, Y, Z for the world origin?	(0, 0, 0)
Is the world origin an absolute or relative position?	Absolute
Is (~0, ~0, ~0) an absolute or relative position?	Relative
Coding with coordinates questions (slide 12)	Answers
What other ideas do you have for using positions when coding?	Responses will vary
What's the difference between absolute world position and relative player position?	<p>Absolute world position = A position that is based on position in the world (in other words, the distance from the world's origin point (0, 0, 0) to an object or entity)</p> <p>Relative player position = A position that is based on where the player is (in other words, the distance from the player to an object or entity)</p>

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

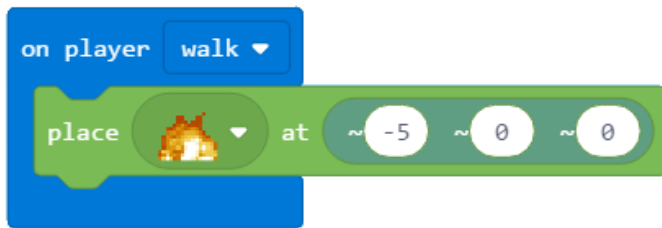
Questions	Answers
<p>1. Explain what this code means:</p> 	<p>When the player walks, fire starts 5 blocks west of the player.</p>
<p>2. What's one reason it's important to know coordinates in Minecraft?</p>	<p>Any of the following:</p> <ul style="list-style-type: none">• Know where you are• Where your agent is• Where resources are so you can find them• A safe place to get back to after the sun goes down in survival mode
<p>3. What's one new thing you were excited to learn today?</p>	<p>Responses will vary.</p>

Coding with Minecraft 3: Coordinates, Lesson A: Exit ticket

Name:

Date:

1. Write in words what this code means:



2. What's one reason it's important to know coordinates in Minecraft?
3. What's one thing you were excited to learn today?

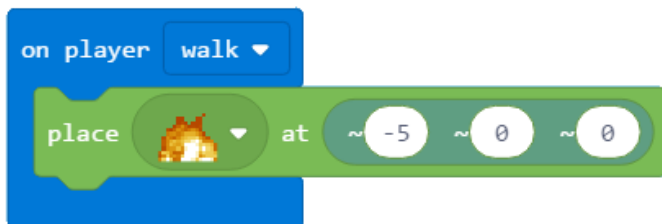


Coding with Minecraft 3: Coordinates, Lesson A: Exit ticket

Name:

Date:

1. Write in words what this code means:



2. What's one reason it's important to know coordinates in Minecraft?
3. What's one thing you were excited to learn today?

Lesson B: Coding with coordinates

“Do now”

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

What's a quick 'handy' way to remember the X, Y, Z axes?

Answer:



Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Understanding coordinates questions	Answers
Does the absolute position of an object with a permanent place change?	No
Does the position of an object relative to your position change as you move around the classroom?	Yes
Coding with coordinates questions (slide 19)	Answers
In Minecraft, what keyboard shortcut shows your player's world position?	F1 function key
How do you easily duplicate blocks in the MakeCode coding workspace?	Right-click (or tap and hold) any block and select Duplicate

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What direction is each X, Y, Z coordinate in Minecraft	X = east/west; Y = up/down; Z = north/south
2. In your life, what's one way you use coordinates? (Remember coordinate is another word for position or location)	Responses will vary

Coding with Minecraft 3: Coordinates, Lesson B: Exit ticket

Name:

Date:

1. What direction is each X, Y, Z coordinate in Minecraft?
2. In your life, what's one way you use coordinates? (Remember coordinate is another word for position or location)



Coding with Minecraft 3: Coordinates, Lesson B: Exit ticket

Name:

Date:

1. What direction is each X, Y, Z coordinate in Minecraft?
2. In your life, what's one way you use coordinates? (Remember coordinate is another word for position or location)

Lesson C: Automating actions with coordinates

“Do now”

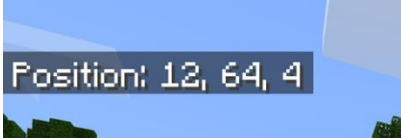
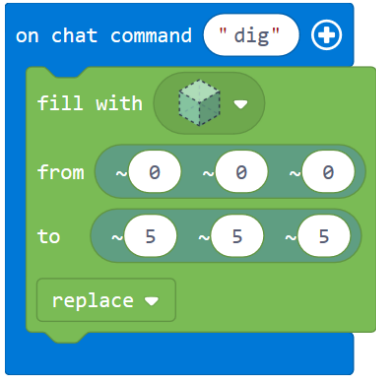
Format: Written on the board at the start of the lesson.

What is the relative position of the block above a player's head in Minecraft?

Answer: Always (~0, ~2, ~0) because all players are two blocks tall

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What type of position is each of the following? (X, Y, Z) (~X, ~Y, ~Z)	Absolute world position Relative player position
2. Draw an arrow to match the term with the definition. Relative position The distance from the world origin to an object or entity Absolute position The distance from player to an object or entity	
3. Describe the following position that appears in the upper left corner of game window in terms of direction and distance from the Minecraft world origin. Whose position is it describing? 	12 blocks east of the origin, 64 blocks above the origin, 4 blocks south of the origin The player's position
4. Which type of position is fixed and doesn't change?	Absolute world position
5. Describe what the following coding blocks do with words. 	Something like: <ul style="list-style-type: none">• When you type dig in the chat command in Minecraft,• A 5x5x5 air block (identifying the type of block as something other than air is ok)• will fill/replace• where the player is standing/current location.

Coding with Minecraft 3: Coordinates, Lesson C: Quiz

Name:

Date:

1. What type of position is each of the following?

(X, Y, Z)

(~X, ~Y, ~Z)

2. Draw an arrow to match the term with the definition.

Relative position

The distance from the world origin to an object or entity.

Absolute position

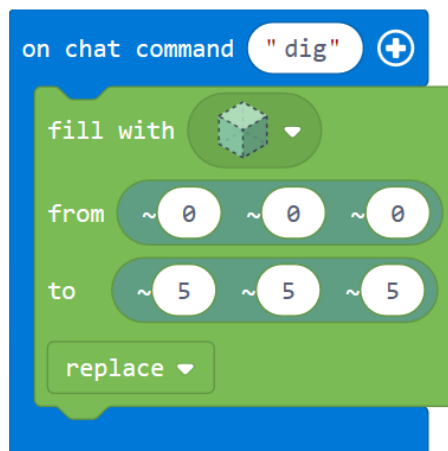
The distance from player to an object or entity.

3. Describe the following position in terms of direction and distance from the Minecraft world origin. Whose position is it?



4. Which type of position is fixed and doesn't change?

5. Describe what the following coding blocks do with words.



Lesson D: Get creative with coordinates

“Do now”

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

What ideas do you have for your coding project?

Answer: Responses will vary

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Coding with Minecraft 3: Coordinates

Minecraft diary

Compose a diary entry addressing the following:

- How did you come up with this idea? What problem are you trying to solve and why?
- What did you decide to alter in the landscape?
- What does your program do?
- Describe how your program alters the landscape.
- Include at least one screenshot of the result of your program.

Note: If you decided to improve one of this unit’s coding activities, please talk about the new code you wrote in addition to what was already provided in the lesson.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students’ unit independent coding projects. (Please see the next page for a printer-friendly version.)

Coding with Minecraft 3: Coordinates

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Project <ul style="list-style-type: none">• Uses coordinates• Alters landscape• Creative/original	Project lacks all three of the required elements.	Project lacks two out of the three required elements.	Project lacks one out of the three required elements.	Project alters the landscape in a creative and original way, efficiently and effectively using coordinates.
Diary <ul style="list-style-type: none">• How did you come up with this idea? What problem are you trying to solve and why?• What did you decide to alter in the landscape?• What does your program do?• Describe how your program alters the landscape.• Include at least one screenshot of the result of your program.	Minecraft diary entry is missing four or more of the required prompts.	Minecraft diary entry is missing two or three of the required prompts.	Minecraft diary entry is missing one of the required prompts.	Minecraft diary addresses all prompts.

CODING WITH MINECRAFT 4: VARIABLES

Lesson A: Introduction to variables

“Do now”

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

Write down two physical objects that can hold multiple items containing information inside them.

Possible answers include: wallet, back pack, house, car, envelope, purse

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with variables questions	Answers
What did your variable determine in the game?	The number of chickens.
Why is it good coding practice to give variables meaningful names?	To make variables easily recognizable. In a large program, naming variables with names you can identify makes finding problems much easier.

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. Write down an example of each of the following types of variables: a. Number variable: b. String variable: c. Boolean variable: d. Position variable:	Answers will vary.
2. What's one thing you were excited to learn today?	Answers will vary.

Coding with Minecraft 4: Variables, Lesson A: Exit ticket

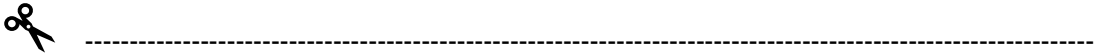
Name:

Date:

1. Write down an example of each of the following types of variables:

- a. Number variable:
- b. String variable:
- c. Boolean variable:
- d. Position variable:

2. What's one thing you were excited to learn today?



Coding with Minecraft 4: Variables, Lesson A: Exit ticket

Name:

Date:

1. Write down an example of each of the following types of variables:

- a. Number variable:
- b. String variable:
- c. Boolean variable:
- d. Position variable:

2. What's one thing you were excited to learn today?

Lesson B: Coding with variables

“Do now”

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

Name two variables that can affect how you dress to go outside.

Possible answers include: weather, time of day, holiday season, school

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with variables questions	Answers
How do you use variables to keep score?	By setting a variable to keep count of objects or actions.
How can you cause something to happen when a counter gets to a certain number?	By using a conditional statement in your coding.
What are variables that hold text called?	String variables

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

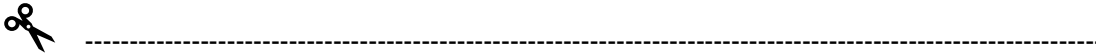
Questions	Answers
1. What are the two types of coding blocks you used to find out how many blocks you fell in Fall is in the Air?	Event handler and counter
2. What other things in Minecraft that might be useful or interesting to use code to count?	Responses will vary

Coding with Minecraft 4: Variables, Lesson B: Exit ticket

Name:

Date:

1. What are the two types of coding blocks you used to find out how many blocks you fell in Fall is in the Air?
2. What other things in Minecraft that might be useful or interesting to use code to count?



Coding with Minecraft 4: Variables, Lesson B: Exit ticket

Name:

Date:

1. What are the two types of coding blocks you used to find out how many blocks you fell in Fall is in the Air?
2. What other things in Minecraft that might be useful or interesting to use code to count?

Lesson C: Combining variables

“Do now”

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

What types measurements can you use in real life to determine how far you have walked?

Possible answers include: inches, feet, steps, miles, street blocks, minutes

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What is a number variable?	This holds numeric data. Examples: a person's age, a player's score, the year
2. What is a string variable?	This holds a string of alphanumeric characters. Examples: a person's name, a password, the day of the week
3. What is a Boolean variable?	This has only two possible values: true or false. Examples: Is it daytime? Is the game over?
4. What is a position variable in MakeCode?	This is a special kind of variable that holds three numbers that describe a specific location in three-dimensional space. These numbers are called the X, Y, and Z coordinates.
5. How did you use coordinates to help align the spacing of your floating compound words?	By storing the player's world position when you started to print
6. Why is it good coding practice to give variables meaningful names?	To make it easily recognizable. In a large program, naming variables with names you can identify makes finding problems much easier.

Coding with Minecraft 4: Variables, Lesson C: Quiz

Name:

Date:

1. What is a number variable?
2. What is a string variable?
3. What is a Boolean variable?
4. What is a position variable in MakeCode?
5. How did you use coordinates to help align the spacing of your floating compound words?
6. Why is it good coding practice to give variables meaningful names?

Lesson D: Get creative with variables

“Do now”

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

Write down a real-life variable that that can alter a different variable.

Answers will vary - (i.e. snow day that extends the end date of a semester)

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Coding with Minecraft 4: Variables

Minecraft diary

Compose a diary entry addressing the following:

- What type of information did you choose to keep track of?
- What problems did you encounter? How did you solve them?
- How did you use variables in your project, and what were their types?
- What did you name your variables and why?
- What was something new that you learned for this project? Describe how you figured it out.
- Include at least one screenshot of your project.

Note: If you decided to improve one of this unit’s coding activities, please talk about the new code you wrote in addition to what was already provided in the lesson.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students’ unit independent coding projects. (Please see the next page for a printer-friendly version.)

Coding with Minecraft 4: Variables

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
<p>Variables in the project</p> <ul style="list-style-type: none">• At least three different variables• Different types of variables• Implemented in a meaningful way	No variables are implemented.	At least one variable is implemented in a meaningful way OR variables are all of the same type.	At least two different variables are implemented in a meaningful way. Variables are of different types (text, number, Boolean, and/or position).	At least three different variables are implemented in a meaningful way. Variables are of different types (text, number, Boolean, and/or position).
<p>Chat / parameter in the project</p> <ul style="list-style-type: none">• An on chat command• One or more parameters in the enclosing code	Project uses no chat command at all.	Project uses a chat command but does not implement parameters.	Project uses a chat command with one or more parameters that are not used by the code.	Project incorporates a chat command that uses one or more parameters in the enclosing code.
<p>Diary</p> <ul style="list-style-type: none">• What type of information did you choose to keep track of?• What problems did you encounter? How did you solve them?• How did you use variables in your project, and what were their types?• What did you name your variables and why?• What was something new that you learned for this project? Describe how you figured it out.• Include at least one screenshot of your project	Minecraft diary entry is missing four or more of the required prompts.	Minecraft diary entry is missing two or three of the required prompts.	Minecraft diary entry is missing one of the required prompts.	Minecraft diary addresses all prompts.

CODING WITH MINECRAFT 5: CONDITIONALS

Lesson A: Introduction to conditionals

“Do now”

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

Think of examples to fill in the blanks of this sentence: If _____, then _____.

Answer: Responses will vary

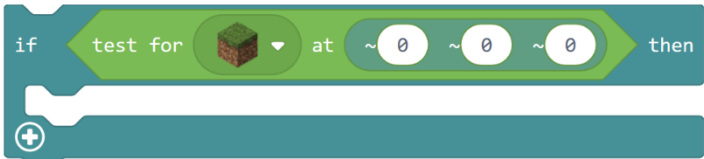
Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Understanding conditionals questions (slide 8)	Answers
In MakeCode, the conditionals blocks are found in which Toolbox drawer?	Logic
What are some of the types of conditional blocks?	If then, if then else, comparison, Boolean

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

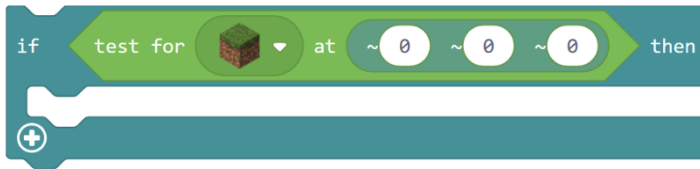
Questions	Answers
<p>1. Explain what this code means:</p> 	<p>A conditional that tests for a certain type of block (grass) at a specific set of coordinates (the player's exact location).</p>
<p>2. What's an example of an IF THEN or IF THEN ELSE statement?</p>	<p>Responses will vary and need to follow one of the following formats:</p> <ul style="list-style-type: none">• If _____, (then) _____• If _____, (then) _____, else _____

Coding with Minecraft 5: Conditionals, Lesson A: Exit ticket

Name:

Date:

1. Write in words what this code means:



2. What's an example of an IF THEN or IF THEN ELSE statement?

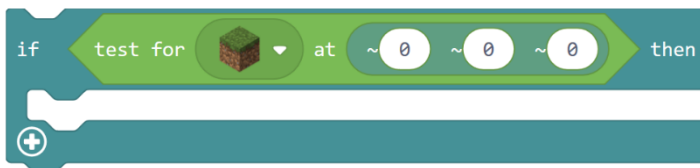
✂ _____

Coding with Minecraft 5: Conditionals, Lesson A: Exit ticket

Name:

Date:

1. Write in words what this code means:



2. What's an example of an IF THEN or IF THEN ELSE statement?

Lesson B: Coding with conditionals

“Do now”

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

What's the purpose of conditionals in coding?

Answer: It tells a program WHEN to perform a certain task (an alternative correct answer could be: It test to see if a certain condition, criteria or rule is met before performing a task)

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with conditionals questions	Answers
What is the other block that can be used for conditionals but isn't located in the Logic toolbox drawer?	While loop block
What are two ways to restart your code?	Use the Stop button in the Code Connection window or Resave your project

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What is it called when you code a loop within a loop?	A nested loop
2. What are you excited to learn more about?	Responses will vary

Coding with Minecraft 5: Conditionals, Lesson B: Exit ticket

Name:

Date:

1. What is it called when you code a loop within a loop?

2. What are you excited to learn more about?



Coding with Minecraft 5: Conditionals, Lesson B: Exit ticket

Name:

Date:

1. What is it called when you code a loop within a loop?

2. What are you excited to learn more about?

“Do now”

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

What is an example of each type of conditional statement: IF THEN and IF THEN ELSE?

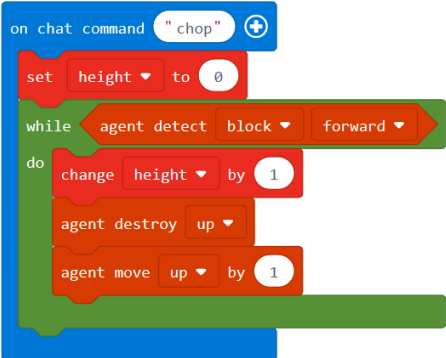
Answer: Responses will vary and need to follow the following formats:

If _____, (then) _____

If _____, (then) _____, else _____

Quiz answer key

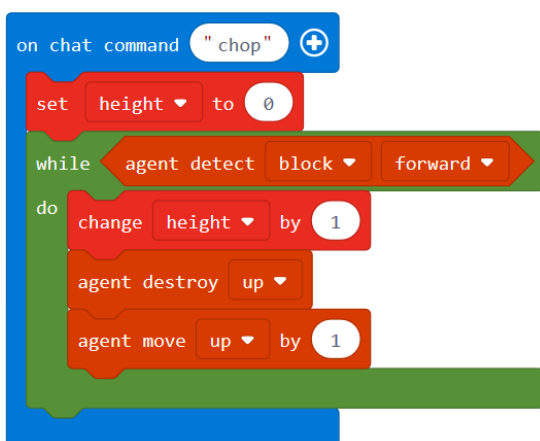
Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What's an example of an IF THEN statement?	Responses will vary and need to follow the Format: If _____, (then) _____
2. What's an example of an IF THEN ELSE statement?	Responses will vary and need to follow the format: If _____, (then) _____, else _____
3. In coding, conditionals tell a computer to do which of the following? a. How to do it b. To do it faster c. When to do it d. Where to do it	c. When to do it
4. What's a type of block acts like a conditional but isn't located in the LOGIC Toolbox drawer?	A While loop
5. What's a reason you might need to restart your code? a. Things aren't working as they should b. An infinite loop c. You get the message Cannot issue command, Agent is out of range d. All of the above e. Only a and c	d. All of the above
6. Describe what the following coding blocks do with words. 	Something like: <ul style="list-style-type: none">• When you type chop in the chat window• and your agent detects a block in front of it,• The height variable increases by one block,• The agent destroys the block above it,• And moves up by one block

Name:

Date:

1. What's an example of an IF THEN statement?
2. What's an example of an IF THEN ELSE statement?
3. In coding, conditionals tell a computer to do which of the following?
 - a. How to do it
 - b. To do it faster
 - c. When to do it
 - d. Where to do it
4. What's a type of block acts like a conditional but isn't located in the LOGIC Toolbox drawer?
5. What's a reason you might need to restart your code?
 - a. Things aren't working as they should
 - b. An infinite loop
 - c. You get the message Cannot issue command, Agent is out of range
 - d. All of the above
 - e. Only a and c
6. Describe what the following coding blocks do with words?



Lesson C: Get creative with conditionals

“Do now”

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

What ideas do you have for your coding project?

Answer: Responses will vary

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Coding with Minecraft 5: Conditionals

Minecraft diary

Compose a diary entry addressing the following:

- What Minecraft problem did you decide to solve? What does your program do?
- How did you use conditional statements in your project?
- Discuss one (or more) ways that working with a partner was different from just doing the project by yourself.
- Describe one point where you got stuck. Then discuss how you figured it out.
- Include at least one screenshot of your agent in action.
- Share your project to the web and include the URL.

Note: If you decided to improve one of this unit’s coding activities, please talk about the new code you wrote in addition to what was already provided.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students’ unit independent coding projects. (See the next page for a printer-friendly version.)

Coding with Minecraft 5: Conditionals

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Project <ul style="list-style-type: none">Worked with a partnerSolved a specific problem in Minecraft with efficient and effective coding and use of conditionalsUsed one or more blocks from the Logic Toolbox drawer	Project lacks all of the required elements.	Project lacks two the required elements.	Project lacks one out of the required elements.	Project solves a specific problem, efficiently and effectively.
Logic <ul style="list-style-type: none">Used conditional statements in an effective way that is integral to the program	Doesn't use conditional statements at all or uses loops in a superficial way and has problems with conditional statement execution.	Uses conditional statements effectively but in a superficial way.	Uses conditional statements in a way that is integral to the program but some problems with conditional statement execution.	Uses conditional statements effectively in a way that is integral to the program.
Diary <ul style="list-style-type: none">What Minecraft problem did you decide to solve? What does your program do?How did you use conditional statements in your project?Discuss one (or more) ways that working with a partner was different from just doing the project by yourself.Describe one point where you got stuck. Then discuss how you figured it out.Include at least one screenshot of your agent in action.Share your project to the web and include the URL.	Minecraft diary entry is missing four or more of the required prompts.	Minecraft diary entry is missing two or three of the required prompts.	Minecraft diary entry is missing one of the required prompts.	Minecraft diary addresses all prompts.

CODING WITH MINECRAFT 6: FUNCTIONS

Lesson A: Introduction to Functions

“Do now”

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

Write down three things you have done today that may require many steps, but are understood by others when you say a single phrase.

Possible answers include: washed my hair, finished my homework, ate breakfast,, walked the dog, etc.

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with functions questions	Answers
How does making something a function save you time when editing?	You only need to edit in one place if you need changes in the future and the function will change anywhere in the program
How is a loop different than a function?	A loop is a block of code to be executed a specific number of times. A function is a grouped block of code needed to complete an action.

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

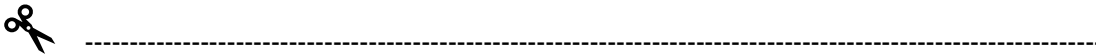
Questions	Answers
Make an ordered list of functions you need to perform to exit the room once class is finished.	Answers will vary: Listen for the teacher to dismiss us, put my things away, clean my desk, stand up, grab my backpack, walk to the door

Coding with Minecraft 6: Functions, Lesson A: Exit ticket

Name:

Date:

Make an ordered list of functions you need to perform to exit the room once class is finished.



Coding with Minecraft 6: Functions, Lesson A: Exit ticket

Name:

Date:

Make an ordered list of functions you need to perform to exit the room once class is finished.

Lesson B: Coding with Functions

“Do now”

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

Give an example of a real-life command involving several functions that would change depending on external factors. List the factor(s) that could alter the list of functions needed to accomplish the command.

Possible answers include: “going to school” on a warm rainy day versus “going to school” on a cold sunny day

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with variables questions	Answers
How did adjust the time of day in the game?	By adding a set time block from the search bar or by looking in GAMEPLAY .
What is something you could add to your code to spawn more Zombie Pigment in an event?	A loop to call the function multiple times

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What would have happened if you set your pigs and lightning to different coordinates in your zombie pig function?	The lightning would not strike the pig and transform it into a zombie.
2. Name a real-life function where a small error would mean something doesn't happen the correct way.	Responses will vary—baking a cake, building a model airplane, reading directions to a test, etc.

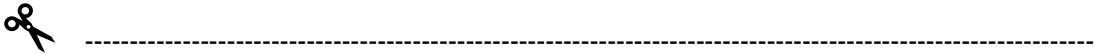
Coding with Minecraft 6: Functions, Lesson B: Exit ticket

Name:

Date:

1. What would have happened if you set your pigs and lightning to different coordinates in your zombie pig function?

2. Name a real-life function where a small error would mean something doesn't happen the correct way.



Coding with Minecraft 6: Functions, Lesson B: Exit ticket

Name:

Date:

1. What would have happened if you set your pigs and lightning to different coordinates in your zombie pig function?

2. Name a real-life function where a small error would mean something doesn't happen the correct way.

Lesson C: Building on Functions

“Do now”

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

Name a real-life function with steps that must be done in a certain order for it work.

Name an out of order step that would ruin that function’s purpose

Possible answers include: putting on shoes—socks before shoes; washing your hair—putting shampoo before getting it wet; making a cake—icing the cake before its baked

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. How does making something a function save you time when editing?	This holds numeric data. Examples: a person’s age, a player’s score, the year
2. How is a loop different than a function?	A loop is a block of code to be executed a specific number of times. A function is a grouped block of code needed to complete an action.
3. What is the difference between a function and a custom function?	A function is a self-contained set of instructions for performing a specific task within a computer program. Most objects have multiple functions associated with them. A custom function is a function created by the programmer (as opposed to functions associated with objects). A custom function usually has a specific purpose and can be/ is used in mutiple places within a program.
4. What is the difference between Main Code functions and Helper functions?	A Helper function usually have a specific purpose and can be/is used in mutiple places within a program. A Main Code function is a self-contained set of instructions for performing a specific task that often includes several Helper functions.
5. Why is it good coding practice to give functions meaningful names?	To make it easily recognizable. In a large program, naming functions with names you can identify makes finding problems much easier.

Coding with Minecraft 6: Functions, Lesson C: Quiz

Name:

Date:

1. How does making something a function save you time when editing?
2. How is a loop different than a function?
3. What is the difference between a function and a custom function?
4. What is the difference between Main Code functions and Helper functions?
5. Why is it good coding practice to give functions meaningful names?

Lesson D: Get creative with Functions

“Do now”

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

List at least five real-life functions you would need to accomplish a large scale, real-life project that requires the use of many functions

Answers will vary – building a skyscraper, training for a marathon, learning a new language, putting on a play, etc.

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Coding with Minecraft 6: Functions

Minecraft diary

Compose a diary entry addressing the following:

- What did you decide to build? Why?
- Describe each of your three functions and what each of them does.
- What kinds of building tasks did you decide you needed to be done by hand? Why?
- Include at least one screenshot of your finished building or piece of architecture.

Note: If you decided to improve one of this unit’s coding activities, please talk about the new code you wrote in addition to what was already provided in the lesson.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students’ unit independent coding projects. (Please see the next page for a printer-friendly version.)

Coding with Minecraft 6: Functions

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
<p>Functions in the project</p> <ul style="list-style-type: none">Creates, or helps to create, a building, temple, monument, or other piece of architecture in MinecraftProvides at least 3 separate and distinct functionsIncludes descriptive names that represent what each function does	No functions logically separate nor appropriately named.	One function logically separate and appropriately named.	Two separate functions, logically separate and appropriately named.	At least three separate functions, logically separate and appropriately named.
Project Design	Project is largely ineffective and/or inefficient.	Project is missing two of the required elements or is somewhat ineffective and/or inefficient.	Project is missing one of the required elements or is mostly effective and/or efficient.	Project addresses all required elements effectively and efficiently.
<p>Diary</p> <ul style="list-style-type: none">What did you decide to build? Why?Describe each of your three functions and what each of them does.What kinds of building tasks did you decide you needed to be done by hand? Why?Include at least one screenshot of your finished building or piece of architecture.	Minecraft diary entry is missing four or more of the required prompts.	Minecraft diary entry is missing two or three of the required prompts.	Minecraft diary entry is missing one of the required prompts.	Minecraft diary addresses all prompts.

CODING WITH MINECRAFT 7: ITERATION

Lesson A: Introduction to iteration

“Do now”

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

What’s a task or action that you do several times a day or day after day?

Answer: Responses will vary

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Introduction with iteration questions	Answers
What’s another word for iteration?	Anyone of the following: <ul style="list-style-type: none">• Repeat• Repetition• Repetitive• Loop• Iterative• Iterate
What are two ways that loops are beneficial when coding?	Any two of the following: <ul style="list-style-type: none">• Fewer lines of code• Simplified code• Takes up less room in memory• Shorter programs• Makes it easier to find mistakes
Coding with iteration questions	Answers
Are agent commands based on coordinates or the direction the agent faces?	Agent direction
How do you turn on the Slo-Mo feature in MakeCode?	Press the snail icon in the lower-left

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (the next page for a printer-friendly version to distribute to students.)

Questions	Answers
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1. Which of these words cannot be used interchangeably with iteration? Repeat, rendition, repetitive, loop, iterative, iterate?	Rendition
2. What's a task you could teach your agent to do?	Responses will vary

Coding with Minecraft 7: Iteration, Lesson A: Exit ticket

Name:

Date:

1. Which of these words cannot be used interchangeably with iteration? Repeat, rendition, repetitive, loop, iterative, iterate?
2. What's a task you could teach your agent to do?



Coding with Minecraft 7: Iteration, Lesson A: Exit ticket

Name:

Date:

1. Which of these words cannot be used interchangeably with iteration? Repeat, rendition, repetitive, loop, iterative, iterate?
2. What's a task you could teach your agent to do?

Lesson B: Coding with iteration

“Do now”

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

What's another word for iteration?

Answers could be any of the following: repeat, repetition, repetitive, loop, iterative, iterate

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with iteration questions	Answers
When an agent places blocks, which corner of his inventory is used?	Whatever is in the upper-left corner
How do you see your agent's inventory?	Point at the agent and right-click or tap and hold

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What type of loop does this describe: while <soup remains>eat with spoon	A while loop
2. What kind of loop starts when a program starts and keeps going until the program ends?	A forever loop

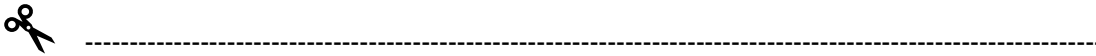
Coding with Minecraft 7: Iteration, Lesson B: Exit ticket

Name:

Date:

1. What type of loop does this describe: while <soup remains>eat with spoon

2. What kind of loop starts when a program starts and keeps going until the program ends?



Coding with Minecraft 7: Iteration, Lesson B: Exit ticket

Name:

Date:

1. What type of loop does this describe: while <soup remains>eat with spoon

2. What kind of loop starts when a program starts and keeps going until the program ends?

Lesson C: Debugging with iteration

“Do now”

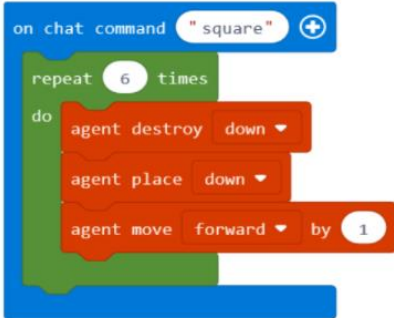
Format: Written on the board at the start of the lesson.

What's a real-life example of iteration?

Answer: Responses will vary

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What's a benefit of iteration in coding?	You only need to edit in one place if you need changes in the future and the function will change anywhere it appears in the program.
2. Match the following types of loops with their definition Repeat Runs a command as long as a condition is true For Runs a command <i>n</i> times While Runs a command until the program ends Forever Runs a command <i>n</i> times with a variable	
3. Is the following statement true or false? The agent will place whatever is in the lower-right corner of his inventory.	False
4. Both functions and loops can be used to repeat code. What's the difference in how they do this?	Loops repeat code over and over in one specific place. Functions spread repeating coding throughout applications.
5. Describe what the following code blocks do with words. 	Something like: <ul style="list-style-type: none">• When you type “square” in the chat command field• The agent will destroy the block it• Place a block in that space• And move forward by one block• To create a line of six blocks, like a trail or road

Coding with Minecraft 7: Iteration, Lesson C: Quiz

Name:

Date:

1. What's a benefit of iteration in coding?

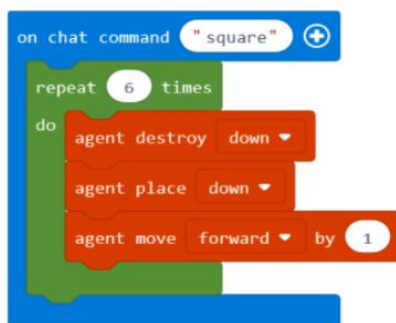
2. Match the following types of loops with their definition

Repeat	Runs a command as long as a condition is true
For	Runs a command n times
While	Runs a command until the program ends
Forever	Runs a command n times with a variable

3. Is the following statement true or false? The agent will place whatever is in the lower-right corner of his inventory.

4. Both functions and loops can be used to repeat code. What's the difference in how they do this?

5. Describe what the following code blocks do with words.



Lesson D: Get creative with iteration

“Do now”

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

What's your favorite coding activity with loops?

Answer: Responses will vary

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Minecraft diary

Compose a diary entry addressing the following:

- What type of staircase did you choose to build: Straight, Spiral, or Diagonal? Why?
- What problems did you encounter? How did you solve them?
- How did you use loops in your staircase?
- Describe one point where you got stuck. Then discuss how you figured it out.
- Include at least one screenshot of your staircase.
- Share your project to the web and include the URL

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students' unit independent coding projects. (See the next page for a printer-friendly version.)

Coding with Minecraft 7: Iteration

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Diary <ul style="list-style-type: none">What type of staircase did you choose to build: Straight, Spiral, or Diagonal? Why?What problems did you encounter? How did you solve them?How did you use loops in your staircase?Describe one point where you got stuck. Then discuss how you figured it out.Include at least one screenshot of your staircase.Share your project to the web and include the URL	Minecraft Diary entry is missing four or more of the required prompts.	Minecraft Diary entry is missing two or three of the required prompts.	Minecraft Diary entry is missing one of the required prompts.	Minecraft Diary addresses all prompts.
Project <ul style="list-style-type: none">Creates, or helps to create, a staircase in Minecraft	Staircase lacks all of the required elements.	Staircase lacks two of the required elements.	Staircase lacks one of the required elements.	Staircase is complete and navigable in both directions. Ends at somewhere around layers 10-13.
Loops <ul style="list-style-type: none">Uses loops effectively in a way that is integral to the program	Doesn't use loops at all or uses loops in a superficial way and has problems with loop output	Uses loops effectively, but in a superficial way	Uses loops in a way that is integral to the program, but there are some problems with the loop output	Use loops in a way that is integral to the program

CODING WITH MINECRAFT 8: ARRAYS

Lesson A: Introduction to arrays

“Do now”

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

Write down two ways you could organize a collection of different magazines.

Answers will vary, i.e., alphabetical order, publishing date, topic, size, number of pages, etc.

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Introduction with arrays questions	Answers
Define the following terms: <ul style="list-style-type: none">• Array length• Sort• Index• Type	<ul style="list-style-type: none">• Array length: the total number of items in the collection• Sort: how you could order items in the collection (for example, date, price, name, color, and so on)• Index: a unique address or location in the collection (for example, page number in an album, shelf on a bookcase, and so on)• Type: the type of item being stored in the collection (for example, DC Comics, \$1 coins, Pokémon cards, and so on)

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. How are arrays different from variables?	Answers will vary, but should include some of the following: <ul style="list-style-type: none">• Variables are used to store information• An array is a series of places to store things, like many variables in one place• You can store several items under the same name and you only need that one name to find the information• The information could be a list of items, a row of mailboxes, or a train of container boxes, for example.• The information in the array is all similar.

Coding with Minecraft 8: Arrays, Lesson A: Exit ticket

Name:

Date:

1. How are arrays different than variables?



Coding with Minecraft 8: Arrays, Lesson A: Exit ticket

Name:

Date:

1. How are arrays different than variables?

Lesson B: Build a Zoo with Arrays

“Do now”

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

What's the purpose of arrays in coding?

Answers will vary: Arrays store similar items under one name to make finding and organizing them easier.

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with arrays questions	Answers
What is a builder?	The Builder is like an invisible cursor in the game that can place blocks along a path very quickly.
What direction does the builder default to when walking, if you do not set a direction?	The direction the builder is facing when the command starts.

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What was the array length in your animal pen program?	Answers will vary Array length: the total number of items in the collection
2. What are you excited to learn more about?	Responses will vary

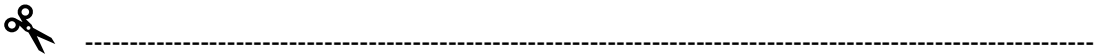
Coding with Minecraft 8: Arrays, Lesson B: Exit ticket

Name:

Date:

1. What was the array length in your animal pen program?

2. What are you excited to learn more about?



Coding with Minecraft 8: Arrays, Lesson B: Exit ticket

Name:

Date:

1. What was the array length in your animal pen program?

2. What are you excited to learn more about?

Lesson C: Teleport with Arrays

“Do now”

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

What information do you need to get a specific place in Minecraft?

Answer: The coordinates

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with arrays questions	Answers
What four commands did you support in this program and what did they do?	<p>Delete: This creates an empty array, effectively deleting your old one.</p> <p>Save: This saves your current position to the next empty spot in the array.</p> <p>Warp: This command, when entered with a number, teleports the player to the position stored at that index in the array.</p> <p>List: This command prints all the positions in the array, with their index numbers.</p>

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

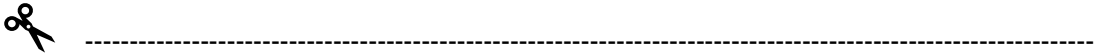
Questions	Answers
1. The first item in an array always had an index of what value?	zero
2. If you could warp anywhere in the real world, where would you go?	Responses will vary

Coding with Minecraft 8: Arrays, Lesson C: Exit ticket

Name:

Date:

1. The first item in an array always has an index of what value?
2. What If you could warp anywhere in the real world, where would you go?



Coding with Minecraft 8: Arrays, Lesson C: Exit ticket

Name:

Date:

1. The first item in an array always has an index of what value?
2. What If you could warp anywhere in the real world, where would you go?

Lesson D: Blocks with Arrays

“Do now”

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

What information do you need to get a specific place in Minecraft?

Answer: The coordinates

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. Define the following array terms: <ul style="list-style-type: none">• Array Length• Sort• Index• Type	<ul style="list-style-type: none">• Array length: the total number of items in the collection• Sort: how you could order items in the collection (for example, date, price, name, color, and so on)• Index: a unique address or location in the collection (for example, page number in an album, shelf on a bookcase, and so on)• Type: the type of item being stored in the collection (for example, DC Comics, \$1 coins, Pokémon cards, and so on)
2. How are arrays different from variables?	Answers will vary, but should include some of the following: <ul style="list-style-type: none">• Variables are used to store information• An array is a series of places to store things, like many variables in one place• You can store several items under the same name and you only need that one name to find the information• The information could be a list of items, a row of mailboxes, or a train of container boxes, for example.• The information in the array is all similar.
3. What is a Builder?	The Builder is like an invisible cursor in the game that can place blocks along a path very quickly.
4. What direction does the builder default to when walking, if you do not set a direction?	The direction the builder is facing when the command starts.

Coding with Minecraft 8: Arrays, Lesson D: Quiz

Name:

Date:

1. Define the following array terms:

- Array Length
- Sort
- Index
- Type

2. How are arrays different from variables?

3. What is a builder?

4. What direction does the builder default to when walking, if you do not set a direction?

Lesson E: Get creative with arrays

“Do now”

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

What does a block ID do in Minecraft?

Answer: The ID is a number Minecraft uses to keep track of all the items, blocks, and other things in the game.

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Minecraft diary

Compose a diary entry addressing the following:

- What kind of art did you decide to make? What does your program do?
- Describe how your program creates its artwork.
- How did you ensure that only valid indexes are accessed?

NOTE: If you decided to improve one of these lesson's activities, please talk about the new code you wrote in addition to what was already provided.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students' unit independent coding projects. (See the next page for a printer-friendly version.)

Coding with Minecraft 7: Iteration

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Diary <ul style="list-style-type: none">What kind of art did you decide to make? What does your program do?Describe how your program creates its artwork.How did you ensure that only valid indexes are accessed?	Minecraft Diary entry is missing four or more of the required prompts.	Minecraft Diary entry is missing two or three of the required prompts.	Minecraft Diary entry is missing one of the required prompts.	Minecraft Diary addresses all prompts.
Project <ul style="list-style-type: none">Use an array of itemsAccess items in the array either in sequence or at randomOnly access indexes that exist in the array (prevent “out-of-bound” access)	Staircase lacks all of the required elements.	Project is missing two of the required elements	Project is missing one of the required elements	Project creates a piece of artwork, efficiently and effectively
Arrays	Array is not properly created or used at all, no means of stopping out-of-bound access was implemented	Array is properly created, some elements not reachable, and out-of-bound access not prevented	Array is properly created (possible to access all elements or no out-of-bound access)	Array is properly created, possible to access all elements, no out-of-bound access

CODING WITH MINECRAFT 9: ARTIFICIAL INTELLIGENCE

Lesson A: Introduction to artificial intelligence

“Do now”

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

What’s one way a computer can be smart?

Answer: Responses will vary

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Introduction with AI questions	Answers
What is artificial intelligence?	Intelligence demonstrated by machines
What’s one reason to classify a computer as “intelligent”?	Any one of the following of other response that makes sense: <ul style="list-style-type: none">• Ability to make “smart” decisions• Ability to learn and increase knowledge• Ability to imitate humans, like language/speech, vision/image recognition
If a computer is intelligent, does that mean it has a conscience, self-awareness, or feelings?	No, not necessarily

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. What is Project Malmo?	A research project at Microsoft that trains artificially intelligent agents using Minecraft.
2. Why is Minecraft ideal for artificial intelligence research?	Responses will vary, but should be similar to one of the following: <ul style="list-style-type: none">• It offers endless possibilities• Ideas can be tested inexpensively and safely

Coding with Minecraft 9: AI, Lesson A: Exit ticket

Name:

Date:

1. What is Project Malmo?
2. Why is Minecraft ideal for artificial intelligence research?



Coding with Minecraft 9: AI, Lesson A: Exit ticket

Name:

Date:

1. What is Project Malmo?
2. Why is Minecraft ideal for artificial intelligence research?

Lesson B: Explore Intelligent Code

“Do now”

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

What's one thing computers could do if we had better AI programs?

Answers can be any one of the following or other responses that make sense: Diagnose diseases, drive our cars, fly airplanes, order our groceries, do our laundry for us, be our personal translator when we travel, do our banking and money management, etc.

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with AI questions	Answers
Describe what the fill block does.	The fill with stone block creates a 10 x 10 block of stone around the player's location and the agent will carve out the maze out of this stone.
Why do we place a block of air at -0 -0 -0?	The agent starts at the center of the 10 x 10 block of stone and carves out a maze, so first we teleport the agent to the player's coordinates, then place a block of air at that spot to free up the agent.
Why do you think we set agent destroy obstacles to false?	We set destroy obstacles to false because we don't want the agent to destroy the blocks in front of it until we have a chance to inspect them. This helps us determine whether we are in an existing maze pathway or not.
What is the difference between the two Teleport commands?	The first teleport to block teleports the agent to the player's location, which is at the center of the maze. The second teleports the player to a spot five blocks above the maze for a bird's-eye view.

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

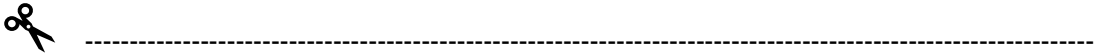
Questions	Answers
1. What is the new form of iteration we learned about today?	Recursion
2. What else could an intelligent agent help you with in Minecraft?	Responses will vary

Coding with Minecraft 9: AI, Lesson B: Exit ticket

Name:

Date:

1. What is the new form of iteration we learned about today?
2. What else could an intelligent agent help you with in Minecraft?



Coding with Minecraft 9: AI, Lesson B: Exit ticket

Name:

Date:

1. What is the new form of iteration we learned about today?
2. What else could an intelligent agent help you with in Minecraft?

Lesson C: Code an Intelligent Agent

“Do now”

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

What's been the most fun and most challenging part of this unit so far?

Answer: Responses will vary

Knowledge check questions and answer key

Format: Q&A discussions during the lesson.

Coding with AI questions	Answers
If you were in a maze in the real world, what's a strategy to find your way out?	Follow one wall consistently
If your agent is in a maze in Minecraft, what are the key steps for it to find its way out?	Always turn left whenever it can, and when it reaches a dead end, turn around

Exit ticket answer key

Format: Printed half-page handout for students to complete and turn in as they leave class. (See the next page for a printer-friendly version to distribute to students.)

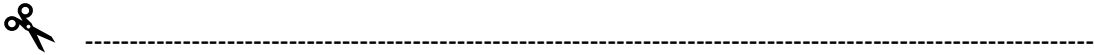
Questions	Answers
1. What does an algorithm describe?	Step-by-step directions
2. What's another activity in Minecraft that an intelligent agent could do?	Responses will vary

Coding with Minecraft 9: AI, Lesson C: Exit ticket

Name:

Date:

1. What does an algorithm describe?
2. What's another activity in Minecraft that an intelligent agent could do?



Coding with Minecraft 9: AI, Lesson C: Exit ticket

Name:

Date:

1. What does an algorithm describe?
2. What's another activity in Minecraft that an intelligent agent could do?

Lesson D: Code a Tree Hunting Agent

“Do now”

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

What's one way to classify a computer as “intelligent”?

Answer: Any one of the following of other response that makes sense:

- Ability to make “smart” decisions
- Ability to learn and increase knowledge
- Ability to imitate humans, like language/speech, vision/image recognition

Quiz answer key

Format: Printed full-page handout for students to complete during class. (See the next page for a printer-friendly version to distribute to students.)

Questions	Answers
1. Which of the following examples are considered artificial intelligence? (Choose all that apply) a. Two players play an online game b. Playing Scrabble against an app c. Garry Kasparov playing chess with IBM's Deep Blue d. All of the above e. None of the above	b and c, as these options are intelligence demonstrated by machines
2. Which of the following are criteria to classify a computer as “intelligent”? (Choose all that apply) a. Ability to increase knowledge b. Ability to feel pain c. Ability to imitate human speech d. All of the above e. None of the above	a and c, as these options demonstrates the consciousness by a computer
3. What are two things computers could do if we had more intelligent programs?	Answers can be any one of the following or other responses that make sense: Diagnose diseases, drive our cars, fly airplanes, order our groceries, do our laundry for us, be our personal translator when we travel, do our banking and money management, etc.
4. If you were working your way through a grove of trees blindfolded, what's an intelligent strategy?	Divide the grove into a grid and proceed through the grid row by row
5. BONUS: What's one other activity that approach would help with?	Something like Search and rescue of a lost person or animal Finding a lost object in a room or house

Coding with Minecraft 9: AI, Lesson D: Quiz

Name:

Date:

1. Which of the following examples are considered artificial intelligence? (Choose all that apply)

- a. Two players play an online game
- b. Playing Scrabble against an app
- c. Garry Kasparov playing chess with IBM's Deep Blue
- d. All of the above
- e. None of the above

2. Which of the following are criteria to classify a computer as “intelligent”? (Choose all that apply)

- a. Ability to increase knowledge
- b. Ability to feel pain
- c. Ability to imitate human speech
- d. All of the above
- e. None of the above

3. What are two things computers could do if we had more intelligent programs?

4. If you were working your way through a grove of trees blindfolded, what’s an intelligent strategy?

5. BONUS: What’s one other activity that approach would help with?

Lesson E: Get creative with AI

“Do now”

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

What are some ways an intelligent agent could help you in the game?

Answer: Responses with vary

Minecraft diary questions

Format: Provide to students electronically. Copy and paste from below.

Minecraft diary

Compose a diary entry addressing the following:

- What Minecraft problem did you decide to solve? What does your program do?
- Describe how your AI figures out how to perform the task or solve the problem
- Discuss one (or more) ways that working with a partner was different from just doing the project by yourself.
- Describe one point when you got stuck. Then discuss how to figured it out.
- Share your project to the web and include the URL.

NOTE: If you decided to improve one of these lesson's activities, please talk about the new code you wrote in addition to what was already provided.

Independent project rubric

Format: Printed full-page rubric for the educator to use to evaluate students' unit independent coding projects. (See the next page for a printer-friendly version.)

Coding with Minecraft 9: Artificial Intelligence

Independent project and Minecraft diary scoring rubric

Assessment	1	2	3	4
Diary <ul style="list-style-type: none">What Minecraft problem did you decide to solve? What does your program do?Describe how your AI figures out how to perform the task or solve the problemDiscuss one (or more) ways that working with a partner was different from just doing the project by yourself.Describe one point when you got stuck. Then discuss how to figured it out.Share your project to the web and include the URL.	Minecraft Diary entry is missing four or more of the required prompts.	Minecraft Diary entry is missing two or three of the required prompts.	Minecraft Diary entry is missing one of the required prompts.	Minecraft Diary addresses all prompts.
Project	Project code is greatly cumbersome and inefficient	Project solves a specific problem but execution of the task is cumbersome or inefficient	Project solves a specific problem mostly efficiently	Project solves a specific problem, efficiently and effectively
Logic	Agent and/or Builder never completes its assigned task	Agent and/or Builder completes its assigned task some of the time in some situations	Agent and/or Builder completes its assigned task most of the time in most situations	Agent and/or Builder completes its assigned task in all circumstances all the time