



## Educator Guide

Unit 3 – 4 Lessons

60 minutes per lesson

Single Student

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# Coding with Minecraft: 3- Coordinates

[EDUCATION.MINECRAFT.NET](https://education.minecraft.net)

## THEME OVERVIEW

In this unit, students will learn about the coding concept—coordinates. This unit will cover how to move around in a Minecraft world based on the three-coordinate grid represented by (X, Y, Z) coordinates. Students will learn the difference between relative position and world position. Students will participate in both unplugged and plugged experiences to help them learn, practice, and apply coordinates in the Minecraft world.

## LESSON OVERVIEW

All of the following lessons are approximately 45-60 minutes, depending on how much time students are given to explore the coding activities:

- Lesson A: Introduction to Coordinates
- Lesson B: Coding with Coordinates
- Lesson C: Automating Actions with Coordinates
- Lesson D: Get Creative with Coordinates

## LESSON OBJECTIVES

- Learn and apply the coding concept of coordinates
- Articulate the difference between relative position and world position
- Describe the difference between relative coordinates and absolute coordinates in real life
- Explain the importance of coordinates in coding and while playing Minecraft
- Design an original project to apply the use of coordinates in new ways

## THINGS TO KEEP IN MIND

- You will need to gather the additional materials for the unplugged activities:  
**Lesson A:** Access to Map app or physical maps/globes, index cards, pencils or pens.  
**Lesson B:** Index cards or blank pieces of paper, Masking tape or painter's tape (optional)
- Remind students that there may be more than one solution for each of the activities.
- Students should keep a coding mindset. As with any other sport or activity, you must practice in order to get better. Coding is no different.

## MINECRAFT MECHANICS

C	C
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	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

	<b>On chat command</b> Runs the code when the student types the chosen text in the chat window
	<b>On player (traveled)—walk/swim/fly/fall, etc.</b> Runs code when the current player travels a certain way
	<b>Print</b> Creates some text in the game world
	<b>Fill</b> Fills a volume between two position
	<b>Clone</b> Makes a copy of a cubic region from one location into another location

	<b>Position</b> Creates a new relative position
	<b>World</b> Creates a new world (absolute) position
	<b>Join</b> Add one text string to another to make one big string

## KEY VOCABULARY

**Coordinates** – an action or occurrence detected by a computer

**X Coordinate** – the coordinate represents a distance along the horizontal plane east or west of the origin, just like real-world longitude values

**Y Coordinate** – the coordinate represents a distance along the vertical plane up or down from the origin, just like real-world altitude values

**Z Coordinate** – the coordinate represents a distance north or south of the origin, just like real-world latitude values

**Relative Position** – a position that is based on the where the player is located (i.e., the distance from the player to an object or entity)

**Absolute World Position** – a position that is based on a position in the world (i.e., the distance from the world’s origin point (0, 0, 0) to an object or an entity)

## LESSON ACTIVITIES

### Lesson A: Introduction to Coordinates (Slides 1-32)

#### Direct Instruction (Teacher-Led; “I Do”)

Welcome to back to Coding with Minecraft, a place to learn all about the basic concepts of computer science. Over the next couple of sessions, we are going to learn about coordinates. (slide 1)

Today, we are going to learn about what are coordinates and how we use them not only in real-life, but how they are used in Minecraft. (slide 2)

Review the lesson objectives. (slide 3)

In Minecraft, it’s important to know where you are in the world, where your Agent is, and where all kinds of things from diamond mines, to woodland mansions, to underground spawners are. In Survival mode, it’s even more important to be able to get back to a safe place when the sun starts to go down, or remember the

location of points of interest so you can find them again if your inventory is full and you need to come back.

Even if you are already familiar with moving around in Minecraft, you might not have used coordinates, except perhaps to teleport. In order to use many of the MakeCode blocks effectively, you need to understand Minecraft *coordinates*, which are also known as *positions*. (slide 4)

### Coordinates in Minecraft

Minecraft uses a set of three coordinates (X, Y, Z) to specify a position in a Minecraft world. MakeCode for Minecraft uses these coordinates in many of its blocks to specify where an action should take place.

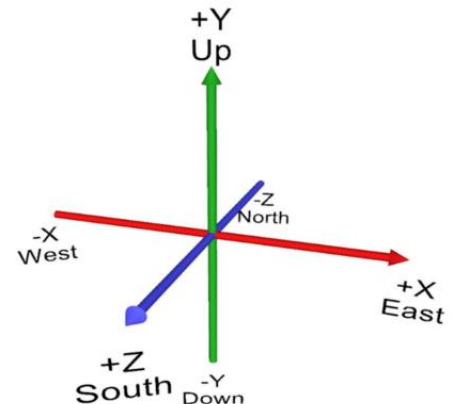
Just as in a three-dimensional coordinate grid in math class, there is an origin point (0, 0, 0) where all three axes meet, and the coordinates X, Y, and Z represent distances from this point. (slide 5)

(X): The coordinate represents a distance along the horizontal plane east or west of the origin, just like in real-world longitude values. You might also think of this as length.

- A distance east of the origin is represented by a positive X value, (+X)
- A distance west of the origin is represented by a negative X value, (-X).

(Y): The Y coordinate represents the distance along the vertical plane up or down from the origin, just like real-world altitudes values. You might also call this height.

- A distance up from the origin is represented by a positive Y value, (+Y).
- A distance down from the origin is represented by a negative Y value, (-Y).



(Z): The coordinate represents a distance north or south of the origin, just like real-world latitude values. You might also think of this as width.

- A distance south of the origin is represented by a positive Z value, (+Z).
- A distance north of the origin is represented by a negative Z value, (-Z).

Here is a quick and “handy” way to remember the X, Y, and Z axes! (slide 6)

- Hold your hand so you’re pointing your index finger parallel to the ground as the X axis;
- your thumb straight up as the Y axis;

- and your middle finger perpendicular to your index finger as the Z axis.



Coordinates are used as positions in Minecraft. It is important that we know and understand the difference between absolute world position and relative player position.

There are two different kinds of positions in Minecraft:

Absolute world position (**slide 7**)

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).

- Could be far down in the ground
- Is visible in the game if you press F1

In this example, your world position in this Minecraft world is currently (3, 98, 0). These numbers represent how far away you are from the world origin point (0, 0, 0).

- X = 3 means that you are three blocks east of the origin point.
- Y = 98 means that you are 98 blocks above the origin point.
- Z = 0 means that you are at north-south origin.



To see where you are in Minecraft, press the function key F1. Your world position (X, Y, Z) coordinates will appear in the upper-left corner of your Minecraft window. Try walking around in Minecraft and see how these values change. Press the spacebar to jump and notice that your altitude (the Y value) changes, momentarily, by +1. If you are flying, Y will change a lot.

### Relative player position (slide 8)

A position that is based on where the player is (in other words, the distance from the player to an object or entity). Relative positions are denoted by a ~ (tilde) symbol before each of the three-coordinate ( $\sim X, \sim Y, \sim Z$ ) position.

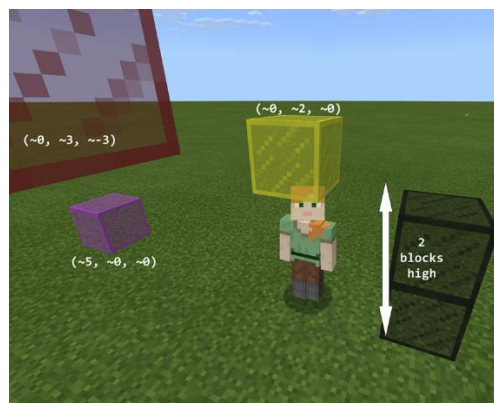
- Distance from the player to an object or entity
- Not visible in game

The relative position is the distance from your player to whatever it is you are talking about. Relative positions are denoted by a ~ (tilde) symbol before each of the three numbers that make up the three-coordinate (X, Y, Z) position.

Minecraft players are two blocks tall, so  $(\sim 0, \sim 0, \sim 0)$  represents the player's feet and  $(\sim 0, \sim 1, \sim 0)$  represents the player's head. As a player moves around in Minecraft, so do the player's feet, which means the relative position is NOT a fixed position- it changes as the player moves around in the game.

For example, wherever the player is in the Minecraft world:

- $(\sim 0, \sim 2, \sim 0)$  will always represent the location just above the player's head.
- $(\sim 5, \sim 0, \sim 0)$  will always represent the location five blocks east of the player's current position,
- $(\sim 0, \sim 3, \sim -3)$  will always represent the block two blocks above the player's head and three blocks north of the player's current position.





Here the block is five blocks west and five blocks north of the character. Both the player and the block are at the same height (65) or level of the Y axis. (slide 9)



### Guided Instruction (Teacher Modeling; “We Do”)


#### Unplugged Activity: World Landmarks

**Materials Needed:** Map App (like Bing Maps), actual globes or physical maps, index cards, pens/pencils



**Objective:** Learn the difference between relative coordinates and absolute coordinates.

In this activity, you will learn the difference between relative coordinates, and absolute coordinates. You will practice using coordinates to become more comfortable and confident. (slide 10)

Let’s look at some real life examples of coordinates to identify the locations of important world landmarks. (slide 11)

<p><b>Null Island</b></p> 	<p>Null Island is the Earth’s geographical origin point. It is located at 0° N 0° E</p>
<p><b>Mount Everest</b></p>	<p>Mount Everest is the tallest mountain in the world. It is located at 27° N 86° E</p>



	
<p><b>Empire State Building</b></p> 	<p>The Empire State Building is located in Manhattan, New York City. It was the tallest building in the world until 1970. It is located at 40° N -73° E</p>

On Earth, the latitude at the equator is 0 degrees, and at the North Pole it is 90 degrees north. A degree of latitude covers about 70 miles or about 112 kilometers.

**Directions for Activity: (slide 12)**

Using Bing maps or the alternative you've chosen:

1. Find your own real-world position- the latitude and longitude of where you are right now. Depending on the age and skills of the students, you might want to have the students use their country/region or state capitols for their world position.
2. Choose a world landmark and look up the landmark's real-world position- its latitude and longitude.
3. Calculate the position of the landmark relative to your current location. Subtract the latitude and longitude of the landmark from your real-world position.

Model the example shown on **Slide 12**. Then allow students to select their own landmarks. Practice calculating coordinates (positions).

After completing this activity, use the reflection questions to debrief the learning. **(slide 13)**

- What are the values for X, Y, Z for the world origin?
- Is the world origin an absolute or relative position?
- Is (~0, ~0, ~0) an absolute or relative position?

### Activity: Compass Rose (slide 14)

Before you begin this coding activity, make sure you are set-up to demonstrate and lead the students through this coding experience. It is best if you complete this activity on a device connected to a projector or presentation screen. Split the screen and display the classroom presentation alongside of the Minecraft world.

Have all students log into Minecraft: Education Edition. After students have logged into the platform, navigate to the Coding with Minecraft subject kit. (slide 15) Once in the Coding with Minecraft subject kit, select Unit 3: Coordinates to begin the lesson. (slide 16)

We are going to create a compass rose by coding with coordinates. (slide 17)

#### Steps for the Coding Activity: Compass Rose

- Press "C" to open Code Builder (slide 18)
- Find the "Compass Rose" tutorial (slide 19)
- Select "Blocks" to start the tutorial (slide 20)
- Step 1: Use the `on chat` command in the workspace and rename it "compassrose". (slide 21)
- Step 2: Insert a `print` into your chat command. Change HELLO to "E". Change the block from `grass` to `glowstone`. (slide 22)
- Step 3: Try it out in Minecraft! Press "T" to open the chat and enter compassrose. (slide 23)
- Step 4: Change the position to ~20, ~0, ~0 so that `print` places the "E" letter 20 blocks east of your current position. (slide 24)
- Step 5: Go to Minecraft and enter compassrose in the chat again. The letter "E" is now printed 20 blocks away! (slide 25)
- Step 6: Put in another `print` to show "W" 20 blocks west. Try it in Minecraft. (slide 26)
- Step 7: Insert another `print` to show "N" 20 blocks north and "S" 20 blocks south. (slide 27)

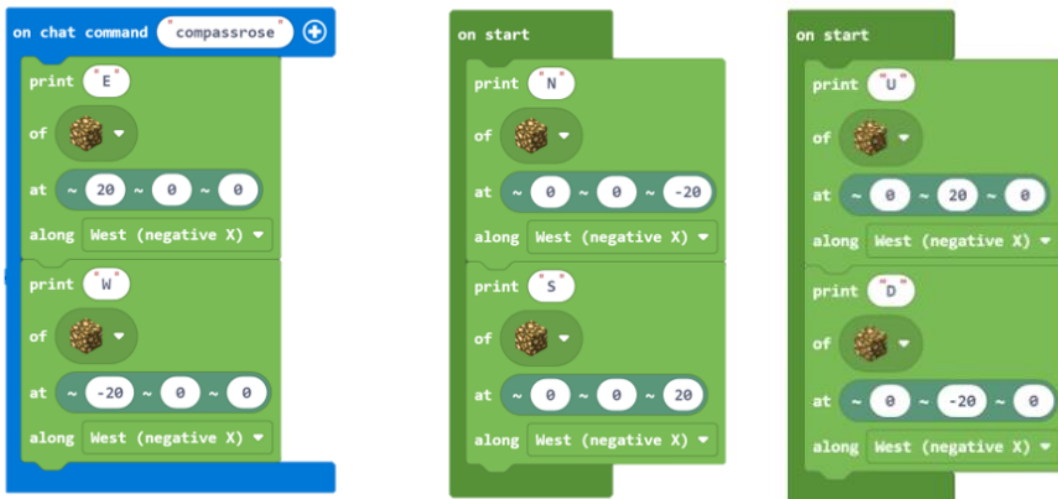
The initial compass rose will look like this: (slide 28)



### Independent Work (Teacher Support; “You Do”)

Students should complete the program by inserting more print blocks to show the “U” 20 blocks up and “D” 20 blocks down. Run the entire program in Minecraft! Students can even change the block type and add in the lines to the compass rose!

### Coding Solution:



If there is additional time, students can try out these challenges and/or challenges:  
 Challenge 1- Create a Bigger Compass

Extend the axis of your compass rose to 41 blocks long. Can you get the letters to print nicely on the end of this new, bigger compass rose?

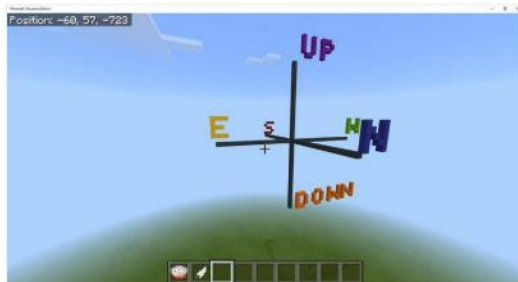


## Challenge 2 – Build an Air Compass

Add an up-and-down Y-axis and labels. Make your compass up in the sky, so you can look up and see it as you walk along. What you will need to do:

1. First, you need to move the regular compass into the sky. What coordinate (X, Y, Z) would you change?
2. Next, you need to build an axis for Y. How could you copy existing code, change it a little, and accomplish that?
3. Finally, print out the words “up” and “down.”

**Tip:** When you print out the words “up” and “down,” move them a little forward (north/south) and a little sideways (east/west). If you don't, the words might cut into your Y-axis.



## Extensions

Copy the code and change things around to see what kind of results you can create. Suggestions are given but do as you like!

### Extension 1- Use Color for Directions

Instead of using Gray Wool to print out a line of blocks along the X, Y and Z axes, you can select different colors to represent the three different directions.

- What else might you add to make this more entertaining?
- What if chickens appeared after blocks? Chickens running along the east/west axis might be interesting.
- Could you somehow make arrows instead of just straight lines?

## Extension 2- Use Colors to Represent Other Compass Features

How about changing the colors of the printed text to the colors of the X, Y, and Z axes? You could change all the colors to something else. You could theme this out a little- make the compass in wood and then use stone and other items to give this compass a medieval theme.

- How would you theme it?
- What if instead of creating a theme you change the code so the Y-axis goes up all the way from the ground like a tower?

## LESSON CONCLUSION

Upon completion of this lesson, students should be able to answer the following questions: (slide 29)

1. What other ideas do you have about how you can use positions when coding?

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

2. What's the difference between absolute world position and relative player position?

Answer: Answers will vary; here are some examples: door opens, lights turn on, hands clap twice, raise hand, etc.

These questions can also be used as a formative assessment. A printable version of these questions can be found in the Assessment Guide.

Conclude the lesson by reviewing the concepts covered in Lesson A. (slide 31)

Provide a preview of the upcoming lesson. (slide 32)

## Lesson B: Coding with Coordinates (Slides 33-59)

### Direct Instruction (Teacher-Led; "I Do")

Welcome back to Coding with Minecraft. We are going to continue to learn about and practice using coordinates in our coding. (slide 33)

Review the lesson objectives. (slide 34)

Review the coding concept of coordinates (through positions) covered in Lesson A. (slide 35)

## Guided Instruction (Teacher Modeling; “We Do”)

Before you begin this unplugged activity, you will need to set-up your classroom. Identify which direction (or wall) of your classroom represent each of the four cardinal directions: north, south, east, and west. Label them using the index cards or blank pieces of paper.

If possible, place masking tape or painter’s tape on the floor to represent the X-axis and the Z-axis, creating a coordinate grid with the origin at the middle point of the room, where the axes meet. (This works really well if you have a tiled floor!)

## Unplugged Activity: Classroom Coordinates (slide 36)

**Materials:** Index cards or blank pieces of paper, masking tape or painter’s tape (optional)

**Objective:** Practice differentiating between relative coordinates and absolute coordinates

### Directions:

#### Student absolute world positions

1. Imagine that your classroom is a Minecraft world of its own.
2. Place a sign with the origin point, indicating the world position (0, 0, 0).
3. Stand at this origin point.
4. Ask the students to write down on an index card or paper their classroom world position in the format (X, Y, Z). In other words, from the origin point, how would you need to travel along the X and Z axes to reach where they are? (If your floor is not tiled, use a step to represent one block.) For this exercise, have them leave the Y coordinate as zero (0).
5. Check a few students’ world positions by walking from the classroom world origin point to each student to make sure they are correct.

Example: A student gives her or his classroom world coordinates as (4, 0, 2). If you walk four steps (or tiles) east and then two steps south from the classroom world origin point, you should end up where they are sitting.

### To discuss:

- Which coordinate will be the same for all students? (Y)
- What determines an average step?
- What is the margin of error for short distances?
- What is the margin of error for large distances?
- Why isn't this a problem in Minecraft itself?

### Object absolute positions

1. Pick an object in the room that has a permanent place.
2. Ask the students to identify this object's classroom world position and label it.
3. If the object is off the floor, have the students give the Y coordinate as something other than 0. (You will want to set a consistent vertical measurement, such as 1 foot= 1 block.)

Although not necessary, it could be useful to have students use rulers to better estimate the distance along the Y-axis, to make the distance up or down easier to measure. Using an arm measurement would also work, though this has similar issues as using steps: how do you determine the average length from elbow to hand?

The topic of measuring with body parts is a historical one. Early civilizations measured length using their forearms, hands, or fingers. This could be the topic of a small extension if appropriate.

Link: [https://en.wikipedia.org/wiki/History\\_of\\_measurement](https://en.wikipedia.org/wiki/History_of_measurement)

Repeat the previous steps with other objects that have a permanent place in the classroom- for example, the wall clock, the door to the classroom, or a window. Have the students label these objects with their respective world positions. When you feel that the students have mastered the concept of absolute world position. Move on to the next section.

### Student relative positions

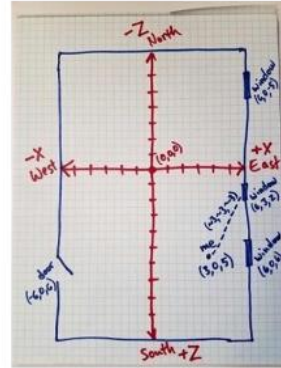
1. Remind students that with relative positions, the origin ( $\sim 0, \sim 0, \sim 0$ ) is where they are.
2. Point out an object in the classroom that was labeled with an absolute world position in the previous exercise.
3. Ask students to write down on an index card or paper how far and in which of the cardinal directions (north, south, east, or west) they would need to travel from where they currently are in the classroom to reach the object. They should use the format ( $\sim X, \sim Y, \sim Z$ ).
4. Have the students move to a different place in the room and then recalculate the object's position relative to their new positions.
5. Repeat the previous step with other objects that have a permanent place in the classroom.



You might suggest that students “map out” their classroom and the location of themselves and objects on a piece of graph paper.

Check a few students' relative positions by having them walk from where they are to the object, following what they wrote down as the object's position relative to their current position.

For example, a student might say that the object is  $(-2, -0, -5)$  relative to their current position. They would need to travel two tiles west and five tiles north to reach the object.



Point out the difference an absolute classroom location and a relative position:

- The absolute position of an object with a permanent place does NOT change.
- The position of an object relative to a student's position changes as the student moves around the classroom.

#### Additional Challenge: Relative position of moving objects

1. Have students work in pairs to calculate their partner's position relative to their own position.
2. Have both students move around and recalculated their positions relative to each other.

If students get really good at calculating relative position, this last challenge could easily be a speed game.

1. Have two people from different groups come up.
2. Give each person an index card with coordinates on it.
3. Say “Go”, and have them travel to those places in the room.
4. The first team to calculate their relative position correctly wins.

There are many other small details you would need to work out, but this could be a fun way to gamify the activity.

Before moving on to the next activity, review the discussion questions to debrief from the unplugged activity. (slide 37)

#### Coding Activity: Minecraft Moving Company (slide 38)

Import project from here:

[https://minecraft.makecode.com/?ipc=1#tutorial:github:mojang/educationcontent/CodingWithMinecraft/unit\\_3/lesson\\_B](https://minecraft.makecode.com/?ipc=1#tutorial:github:mojang/educationcontent/CodingWithMinecraft/unit_3/lesson_B)

Make sure you are set-up to demonstrate and lead the students through this coding experience. It is best if you complete this activity on a device connected to a projector or presentation screen. Split the screen and display the classroom presentation alongside of the Minecraft world.

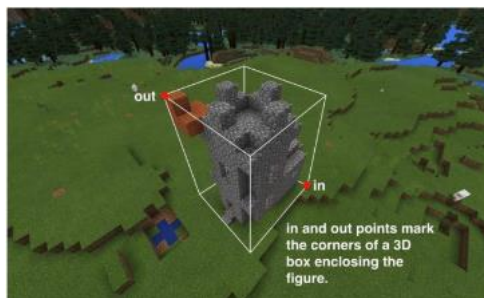
Have all students log into Minecraft: Education Edition. Students should continue working in the same world from Lesson A. Directions for navigating to the previous world can be found on **slide 39**.

Have you ever built the perfect house in Minecraft, but wished you had done it in a different location? Well, now you can! You can use coordinates and some of the block operations in the Toolbox drawer to copy and paste entire portions of the Minecraft landscape. You can copy hillsides, lakes, and even entire buildings! Let's create a way to specify an area of the world, then copy it somewhere else. (**slide 40**)

Build a simple house in Minecraft. (**slide 41**)

In this project, you will use three different **on chat** commands: (**slides 42-55**)

- **"start"**: This sets one corner of the area to be copied
- **"stop"**: This sets the opposite corner of the area to be copied
- **"copy"**: This creates an exact copy of everything between the start and stop points, placing it at your current position

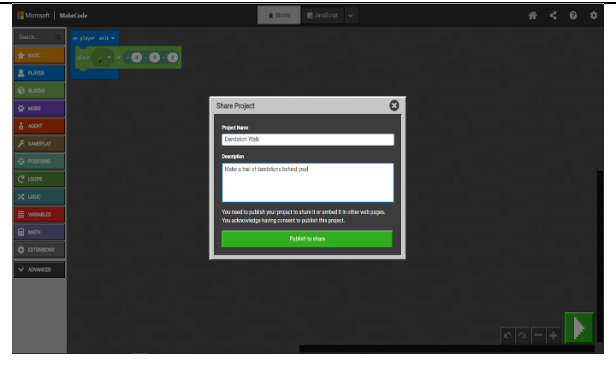


**Step 1:** Share your program.

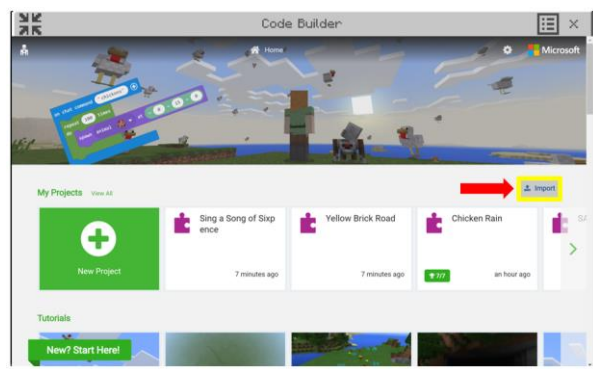
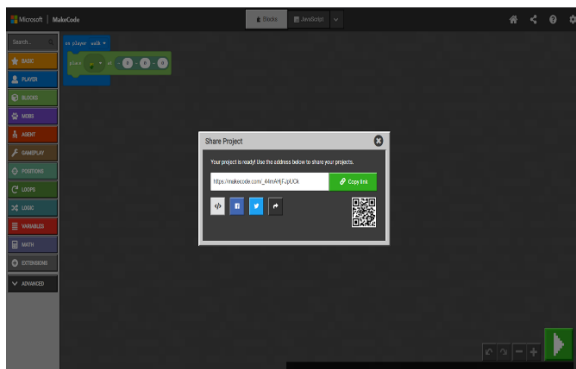
**Step 2:** Name the project, provide a brief description, and select the "Publish to share" button.



**Step 3:** Select the green “Copy link” button.

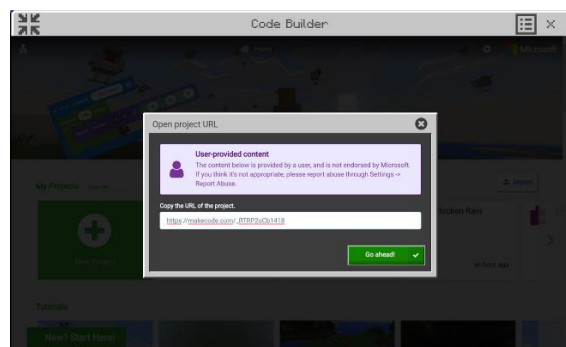
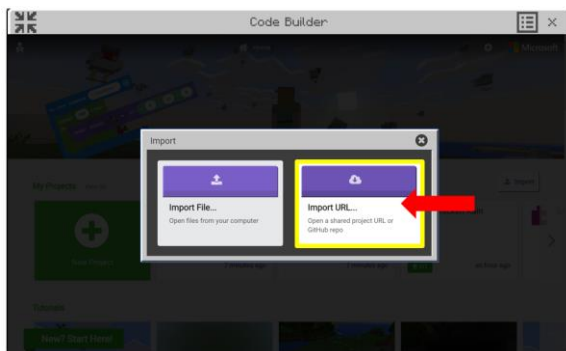


**Step 4:** Inside Code Builder, select the “Import” button.



**Step 5:** Select the “Import URL” button.

**Step 6:** Paste the Project URL. Then, select the “Go ahead!” button.



1. Move your player to one of the bottom corners of the structure, and in the chat window, type the command “start”.
2. Move your player diagonally to the top corner from the start. In the chat window, type the command “stop”.
3. Move your player to an open space in the world project where you want to copy the structure, and in the chat window, type the command “copy”.

Did it copy your house correctly? (slide 56)

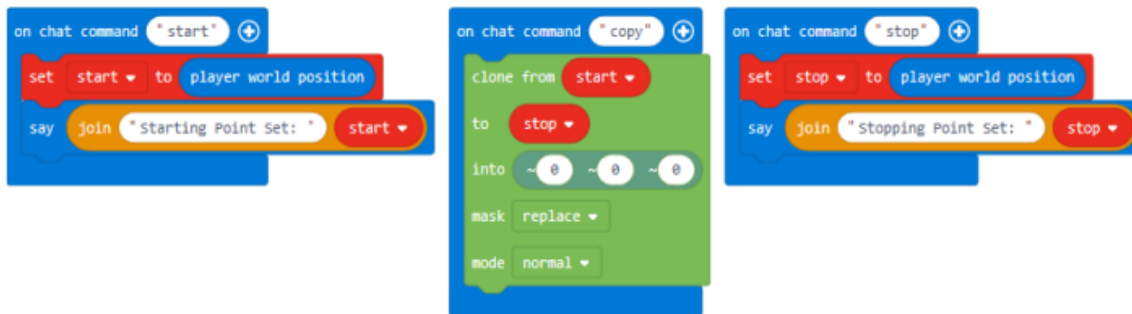
**Tip:** If you can, leave a block or two of space between your character and the object you are copying. That way you will not cut it off.

For fun, cut some objects in half!!

The orientation of whatever you copy will always be the same. For example, if building faces east, it is always going to face east.

In the clone block, for the mode property, if you choose move instead of normal, the code will perform a cut and paste rather than a copy and paste. It will delete what was in between the old coordinates and paste a copy at the new coordinates.

### Coding Solution:



Shared Program: [https://makecode.com/\\_dHhhCoW85JA](https://makecode.com/_dHhhCoW85JA)

## Independent Work (Teacher Support; "You Do")

### Challenges

Now you can change some things to make your own different and unique situations!

#### Challenge 1 – Cut and Paste Structures

How would you move something instead of copying it? Play around with the settings of the **clone** block to make this possible. Then rename your **on chat** command to "cut\_paste".

#### Challenge 2 – Move Only the Tree Trunk

How would you implement a cut and paste special? Is there a way to cut only certain blocks from the area? Let's try to cut only the trunk of the tree.

Can any of the **clone** settings in help you? See if you can figure out how!

HINT: Did you notice that there are two kinds of **clone** blocks?

## LESSON CONCLUSION

Upon completion of this lesson, students should be able to answer the following questions: (slide 57)

1. In Minecraft, what keyboard shortcut shows your player's world position?  
Answer: F1 function key
2. How do you easily duplicate blocks in the MakeCode coding workspace?  
Answer: Right-click (or tap and hold on touch devices) any block and select **duplicate**

These questions can also be used as a formative assessment. A printable version of these questions can be found in the Assessment Guide.

Conclude the lesson by reviewing the concepts covered in Lesson B. (slide 58)

Provide a preview of the upcoming lesson. (slide 59)

## Lesson C: Code with Coordinates and Moving Objects (Slides 60-66)

### Direct Instruction (Teacher-Led; "I Do")

Welcome back to Coding with Minecraft. We are going to continue to learn about and practice using coordinates. (slide 60)

Review the lesson objective. (slide 61)

In this coding activity, students will become farmers who must herd sheep in Minecraft. First, we will create some sheep and then automatically put them into their pen. (slide 62)

### Guided Instruction (Teacher Modeling; "We Do")

Before you begin this coding activity, make sure you are set-up to demonstrate and lead the students through this coding experience. It is best if you complete this activity on a device connected to a projector or presentation screen. Split the screen and display the classroom presentation alongside of the Minecraft world.

Have all students log into Minecraft: Education Edition. Students should continue working in the same world from Lesson B. Directions for navigating to the previous world can be found on slide 63.

## Coding Activity: Auto-Farmer (slide 64)

Tutorial can be found here:

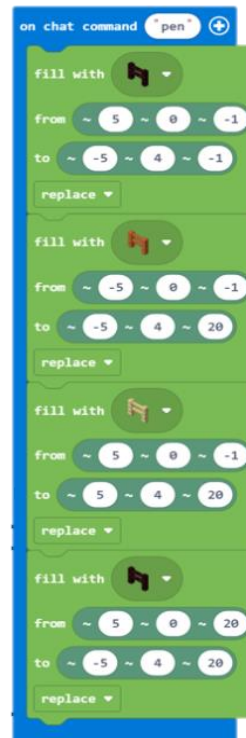
[https://minecraft.makecode.com/?ipc=1#tutorial:github:mojang/educationcontent/CodingWithMinecraft/unit\\_3/lesson\\_C](https://minecraft.makecode.com/?ipc=1#tutorial:github:mojang/educationcontent/CodingWithMinecraft/unit_3/lesson_C)

Shared Program: [https://makecode.com/\\_Ujy54M35pHmH](https://makecode.com/_Ujy54M35pHmH)

Start walking to create a lot of sheep in your Minecraft world. Then try to pen as many sheep as possible by entering "pen" in the chat window. You can walk by pressing the "W" key, which is the forward key by default. See how many sheep you can pen. Compete against your friends to see who can pen the most sheep in the class!



## Coding Solutions:





## Independent Work (Teacher Support; “You Do”)

### Challenges

Now you can change some things to make your own different and unique situations!

#### Challenge 1- Spawn Some Polar Bears Randomly

In this challenge, test out a new protection system for your player. First, you’ll need some animals to test it out. Spawn some polar bears randomly, but make sure to put them a little bit away from your player so you can get ready. You can use the **on walk** event or something else if you prefer.

#### Challenge 2- Build a Protective Cage

Now, instead of building a pen to keep bears in, you will build a cage to keep your player safe. It should be five blocks square around your player and five blocks tall. You can use the **on sneak** event and any fencing you like.

To sneak, hold down **Shift** while pressing **W** key.

Next you will need to set the gamemode to Survival to make this interesting. Enter this in the chat window: `/gamemode s`

Finally, make sure your difficulty is not set to Peaceful. Enter this in the chat window: `/difficulty n`



#### Extension - Maze-Builder

This is a maze builder. First, enter **ms** in the chat window and then sprint by holding down the Control key and pressing W.

A maze should build as you run. You could the colors or extension with the shapes to create your own maze. What can you create?





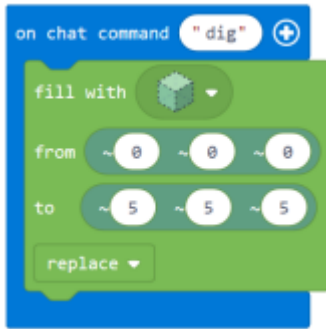
## LESSON CONCLUSION

Upon completion of this lesson, review the concepts covered in this lesson. (slide 65)

Then, students should take the quiz (found in the assessment guide). This is intended as a low-stakes formative assessment tool to establish whether students are prepared to take on the unit independent project.

Questions	Answers
1. What type of position is each of the following: (X, Y, Z) (~X, ~Y, ~Z)	(X, Y, Z) – Absolute World Position (~X, ~Y, ~Z) – Relative Player Position
2. Draw an arrow to match the term with the definition. Relative Position Absolute Position	<ul style="list-style-type: none"> <li>The distance from the world origin to an object or entity.</li> <li>The distance from player to an object or entity.</li> </ul>
3. Describe the following position that appears in the upper left corner of the 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:

- When you type "dig" into the chat command in Minecraft
- A 5x5x5 air block (identifying the type of block as something other than air is okay!)
- Will fill/replace
- Where the player is standing/current position

Then provide students with a preview of the next lesson. (slide 66)

## Lesson D: Get Creative with Events (Slides 67-75)

### Direct Instruction (Teacher-Led; "I Do")

Welcome back to Coding with Minecraft. Today, we are going to have the opportunity to demonstrate our new knowledge and skills about coordinates. (slide 67)

Review the lesson objectives. (slide 68)

### Guided Instruction (Teacher Modeling; "We Do")

In this independent project, your goal is to create one or more commands that alter the Minecraft landscape in some way. (slide 69)

You must:

- Use coordinates in some way
- Alter the landscape using code
- Be creative and original!

Review possible ideas for their Minecraft projects. (slide 70)

Showcase some examples projects. (slides 71)

Review the success criteria for the independent project. (slide 72)

### Independent Work (Teacher Support; "You Do")

#### Coding activity: Independent project

Have all students log into Minecraft: Education Edition. Students are able to use any template/world they wish for this project. After students complete the

independent project, they will be responsible for completing a Minecraft diary entry.

### **Minecraft Diary Expectations (slide 73)**

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 decide to improve one of this lesson's activities, please talk about the new code you wrote in addition to what was already provided in this lesson.

### **Grading Criteria**

**4** = Minecraft Diary addresses all prompts.

**3** = Minecraft Diary entry is missing one of the required prompts.

**2** = Minecraft Diary entry is missing two or three of the required prompts.

**1** = Minecraft Diary entry is missing four or more of the required prompts.

## **LESSON CONCLUSION**

Upon completion of this lesson, review the concepts covered in this lesson. (slide 74).

Preview the upcoming unit—Variables! (slide 75)

## EDUCATIONAL STANDARDS

### CSTA Standards

- **2-AP-10** Use flowcharts and/or pseudocode to address complex problems as algorithms.
- **2-AP-12** Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.
- **2-AP-13** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
- **2-AP-19** Document programs in order to make them easier to follow, test, and debug.

### ISTE Standards

- **1.4.c** Students develop, test and refine prototypes as part of a cyclical design process.
- **1.5.a** Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- **1.5.c** Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- **1.6.b** Students create original works or responsibly repurpose or remix digital resources into new creations.

### UK NATIONAL CURRICULUM: COMPUTING - KEY STAGE 3

- Understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem
- Use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures [for example, lists, tables or arrays]; design and develop modular programs that use procedures or functions
- understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits

### AUSTRALIAN F-10 CURRICULUM: DIGITAL TECHNOLOGIES - YEAR 7 AND 8

- **(ACTDIP027)** Define and decompose real-world problems taking into account functional requirements and economic, environmental, social, technical and usability constraints
- **(ACTDIP030)** Implement and modify programs with user interfaces involving branching, iteration and functions in a general-purpose programming language
- **(ACTDIP029)** Design algorithms represented diagrammatically and in English, and trace algorithms to predict output for a given input and to identify errors