
PARENT LETTER

MINECRAFTING, PROGRAMMING AND LOGIC!

Thank you for signing your child up for our Minecrafting, Programming and Logic class! We would like to fill you in on what your child will be learning this class.

We aren't *just* playing Minecraft here! These are the two main goals for this class.

1. Learn to program using the LUA programming language through ComputerCraft (a Mod of Minecraft)
2. Build an adding machine using the binary numeral system inside Minecraft

We love this game because the player must be creative and self motivated in order to enjoy playing it. There is no obvious story plot to follow or achievements to gain, just the player's creative drive. We use that creative energy and love for the game to teach our students basic computer science concepts such as Boolean Logic and the Binary numeral system, along with the LUA programming language.

[Please click here](#) to find an attachment of step by step instructions for downloading the ComputerCraft mod to your home computer. This will allow your child to continue practicing what he or she learned in class at home! (Please let us know if you did not receive this attachment!)

If you would like your child to be able to continue working on the programs he or she started in class, please send him/her with a USB flash drive on the last day of class.

PART 1

First we will learn how to get computercraft up and running, as well as how to start programming turtles (the little robots added to the game). We will learn how to create and save files and write our first program ("Hello Minecraft!"). We will then move on to learn about variables and "for" loops, and will have several programming challenges including writing programs to add numbers, build walls, and even make the turtle dance!

PART 2

Next, we will start with learning conditional (If/Then) statements. We will learn what conditions are and how to write them. We will also begin to understand functions, what

function returns are, and how to use them inside of conditional statements. We will finish the day by learning about a conditional loop (the "while" loop), and will use what we've learned to make a lumberjack program.

PART 3

Now we will start putting everything we've learned so far together to start writing larger programs. We will learn what functions are, as well as how to "declare" (write) functions and how to "call" (use) functions. We will then move on to learning about the arguments of a function and what they can be used for. We will use what we've learned to make item transfer and trench digging programs for the turtle.

We should also get started with Boolean Logic today. We'll learn about NOT, AND, OR, and XOR gates. These are great discovery questions to remind your child about the different types of gates!

Discovery Question: When is an AND gate's output on?

Answer: When both inputs are on.

Discovery Question: When is an OR gate's output off?

Answer: When both inputs are off.

Discovery Question: When is an XOR gate's output on?

Answer: When the inputs are in opposite positions (one on and one off).

We will then build these 3 logic gates in the game of Minecraft.

PART 4

Now we go a little farther in learning about the flexibility of arguments by using them for our programs themselves, rather than just functions. We will learn how to take the arguments passed to the program, turn them into variables, and use them to enhance the functionality of the program. The day will end with our hardest challenge yet: A structure building program that will have the turtle build a rectangular wall of configurable size.

We will also start to talk about making our adding machine (or calculator). Since there are no numbers in Minecraft, we have to use binary to make our calculators. We will learn how to count in binary (we can count to 31 on one hand!) Then we will learn about adding binary numbers and how to figure out what number we are looking at.

Discovery Question: What type of numeral system do we use?

Answer: Base 10 (because there are 10 different digits that we use)

Discovery Question: What type of numeral system is Binary?

Answer: Base 2 (because we only use 2 digits: 0 and 1)

Discovery Question: What is 8 in binary?

Answer: 1000

Discovery Question: What is 2+2 in binary?

Answer: $10+10=100$ (which is 4)

Discovery Question: What is the Base 10 equivalent of the binary number 1101?

Answer: 13. Add the numeral equivalent of each one's place that has a 1 in it (1=1, 10=2, 100=4, 1000=8, 10000=16, etc. $1+4+8=13$.)

This is a very difficult concept for the student's to grasp, so it will be very helpful for you to review with them regularly!

We will also learn about the last 3 types of Boolean Logic gates: NAND, NOR, and XNOR, which are the same gates with a NOT gate added.

PART 5

Lastly will review all that we have learned and then use that knowledge to put together a large, complex program collaboratively. The whole class will be involved in discussion and problem-solving, and by the end of the day will have written a complex and useful program that they have chosen from several options including branch mining, farming, and house building.

We will also make our calculators in Minecraft! We will review binary and the two logic gates we will be using: AND and XOR. Then we will discuss Boolean logic symbols and go over the calculator diagrams. Students will break into groups and build a 1-bit input, 2-bit output calculator using the diagrams and the example already built. If they finish early and are not mentally exhausted, they can then expand to the 2-bit input, 3-bit output. All that work and we can only add up to 6!

I hope your child has as much fun as we do in this class! Please let us know if you have any questions or feedback! We hope to see you again soon!

Best Regards,

Imagine That! and Future Tech Staff