# 3

// Vocabulary: Variable, Boolean, Integer, Character, Value

Variables are one of the most important concepts in computer programming. But what exactly are **variables**? **Variables** are like baskets that hold pieces of information. There are a couple different kinds of **variables** depending on what kind of information you need to keep track of. You have probably already heard of most of the different kinds of **variables**. Here are the definitions of three different kinds of **variables**. There are more types of variables, but to start with these are the most important types of **variables**.

- **Boolean variable:** A boolean variable can be true or false (one or zero).
- **Integer variable:** An integer variable can be any whole number from −32768 to 32767.
- **Character variable:** A character variable can be any one letter (or punctuation or symbol).

Below is a robot, answer the questions to the right of the robot and be as silly as you want. Then write the type of **variable** you would use to store this information. For a **boolean** write "boolean", for an **integer** write "int" and for a **character** write "char".
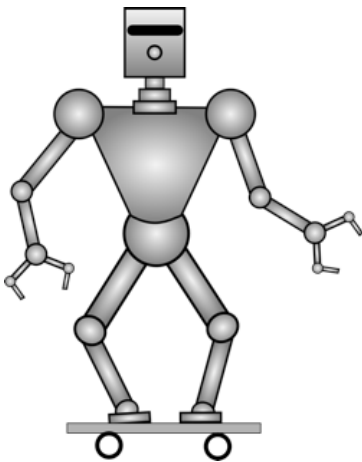
Is this robot good at skateboarding? _____ Variable type: **Boolean**

How old is this robot? _____ Variable type: **Integer**

What is the first letter of this robot's name? _____ Variable type: **Character**

How many years has it been skateboarding? _____ Variable type: **Integer**

Is it wearing pants? _____ Variable type: **Boolean**

What is the first letter of the robot's dog's name? _____ Variable type: **Character**

Is the robot going to crash? _____ Variable type: **Boolean**

How many feet of air has this robot gotten? _____ Variable type: **Integer**

The number, or character, you put into a **variable** is called its **value**. Once you have created a **variable** you can change the **value** whenever you need to. For example, if we decided the robot is 1000 years old, in a year we need to be able to change its age to 1001. First we need to create a **variable** to keep track of its age. We can name the **variable** whatever we want, but "age" makes sense so we'll go with that. Then we need to put a **value** into the **variable**. The first **value** was 1000, but a year later we delete that **value** and replace it with the new **value**, 1001. Pretty easy, huh? If we wanted to keep track of how old the robot used to be when we met it we could create a new **variable** called "ageWeMet". That

way when we have to change the "age" **variable** we can keep track of how old the robot was when we met it in the other **variable** "ageWeMet". You may have noticed that there are no spaces in the name of this second **variable**. That is because **variable** names can't have any spaces.

Circle the **variable** in the sentences below and put a box around the **value**.

The robot's favorite letter is Q. The robot's height is 100 ft. The robot's power is on.

// Vocabulary: Boolean, Declare, Assign

OK! You're ready to start programming your first **boolean** variable. Anytime you see *italics like this* it is an example of how you would write something in the Arduino computer language.

• A **Boolean** variable is the simplest kind of variable, it is either true or false.
• True is represented by a one or HIGH and false is represented by a zero or LOW.
• HIGH can be used as true, but it means there is electricity flowing through a circuit.
• LOW can be used as false, but it means there is no electricity flowing through a circuit.
• To create a **Boolean** variable you type the following: *boolean variableName;*
• Creating a variable is called "**declaring**" a variable.
• The variableName can be anything you like, but it should make sense to you.

For example you could **declare** a **Boolean** variable named *dayLight(boolean dayLight;)* that represents whether it is daytime or not. Once you have **declared** your variable it is not equal to anything, it is empty and waiting for you to set it equal to true or false. To do this you type the following: *dayLight = true;* or *dayLight = 1;*. (Don't forget the ; at the end, it's very important! It is called a semicolon and it tells the computer that you are done doing something.)

This means that dayLight is true, and you can see the sun. Setting a variable equal to a value is called "**assigning**". **Declare** three **Boolean** variables about the robot on this page in the spaces below and then **assign** them values of true or false (or one or zero). Remember, you can name the variables whatever you want! They're your variables, it's up to you. Look at the example above if you are unsure of how to **declare** and **assign**. (Don't forget the semicolons at the end of each line, they're important!)

Declare three variables about the robot below:

Assign values to the three values you declared above:

List three of the silliest things you can think of that you might keep track of with a **boolean** variable. Examples: Do I have peanut butter in my ear? Are penguins good to use as dodgeballs?

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Now pick one of the silly ideas above. In the space below **declare** your silly variable and then **assign** it a value. For example: *boolean peanutButter; peanutButter = true;* This means that I do have peanut butter in my ear... maybe I am saving it for lunch.

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// Vocabulary: Integer, Declare, Assign

Wow! You're ready to start programming your first **integer** variable. Anytime you see *italics* it is an example of how you would write something in Arduino computer language.

• An **Integer** variable is a number (no fractions or decimals) between -32768 and 32767.
• To create a **Integer** variable you type the following: *int variableName;*
• This is called "**declaring**" a variable.
• The variableName can be anything you like, but it should make sense to you.
• To **assign** an **Integer** variable the value 120 type the following: *variableName = 120;*

For example you could **declare** an **Integer** variable named clouds (*int clouds;*) that represents the number of clouds in the sky. Once you have **declared** your variable

it is not equal to anything, it is empty and waiting for you to set it equal to a number between −32768 and 32767. To do this you type the following: clouds = 8;. (Don't forget the ; at the end. This is called a semicolon and it's how the computer knows you are done doing something.)

This means that you can see eight clouds in the sky. Setting a variable equal to a value is called "**assigning**". **Declare** three **Integer** variables about the picture on this page in the spaces below and then **assign** them values between −32768 and 32767. Include at least one variable with a negative value and one variable with a value greater than ten. Feel free to make up variables and values that you can't actual see in the picture, just try to keep it sort of making sense. Look at the example above if you are unsure of how to **declare** and **assign**. (Don't forget the semicolons at the end of each line!)

Declare three integer variables about the pictures below:

Assign values to the three values you declared above:

List three of the silliest things you can think of that you might keep track of with an **integer** variable. Example: How many pieces of ham do I have in my pocket? How many bugs could you fit in a rocket?

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Now pick one of the ideas above. In the space below declare your variable and **assign** it a value. For example: *int ham; ham = 1073;* Either I have big pockets or small pieces of ham.

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// Vocabulary: Character, Declare, Assign

OK! You're ready to start programming your first **character** variable. Anytime you see italics it is an example of how you would write something in the Arduino computer language.

- A **Character** variable is a single letter, symbol or number.
- To create a **Character** variable you type the following: *char variableName;*
- This is called "**declaring**" a variable.
- The variableName can be anything you like, but it should make sense to you.
- To **assign** a **Character** variable the value "Q" you type the following: *variableName = 'Q';*

For example you can **declare** a **character** variable named weather (*char weather;*) that uses a letter to represents the weather. You can use the letter R to mean it is raining, S for snow, and C for clear. Once you have **declared** your variable it is not equal to anything, it is empty and waiting for you to set it equal to a **character**.

To do this you type the following: *weather = 'C';*. (Don't forget the ; at the end. This is called a semicolon and it's how the computer knows you are done doing something.) Also, there are many different **character** types other than a letter: !?*%$&@ are all valid **character**s.

For example, *weather = 'C';* means that the sky is clear, but that's just because you decided it means that. C could mean whatever you need to keep track of. For example C could mean that it is cold out, if that's what you decided. Setting a variable equal to a value is called "**assigning**". **Declare** three **Character** variables about the picture on this page in the spaces below and then **assign** them **character** values that make sense. Check the example when your are **assigning** a value, this can get tricky. Make sure the variable names describe the object you want to keep track of. Look at the example above if you are unsure of how to **declare** and **assign**. (Don't forget the quotation marks and semicolons at the end of each line!)

Declare three charater variables about the picture below:

Assign values to the three values you declared above:
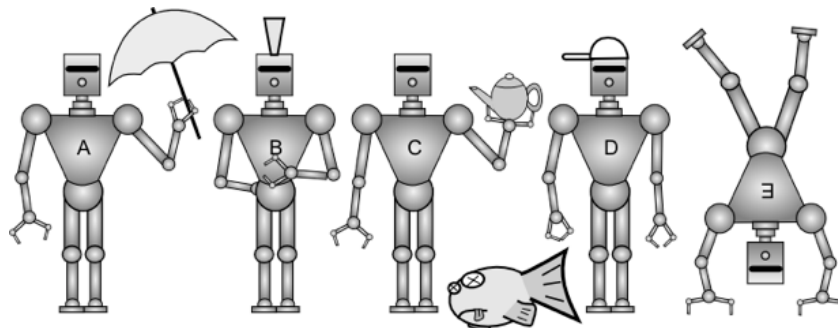
List three of the silliest things you can think of that you might keep track of with a **Character** variable. Example: What color lollipops do robots eat? What's a pirate's favorite letter?

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