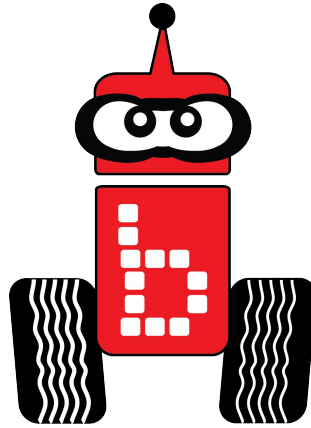




Variables

- **Key Concepts**
 - Understand what a variable is and how to use it.
- **Pacing**
 - Over several class periods.

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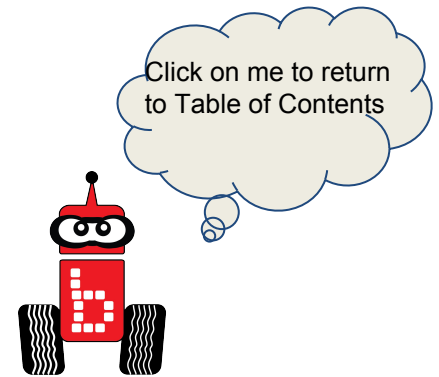
Working with Variables

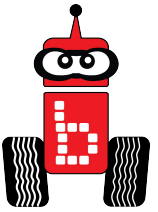
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Standards

Goal:

- Students will familiarize themselves with the functions `msleep()` and `motor()`
- Students will understand how to move their robots in the following manner: forwards, backwards, straight, circles, right and left turns

Standards:

Common Core State Standards Math Practices

CCSSMP1: Make sense of problems and persevere in solving them

CCSSMP2: Reason abstractly and quantitatively

CCSSMP4: Model with mathematics

CCSSMP6: Attend to precision

CCSSMP8: Look for and express regularity in repeated reasoning

Next Generation Science and Engineering Practice

1: Asking questions and defining problems

2: Developing and using models

3: Planning and carrying out investigations

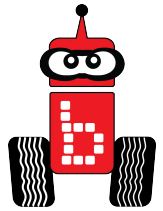
4: Analyzing and interpreting data

5: Using mathematics and computational thinking

6: Constructing explanations and designing solution

7: Engaging in argument from evidence obtaining, evaluating, and communicating information

Standards Continued



Standards Continued:

2016 ISTE Standards

Empowered Learner

1c: Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

1d: Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

Knowledge Constructor

3d: Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

Innovative Designer

4a: Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.

4b: Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

4c: Students develop, test and refine prototypes as part of a cyclical design process.

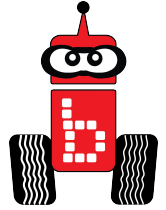
4d: Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

Computational Thinker

5a: Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.

Intro to Variables:

Activity 1

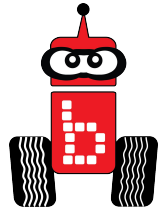


Prerequisite:

1. Open a previous program that moves your robot somewhere or create a simple program that moves your robot somewhere.
2. Go to the next slide

Intro to Variables:

Activity 1



What ports are your motors plugged into?

Left Motor Port

Right Motor Port

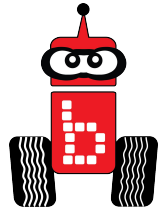
Great! Now, plug your motors into different motor ports without changing your code.

Does your code work?

Discuss with your partner why or why not.

Intro to Variables:

Activity 1 Continued

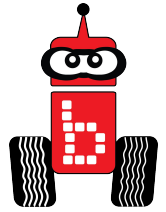


- Modify your code to run with the new motor ports.

**WOW! That was exhausting.
This would be a great place
to use a variable.**

Intro to Variables:

Activity 1-Continued

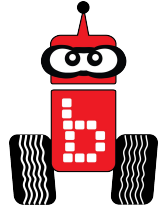


Some reasons to use a variable:

1. You don't have to *remember* which port # is left and which is right—the computer remembers for you!
2. You don't have to *remember* how long to “sleep” for a 90-degree turn—the computer remembers for you!
3. If a motor port is changed, you can simply plug the motor into a different port, change the value of a variable in your program, and run your program.

Working with Variables:

Activity 2



A “**variable**” is a ***named*** container that stores a **value**.

Left Motor Port

0

`left_motor = 0;`

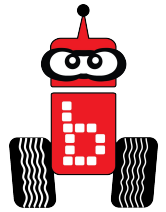
Right Motor Port

3

`right_motor = 3;`

Working with Variables:

Activity 2



A variable should go inside a block of code (i.e., inside the { }) immediately after the starting curly brace (i.e., {).

What is `int`?

`int` stands for “integer”. This means that the variable `left_motor` will have an integer value.

1. *Creating* a variable: `int left_motor`

As long as your variable is meaningful and your team understands it can be named

whatever you want. Example: `int l_motor` or `int lm`

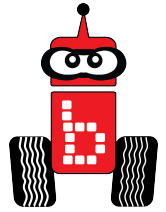
2. *Setting* a variable: `left_motor = 1;`

3. *Using* a variable: `left_motor`

[Click here for:
Additional Data Types- Advanced learning](#)

Working with Variables:

Activity 2



Example: *creating, setting, and using variables*

```
#include <kipr/botball.h>

int main()
{
    int left_motor; // 1. creating variables
    int right_motor;

    left_motor = 0; // 2. setting variables
    right_motor = 3;

    motor(left_motor, 100); // 3. using variables
    motor(right_motor, 100);
    msleep(1000);

    ao();
    return 0;
}
```

Sample of comments

```
#include <kipr/botball.h>
```

```
int main ()
```

```
{
```

```
int arm = 0;
```

```
int up = 1234;
```

```
int down = 230;
```

```
int claw = 3;
```

```
int close= ?;
```

```
int open= ?;
```

```
printf("Hello World\n");
```

```
return 0;
```

```
}
```



```
/ arm = 0
```

```
// up = 1234
```

```
// down = 230
```

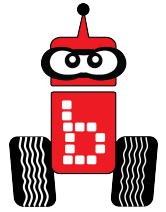
```
// claw= 3
```

```
// close=?
```

```
//open=?
```

Working with Variables:

Activity 2



1. Copy the code from the [previous slide](#) and run the program.
2. Three things we *currently* know that we can apply variables to are:
 - a. motor ports
 - b. motor power

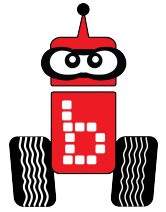
`int spd`

- c. duration (sleep time)

`int time`

Working with Variables:

Activity 3

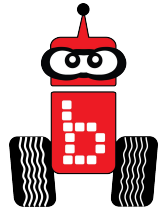


Use the [“Tag You’re It” assessment](#) from Unit 7, except you must specify the the **msleep** by

1. *creating* variables,
2. *setting* variables, and
3. *using* variables.

Working with Variables:

Activity 4

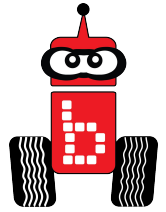


Use the [“Go Fetch” activity 9](#) from Unit 9, except you must specify the the claw positions by

1. *creating* variables,
2. *setting* variables, and
3. *using* variables.

counter as an application of variables

Assessments and Rubrics



Suggestions: *Understanding* rubric
and or *Group Collaboration*