

## 7.1 Worksheet: Intro To Electronics In Robotics

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

Answer the following questions:

- 1 In your own words, describe the role that electronics plays in robotics.

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- 2 What benefit is there in using a breadboard to prototype a circuit?

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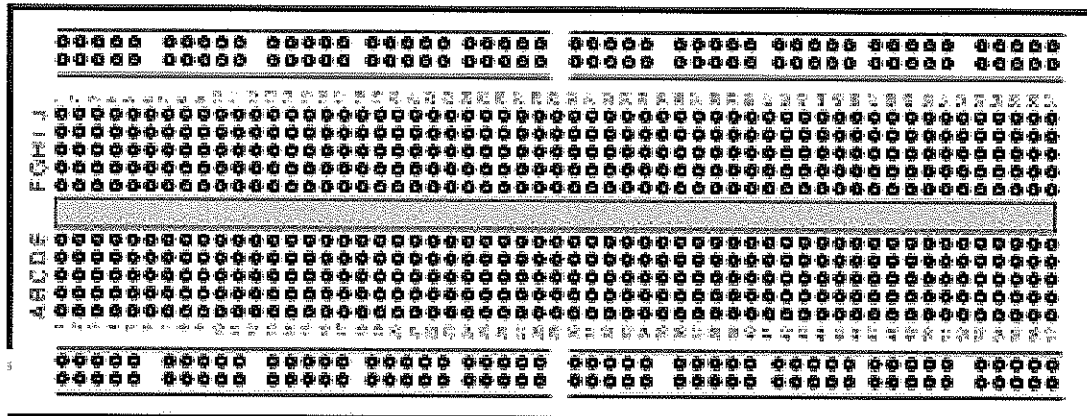


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- 3 Connect the circles for an appropriate group of holes to indicate how a breadboard is connected.



## 7.2 Worksheet: Components & Schematics

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

Answer the following questions:

1 What is the function of a resistor?

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2 How do you determine the value of a resistor?

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3 What is the unit of measure for capacitance?

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4 Draw the symbols for a resistor, a polarized capacitor, a 2-cell battery, and a diode. Be sure to label polarity where appropriate.

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5 What is the function of a diode?

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**7.3 Questions: Schematics & Breadboards**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Answer the following questions:**

**Question 1** Name two characteristics used to identify a capacitor.

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**Question 2** What hand tools would you need to form and trim component leads?

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**Question 3** What function does a schematic have?

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**Question 4** What should you do with the battery or power source prior to making any changes to a circuit?

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## 7.4 Worksheet: Ohm's Law & Making Measurements

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

Answer the following questions:

- 1 Write Ohm's Law so you can solve for current (amps).

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- 2 If you had 9Volts and 200mA; what would the resistance be?

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- 3 If you were going to measure a resistor that you thought was 3.9K ohms; what range would you select on your multimeter?

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- 4 How do you measure current in a circuit? Explain and show graphic representation

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5 List 3 functions you would look for in a digital multimeter if you were going to buy one.

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6 In Ohm's Law, the current is directly proportional to the \_\_\_\_\_  
and inversely proportional to the \_\_\_\_\_.  
Fill in the blanks.

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**7.5 Questions: Using a Multimeter & Ohm's Law**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Answer the following questions:**

**Question 1** How does the measured current for Circuit 1 compare to the value you calculated based on the theoretical voltage and resistance?

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**Question 2** How does the measured current for Circuit 1 compare to the value you calculated based on the measured voltage and resistance?

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**Question 3** In circuit 2, do you see a difference in the brightness of the LED?

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**Question 4** Is the LED in Circuit 2 brighter or dimmer than before? Why do you think that is?

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**Question 5** Is the Circuit 2 voltage drop different than the voltage drop in Circuit 1?

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**Question 6** Is the Circuit 2 voltage drop more or less than Circuit 1? Why do you think that is?

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**Question 7** Is The Circuit 2 measured current different than the theoretical value you calculated?

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**Question 8** Is The Circuit 2 measured current different than the current calculated from the measured voltage and resistance?

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## 7.6 Worksheet: Circuits

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

Answer the following questions:

1 How is capacitance affected in a parallel circuit?

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2 If you have 2 resistors in series, one 1K ohm and one 2K ohm: what would the total resistance be?

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3 If the above were in parallel?

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**7.7 Activity: Series and Parallel Circuits**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Question Sheet**

**Question 1** Can you think of a purpose for each type of circuit?

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**Question 2** What benefits do you see for each type?

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**Question 3** What drawbacks do you see for each?

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## 7.8 Worksheet: Sensors, LEDs, Encoders-Feedback from the Robot

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

Answer the following questions:

1 List 3 types of sensors that might be found on a robot.

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2 How could you use an encoder on a robotic arm?

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3 What does an LED do? Draw a symbol that represents an LED.

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4 Why would you need feedback from a robot?

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5 What type of sensor is most commonly used as a safety curtain?

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6 What use would a limit switch have on a robot?

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**7.9F Activity: Blinking LED**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Question Sheet**

**7.9.2F Duty Cycle and Frequency**

Now that you have done the 2 sets of calculations for  $t_1$ ,  $t_2$ , D & f:

**Question 1** Which circuit would blink the fastest?

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**Question 2** In which circuit would the LED stay lit the longest?

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**Question 3** In which circuit would the LED blink the slowest?

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**Question 4** What do you notice about the blinking LED?

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**7.9.3F: Using Photoresistors**

**Question 5** If you cover  $R_1$  with your finger, how does the response change?

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**Question 6** If you uncover  $R_1$  and cover  $R_2$  with your finger how does the response change?

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**Question 7** If you cover both?

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**7.10 Worksheet: Working with easyC and Sensors**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

1 For the following numbers, refer to the chart below and determine the most efficient type of variable that could handle each number :

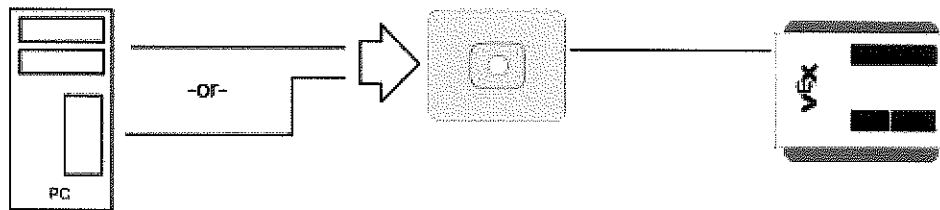
Type	Size	Minimum	Maximum
char	8 bits	-128	127
signed char	8 bits	-128	127
unsigned char	8 bits	0	255
int	16 bits	-32,768	32,767
unsigned int	16 bits	0	65,535
short	16 bits	-32,768	32,767
unsigned short	16 bits	0	65,535
short long	24 bits	-8,388,608	8,388,607
unsigned short long	24 bits	0	16,777,215
long	32 bits	-2,147,483,648	2,147,483,647
unsigned long	32 bits	0	4,294,967,295

Number	Variable type
38	
-42	
43,212	
-661	
9,421,099	
-33	
254	
-7,119,847	
5	
-1	
2,296,342,101	
-1,215,796,541	

2 Which of the following are good reasons to comment your programs (check all that apply)

- a) Comments reduce the amount of memory used by the programs
- b) Comments reduce the need for other documentation
- c) Comments can help you find logic problems
- d) Comments make a program easier to print out
- e) Comments make it easier to track changes
- f) Comments make it easier for others to understand your code
- g) Commenting makes bad code look good

3 Label and describe the following diagram:




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4 Briefly describe the function of the program that follows and write the pseudo code that would have preceded it.

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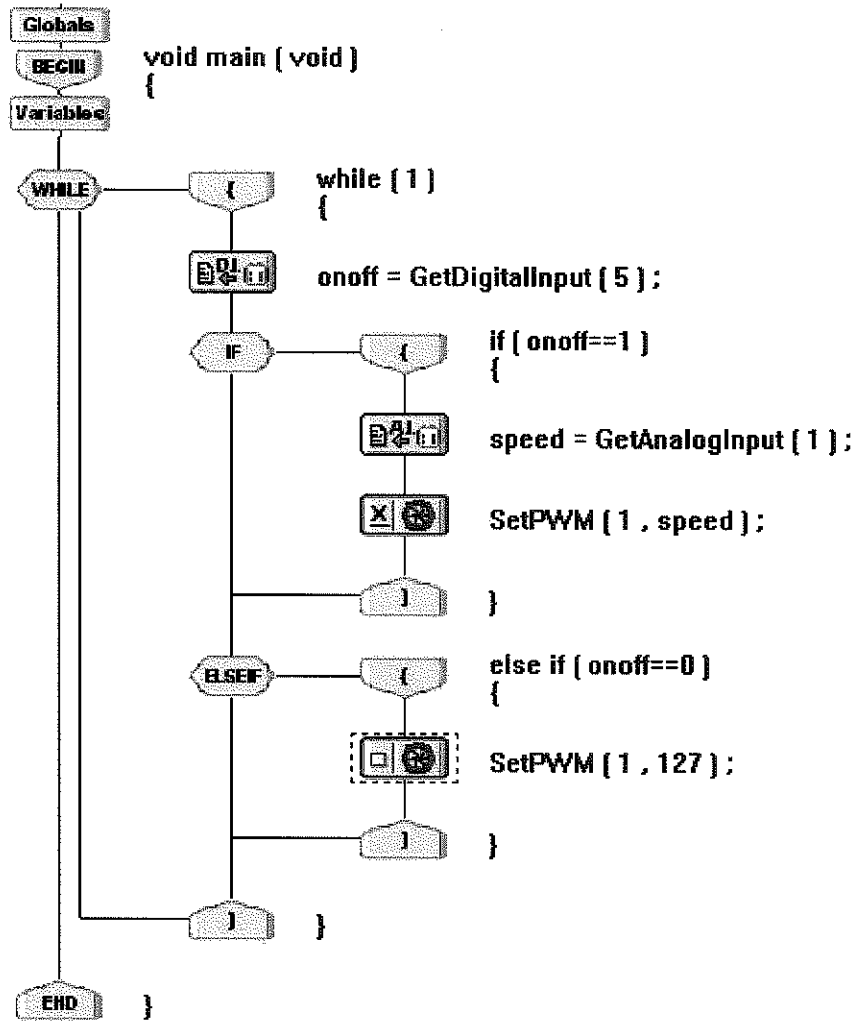
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5 What are the variables in the above program?

6 What type of variables would each be and why?



**7.11F Activity: Integrating Hardware and Software**

Name: \_\_\_\_\_ Class/Period: \_\_\_\_\_ Date: \_\_\_\_\_

**Question Sheet**

**Question 1** Write pseudocode for the modified program.

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**Question 2** What benefits can you see to using an electronic circuit integrated with software and the controller versus just an electronic circuit?

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**Question 3** List 3 types of input devices you could use on a robot design and what that use would be.

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**Question 4** List 3 types of output devices you could use on a robot design and describe what they might be used for.

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