

Robot Name: Arduino

Project One: Light

Activity: Blinking an LED

Grade Level	7-9	Difficulty	Beginner
Subject	Practical and Applied Arts Science		
Description	<p>Each project is broken up into several circuits, the last circuit being a culmination of the technologies that came before. The purpose of these projects is to help students learn about new technologies and concepts.</p> <p>This first project is titled “Light” and is divided up into several activities. By completing these activities, students will be given the prior knowledge to design, build, and program their own multi-coloured light project that uses inputs and outputs to change the color, timing, and intensity of lighting.</p> <p>In this activity, students will learn about LED’s (light-emitting diodes), resistors, inputs, outputs, and sensors and write a code that makes an LED blink on and off.</p>		
Outcome(s)	Supports: PAA - Electronics Modules - ELEC02A, ELEC04A; Robotics Modules - ROBA7, ROBA9, ROBA12A, ROBA13A, ROBA15A, ROBA21, ROBA23A, ROBA28A; Science - CE9.1, CE9.2		
Required Prior Learning			
Time Frame	One hour		
Materials	Arduino Uno Board, Breadboard, LED, 330 Ω Resistor, 2 Jumper Wires Activity: Blinking an LED BlocklyDuino Reference		
Additional Resources	Sparkfun Inventor's Kit Guide ,		
Assessment	Review lesson ending questions with students for understanding and future application.		

Activity: Blinking an LED

Procedure:

Review the organization of the kit and how groups need to be careful with all the components, how they are used, and how they need to be kept organized and put back into their place when done.

Divide your class into groups of two (Paired Programming). Paired programming is highly recommended when working with coding and robotics so that students can piggyback off each others ideas and strengths.

Students will wire a circuit using an Arduino Board, LED, breadboard, 330 Ω Resistor, and two jumper wires to create a circuit that will make an LED blink following the instructions online or you can choose to make a handout. Once students have wired their Arduino, students can create the blocklyduino code in the Chrome App and transfer their code to the Arduino Editor. They can also copy and paste the provided code into the Arduino Editor directly and download it onto the Arduino Board. Once downloaded, the LED will blink at 2 second intervals.

Extension

Students can complete the extension challenges once they have done the first program

Student Handouts

Activity - Blinking an LED

Assessment Guide

Circulate the room observing and assisting with students so that they can complete the project. Correct the assignment sheet as a class ensuring that students share their errors and successes while reinforcing the importance of persistence and patience in programming.

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Activity: Blinking an LED

Purpose:

- To wire and code a light to blink at different intervals using parallel and series circuits.
- To use BlocklyDuino and Codebender to create code to communicate with the Arduino microcontroller

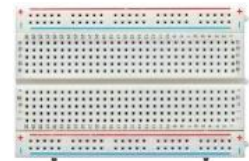
Materials: Computer, Arduino Uno Board, USB cable, Breadboard, 2 coloured LED's, 200 - 330 Ω Resistor, 2 Jumper Wires

New Components:

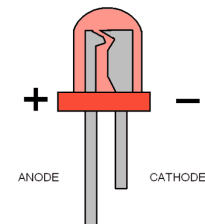
Arduino Uno Board: The Arduino is a microcontroller that will communicate the code to the components of your program. For example, the uno will communicate your code to the LED so that it performs what it is instructed to.



Breadboard: A breadboard is a solderless device for temporary wiring used to test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.



LEDs: (Light Emitting Diodes) are small lights made from a silicon diode. They come in different colors, brightnesses and sizes. LEDs have a positive (+) leg and a negative (-) leg, and they will only let electricity flow through them in one direction. The (+) leg is the longer of the legs on the LED.



Resistors: Resistors resist the flow of electricity. You can use them to protect sensitive components like LEDs from . The strength of a resistor (measured in ohms) is marked on the body of the resistor using small colored bands. Each color stands for a number, which you can look up using a [resistor chart](#). The LED can be safely lit without a resistor, but will be brighter.



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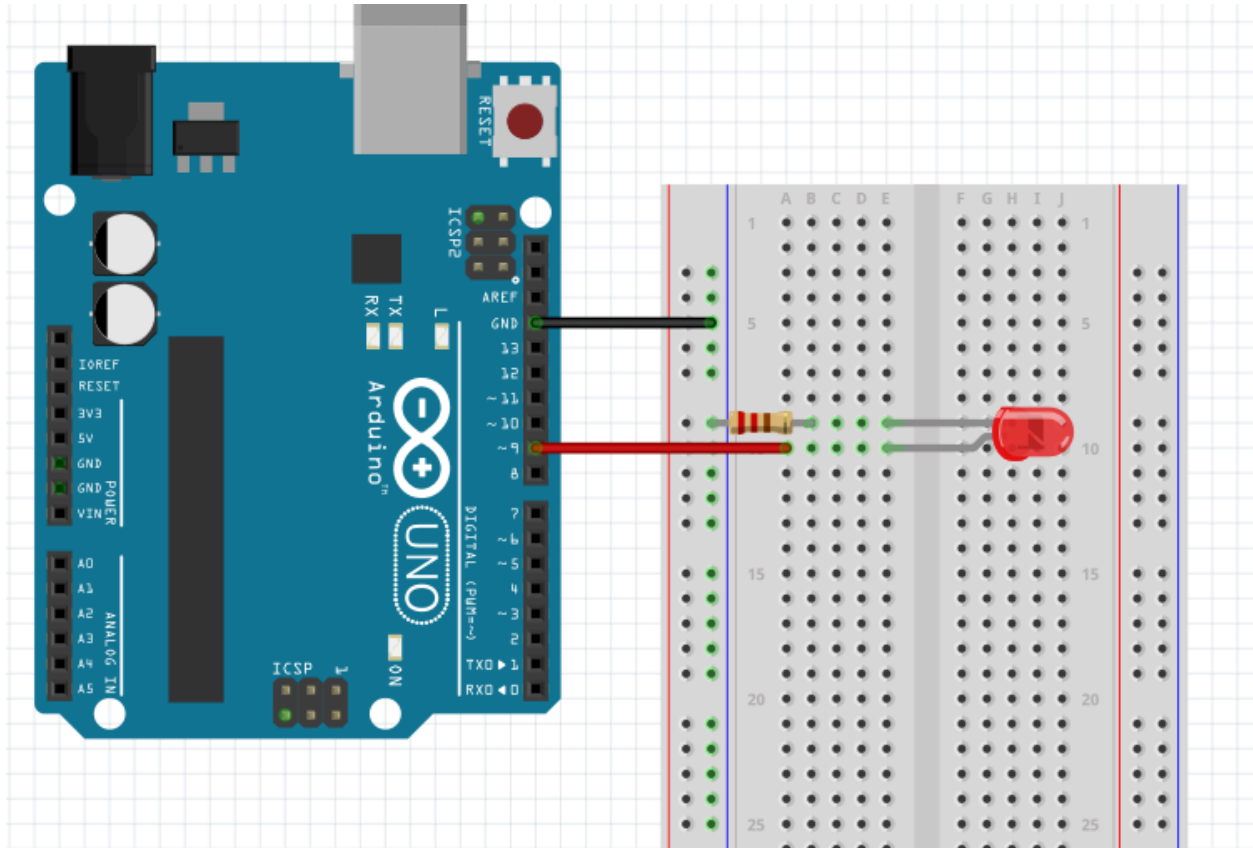
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Assignment: BLINKY

Procedure:

1. Wire the project using the following schematic.



2. You can create your code in [BlocklyDuino](#) that you downloaded last lesson and then paste it to the Arduino IDE. Below is the blockly code that you will need to make and the Arduino code that you will need to copy and paste into codebender. Click [BlocklyDuino Reference](#) for a link to all the blockly codes.

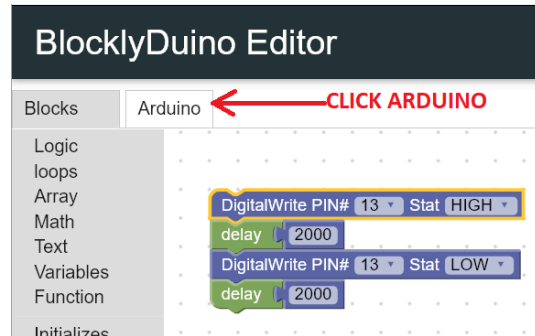
BLOCKLY CODE	ARDUINO CODE
	<pre> Blocks Arduino void setup() { pinMode(9, OUTPUT); } void loop() { digitalWrite(9, HIGH); delay(2000); digitalWrite(9, LOW); delay(2000); } </pre>

SAVE your sketch to your BlocklyDuino Folder that you created

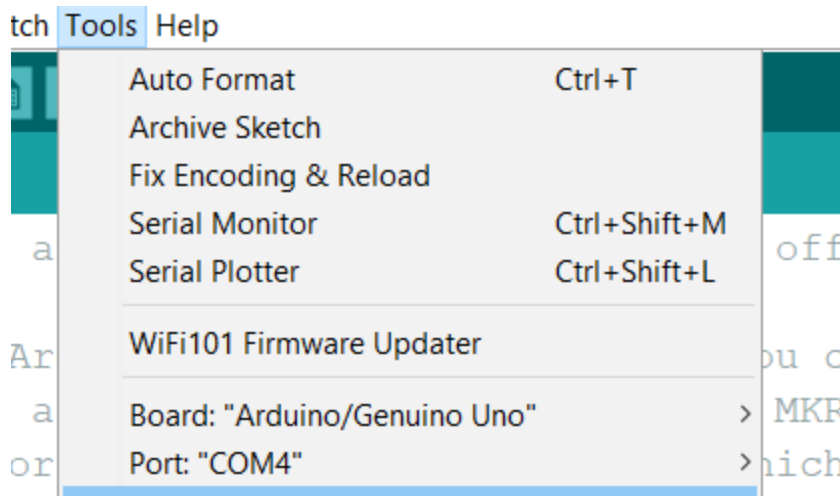
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- Copy the Arduino Code from [BlocklyDuino](#) into the Arduino IDE. To paste the code into the website be sure to use ctrl "v." Hook up your arduino to your computer using the USB cable.



- Make sure the Arduino Uno board is hooked up using the supplied USB cord to your computer. Select the correct serial port by clicking the Tools Menu then select port and pick the serial port that appears (i.e. COM4 in this example).






- Click the "upload" button.



- Your program is now loaded. Observe your LED and complete your worksheet titled Assignment: Blinking an LED.

Assignment WORKSHEET: Blinking an LED.

1. Describe in detail what the LED is doing. (Observe the timing).
2. THE CODE. Code is a set of instructions used to communicate to the arduino. Answer the following questions relating to code:
 - a) What does the output block  do?
 - b) How would you write this code in Arduino?
 - c) What does this timing block  do ?
 - d) How would you write this code in Arduino?
 - e) The following code turns the led off  . How would you write this in Arduino. (two lines)
 - f) Coders can add a description of each line of code by putting // after their code. It gives the person a reading it a description of what the code does. What punctuation does Arduino use at the end of each instruction to separate them?

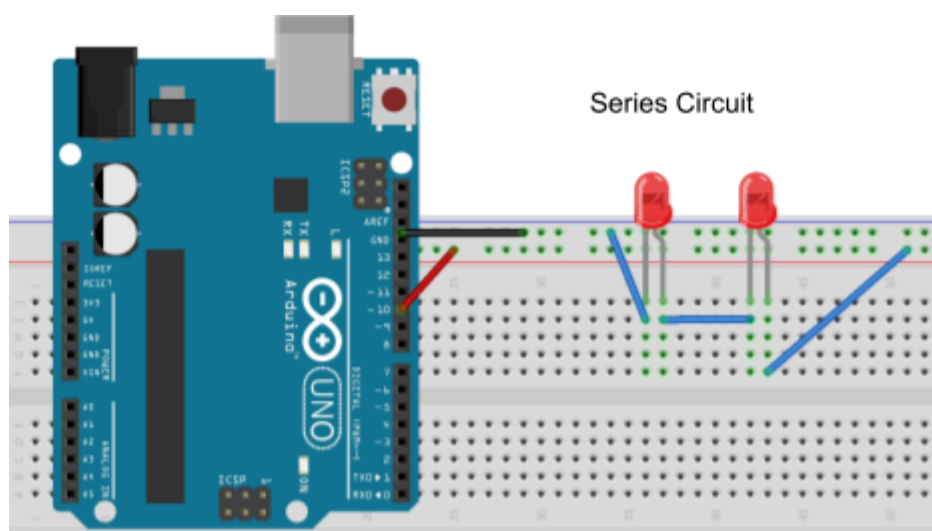
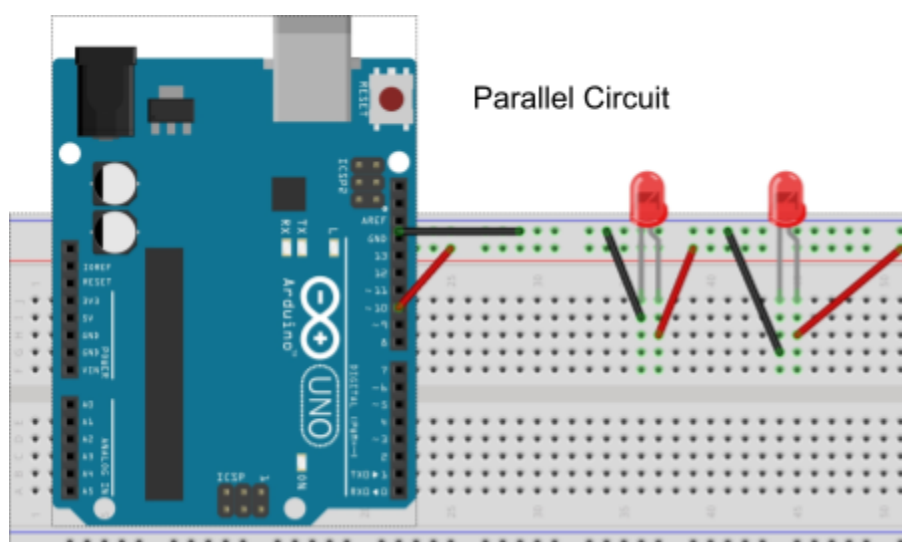
Extension Challenges:

3. Change your code so that your LED flashes on and off at one second intervals. Explain how you changed your code to achieve this.
4. Change your code so that your LED flashes on for three seconds and off for one second. Explain how you changed your code to achieve this.
5. Connect a different colored light to pin 10. Code your arduino to flash both lights at the same time. Show your teacher!
6. Code light one to flash every two seconds and light two to code every second.
7. Code your lights so that when light one flashes on, light two flashes off and when light two flashes on, light one flashes off. Show your teacher!

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- Wire a parallel and series circuit.



CONCLUSION:

- List two real life applications that coding lights have in our everyday lives.