

Crumble Student Packet

Getting to know your Crumble

Included In Each Kit:

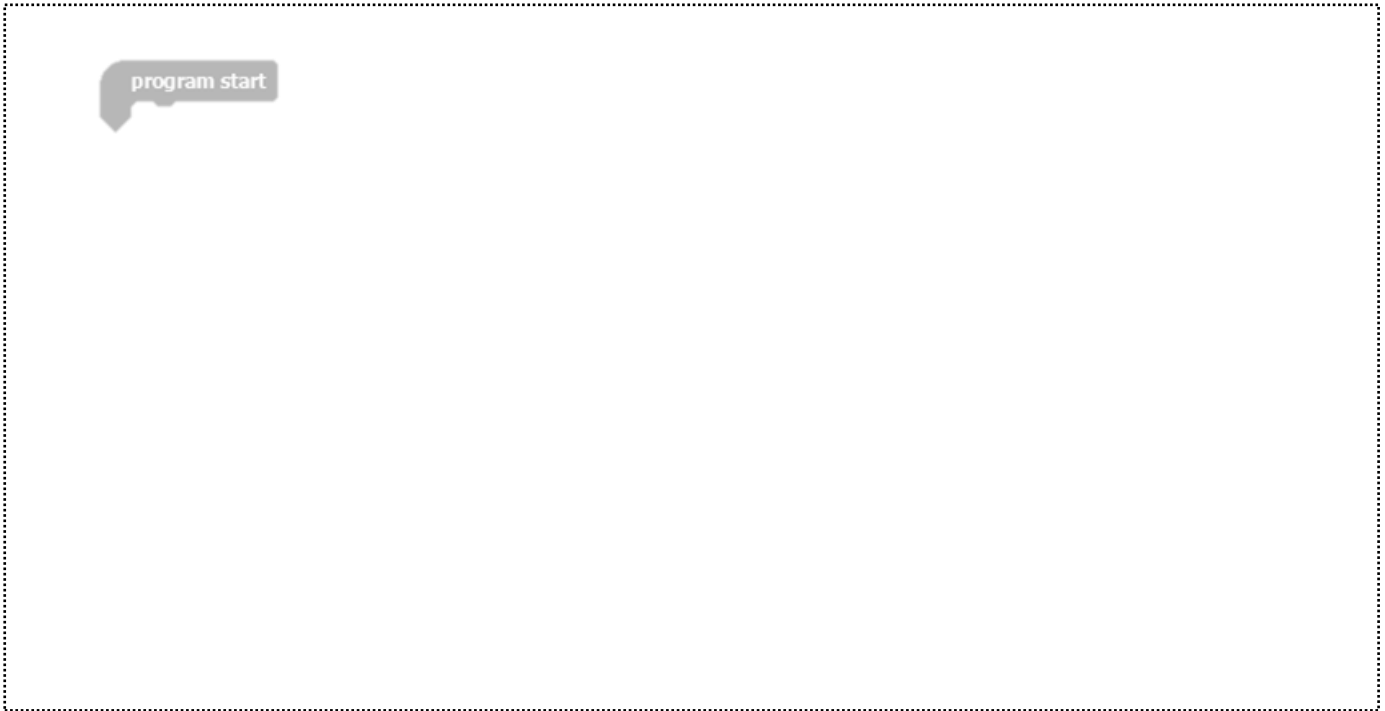
- Crumble
- White USB cord
- Battery pack
- 2 sparkles (LED)
- 1 sparkle baton
- 1 sparkle matrix
- Normal light bulb
- Big **red** light
- Toggle switch
- Push button
- Micro switch
- 3 **yellow** wires
- 3 **red** wires
- 3 **green** wires
- 3 **black** wires

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Design Challenge 1

Learning Objective: To identify patterns and use a loop to control physical outputs.

What would the program look like for police lights (alternating a flashing pattern of red & blue)?



Draw a diagram of how you would connect this circuit.

Label the parts of your circuit.

Change the light colors and the type of pattern, and have it repeat several times.

STOP
Teacher
Signature _____

Question: If you were to light up a third Sparkle, what number would you have to add in the block?

Design Challenge 1

Self-Reflection – Please write in full sentences.

What was the easiest part of this challenge?

What was the most difficult part of this challenge?

What skills (be specific) did you apply from other classes to complete this challenge?

Describe 3 examples where this type of code/system could be applied in real life applications.

- 1.
- 2.
- 3.

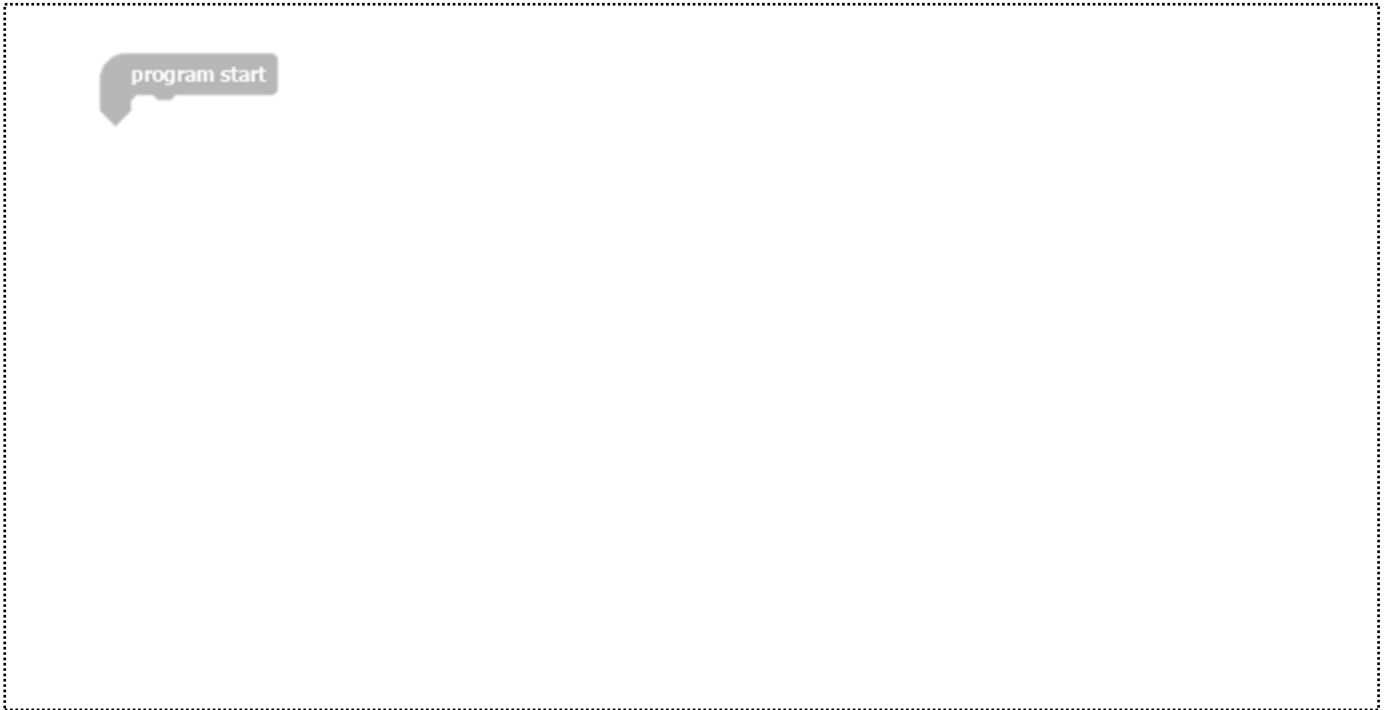
STOP
Teacher
Signature _____

Design Challenge 2

Learning Objective: To identify patterns and use a loop to control physical outputs.

What would the program look like to have a rainbow flash across the LED bar?

(red → yellow → green → blue → purple)



Draw a diagram of how you would connect this circuit.

Label the parts of your circuit.

Change the code so that the rainbow flashes each color one at a time going up and back down.

(red → PAUSE → yellow → PAUSE → green → PAUSE → blue → PAUSE → purple → PAUSE → blue → PAUSE → green → PAUSE → yellow → PAUSE → red)



Design Challenge 2

Using the sparkle matrix, write two codes that can perform the following:

1. Have a minimum of three letters flash on the display, one at a time.
You must use 3 different letters.

program start

STOP
Teacher
Signature

2. Pick an appropriate song on YouTube to design a flashing light show with the sparkle matrix that is synced with the beat or lyrics. The show must last for 10 seconds.

STOP
Teacher
Signature

Design Challenge 3

Learning Objective: To apply computational thinking and switches to control series and parallel circuits.

Draw a simple series and a parallel circuit diagram. Then, connect it integrating the Crumble.

SERIES	PARALLEL
Draw a circuit that turns on one light with a switch.	Draw a circuit with two lights and two switches, with each light working independently of each other.

Describe where you have seen a series circuit in real life. Explain the advantages of using series circuits.

Describe where you have seen a parallel circuit in real life. Explain the advantages of using parallel circuits.

STOP
Teacher
Signature _____

Design Challenge 3

Use an “if, then” statement to design a code for the following circuits:

1. Design a program for a series circuit that turns a green sparkle when a switch is flipped one way, and RED when flipped the other way.

STOP
Teacher
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2. Design a program for a parallel circuit with two sparkles and two switches.
When the first switch is flipped one way the sparkle should turn red, when flipped the other way it should turn blue.
When the second switch is flipped one way the sparkle will turn purple, when flipped the other way it should turn orange.

STOP
Teacher
Signature _____

Design Challenge 4

Learning Objective: Create a program to operate a mechanical system.

Go to <https://www.youtube.com/watch?v=4owYlahKils&t=23s>.

Watch the video and wire up the wheels and motors to your Crumble.

Note: **DO NOT MANUALLY SPIN THE WHEELS ON THE MOTORS WITH YOUR HANDS.**

Show the teacher when you have finished this.

STOP
Teacher
Signature _____

Now add in a switch that makes the wheels turn at 90% power forward for 5 seconds, and when the switch is pressed, reverse slowly at 20% power backwards for 5 seconds.

STOP
Teacher
Signature _____

Design Challenge 5

Learning Objective: Apply knowledge from the previous design challenges to create a robotic vehicle that can successfully navigate through a course.

Directions:

Design a 2-4 wheel robotic vehicle to successfully navigate through an entire course.

Constraints:

- Cannot use more than 4 wheels and motors.
- The vehicle body must be made out of cardboard or other materials provided to you.
- The direction of the vehicle should function based on switches and the program.
- Sparkle lights must be included in the design, and they must change colors when the switches are pressed.

Note: **DO NOT MANUALLY SPIN THE WHEELS ON THE MOTORS WITH YOUR HANDS.**

Sketch your ideas: (All ideas should include labels for ALL parts on the vehicle).

Sketch 1

Sketch 2

Get your sketch approved before making a final sketch.

Final Sketch:

A large rectangular area defined by a dashed black border, intended for the student's final sketch.

Write a step by step plan of how you are going to execute the construction and programming of this vehicle. (What will you do each day, provide details.)

Robot has successful navigated through the course

