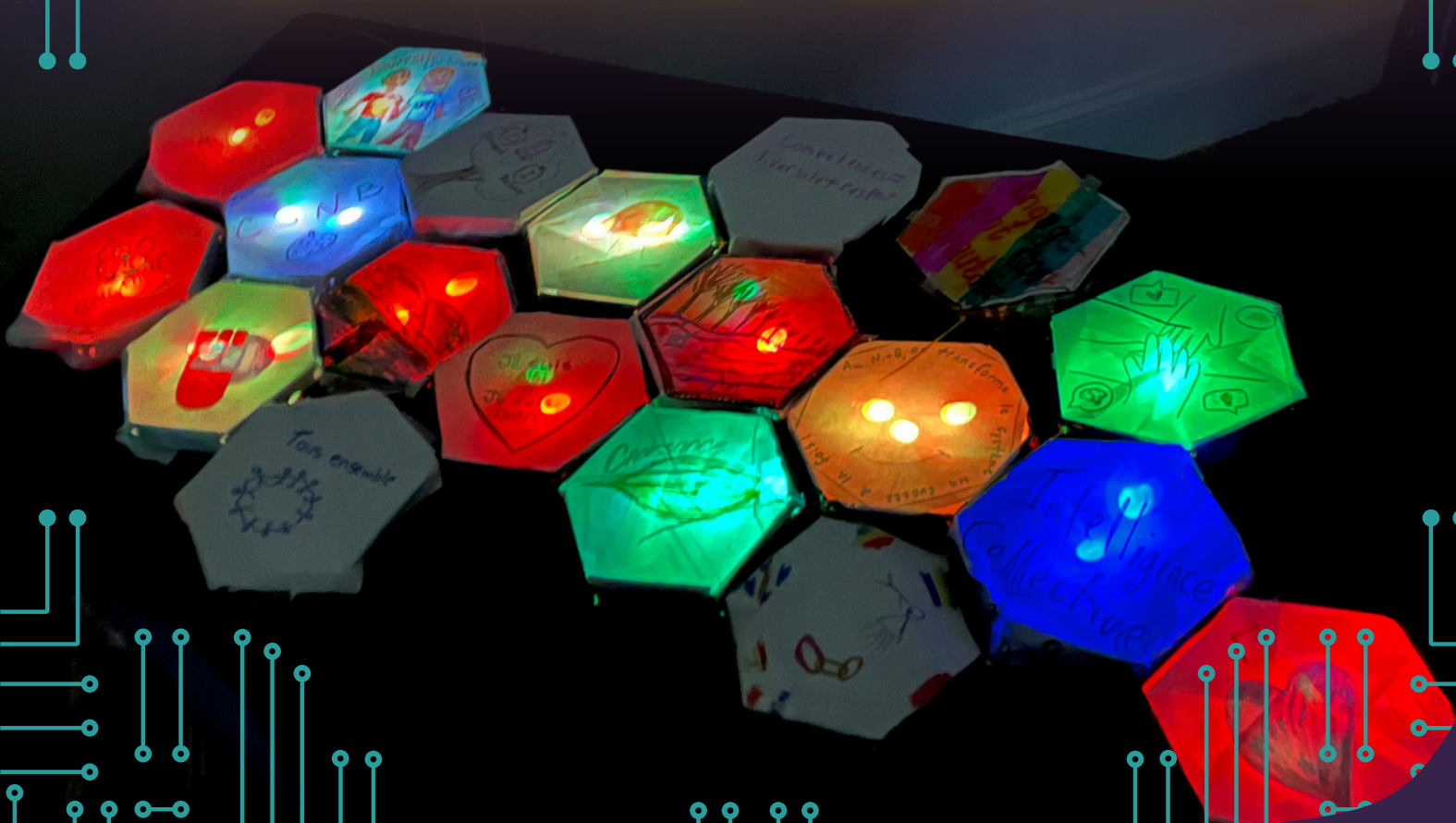


FUN WITH



# CIRCUITS



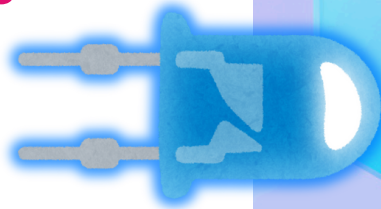
Brilliant  
LABS



LABOS  
Créatifs

# What IF...

you were able to combine electrical circuits with switches to create a collaborative display?



Students will create individual light-up hexagon boxes that connect to form a larger, collaborative artwork with a circuit triggered by a magnet. Each student will design and build their own hexagon, incorporating artistic elements, technology, lights, and switches. The final outcome will be an interconnected display that showcases both individual creativity and collective effort.

Ideation and problem-solving are crucial as students brainstorm unique designs for their hexagons and figure out how to integrate their pieces seamlessly. Their innovative ideas will contribute to the project's success by enhancing the overall visual and interactive experience of the collaborative artwork.

# UN SDG



- hands-on learning and interdisciplinary exploration
- promoting sustainable innovation and advancing technical skills
- reducing the impact mass production and consumerism has on the environment
- exposure to traditionally gender biased skills
- supporting ethical and sustainable production practices and environmental stewardship

## FUN FACT:



Hexagons aren't just stylish—they're nature's design! Bees use them in honeycombs because they cover space efficiently with less material. Lighting up hexagons means you're celebrating this clever natural pattern!



# SKILLS

## Students will learn :

### Artistic design:

Combining visual creativity with technical elements to design a unique box that includes a paper circuit that lights up with embedded LEDs.

### Basic electronics and circuitry:

Understanding how to integrate lights and switches into their designs.

## DID YOU KNOW?

Hexagons can create stunning, customizable patterns because hexagons are the only shape that can tessellate with triangles and diamonds seamlessly. This means you can design endless, unique layouts—like playing with glowing puzzle pieces!





## Topics/curriculum area

Science: Electricity, Magnetism

Technology: Circuits, Reed Switches

Engineering: 3D Construction, Designing

Arts: Visual Storytelling, Representing

Mathematics: Geometry, Measurement

## Competencies

This project has been designed to support the Council of Ministers of Education, Canada global competencies.

- Critical thinking and problem solving
- Innovation, creativity, and entrepreneurship
- Learning to learn/self-awareness and self-direction
- Collaboration
- Communication
- Global citizenship and sustainability

## BADGES

- Circuits
- Design Thinking
- Problem Solving
- Engineering
- Digital Citizenship



# Levels of activity

## **Hello World**

- create a single light-up hexagon

## **Intermediate**

- create hexagons with circuits that connect to each other using reed switches

## **Advanced**

- use multiple lights in parallel and explore using other outputs (fans, buzzers)

## **Brilliant**

- add a b.Board and various sensors to your piece.

## **Prerequisite skills**

Basic understanding of circuits

## **Timeframe**

1 - 3 hours

## **Suggested grade level**

**3 - 12**





# Materials & resources

## In the Kit:

- copper tape
- batteries (CR3202)
- LEDs
- paper clips
- reed switches
- magnets
- circuit diagram card
- box nets
- paper circuit inlays

## Not in the Kit:

- markers
- scissors
- tape/glue

## Useful resources

### Template FRONT

### Teacher document

### Template BACK

### How to make a circuit

### LED Circuit

### Paper circuit exploration

Circuit templates of hexagons to be used with Cricut .

### Box Templates

Circuit templates can also be photocopied and cut manually with scissors

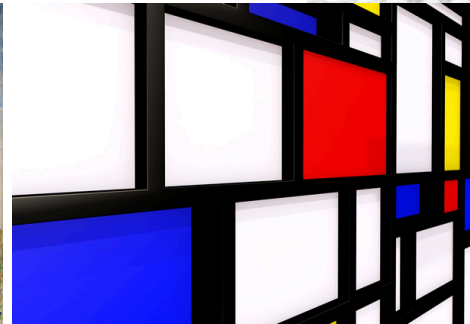




# Possible development

## Introduction

Discuss art. What makes some art more valuable than others? What type of art would you like to own? What makes art memorable for you? Consider showing students the Banksy stunt where a piece of art was shredded upon being sold or various art installations from around the world.



## Discuss the power of art

Explain to students how art can evoke emotions and tell stories without words. Ask students:

- Why do we remember certain pieces of art more than others?
- What features make art unique or eye-catching?
- What makes art effective?
- Have you ever seen art with embedded technology, like lights or sounds?

## Using the design thinking process

Introduce the concept of paper circuits. Students will learn how to make their own by using a coin cell battery, copper tape, and LED lights.





# Creating the **PROJECT**

## **Building the Box**

1. Fold the box. The side-lengths around the boxes have been scored for you.
2. Secure the flaps (using glue or tape) to build the hexagon box. Use the flaps to hold the sides together. Try to have the flaps on the inside rather than outside. (See video).

## **Making the Circuit**

The LED circuit will be placed in the bottom of the box

3. Make your circuit plan based on the example included in the kit. Cut the tape to length, peel backing (peel a small amount at a time) and press in place. Fold out the legs of the LED while paying attention to which is positive (longer lead) and which is negative (shorter lead).
4. Sandwich the legs of the LED between the copper tape on the hexagon and a new, short piece of copper tape.
5. You now have a positive side and a negative side to your circuit. Install a coin cell battery by having one length going from the LED to under the battery and the other going from the top to the reed switch location. (make sure the battery has the correct orientation).



## Creating the

# PROJECT

6. Attach the reed switch. The reed switch does not have polarity. Sandwich the legs of the reed switch in place.
7. Add a paperclip to the other side of the paper behind the reed switch. (this helps with connecting to the magnet)
8. Test your circuit by holding a magnet near the reed switch.
9. Glue or tape the magnet onto one side of the hexagon lid.  
Bringing the magnet near other hexagons will make it light up.

## Personalize the Box

10. Students should decorate the lid of the box to tell a story, make a cohesive artwork, or elicit a viewer response.
11. Class should decide on whether the project is thematic, whole-class or individual designs.

## Reflection

Students will reflect on how integrating technology can make artwork more interactive and memorable.

How can this new skill be used to create personalized, innovative designs?



# Possible Problems:



## The copper tape tears or is scrunched up



- students should only peel off a small part of the backing at a time as they lay the tape down
- put new tape over the tear to ensure a solid connection.



## The LED isn't lighting up



- Check if the battery is not dead with a different LED
- Check if the light is working with a different battery
- Try turning the battery over in case the positive and negative leads of the LED are not properly aligned with the battery terminals
- Smooth out the copper tape and add tape on top of any questionable areas, check that the copper tape connections are secure and not broken
- Check the magnet is connecting with the reed switch.
- Press down on the LED legs and reed switch legs to ensure a good connection
- Check that the copper tape strips are not touching each other, causing a short circuit
- Check that the copper tape is not continuous under the light and switch.



## Facilitator tips

### Start Simple:

Teacher may want to consider creating a simple paper circuit as an introduction to this project. Also, it is advisable to pre-plan with students where they are going to place their hexagon in the overall project so that the reed switch can be positioned in the right location on their shape.

### Provide Demonstration:

Model how to peel only a small amount of the backing of the copper tape in order to not ruin the tape. If students peel off longer than 10 cm, it will twirl and the tape will be useless. It is important to note that the copper tape conducts better on the non-sticky side.

## Safety tips

LEDs have a positive and a negative side; reversing the polarity can prevent the LED from working or potentially damaging it. Using a power source with too high voltage or current can overheat the circuit components, leading to potential burns or fires. LEDs and copper tape can get hot if too much current flows through them.



### Handle tools with care:

Copper tape can easily cause short circuits if it crosses over itself or if connections are not insulated properly. If it comes into contact with other conductive materials unintentionally, it could create unwanted paths for electricity.

# Glossary

## LED (light emitting diode)

A small electrical component that produces light.

## Polarity

Two poles that create an electric charge (e.g., north/south of a magnet or the Earth)

## Parallel circuit

a circuit that has all components separately connected to the positive and negative, so each component has its own path for the current to flow.

## Circuit

Loop through which electrical current can flow

## Conductive

Materials that allow the flow of electricity through (e.g., aluminum, copper, water)

## Series circuit

a circuit that has all the components connected one after the other along which the whole current flows through each component.

## Take it further

**Light Up Quilt**  
**Light up Wearables**

**Innovation challenge possible : Novel Storytelling**



