Toy Design Challenge

Group Members:

Key Concept: Development

Related Concepts: Function, Innovation, Adaptation

Global context: Scientific and Technical Innovation

STATEMENT OF INQUIRY

Through innovation and development, designers create functional and age-appropriate solutions that use technology to support learning through play.

Factual questions: What are the learning needs of children at different ages? What is Micro:bit and how does it work? How do simple electrical circuits function? What types of toys are suitable for different age groups? What safety considerations must be taken when designing toys for young children?

Conceptual question: How does the function of a toy influence how children learn? Why is age-appropriate design important when creating toys? How does technology enhance learning through play? How do designers adapt ideas based on user feedback? In what ways does physical design affect user interaction?

Debatable question: Are high-tech toys better for learning than traditional toys? Should educational toys focus more on learning outcomes or enjoyment? Can technology replace imaginative play in early childhood? Is a simple toy sometimes more effective than a complex one? How much technology is too much for young children?

READ

Lesson 1

Lesson 1: Project Overview

You are a junior toy designer working for Hasbro. Your team has been assigned to design a children's educational toy that helps young children learn through play.

Design Challenge
Create a functioning educational toy prototype that supports learning for a specific age group using physical design, coding, and electronics.

Your toy must be:

A. **Age-appropriate**
B. **Safe**
C. **Educational**
D. **Interactive (Must use sound)**

You will design and build a fully functioning prototype using:

1. **Cardboard prototyping**
2. **Micro:bit**
3. **Scratch**
4. **Simple electrical circuits (copper wire, buttons, LEDs, etc.)**

Your toy will be tested and evaluated by children of different ages (children of school staff).

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Assigned Scenarios (Choose or Teacher Assigned)

Scenario	Age Group	Learning Goal
1	6 months – 1 year	Count to 3 & learn primary colours
2	2–3 years	Learn basic shapes
3	3–4 years	Learn different languages
4	1–2 years	Playing a musical instrument

Task 1 - Research & Analysis

What You Must Do:

Research how toys help children learn at your assigned age.

Required Evidence:

- **Research 3 existing children's toys**
- **1 video**
- **1 article**

For each toy, explain:

a. **Target age**
b. **What the toy teaches**
c. **Strengths and weaknesses**

Explain:

a. **Why your toy is needed**
b. **What your toy must do to be successful**

You will be assessed on the following:

1. **Understanding user needs**
2. **Analyzing existing products**
3. **Justifying a design need**

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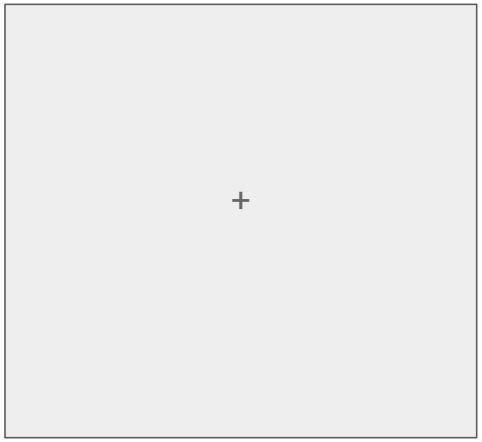
Task 1 - Research & Analysis

Case Scenario:

Why your toy is needed?

What your toy must do to be successful?

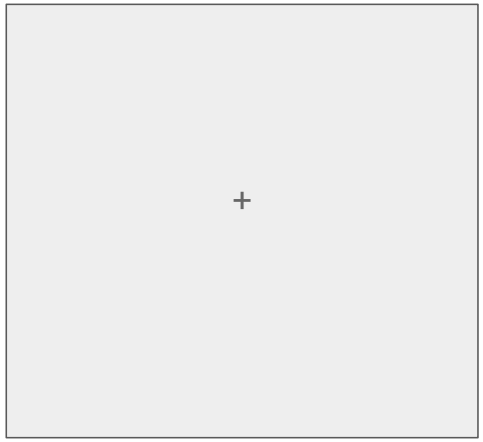
Toy 1



Target age:
What the toy teaches:
Strengths and weaknesses:

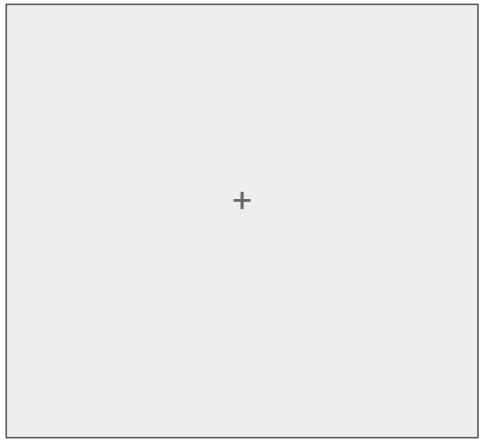
Insert Video Here

Toy 2



Target age:
What the toy teaches:
Strengths and weaknesses:

Toy 3



Target age:
What the toy teaches:
Strengths and weaknesses:

Criteria A

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Lesson 1

Task 2 - Developing Design Ideas

What You Must Do: Design possible toy ideas before choosing your final design.

Required Evidence: 3 different design sketches, each:

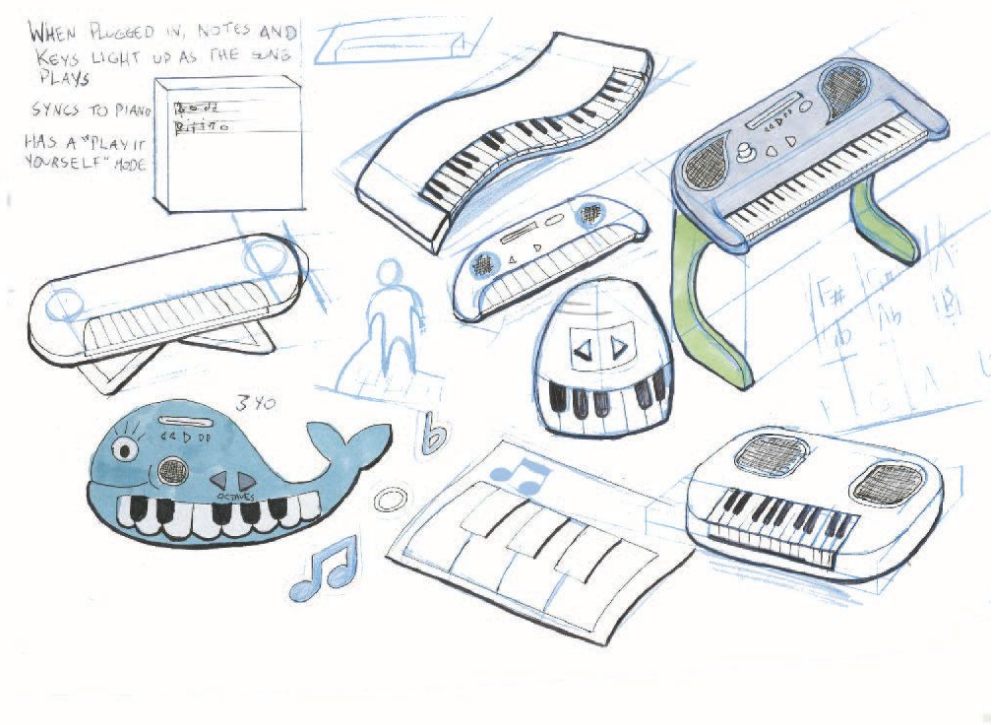
- **Labeled**
- **Explained**
- **Linked to the learning goal**

1 final selected design, showing:

- **Physical shape**
- **Interaction points (buttons, movement)**
- **How Micro:bit, Scratch, and circuits will be used**

Assessed Skills:

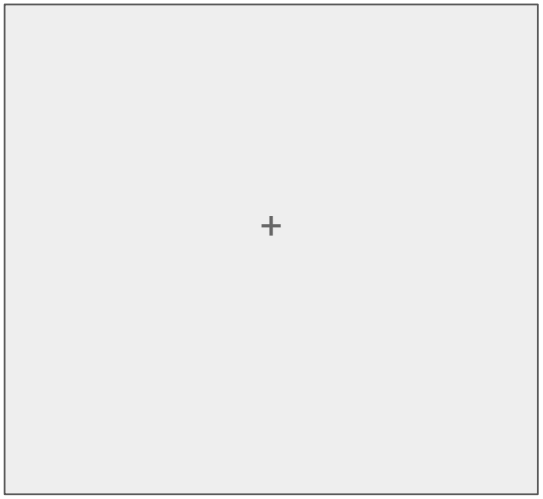
1. **Idea generation**
2. **Visual communication**
3. **Clear planning**



Criteria B

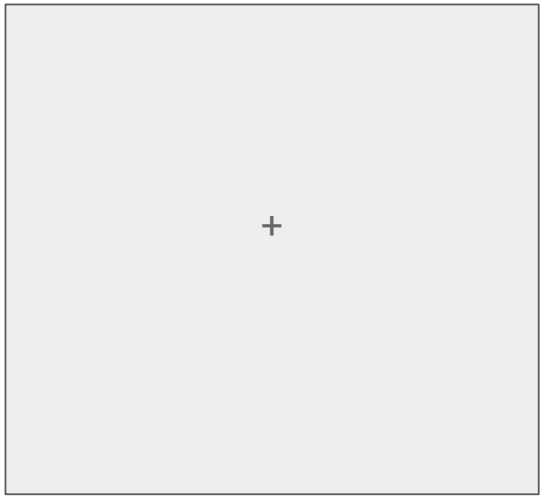
Task 2 - Developing Design Ideas

Sketch 1



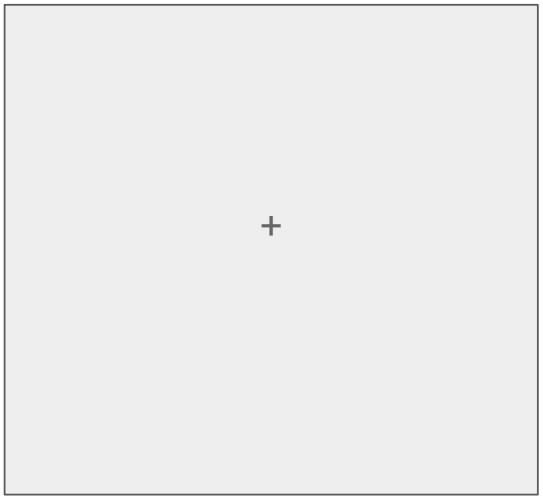
... insert an explanation of your sketch along with links to the learning goals.

Sketch 2



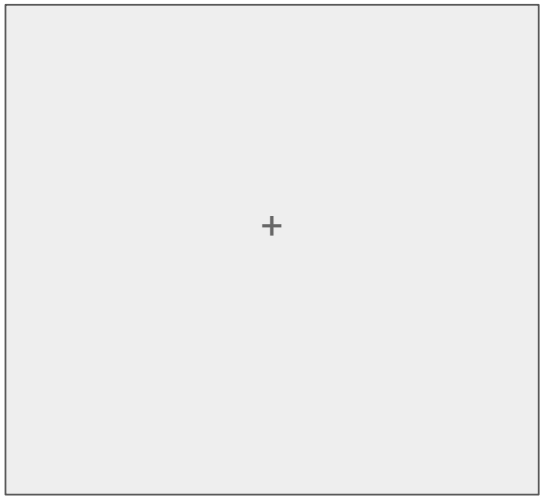
... insert an explanation of your sketch along with links to the learning goals.

Sketch 3



... insert an explanation of your sketch along with links to the learning goals.

Final Sketch



... insert an explanation of your final sketch along with links to the learning goals.

Task 3 - Exploring Coding & Micro:bit

What You Must Do: Learn how Micro:bit and Scratch work befo
building your final toy.

Required Evidence:

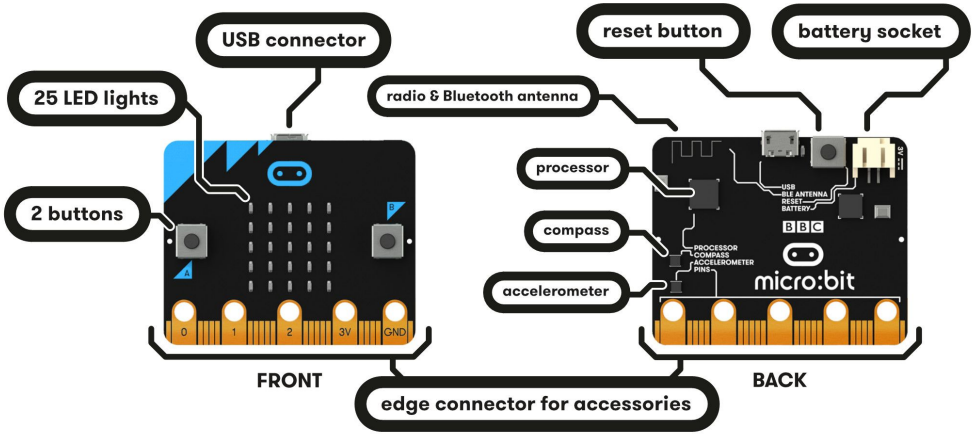
- **Screenshots of Scratch experiments**
- **Screenshots of Micro:bit MakeCode experiments**

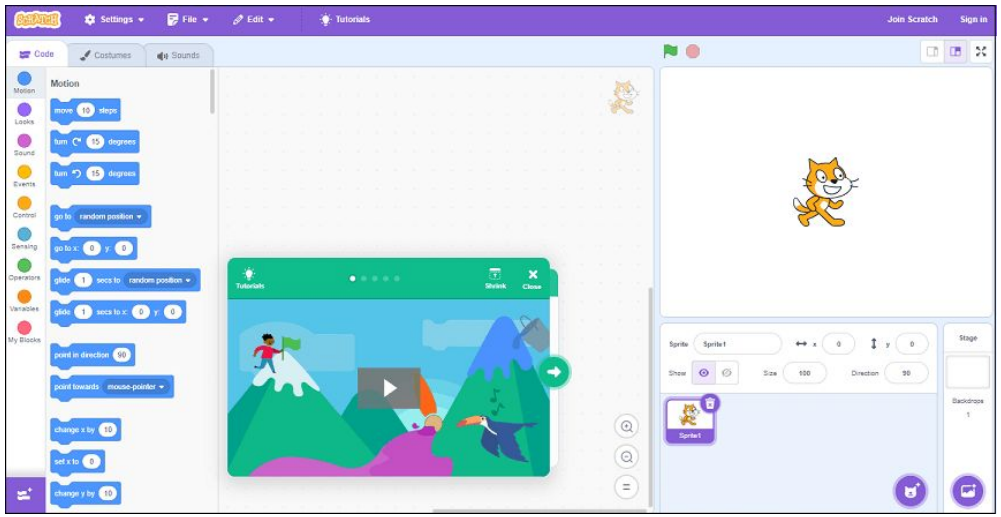
Short explanations of:

1. **What each program does**
2. **What inputs and outputs are used**

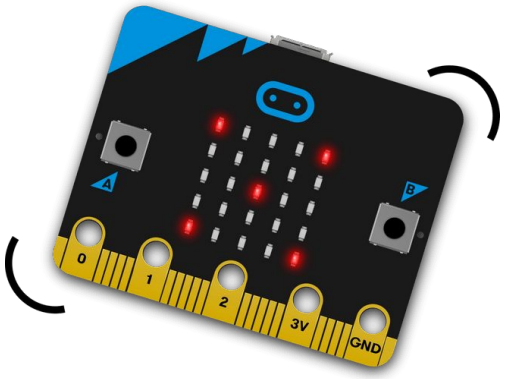
Notes on:

a. **What worked**
b. **What didn't work**
c. **What you learned**





Supporting Resources



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Task 3 - Exploring Coding & Micro:bit

Screenshots of Micro:bit MakeCode experiments	Screenshots of Scratch experiments

Answer the following questions:
What does each program do?
What are inputs and outputs?
What worked?
What didn't work?
What did you learn?

Criteria C

Task 4 - Coding Documentation

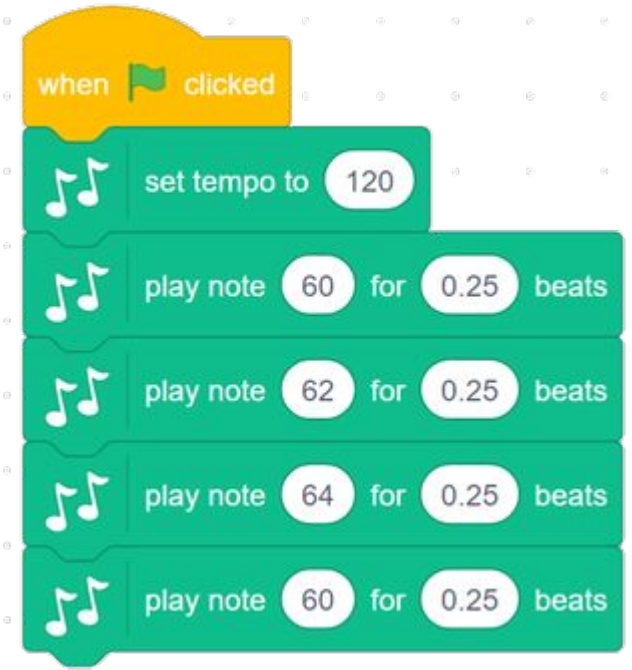
What You Must Do:
Document how your code develops from early attempts to a working solution.

Required Evidence:

- **Screenshots of early code**
- **Screenshots of improved versions**
- **Screenshots of final working code**

Explanations of:

A. **What the code controls**
B. **How it supports learning**
C. **Evidence of problem-solving and debugging**



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Task 4 - Coding Documentation

Early code

Improved code

Final code

Explain what the code controls, how it supports learning, evidence of problem-solving and debugging.

Criteria C

Task 5 - Electrical / Circuit Documentation

What You Must Do:

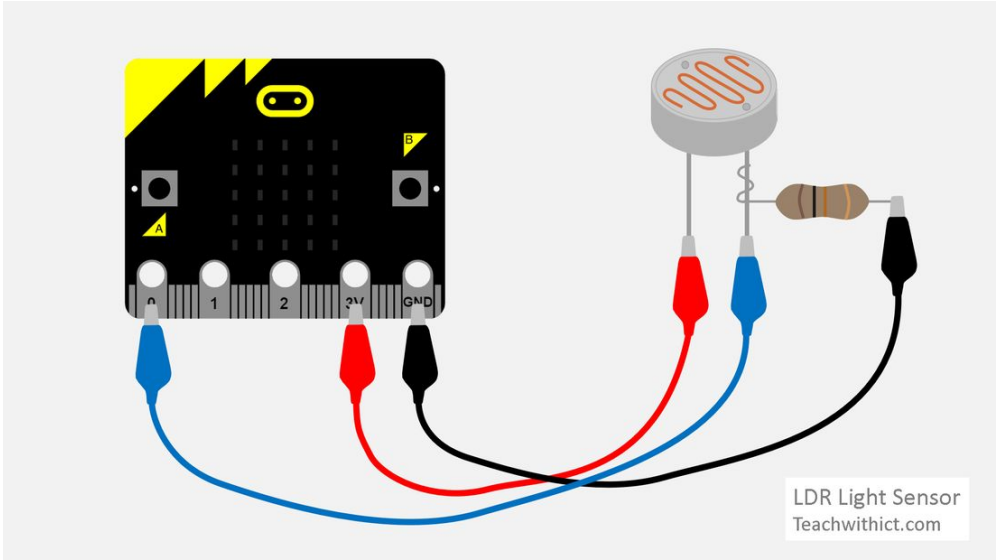
Document how electricity is used in your toy.

Required Evidence:

- ➢ **Photos or diagrams of Circuits**
- ➢ **Photos of Buttons, LEDs, or sensors**
- ➢ **Photos of Inputs and outputs**

Explanation of:

a. **How electricity flows**
b. **How circuits connect to code**
c. **Reflection on at least one circuit issue and how it was fixed**



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Task 5 - Electrical / Circuit Documentation

Photos or Diagram of Circuits

Insert photos of buttons

Insert photos of inputs/ outputs

Explain how electricity flows, how circuits connect to code, and reflect on at least one circuit issue and how it was fixed.

Criteria C

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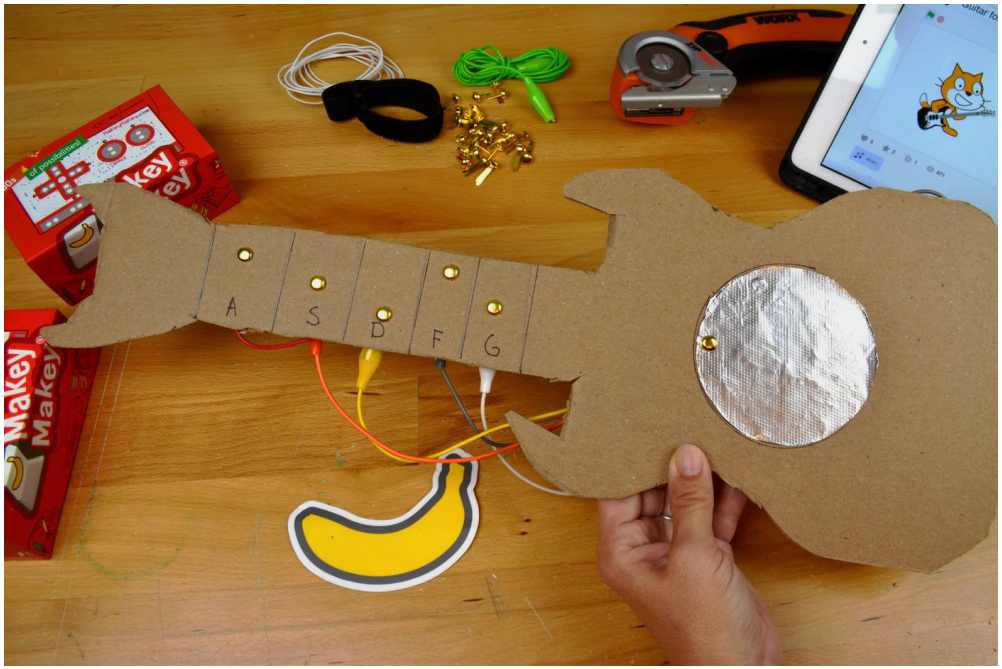
Task 6 - Physical Prototyping Documentation

What You Must Do: Document how you build and improve your fully functional prototype

Reminder: Your fully functional prototype must have:

1. **Physical interaction must trigger the circuits**
2. **Circuits must activate the Micro:bit**
3. **Code must creates visual/sound responses**
4. **Scratch is used to support or extend interaction**



Required Evidence:

- ➢ **Photos of early prototype**
- ➢ **Photos of mid-stage build**
- ➢ **Photos of final prototype**

Notes explaining:

a. **Material choices**
b. **Changes made**
c. **How the design suits the age group**
d. **Reflection on safety, durability, and usability**

What You Must Do:

Video or live demonstration

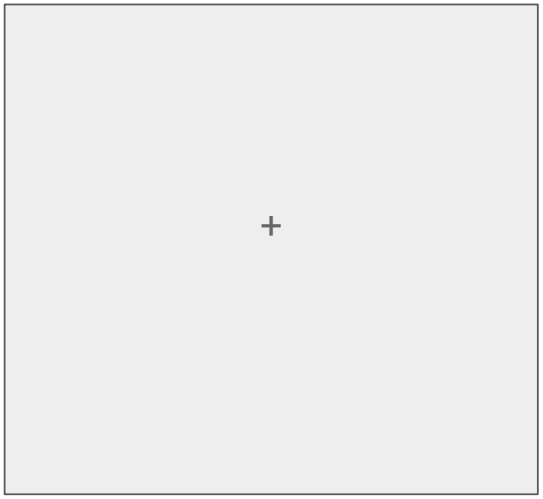
Explanation of how all systems work together

Criteria C

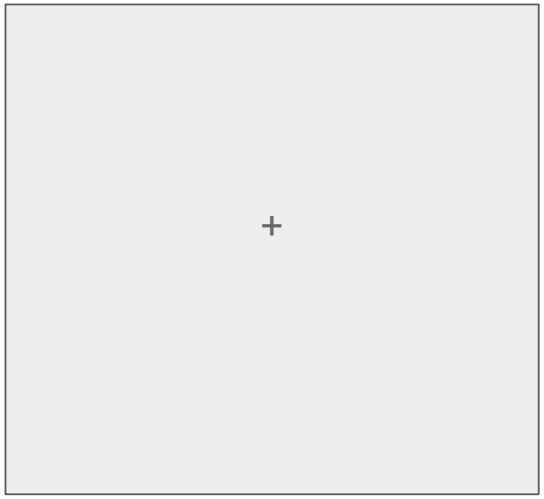
Lesson 1

Task 6 - Physical Prototyping Documentation

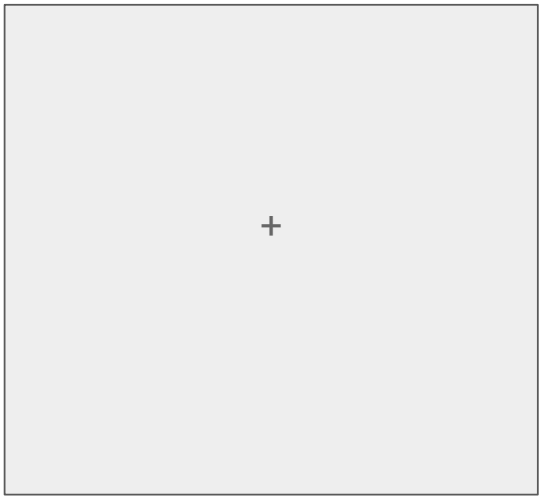
Early prototype



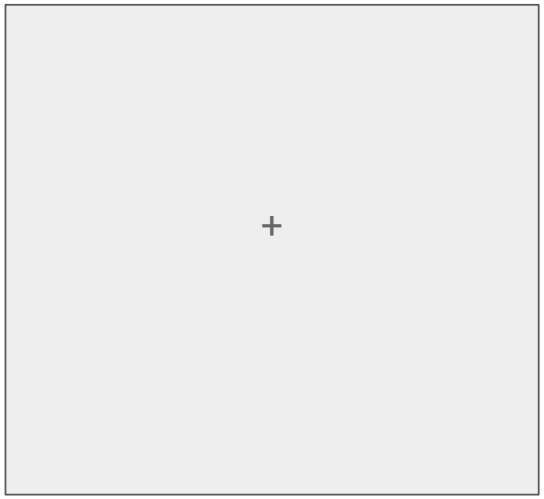
Mid-stage prototype



Final Prototype



Video



Criteria C

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Task 6 - Physical Prototyping Documentation

Notes explaining:

a. Material choices
b. Changes made
c. How the design suits the age group
d. Reflection on safety, durability, and usability

Criteria D