Lesson Plan: Simulating Electric Circuits in Scratch🔌

Grade Level: 9
Subject: Science
Topic: Electric Circuits
Time: 2 class periods (45–60 min each)

Learning Objectives

- Demonstrate that electricity requires a complete path (circuit) to flow and can produce light, heat, and sound.
- Use Scratch to simulate a science concept.
- Identify the problem (how electricity flows).
- Choose Scratch as the right tool to illustrate it.
- Review, revise, and explain the digital project.

4Cs:

- **Critical Thinking:** How do we simulate a closed circuit?
- **Creativity:** Designing characters and effects for outputs (light, heat, sound).
- **Communication:** Explaining how the circuit works to peers.

Materials Needed

- Laptops or Chromebooks with Scratch (or tablets with Scratch Jr)
- Internet access (optional)
- Headphones (if using sound in simulations)
- Example Scratch project (to be provided)
- Student Worksheet (provided as printable PDF)
- Teacher Guide (provided as printable PDF)

Lesson Procedure

Day 1: Introduction & Build

1. **Engage (10 min):**
    - Ask: “What needs to happen for a lightbulb to turn on?”
    - Show simple real-world circuit diagram (battery, wires, lightbulb).
2. **Explain (10 min):**
    - Teach basic circuit components: power source, conductor, output device (light/sound).
    - Discuss what a closed vs. open circuit is.
3. **Explore (20–30 min):**
    - Show Scratch example simulation.
    - Students begin creating their own:
        - Add sprites for battery, wires, switch, and bulb or buzzer.
        - Use variables (e.g., `currentFlow = true/false`).
        - Use `if currentFlow = true → turn on light` logic.
        - Add events (e.g., when green flag clicked, when sprite clicked).

Day 2: Test, Reflect, Share

1. **Evaluate (15 min):**
    - Peer testing: Students test each other's circuits.
    - Use checklist from worksheet to evaluate if project has:
        - Complete circuit
        - Turns light/sound on when closed
        - Turns off when open
2. **Elaborate (20 min):**
    - Add creative features:
        - Use sound blocks for buzzers
        - Add animations when current flows
3. **Exit Ticket (10 min):**
    - Draw a real-life circuit and write 2 sentences explaining how your Scratch project demonstrates that a closed path is needed for electricity to flow.

Printable Resources

- **Student Worksheet**: Circuit planning sheet + peer review checklist + exit ticket
- Electric_Circuit_Student_Worksheet.docx
- Slide Presentation (must log in to Google account or create one) https://app.chalkie.ai/lessons/9f39da52-f9cf-4ac3-ad70-b9207a509596

Assessment

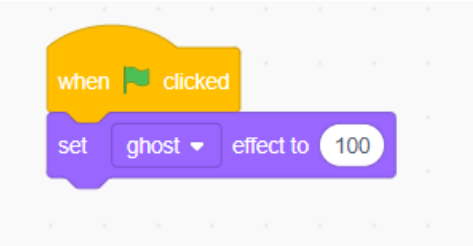
Component	Criteria	Points
Circuit Simulation	Includes battery, wires, switch, and bulb/sound	10
Conditional Logic	Light or sound turns on/off depending on current	10
Creativity	Unique design, added animations or interactivity	5
Communication	Clear explanation of how it works	5
Peer Feedback Participation	Gives and receives feedback respectfully	5

Total: /35 points

******SAMPLE PROJECT / SOLUTION

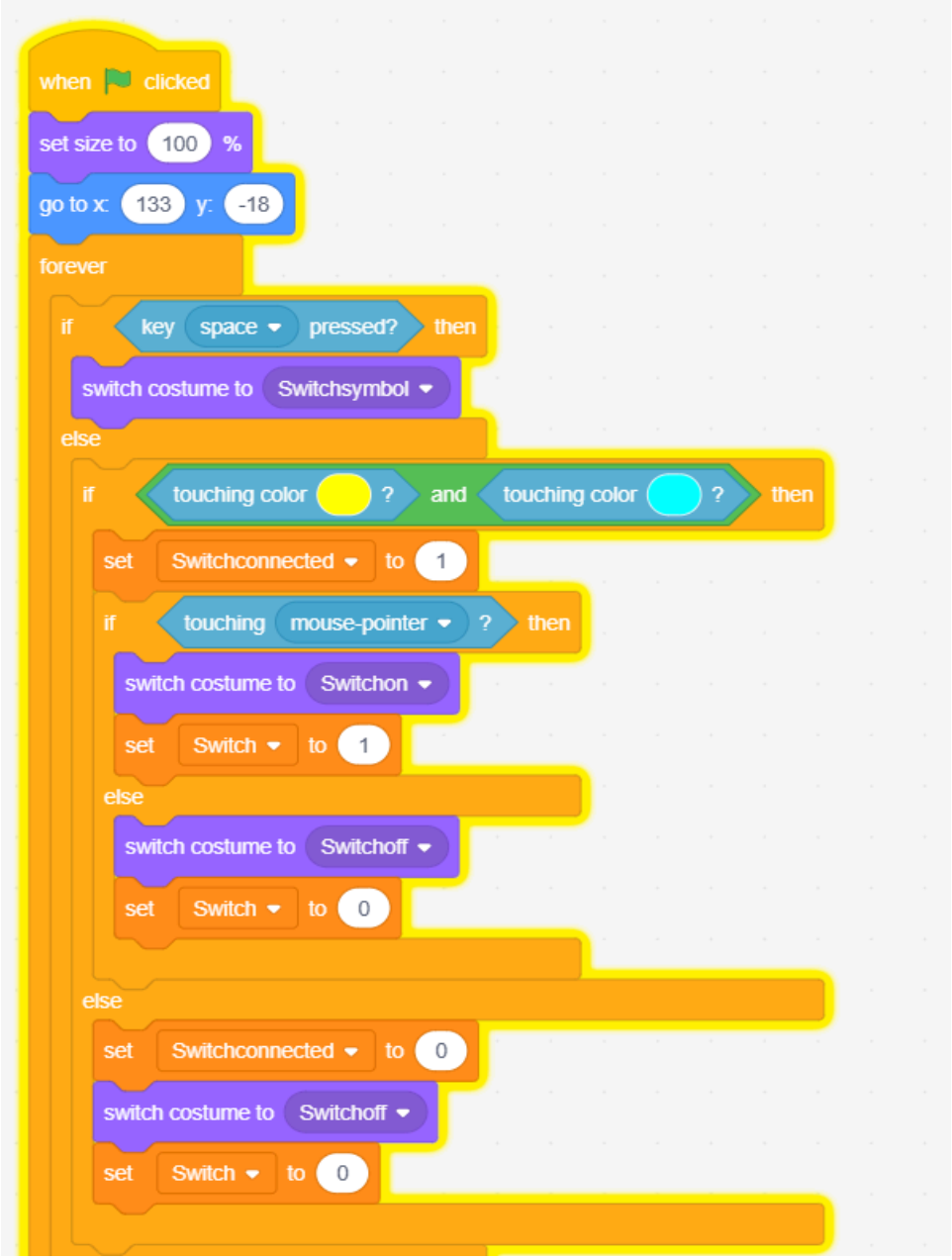
Instructions Switch Battery Bulb

Instructions

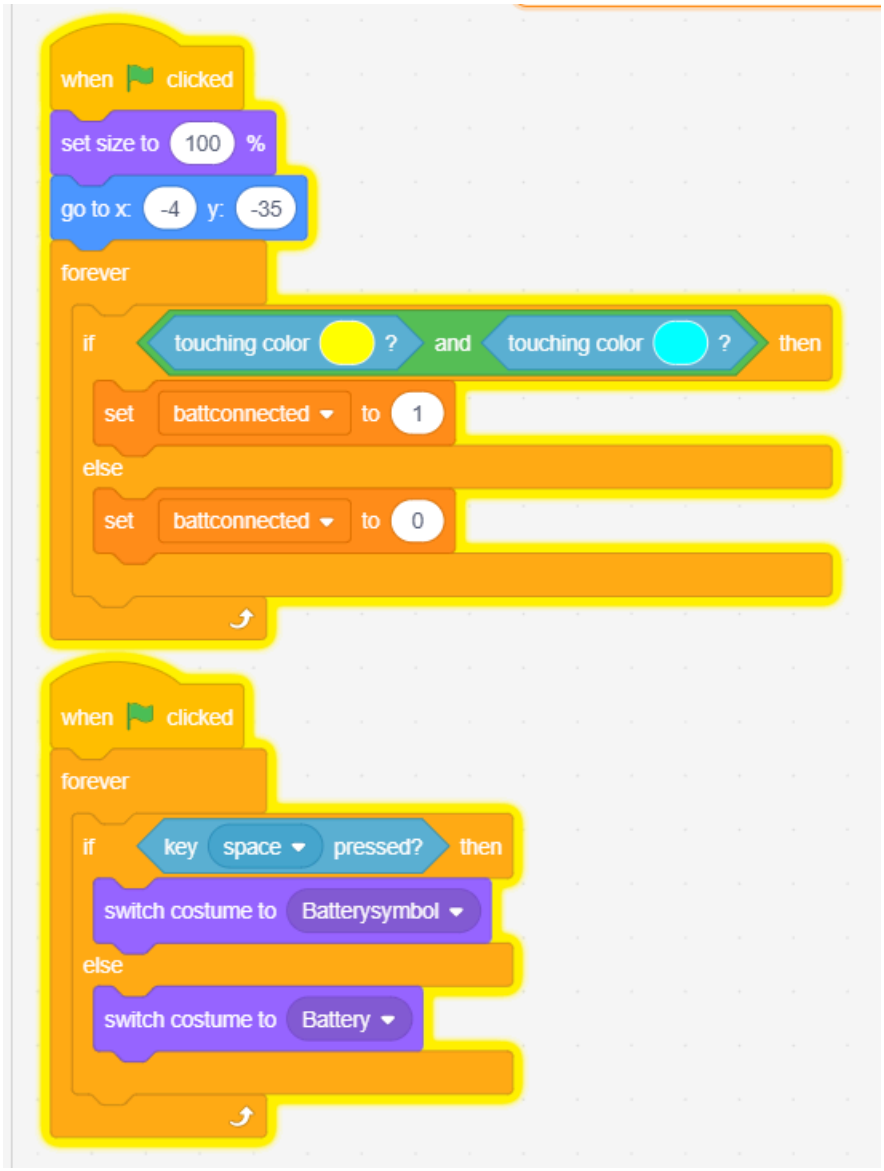


Instructions: Click green flag. Drag the circuit parts around to connect them and light the bulb. Mouse over the switch and push the space bar to engage.

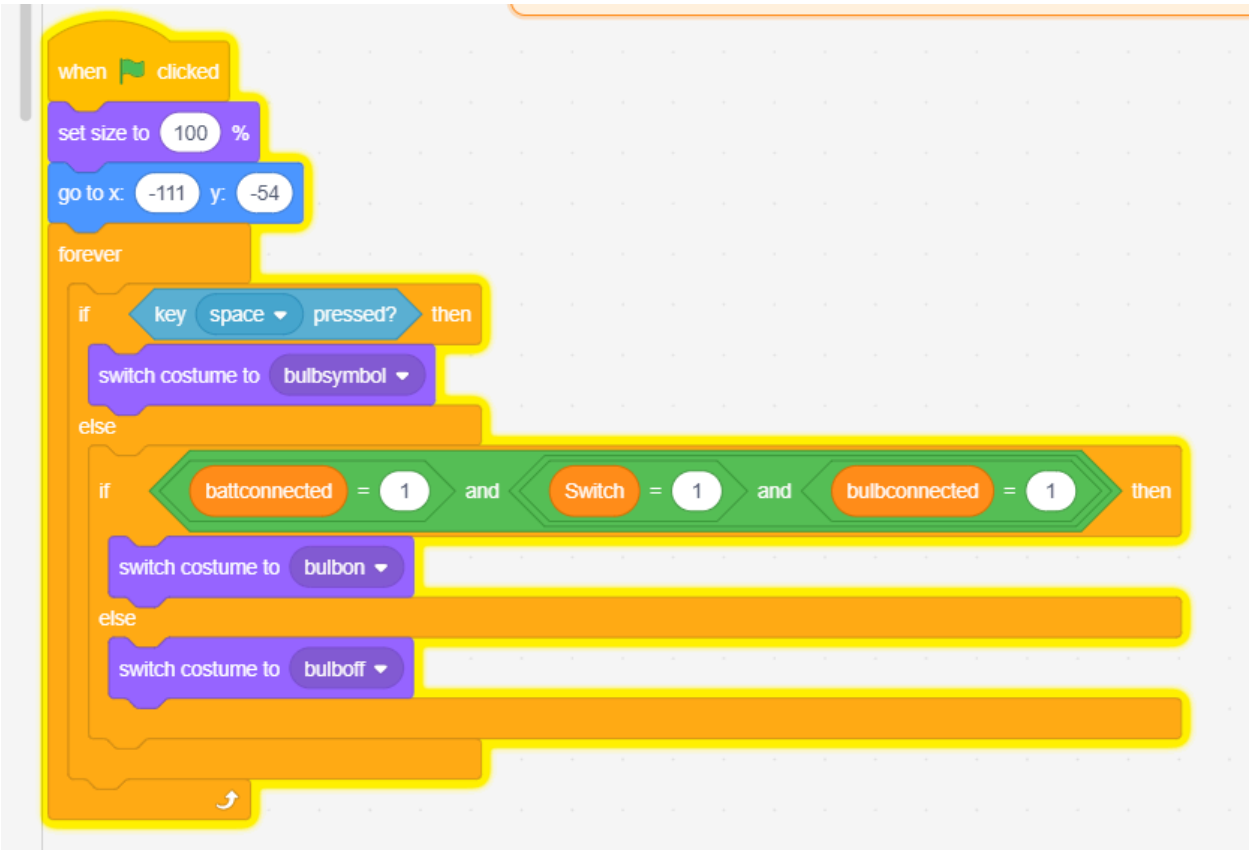
Switch


when clicked
set size to 100 %
go to x: 133 y: -18
forever
if key space pressed? then
switch costume to Switchsymbol
else
if touching color ? and touching color ? then
set Switchconnected to 1
if touching mouse-pointer ? then
switch costume to Switchon
set Switch to 1
else
switch costume to Switchoff
set Switch to 0
else
set Switchconnected to 0
switch costume to Switchoff
set Switch to 0

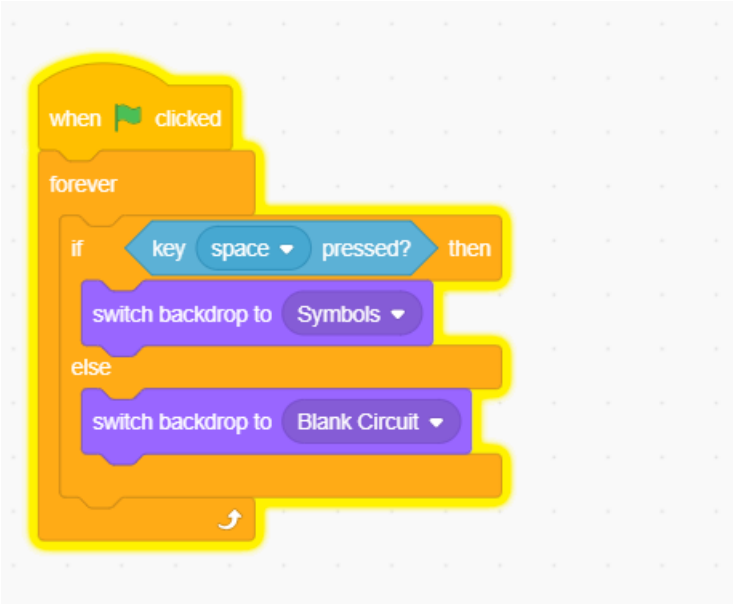
Battery

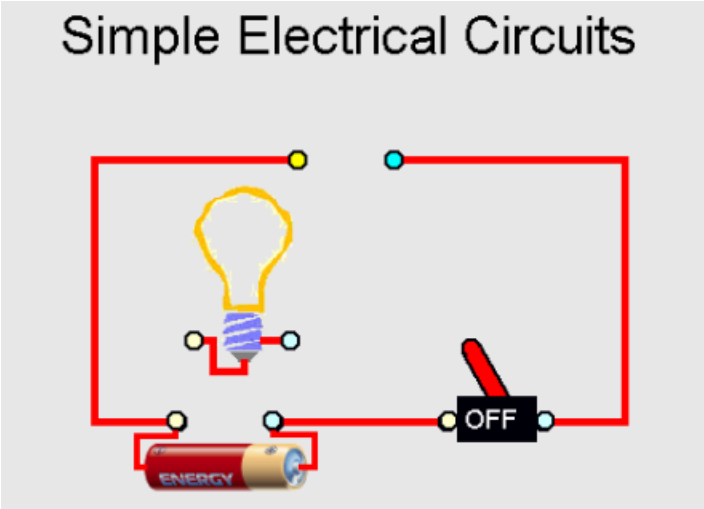

when clicked
set size to 100 %
go to x: -4 y: -35
forever
if touching color ? and touching color ? then
set battconnected to 1
else
set battconnected to 0
when clicked
forever
if key space pressed? then
switch costume to Batterysymbol
else
switch costume to Battery

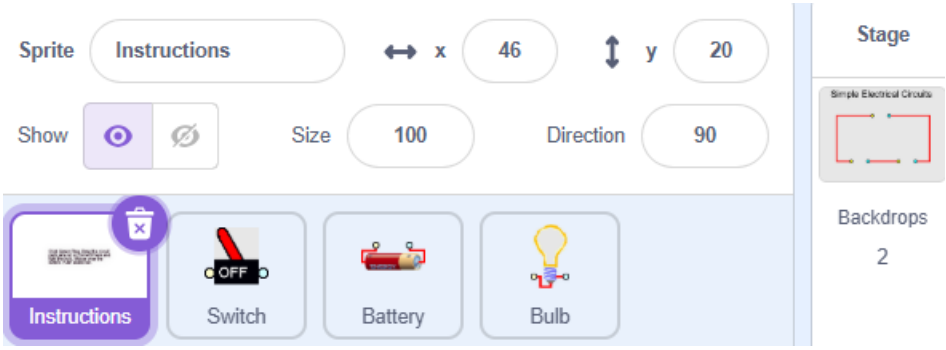
Bulb


when clicked
set size to 100 %
go to x: -111 y: -54
forever
if key space pressed? then
switch costume to bulbsymbol
else
if battconnected = 1 and Switch = 1 and bulbconnected = 1 then
switch costume to bulbon
else
switch costume to bulboff

Stage


when clicked
forever
if key space pressed? then
switch backdrop to Symbols
else
switch backdrop to Blank Circuit


Simple Electrical Circuits
OFF
ENERGY


Sprite
Instructions
x
46
y
20
Show
Size
100
Direction
90
Instructions
OFF
Switch
Battery
Bulb
Stage
Backdrops
2