STEAM NOTE FOR Grade 4

1. What does STEAM mean?
STEAM stands for **Science, Technology, Engineering, Arts, and Mathematics**.

2. Write two safety rules for working with electricity.

- Never touch wires or plugs with wet hands.
- Always check connections before switching on the power.

3. What is an electrical circuit?
An electrical circuit is a path through which electricity flows.

4. What is the difference between an open and a closed circuit?

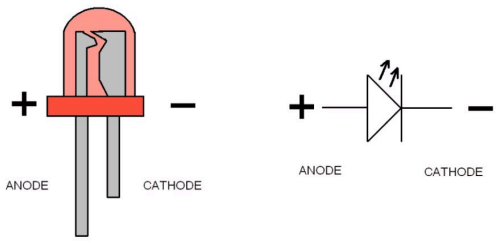
- **Open circuit**: The path is broken; electricity cannot flow.
- **Closed circuit**: The path is complete; electricity flows.

5. Name the parts needed to light an LED on a breadboard.

- LED
- Resistor
- Breadboard
- Jumper wires
- Power source (battery or USB supply)

6. What is a motor used for in robotics?
A motor is used to create movement (e.g., turning wheels, moving arms).

7. What is an LED?
LED means **Light Emitting Diode** – a small light that glows when current flows.



8. Why do we use a resistor with an LED?
To limit the current and prevent the LED from burning out.

9. What is a breadboard used for?
A breadboard is used to build and test circuits without soldering.

10. In Scratch, what is a sprite? Give one example.
A sprite is a character or object that can move or act in Scratch.
Example: The Scratch cat.

11. How do you make a sprite move and say Hello in Scratch?

- Use the block **"move 10 steps"** to move.
- Use the block **"say Hello for 2 seconds"** to talk.

12. Write two examples of conductors and two of insulators.

- Conductors: Copper, Aluminum
- Insulators: Rubber, Plastic

13. How does a buzzer game work?
A buzzer game works by creating a closed circuit when the metal loop touches the wire, which makes the buzzer sound.

14. Full Forms

a. LED: Light Emitting Diode
b. LCD: Liquid Crystal Display
c. DPDT: Double Pole Double Throw
d. AI: Artificial Intelligence
e. DC: Direct Current
f. CPU: Center Processing Unit
g. AC: Alternative Current
h. STEAM: Science, Technology, Engineering, Arts and Mathematics

Chapter 1–2: Introduction to STEAM & Circuits

- **STEAM**: Science, Technology, Engineering, Arts, Mathematics → helps us learn, create, and solve problems.
- **Safety Rules**:
    - Don’t touch wires with wet hands.
    - Handle batteries carefully.
    - Check connections before switching on.
    - Don’t look directly at bright LEDs.
- **Circuit**: It is a path for electricity to flow.
    - Open Circuit → path broken, electricity does not flow. (Switch OFF)
    - Closed Circuit → complete path, electricity flows.(Switch ON)

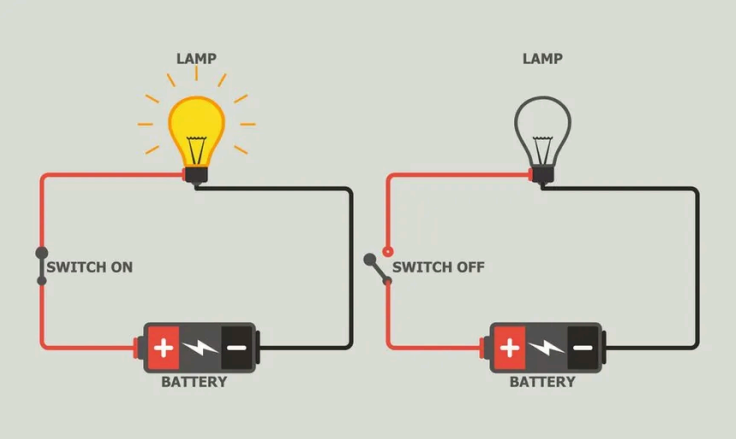


Figure: Closed and Open Circuit

- **Components**:
    - **Battery**: A battery is a device that stores electricity and gives power to things when needed.
    - **LED**: Small light that glows when current flows (long leg = positive also known as Anode , short = negative also known as Cathode).
    - **Motor**: A motor is a machine that converts electricity to motion.
    - **Breadboard**: Breadboard is a plastic board with many small holes used to connect wires and electronic parts to make circuits.

- **Resistor**: A **resistor** is an electronic part that **controls or reduces the flow of electricity** in a circuit.

- **Circuit Diagram:**

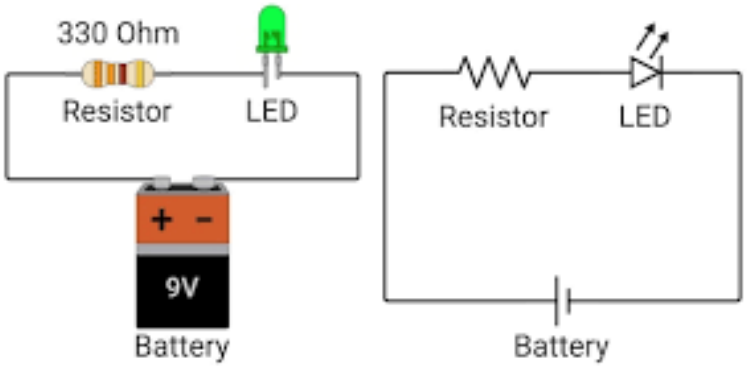


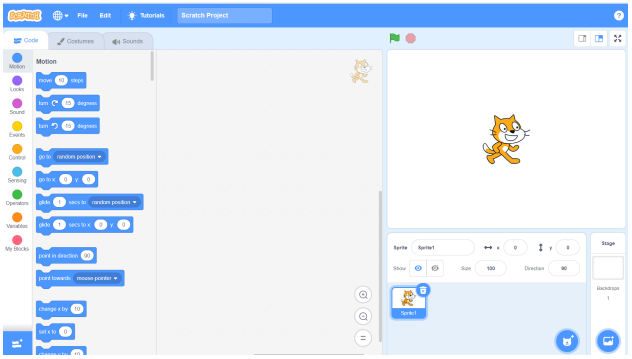
Figure: LED Circuit

Possible Exam Questions

1. What does STEAM stand for?
2. Write 2 safety rules for working with circuits.
3. What is the difference between an open and closed circuit? Draw diagrams.
4. Name two functions of a resistor.
5. Draw and label a simple LED circuit.

Chapter 3–4: Introduction to Scratch Programming

- **Scratch**: Block-based coding platform for games, animations, and stories.
- **Key Terms**:
  - **Sprite**: Character/object.
  - **Backdrop**: Background.
  - **Code Blocks**: Colorful commands to control sprites.



- **Scratch Interface**:
    - Stage Area, Sprite List, Block Palette, Script Area.

Examples

- Make a sprite move: `when the green flag clicked → move 10 steps`.
- Make sprite dance: `forever → next costume → wait 0.3s`.

Possible Exam Questions

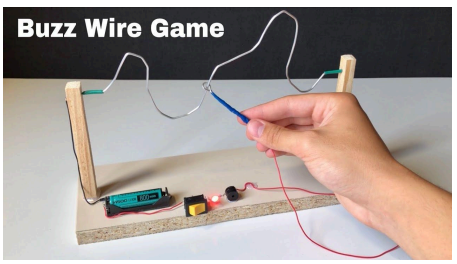
1. What is Scratch used for?
2. Define Sprite and Backdrop.
3. Write steps to make a sprite move and speak.
4. What are code blocks in Scratch?

Chapter 5–6: Conductors, Insulators & Crafting

Conductor: A conductor is a substance through which electric current or heat can flow freely because it has free-moving particles (like electrons).
Examples: copper wire, iron rod, gold, seawater**.**

Insulator: An insulator is a substance that resists the flow of electric current or heat because it does not have free-moving particles.
Examples: plastic, rubber, glass, dry wood.

- **Buzzer Game**: Wire loop touches path → buzzer sounds.



- **Crafting**: Build models of Nepali houses using cardboard, paper, and glue.

Safety Tip: Use a hot glue gun with supervision.

Possible Exam Questions

1. Define conductor and give 2 examples.
2. What is an insulator and give 2 examples.
3. Explain how a buzzer game works.
4. List materials used in a Nepali house model.

Chapter 7–8: Variables & Loops in Scratch

- **Events**: Blocks that trigger scripts (`when green flag clicked`).
- **Variables**: Store values (like Score, Timer).
- **Loops**: Repeat actions.
    - **Repeat [n]**: Fixed times.
    - **Forever**: Runs endlessly.

Examples

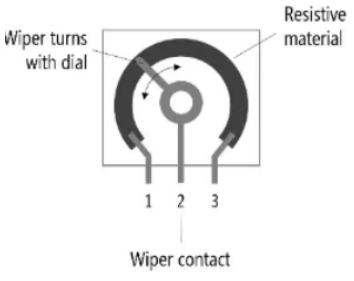
- **Click the Sprite Game**: `when sprite clicked → change score by 1`.
- **Self-drawing Pen**: Use pen extension + motion + repeat blocks.

Possible Exam Questions

1. What is a variable in Scratch?
2. Name 2 types of loops in Scratch.
3. Write steps to create a sprite-clicking game.

Chapter 9–10: Potentiometer, Tinkercad & Robotics Components

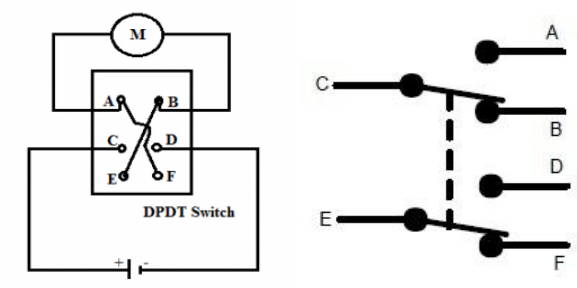
- **Potentiometer**: potentiometer is a special knob that controls things like light, sound, or motor speed.



For example: Controlling LED brightness, Controlling Fan Speed

- **Switch**: A switch is a device that can turn electricity ON or OFF in a circuit.
  Types of Switch: SPST, DPDT, Push Button, Toggle, Rotary.

- **DPDT Switch**: Double Pole Double Throw (DPDT) Switch can control 2 circuits and is used for motor direction.



- **Multimeter**: Measures voltage, current, resistance.

Figure: Multimeter

- **Tinkercad**:Tinkercad is a free online tool where you can design 3D objects and make electronic circuits on a computer. For example: Led blink, Traffic light system and Controlling led brightness with potentiometer.
- **AC:** Alternating Current (AC) changes the direction of electricity again and again. Example**:** Electricity from your home wall socket.
- **DC**: Direct Current(DC) flows electricity in only one direction. Example: Battery in a toy or remote.

Possible Exam Questions

1. What is a potentiometer? Give one use.
2. Write names of 3 types of switches.
3. What does a multimeter measure?
4. What is Tinkercad used for?

Chapter 11–12: Conditionals & Donut Collector Game

- **Conditional Statements**: Run code only if a condition is true.
    - If-Then
    - If-Then-Else
- **Sensing Blocks**: Detect interaction (touching sprite?, key pressed?).

Donut Collector Game

- Sprite collects donuts → score increases.
- Uses variables, loops, and conditionals.

Possible Exam Questions

1. Name 2 examples of sensing blocks.
2. Write steps to create a Donut Collector game.

Full Forms

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