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Physics A First Course Investigations

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Investigations Pages

Investigation title

Unit icon

Electricity

Investigation number

Key question for the Investigation

Question for this Investigation:

1. How is electricity measured and described?

Explanation of Investigation content

We use electricity every day, almost every minute. In this Investigation you will build circuits and learn about voltage (volts) and current (amps) which are fundamental quantities that describe the electricity we use.

Materials list

Materials

- Electric circuits kit
- Digital multimeter with test leads
- Pieces of foil, wood, plastic, metal paper clips, and other small objects.

Investigations sequence numbers

1 Building a circuit

Diagram that supports Investigation

Single bulb circuit

Bulb

Switch

Battery

1. Build the circuit shown in the diagram with one battery, a switch, and a bulb.

2. Open and close the switch and see what happens.

2 Thinking about what you observed

- How can you tell electric current is flowing in the circuit? Can you?
- Current flows from positive to negative. Trace the flow of current.
- How does the switch cause the current to stop flowing?
- Why does the bulb go out when you open the switch?
- Draw an energy flow diagram of the circuit. Label the forms of energy.

55

Detailed explanations of Investigation procedures, equipment setup, and data collection

Example data table

Questions you will answer

Investigation number

8 A circuit with a dimmer switch

Explanation of Investigation content

The potentiometer (or *pot*) is an electrical device that can be used to make a dimmer switch. When the dial on the pot is turned one way the pot acts like a closed switch and current flows freely through it. When the dial is turned the pot resists the flow of current depending on the position of the dial.

Measure voltage between these two points

Potentiometer (pot)

- Connect the circuit in the diagram using the pot, a battery, wire, and a bulb.
- Adjust the dial and watch what happens to the bulb.
- Use the meter to measure the voltage across the bulb for different settings of the pot. Record your data in table 1.

Table 1: Pot settings and voltage across bulb

Pot dial position	Voltage across bulb (V)	Observed light output of bulb

9 Thinking about what you observed

- As you changed the settings of the pot, what happened to the voltage across the bulb?
- Did you observe a relationship between the voltage across the bulb and the light output?
- Propose a relationship between power and voltage that would explain the light output of the bulb.

58

NOTE: All data and answers to questions will be written on a separate fill-in answer sheet.

Table of Contents



Unit 1 Forces and Motion

1A	Time, Distance, and Speed	1
1B	Systems, Energy and Change	5
2A	The Law of Inertia	8
2B	Newton's Second Law	10
3A	Momentum and the Third Law	12
3B	Conservation of Energy	14



Unit 2 Energy and Systems

4A	Force, Work, and Machines	16
4B	Work and Energy	19
5A	Equilibrium and Forces	22
5B	Friction	24
6A	Projectile Motion	26
6B	Motion on a Ramp	28



Unit 3 Matter and Energy

7A	Temperature and Heat.....	30
7B	Energy and Phase Changes.....	33
8A	Density and the Phases of Matter	35
8B	Motion of Fluids	37
9A	The Atom	39
9B	Energy and the Quantum Theory ..	42



Unit 4 Energy and Change

10A	Energy and Efficiency	44
10B	Energy Flow in a System	46
11A	Energy and Chemical Changes	48
11B	Nuclear Reactions and Radioactivity	51
12A	Frames of Reference	53
12B	Relativity	55



Unit 5 Electricity

13A	Electricity	57
13B	Resistance and Ohm's Law	61
14A	Electric Circuits	65
14B	Electrical Energy and Power.....	69
15A	Electric Charge	72
15B	The Flow of Electric Charge	74



Unit 6 Electricity and Magnetism

16A	Magnetism	77
16B	Electromagnets.....	80
17A	Electromagnetic forces	83
17B	Electromagnetic Induction	85
18A	The Magnetic Field	88
18B	Using Fields	90



Unit 7 Vibrations, Waves and Sound

19A	Harmonic Motion.....	92
19B	Natural Frequency	95
20A	Waves.....	98
20B	Resonance and Standing Waves	101
21A	The Properties of Sound.....	104
21B	Wave Properties of Sound.....	107



Unit 8 Light and Optics

22A	Light and Color	110
22B	Reflection and Refraction	113
23A	Optics	117
23B	Optics and Images.....	120
24A	The Frequency and Wavelength of Light	122
24B	Waves and Photons	124



Equipment Setup

Physics Stand.....	128
Car and Track.....	130
Ropes and Pulleys	134
Marble Launcher	136
Atom Building Game	138
Electric Circuits.....	139
Ripcord Generator.....	141
Pendulum	144
Sound and Waves	146
Light and Optics	149



Projects

Unit 1: Using Computer Spreadsheets	150
Unit 2: Calculating Bicycle Gear Ratios	153
Unit 3: Measuring Surface Tension	155
Unit 4: Researching Energy Sources	157
Unit 5: Building an Electric Circuit Game.....	159
Unit 6: Making a Model Maglev Train.....	161
Unit 7: Making Palm Pipes	164
Unit 8: Building a Sundial	167