Science for Primary Teachers 3

COURSEWORK				
Content/Unit	Specific Objectives	Taxonomy	Type of Item	Weighting
Unit 1	10. Investigate and give examples of reflection or refraction of light.	Application Analysis Comprehension	Experiment	1 item @ 15 %
Unit 3	8. Describe how pulleys make work easier: simple, double, fixed, moving	Create Synthesis Application	Create a model & Experiment	1 item @ 15 %
Units 1 - 3	All objectives	Knowledge Comprehension Application Analysis	Test/Quiz	1 item @ 20 %

NB: Students should do either the Reflection or Refraction of Light Lab.

Experiment to Investigate Reflection or Refraction of Light

Objective: To observe and measure the phenomena of reflection and refraction of light using simple materials.

Materials:

- Light source (laser pointer or flashlight)
- Plane mirror
- Glass block or acrylic block
- Protractor
- Ruler
- White sheet of paper
- Pencil
- Water (optional for additional refraction experiment)

Procedure:

1. **Reflection Experiment:**
    - Set up the plane mirror on a flat surface.
    - Position the light source so that it shines directly at the mirror at a known angle (e.g., 30 degrees).
    - Use the protractor to measure the angle of incidence (the angle between the incoming light ray and the normal line perpendicular to the mirror surface).
    - Observe the angle of reflection (the angle between the reflected ray and the normal).
    - Record your observations and measure both angles using the protractor.
    - Repeat the experiment at different angles (e.g., 15°, 45°, 60°) and document the results.

    (Method to be placed in past tense: 3marks=no errors, 1mark= 1 – 2 errors, mark= over 3 errors = 0 marks)

    Data analysis:

- Compare the angles of incidence and reflection in the reflection experiment to verify the law of reflection (angle of incidence = angle of reflection). (**4marks)**

Discussion:

- Address the following questions:
- Discuss the results observed in the experiment. **3 marks**
- Reflect on how the findings relate to the principles of reflection. **3 marks**

Conclusion:

- Suggest improvements or extensions to the experiment for further investigation. 2**marks**

OR

2. **Refraction Experiment:**
    - Place the glass block or acrylic block on the white sheet of paper.
    - Shine the light source at the block at an angle (e.g., 30 degrees).
    - Draw the incident ray and the refracted ray as they pass through the block, marking the normal line where the light enters.
    - Measure the angle of incidence and the angle of refraction using the protractor.
    - Repeat this for different angles of incidence and document your observations.
    - (Optional) Conduct a similar experiment using water in a transparent container to observe the refraction of light through water.

      (Method to be placed in past tense: 3 marks=no errors, 1 mark= 1 – 2 errors, over 3 errors = 0 marks)

      Data analysis

- In the refraction experiment, analyze how the angles of incidence and refraction relate to each other and to the material (**4 marks)**

Discussion:

- Address the following questions:

- Discuss the results observed in the experiment. **3 marks**
- Reflect on how the findings relate to the principles of refraction. **3 marks**

Conclusion:

Suggest improvements or extensions to the experiment for further investigation.

(2**marks)**

TOTAL 15 MARKS

Assignment: Exploring Pulleys and Their Impact on Work

Objective: To investigate how pulleys reduce the amount of force needed to lift objects

Materials Needed:

- Various types of pulleys (fixed, movable, and)
- Weights (bags of sand or small weights)
- String
- Spring scale (to measure force)
- A ruler or measuring tape
- Stopwatch (optional)

2. **Method:**
    - Set up the pulley system using the materials provided
    - Measure and record the weight of the object they will lift.
    - Use the spring scale to measure the force required to lift the weight without the pulley.
    - Next, use the moveable and fixed pulley to lift the same weight and record the required force.
    - Repeat the measurements at least three times to ensure accuracy.
    - Calculate the differences between the force required to lift the weight with and without the pulleys.

      (Method to be placed in past tense: 3 marks=no errors, 2 marks= 1 – 2 errors, over 3 errors = 0 marks

3. **Observation:**
    - What force was required to lift the weight with the two types of pulleys. **1 mark**
    - What was the force required to lift the weight without the pulley. **1 mark**
    - State the differences between the forces required to lift the weight with and without the pulley. **2 marks**
4. **Discussion**:

    Address the following questions:
    - What was the advantage of using a single moveable pulley? **2 marks**
    - What are two real-world applications of pulleys that you can think of? **2 marks**
    - How do you think the design of a pulley affects its efficiency? **2 marks**
5. **Conclusion: Appropriate conclusion 2 marks**

TOTAL 15 MARKS