Teaching Grade 10 Science Using an Inquiry Approach

Exploring Light Experimental Setup

Setting up a very open-ended experiment can seem very daunting, but work and issues can significantly be reduced by careful planning and establishing required check-points. The check-points can be repeated in cases where the proposal was not satisfactory. Also, the proposals can be kept in a portfolio to allow all stake-holders to monitor progress and achievement.

1. CHECK-POINT ONE: ESTABLISHING A SPECIFIC GOAL

Now that students have brain-stormed to determined what could be tested regarding light or what topics interest them regarding light, they need to determine what specific question or experiment they will focus on for their project. Some students may wish to research this using online sources or some students may wish to work in a group to narrow down their focus. In some cases, students will find it helpful to play with the equipment associated with their topic to help them identify their specific task. In the end, the students need to submit a proposal (see below) to allow them to proceed. The purpose of this check-point is to provide feedback to ensure students are ready to set up their investigation.

2. CHECK-POINT TWO: ESTABLISHING A DETAILED PROTOCOL

Now that the students have received feedback about their task, they may need to revise their proposal or they may be ready to proceed with establishing a scientific protocol to conduct their investigation. In many cases, the students will need to physically experiment with the equipment that they will need to conduct their investigation to fully appreciate how to set up the investigation. In the end, the students need to submit a proposal (see below) to allow them to proceed. The purpose of this check-point is to provide feedback to ensure students are establishing a proper and safe scientific protocol.

3. CHECK-POINT THREE: CONDUCTING THE INVESTIGATION

4. CHECK-POINT FOUR: SUBMITTING A SUMMARY NOTE

POSSIBLE STUDENT TOPICS

A. Studying Properties of Light

1. Compare sources of light or wavelengths of light and their ability to generate heat.
   - E.g. compare a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity and the temperature generated in a sample of water or within a constructed solar oven
   - E.g. compare blue, green, white light, etc. of equal intensity and the temperature generated in a sample of water or within a constructed solar oven
2. Compare sources of light or wavelengths of light and their ability to generate electricity.
   - E.g. compare a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity and the power generated by a standard solar panel by measuring voltage output
   - E.g. compare blue, green, white light, etc. of equal intensity and the power generated by a standard solar panel by measuring voltage output
3. Compare sources of light or wavelengths of light and their ability to generate shadows/types of shadows.
   - E.g. compare a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity and the type or size of shadow generated by a standard object at a standard distance
   - E.g. compare blue, green, white light, etc. of equal intensity and the type or size of shadow generated by a standard object at a standard distance
4. Compare sources of light or wavelengths of light and their ability to generate optical illusions.
   - E.g. compare a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity and the change generated in the creation of an optical illusion (such as the size of a penny in a glass of water)
   - E.g. compare blue, green, white light, etc. of equal intensity and the change generated in the creation of an optical illusion (such as the size of a penny in a glass of water)
5. Compare sources of light or wavelengths of light and their ability to generate reflections with a mirror.
   - E.g. compare a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity and the image created by an standard mirror set at a standard distance
   - E.g. compare blue, green, white light, etc. of equal intensity and the image created by an standard mirror set at a standard distance

B. Studying Properties of Reflections

1. Compare types of mirrors and type or quality of images produced.
   - E.g. determine the effect of different types of mirrors on the type/quality of the image generated by a standard object set at a standard distance
2. Compare size of mirrors and type or quality of images produced.
   - E.g. determine the effect of different sizes of a standard mirror on the type/quality of the image generated by a standard object set at a standard distance
3. Compare distance between a mirror and an object and type or quality of images produced.
   - E.g. determine the effect of changing distances between a standard mirror on the type/quality of the image generated by a standard object

C. Studying Effects of Lenses/Filters

1. Compare sources of light or wavelengths of light and their effect on light transmittance through a lens.
   - E.g. determine the effect on light transmitted through a standard lens using a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity
   - E.g. determine the effect on light transmitted through a standard lens using blue, green, white light, etc. of equal intensity
2. Compare sources of light or wavelengths of light and their effect on light transmittance through a filter.
   - E.g. determine the effect on light transmitted through a standard filter using a candle, sunlight, an incandescent bulb and a fluorescent bulb of equal intensity
   - E.g. determine the effect on light transmitted through a standard filter using blue, green, white light, etc. of equal intensity

3. Compare types of lenses and their effect on light transmittance.
   - E.g. determine the effect on light transmitted through different types of lenses using a standard light source set at a standard distance
4. Compare size/thickness of lenses and their effect on light transmittance.
   - E.g. determine the effect on light transmitted through lenses differing only in size or thickness using a standard light source set at a standard distance
5. Compare distance between lenses and their effect on light transmittance.
   - E.g. determine the effect on light transmitted through a standard lens using a standard light source set at varying distances
6. Compare types of filters and their effect on light transmittance.
   - E.g. determine the effect on light transmitted through different types of filters using a standard light source set at a standard distance
7. Compare distance between filters and their effect on light transmittance.
   - E.g. determine the effect on light transmitted through a standard filter using a standard light source set at varying distances