

LIGHT - SAFETY AT NIGHT

SENSOR(S) - Internal Light

INVESTIGATE

- That light can be reflected from certain surfaces
- That materials are often chosen for specific applications depending on the way they affect light
- How to interpret results and apply them to 'real world' applications
- Which material is best to wear at night



INTRODUCTION TO THE INVESTIGATION

Discuss how some materials at night show up better in car head lights than other. The ability of some materials to reflect light is important when designing safety clothing for use at night.

The task is to compare various materials to find the one that is most reflective and best suited to wear at night.

This investigation can be linked to a class project on safety which can include work on designing safety posters and campaigns, cycle proficiency and the design of safety equipment in technology. As well as cloth used in clothing work can be done to look at certain paints etc. that can be used on the bicycle or other objects to enhance visibility.

Because the internal light level sensor is designed to work in such a wide range of light, from a dimly lit classroom to bright sunshine, the amount of change shown can appear small. It is therefore best to use an additional light source when carrying out this style of investigation e.g. a lamp or bright torch (see the section on the light sensor in part 1 of the manual).

A test rig needs to be created to test the material to ensure that only the reflected light is recorded. Depending on the abilities of the pupils the test rig can either be provided or designed and manufactured by the pupils.

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RESOURCES

- Explorer datalogger , datalogging software, computer, LogIT computer link cable
- Materials to make a test rig or a pre-made rig (see later)
- A range of different materials to test
- Light source such as a bright torch, low wattage lamp or bright sunshine.

WHAT TO DO

- Connect the Explorer to the computer and run the datalogging software.
- Set up the snapshot facility of the software (if available).**
- Discuss which materials will reflect the most light and which the least. The pupils could place them on a desk in the order they think they will reflect.
- Choose a piece of material and write down its description so that when you come to view the graph you know which point on the graph refers to which piece of material.
- Place the material in the test rig.
- Point the Explorer at the correct point of the rig.
- Press the snapshot button for the software
- Repeat this for each piece of material to be tested.
- When finished print and save the results - decide on the best way to show the results.
- Discuss and/or write up the findings and whether they matched the predictions.

** If computers are limited, or if your software does not support snapshot, the same investigation can be carried out using the Explorer's remote snapshot facility which is selected by using the blue button. Results can then be downloaded to a computer.

SAFETY



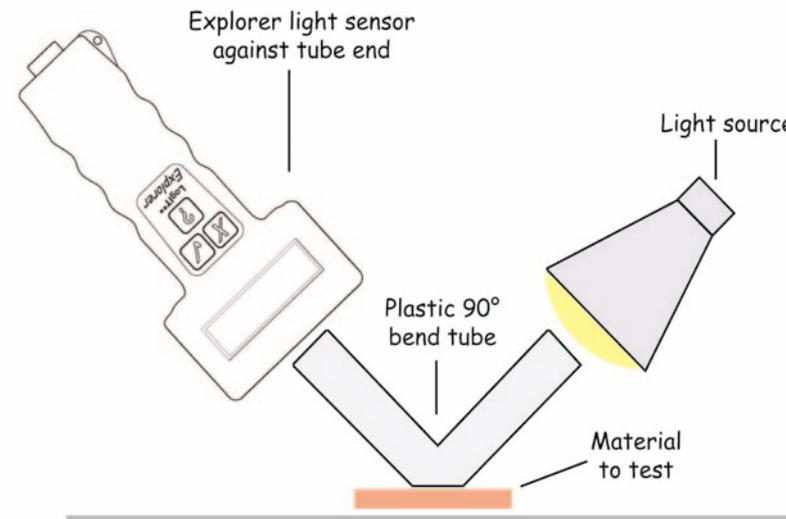
- Do not look directly into sources of light as damage to the eye could result.
- Do not allow pupils or material to touch the light source

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DIAGRAM

Making a Test Rig:

The recommended test rig is made up from a 90° bend section of conduit or similar plastic piping. Simply cut off the outside edge of the bend so that it can stand flat on a table with the two ends of the tube standing upright at 45°. A bright light is shone down one tube and the Explorer light sensor held at the other – alternatively the fibre optic can be placed through a cork/bung and this can be placed in the tube. The material to be tested is placed at the flat of the tubing.



ABOUT THE RESULTS

- Which material was the most reflective ?
- Which material was the least reflective ?
- Is the material suitable to be worn ?
- Does the position of the light source or Explorer effect the result ? (fair testing)
- How does the graph display the results – discuss the interpretation of graphs
- Decide how best to show the results e.g. a simple display or as part of a larger class activity.

EXTENSION ACTIVITIES

- More able pupils can discuss whether it is the type material or the colour of the material that is causing the reflection.
- What kind of things can reflective materials be used for ?
- Design different reflective products for different people ?
- Produce a safety poster informing people why they should wear reflective clothing.
- Depending on the age and abilities of the pupils you can use this investigation to introduce the idea of fluorescent by substituting the light source for an ultra violet light.