Periscope investigation — Investigation planner

Name: _____

Teachers copy

This lesson is designed to support the students into the assessment task and, as such, the focus is on the inquiry skills and ability to construct explanations. Of course, this means that the students are expected to display some understanding of the properties of light as studied through the unit.

This lesson is a very important monitoring opportunity to determine where students require assistance with their inquiry skills. It also allows for a considerable amount of feedback on these skills.

Periscope construction

The periscope construction needs to be strongly guided as the steps can be somewhat confusing. There are many other ways to make periscopes, but this will be the easiest to make a change to.

The procedure can be printed in black and white for students to share.

You will need mirrors. The use of reflective cardboard will not work here as there is too much scatter. (This could actually be the change the students make, replace the mirrors with reflective card.) Small plastic mirrors would be the best option and are easily attainable. You may wish to have students share mirrors for this task.

Any cardboard will work as long as it is a suitable size for the mirrors

Variables

Measure (M): The variable being measured is the quality of the image seen through the periscope.

List the possible changes you could make to the periscope.

Here are some possible changes:

- Length of the scope
- Reflective surface (mirror to reflective card)
- The scope could be made from a transparent material.
- The scope could be made from a translucent material.
- The shape of the periscope could be changed (this would mean more mirrors) e.g. it could be a 'U' shape.
- A window could be cut in the scope.

Change (C): From the list above, circle **one** thing to change.
Guide students to choose 'The scope could be made from a transparent material'.

Keep the same (S): List the things you will keep the same.

Investigation question — What is the question you are investigating?
What happens to the quality of the image seen through the periscope when I change the material the scope is made from to a transparent material.
Predict — What do you think will happen and why?

If I change (C) the material of the scope to a transparent material then (M) the quality of the image will be very bad because there will be too much light being transmitted through the case and too much light reflecting off the mirrors.

Equipment and materials

List the materials and equipment you require to complete the investigation.

- scissors
- transparency sheets
- tape
- ruler
- 2 mirrors

adhesive putty

Method

List the steps you will follow in order to test your change.

1 Make the periscope following the periscope construction procedure. Replace the cardboard with a transparency sheet
2 Select an object to view.
3 Mark the spot from where you will make your observations.
4 View the object through the original periscope first.
5 Record your observations.
6 View the object, from the same spot, through the transparency sheet periscope.
7 Record your observations
8 Repeat steps 4–7 twice more and compare results.

Make sure you check your procedure with your teacher before you carry on.

Make sure you check your method with your teacher before you carry on.

Observations

Record observations about the images seen through the periscope.

Encourage students to compare their observations between the two different periscopes and make it a part of their procedure.

Be sure to record observations before you make changes to the periscope so you can compare the observations.

Discussion — Why do you think you observed your results?

Explain how your observations match your prediction.

What patterns did you notice in your observations?

Use these patterns as evidence to explain how your change affected the image seen through the periscope.

Include an annotated diagram to explain what happened.

The annotated diagram should be a ray diagram. The students will probably need to be reminded of this. Make sure they complete an annotated diagram.

Evaluation

Did you experience any difficulties completing the investigation?

Why do you think you experienced these difficulties?

If you were to repeat the investigation, what would you do differently and why?

Teacher feedback