Periscopes

Lesson Plan

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Product Code: TE10015

Periscopes Summary

Recommended level – Years 3-6
Time taken – 2-3 hours
Pupils to work individually
Additional adult help is useful – you could invite in parent helpers
Expectation – each pupil to complete a working periscope
Associated resources:
Periscopes PowerPoint
Periscopes worksheet
Periscopes worksheet – suggested answers
How to make a periscope blog

STEM Links

- **S**cience – explore the way that light behaves, including reflection
- **T**echnology – give reasons for the particular uses of everyday materials
- **E**ngineering – construct a periscope and understand how it works
- **M**aths – draw and measure angles in degrees using a protractor

Curriculum Learning Objectives – it is recommended to cover these topics prior to the exercise so that the pupils are reinforcing their knowledge and understanding, rather than meeting the topics for the first time.

Science: Light

Pupils should be taught to:
- recognize that they need light in order to see things
- notice that light is reflected from surfaces
- recognize that light from the sun can be dangerous
- recognize that light appears to travel in straight lines

Pupils should explore what happens when light reflects off a mirror.
Pupils might work scientifically by designing and making a periscope and using the idea that light travels in straight lines to explain how it works.

Design and Technology

Use a range of tools and equipment to perform practical tasks (for example cutting, shaping, joining and finishing) accurately.
Use a range of materials according to their functional properties and aesthetic qualities.

Mathematics

Pupils should be taught to:
- Draw given angles and measure them in degrees (°)

Pupils become accurate in drawing lines with a ruler to the nearest millimeter and measuring with a protractor.

Equipment needed

Parts included in class kit:

- Periscope card templates (60)
- Mountboard, 8 A3 sheets (enough for 60 periscopes plus spare)
- Plastic mirror, 10 A4 sheets (enough for 60 periscopes plus spare)
- Colourful foam leaf shapes (500)

Check you have received the correct contents in your class kit. Please let TTS know if there are any problems as soon as possible.

Tools and consumables (not included):

- 30 cm rulers (1 each)
- Protractors (1 each)
- Marker pens or felt tip pens (1 each)
- Scissors (1 each – if possible larger and sharper than the usual school scissors!)
- Transparent sticky tape (1 dispenser per table)
- Cool melt glue guns and cool melt glue sticks for decorating
- Optional – acrylic paint and paintbrushes
- Optional – other decorations

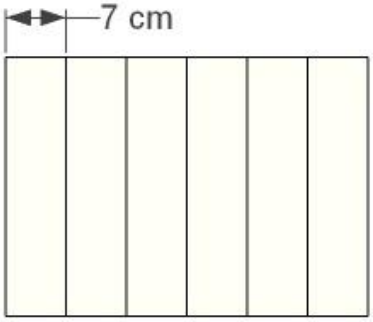
Risk Assessment

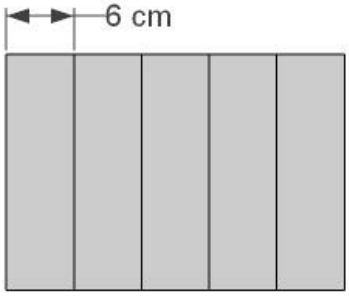
Conduct a risk assessment before undertaking the activity. A sample risk assessment is given below; you can use this as a starting point when writing your own.

Activity	Identified Hazard	Initial Risk Rating L/M/H	Control Measures	Controlled Risk Rating L/M/H
Use of scissors	Injury e.g. to fingers	M	Make the children aware of the dangers. Do not give out the scissors until after the safety briefing.	L
Use of glue guns	Burns	H	Children should be supervised by a responsible adult at all times when using the glue guns. Explain to children how to use the glue guns. Warn them that the ends are very hot. Use only low melt temperature glue guns. If burned hold under running water for ten minutes. Don't switch on the glue guns until after the safety briefing.	M
Running extension leads along floor for glue guns	Trip hazard	M	Otherwise make sure extension leads are run where they cannot be tripped over.	L
Damaged extension leads or glue gun leads	Electrocution hazard	H	Conduct a visual check of all electrical items before session to ensure the leads are undamaged. PAT test electrical items regularly.	L
Use of tape dispensers	Injury e.g. to hands	M	Make the children aware of the dangers. Show them how to use the tape dispensers safely.	L
Using periscope to look at the sun	Damage to eyes	M	Warn children not to use the periscope to look at the sun because it will damage their eyes.	L

Preparation needed

- Pre-cut the mountboard into 7 cm strips to distribute to the pupils. A craft knife, straight edge and cutting mat is recommended for this. You should get 6 strips from each A2 sheet as shown. Each strip should be cut into three 10 cm lengths by the pupils (enough for 1.5 periscopes). In total there should be enough material to make 144 mirror mounts.





- Pre-cut the mirror into 6 cm strips to distribute to the pupils. A marker pen and ruler is useful to mark the lines before cutting. You should get 6 strips from each A3 sheet as shown. Each strip should be cut into three 7 cm lengths by the pupils (enough for 1.5 periscopes). In total there should be enough material to make 150 mirrors.

- Build a sample periscope to explore any pitfalls, and to demonstrate to the pupils what they will be making and how it works. Instructions are given in the 'How to make a periscope' blog.

- Print out a worksheet for each pupil.

Some suggested answers to questions on PowerPoint

Slide 2 – What are periscopes used for?
In World War 1 soldiers used them to see out of the trenches without exposing themselves to enemy fire.
They are used in submarines to see what is happening above the water without having to surface.
They are used to see out of tanks and armoured vehicles.
They are used at golf matches, horse racing and festivals to see over the heads of crowds.

Slide 4 – Work Safely
Don't cut yourself with the scissors or tape dispenser.
Don't use the periscope to look at the sun.

Slide 8 – How the Periscope Works
When light from an object is reflected by a surface it changes direction. It 'bounces off' the surface at the same angle that it hits it. So light coming in through the square hole is reflected by the top mirror down the middle of the periscope. It then reflects off the lower mirror and into your eye.

Slide 13 – Properties of materials
A smooth shiny surface reflects light better.
The mirror reflects light.
The mountboard needs to be stiff to keep the mirror flat.
The sticky tape, glue and the back of the mirror are sticky.
The mountboard, mirror and box template all need to be cut.
The box template needs to be bent. However, it also needs to be stiff enough to support the mirrors.