

# Watching the Enemy: Technology in World War I

World War I in Europe was characterised by trench warfare, a type of combat employed when neither side can outflank the other to gain the upper hand and each is forced to stand their ground. Trenches were dug to protect soldiers from enemy fire. The trench periscope is an optical device that soldiers used to observe the ground in front of their trenches and fortifications, without having to risk raising their head above parapets and becoming a target for enemy snipers.

This resource explores the use of periscopes in WWI. It encourages pupils to develop their understanding of the nature and properties of light and how these can be used in communication by making and experimenting with a simple periscope.

The resource is designed to develop communication and critical thinking skills through STEM-based and creative learning.

## Set the Scene

- Why was it important that soldiers see over the top of trenches?
- Why was this dangerous?
- What did they use to safely see over the top?

Trench warfare posed particular challenges to observation. Sentries had to keep watch over No Man's Land for signs of impending attack and warn the men in the trenches. Artillery observers needed to analyse enemy positions, in order to identify targets and gauge the accuracy of shells. But a soldier who raised his head above the parapet was an easy target for a sniper.

Instead, men in the trenches used an optical device called a periscope. They often improvised trench periscopes, simply by attaching two mirrors angled at 45 degrees to either end of a long box or tube. By mid 1916, trench periscopes were being manufactured by British Army workshops behind the front lines. Variations such as the pocket periscope were commercially manufactured by private companies.

Some armies made specialised periscopes. William Beech is often credited with inventing a form of periscope rifle which was used on many front lines during the conflict. This was a rifle that was adapted so it could be sighted using a periscope, allowing the shooter to remain concealed. Though the periscope rifle had a reduced effective range, it was a popular weapon, particularly during the Gallipoli campaign where the Turkish and Allied trenches were very close together in many sectors.

## Second and Third Level

### Tasks

1. Ask the pupils to make a periscope. This online tutorial provides a template for making a box periscope using a cereal box: <https://www.savvyhomemade.com/making-a-periscope-for-kids/>
2. Ask the pupils if they can describe what is happening when they look through the periscope.

We see an object when light coming from it enters our eyes. This light may have been made by the object itself or it may have simply bounced off it.

Light travels in straight lines, and when it hits a mirror it bounces off at the same angle at which it arrived. In a periscope, light travelling horizontally hits the first mirror at 45 degrees and then bounces off at 45 degrees, making 90 degrees altogether, so that it ends up travelling vertically downwards. At the bottom of the periscope, the light strikes another mirror at 45 degrees and then is reflected into the viewer's eye.

3. Ask the pupils to draw a diagram to show the path of the light as it travels from an object, through the periscope and into the eye. Remind them to use rulers!
4. Ask the pupils to discuss in groups whether they think the periscope would work if the mirrors were at some angle other than 45 degrees. If not, why not? How could you design your periscope to see behind you?

## Curriculum Experiences & Outcomes

### Second Level

By exploring reflections, the formation of shadows and the mixing of coloured lights, I can use my knowledge of the properties of light to show how it can be used in a creative way.

**SCN 2-11b**

### Third Level

By exploring the refraction of light when passed through different materials, lenses and prisms, I can explain how light can be used in a variety of applications. **SCN 3-11a**

### Core Skills

- Thinking
- Communication
- Working with others

### Approaches & Methods

- STEM-based learning
- Creative learning