

YEAR 6 UNIT 4: Let it shine! (Light)

Enquiry Question: How does light behave?

Related units: Year 3 Unit 3 – How do we see things?

Unit overview

National Curriculum Link Year 6: Light

Pupils will recognize that light appears to travel in straight lines and use this to explain that objects are seen because they give out or reflect light into the eye. They will be able to explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. They will use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. The topic then takes the learning into the realm of coloured light and rainbows, using scientific skills to raise and answer questions. It builds on the work carried out in Year 3 on light, shadows, and reflection. Children will already know how we see things, that light reflects at the surface of an object, that shiny objects are generally smooth and that light travels in straight lines.

Assessment

1. Explain how we see things
2. Explain the difference between shadow formation and reflection in terms of the path of light
3. Explain how a shadow is formed and what a shadow looks like
4. Explain how light can be reflected

Scientific vocabulary

light ray
cornea
pupil
iris
reflection
symmetry
rainbow
refracted
prism glass
shadow
dense
deviation
silhouette
white light
luminous
Plato
Ptolemy

Working Scientifically

Straight as an arrow

Report findings from enquiries, including conclusions and causal relationships.

The perfect silhouette

Plan a scientific enquiry to answer a question, including recognising and controlling variables where necessary (fair test), present findings including conclusions.

Mirror image

Present findings including conclusions.

Seeing is believing

Record using scientific diagrams, present findings including conclusions.

Light misbehaviour

Report and present findings from enquiries including conclusions, causal relationships.

Rainbows

Report and present findings from enquiries including conclusions, causal relationships

Cross-curricular links

English: Report and present findings from enquiries including conclusions, causal relationships

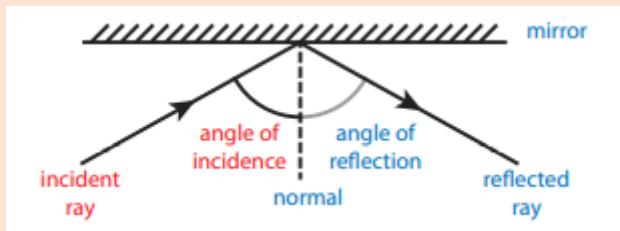
Maths: Measuring distances accurately

Teacher knowledge

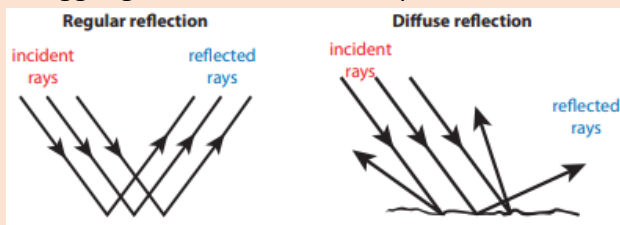
Visible light is a member of a family of waves known as the electromagnetic spectrum. All waves behave similarly. They all travel in straight lines. Light travels faster than sound, (330m/s), which is why we see lightning before we hear thunder and why, when we look at someone hitting something, from a distance, we see them make the action before we hear the sound. Because light travels in straight lines, the edges of light beams are straight and shadows are the same shape as the object casting them.

If the light source is small, the edges of the shadows are sharp. If a large light source is used, the edges of the shadow are blurred.

All objects reflect light, but some reflect light more than others; that is why we can see them. Light from a luminous source, such as the Sun or a bulb, reflects from an object into our eyes. Even black objects reflect a small amount of light. Both Plato and Ptolemy developed theories which stated that we see things because the eyes emit rays. Superhero comics often show rays being emitted from the hero's eyes, which helps to generate the misconception that children may have about light coming from our eyes. The law of reflection states: The angle of incidence equals the angle of reflection:



The children don't need to be able to draw or use this at this stage, unless they notice this as part of their investigations. However, it will help you if they are struggling to work out how to position their mirrors in the activities. It also helps with the fact that all materials reflect light.



When light passes from one material into another, it changes direction. The change in direction is known as refraction.

When it passes from air into a more dense material, such as glass, Perspex or water, it changes direction towards the normal. When it passes from a more dense material into air, it changes direction away from the normal.

White light is a combination of coloured light: light at different wavelengths, ranging from the end of the infra-red through the start of the ultra violet spectra. If you shine different coloured lights onto the same spot, they will make what is known as 'white' light – the light we usually see. This can be seen at theatres, where they will have different coloured spotlights. If you look at the shadows cast by the actors, you will notice they have different coloured edges as the lights each are blocked by the actor, but the actor will look 'normal', bathed in 'white' light.

Did you know?

- Insects can see ultraviolet light, which we can't! Light travels nearly 1000 times faster than sound!
- Light takes 1.255 seconds to get from the Earth to the Moon.
- Sunlight can reach a depth of around 80 metres in the ocean.
- Photosynthesis is a process that involves plants using energy from sunlight to convert carbon dioxide into food.

Misconceptions: Children might think...

- that light comes out of our eyes; in fact, it comes from a light source.
- that we can see the features on shadows; in fact, a shadow is created by the object blocking the light and there are no features seen
- that light bounces from our eyes to the object. This is illustrated in their diagrams rather than their speech.
- that they can see round corners.
- that we have laser beams that come out of our eyes – particularly if we are superheroes.
- that light is made up of a single colour.
- that mirrors are the only thing that can bend light

Resources

- www.sciencekids.co.nz/light.html has interesting ideas and facts for children about light and different aspects of light. www.learner.org/teacherslab/science/light/ has facts about light and colour – could be useful later in the unit too.
- www.ducksters.com/science/experiment_light_travel.php has an activity to show how light travels, that you or the children could do
- www.sciencekids.co.nz/gamesactivities/howweseesee.html has a quick game to review placing mirrors for reflection. www.factmonster.com/dk/science/encyclopedia/reflection.html has facts about reflections in a variety of occasions.
- www.optics4kids.org/home/tutorials.aspx/ is an interesting website that may be focused on the higher attaining or used the teacher to support them on various aspects of optics and light. www.optics4kids.org/home/content/classroom-activities www.optics4kids.org/home/teachersparents/classroomactivities.aspx/ has support ideas for teachers on activities about light. www.kidspot.com.au/kids-activities-and-games/science-experiments+10/how-to-bend-the-light+11693.htm has an activity on bending light for the children to do.

