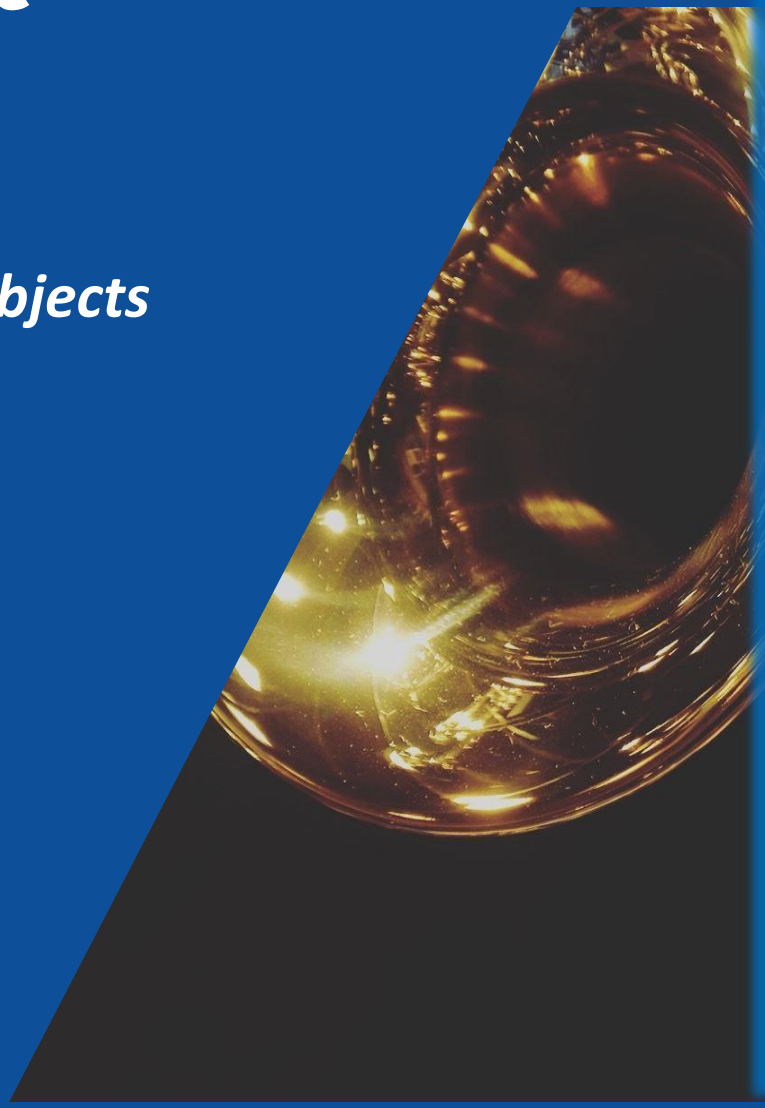
Year 6: Light

Seeing shiny and matt objects

Year 6
Age 10-11



For parents

Thank you for supporting your child's learning in science.

Before the session:

- Please read slide 2 so you know what your child is learning and what you need to get ready.
- As an alternative to lined paper, slide 5 may be printed for your child to record on.

During the session:

- Share the learning intentions on slide 2.
- Support your child with the main activities on slides 3, 4 & 5, as needed.
- Slide 6 is a further, optional activity.
- Slide 7 has a glossary of key terms.

Reviewing with your child:

- Slide 8 gives an idea of what your child may produce.

The Association for Science Education

Light

Seeing shiny and matt objects

Key Learning

- The idea that **light** travels in **straight lines** can explain how **non-luminous** objects are seen.
- All **surfaces reflect** some light.
- **Shiny** surfaces reflect light better than **matt** surfaces.

I can…

- record the results of a reflection investigation in a **Carroll diagram**.
- draw **ray diagrams** to show how **non-luminous** objects are seen directly, and when they are seen reflected in a **mirror**.

Activities (pages 3-5): 30 - 40 mins

Household items to support learning:

- a torch
- objects around your home

Use lined paper, a ruler and a pencil for recording. *Alternatively you may wish to print page 5 as a worksheet.*

Find out more… (page 6)

- You may like to research and explore mirrors further (using a spoon, mirror or your toys).
- You might like to model how light reflects from a mirror using a football and chalk/string in a paved area outside.

Explore, review, think, talk...

What do you already know about the reflection of light?

(10 minutes)

Jot down a list of the following and talk or think about what they are made of:

- Five **shiny** objects (e.g. a metal spoon)
- Five **matt** objects (e.g. a piece of paper)
- Five **luminous** objects (e.g. a candle)

Think or talk about whether each of these is **luminous** or a good **reflector**?

You could watch *www.bbc.co.uk/bitesize/clips/zs3ygk7*

- **Shiny** objects are often made of metal or have a metal layer covered by clear plastic or glass. Some polished or very smooth objects such as crystals are shiny. Shiny objects **reflect** most light that hits them in a particular direction.
- **Matt** objects are less good reflectors of light than shiny objects as they absorb some of the light energy. Their **surfaces** are less smooth than those of shiny objects, so the light they **reflect scatters** in all directions.
- **Luminous** objects are **light sources**.
- The moon, hi-vis jacket and cat's eyes are all excellent reflectors; they do not emit light.

Light

Investigate the reflective properties of objects

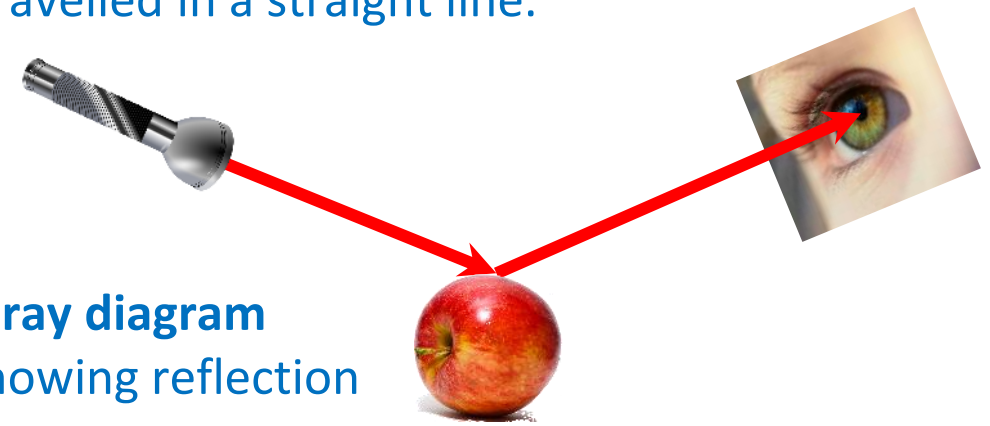
(20 - 30 minutes)

Investigate **reflection** by shining a torch on various objects/surfaces around the room to see how bright the circle of light looks on each of them. You could investigate one of these:

- If smooth surfaces are always more reflective than rough ones?
- If white/pale surfaces are always more reflective than black/dark ones?
- If some surfaces reflect equally brightly when the torch is held at different angles to them, or not?

You could try black and white paper or t-shirts, a mobile phone screen, carpet, shiny paper, **mirrors** and plastic of different colours/textures.

- Record your results using a **Carroll diagram** (see next page) to group your data according to the 'yes/no' question you investigated and how reflective or not the objects/surfaces were.
- In each test, light travelled from your torch, reflected off an object and then travelled into your eye. In each part of its 'journey' the light travelled in a straight line.



A **ray diagram** showing reflection

Label your **Carroll diagram** to match the question you are investigating. For example ‘Smooth’ vs. ‘Rough’, ‘White/pale’ vs ‘Black/dark’ or ‘Reflects better…’ vs. ‘Reflects equally…’

Write the name of each object or surface you tested in a square of the **Carroll diagram**. For example, for a smooth/rough test, ‘mirror’ would be in the top-left square.

Draw a **ray diagram** showing how light travels to enable you to:

1) see a toy teddy, and
2) see the reflection of a toy teddy in a **mirror**.

I can record the results of my **reflection** investigation in a **Carroll**

Label this ? for your investigation	(Choose one of: ‘Smooth’, ‘White/pale’ or ‘Reflects more light in some directions than others’)	(Choose the opposite! - ‘Rough, ‘Black/dark’ or ‘Reflects equally in all directions’)
Reflective		
Not very reflective		

I can draw **ray diagrams** to show how **non-luminous** objects are 1) seen directly and 2) when they are seen reflected in a **mirror**

Find out more...

Find out more about the reflection of light

(Optional)

Find out more about **mirrors**. You could:

- Explore reflection from non-flat mirrors using both sides of a spoon held at various distances.

- Investigate any toys you have with mirrors – e.g. a periscope or kaleidoscope.

- Try to create an infinite tunnel using two parallel mirrors. How does it work?
- Research what is special about the angles when you get reflection off a mirror.
- Try this…*www.beano.com/games/lazer-maze*

- Watch this BBC Bitesize clip about reflection *www.bbc.co.uk/bitesize/topics/zbssgk7/articles/zqdxb82*
- Model reflection of light in a mirror, by kicking a football slowly from your patio or yard against a smooth wall at different angles. You could use chalk or markers to show where you kick from, where the ball hits the wall and where it goes next. You could mark the path of the ball using chalk or string and use a protractor to work out the angles involved. Don't forget to take a photo!
- Just before bedtime, test whether it's easier to see reflective things when its dark.

Glossary of terms

Carroll diagram: A **Carroll diagram** is a way of grouping data according to whether it fits certain criteria.

light: **Light** is the form of energy that makes it possible for us to see things with our eyes.

light source: A **light source** emits (gives out) light. It can be natural or man-made.

luminous: A **luminous** object emits light, whereas a **non-luminous** object reflects it.

matt: **Matt** surfaces look dull and not shiny.

mirror: A **mirror** reflects a clear image, with almost all the light bouncing back.

ray diagram: A **ray diagram** is a drawing showing the straight-line paths that light travels in from a light source to the eye, often reflecting off objects on the way.

reflect: Light **reflects** when it 'bounces back' off a surface or object. All objects **reflect** some light otherwise we couldn't see them.

scatter: If a light ray **scatters** it changes direction to a different random direction.

shiny: A **shiny** surface reflects most light that reaches it.

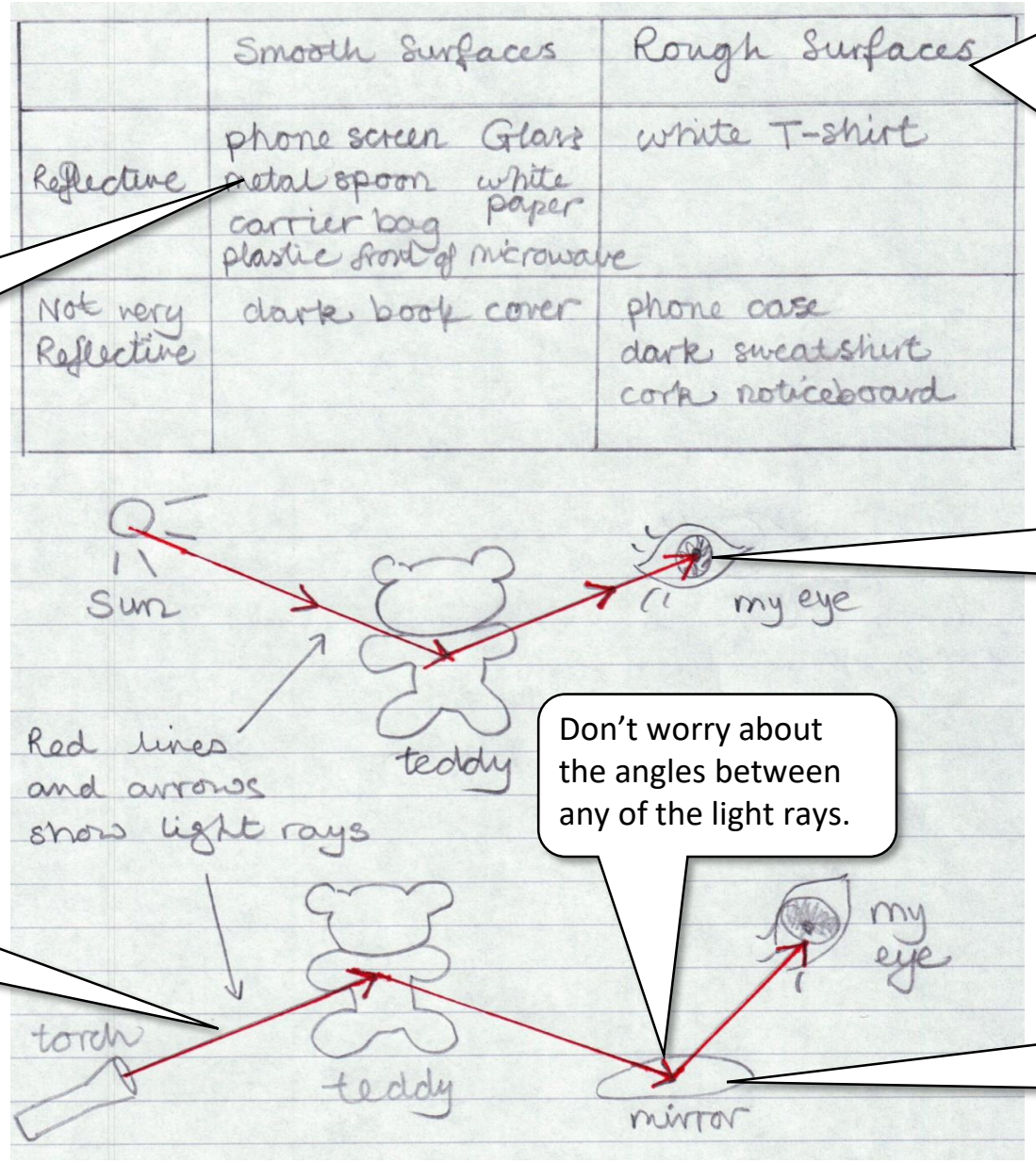
straight lines: A **straight line** continues in the same direction and does not curve.

surface: A **surface** is the outside or top layer of something.

Possible learning outcome for reviewing your work:

I can record the results of my reflection investigation in a **Carroll diagram**.

I can draw **ray diagrams** to show how **non-luminous** objects are seen directly and when they are seen reflected in a mirror.



You will probably find that:

- Smooth **surfaces** are usually reflective and rough surfaces are not very reflective.
- White/pale surfaces are usually quite reflective and black/dark surfaces are not.
- **Mirrors** and **shiny** surfaces are reflective and reflect more light in some directions than others. **Matt** surfaces are not very reflective and reflect (or, in reality, **scatter**) light equally in all directions.

The header row of the **Carroll diagram** should have matching labels for the chosen investigation

- 'Smooth' and 'Rough'
- 'White/pale' and 'Black/dark',
- 'Reflects more light in some directions than others' and 'Reflects equally in all directions'.

Another light ray should travel in a straight line into the eye in both diagrams.

Don't worry about the angles between any of the light rays.

The first light ray should travel in a straight line starting at the **light source** and travelling to the object.

This diagram is very like the first one, but with a mirror added between the object and the eye.