

Light

National curriculum Objectives:

- Recognise that light appears to travel in straight lines
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

Science in the news today

The most powerful solar telescope has been made recently by scientists on top of a mountain in Hawaii.

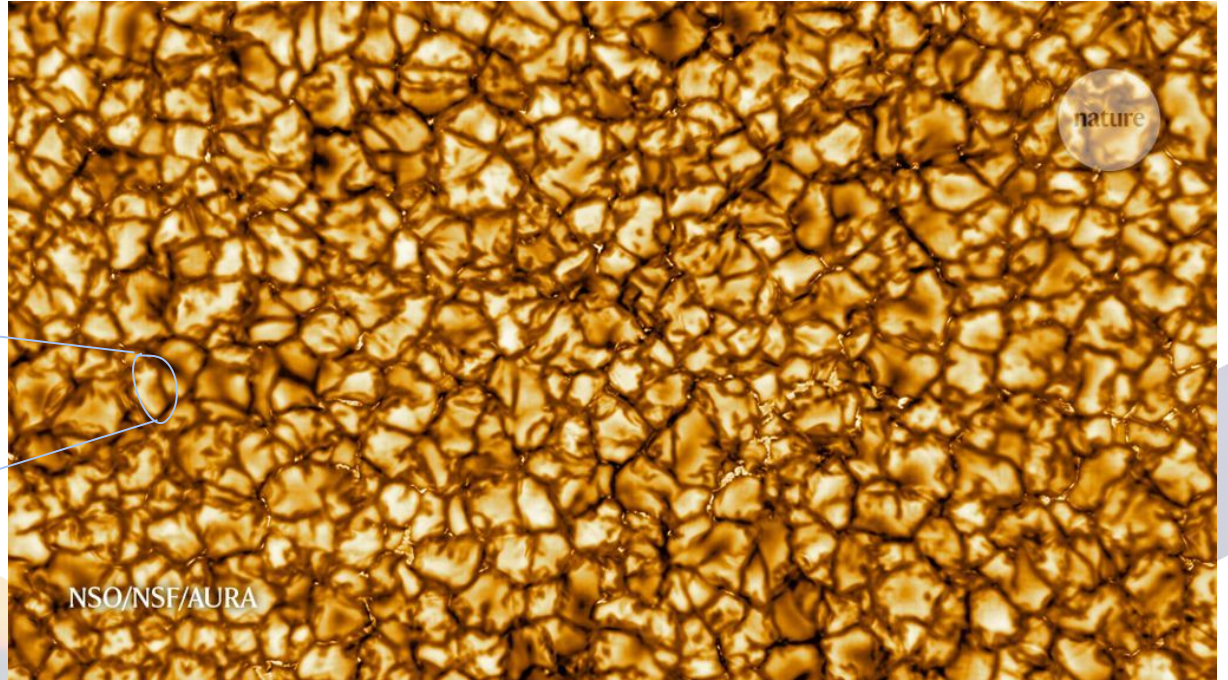
This telescope can take the most detailed pictures of the sun, ever.

The sun is the reason we have light outside in the day and dark at night. It's the huge star in the centre of our **solar system** that gives earth light. It is **150 million** km away from earth.

Humans should never look directly at the sun, even when wearing glasses. Luckily now, with this telescope, we can see it's surface all those kilometres away.

Here is a picture of the sun's surface, taken using the telescope

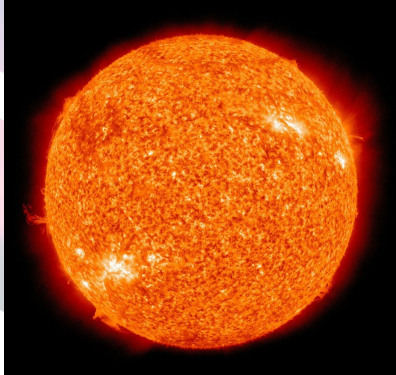
Each 'nugget' is about the size of France!



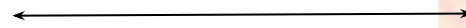
How does the sunlight reach us?

The light that leaves the Sun travels in straight lines all the way to Earth. That's because **all light** travels in straight lines.

Light moves faster than anything else in the universe: **300 million meters per second**. That means it takes only about 8 minutes for a ray of light to reach earth from the sun, 150 million km away.



The Sun



150,000,000 km



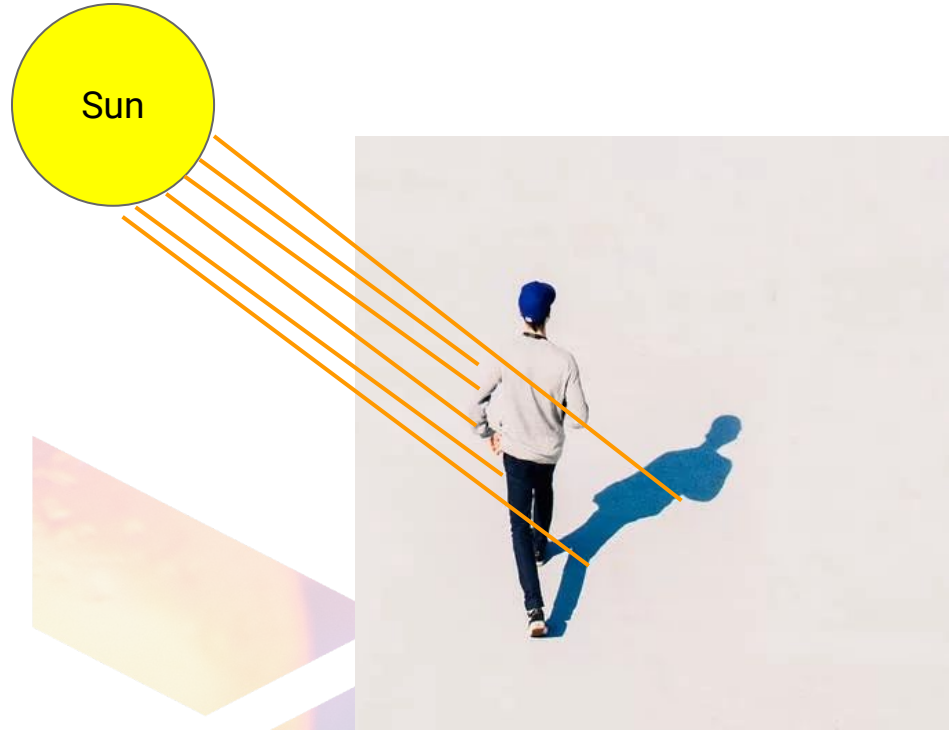
The Earth

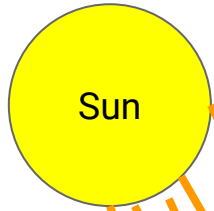
The world outside is bright because all that light is zooming to Earth, in straight lines, from the sun.

Light and shadows

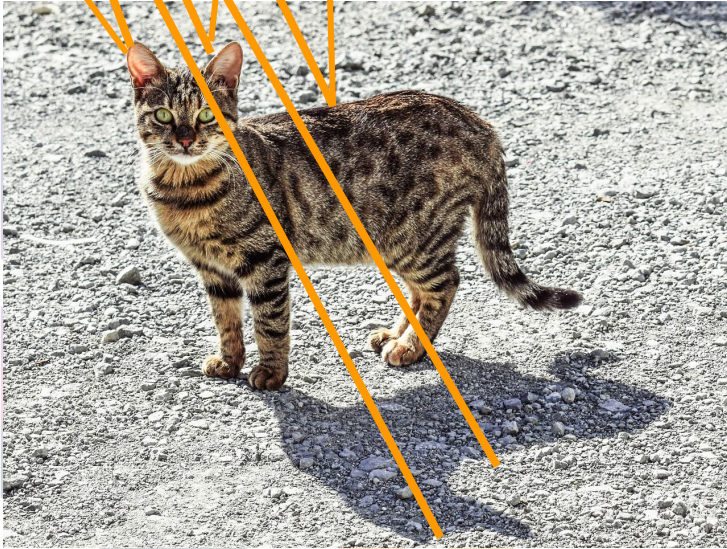
If we stand outside on a sunny day, we get a **shadow**. This is because the light doesn't go *through* us, meaning there is a bit of ground that gets no sun. That bit of ground stays dark and is called our shadow.

Our shadow is the same shape as us, because light travels in straight lines.





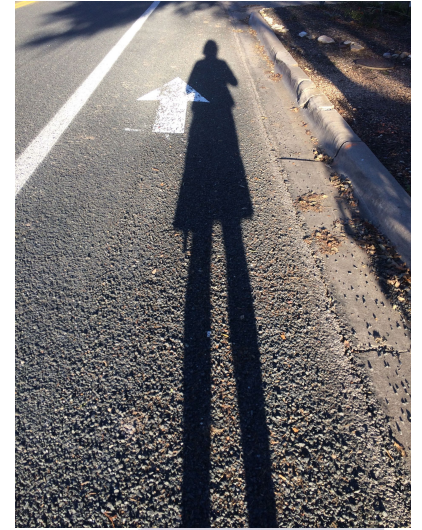
Shadows are always the same shape as the object that made them. For example, this cat's shadow is exactly the same shape as the cat.



However shadows can appear bigger, smaller, or stretched depending on where the light source is when it hits the object.

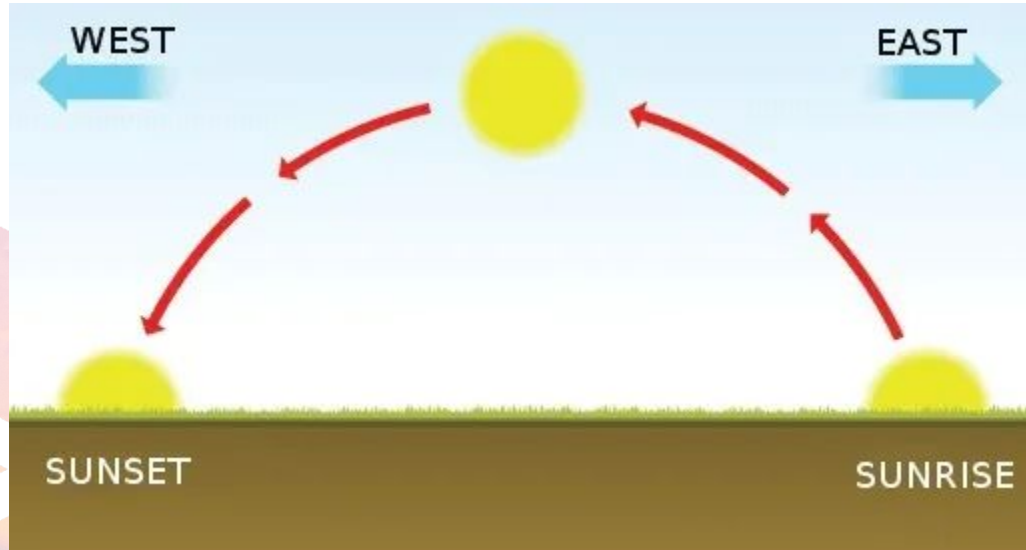


In this photo, the sun is high in the sky, almost directly above his head, meaning the shadow is very small.



In this photo, the sun is low in the sky, meaning the shadow is long and stretched.

Because the Earth rotates (spins), the Sun looks like it travels across our sky from East to West. That means, at different times of the day, the sun casts a shadow in a different direction.



Because the sun travels from East to West in the sky, at Midday the sun is directly South in the sky (and neither East nor West).



Can you use this information to work out which way your house or garden is facing?

This technique for working out the direction you are facing will work anywhere in the northern hemisphere. What does that mean? Can you find out?

Create a sundial!

What do you need?

- Something long and thin, like a pen, pencil, straw or stick.
- An A4 piece of paper or a paper plate (anything you can draw on or make marks on).
- Blu Tac, or something sticky that can hold your object up
- Pens and pencils for drawing and decorating
- A sunny spot in your garden or on a windowsill



Instructions:

1. First, take your piece of paper or paper plate and decorate it however you like (this will be the face of your sundial). Top tip - don't decorate it in dark colours as you will need to make visible marks later on.
2. Next find your long object and place this upright firmly in the centre of your surface. Top tip - push the object through your paper and into something underneath e.g. blu tac or it could be pushed straight into your lawn if you're setting up outside. It needs to stand upright all day so ask an adult to help you if you need to.
3. Every hour of the day, you need to mark on the piece of paper where the shadow is made from the sun, with the time of day you marked it. For example, for the shadow you mark at 10 am, write 10 next to it. Top tip - Don't move the sundial once you have started taking measurements!
4. Then set an alarm so you remember to make a mark where the shadow hits the paper every hour. Remember to record which hour corresponds to which mark.
5. Once you have marked all the hours of daylight on your sundial, you are done. We would love to see the ones you've made, so please take a photo and send it to juniors@unitdx.com.

Make shadow puppets

What do you need?

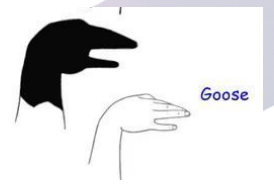
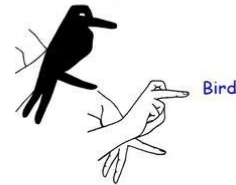
- A piece of card (this doesn't have to be plain, it could be old packaging for example)
- The sun shining on a wall, or a torch
- Something long and thin, like a pen, pencil, chopstick, straw or stick (optional)
- Sellotape or glue (optional)



Instructions:

1. First, decide what characters and shapes you want for your shadow puppet play e.g. underwater characters and fish.
2. Next, draw these onto your cardboard and carefully cut them out. Let an adult know when you're using scissors.
3. Then, if you have sellotape or glue and something long and thin, stick it on to make a handle.
4. Finally hold these characters and shapes in front of a sunny wall (or in a darkened room, shine a torch at the wall)

Top tip - if you don't have the things needed here, try making shapes and animals using your hands instead!



Play 'pencils in the dark'

This game is simple, but the **idea** is a little more complicated.

What do you need?

- Some colouring pencils
- A piece of paper
- A room with curtains or blinds so you can make it dark

Instructions:

1. First, sit opposite your partner, each with a piece of paper in front of you.
2. Next, both secretly choose 4 coloured pencils but DON'T let the other person see which colours you have chosen.
3. Then, turn the lights off and make the room as dark as possible. Safely return to your seats.
4. Slowly your eyes will adjust to the darkness and you will be able to see around you
5. When this happens, place your chosen pencils on the piece of paper in front of your partner. They should do the same for you.
6. Both of you should now write down, underneath the pencils, what colour you think the pencils are. Leave them on the paper.
7. Finally, turn the lights back on. Did you guess the colours right?

Top tip - Do some extra learning to work out why colours look different in the dark!