

## Activities for Lighthouse at Home Sunday 22<sup>nd</sup> November 2020

### Activity 1: Light tricks.

#### 1. One coin or two coins?

You will need a glass, a coin and some water.

Put about 2cm of water in a glass and place the coin at the bottom of the glass. When you look into the glass you see only one coin but if you hold the glass in front of your eyes. You will see a big coin on the bottom and a small one just above in the water.

Note: you may need to move the glass a little in order to see it. If you don't see it at first, move the glass a little lower/higher until you see it. Your eyes will be slightly higher than the water line.

#### 2. Bouncing beam

You will need a square glass or clear plastic container, a torch, water to fill the container, a book or two or a box and a piece of paper or card

Stand the square container on the books/box and fill with water. Prop up the sheet of paper at one end. Darken the room by turning off the light or closing the curtains. Shine a torch horizontally through the water in the glass and the beam comes out in a straight line. Shine the torch at an angle and it come out at an angle on the paper. Then try shining the beam through the water at different angles to see how the beam bends.

Why this happens: When the beam hits the top of the water it reflects the beam back at an angle.

In both these experiments the top of the water is acting like a mirror and reflecting the coin or the beam from the torch. Genesis 1:26 tell us that we are made in the image of God and in Matthew 5:14-16 Jesus tells us we are the light of the world and we are to shine out so that all will see and praise God.

*You are the light of the world – like a city on a mountain, glowing in the night for all to see. Don't hide your light under a basket! Instead, put it on a stand and let it shine for all. In the same way, let your good deeds shine out for all to see, so that everyone will praise your heavenly Father. Matthew 5:14-16*

### Activity 2: Camouflage

You will need paper (a variety of colours if possible) and a hole punch.

Have fun making lots of coloured paper dots. (if you don't have a hole punch you could cut the paper into tiny squares) Put the paper dots into a container.

Now spread out some sheets of paper in one of the colours and sprinkle the dots all over it. Now see how many paper dots can be picked up in 30 seconds using one hand only (other hand should be placed behind your back to stop you using it! At the end of the 30 second collect up all the dots that have not been picked up. Which colour are most of them? It is most likely they will be the same as the background colour as these are more difficult to see as they blend in.

Jesus tells us not to be like the camouflaged paper dots and be the same as all the people around us in the world but to be different and shine out for him and make the things we do show the world what God is like. Christians are to stand out, to make a difference in the world. What do you think you could do? What could your family do together to make a difference at this time?

*Don't hide your light under a basket! Instead, put it on a stand and let it shine for all. In the same way, let your good deeds shine out for all to see, so that everyone will praise your heavenly Father. Matthew 5:15-16*

### Activity 3: Jesus is the light of the world lantern and card

#### 1. Lantern

You will need colours, a scissors, glue stick (or a tiny amount of PVA) and the lighthouse of the world lantern sheet.

Colour in the lantern and cut it out. Cut along the heavy line to create the strip for the handle. Then fold along the dotted line and cut along the solid lines through both layers of paper. Open it out and glue into a cylinder and glue the handle to the top.

#### 2. Card

You will need colours, a scissors and the card sheet

Cut around the rectangle (not the candle). Then zig-zag (concertina) fold the card. Then holding all the layer together cut around the candle shape. Add details to the other candles and colour the card. Send it to someone for Christmas to remind them that Jesus is the Light of the world: a light no darkness can put out.

*Jesus said to the people, 'I am the light of the world. If you follow me you won't be stumbling in the darkness, because you will have the light that leads to life.' John 8:12*

### Activity 4: measuring the speed of light

You will need: a microwave oven, a bar or more of chocolate (20-30 cm long), a ruler, plastic bowl or cup with a flat bottom, heat resistant glass plate and a calculator (optional)

You will also need to frequency of the oven. This is usually on the back or inside the door and is usually 2,450MHz – that's 2,450,000,000 cycles of the wave every second!

Light is everywhere and is travels at the fastest speed of anything in the universe. Microwaves are a form of light used to cook and send signals between our mobile phones. We are going to measure its speed using the microwave oven and some chocolate!

1. Remove the rotating tray from the microwave and place the plastic bowl or cup over the centre of the oven and then place the heat resistant glass plate on top of it. Put the bar of chocolate across the centre of the plate. It is best if it extends all the way across the plate – you may need to use parts of more than one bar to do this.
2. Microwave on full power for 20 seconds. Parts of the bar will have melted. Measure the distance between the melted parts (typically 6 – 7cm) This is half the wavelength of the microwaves.
3. Convert the wavelength from centimetres to metres (divide by 100). Then multiply it by the frequency of the microwave and the resulting number is the speed of light in metres per second.

Calculations from experiment in video

Frequency of microwave	2,450 MHz = 2,450,000,000
Measurement between melted parts	5cm.
Multiply this by 2 to get the wavelength	10cm
Divide by 100 to get wavelength in metres	0.13m

Frequency of microwave X wavelength = speed of light  
2,450,000,000 X 0.1 = 245,000,000 metres per second

The actual speed of light is 299,792,458 metres per second.

Think about why your answer may not be exact.

It's difficult to measure the melted chocolate accurately as heat from the melted chocolate may have spread along the bar and melted more chocolate.

It's also difficult to know exactly where to measure from.

And with a ruler you might be a millimetre or 2 out in your measurement.

Perhaps your answer will be more accurate than mine.

Today we are thinking about how Jesus said 'I am the light of the world' and how he also said 'you are the light of the world' meaning that his light shines through us when we follow him.

*Jesus said to the people, 'I am the light of the world. If you follow me you won't be stumbling in the darkness, because you will have the light that leads to life.' John 8:12*

*You are the light of the world – like a city on a mountain, glowing in the night for all to see. Matthew 5:14*