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June 2020

Week 8 #SolveItWithSTEM@Home Experiment Pack for Secondary Schools

featuring Alice and Eddie - our STEM Gurus

Reminder: Make sure you do the experiment safely and with an adult present!



Welcome back everyone – we are now on Week 8 and ready to experiment! We hope you have found the STEM packs enjoyable and educational so far.

Alice and I have put together another great pack for you to enjoy. We hope these activities and experiments are helping you think about what you'd like to do as a future career!

Anyway, enough of me...another interesting maths question on page 7 with the answer to Week 7 on page 8. Speak soon!



Experiment #13: Polarity of water

(Make sure you have an adult help you with this experiment)

Items Required:

There are two methods to this experiment.

Method one includes:

- 1 empty plastic bottle
- 1 balloon
- Scissors or safety pin
- Water

Method two includes:

- A controllable tap
- 1 balloon
- Water

Instructions:

Method One:

- Using your scissors or safety pin, make a small pin sized hole in the bottom of the plastic bottle.
- Fill the bottle with water – hold the bottle over a sink whilst doing this as water will start to drip out of the hole. **Hand this part of the experiment over to an adult as you will need both hands for the next part. Ensure they fill the bottle with enough water to keep the constant drip through the bottom.**
- Blow up a balloon and rub it on clothes or the carpet – this will build an electrical charge called 'static' onto the balloon.
- Hold the balloon towards the flow of water coming out of the plastic bottle and watch what happens!

Method Two:

- Blow up a balloon and rub it on clothes or the carpet – this will build an electrical charge called 'static' onto the balloon.
- Turn a tap on so it produces a small flow of water.
- Hold the balloon towards the flow of water coming out of the tap and watch what happens!



Method One



Method Two

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How does it work?...

The water coming from the tap is neutral with positive and negative charges. The negatively charged balloon pushes electrons away from the stream of water nearest the balloon, leaving this area slightly positive. This positively charged water is attracted to the balloon so the stream is deflected.

This explanation was taken from the [naked scientists website](#) – why not check it out!



Experiment #14: Water optics

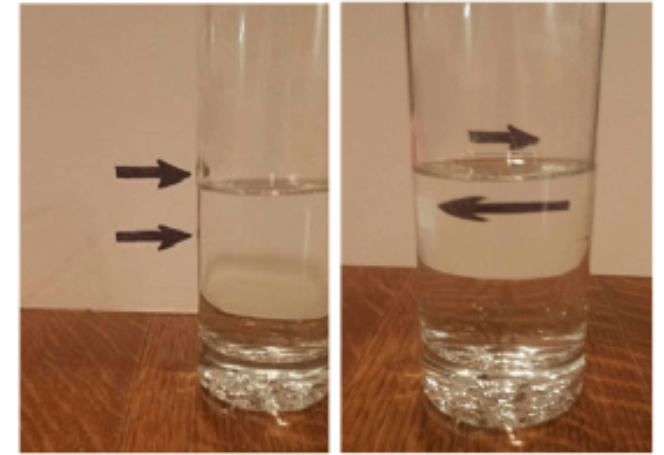
(Make sure you have an adult help you with this experiment)

Items Required:

- Paper to draw a picture or text on
- Marker pen
- Transparent, straight sided glass or tumbler
- Water

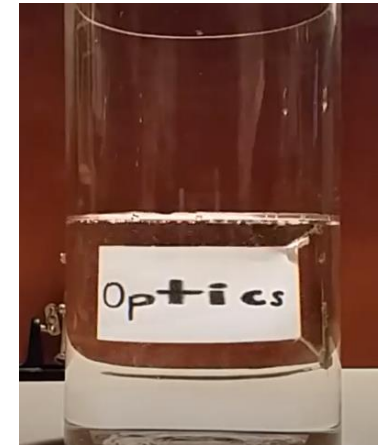
Instructions:

- Draw two arrows on a piece of paper with the marker pen. Both arrows pointing in the same direction. [Refer to Picture 1](#).
- Fill the glass half way with water
- Hold the picture behind the glass and see what happens...it should look something similar to [Picture 2](#).
- Try this technique again but with a different drawing – write a word backwards on a piece of paper and hold it up behind the glass to see if it changes!

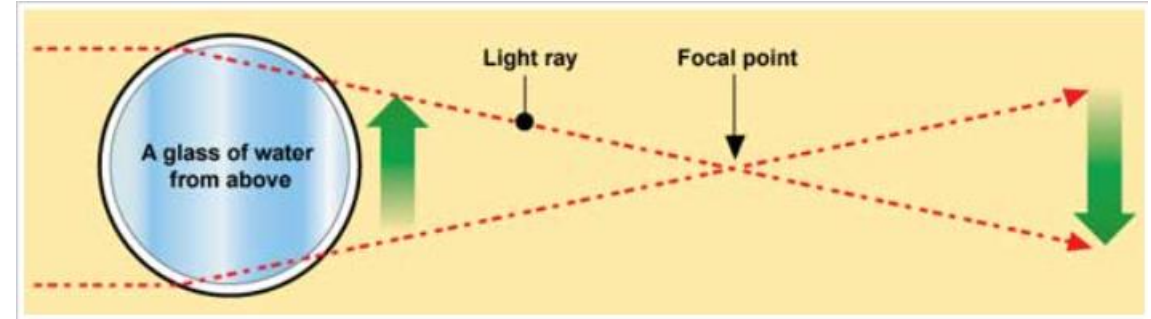


Picture 1

Picture 2



How does it work?...



This process is called **refraction** – the bending of light. When the arrow is moved to a particular distance behind the glass, it looks like it reversed itself. When light passes from one material to another, it can bend or refract. In the experiment that you just completed, light travelled from the air, through the glass, through the water, through the back of the glass, and then back through the air, before hitting the arrow. Anytime that light passes from one medium, or material, into another, it refracts.

Just because light bends when it travels through different materials, doesn't explain why the arrow reverses itself. To explain this, you must think about the glass of water as if it is a magnifying glass. When light goes through a magnifying glass the light bends toward the centre. Where the light all comes together it is called the focal point, but beyond the focal point the image appears to reverse because the light rays that were bent, pass each other and the light that was on the right side is now on the left and the left on the right, which makes the arrow appear to be reversed.



This was taken from the [physics central website](#) – why not check it out!

Week 8 – Maths Question!

$$\text{burger} + \text{drink} + \text{fries} = 58$$

$$1 \times \text{burger} = \text{fries}$$

$$\text{drink} \times \text{drink} = 64$$

$$\text{burger} = ? \quad \text{drink} = ? \quad \text{fries} = ?$$

$$\text{gamepad} \times \text{gamepad} \times \text{gamepad} = 216$$

$$\text{console} \div \text{game} = \text{gamepad}$$

$$\text{game} \times \text{console} = 54$$

$$\text{gamepad} = ? \quad \text{game} = ? \quad \text{console} = ?$$

This is actually algebra...but a bit more colourful than usual!

Why not give this maths question a go.

The correct answer will be included within next week's pack...stay tuned!

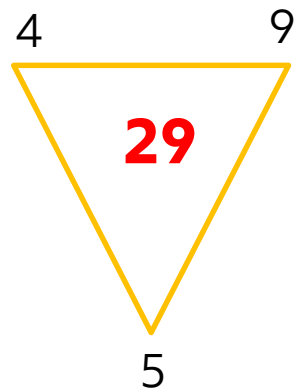
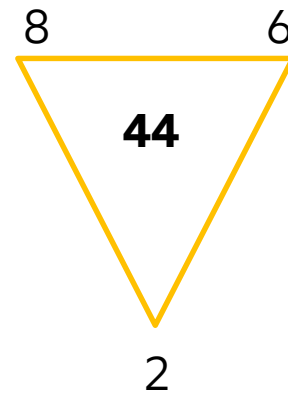
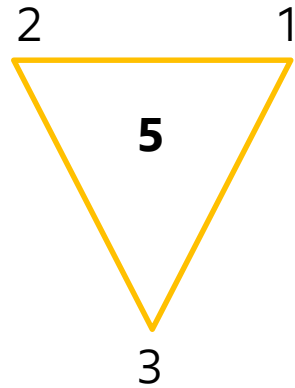
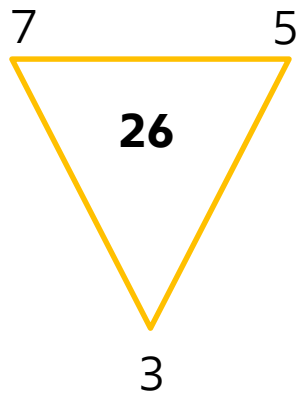


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Week 7 – Maths Question Answer!

What is the missing number in triangle four?



The product of the two largest, minus the square of the smallest.

So the missing number is
 $45 - 16 = 29$

We hope you enjoyed the Week 8 activities.

Week 9 will be coming soon.

Best wishes

The ExxonMobil Fawley #SolveItWithSTEM Team!