June 2020

Week 10 #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!

Hey, how's it going?

Another week has passed and we are on Week 10 – can't believe it!

A couple of interesting experiments for you to try this week with in depth theories on how they work!

We have included a couple of arithmagons for you to try and work out.

The answers to Week 9 are on page 6.

See you all soon ☺

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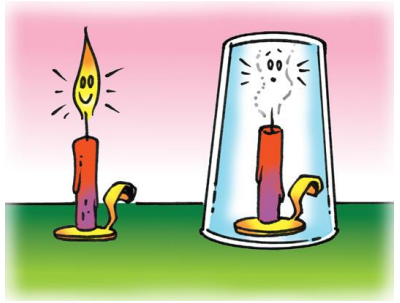
Experiment #17: Oxygen and fire

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

Items Required:

- 1 glass or jar
- 1 tea light (or a birthday candle with plasticene to help the candle stand up)
- Tap water
- Saucer
- Food colouring

You could even try different sized jars and time how long it takes for the candle to go out each time!



Instructions:

- Firstly light the tea light and place the glass over the candle.
- As the oxygen is used up, the candle will go out.

Now try this…

- Complete the same experiment again but this time place the candle on a saucer with some water underneath.
- Add a few drops of food colouring to the water so you can see what happens.
- As the oxygen is used up, the water should rise.

How does this work you ask?

Putting a jar over the candle keeps oxygen from outside the jar from getting in. The reaction can only use the oxygen that is already in the jar. So when that oxygen is used up, the reaction can't keep going. Running out of oxygen makes the flame go out.

Why does the water rise?

There are many theories on why the water rises – some say it is to do with the burning candle using up all the oxygen, in turn changing the pressure in the jar causing the water to rise. Others say it is to do with the change in temperature.

What do you think it is?…why not take a look at the following links to discover the many explanations online!

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More information can be found at:
ACS Chemistry for Life , STEAM Powered Family , Harvard websites

Experiment #18: Storm in a glass

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

Items Required:

- Shaving foam
- A large glass
- Water
- Food colouring
- Spoon

Instructions:

- Fill the glass ½ full with water
- Spray some shaving foam on top of the water to fill the glass to ¾ full.
- Use a spoon to spread the shaving foam evenly over the top of the water. The top of the shaving foam should be flat.
- Mix ½ a cup of water with 10 drops of food colouring in a separate glass. Gently add the coloured water, spoonful by spoonful, to the top of the shaving cream. When it gets too heavy, watch it storm!

How does this work you ask?

Clouds in the sky hold onto water. They can hold millions of gallons! The layer of shaving cream is our pretend cloud in this experiment. The shaving cream layer can also hold onto water. Clouds can't keep storing more and more water forever, eventually they get too heavy. When that happens, the water falls out (precipitates) as rain, snow, sleet, or hail.

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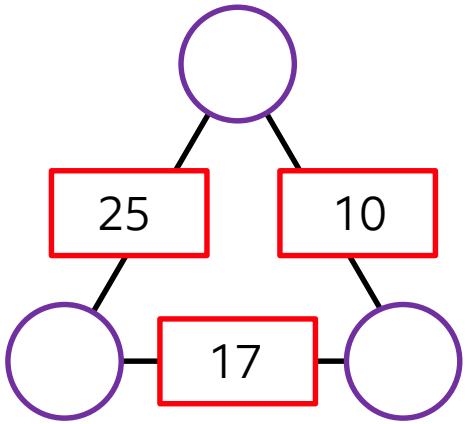
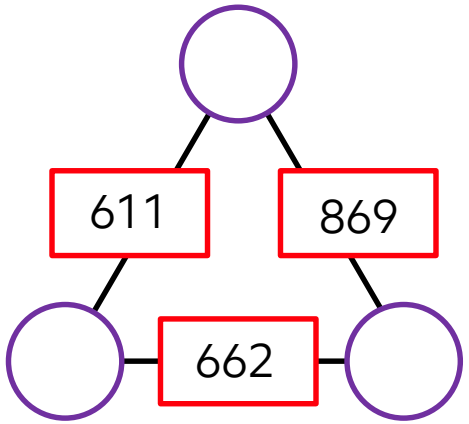
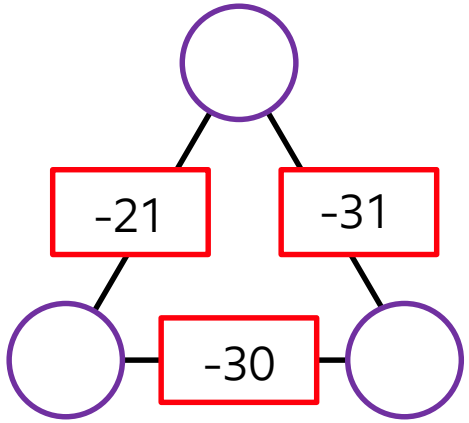
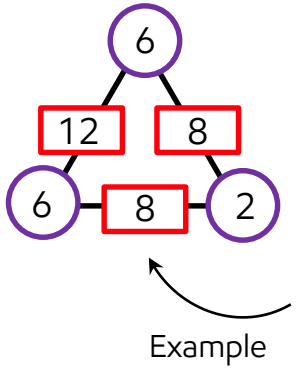
More information can be found at: ScienceFun.org and Popular Science websites

Week 10 – Maths questions!









Example

The red box indicates the total value of the two vertices on that side of the triangle.

Can you work out what number(s) should be in the purple circles?

The correct answers will be included within next week's pack…stay tuned.

Hint: you can use algebra to work this out and it'll work every time!

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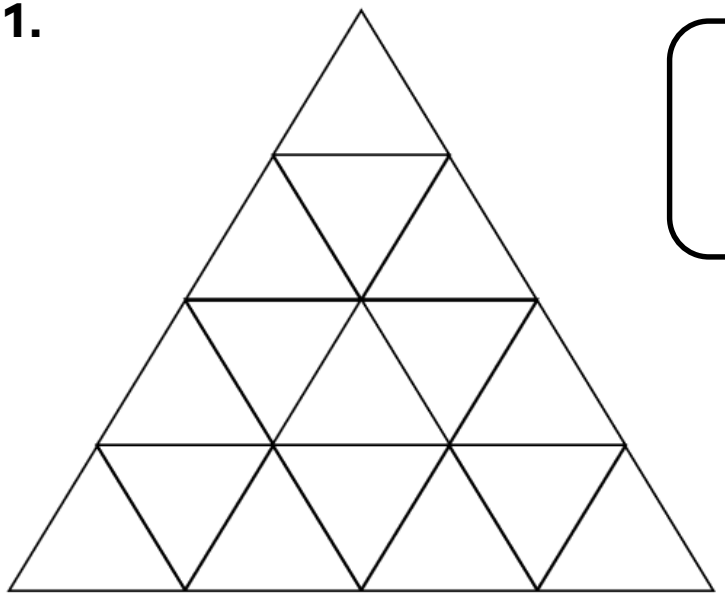
Week 9 – Answers to the maths questions!

1.



Answer:
27 triangles

2.
There are 7 girls on a bus.
Each girl has 7 backpacks.
In each backpack, there are 7 big cats.
For every big cat there are 7 little cats.

How many legs are on the bus, not counting the driver?

Solution: There are a total of 10,990 legs.

- There are $7 \times 7 \times 7 = 343$ large cats. They have $343 \times 4 = 1372$ legs.
- There are $7 \times 7 \times 7 \times 7 = 2401$ little cats. They have $2401 \times 4 = 9604$ legs.
- There are 7 girls. They have 14 legs.

In total we get $1372 + 9604 + 14 = 10{,}990$ legs.

We hope you enjoyed the Week 10 activities.

Week 11 will be coming soon.

Best wishes
The ExxonMobil Fawley #SolveItWithSTEM Team!