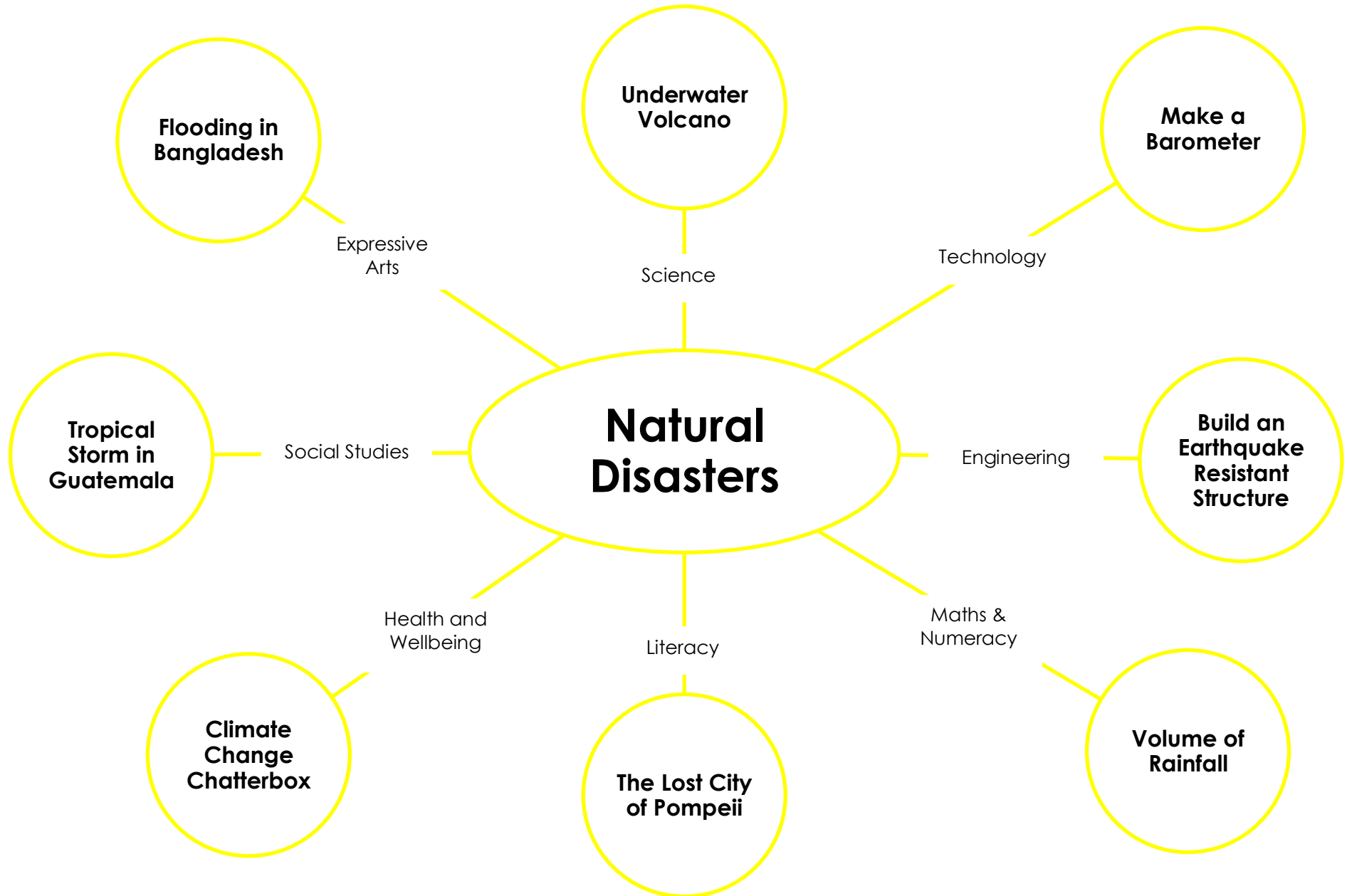




Learning from Home



Science Challenge



Underwater Volcano

A volcano is an opening in Earth's crust through which lava, volcanic ash, and gases escape. Did you know that volcanoes also exist under the water? In fact, about $\frac{3}{4}$ of all volcanoes and eruptions are thought to be under water.

Your Task: Create a colourful underwater volcano.

You Will Need: string, scissors (**with adult supervision**), an empty saltshaker, a large jar, food colouring (red is best but any colour will do)

Instructions:

1. Cut a 60cm length of string with a pair of scissors. Tie a knot around the neck of a saltshaker with one end of the string. Double-knot it to ensure the knot is secure. Repeat this process with the other end of the string, resulting in a handle to lower your shaker.
2. Empty and clean a large jar. Fill the clean jar about three quarters full with cold water.
3. Fill the saltshaker with hot water (**with adult supervision**) – as hot as you can get from your tap – to just below the neck. Add three to four drops of red food colouring.
4. Hold your saltshaker over the mouth of the jar by the string handle. Slowly lower the saltshaker into the jar until the shaker is completely submerged and resting upright on the bottom of the jar. Observe how the coloured water erupts from the shaker into the cold water.



The Science:

This shows how convection currents work. A convection current is the way that heat rises and falls in liquids and gases.

Hot air balloons use convection currents. As hot air rises so too does the balloon. Gliders also use convection currents as do some birds.

Activity and image from The James Dyson Foundation @ www.jamesdysonfoundation.co.uk/

To find out more about volcanoes click on the links below:

https://www.youtube.com/watch?v=K7Oq9_DU1Mc

and here: www.youtube.com/watch?v=XHe7-QHETfg

Technology Challenge



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Make a Barometer

A barometer is a weather instrument that measures atmospheric pressure (also known as air pressure or barometric pressure) - the weight of the air in the atmosphere. It is one of the basic sensors included in weather stations.

In general, when the air pressure is high, our weather is generally dry and fine and as the air pressure decreases it becomes wetter and stormier. To find out more about barometers click here: <https://www.youtube.com/watch?v=YKcLbbjV3AA>

Your Task: Make your own barometer.

You Will Need: glass jar (or similar container), balloon (or cling film), scissors, a straw, piece of A4 card, rubber band, sticky tape,



Instructions:

1. Cut off the open end of the balloon and tightly cover the top of the jar with it. Use a rubber band to hold it in place. (Or cover the top with cling film – making sure it is secure)
2. The cover should be tight making the jar airtight.
3. Place the straw horizontally or sideways on the plastic wrap so that two-thirds of the straw is on the can.
4. Tape the straw to the middle of the plastic wrap so that it will not fall off.
5. Tape a piece of card to the jar behind the straw. The straw will act as a pointer on the card.
6. Carefully record the location of the straw on the card with a pencil. If desired, marks can be drawn on the card to make observing the changes easier.
7. After 15 minutes, record the new location of the straw on the card. Continue checking and recording the straw location as often as you want. (Over several days if possible)

Click here for video instructions: https://www.youtube.com/watch?v=m_VFxqM41EM&t=30s

Discussion:

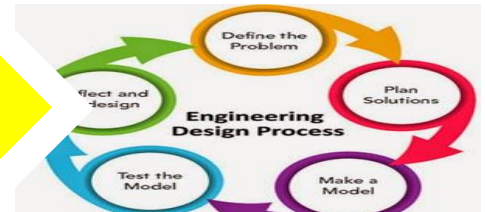
High pressure will make the balloon cave in and the straw go up. Low pressure will make the balloon puff up and the straw go down. If possible, check your measurements with a real barometer.



Activity adapted from <http://stem-works.com/>

Images from www.clipart-library.com and We the Curious via YouTube (<https://www.wethecurious.org/>)

Engineering Challenge



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Build an Earthquake Resistant Structure

Adult help and supervision required – burn hazard!

Your Task: Design and build an earthquake resistant structure. You will test your structure with a 'mini earthquake'.



You Will Need: marshmallows, matchsticks (or cocktail sticks – be careful with pointed ends), jelly crystals (can use jelly cubes but this will take longer), boiling water, measuring jug, spoon, heat resistant tray or container (flat one which will be large enough to sit your structure on top of)

Before building your structure, **ask an adult** to help (or to make) your jelly using the crystals or cubes. The jelly mixture should be poured into your heat resistant tray, then placed into a fridge to set. **(This task requires boiling water so care must be taken!)**

Plan it: Research how architects and engineers have designed buildings to help them withstand earthquakes. You may have reference books at home, but the internet is likely to give you the most (up to date) information here. **Click here for some background information:** <https://www.youtube.com/watch?v=c4fKBGslIZI>

Build it: Draw a picture of what you think your design will look like before using your materials to build your structure. (Take care if working with cocktail sticks)

Test it: Place your structure on top of your set jelly. Now shake the tray. Observe your structure. Does it remain stable and standing or does it collapse?

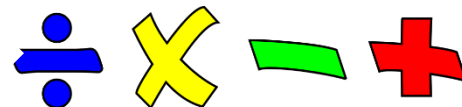
Reflect: Based on your test results, how did your structure respond to the earthquake. Did it remain standing? What could you change to improve its stability and strength? Could you add any additional features?

Improve it: Based on your reflections, make changes to improve your structure and retest it. You may want to add some new materials to your improved model.

Images from www.clipart-library.com



Maths & Numeracy Challenge



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Volume of Rainfall

During a typhoon (intense tropical storm), strong winds and heavy rains occur. To measure the rainfall some cuboid shaped containers have been set up at the local weather station in the Philippines.

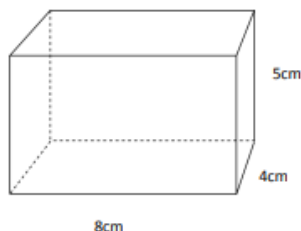
The volume of a cuboid is found by multiplying the length by the breadth by the height.

$$\text{Volume} = L \times B \times H$$

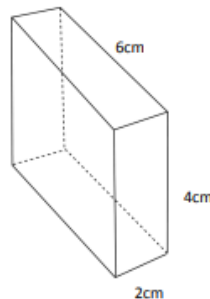
When writing volume, you must use units cubed E.g., $2\text{cm} \times 6\text{cm} \times 3\text{cm} = 36\text{cm}^3$

1. What is the volume of these cuboids?

A



B



Remember to use the same unit of measurement before calculating the volume.

E.g., if $L = 5\text{cm}$, $B = 6\text{cm}$ and $H = 60\text{mm}$, convert the H to $(6)\text{cm}$ first

2. The length, width and height of a cuboid are: 5cm , 2cm and 3cm . What is its volume?

3. Find the missing measurements in this table:

| Length | Width | Height | Volume |
|---------------|--------------|--------------|-----------------|
| 10cm | 4cm | 3cm | |
| | 6cm | 2cm | 60cm^3 |
| 8cm | 2cm | | 48cm^3 |
| 10m | | 6m | 180m^3 |
| 9mm | 2mm | | 72mm^3 |

4. **a)** A cuboid has a volume of 72cm^3 . If the length, width and height are all whole numbers, how many different sets of measurements can you find?

b) How many can you find for a cuboid with volume 96cm^3 ?

5. What is the volume of a cube which has an edge measuring 2cm ?

Activity and images from TES

Literacy Challenge



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The Lost City of Pompeii

Task 1: Read the report below about the famous eruption of Mount Vesuvius in AD79, fill in the blanks in the account using words from the word bank below.

The southern Italian city of Pompeii was a Roman city near modern day Naples. Pompeii was destroyed and _____ under metres of ash and pumice in the great _____ of Mount Vesuvius in 79 AD. The site was lost for almost 1500 years. When rediscovered, many of the buildings, artifacts and victims of the eruption were found to be well preserved because of the lack of air and moisture. Bodies can be seen, preserved in the positions they were in when they perished.

Mount Vesuvius is a _____ which formed as a result of the collision of two _____. One plate was _____ beneath the other and this ultimately resulted in the creation of the volcano.

The eruption of AD79 was preceded by a powerful _____ seventeen years earlier. Accounts of the time noted that earthquakes were not a concern as they were so frequent. So, when minor _____ were felt from August 20th AD79, no-one took much notice. At around 1:00pm on August 24th, Mount Vesuvius _____ exploded, throwing up a tall column (up to 30km) from which ash began to fall plunging the area into _____. This was not the worst of it, sometime in the night or on the following day m_____ flows began to roar down the side of the volcano.

People tried to flee for their lives but the fast-moving flows of very hot ash, rocks and _____ incinerated or suffocated anyone in its path. The landscape and coastline was forever altered. The flows were accompanied by more minor earthquakes and even a _____ in the Bay of Naples. The result was utter devastation. The writings of Pliny the Younger were one of the few accounts that survived, his uncle Pliny the Elder died from _____ toxic gases as he tried to rescue people.

Today Mount Vesuvius is a popular tourist attraction, but it remains the most deadly volcano on the European mainland.



| | | | | |
|---------|------------|------------|---------|----------|
| tsunami | eruption | darkness | buried | inhaling |
| tremors | earthquake | lava | volcano | tectonic |
| | magma | violently_ | forced | plates |

Task 2: Rewrite the report in your own words. You may wish to do further research on the event first.

Activity adapted from TES Images from www.clipart-library.com



Health & Wellbeing Challenge

Climate Change Chatterbox

The climate is changing as a result of pollution. It is thought that some natural disasters including floods, droughts and storms are happening more often partly as a result of climate change. Across the world, people are busy finding ways to adapt to the changing weather and to reduce carbon emissions, which make climate change worse.

Flood
Turn off lights
Turning off the lights around the home when you leave a room could save your family around £8 a year.

Drought
Buy local produce
In the UK, our food travels an amazing 3 billion kilometres each year.

Typhoon
Compost your waste
Up to 30% of household waste is organic and could be composted.

Hurricane
Turn off electric appliances
Many appliances use nearly as much energy in standby mode as when they are turned on! People in the UK waste £740 million a year by leaving appliances on standby.

Recycling in the UK saves an estimated 18 million tonnes of CO₂ a year – the equivalent to taking 5 million cars off the road.

80% of home energy is used for heating. Turning heating down by just a couple of degrees saves energy and money.

During term-time, it is estimated that one in five cars on the road in the morning are taking children to school.

Instructions:

1. Cut out the chatterbox along the outside line.
2. Write a carbon-cutting action in the dotted area and write what effect this action might have in the striped area.
3. With the printed side up, fold the square in half horizontally and then vertically, and then open out. Turn the square over.
4. Fold each corner over so they meet neatly in the middle, they should not overlap.
5. Leave the square folded and flip the square over.
6. Neatly fold the corners into the centre – make sure they do not overlap.

7. With a pair of scissors, carefully cut down the middle of each flap.
8. Now the fiddly bit! Fold the whole square in half and poke thumbs and forefingers under the flaps.
9. When fingers are brought together, the chatterbox should form a peak and you will be ready to play!

Activity and image from www.christianaid.org.uk

Social Studies Challenge



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Tropical Storm in Guatemala



Storms and hurricanes usually mean very strong winds and heavy rain. They can cause lots of damage. The changing climate is making some parts of the world experience storms and hurricanes more often.



Juan David's Story

Juan David Valladares Paz is seven. He lives near a river in Guatemala, a country that is threatened by storms and floods for half of the year. In 2010, Juan David's family faced floods caused by two tropical storms. He had to climb a tree to escape the flood and saw his house collapse into a river. Juan David explains: 'My cousin came to warn us about the floods: he had heard a warning on the radio. We went to the beach before the floods got too bad. People came to get us with a boat so we could get there safely. I wanted to go to the beach because my home is not safe when the floods come. You could drown.' 'We were without my mum for eight days. She was in a shelter in a house that is on high land. I watched my house fall into the water; it was breaking in half. Lots of my toys were lost. I never used to be scared of the river, but I am now.'

'I am in the first year at school, but we couldn't go after the flood because the school was flooded too. We waited until it dried out and then we went back. We were off school for eight days. The floor of the school was all muddy when we went back.'

Because Guatemala regularly experiences tropical storms and flooding, a charity had been working with communities like Juan David's to make sure they were prepared for storms. It provided mobile phones and radios to warn people when a storm was on its way. Juan David's cousin heard the flood warning on the radio and was able to warn the family and give them time to escape. Luckily, no one died in this flood. Storms and hurricanes usually mean very strong winds and heavy rain. They can cause lots of damage. The changing climate is making some parts of the world experience storms and hurricanes more often. The charity is also helping people to ask the government to make sure that rivers are not blocked so that floodwater can be carried away as quickly as possible in a storm.

Task: What happened here? Complete the boxes to help you understand this disaster.

| | | | |
|---|--|---|---|
| <p>What caused this disaster?</p> | <p>Where did it happen?</p> | <p>How were people helped just after the disaster struck?</p> | <p>What were the effects on people living there?</p> |
| <p>What questions would you like to ask the people affected by the disaster?</p> | <p>How have people been helped to prepare for future disasters?</p> | <p>Task 2: Find out where Guatemala is by using an atlas or by researching on the internet. Which continent is it in? Where is it in comparison with Scotland?</p> | |

Activity and images from www.christianaid.org.uk



Expressive Arts Challenge



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Flooding in Bangladesh

Bangladesh is a country in southern Asia. Bangladesh is one of the most flood prone countries on Earth. Click on the link to find out more: <https://www.youtube.com/watch?v=gRwAMjeTgYQ>

Your Task: Use Drama activities to re-enact a flood disaster.

You Will Need: space to move around and a partner

Task 1: Ask your partner to shout out different types of weather and you act/mime accordingly, e.g. It's cold (shiver/put on a jumper) It's raining (mime putting up an umbrella) etc.

Task 2: Walk around your room, finding space. Ask your partner to repeat shouting out different types of weather. Act out how you would feel as you're walking. Imagine that there is light rain, feel it on your face as you walk. The rain is getting heavier, and your clothes are wet. How are you walking now? The rain is very heavy now and your clothes are soaking wet; you have to avoid big puddles. You don't have an umbrella and it won't stop raining. How do you feel - do you like walking in the rain? What do you want to do when you get home in the dry (e.g., have a bath, dry your hair etc)?

Task 3: Think about what happens when it doesn't stop raining? Can you go home? What kind of problems could you face? (E.g., homes, shops and schools are flooded, people and animals have drowned, crops are ruined, diseases spread as there is no clean water, etc.)

Task 4: You are going to pretend that you are living in Bangladesh. Now try to imagine that you are in these different flood situations:

1. The banks of the river have burst, and the floodwaters are starting to rise.
2. You are at school. What happens next?
3. You and your family are at home. What happens next?
4. You are a doctor or nurse working in a local hospital. Your job is to look after people who are sick or injured.
5. You work in a charity office in Bangladesh. Your job is to make sure that people can get clean water and food to eat.

In each scenario, think about the problems you faced and how you were helped. What do you think happens after the flood? What are the new problems? (E.g., being homeless, losing family members, not being able to go to school or other places that have been destroyed, dirty water in the wells, lack of food)

Activity adapted from www.christianaid.org.uk/learn

