ATHLETE CLIMATE ACADEMY

WITH KILIAN JORNET FOUNDATION
AND ANTURUS EDUCATION

FOR SCHOOLS

GREENHOUSE EFFECT

ATHLETE CLIMATE ACADEMY

SCIENCE EXPERIMENT
DURATION 1 HOUR

Our climate is warming. In part, this is because of a phenomenon called the Greehouse Effect. This in a natural process that warms the surface of our planet.

When the Sun's energy reaches Eart, some is reflected back off in to space. Some though is absorbed and then sent back out by greenhouse gases. The more greenhouse gases we have in our atmosphere, the wormer we're going to get.

You can think of it like being in a greehouse or a tent on a hot day. The glass or fabric of the tent blocks some of the energy from getting in. But some energy passes through and stays there, warming the greenhouse or tent.

This is why fewer greenhouse gases will be better for our climate.

EQUIPMENT

- 2 x Thermometers

- A Glass Vase, Jar or Tent

INSTRUCTIONS

- In science it's very important to have a control measurement. This measurement is what we would expect to see without changing anything. This is why we have 2 thermometers.

- Start with 2 thermometers in the house or classroom. Then place one thermometer outdoors but in the shade. This minimises the effect sunlight will have on it. Note it's reading.

- Place the other thermometer in a covered glass vase, a closed glass jar, or in your closed tent. Note it's reading.

- Over the next hour, record each reading every 5 minutes. What do you find?

FURTHER INVESTIGATIONS

- Try putting both thermometers in direct sunlight and running the experiment again. How does this change it's temperature. Does it warm up faster?

- What happens if you stay in the tent with the thermometer? Humans breathe out carbon dioxide which is a greenhouse gas. Does it make a difference?

It's important that we can measure how the greenhouse effect is warming our planet so we can make predictions about what will happen to humans, plants, glaciers, oceans, etc.

The more experiments we can run, the better we will be prepared for our changing climate.

BRIGHT GLACIERS

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SCIENCE EXPERIMENT
DURATION 1 HOUR

Ten percent of our planet is covered in ice. At the height of our last ice age it was thirty two percent covered in ice. This changes how much sunlight is reflected back in to space.

On glaciers in the mountains the same thing happens. When a glacier is bright and white it reflects a lot of sunlight back in to space and doesn't absorb the energy. But when it is dark it can absorb that energy which makes it melt faster.

A glacier can become darker for many reasons. It could be from microorganisms like algae growing on the surface, from volcanic ash, or from dust being blown down on to the surface.

However it ends up on the surface, it can help in the melting process of the glacier which is why we monitor it.

EQUIPMENT

- 1 x Silicone Loaf Tin

- A Freezer

- A Dark Powder

INSTRUCTIONS

- Take your Silicone Loaf Tin and fill it with water, then place securely in the freezer overnight. You'll need two of these so store one in the freezer while you make another.

- Now place your newly made glaciers outside, both on the same surface. This is important because the surface they are on could change your results.

- Sprinkle your dark powder on to one of the mini glaciers. Herbs and spices work well for this. If you have actual rock dust, or volcanic ash, thet will work too!

- Over the next few hours, note down how long it takes them to melt. You could take dimensional measurements or just watch what happens.

FURTHER INVESTIGATIONS

- Try taking a timelapse video of whats happening with the mini glaciers.

- Try using lager particles like small stones or grit on the ice to see how it changes.

- Try placing them in both shade and direct sunshine to see how the results change.

Our glaciers are melting for many reasons, but this is one of them. In the future, mountain glaciers will disappear and with them, the drinking water for billions of people. So it's important we study these places to see how they hold and release their fresh water.

CLIMATE IN A JAR

SCIENCE EXPERIMENT
DURATION 1 HOUR x 2

Human caused global warming is caused by greenhouse gases. Carbon Dioxide is not the most potent of these gases, but we are putting it in the atmosphere at a faster rate than any other greenhouse gas.

When the Sun's energy reaches Earth, a lot of it gets reflected back in to space. These increased greenhouse gases mean that more of that energy is getting trapped here on Earth, and it is warming up the planet.

To see this effect we can create a closed jar with an increased amount of carbon dioxide, and a lamp to represent the Sun.

In this scenario we will measure the effects without extra carbon dioxide, and the same with the extra carbon dioxide, and compare the two.

EQUIPMENT

- Lamp (with incandescent bulbs)
- Jar with lid
- Thermometer (with probe)
- Toilet Roll Tube
- Bicarbonate of Soda
- White vinegar

INSTRUCTIONS

- Tape the thermometers probe to the inside of the toilet roll tube.

- Put 10g of bicarbonate of soda and 50g of vinegar in to the jar.

- Tape the toilet roll tube to the inside of the jar and close the lid.

- Note the temperature on the probe and bring in the lamp. Place the lamp right next to the jar.

- The bicarbonate of soda and vinegar will make carbon dioxide. The toilet roll tube acts as a screen to make sure it's not in direct light.

- Run this experiment for 1 hour, then run it again with no bicarbonate of soda or vinegar.

FURTHER INVESTIGATIONS

- Try doing the same experiment with the lid open. Does the escaped carbon dioxide change the temperature?

- How about other gases? How do they effect the temperature?

RISING SEAS

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SCIENCE EXPERIMENT
DURATION 1 HOUR

We hear a lot about sea levels rising and why climate change is bad for that.

Ice melting into the oceans will cause sea levels to rise, but there's a difference between ice already in the sea, sea ice, and ice on the land, land ice.

Both forms of ice will melt if the average global temperature continues to rise, but what impact will this have on sea levels?

With glaciers receding at an alarming rate,and sea ice disappearing each year, does this mean sea levels will continue to rise?

In this experiment we'll look at the difference between the two.

EQUIPMENT

- Two medium tubs

- Pebbles

- Ice Cubes

- Blue food colouring

INSTRUCTIONS

Prepare your ice cubes in the prep session ready for the lesson.

- Take your tubs and start filling one side with pebbles, creating a shore line (both tubs);

- Fill the tubs with food dye and water to the shore line;

- Label your tubs A and B. In tub A, place 8 ice cubes in the water and mark with a pen the level of the sea with the Ice cubes in the water;

- In tub B, place 8 ice cubes on top of the pebbles, on land. Mark the level of the water in tub B. Wait for the ice to melt in both tubs then mark the sea level again on the outside of the tub.

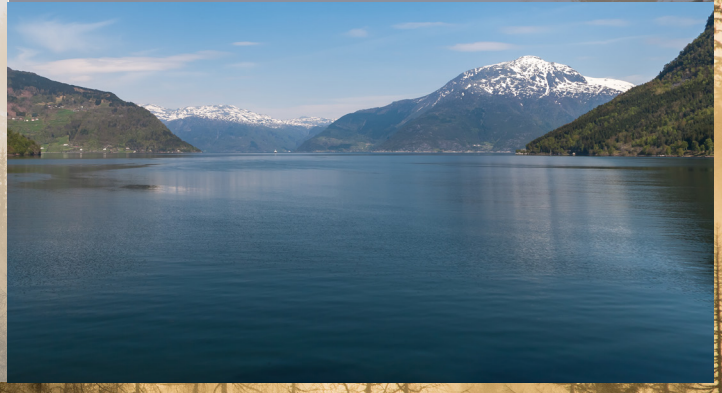
FURTHER INVESTIGATIONS

- Discuss with classmates why there were different rises of the sea level

- Try more ice in each tub

- Try less ice in each tub

- On a map, note down the cities around the world that may be affected by a rise in sea level.



FALLING PARTICULATE

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SCIENCE EXPERIMENT
DURATION 24 HOURS

As glaciers move down hill they erode the mountain around them. They then shrink in size and that erosion causes rocks to fall on to the surface of the glacier. Other glaciers may be near volcanoes that have significant ash fall on them.

Whatever the mechanism, there's normally some amount of particle falling on a glacier and that can dramatically change it's albedo. This means that it will have a darker surface and absorb more of the Sun's energy.

It's not just near a glacier that we get particles in the air. There are always particles in the air all around us. In this experiment we'll find out how many particles fall near you.

EQUIPMENT

- Postcards

- Vaseline

- Sticks

INSTRUCTIONS

- In this experiment we're going to measure how many particles fall on a postcard over a 24 hour period.

- To begin, we will coat our postcard in a thin layer of vaseline.

- This will then be secured to our stick facing the sky.

- Leave the stick and postcard out on a dry night and see how many particles they collect.

- To make it easier to count, you could add a grid pattern to the postcards.

- Ensure the postcards aren't under anything (like a tree), where more particles than normal could get on it.

FURTHER INVESTIGATIONS

- Try putting the postcards at different angles to see how it impacts the results.

- Try putting the particle catchers in different places around the school.

-Try running this experiment through the year. Is there a season that gives more particles?


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