



UNIVERSITY OF
OXFORD

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DEPT. OF PHYSICS

Weather Station Project



Encouraging children to become curious, confident and
creative in science

Name:

Introduction

Welcome weather watchers! Weather has a big effect on our day to day lives. Both rain and sunshine are necessary to grow much of the food that we eat. On the other hand, heavy rainfall can have a devastating impact on people by causing flooding. Physicists use weather observations and computers to predict how the weather will change each day and also to predict how our weather may be different in future because of climate change.

In this project we are going to learn about the weather by making some simple instruments from household items to measure things like rainfall, pressure, and wind speed/direction. We'll record our measurements in a weather diary and learn to understand some of the common features of different types of weather.

Making a weather diary

Feel free to make as many or as few of the experiments in this booklet as you like. On the last page you will find an example of a weather diary – you can make your own one on a separate piece of paper.

Pick a week to make your observations. When taking observations, you should pick a regular time each morning and afternoon, and record what you see.

Happy weather watching!

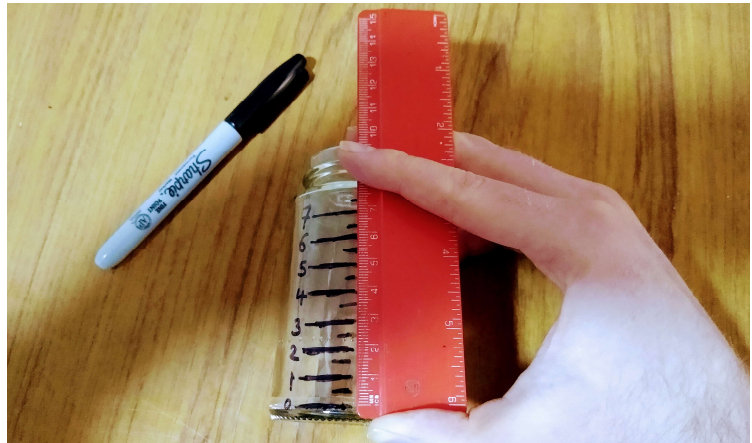
Task 1 – Making a rain gauge

Aim

The aim of this task is to create a rain gauge to measure the amount of rainfall in a given time period.

Equipment

- Glass jar
- Plastic bottle
- Ruler / tape measure
- Scissors / sharp knife
- Permanent marker pen



Method

1. Take the bottle and cut off the top few centimetres. **It will probably be best to find an adult to help you to do this.** The top of the bottle will be used as a funnel to collect rain.
2. Take the jar and make marks at intervals of 0.5cm from the bottom of the jar using the ruler and permanent marker. Label the marks at 1cm intervals.
3. Place the funnel in the jar.

Using the rain gauge

1. Leave the rain gauge on the ground outside, preferably in an open area away from buildings and trees.
2. When you come to read the rain gauge, make sure that you place it on a non-sloping surface and record the mark that the water has reached up to.
3. After reading the rain gauge, tip out the water and replace the rain gauge where you left it before.

Task 2 – Making a barometer

Aim

The aim of this task is to make a simple barometer which is a device to measure changes in atmospheric pressure.

Equipment

- Glass jar
- Plastic bottle
- Elastic band
- Marker pen
- Food colouring (not essential)

Method

1. Pour some water into the jar and place the bottle on top, upside down. There should be enough water to completely cover the mouth of the bottle by a few centimetres.
2. Place an elastic band around the jar at the top of the water level. You may want to add food colouring to the water to make the water level more obvious.
3. Make marks on the jar with the pen above and below the elastic band to indicate high / low pressure.



Using the barometer

- Place the barometer outside in a sheltered area such as a porch.
- With a marker pen, mark the water level on the jar.
- When air pressure is high, the air will push down on the water, forcing it up into the mouth of the bottle. On the other hand, when the air pressure is low, the air presses down on the water less strongly and the water level will fall.
- High pressure is often linked to dry, settled weather, while low pressure is associated with wet, unsettled weather.

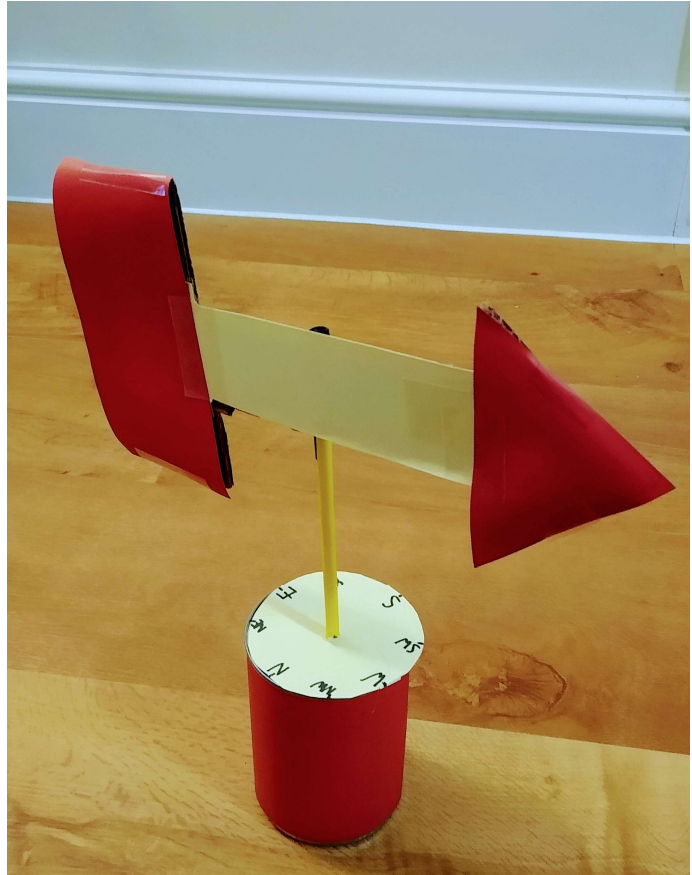
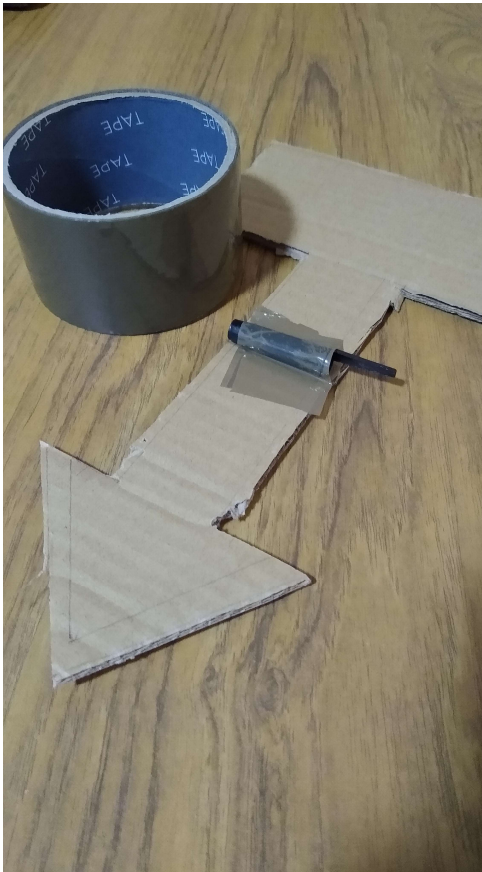
Task 3 – Making a wind vane

Aim

The aim of this task is to make a wind vane which will tell us which direction the wind is blowing from.

Equipment

- Pen lid
- Scissors
- Cardboard sheet
- Pencil or drinking straw
- Aluminium can or similar
- Compass (some phones may have an app for this)



Method

1. Draw an arrow shape on cardboard, like in the picture, and cut this out.
2. Tape the pen lid to the middle of the arrow.
3. Put the pencil or drinking straw into the pen lid and make sure that the arrow can turn smoothly without sticking.
4. Cut out a circle of card, marking north, south, east and west on it. Make a hole in the middle to put the pencil / straw through.

Task 3 – Making a wind vane

Method continued...

5. Fill the can with sand or gravel to weigh it down.
6. Push the pencil / straw through the hole and stick the circle onto the rim of the can.



Using the wind vane

- Take the wind vane outside to an open area away from any buildings and trees.
- Line up the wind vane using the compass so that 'N' points to the north.
- It may be easiest to hold it above your head as the wind will be stronger there than near the ground.
- Record the direction in which the arrow is pointing. The arrow will point in the direction that the wind is coming from.
- You may have heard weather presenters on TV talk about 'westerly' winds because the wind in the UK often comes from the west or south-west.

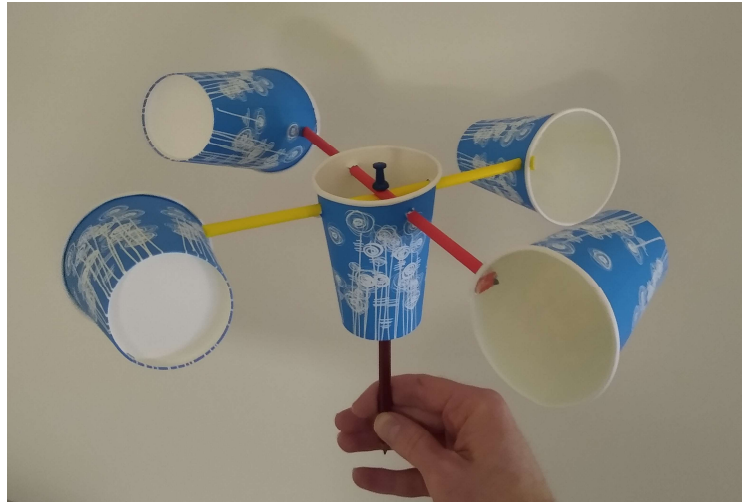
Task 4 – Making an anemometer

Aim

The aim of this task is to make an anemometer which measures wind speed.

Equipment

- 5 paper or plastic cups
- 2 drinking straws
- Pencil with a rubber on the end
- A pin



Method

1. In four of the cups, make a hole big enough for the straw to fit through, about 1cm from the top.
2. In the other cup, make four holes at the top, each at 90° to each other and another hole at the bottom.
3. Pull the two straws through the holes in the centre cup. Next, pull the straws through the holes in the other cups, bend the ends of the straws and tape to the cups.
4. Push the pencil up through the bottom of the centre cup and push a pin down through the straws into the pencil rubber. **Ask an adult to help you when inserting the pin.**

Using the anemometer

- Count the number of revolutions of the cups in a given period, say a minute. For example, the speed could be 10 revolutions per minute.

Task 5 – Identifying clouds

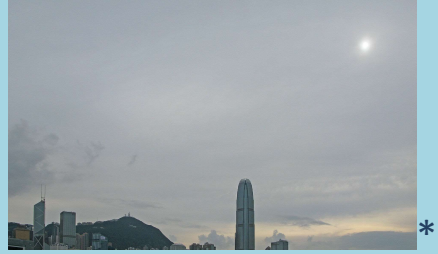
Aim

The aim of this task is to be able to identify common types of clouds.

See if you can identify the main type of clouds on each day



Altocumulus



Altostratus



Cirrocumulus



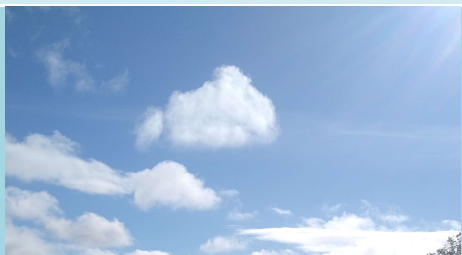
Cirrostratus



Cirrus



Cumulonimbus



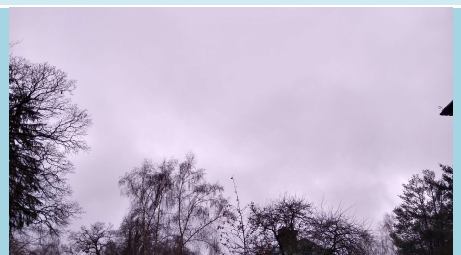
Cumulus



Nimbostratus



Stratocumulus



Stratus

* Image source: Wikipedia.org, Creative Commons License. Note that some of these clouds are slightly less common in the UK.

Weather diary

This is an example of a weather diary, feel free to create your own!

Day	Example	Day 1	Day 2	Day 3	Day 4	Day 5
<i>Morning</i>	-	-	-	-	-	-
Rain (cm)	0					
Pressure	<i>Neutral</i>					
Wind direction	<i>(Coming from the...) South</i>					
Wind speed (rpm)	0					
Clouds	<i>Cirrus</i>					
Comments	<i>A cold and sunny morning with very few clouds</i>					
<i>Afternoon</i>	-	-	-	-	-	-
Rain (cm)	2					
Pressure	<i>Low</i>					
Wind direction	<i>South-west</i>					
Wind speed (rpm)	10					
Clouds	<i>Nimbostratus</i>					
Comments	<i>A mild and wet afternoon with plenty of cloud cover</i>					

(Don't forget to take observations at the same times every day!)