

Weather and Climate

Measuring the Weather



Learning Objective

- To understand how weather instruments are used to measure the weather.

Success Criteria

- To identify weather instruments and what they measure.
- To interpret cloud cover symbols used on weather maps.
- To explain which groups of people would find the weather forecast useful.

Starter



Unscramble these weather anagrams.



UPTERM TAREE

TEMPERATURE

IRAN

RAIN

SHINSNUE

SUNSHINE

DINW

WIND

COLDU

CLOUD

ARESURPRISE

AIR PRESSURE

Does your family own any weather instruments?
What do they measure?



How Do We Measure the Weather?



Key Terms

Weather instruments are used to measure and record the weather.

Weather instruments can be found in **weather stations** on land. The Met Office has hundreds of weather stations all over the UK.

Have you ever seen a weather station?

This is a weather station in Kew Gardens, London. You can see the weather instruments inside the fence.



Photo © David Hawgood (cc-by-sa/2.0)

How Do We Measure the Weather?



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Weather instruments are also found at sea. They are found on some ships, but mainly on weather buoys designed to monitor weather and sea conditions.



How Do We Measure the Weather?



Planes, weather balloons and satellites also have weather instruments to measure the weather away from the Earth's surface.



How Do We Measure the Weather?

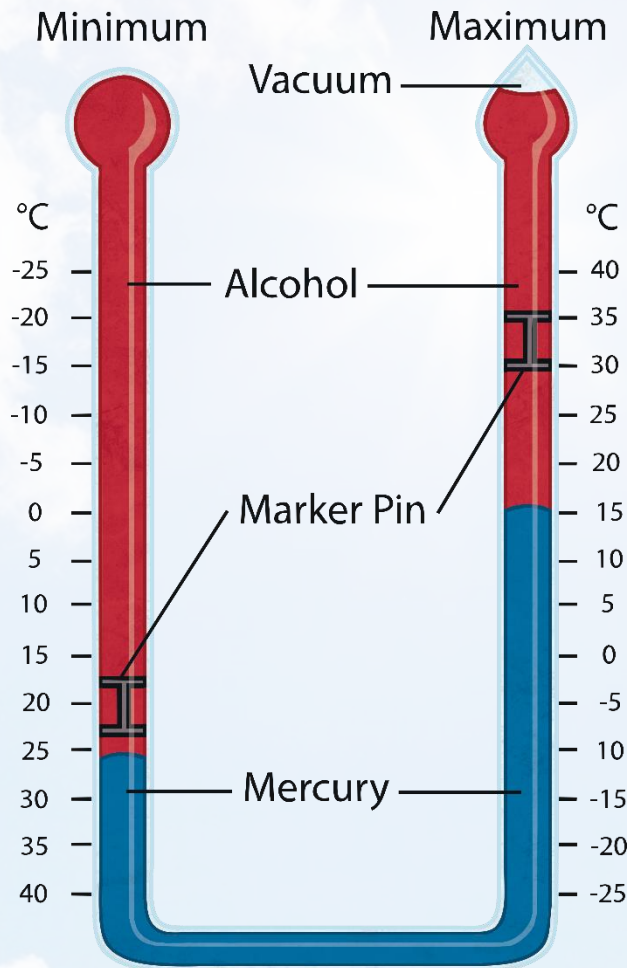


Study the images of six different **weather instruments**. What do you think are the units of measurement?

Use this information to complete your
Weather Instrument Activity Sheet.



How Do We Measure the Weather?



Six's thermometer

A **Six's thermometer** is a special thermometer which measures the maximum and minimum **air temperature** over a 24-hour period. Temperature is usually measured in degrees Celsius.

The alcohol expands as temperature increases, and pushes the mercury around a u-shaped tube. The mercury pushes a steel marker pin. This marker remains at the highest temperature reached and can be used to read the **maximum temperature**.

As the temperature falls, the alcohol contracts. A second marker pin can be used to show the **minimum temperature**.

How Do We Measure the Weather?



Stevenson Screen

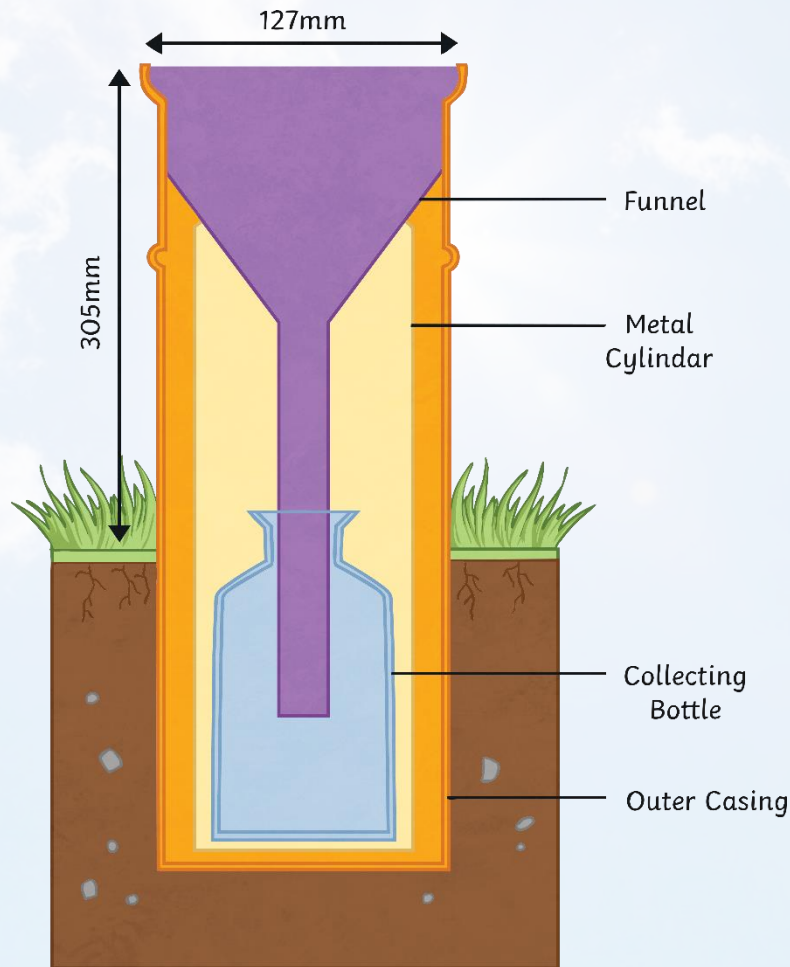
Thermometers are kept in a special shelter called a **Stevenson Screen**.

Can you suggest why?

- Temperature needs to be measured in the shade.
- The thermometer is protected from rain, snow and high winds.
- The thermometer is raised off the ground (1.25m) so that air temperature and not ground temperature is recorded.
- Slats on the sides allow air to pass through.
- The Stevenson Screen is painted white to reflect heat.



How Do We Measure the Weather?



rain gauge

A rain gauge measures the amount of **precipitation** (rain, sleet, hail or snow) that has fallen in a 24-hour period. This is usually measured in **millimetres**.

The rain gauge should always be placed in an open space away from trees and buildings.

Can you suggest why?

To prevent precipitation being intercepted (caught) by trees and buildings which would affect how much water is collected.

How Do We Measure the Weather?



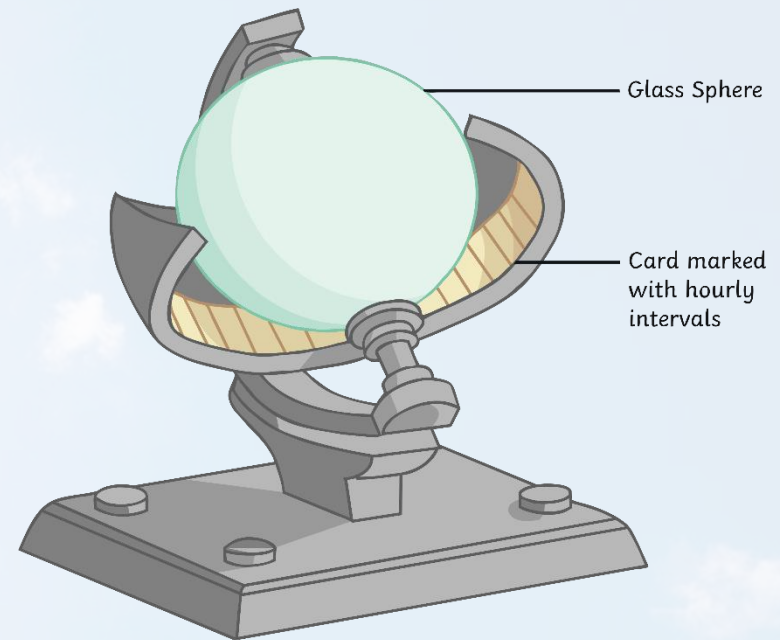
Campbell-Stokes Sunshine Recorder

The **Campbell-Stokes Sunshine Recorder** measures the amount of **sunshine** during the day.

A glass sphere concentrates the Sun's rays on a strip of card, burning a small hole (just like a magnifying glass!).

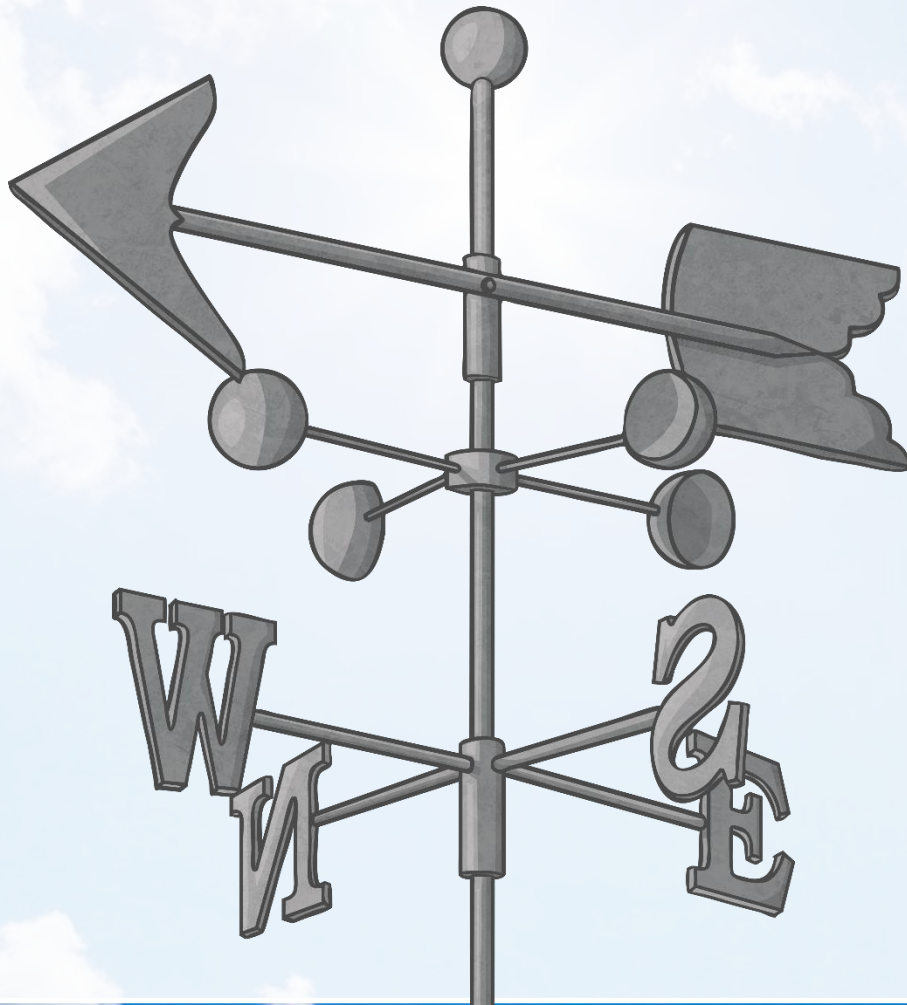
As the Sun moves across the sky, the rays are directed at a different section of the card.

The length of burnt sections can be added up to give the total amount of sunshine.



How many hours of sunshine were there in this example?

How Do We Measure the Weather?



wind vane

A **wind vane** shows the **wind direction**.

The arrow points in the direction the wind is blowing **from**.

What is the wind direction shown in the photo?

Westerly wind

How Do We Measure the Weather?



barometer

A **barometer** measures **air pressure**. This is the force or weight of the air above us.

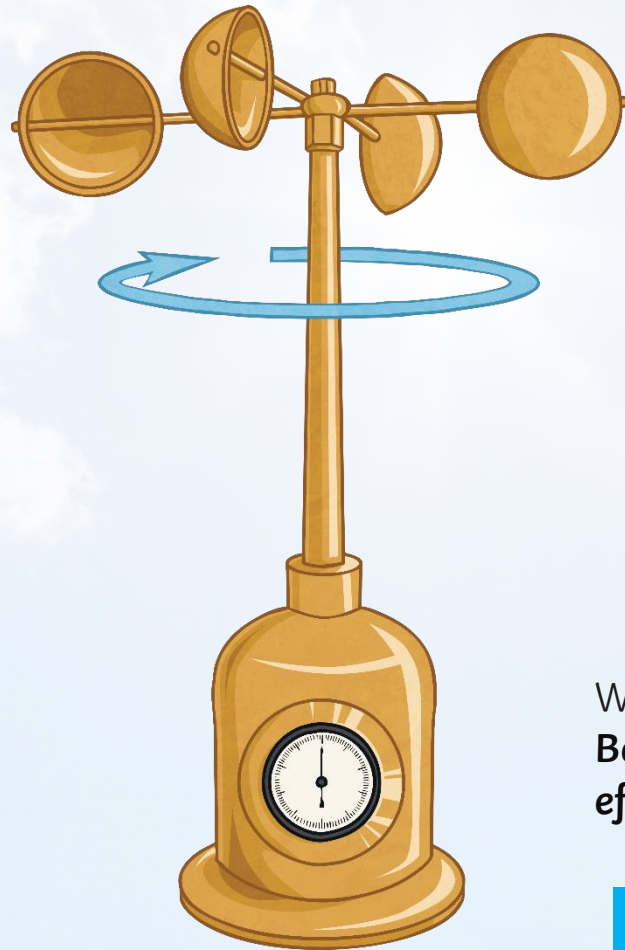
A high pressure reading means sunny and dry conditions.

A low pressure reading means stormy and wet conditions.

What air pressure is shown in this barometer?



How Do We Measure the Weather?



anemometer

An **anemometer** is used to measure **wind speed** in miles or km per hour. The cups rotate in the wind and turn a vertical rod. The stronger the wind blows, the faster the cups and the rod spin. The anemometer counts the number of rotations which is used to calculate wind speed.

Wind strength can also be measured by using the **Beaufort Scale**. This scale uses observations of the **effects** of the wind to determine wind speed.

Complete the Beaufort Scale Activity Sheet.

How Do We Measure the Weather?



cloud cover

The amount of **cloud cover** can be measured visually.

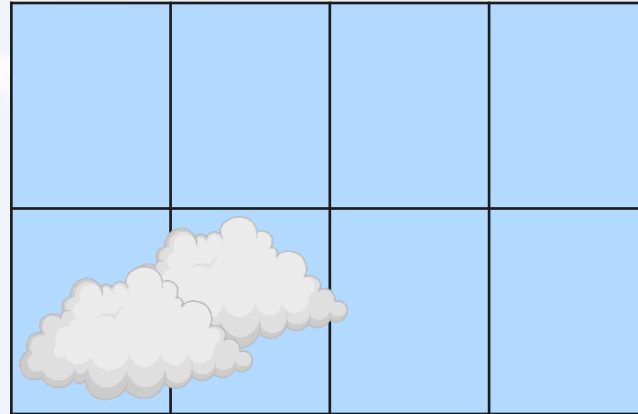
An area of sky above a weather station is divided into eighths.

The fraction of sky covered by cloud is then estimated.

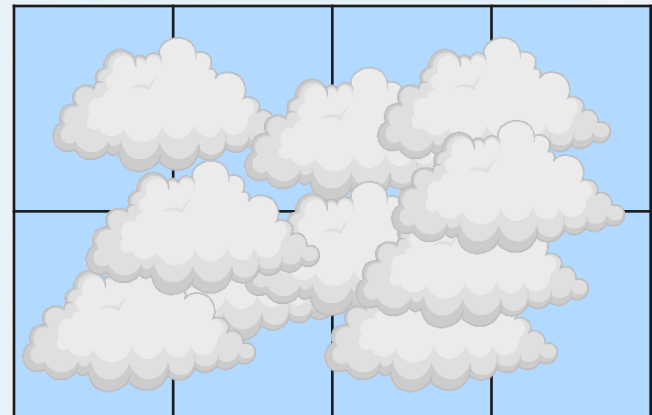
Cloud cover is shown in **oktas** (eighths).

What cloud cover is shown in the diagrams?

Sky A 1 okta



Sky B 5 oktas



How Do We Measure the Weather?



cloud cover

The amount of cloud cover for an area can be shown by a symbol on a weather map.

The shaded part of the circle represents the amount of cloud cover.

You have 1 minute to study this diagram.

Cloud Cover

Symbol	Scale in oktas (eighths)
	0 Sky completely clear
	1
	2
	3
	4 Sky half cloudy
	5
	6
	7
	8 Sky completely cloudy
	9 Sky obstructed from view

How Do We Measure the Weather?



5 kg to 10 kg of water

Complete your Cloud Cover Activity Sheet.



Weather Forecasting



Information from weather instruments and weather satellites is used to create a **weather forecast**.



weather forecast

a prediction of what the weather will be like in the next few hours, days, weeks or even months.



prediction

what someone thinks will happen.



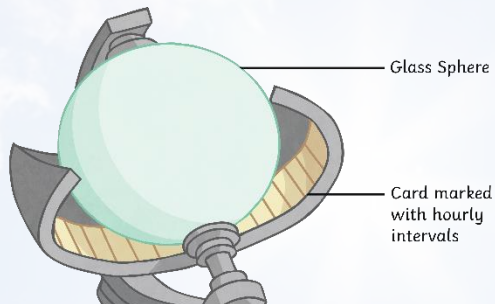
Think of **four different groups of people** who would find a weather forecast useful. Give detailed reasons for each choice.



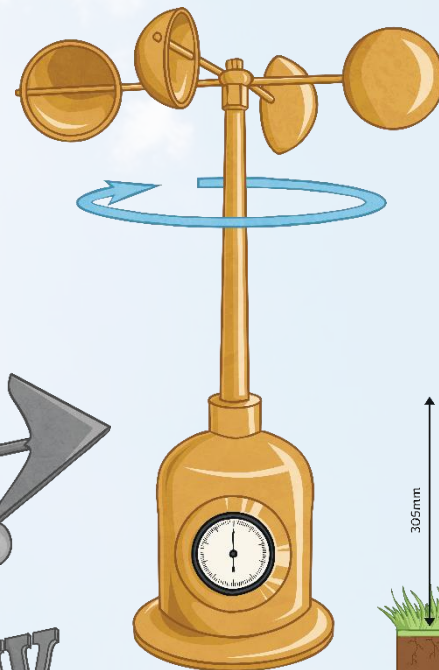
Name the Weather Instrument



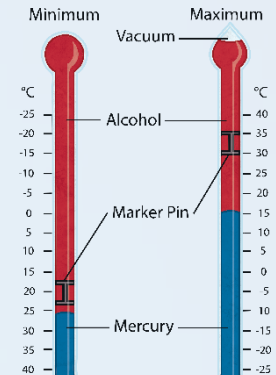
Can you name the weather instruments and give **one** fact about each?



Campbell-Stokes sunshine recorder



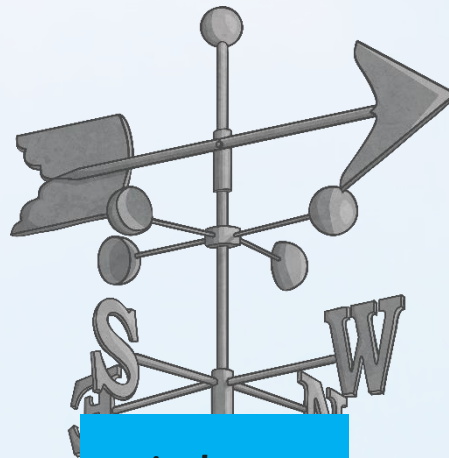
anemometer



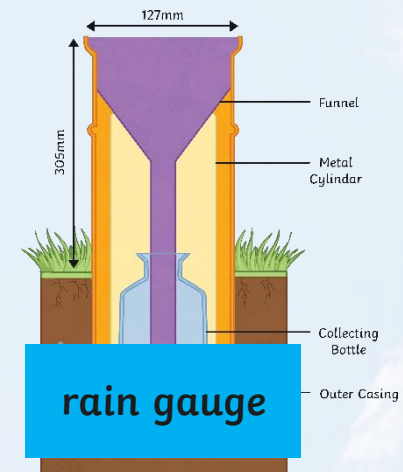
Six's Thermometer



barometer



wind vane



rain gauge

Task

Use the guides to make some of the equipment and measure and record the weather over the next week.

Then you use this information to create a 'weather forecast' (although it will be after the event) and present this to your family.