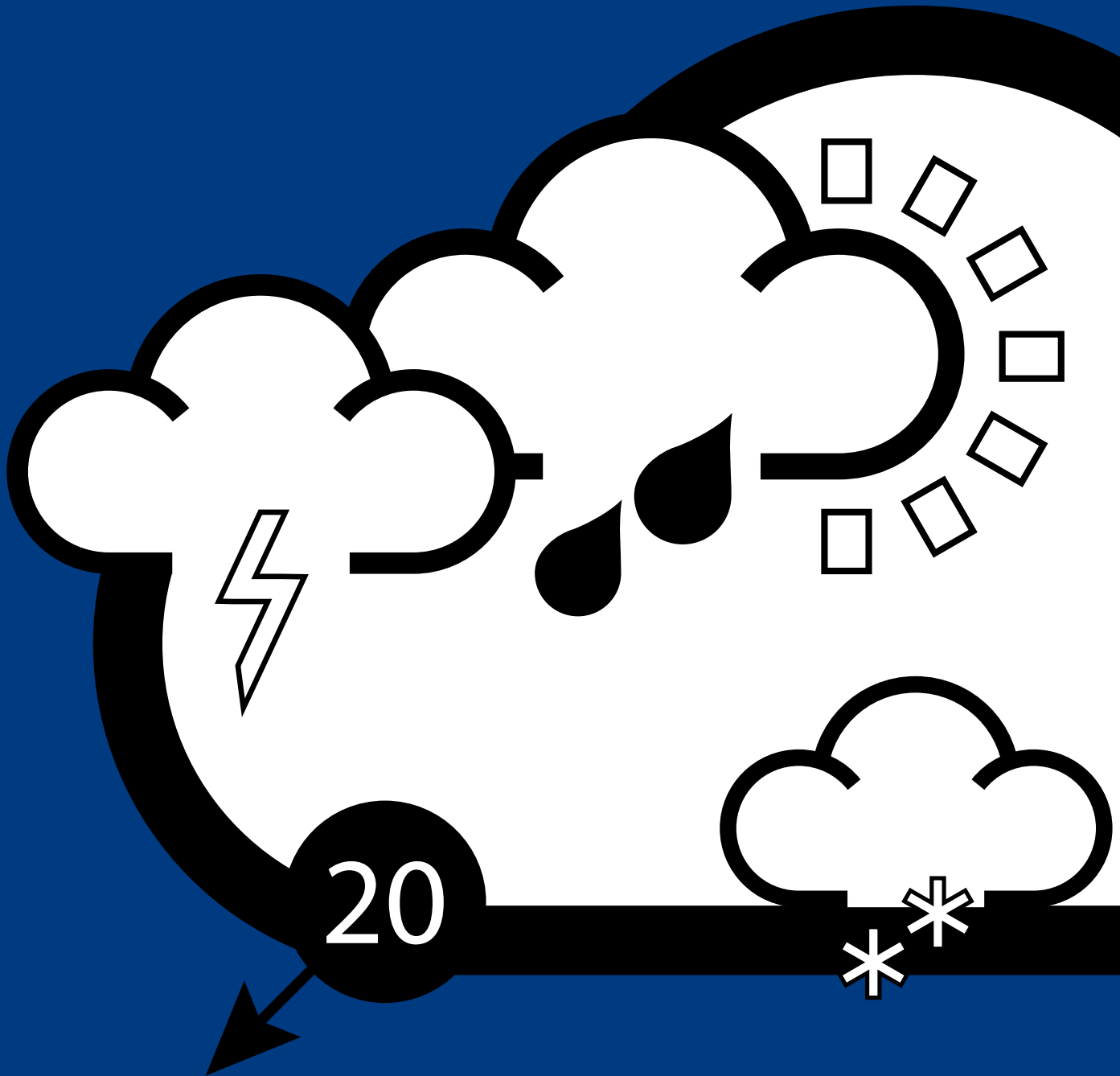


Microclimate Investigations at Castle Archdale

Key Stage 3



Microclimate Investigations at Castle Archdale

What is a microclimate? – According to the definition in “Foundation”, a first year Geography textbook, it is “the climate of a small area”.

Microclimate studies involve measuring the change in local weather conditions over a period of time in a small area; in our case Castle Archdale Country Park. We could also study a microclimate at home in our garden, or, if we live in the country, on our farm.

Introduction

Welcome to the study of weather at Castle Archdale Country Park. In our study we will be focusing specifically on *microclimate*.

Climate

is the state of the weather in a specific area or region. For example, we use the term ‘climate’ to describe the weather in Fermanagh.

Weather

is the state of the atmosphere around us, hour-by-hour, day-by-day. We can describe the state of the weather simply by looking at it.

Microclimate

is the term used to describe the climate of a very small area, in our case, Castle Archdale Country Park. Equally, you could study the microclimate where you live. Your area’s microclimate may be sunnier, wetter or windier than average local conditions in Fermanagh.

Before we begin our microclimate study in Castle Archdale Country Park, we need to take a look at some of the instruments and equipment – some bought and some homemade – that we will be using. By completing some of the exercises in our book, we will also learn how to read and record with these instruments.

Methodology

Our *methodology* for our microclimate study – i.e. the way we must carry out our study.

We are going to look at 10 sites/locations within the park. At each site you will find the following pieces of equipment:

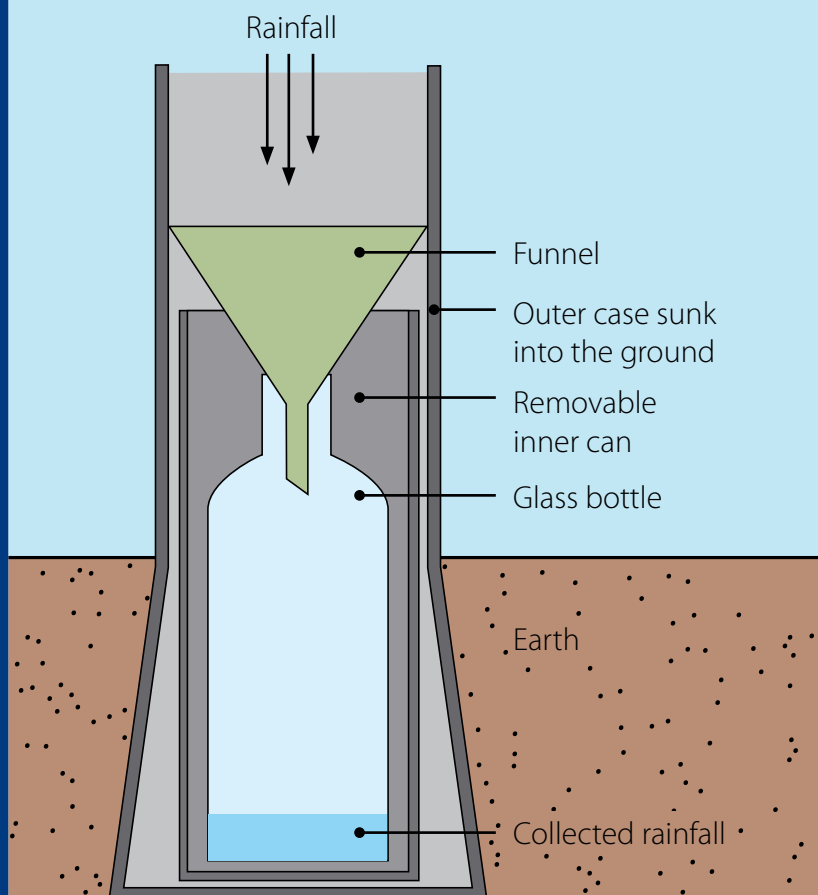
1. A Weather Watch –

this is a piece of equipment attached to the top of a pole. A weather watch can record the following aspects of the weather at each site;

- Rainfall
- Air temperature
- Wind speed
- Wind direction
- Wind chill (if appropriate)

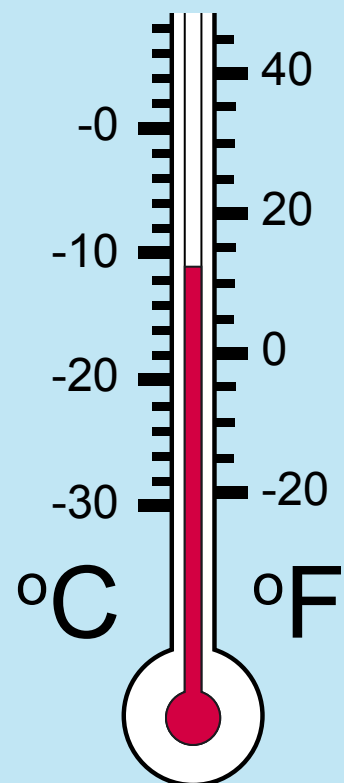
2. A Rain Gauge –

this is a homemade piece of equipment. A rain gauge is used to measure rainfall.



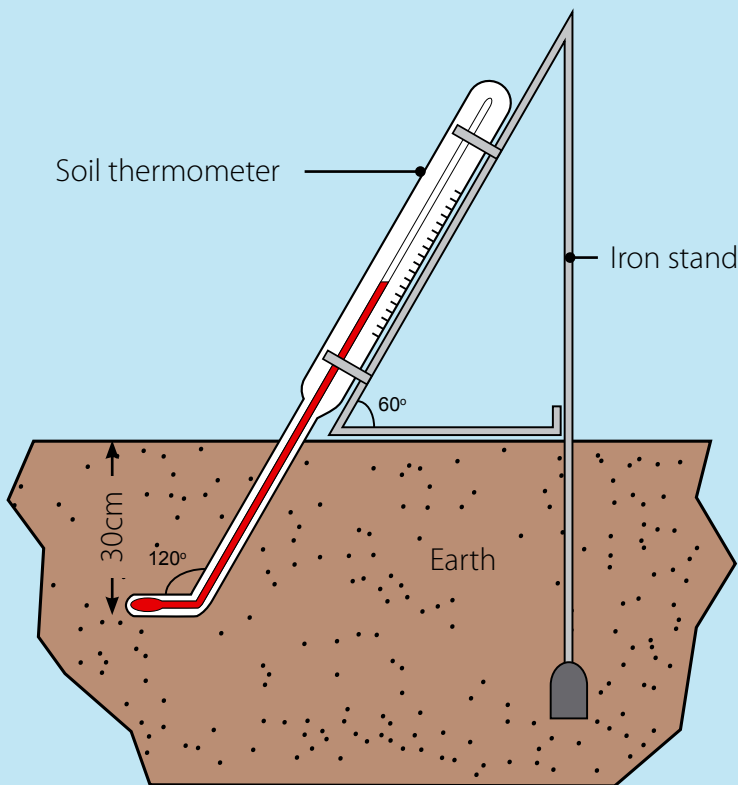
3. A large plastic Thermometer –

this is attached to the end of the pole and should be used to crosscheck the temperature at each site.



4. A Soil Thermometer –

this will be inserted into the earth at each site to record the temperature of the soil.



5. A Digital Hygrometer/ Thermometer –

we will bring a digital hygrometer to each site to measure the humidity i.e. the amount of water vapour in the air. We will use the digital thermometer to take a temperature reading which we will then compare to our other 2 temperature readings for this site.

7. A Cloud Cover Chart –

we will use the cloud cover chart to assess the amount of cloud cover in the park.

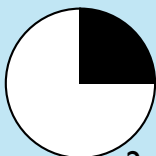


Clear Sky

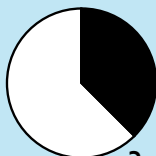
Cloud Cover is measured in eights or Oktas. 'Cloud cover 4' means that four-eights (or half) of the sky is cloud.



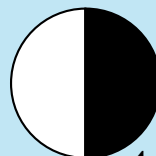
1.



2.



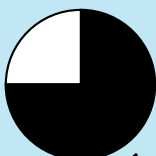
3.



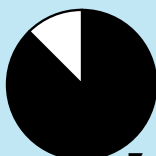
4.



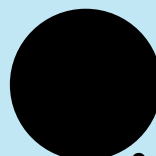
5.



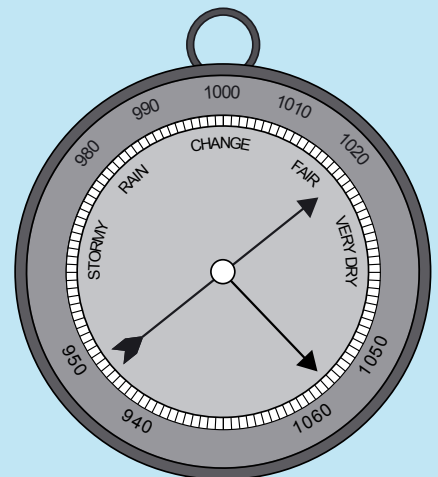
6.



7.



8.



6. A Barometer –

we will use the barometer to check the air pressure outside the classroom in the courtyard.

All readings at each site should be recorded on the recording sheet (page 9) in your booklet.

Weather measurements and instruments

A weather scientist (or meteorologist) needs the following measurements in order to describe the weather –

1. – Temperature

is measured using a thermometer. The measurement of temperature tells us how hot or cold it is. Temperature is measured in degrees centigrade (°C).

2. – Pressure

is measured using a barometer. Pressure is the weight of air pressing in on us. It is measured in millibars (mb.).

3. – Rainfall

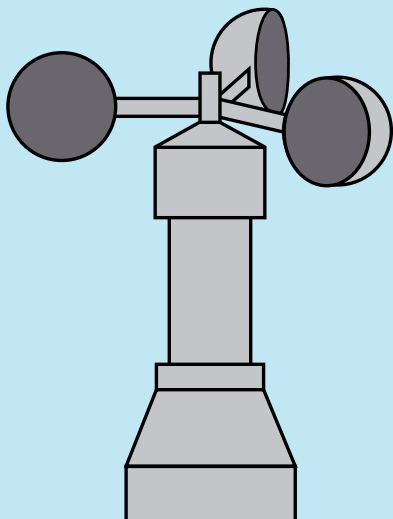
is measured with a rain gauge. Precipitation in the form of rain, snow, sleet or hail is measured in millimetres (mm).

4. – Relative humidity

is measured using a wet and dry bulb thermometer or a digital hygrometer. The measurement of relative humidity tells us how 'wet' the air around us is.

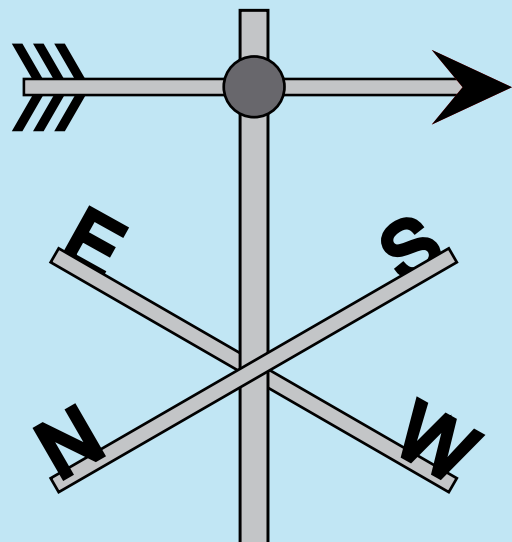
5. – Wind speed

is measured using an anemometer. Moving air has wind speed. It is measured in kilometres, miles or knots per hour.



6. – Wind direction

is shown by a wind vane. Wind direction is the point of the compass from which the wind blows.



7. – Sunshine

is measured by a sunshine recorder. Sunshine is measured in hours per day.

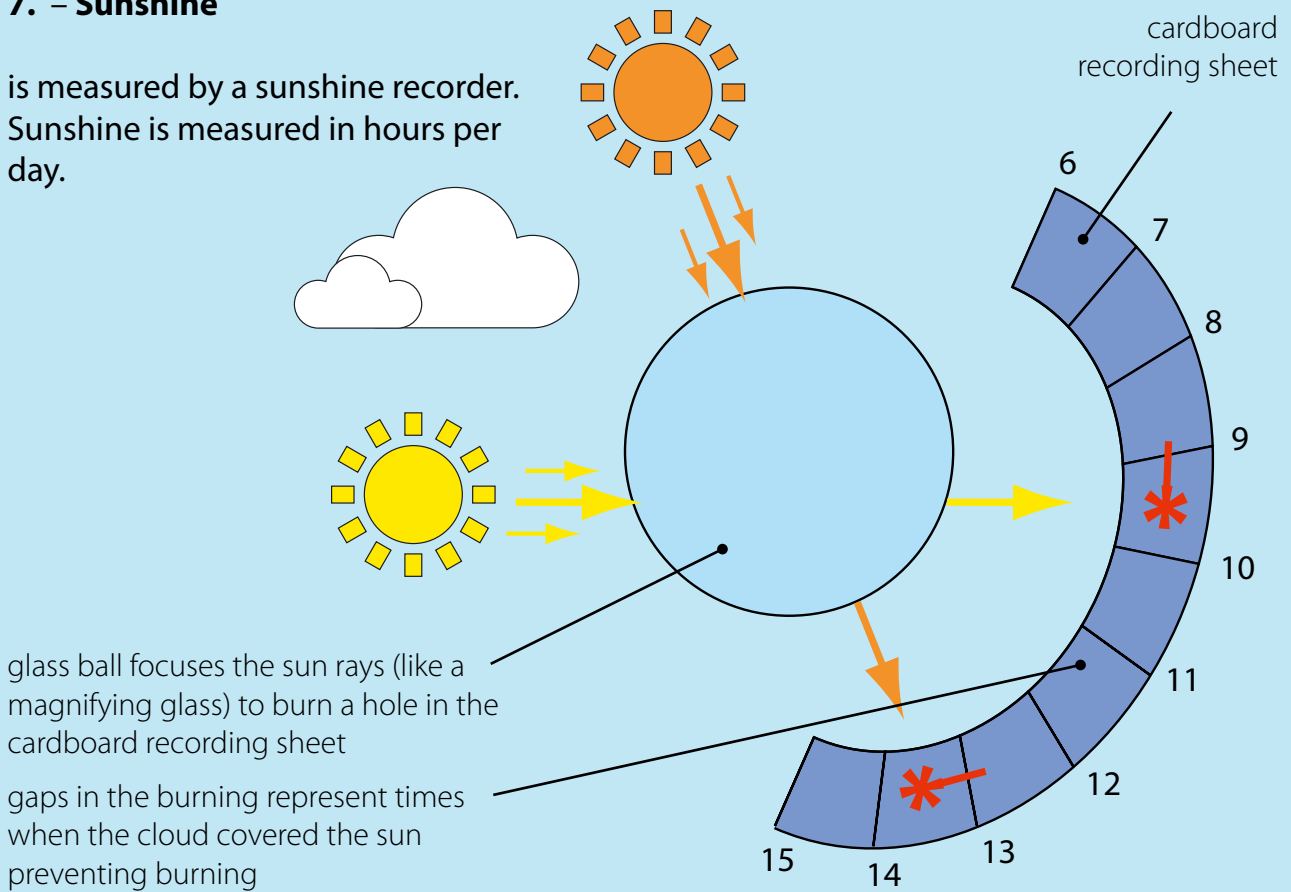


Diagram of a parheliometer or campbell-stokes recorder.

8. – Visibility

is a measure of how far we can see. The visibility may be good, poor or foggy.

9. – Cloud cover

is measured by looking at the sky. Cloud cover is measured in eighths or oktas. 'Cloud cover 4' means that four-eighths (or half) of the sky is cloud.

10. – General weather

is described in words. We use words such as rainy, snowy, foggy, windy, stormy, cloudy or sunny.

On the next two pages there are 2 easy exercises for you to complete before you go out around the weather stations in the park.

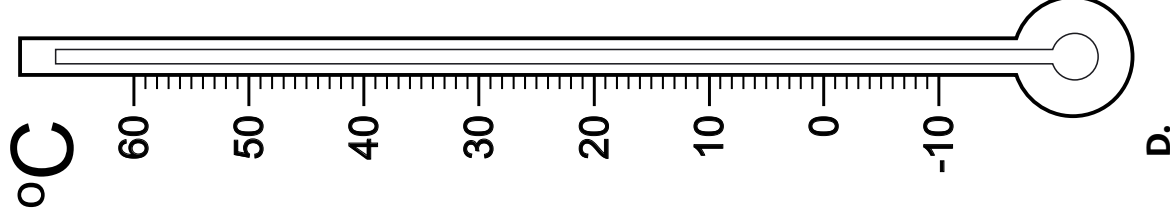
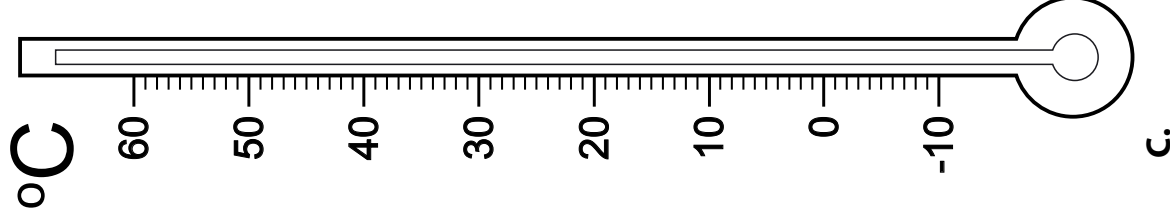
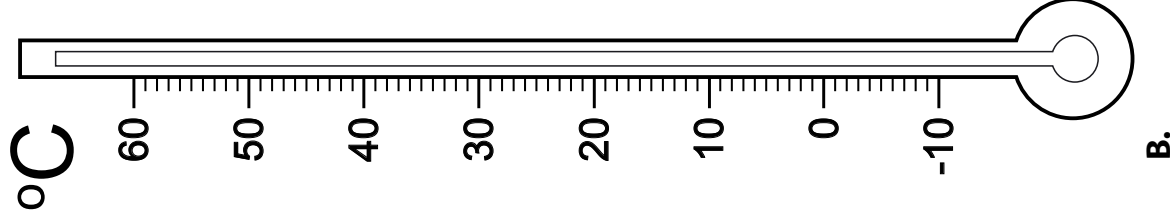
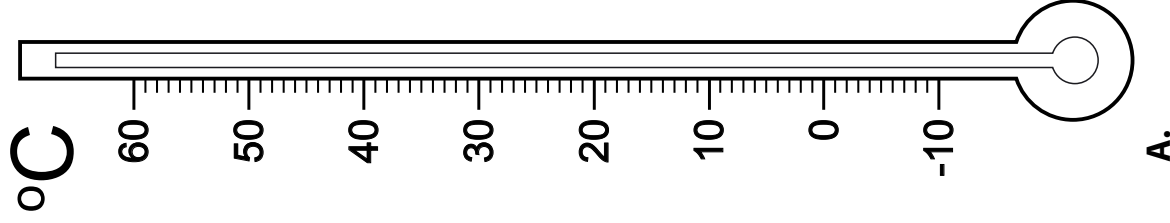
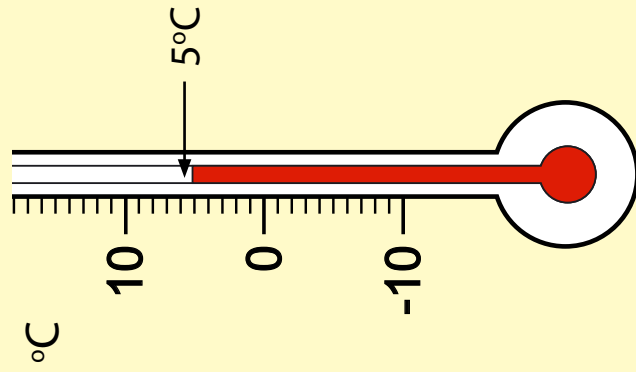
Recording the Temperature

TASK

Fill in the thermometers as below;

- A. 0°C
- B. 10°C
- C. 15°C
- D. 27°C

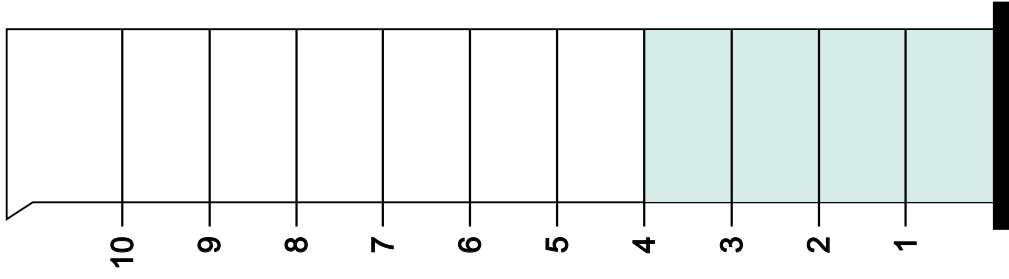
EXAMPLE



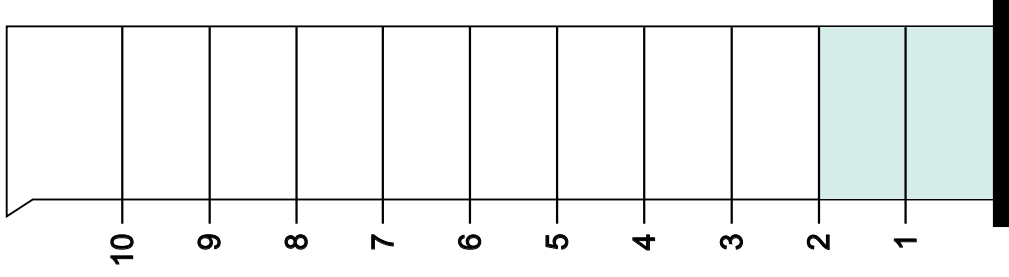
Recording the Rainfall

TASK

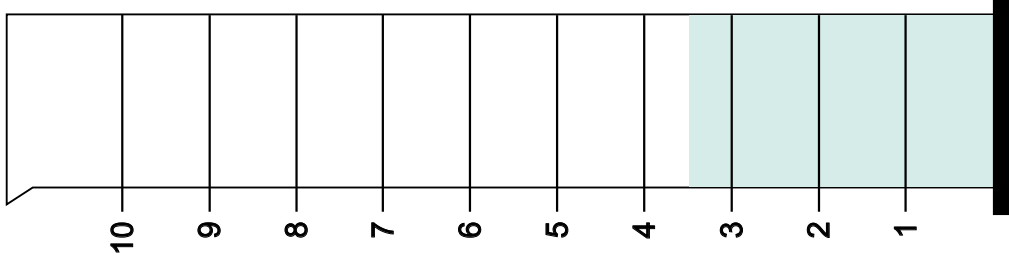
List the amount of rainfall in each measuring cylinder.



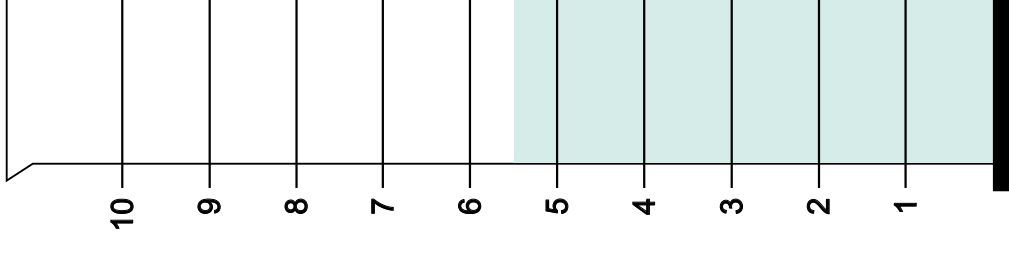
A. _____ mm



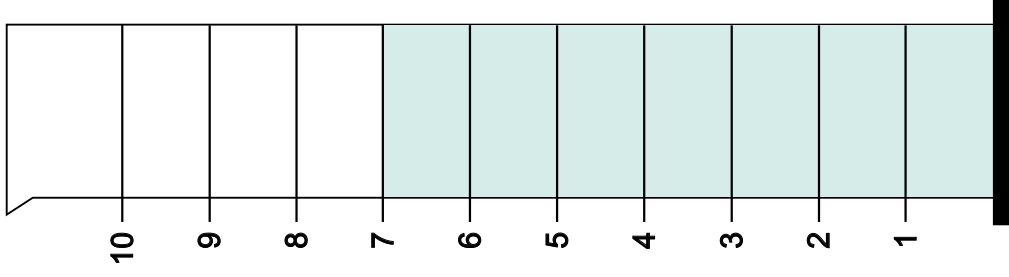
B. _____ mm



C. _____ mm

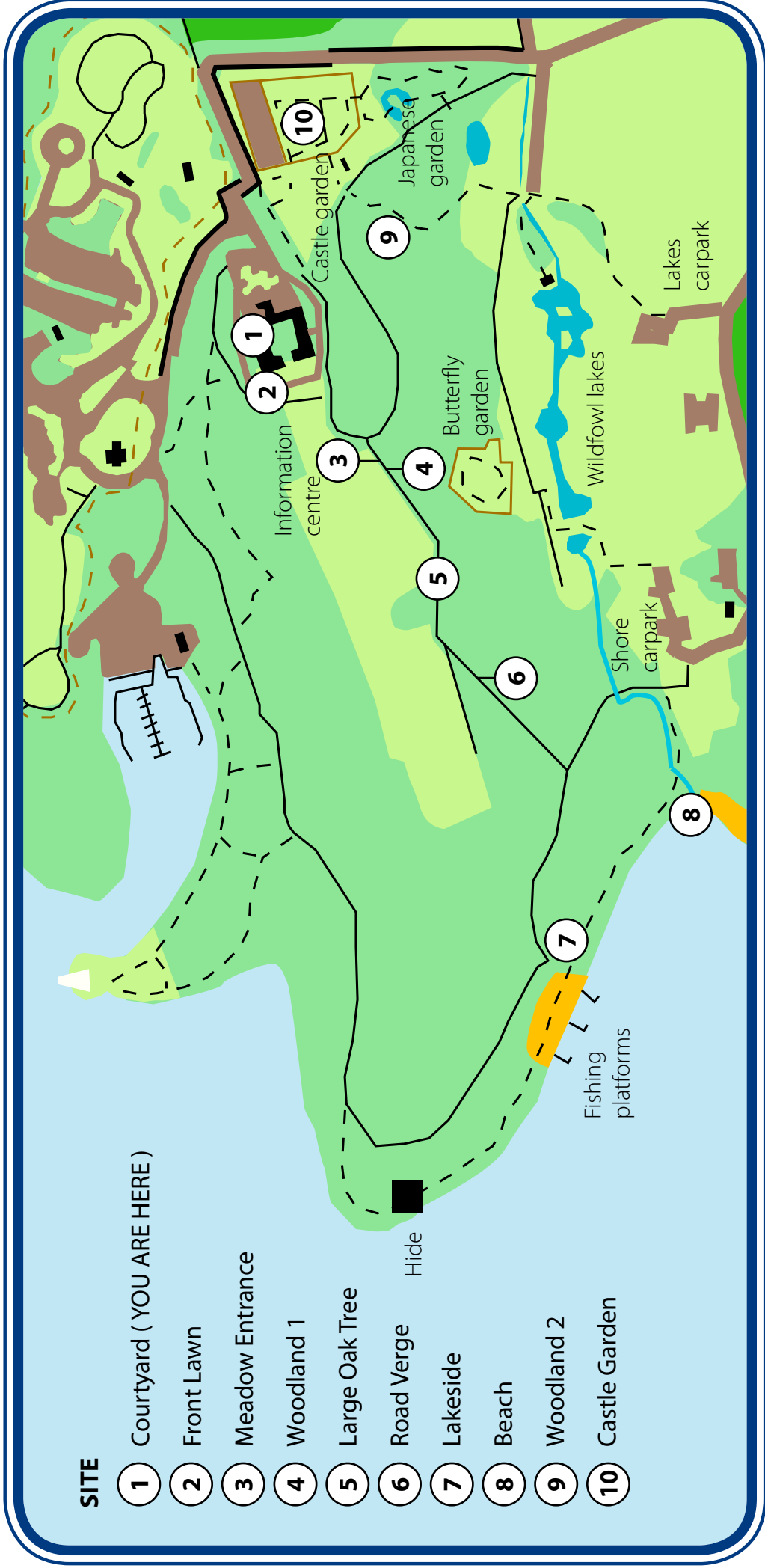


D. _____ mm



E. _____ mm

Castle Archdale Country Park Map



SITE

- 1** Courtyard (YOU ARE HERE)
- 2** Front Lawn
- 3** Meadow Entrance
- 4** Woodland 1
- 5** Large Oak Tree
- 6** Road Verge
- 7** Lakeside
- 8** Beach
- 9** Woodland 2
- 10** Castle Garden

Recording sheet

	Air Temperature	Soil Temperature	Wind Speed	Wind Direction	Rainfall	Relative Humidity	Barometric Pressure
Site 1 Courtyard							
Site 2 Front Lawn							
Site 3 Meadow Entrance							
Site 4 Woodland 1							
Site 5 Large Oak Tree							
Site 6 Road Verge							
Site 7 Lakeside							
Site 8 Beach							
Site 9 Woodland 2							
Site 10 Garden							

Recording Sheet Questions

TASK

Answer the following questions about your recording sheet.

1. Which of the ten sites had the highest air temperature?

Site no. Temp.

2. Which site had the highest wind speed?

Site no. Wind speed

3. What was the "mean" or average temperature in the park?

Mean temperature

4. What was the barometric pressure on that day?

Ans: mb

5. Why might air temperature be different between site 2 (front lawn) and site 4 (woodland)? Give a reason for your answer.

Ans:
.....

6. Which site had the highest relative humidity?

Ans: %

7. Why do you think relative humidity might vary between sites?

Ans:
.....

8. Explain why rainfall in the woodland and rainfall on the beach might be different.

Ans:
.....

The Beaufort Wind Scale

The Beaufort Wind Scale is a simply way of estimating (judging) wind speed when there is no anemometer.

The Beaufort Wind Scale is named after a man called Beaufort.

The Beaufort Wind Scale

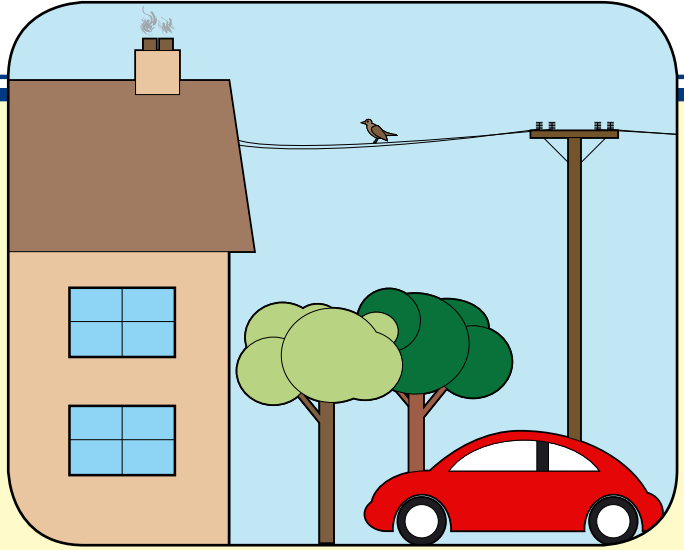
Beaufort Number	Descriptive Title
0	Calm
1	Light air
2	Light breeze
3	Gentle breeze
4	Moderate breeze
5	Fresh breeze
6	Strong breeze
7	Near gale
8	Gale
9	Strong gale
10	Storm
11	Violent storm
12	Hurricane

TASK

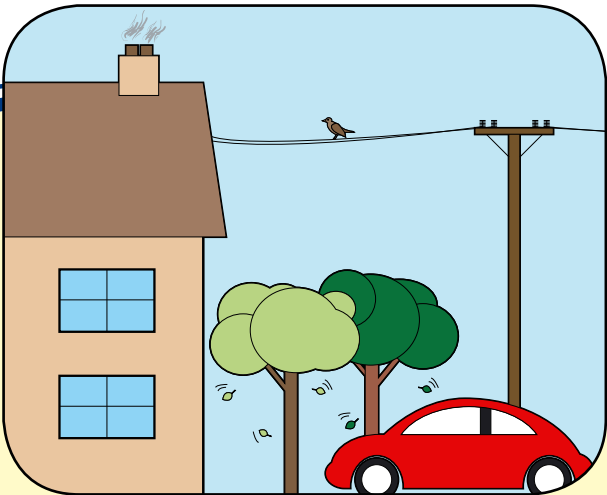
After looking at the Beaufort Scale now look at the drawings illustrating some of these wind conditions and put the correct Beaufort number beside each picture. The first one has been done for you.

The Beaufort Wind Scale

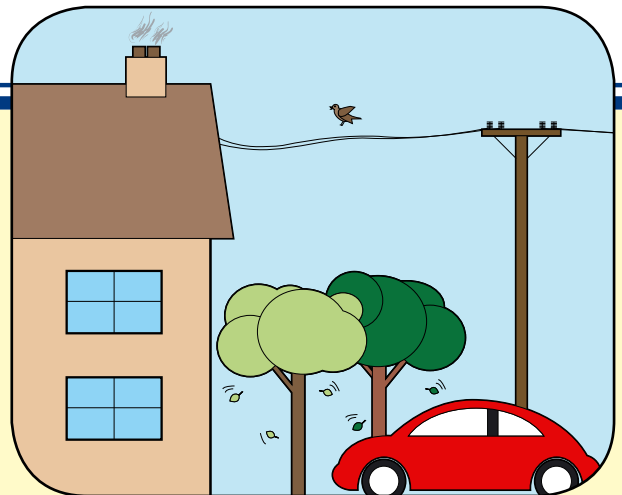
LIGHT AIR 1



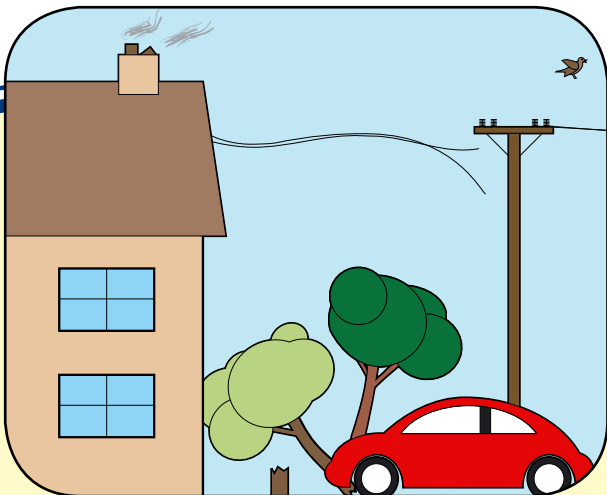
MODERATE BREEZE



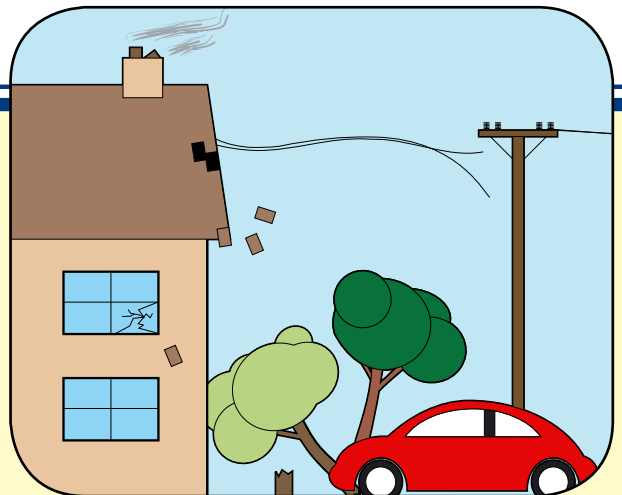
FRESH BREEZE

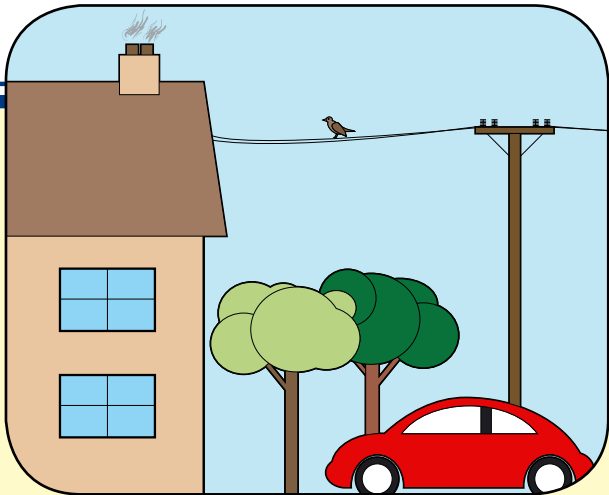


GALE

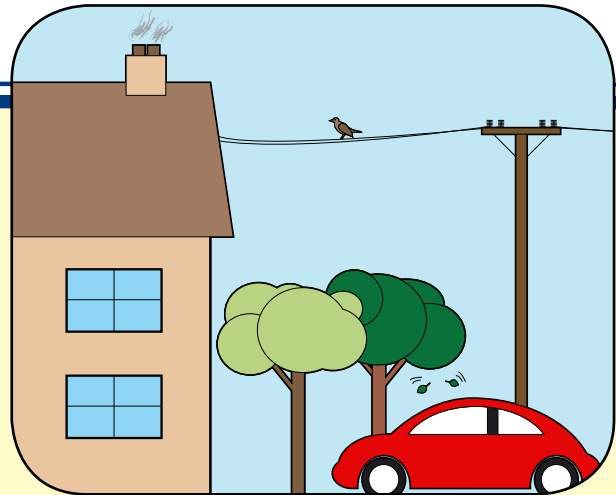


STORM

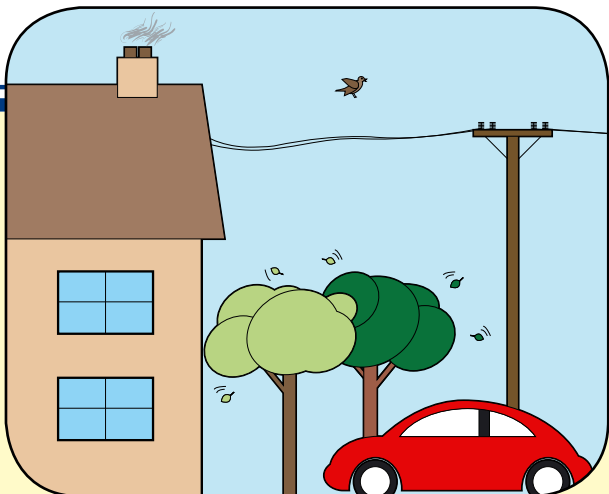




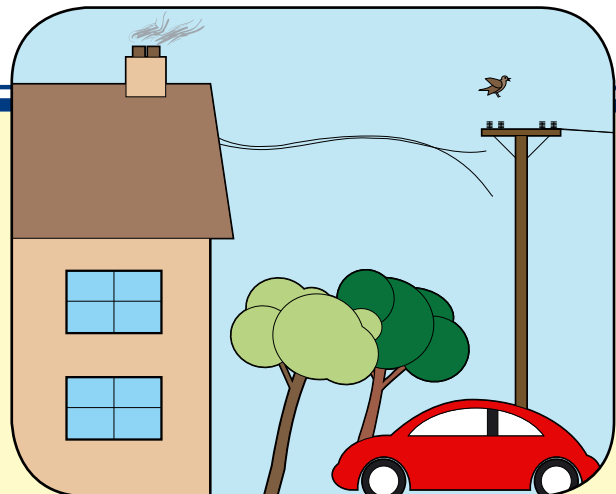
LIGHT BREEZE



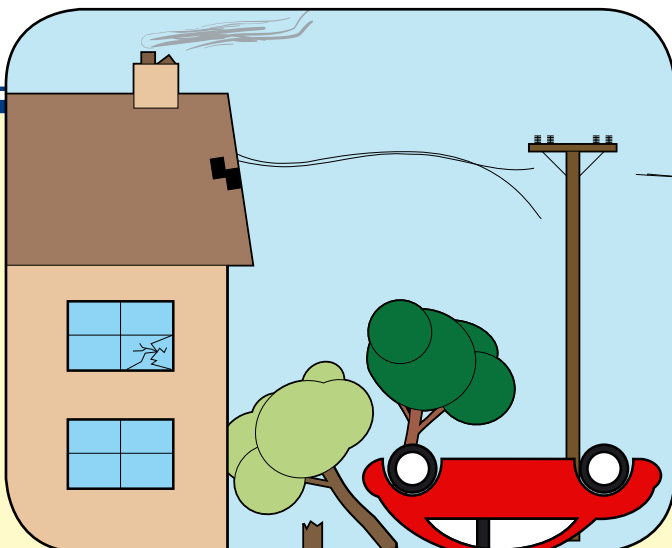
GENTLE BREEZE



STRONG BREEZE



NEAR GALE



HURRICANE

Recording the Wind Direction

WIND ROSE

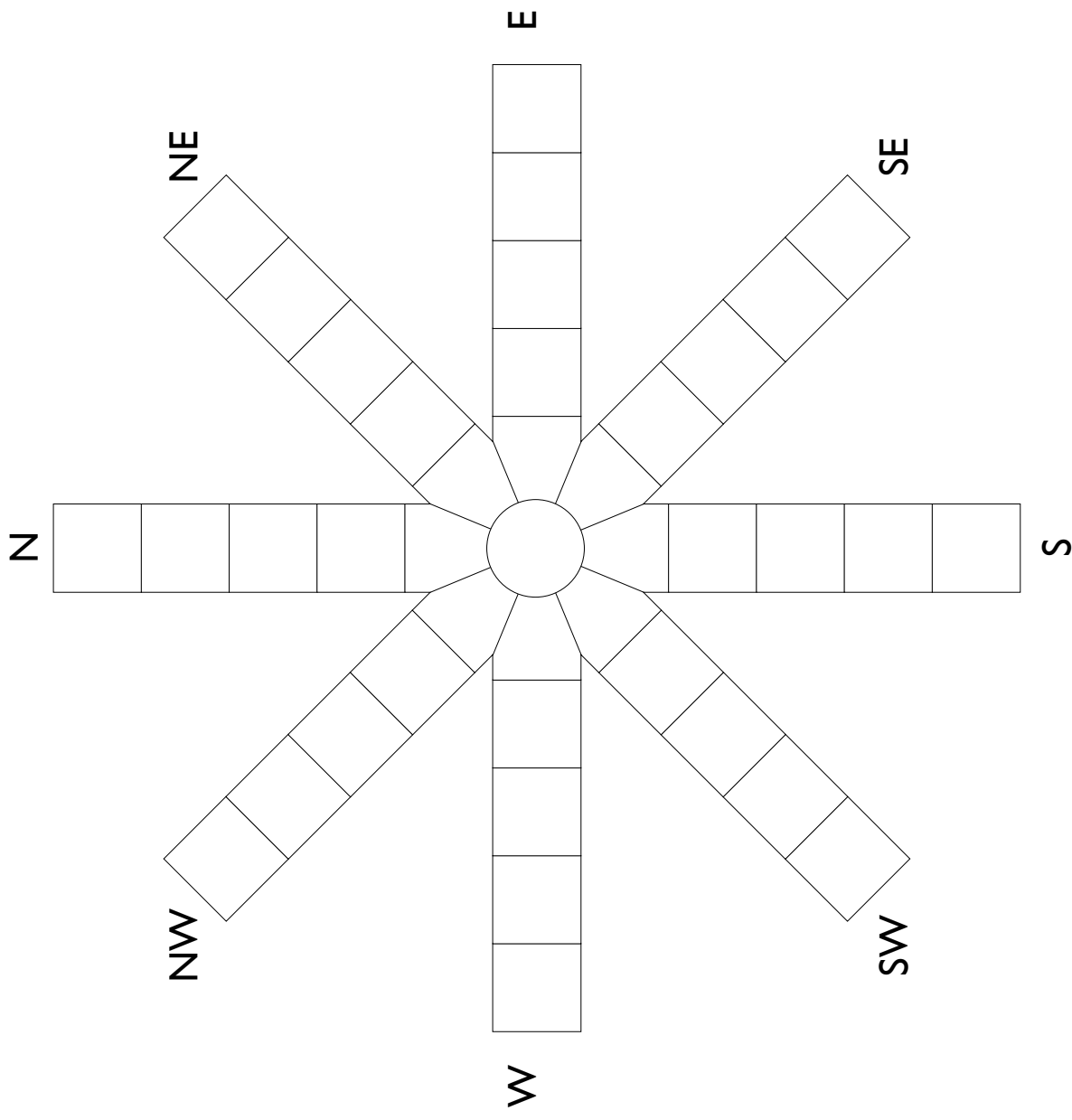
TASK

Colour the 'Wind Rose' according to the information below;

- Monday = **Blue**
- Tuesday = **Red**
- Wednesday = **Brown**
- Thursday = **Green**
- Friday = **Yellow**

Week Beginning -

.....



WIND ROSE

Week Beginning -

3rd December

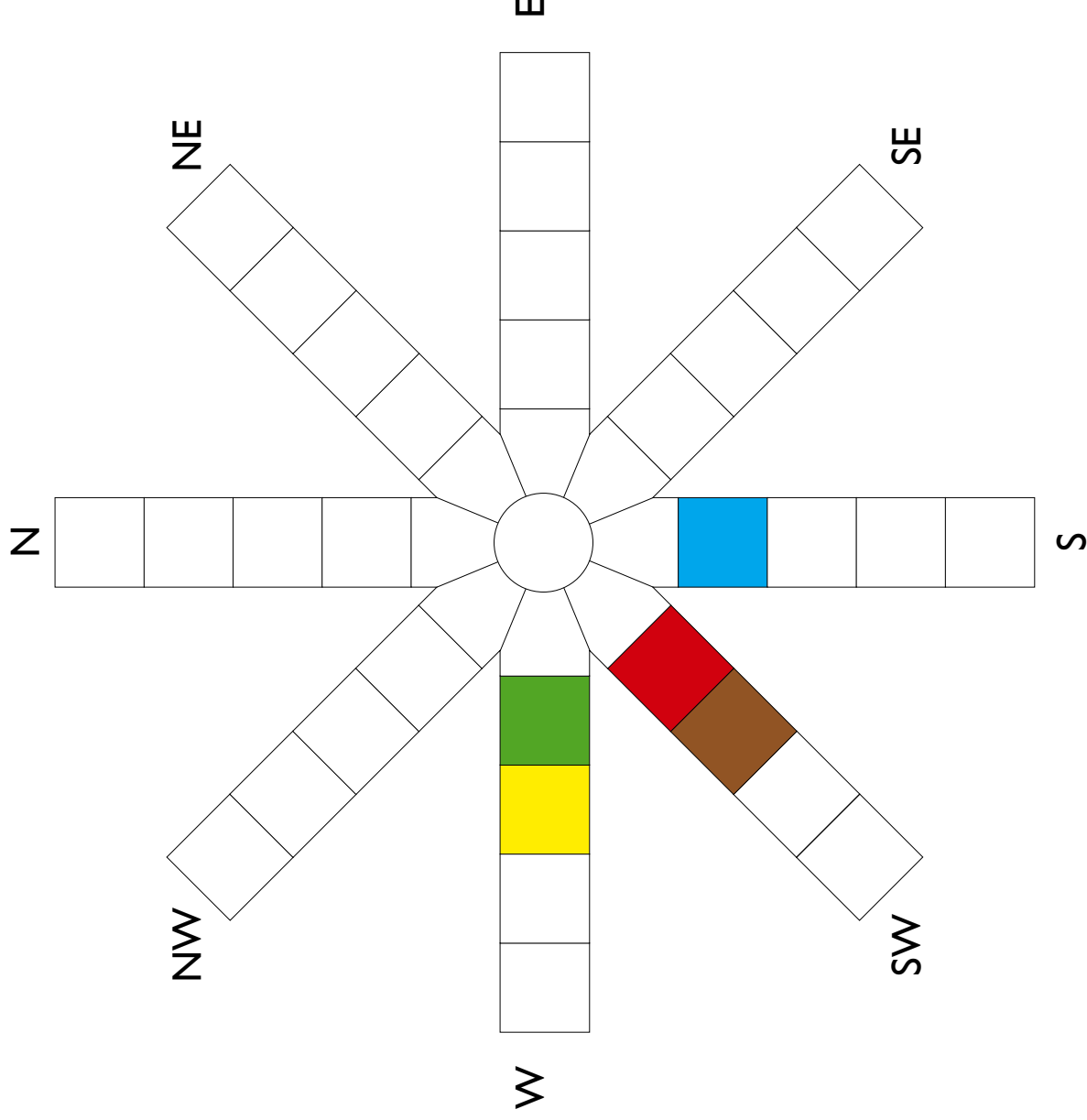
.....

TASK

1. From which direction did the wind blow most often?

2. If this 'Wind Rose' showed wind direction over Ireland for the week beginning 3rd December, do you think the winds were mild or cold?

Give a reason for your answer



Wind Speed and Direction

TASK

The words in these sentences are not in the correct order. Write each sentence out correctly. The first word of each sentence has been highlighted for you.

1. calm is no **When** wind is it there

Ans:

2. straight when calm is goes **Smoke** it up

Ans:

3. good day to windy **A** sailing is a day go

Ans:

4. measured wind the Beaufort Scale **The** strength of is on the

Ans:

5. wind instrument **The** used anemometer is measure to the an speed

Ans:

6. blows which is from it **A** named after direction wind the

Ans:

7. wind common most **We** a rose show the use wind direction to

Ans:

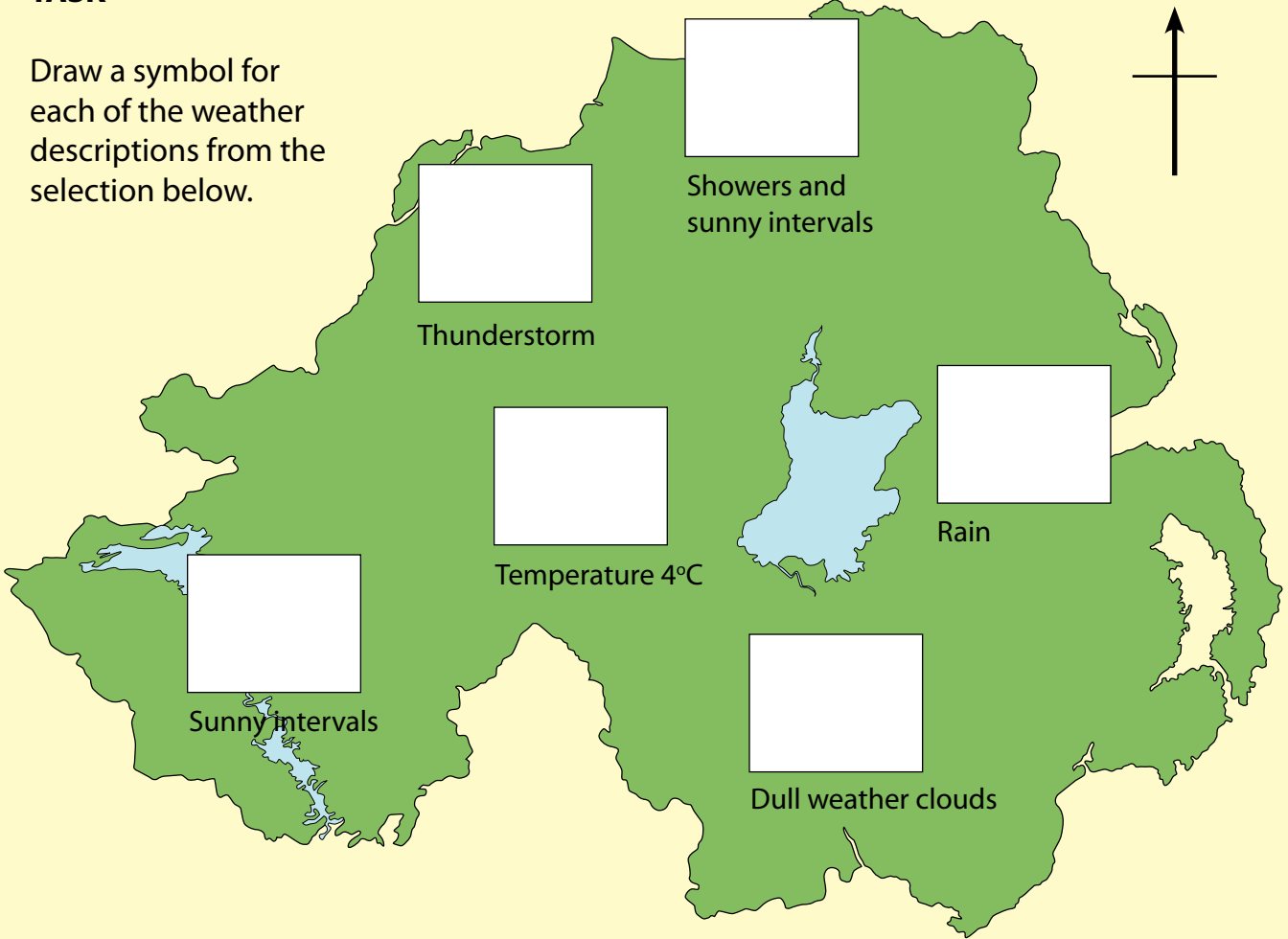
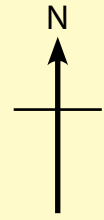
8. strongest is **A** wind hurricane the

Ans:

TV Weather Symbols

TASK

Draw a symbol for each of the weather descriptions from the selection below.



4

TASK

Draw lines to match the symbol with the weather forecast description.

Hail

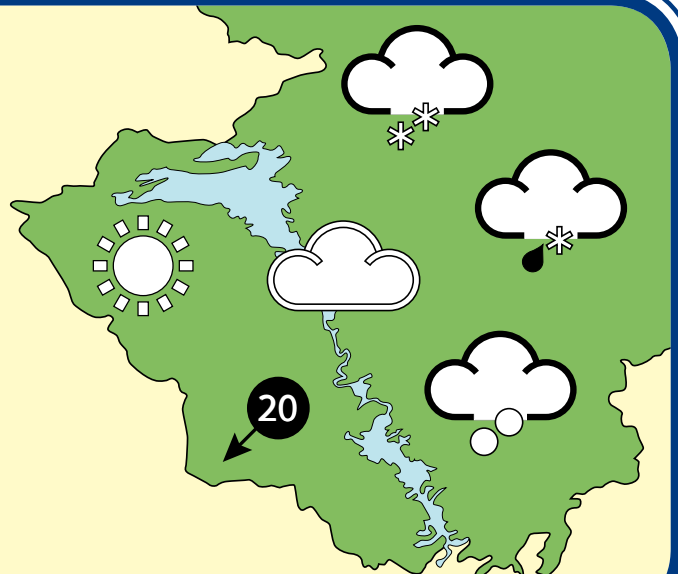
Sleet

Wind speed and direction

Sunshine

Fair-weather clouds

Snow



How the Met. Office collects weather information

The weather maps on television are based on thousands of weather observations made around the World. Weather forecasting is very scientific; it uses satellites, weather balloons, ships, aircraft, radar and some of the most powerful computers in the world.

TASK

Draw lines to match each picture to the correct label. Choose a different colour for each line. The first one has been done for you.

Weather balloons...

Satellites...

Civil & Military Aircraft...

Weather radar...

Drifting buoys...

Weather Stations on land...

...measure sea surface temperature

...and sea measure wind, rainfall, temperature and more

...report as they travel the world

...measure winds, temperature and humidity high in the sky.

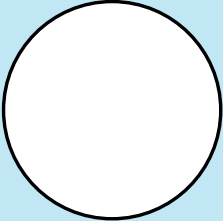
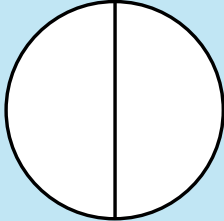
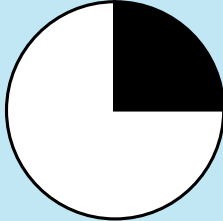
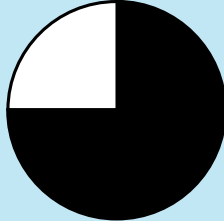
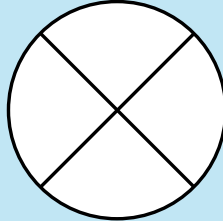
...show where it is raining

...in space send back pictures of clouds

All this weather information is used by scientists to give accurate forecasts. Met. Office weather forecasts are much better now than a few years ago and they are still improving.

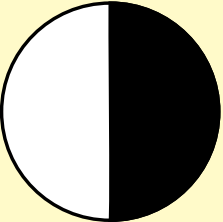
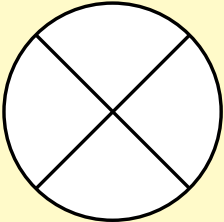
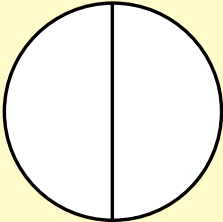
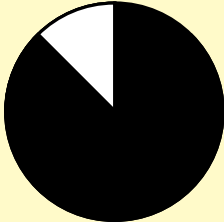
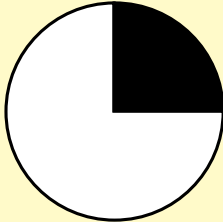
Cloud Cover Measurement

We do not need an instrument to measure cloud but we can measure it by looking at the sky. Even though we do not measure cloud we do use special symbols to show how much cloud there is in the sky. The chart below shows these symbols and tells you what each one means.

				
Clear Sky	Little Cloud 1 OKTA	Some Cloud 2 OKTA's	Mostly Cloud 6 OKTA's	Sky Covered 8 OKTA's

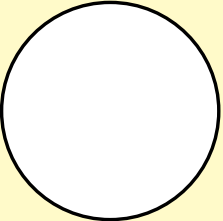
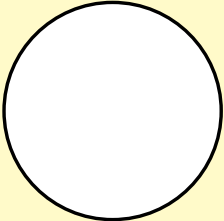
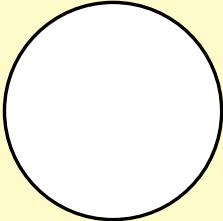
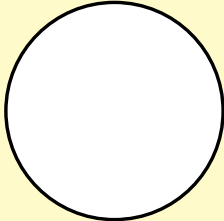
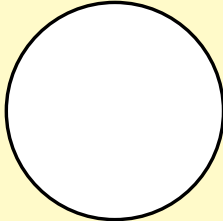
TASK

Write the cloud cover below each box.

				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

TASK

Use the chart below to record the cloud cover for a week.

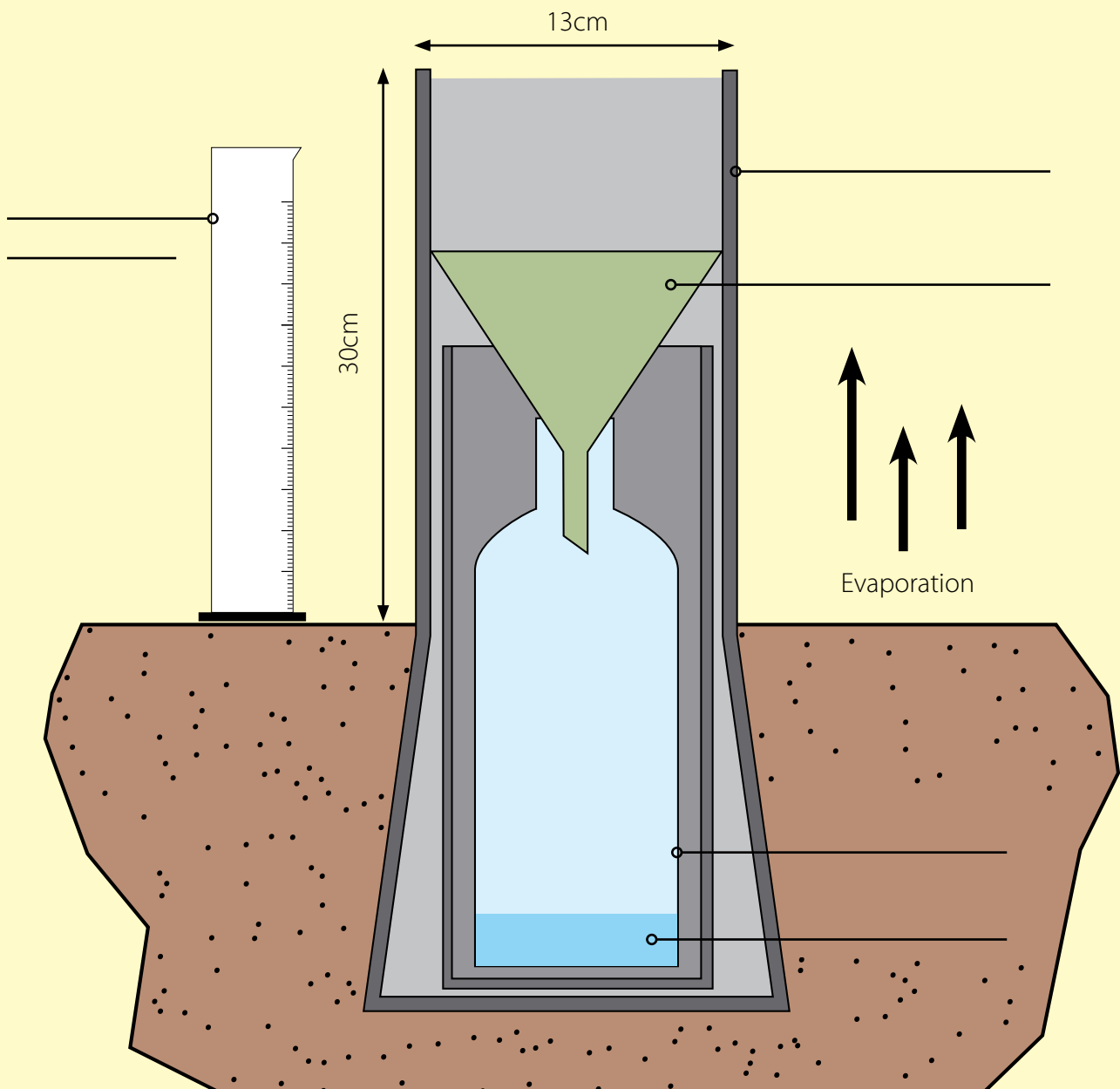
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
				
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Rainfall Measurement

Because it will affect how we live it is important that we measure and keep records of the amount of rain that falls.

TASK

How is rain measured? Fill in the labels from the list below.



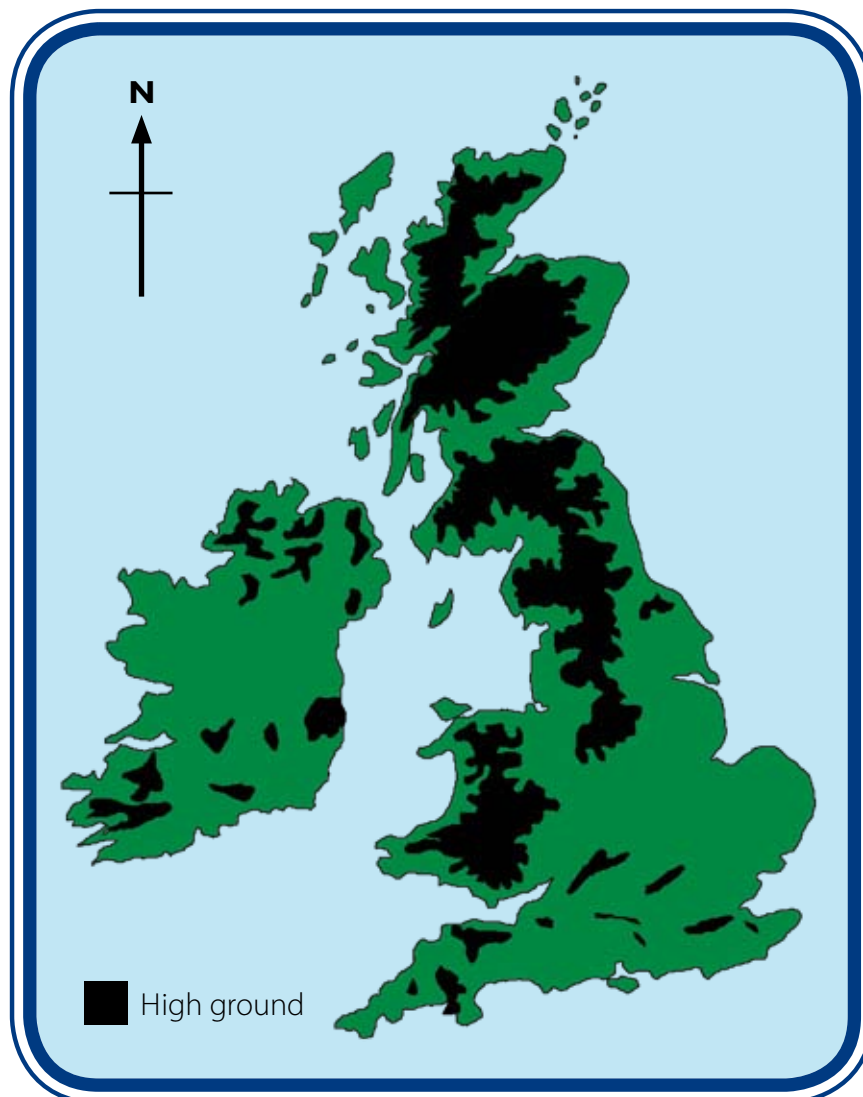
RAIN GAUGE • MEASURING JAR • FUNNEL • COLLECTING JAR • DEPTH OF RAIN

The Climate of the British Isles

Weather is the state of the atmosphere around us hour by hour, day by day. Climate is different – it is the average weather over a long time (usually a period of at least 30 years). Climate information tells us what the weather in an area is usually like.

Britain may be a small area of land but the climate varies from place to place. Generally the west of Britain is wet, the north is cool and the south is warm.

The **NORTH** is coldest



The **WEST** has most mountains

The **WEST** gets more rain

The **EAST** is mostly flat land

The **EAST** gets little rain

The **SOUTH** is warmer than the north

TASK

Fill in the spaces using the following words. **NORTH SOUTH WEST EAST**

The _____ has the most mountains and gets more rain than the _____, which gets little rain and is mostly flat land. The _____ is warmer than the _____, which is coldest.

1971 – 2000 Averages at Castle Archdale

Month	Max Temp °C	Min Temp °C	Days of Air Frost	Sunshine Hours	Rainfall in mm	Days of > 1mm rainfall
January	7.0	1.7	8.7	42.6	89.4	16.2
February	7.4	1.7	7.6	62.7	65.4	12.4
March	8.9	2.9	3.8	85.3	83.5	17.2
April	11.1	4.2	1.4	140.4	58.8	12.2
May	13.9	6.4	0.2	179.5	57.9	11.8
June	16.0	8.9	0.0	145.8	63.9	12.2
July	17.7	10.9	0.0	128.0	75.3	13.9
August	17.8	11.0	0.0	133.0	84.1	13.9
September	15.5	9.0	0.0	111.6	86.1	15.2
October	12.4	6.8	0.2	81.2	104.3	17.4
November	9.3	3.9	2.7	48.6	98.5	17.6
December	7.7	2.7	5.1	29.1	100.0	17.6
Year	12.1	5.9	27.6	1179.0	993.0	181.4

TASK

Finally look at the table of weather figures for castle archdale from 1971 – 2000 and answer the following questions.

1. Which of the following months had the most hours of sunshine - July, May, August?

Ans:

2. Which month had the lowest rainfall?

Ans:

3. Which months had more than 15 days with more than (>) 1mm of rain?

Ans:

4. Which month had the biggest number of days with air frost?

Ans:

5. Which was the wettest month? And the driest month?

Ans: Wettest month

Driest Month

6. Which month had the highest average daily temperature?

Ans:

Microclimate Vocabulary check list

Anemometer	instrument for recording the speed and often the direction of wind
Barometer	instrument used to measure atmospheric pressure
Beaufort wind scale	named after a man called Beaufort, the Beaufort wind scale is a simple way of estimating wind speed when there is no anemometer
Climate	is the state of the weather in a specific area or region measured for a period of at least 30 years.
Humidity	measure of the amount of moisture in the air
Meteorologist	somebody who studies the earth's atmosphere especially weather forecasting
Microclimate	term used to describe the climate of a very small area
Pressure	is the weight of air pressing down on us, measured in millibars (mb.).
OKTA's	visual measurement of cloud cover, within a scale of 0-8 (0 = clear sky)
Thermometer	instrument used to measure temperature, how hot or cold it is (°C or °F)
Weather	is the state of the atmosphere around us, hour-by-hour, day-by-day
Wind Rose	diagram showing the frequency of winds from each direction affecting a specific place

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