

Scientific Enquiry Materials

KS2

WEATHER



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Tel: 0151 794 3270

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Levels 2–5**Resources**

- ▶ Enquiry Sheet – Extreme weather

Links to skills in the Science PoS

The main emphasis of this activity is on developing ideas about cause and effect.

Reflection takes the form of discussing and sharing ideas, which are recorded in writing.

Extreme weather**Overview**

This activity requires pupils to discuss and describe different types of extreme weather, its effects and consequences.

Activity

Ask pairs of pupils to think about and discuss their ideas about extreme weather. They could use the Enquiry Sheet to make a list of the different types of extreme weather they have experienced, e.g. 'hottest', 'wettest', etc.

Ask them to describe where they were when they experienced these different types of extreme weather and the effect the weather had on them and their local environment.

Arrange a class discussion in which pupils share their ideas. The list of different types of extreme weather conditions experienced by the pupils could be shared using an interactive whiteboard. Then, ask the pupils to think about what they could do to try to keep safe in extreme weather and counteract some of the effects of extreme weather.

They could record their ideas on the second part of the Enquiry Sheet.

Suggested questions

Was this weather usual for that place?

How did you feel when the weather was very hot / cold / windy etc?

What did you wear to protect yourself when it was very hot / cold / windy etc?

What could you do to keep safe in extreme weather?

Supplementary activities

Pupils could describe any measurements that could have been recorded to compare the extreme weather conditions with those on other days when the weather was not extreme.

Make a list of all the different types of extreme weather you have experienced.
Describe **where you were** and the **effect of the weather** on you.

the weather I have experienced	the place	its effect on me
hottest		
coldest		
windiest		
stormiest		
wettest		
driest		

Discuss some of the ways you could keep safe in extreme weather.

type of weather	how I could keep safe
very hot	
very cold	
very windy	
very wet	
very dry	

Levels 2–5**Resources**

- ▶ Enquiry Sheet – Weather predictions
- ▶ Internet access
- ▶ metoffice.gov.uk

**Links to skills in the Science PoS**

Pupils are invited to use prior knowledge to make predictions. They review the outcomes of their predictions by checking the reliability of observations, communicating ideas in writing.

Weather predictions**Overview**

This activity requires pupils to think about and record what they and their family look at to predict the weather, the kind of weather this helps them to predict and whether the result is a correct or incorrect prediction.

Activity

Prior to this activity, encourage pupils to find out how some members of their family predict the weather. For example, some may look at the clouds in the sky. Ask groups of pupils to think about and discuss what information they and other members of their families use to predict what the weather will be like each day. The pupils should share the kinds of information or clues that are used to predict the weather and discuss if these predictions are usually correct or incorrect. Pupils can use the Enquiry Sheet to record their ideas.

Suggested questions

How do people in your family decide what the weather is going to be like?
 How do you decide what the weather is going to be like so you know what clothes to wear?
 What clues do you use to decide what the weather is going to be like?
 How far into the future can you predict the weather?
 Are your predictions about the weather always correct?
 Why do you think you are sometimes wrong about the weather you have predicted?

Supplementary activities

Pupils could make a list of things that they and other members of their family do that is dependent on specific types of weather, e.g. sailing needs wind, building a snowman needs snow, gathering the harvest needs dry weather.

Levels 2–5

Resources

- ▶ Enquiry Sheet – Weather symbols
- ▶ magazines or newspapers
- ▶ Internet access
- ▶ metoffice.gov.uk



Links to skills in the Science PoS

The emphasis in this activity is on forming considered opinions and reflecting by making suggestions for improvements. Ideas are communicated in speech, drawings and writing.

Weather symbols

Overview

This activity requires pupils to list the weather conditions they have seen or heard in weather forecasts. They should record how each weather condition is represented, say how effective they think the symbols are and suggest improvements.

Activity

Ask pupils to look at some different weather forecasts on TV, the Internet or in magazines and newspapers.

Discuss with the pupils how scientists use pictures, symbols, numbers and words to present information about the weather.

Using the Enquiry Sheet, they should list some of the different weather conditions that are usually mentioned in forecasts. Pupils should think about how the weather is shown in forecasts and their thoughts about the way it is shown. Pupils might be able to suggest improvements to the way weather conditions are shown and explain their reasoning.

Suggested questions

How are different weather conditions shown in the reports?

What do you think of the way information about weather is shown?

Can you think of a different way of showing weather conditions?

Is your symbol an improvement?

Supplementary activities

Pupils could use the Internet to look at weather maps and forecasts from other countries. Do they use similar or different pictures, symbols and methods to those used in this country?

Working in pairs, list the weather conditions you have seen or heard reported in weather forecasts. Decide if each weather condition is shown by a picture, a symbol, a number or something else.

What do you think of the way each weather condition is shown?

Can you suggest any improvements to the way each weather condition is shown?

weather condition	how the weather is shown	what we think about the way it is shown	suggestions for improvement
			
			
			
			
			
			

Levels 3–5**Resources**

- ▶ Enquiry Sheet – Weather forecasting
- ▶ Internet access
- ▶ metoffice.gov.uk

**Links to skills in the Science PoS**

This activity offers the pupils the opportunity to explore and identify relevant information and ideas. Pupils have to make comparisons and form considered opinions about different methods. Reflection takes the form of sharing and justifying ideas that are communicated by speech.

Weather forecasting**Overview**

This activity encourages pupils to think about some of the different methods that are used to forecast the weather and to consider how dependable these methods are.

Activity

Ask the pupils to think about and discuss the different methods they know about of forecasting the weather. Encourage them to share their ideas with the class. Tell the pupils that the Enquiry Sheet shows a newspaper forecast, an Internet forecast, folklore sayings, a pine cone, a barometer and a weather house. Briefly introduce each of the methods of forecasting the weather to the pupils and ask them to think about and discuss how each method might work, and how they might differ. Groups of pupils could report their ideas to the class. Finally, ask the pupils to decide how dependable they think each method is for forecasting the weather. Encourage groups to share and justify their ideas.

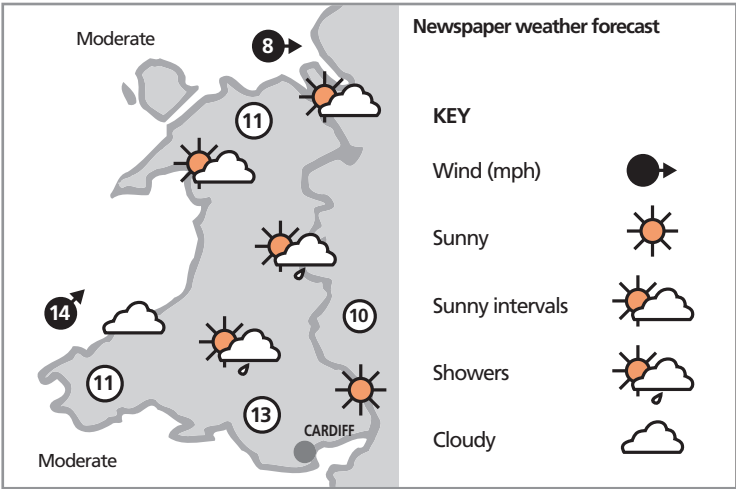
Suggested questions

How do you think the weather is forecast by each method?
 What are the similarities / differences between the methods of weather forecasting?
 For how many days ahead do you think it is possible to predict the weather?
 Where do you think the information for each method of weather forecasting might come from?
 How dependable do you think each method is for forecasting the weather?

Supplementary activities

Pupils could try using some of the different methods of forecasting the weather and investigate how dependable the forecasts are.
 Pupils could find out about the use of satellite systems and other equipment for forecasting the weather.
 Pupils could collect some folklore sayings and present them in a booklet, as a podcast or on a CD-ROM.

Different ways of forecasting the weather.



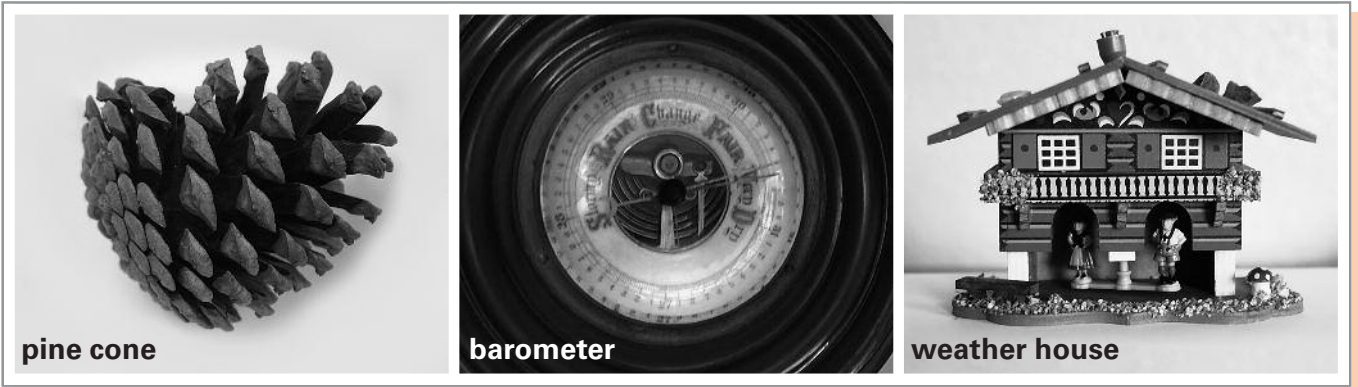
Internet five-day weather forecast for Cardiff

	Summary	Max (day)	Min (night)	Wind (mph)	Sun index	Pollution
Friday Sunrise 07:20 Sunset 16:32	[Icon: sun behind cloud]	12°C	8°C	8	[Icon: exclamation mark in triangle]	[Icon: exclamation mark in triangle]
Saturday Sunrise 07:22 Sunset 16:31	[Icon: sun behind cloud]	11°C	10°C	23	[Icon: exclamation mark in triangle]	[Icon: exclamation mark in triangle]
Sunday Sunrise 07:23 Sunset 16:29	[Icon: sun behind cloud]	12°C	10°C	6	[Icon: exclamation mark in triangle]	[Icon: exclamation mark in triangle]
Monday Sunrise 07:25 Sunset 16:28	[Icon: sun behind cloud]	14°C	12°C	16	[Icon: exclamation mark in triangle]	[Icon: exclamation mark in triangle]
Tuesday Sunrise 07:27 Sunset 16:26	[Icon: sun behind cloud]	13°C	11°C	18	[Icon: exclamation mark in triangle]	[Icon: exclamation mark in triangle]

Folklore weather sayings:

When the sheep are in groups in a field, the weather will be bad.

Red sky at night, shepherd's delight.
Red sky in the morning, shepherd's warning.



Levels 2–5**Resources**

- ▶ Enquiry Sheet – Gathering weather information
- ▶ Internet access
- ▶ metoffice.gov.uk

**Links to skills in the Science PoS**

This activity gives pupils the opportunity to identify where and how to find relevant information and ideas. They form opinions using some prior knowledge and explain their reasoning.

Gathering weather information**Overview**

This activity requires pupils to find out how information for weather forecasts is collected, by whom and the equipment used. Pupils consider how important weather forecasts are to a range of people.

Activity

In pairs, ask the pupils to find out how information for weather forecasts is collected, who collects this information and what equipment might be used in this process. They should use the Enquiry Sheet to make notes of the information that they find and report their findings to the class.

The second part of the Enquiry Sheet requires pupils to suggest people for whom weather forecasts are important and to explain why they think they are important to these people.

Suggested questions

- How do you think information for a weather forecast is collected?
- Who collects this information?
- What equipment do they need?
- How reliable is the information?
- Why are weather forecasts important to different people?
- What happens if a forecast is wrong?

Supplementary activities

- Pupils could construct and report weather forecasts using a map of the local area.
- Pupils could present and record their weather forecasts using video.
- Pupils could invite a local TV or radio weather forecaster to school to give a talk / presentation.
- Pupils could consider why it is important for weather information to be as accurate as possible.

In pairs, find out how information for a weather forecast is collected, who collects this information and any equipment they might use to help them. Make notes of the information you find.

Report your findings to the rest of your class.

--

Think of some people for whom weather forecasts are important.
Explain why you think weather forecasts are important to these people.

weather forecasts are important to these people:	reasons why weather forecasts are important to these people:

Levels 2–5

Resources

- ▶ Enquiry Sheet – Making a rain gauge
- ▶ materials chosen by pupils to make a rain gauge



Links to skills in the Science PoS

Pupils are given the opportunity to plan to make measuring equipment based on their own ideas.

Making a rain gauge

Overview

This activity introduces the idea that some weather conditions, such as rainfall, can be quantified fairly easily. Each pupil in a group is required to design a rain gauge. The group then evaluates the designs and selects what they consider to be the most suitable rain gauge for measuring rainfall.

Activity

Ask the pupils to think about and discuss what makes a good rain gauge. They should share their ideas with the class.

Ask groups of pupils to design a rain gauge to measure rainfall.

The Enquiry Sheet will help groups to record their ideas.

The group should consider the advantages and disadvantages of each rain gauge design before deciding which design will be the most suitable for measuring rainfall.

Encourage pupils to share their reasons for choosing a particular rain gauge. Each group of pupils should then make their rain gauge.

Suggested questions

How would you make a rain gauge?

What materials would you use to make your rain gauge?

How will you make sure that your measurements are as accurate as possible?

What criteria will you use to evaluate each rain gauge?

Supplementary activities

Pupils could be encouraged to evaluate the rain gauges designed / made by other groups.

Pupils could arrange a visit to a local weather station to examine the equipment used to collect data.

Pupils could explore the weather information contained on many school websites.

Pupils could use a KWHL* grid to decide what they know about collecting weather data, what they would like to learn and how they could find out more about weather forecasting.

* A KWHL grid has four columns, one for each letter. The K stands for 'What do I already know?' the W for 'What do I want to find out?' the H for 'How I will find out.' and the L for 'What have I learned?'
The strength of this process is that it helps pupils monitor their own learning.

A rain gauge measures the amount of rain that falls.

Working in your group:

- ▶ Think of a way of making a rain gauge.
- ▶ Draw and write your ideas in these boxes.
- ▶ List any materials you will need and the units of measurement you will use.
- ▶ Discuss the advantages and disadvantages of each rain gauge.
- ▶ Agree which one of the rain gauges is the most suitable.
- ▶ Explain why you chose that particular rain gauge.

rain gauge 1

rain gauge 2

rain gauge 3

rain gauge 4

the rain gauge we are going to make

our reason for choosing it

Make your rain gauge.

Levels 3–5**Resources**

- ▶ Enquiry Sheet – Presenting rainfall data

**Links to skills in the Science PoS**

Pupils are encouraged to consider the merits and limitations of different methods of presenting data.

Presenting rainfall data**Overview**

This activity introduces the idea that there are different ways of presenting data that has been collected. Pupils should decide one way of presenting the rainfall data that they have collected. They are encouraged to discuss their ideas in pairs and in groups.

Activity

Ask the pupils to use the rain gauge they made in the previous activity 'Making a rain gauge', to measure and record the amount of rainfall each day for a week. Ask pairs of pupils to think about and discuss different ways of presenting their data showing the amount of rainfall each day for a week. They should decide the best method to use. Encourage pupils to explain why they chose this method. Some may use the Enquiry Sheet to record their data.

Suggested questions

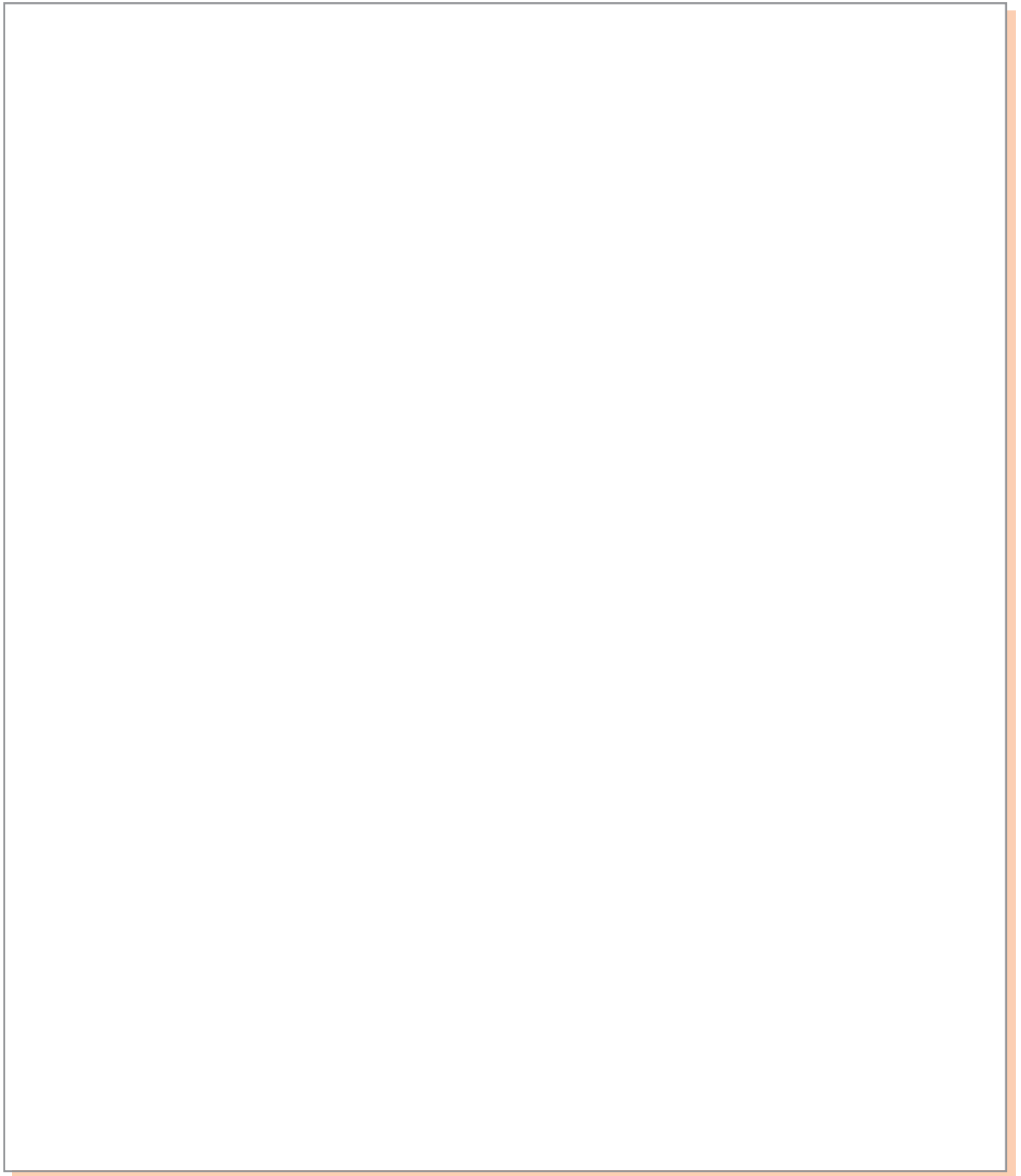
What information have you collected?
 What variable have you measured?
 How have you presented these data?
 What do you think are the advantages of this method?
 When is it correct to use a bar chart rather than a line graph?
 Why would using a spreadsheet be useful?

Supplementary activities

Pupils could carry out their own investigations to collect data that could be presented as line graphs, e.g. using a sensor to record the classroom temperature over a period of time.
 Pupils could repeat this investigation at different times of the year and the results and line graphs could be compared and discussed.
 Some pupils may be able to consider what data should be presented as a bar chart and what data should be presented as a line graph.
 Pupils might explore weather statistics, for instance, to estimate the heaviest rainfall recorded in Wales in a day and the lightest rainfall recorded in Wales in a day.

You have used your rain gauge to measure rainfall each day for a week.

In pairs, think about and discuss the best way of presenting your data. You may use this box to present your data.

A large, empty rectangular box with a thin black border, intended for students to present their rainfall data. The box is positioned below the instructions and above the final question.

Describe why you chose this way to present your results.

Levels 3–5**Resources**

- ▶ Enquiry Sheet – Weather sayings
- ▶ Internet access
- ▶ metoffice.gov.uk

**Links to skills in the Science PoS**

This activity invites pupils to consider different claims and to consider how they might follow a planned approach to collect evidence to test these claims. An emphasis is also placed on the finding and accessing of relevant information.

Weather sayings**Overview**

This activity requires pupils to think about and find the meaning of some common weather sayings and to plan how to collect evidence to test these sayings.

Activity

Explain to the pupils that as well as weather forecasters there are many other people who predict the weather. Since the time when people first worked and lived on the land there have been lots of traditional sayings, proverbs and folklore that aim to help people predict the weather.

Ask the pupils to think about and discuss any sayings, proverbs or folklore they know about the weather. They should share their ideas in a class discussion. Ask pairs of pupils to look at the sayings on the Enquiry sheet. They should think about and discuss what they think some of these sayings mean and be encouraged to use secondary sources to help their research if required. Pupils should share their ideas with the class.

Explain to the pupils that these sayings all make a claim about the weather. Ask pairs of pupils to plan how they would collect evidence to test some of these claims.

Suggested questions

What do you think each saying means?

How will you find out what it means if you don't know?

What evidence could you collect to test a saying such as 'A sunshiny shower, won't last half an hour'?

Supplementary activities

Pupils could compare and contrast weather sayings from different countries.

Pupils could rate different weather sayings according to how likely they are to be accurate.

They could compare the different rankings and explain their judgments.

Rain is on the way if people with curly hair find their hair curlier
and people with straight hair find their hair straighter.

When a rainstorm is coming:
dandelions close their blossoms tightly;
morning glories 'tuck in' their blooms as if ready for a long nap;
clover folds up its leaves;
leaves on many trees roll up or show their undersides

Fast runs the ant
as the mercury rises.

A sun shiny shower,
won't last half an hour.

Rain before seven,
fine by eleven.

Mackerel sky and mares' tails make tall ships carry low sails.

If crows fly low, wind's going to blow;
if crows fly high, wind's going to die.

When smoke descends,
good weather ends.

A cow's tail to the west is weather coming at its best;
a cow's tail to the east is weather coming at its least.

When sea birds fly to land there truly is a storm at hand.

Levels 3–5**Resources**

- ▶ Enquiry sheet – Making a cloud
- ▶ a clear glass or similar see-through container, warm water, ice, metal dish
- ▶ Internet access
- ▶ metoffice.gov.uk

**Links to skills in the Science PoS**

This activity invites pupils to follow a planned approach. They are required to make careful observations and use some prior knowledge to explain links between cause and effect. They reflect on their learning by comparing their model with their knowledge of cloud formation.

Making a cloud**Overview**

This activity invites pupils to follow instructions to make a 'cloud in a glass'. They share their observations of what happened and their ideas of why it happened. Pupils report their ideas and relate them to their knowledge and understanding of the weather.

Activity

Tell the pupils that it is possible to make models of some weather phenomena in the classroom. Ask them to think about and discuss how it may be possible to make a model of a cloud. Pupils should share their ideas with the class. Some pupils could make these models. Others might follow the instructions about 'How to make a cloud' on the Enquiry Sheet. Ask the pupils to think about, discuss, draw and make diagrams to show their observations and their reasoning. Encourage pupils to agree a group explanation for their observations. Each group could report and justify its ideas to the class. Encourage pupils to relate their observations to their knowledge and understanding of the weather.

Suggested questions

How do you think a cloud could be modelled in the classroom?
 What do you think is happening inside the container?
 How would you explain what is happening inside the container?
 How is your model similar and different to a cloud?

Supplementary activities

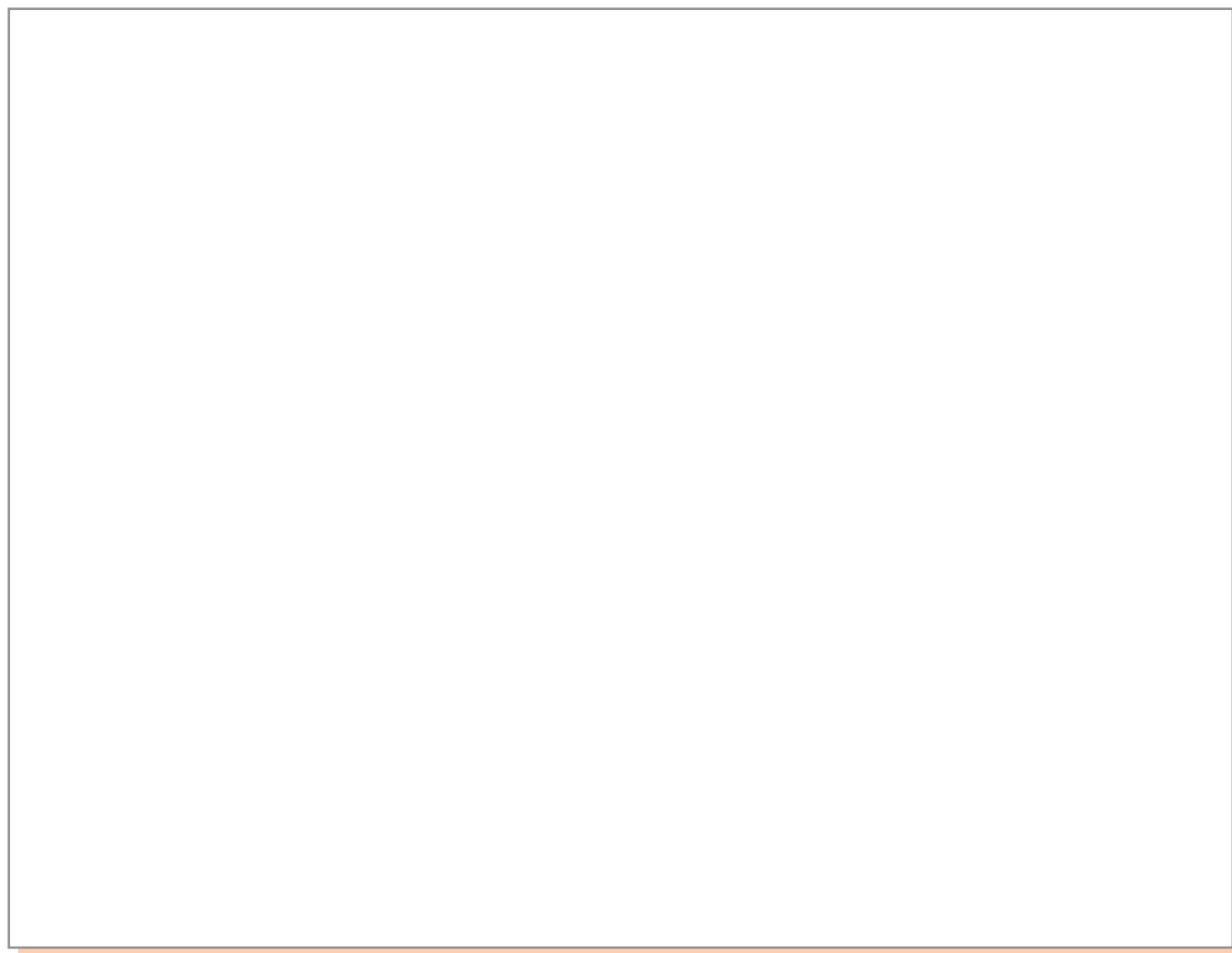
Pupils could use secondary sources to find out if other aspects of the weather could be modelled in the classroom.

Your group needs the following equipment:

- ▶ a clear glass or similar see-through container
- ▶ warm water
- ▶ ice
- ▶ a metal dish

Follow these instructions for using the equipment:

- ▶ place the ice into the metal dish
- ▶ pour a small amount of warm water into the bottom of the see-through container
- ▶ once the metal dish is really cold, place it on top of the container
- ▶ describe what you saw happening inside the see-through container



Share your ideas about why you think it happened.

Agree as a group an explanation for why you think it happened.

Choose one person in your group to report your explanation to the rest of the class.

Levels 3–5**Resources**

- ▶ Enquiry Sheet – Snow centre
- ▶ Internet access

**Links to skills in the Science PoS**

This activity gives pupils the chance to outline a planned approach recognising equipment, techniques and hazards. The sharing and presenting of ideas provides opportunity for reflection.

Snow centre**Overview**

This activity encourages pupils to imagine they are scientists required to discuss and agree a plan to tackle the scientific issues involved in building a 'snow centre'.

Activity

Explain to the pupils that a proposal to develop a 'snow centre' at the Glyn Rhonwy site near Llanberis in Snowdonia was put forward in 2006. The 'snow centre' would include a 500 m real snow, ski and snowboarding slope.

Explain to pupils that a plan like this needs advice and expertise in many areas including science, business, health, management, etc.

In small groups, ask them to imagine they are in charge of the science behind the development. Tell the pupils that they have to discuss and agree a plan that shows how they will:

- ▶ provide snow for the centre
- ▶ stop the snow from melting

Suggested questions

How could you provide snow for the 'snow centre'?

Would your idea provide snow throughout the year?

How could you stop the snow from melting?

Supplementary activities

Pupils could discuss and agree a plan that shows how they will:

- ▶ choose the materials to be used to make the slope
- ▶ make sure people are safe on the slope
- ▶ move people to the top of the slope so that they can slide down.

Pupils might plan their own environmentally friendly leisure resort. They should be encouraged to consider the facilities at the resort and the impact on the local environment.

Pupils could be asked to think about and discuss the effects this development might have on, e.g. the local environment, jobs, local transport links, etc.

Pupils could use data loggers to compare different ways of slowing down the time taken for snow / ice to melt.

Pupils could visit an artificial ski slope.

A plan to build a 'snow centre' near Llanberis in North Wales was sent to the local Council in 2006. The 'snow centre' would include a covered ski and snowboarding run with a real snow surface.

Imagine your group is made up of experts in charge of the science behind the development.

Discuss and agree a plan that shows how your group will:

- ▶ provide snow for the centre
- ▶ stop the snow from melting

Your plan can use any equipment.

You can use any sources of information, e.g. the Internet to investigate your ideas and decide your plan.

You should consider the pros and cons of your plan for the environment and justify your reasoning.

You can use video, drawings, models, writing, speech, data, etc. to present your plan to the rest of your class.

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Authors:
Terry Russell
Linda McGuigan
Dewi Roberts
Mark Thomas