Introduction to Weather

These lesson objectives are intended for the **KS3 Geography curriculum**, specifically focusing on the topic of **weather and climate**. However, the content can be tailored to suit different key stages, accommodating varying levels of prior knowledge and understanding.

The lesson on **Introduction to Weather** can be worked through at any pace, and it can be split into multiple lessons if needed. This flexibility allows you to adjust the flow based on the class's understanding and time constraints. If some sections require more in-depth exploration, feel free to extend them over additional lessons to ensure students fully grasp the concepts before moving on.

The worksheets can be filled in during the lesson, as homework, or in individual sections, depending on the pace of the lesson.

Lesson Aim:
The aim of the lesson is to provide students with a comprehensive understanding of weather concepts, measurement instruments, the importance of weather forecasts, and the ability to interpret weather graphs effectively.

Lesson Objectives:
- Define weather and identify/describe different weather types.
- List and describe basic instruments used to measure weather (e.g. thermometer, barometer, anemometer, rain gauge).
- Understand the Importance and Creation of Weather Forecasts.
- Demonstrate how to read a simple weather graph showing temperature and precipitation.

Assumed Prior knowledge:
- Understanding of Different Weather Experienced in the UK: Students should have a basic understanding of the various types of weather commonly experienced in the UK, including sunny, rainy, cloudy, windy and snowy conditions. They should be able to recognise and describe these different weather types.

- Basics in Reading Graphs: Students should be familiar with the basic elements of graphs such as axes, labels and data points. They should understand how to interpret information presented graphically.

Resources:
- NASA Climate Change YouTube video – What's the difference between weather and climate? https://www.youtube.com/watch?v=vH298zSCQzY
- Lesson 1 Worksheet
  - Fill the blanks exercises.
  - Match key words and definitions exercise.
  - Read graph exercise.

All the blank worksheets for this lesson can be found as a separate download within the 'Lesson 1' page of the The Flood Hub KS3 Geography Weather and Climate Learning section. The answers for the worksheets can be found at the end of this document.

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Notes for Each Slide:
Teachers should decide what students should copy into their workbooks. While most content is provided on the worksheet, any additional information can be recorded in the workbooks.

Slide 1 - Learning Objectives
- Slide containing the aims and objectives of the lesson

Slide 2 - Starter Activity
- Ask students to discuss in pairs or small groups what the weather is like today compared to yesterday.
- **TASK:** Have students note their observations on the provided line in their worksheets.
- **Prompt:** Encourage students to think about factors such as temperature, precipitation, wind, and cloud cover in their comparisons. Ask questions like "Is it warmer or colder today?" or "Was it raining yesterday but sunny today?"
- Use some examples from student observations to lead into the main topic of the lesson.

Slide 3- What's the difference between weather and climate (2mins)
- Watch the The NASA video, which explains the difference between weather and climate in the first one minute. After that, it touches on climate change which can be shown to the class.
- https://www.youtube.com/watch?v=vH298zSCQzY

Slide 4- Weather definition
- Following the video, the teacher can talk through the definition.
- **TASK:** Complete the fill-in-the-blank activity on their worksheets using key terms from the slide.
- Review the definition with the class, emphasising the key words they need for their worksheets.

Slide 5 - Temperature
- Explain what temperature is, how it is measured and provide information on the highest and lowest recorded temperatures in Britain.
- **TASK:** Have students note down the key facts about the highest and lowest recorded temperatures on their worksheets.
- **Discussion:** Ask the class to suggest things that can influence temperature, such as time of day, season, altitude, or location.

Slide 6 - Factors affecting temperature
- Explain various factors that influence temperature.
- Additional information:
  - **Sunlight**: Areas receiving more direct sunlight generally have higher temperatures.
  - **Time of Day:** Temperatures are typically warmer in the afternoon because the sun has had time to heat the earth, whereas it's cooler in the morning and evening as the earth loses heat.
  - **Season**: The tilt of the Earth's axis results in varying amounts of sunlight reaching different parts of the Earth, making summers warmer and winters cooler.
  - **Location**: Regions closer to the equator receive more direct sunlight throughout the year, making them warmer, while areas near the poles receive less direct sunlight, resulting in cooler temperatures.
  - Altitude: Higher altitudes have thinner air, which retains less heat, leading to cooler temperatures.

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- **Weather:** Cloud cover can reflect sunlight away, making it cooler, whereas clear skies allow more sunlight to reach the ground, making it warmer.
- **Surroundings:** The urban heat island effect, where cities are warmer due to human activities, buildings and tarmac, which absorb and retain heat, compared to rural areas with more vegetation.

Slide 7 - Precipitation

- Explain what precipitation is, how it is measured and provide information on the record rainfall amount in Britain.
- **TASK:** Note down the key facts about the the record rainfall amount in Britain on the worksheet.

Slide 8 - Wind

- Explain the methods used to measure wind speed and direction.
- **TASK:** Instruct students to write down the record gusts in Britain on their worksheets.

Slide 9 - Air pressure

- Explain the concept of air pressure and how it influences weather.
- Additional information:
  - Begin by defining air pressure as the force exerted by the weight of air molecules in the atmosphere.
  - Explain that high pressure areas have more dense air and are associated with fair weather, while low pressure areas have less dense air and are associated with unsettled weather.
  - Provide examples of weather conditions associated with high and low pressure systems, such as clear skies and calm conditions for high pressure, and clouds, precipitation and wind for low pressure.

Slide 10 - How do we measure weather task

- **TASK:** Direct students to complete the matching activity on their worksheets, where they match each weather measuring tool to its corresponding definition.

Slide 11 - Weather forecasting

- Introduce the concept of weather forecasting.

Slide 12 - Whys it important to have weather forecasting

- Explain the importance of weather forecasting
- **TASK:** List some activities and occupations which you would check the weather forecast for in the space on the worksheet.
- Examples of activities or occupations can include:
  - Planning Outfits, Outdoor Sports, Travel, Gardening, Fishing, Picnics and BBQs, Hiking and Camping, Beach Days, Biking...
  - Farmers, Construction Workers, Pilots, Sailors and Fishermen, Event Planners, Delivery Drivers, Emergency Responders, Utility Workers, Public Transportation Operators...

Slide 13 - How are weather forecasts made?

- Read aloud the content on explaining the steps involved in weather forecasting. Highlight key points such as data collection, analysis, computer modelling, and issuing forecasts.
- **TASK**: Copy the different types of data collection onto the worksheet.

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Slide 14 - Weather Graphs

- Teach students how to read and analyse a weather graph.
- Explain that the x-axis shows the months, the bar chart represents rainfall and the line graph indicates temperature.

Slide 15- Weather Graph questions on worksheet

- **TASK:** Direct students to complete the questions on their worksheets about the weather graph.
- Questions to answer:
  - Which month has the least amount of precipitation?
  - Which month has the highest mean temperature?
  - What's the average rainfall for October?

Slide 16 - Weather Graph: Which month had the least amount of precipitation?

- Talk through the answer with the students. Answer: April
- Highlight how to read the bar chart on the left y-axis, to determine the month with the lowest rainfall.

Slide 17 - Weather Graph: Which month had the highest mean temperature?

- Talk through the answer with the students. Answer: July
- Explain how to follow the line graph and measure on the right y-axis to identify the month with the highest mean temperature.

Slide 18 - Weather Graph: What was the average rainfall for October?

- Talk through the answer with the students. Answer: ~72mm (between 70-75mm).
- Show how to find October on the left x-axis and read the corresponding bar height to determine the average rainfall.

Slide 19 - Weather symbols

- Introduce the importance of weather symbols as representations of different weather conditions. Explain to students the significance of weather symbols in weather forecasts and maps.

Slide 21 - Weather symbols activity

- Instruct students to work in groups or have a class discussion to match each weather condition with its corresponding symbol.

Slide 21 - Weather symbols answer

- Provide students with the correct answers for the weather symbol matching activity, then record record the final answers on their worksheets for reference.

Slide 22 - Plenary

- Begin by recapping the key points covered in the lesson, including the importance of weather forecasting, interpreting weather graphs, and understanding weather symbols.
- Encourage students to think about the differences between regular weather and extreme weather events before their next lesson.

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What is the weather like today?

e.g. It's sunny today and quite warm, it was cloudy in the morning.

How is this different from yesterday?

e.g. yesterday was overcast in the morning with some showers in the evening.

Fill in the blanks: forecasts day-to-day atmospheric dry particular place hot

Weather refers to the day-to-day changes in the atmosphere. It is a description of what the conditions are like in a particular place such as hot or cold, wet or dry, windy or calm, or stormy with thunder and lightning. We can measure atmospheric conditions, such as air pressure and wind direction, to create weather forecast.

British weather records:

Temperature:

Highest: Coningsby, Lincolnshire hit 40.3°C in July 2022.

Lowest: Altnaharra, Scotland reached -27.2°C in December 1995.

Rainfall: 341.4 mm in 24 hours, recorded at Honister Pass, Cumbria, on 5 December 2015.

Wind: A gust of 173 mph, measured at Cairn Gorm Summit in Scotland on 20 March 1986.

Match up the instruments for measuring weather with their function:

Measuring instrument	Function
Thermometer	This shows the wind direction. They have compass points and an arrow that aligns itself with the blowing wind. This tell us which direction the wind is coming from.
Rain gauge	This measures wind speed in miles per hour (mph). They spin when the wind blows. As they spin, they calculate the wind speed.
Barometer	This measures temperature in degrees Celsius (°C) and/or degrees Fahrenheit (°F).
Anemometer	This measures rainfall in millimetres (mm).
Weathervane	This measures air pressure in millibars (mb). High pressure means that air is falling. This usually leads to clear skies and dry weather. Low pressure means that air is rising. This usually leads to cloudy skies and rainfall.

What are some activities or occupations you would check the weather forecast for?

Picking what to wear, Outdoor Sports e.g. cricket, Picnics and Barbecues, Hiking and Camping, Beach days, Fishing, Gardening, Farmers, Pilots, Sailors.....

How are weather forecasts made?

Ground level: Weather stations across the UK collect data on temperature, humidity, wind speed and air pressure.

Aeroplanes: Special instruments on planes measure weather conditions at different altitudes.

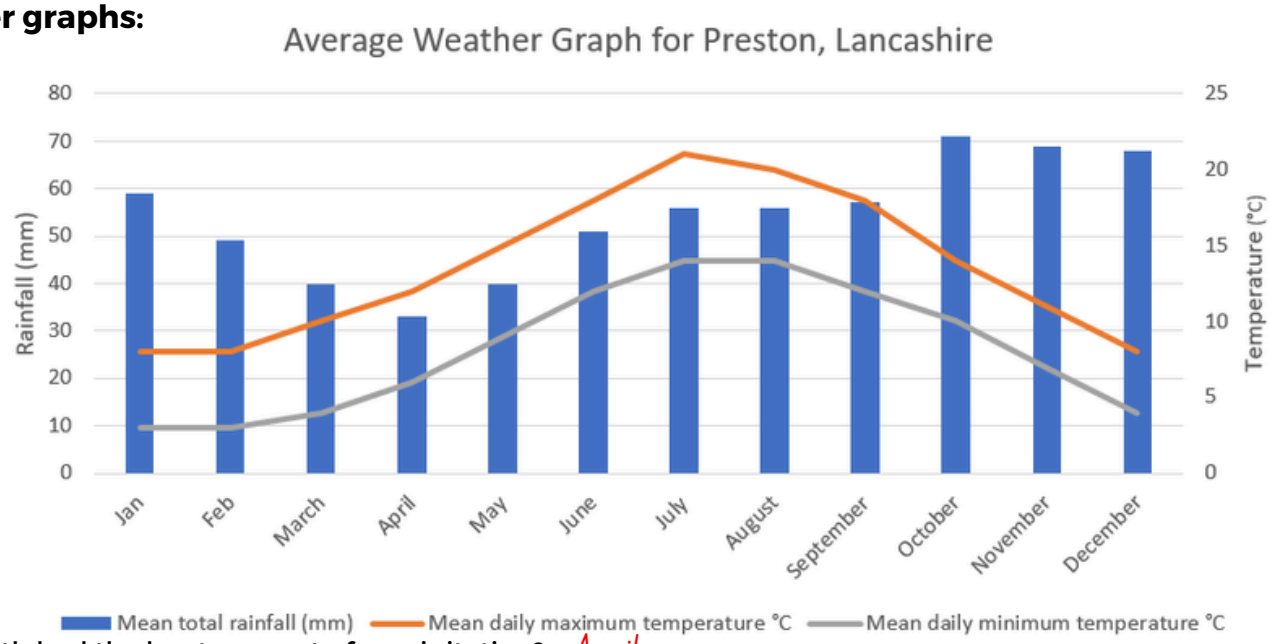
Radar: Radar systems track rain, snow, and storms by bouncing radio waves off precipitation.

Satellites: Satellites in space take pictures of clouds and track large weather systems from above.

Weather buoys: Floating devices in the sea measure water temperature and wave height.

Meteorologists, who are scientists that study weather, analyse this data and use powerful computers to predict what the weather will be like in the future. They look at patterns in the data and use computer models to simulate the atmosphere. Based on this, they create weather forecasts and keep updating them as new information comes in to make sure the predictions are accurate.

Weather graphs:

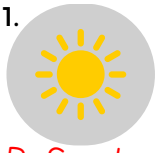


Which month had the least amount of precipitation? April

Which month had the highest mean temperature? July

What was the average rainfall for October? ~72mm (between 70-75mm) mm

Match the weather symbol with the correct type of weather:

1. 
B. Sunshine

2. 
G. Sunshine and cloud

3. 
J. Light rainfall

4. 
A. Heavy rainfall

5. 
I. Hail

6. 
H. Light cloud cover

7. 
D. Overcast

8. 
F. Occasional sunshine and light showers

9. 
C. Snow

10. 
E. Thunderstorms

A. Heavy rainfall **B.** Sunshine **C.** Snow **D.** Overcast
E. Thunderstorms **F.** Occasional sunshine and light showers
G. Sunshine and cloud **H.** Light cloud cover **I.** Hail **J.** Light rainfall

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