DEALING WITH THE WEATHER

BACKGROUND

BACKGROUND

Weather affects air activity in lots of different ways. Changes in atmospheric conditions are recorded by forecasters on charts, which help tell air activity bases about upcoming weather and how it may affect flight conditions. The changes in atmospheric conditions include temperature, precipitation (rain and snow), wind speed and direction, atmospheric pressure and cloud coverage.

Activity link

"Weather across the UK"

Activity link

"Do you know your cloud types"

Answers:
Cirrus - white, feathery, highest clouds.
Cirruscumulus - small, white patches of clouds often arranged in rows and present in high altitudes.
Altocumulus - Altocumulus clouds are the most common clouds in the middle atmosphere. They look like the wool of sheep.
Stratus - these hang low in the sky as a flat, featureless, uniform layer of grayish cloud. They look a bit like fog.
Cumulus - these are puffy clouds that sit quite low in the sky.
Stratocumulus - these are low, puffy, grayish or whitish clouds that occur in patches with blue sky visible in between.
Cumulonimbus - They resemble the cumulus clouds from which they grow, except they rise into towers with bulging upper portions that look like cauliflower. These are the clouds that cause thunderstorms.

Activity link

"Weather measurement"

Answers:
(A) Windsock, (B) Runway lights, (C) Instrument panel, (D) Anemometers, (E) Radar, (F) Rainfall gauges, (G) Satellites, (H) Weather maps, (I) Computerised weather maps.

Commercial aircrafts tend to fly above the weather systems where possible, however military aircraft have to fly in all weather conditions.

There are weather-related factors that pilots need to know before each flight. These include:

- Wind speed and direction
- Surface conditions
- Rain, snow and hail
- Thunderstorms
- Predicted changes in the weather throughout their flight path

There are several aids and weather measurement instruments that pilots use to fly safely in different weather conditions.

Activity link

"How we measure the weather"

BACKGROUND

Aircraft are also regularly used to examine weather conditions and they are equipped with lots of weather measurement devices. These include:

MMS

measures pressure, temperature, wind and turbulence

CAPS, CSI, PIP

measures rainfall, cloud particle size, ice content

DAWN

measures wind

APR2

measures areas of rain, snow and cross winds

DROPSONDES

measures humidity, temperature and pressure

Activity link

"Aircraft that can measure bad weather".

BACKGROUND

Surface pressure and weather fronts

Most weather forecasts include information on surface pressures and weather fronts. You can see on the map areas of high (H) and low (L) indicating areas of High and Low pressure. It is important for the pilots to be aware of surface pressure.

Changes in atmospheric pressure cause changing wind directions. Areas of low and high pressure are caused by ascending and descending air.

High pressure

In a high pressure area, air is descending, reducing cloud formation and causing light winds. High pressure usually indicates stable conditions, high clouds and clear skies.

Low pressure

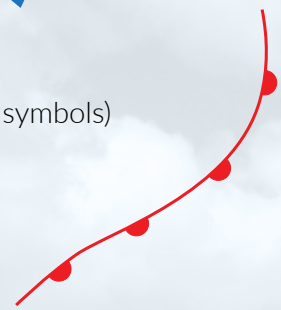
In a low pressure area, air is rising, and as it cools water vapour condenses to form clouds and precipitation. Low pressure indicates unsettled conditions and carry fronts.

Weather fronts

Fronts are the boundaries between cold and warm air masses and the conditions caused include wind, rain and snow, low clouds and fog. Fronts are indicated on this image as:

Cold fronts
(pictured as blue symbols)

Warm fronts
(pictured as red symbols)



Occluded fronts
(pictured as pink symbols)

Activity link

"Weather fronts"

Activity link

"Symbols and icons"

Answers:
(Left to right from top) (7) Cloud, (17) Rain, (21) Snow, (12) Light rain, (20) Sleet, (19) Rain with lightening, (3) Cloudy with some sunshine, (5) Cloudy with some sunshine and rain, (6) Cloudy with some sunshine and snow, (22) Snowfall at night, (2) Cloudy night, (1) Fog, (24) Wind, (11) Hurricane, (10) High temperatures, (9) Heavy rain (23) Sunshine, (16) Night, (14) Lightening with sunshine, (8) Hail storm, (13) Lightening (15) Low temperatures, (18) Rain with hail, (4) Cloudy, sunshine and heavy snow.

Activity link

"Fun weather quiz"

Answers:
1(c), 2(b), 3(A) Occluded (B) Cold (C) Warm), 4(a), 5(a) Rain gauge, (b) Thermometer, (c) Weather vane, (d) Anemometer, 6 Weather vane, 7 Rain gauge, 8 Thermometer.

Weather reports for aviation - TAFs

Accurate weather reporting is important in aviation. Information should be clear and to the point. For this reason a system of forecasting weather has been developed especially for pilots and aviation. The terminal aerodrome forecast (or TAF) is a format for reporting weather forecast information, particularly as it relates to aviation. TAFs are issued at least four times a day, every six hours, for major civil airfields: 0000, 0600, 1200 and 1800, and generally apply to a 24- or 30-hour period. TAFs are issued every three hours for military airfields and some civil airfields and cover a period ranging from 3 hours to 30 hours.

EXAMPLE TAF REPORTS

The colouring in each TAF signifies the military colour state associated with the given meteorological conditions. Information in this format quickly highlights to pilots how good/bad conditions are.

Activity link

"Online video: Reporting on the weather, RAF Coningsby"

Video content.

CONINGSBY
[Today 09:00Z - Tomorrow 03:00Z]
Long TAF EGXC 040736Z 0409/0503 12009KT **9999 SCT030** TEMPO 0411/0419 **6000** SHRA RA **SCT018** PROB30 TEMPO 0414/0418 12015G25KT **4000** +SHRA **SCT012** BKN018CB PROB30 TEMPO 0418/0422 **SCT005** BKN008=

WADDINGTON
[Today 06:00Z - Tomorrow 00:00Z]
Long TAF EGXW 040426Z 0406/0424 14010KT **9999** FEW035 TEMPO 0411/0418 **7000** SHRA PROB30 TEMPO 0413/0418 14015G25KT **4000** +SHRA **BKN014CB**=

DEALING WITH THE WEATHER

ACTIVITIES

WEATHER ACROSS THE UK

You can visit skylinkweather.com to see an air map of the UK. On this site you can obtain a forecast for a weather activity in your area and see the weather charts linked to this.

Go to the URL below, or scan the QR code.

http://skylinkweather.com.

DO YOU KNOW YOUR CLOUD TYPES?

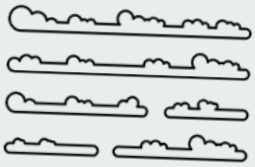
Pick **at least two** of the cloud types below and find something out about them.

Cirrus

Cirruscumulus

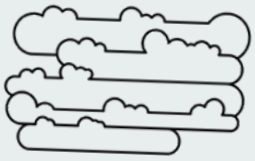
Altocumulus

Altostratus



Stratus

Cumulus



Stratuscumulus

Cumulonimbus

ACTIVITY

WEATHER MEASUREMENT
Match the weather measurement instrument term to the correct definition.

ANEMOMETERS

WINDSOCK

RUNWAY LIGHTING

INSTRUMENT PANEL

RAINFALL GAUGES

COMPUTERISED WEATHER MAPS

RADAR

SATELLITES

WEATHER MAPS

Definitions:

A. Shows the direction of the wind.

B. Used to communicate to pilots and provide guidance into an airport or airfield.

C. Provides information on speed, direction, pressure etc.

D. Used to measure wind speed. Cups at the top are propelled by the force of the wind, and measuring the revolutions tells us wind speed.

E. Maps with codes and moving images showing aircraft movement.

F. Measures the amount of rainfall in a given period.

G. Used to detect severe weather conditions - such as tornados.

H. Used to show weather conditions.

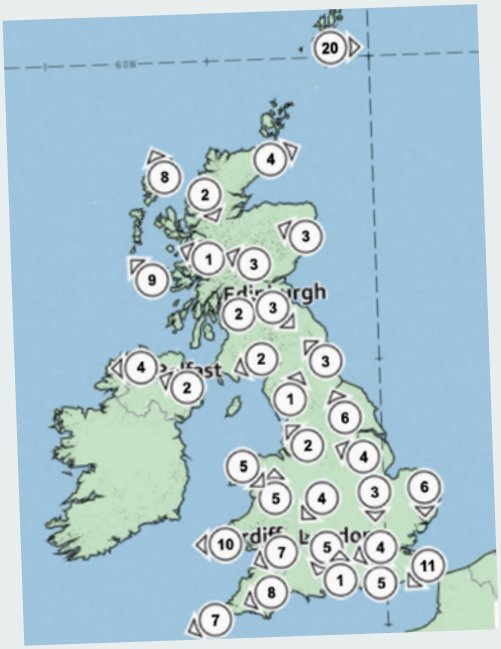
I. Used to show changes in real-time weather conditions.

HOW WE MEASURE THE WEATHER

With other students, go online and find images of as many of the weather measurement devices as you can. Compare what you have found with others. Who found the most?

WIND MAPS

Up-to-date computerised weather maps are really important to pilots. They need to know what weather conditions are within their planned flight path and how to deal with changes in the weather. Some aircraft with less sophisticated avionics are restricted in certain weather conditions.

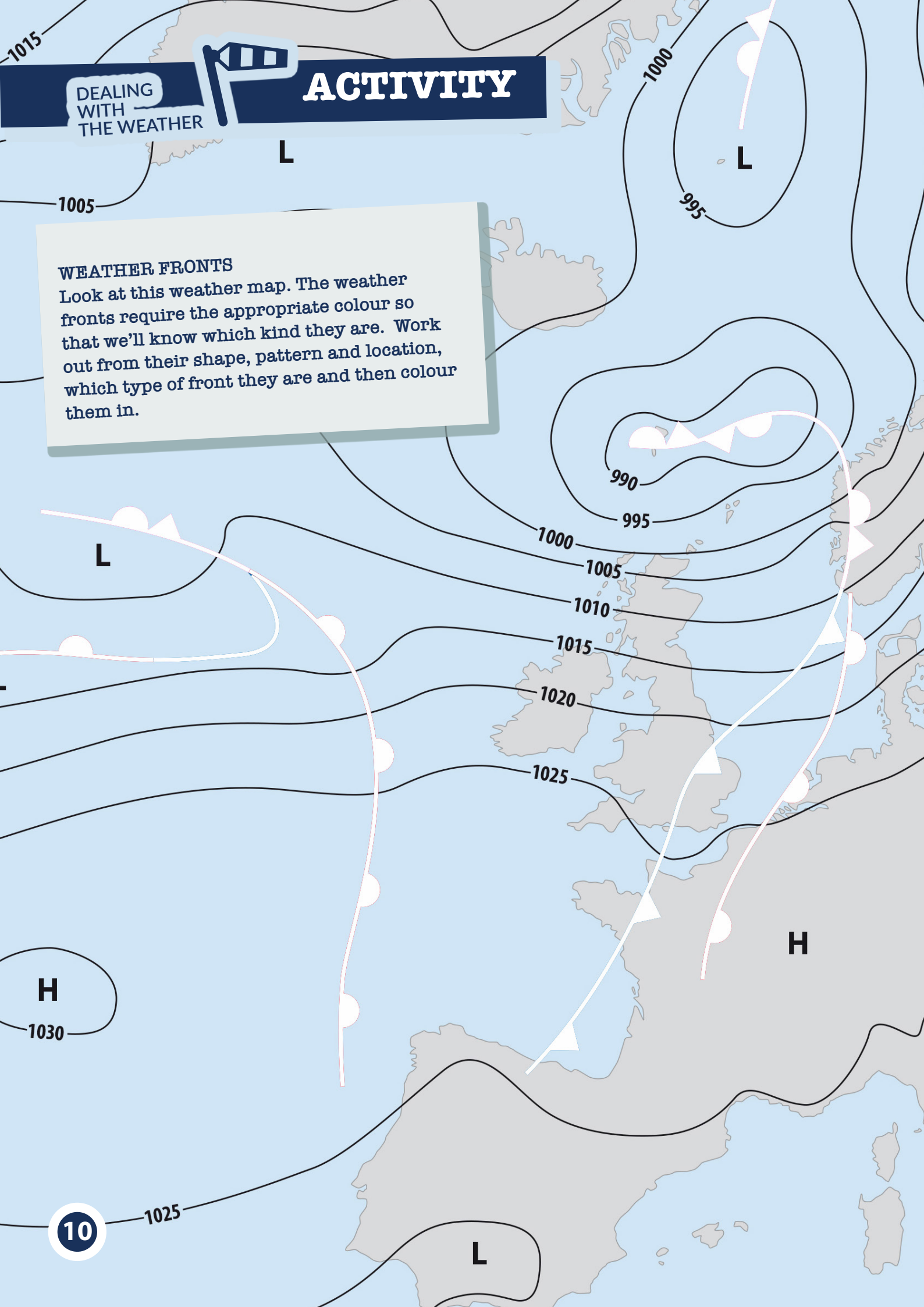


This is a wind map. It shows the direction the wind is coming from and the wind speed.

Take a look at the Met Office interactive wind map using the URL below, or scan the QR code.

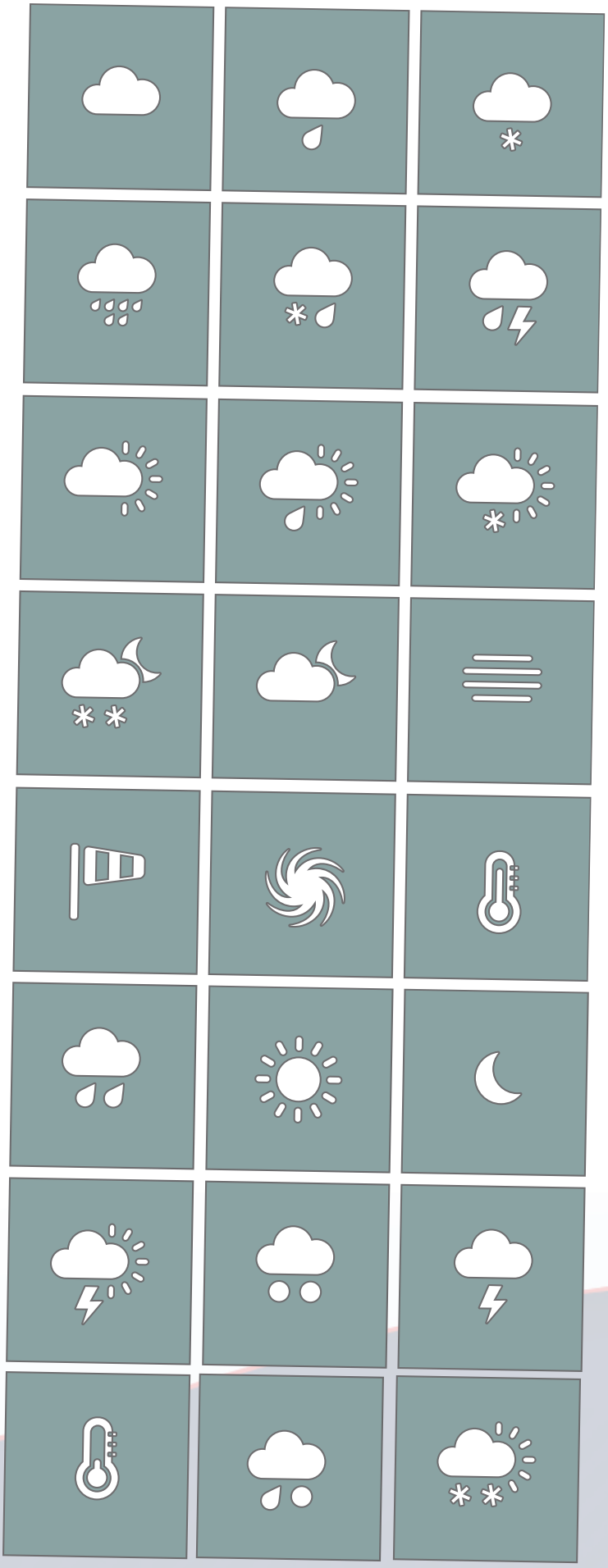
https://www.metoffice.gov.uk/public/weather/wind-map/

ACTIVITY



WEATHER FRONTS

Look at this weather map. The weather fronts require the appropriate colour so that we'll know which kind they are. Work out from their shape, pattern and location, which type of front they are and then colour them in.



SYMBOLS AND ICONS

Symbols and icons tell us lots about the weather.

Using the list here, place the correct number describing the weather in the appropriate box on the right. Compare your lists with others once you've done this to see if you all agree.

1. Fog
2. Cloudy night
3. Cloudy with some sunshine
4. Cloudy, sunshine and heavy snow
5. Cloudy, sunshine and rain
6. Cloudy, sunshine and snow
7. Cloud
8. Hail storm
9. Heavy rain
10. High temperatures
11. Hurricane
12. Light rain
13. Lightening
14. Lightening with sunshine
15. Low temperatures
16. Night
17. Rain
18. Rain with hail
19. Rain with lightening
20. Sleet
21. Snow
22. Snowfall at night
23. Sunshine
24. Wind

ACTIVITY

FUN WEATHER QUIZ

1. What instrument, typically found on an airfield measures wind speed?

a) Speedometer
b) Windsock
c) Anemometer

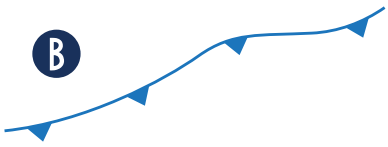
2. Which type of pressure leads to more unsettled and dangerous weather conditions for flying?

a) High pressure
b) Low pressure

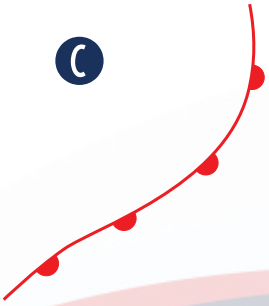
3. What type of front are these images showing?

A

B



C



4. What does the Meteorological Measurement System (MMS) measure on an aircraft?

a) Wind and turbulence
b) Altitude
c) Ice

5. Re-arrange these scrambled words to work out which tools are used to measure the weather:

a) IRNA UGGAE

b) TEMTEMHREOR

c) NAEV TAEWEHR

d) MAEMEONERT

6. Which piece of equipment measures wind direction?

.....

7. What is used to measure the amount of precipitation?

.....

8. What device is used to measure air temperature?

.....

AIRCRAFT THAT CAN MEASURE BAD WEATHER

Want to know more? Scan the QR code here to see the kind of equipment used on aircraft to measure bad weather all over the world.

If you can't scan this code, try searching yourself using the following:

"military aircraft bad weather tools"

ACTIVITY

REPORTING ON THE WEATHER, RAF CONINGSBY

Want to know more about how weather forecasters produce TAF reports and other aspects of the weather that are important for aviation? Take a look at our short video especially produced for this activity.

LINK TO VIDEO HERE

(you can download this Mp4 file so that you can use it anywhere)

TAF REPORT

CONINGSBY
[Today 09:00Z - Tomorrow 03:00Z]
Long TAF EGXC 040736Z 0409/0503 12009KT **9999 SCT030** TEMPO 0411/0419 **6000** SHRA RA **SCT018** PROB30 TEMPO 0414/0418 12015G25KT **4000** +SHRA **SCT012** BKN018CB PROB30 TEMPO 0418/0422 **SCT005** BKN008=

WADDINGTON
[Today 06:00Z - Tomorrow 00:00Z]
Long TAF EGXW 040426Z 0406/0424 14010KT **9999** FEW035 TEMPO 0411/0418 **7000** SHRA PROB30 TEMPO 0413/0418 14015G25KT **4000** +SHRA **BKN014CB**=