

Extreme weather RMetS homework activity

Delete/amend as required

A selection of questions relating to the attached resources to develop the following requirements from the specification:

- **1.1**
How can weather be hazardous
- **1.1a**
Why do we have weather extremes; The extremes in weather conditions associated with...temperature and precipitation.

- **9.1.4**
Extract, interpret, analyse and evaluate information
- **9**
Use Choropleth maps
- **9.1.6**
Describe, interpret and analyse geo-spatial data presented in a GIS framework

Using the climate average maps answer the following questions. You may need a map!

Section 1 - Mean Max. Temperature

Part A : Extracting information

1. >14C
2. <7C
3. Lower

Part B : Describing and explaining patterns

1. Generally in the west, higher the land the lower the maximum, e.g. lowest maximums are in the Highlands, Pennines, Cumbrian Mountains, Snowdonia.
2. In the South-East, mostly away from the coast, near sea-level.
3. Height about mean sea level. Temperature drops by approx. 1C per 100m height gained.

Section 2 - Mean Min. Temperature

Part A : Extracting information

1. >7C
2. 6-7C
3. Lake District

Part B : Describing and explaining patterns

1. Mountainous areas – central Wales, Pennines, Cumbria, Scottish borders, Highlands.
2. Generally in the South, near the coast, land near sea level. Urban areas have a higher mean minimum temperature (most obvious in large cities like London, Manchester, Bristol, Liverpool).
3. Altitude, relief.

Section 3 – Mean rainfall

Part A : Extracting information

1. >3000mm
2. 1000-1250
3. All lower

Part B : Describing and explaining patterns

1. On the western side of the UK, higher altitude/more mountainous, wetter. E.g. Welsh mountains, Dartmoor, Cumbria, Highlands/Skye
2. Prevailing wind is from the South-West, which brings warm, wet air from the Atlantic. Mountains make this air rise, and as it cools the water it carries condenses and falls a precipitation (rain/sleet/hail/snow/fog). Because of the direction of the wind, the windward side of high land is normally wetter than the leeward side (the rain shadow).
3. The driest areas are on the Eastern side of the UK, particularly Lincolnshire, Cambridgeshire and near to the Essex/Suffolk coast. Cities in the driest areas include Canterbury, London, Chelmsford, Norwich, Cambridge, Oxford, Lincoln, Nottingham, York, Peterborough. This area is driest as the prevailing wind is much drier by the time it reaches the eastern side of the UK. If air masses are arrived from the South, South-East or East they contain less water (so produce less precipitation).

Using the **climate anomaly maps** answer the following questions.

The climate anomaly maps map the deviation from the long-term average in each year from 1919-2015 (i.e. whether the year was hotter/colder/wetter/drier than the 1961-1990 average)

The questions will ask about anomalies:

- A cold anomaly means that the year was colder than the 1961-1990 average
- A warm anomaly means that year was hotter than the 1961-1990 average
- A wet anomaly means that the year had more rainfall than the 1961-1990 average
- A dry anomaly means that the year had less rainfall than the 1961-1990 average

Section 1 – Mean Temperature

Part A : Extracting information

1. 1919
2. 2014
3. 1947, 1973, 1970

Part B : Describing and explaining patterns

4. Almost always positive and increasingly large with some exceptions (e.g. 2010), though no consistent pattern.
5. 2 warm years, 2 cold years. 1964-1969 weak anomalies flip-flopping warm/cool, exception of 1965 which was slightly cooler than others.
6. 1940s started cool, particular 1940 in particular quite cold, then became warmer, with 1943, 1945 and 1949 being particularly warm years. There was less alternation between warm/cool years.

Section 2 – Mean Max. Temperature

Part A : Extracting information

4. 1963
5. 1921, 1949, 1959
6. 2010

Part B : Describing and explaining patterns

7. Most years with warm anomalies are since 1990. Some occurred earlier, e.g. 1989, 1959, 1949, 1921.
8. The years with the lowest mean max anomaly do not show a clear pattern. Some years are particularly cold, e.g. 1962/3, 1917, 1919. Generally cool years are just below the average. There are more of them than warmer years until 1990. Since 1990 there has not been a year significantly cooler than the long-term average.
9. 2003. The anomaly was the greatest across the whole of the UK, suggesting even areas unused to extremes were experiencing warmer weather. This unusualness correlates with the ability of services to cope with demand, and with people's resilience.

Section 3 – Mean Min. Temperature

Part A : Extracting information

7. 1915,1919,1922,1929
8. 1945,1949,1953
9. 1993

Part B : Describing and explaining patterns

10. Although some of the years with the highest mean minimum temperature occurred in the 1930s and 40s (e.g. 1933, 1949) it is since 1990, and especially 1997 that the largest warm anomalies have occurred.
11. There is no obvious overall pattern to the **lowest** mean minimum temperatures, however the largest anomalies occurred in 1915,1917, 1919, 1922 and 1929. Although there were some cool years it was not until 1962/3 that larger cool anomalies were recorded. Since 1990 only 2010 has shown an anomalously low mean minimum temperature.
12. 1919. The cold anomaly was widespread, homes did not have central heating. It was just after WW1, so life would have been harder.

Section 4 – Mean rainfall

Part A : Extracting information

10. Accept 1921 or 1933
11. 2000, 2002, 2012
12. 1933. The driest areas are all in the West which is normally the wettest part of the UK.

Part B : Describing and explaining patterns

13. 1010 was a dry year, as was 2011 in the South, though simultaneously very wet in the North. 2012 was an exceptionally wet year, followed by 2013 being a little dry. 2014 was wetter than usual again, before 2015 mirrored the divide from 2011. Overall we seem to flip between wet and dry years.
14. The wettest areas were in the South and East of the UK, areas which do not normally receive high rainfall. As such they were unprepared and could not cope with high rainfall, runoff, river levels and flooding.
15. Almost every year in the 1970s was drier than normal, except 1974, 1977 (just), and 1979. 1971-1973, and 1975-76 were dry for large areas of the UK. Consecutive years of low rainfall affected crops, water supply (low river levels, low groundwater) – reservoirs ran empty, affected water quality (pollutants weren't dispersed).