Edexcel AS Maths: Statistics

Your notes

6.1 Large Data Set

Contents

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Using a Large Data Set

What is a large data set?

- As part of your course there is a large data set that you can use
- It contains lots of information
- You are not expected to memorise any results from the data
- You will have an advantage if you are familiar with the large data set
  - Understand what the variables are
  - Understand the terminology used
  - Understand the context
- You will **not** get a copy of the large data set in your exam
  - if you are required to calculate anything using the large data set you will be given an extract within the question

What skills can I practice with a large data set?

- Cleaning data
  - There might be missing data
  - You could identify outliers and question their validity
- Sampling and hypothesis testing
  - You can practice different methods of sampling using the data
  - You could use a sample to test a hypothesis
- Statistical measures and diagram
  - You could calculate summary statistics for different variables
  - You could create different diagrams
  - You can interpret the summary statistics and diagrams (as it is real data you could explore the context behind the results)
  - You could compare summary statistics and diagrams

Do I have to use spreadsheets and other technology?

- You will not be assessed on using spreadsheets
  - However, it is a useful skill for your future career
- You could use technology to calculate the summary statistics and create the statistical diagrams
  - This will help you to practice these skills whilst using real data
  - Spreadsheets can calculate summary statistics
  - In the exam you could use the statistics mode on your calculator

Summary of the Edexcel Large Data Set


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What is the data about?

- The data consists of samples of data on the weather for eight locations over two different time periods
- The five UK locations are:
  - Leuchars: town in Scotland
  - Leeming: village in North Yorkshire
  - Heathrow: hamlet in Greater London
  - Hurn: village in Dorset (South West England)
  - Camborne: town in Cornwall (South West England)
- The three international locations are:
  - Beijing: capital city of China
  - Perth: capital city of Western Australia (state of Australia)
  - Jacksonville: city in Florida (state of USA)
- The two time periods are:
  - May to October 1987
  - May to October 2015

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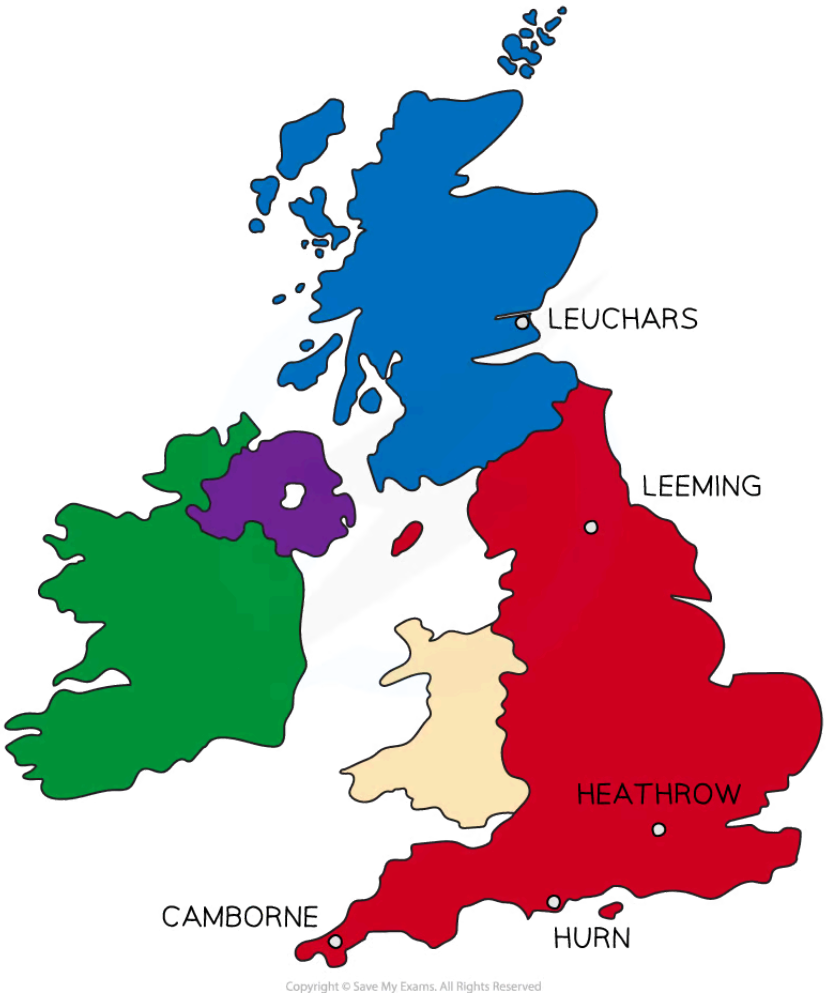

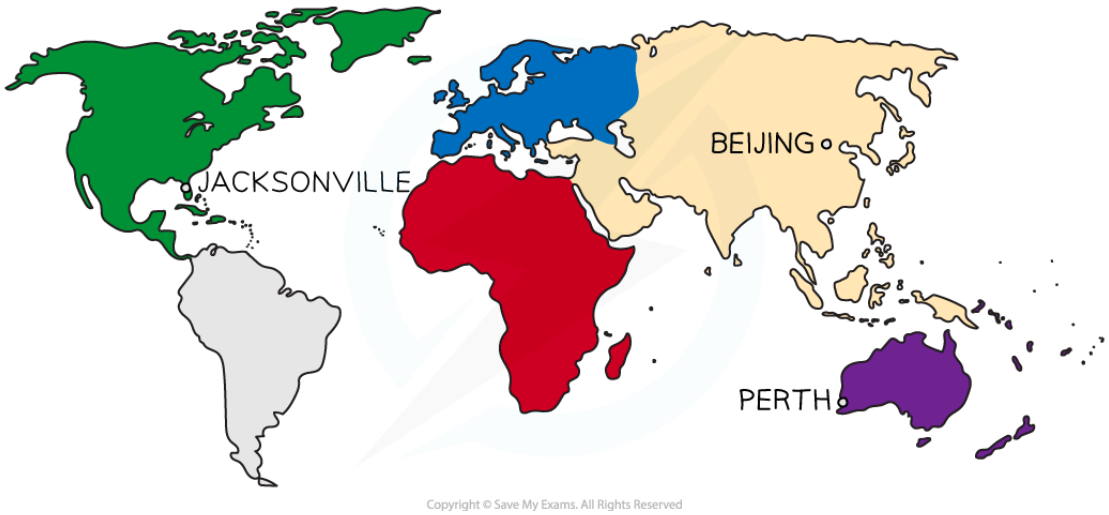

What variables are included in the large data set?

- Daily mean (air) temperature
  - Measured in degrees Celsius (°C) given to 1dp
  - Average of hourly temperature readings between 0900 - 0900 GMT
- Daily total rainfall
  - Measured in millimetres (mm) given to 1dp
  - Measured for the 24 hours starting at 0900 GMT
  - A trace of rain 'tr' is an amount less than 0.05mm
- Daily total sunshine
  - Measured in hours (hr) given to 1dp
- Daily maximum relative humidity
  - Given as a percentage given to the nearest integer
  - A reading above 95% is associated with mist and fog
- Daily mean windspeed and direction
  - Mean measured in knots (1 kn = 1.15 mph) given to nearest integer and is described using the Beaufort conversion (calm, light, etc)
  - Direction measured in degrees rounded to the nearest 10 and is given as a cardinal direction (north, south, etc)
  - Averaged for 24 hours starting at 0000 GMT
- Daily maximum gust and direction
  - Measured using the same units as windspeed
  - The maximum instantaneous speed over the 24 hours
- Cloud cover
  - Measured in Oktas (eighths of the sky covered by cloud)
- Daily mean visibility
  - Measured in decametres (1 Dm = 10 m) horizontally
- Daily mean pressure
  - Measured in hectopascals (1 hPa = 100 Pa = 1 millibar)

Is the data complete?

- There are missing or unknown pieces of data
  - These are listed as 'n/a' or '-'
  - The total daily total sunshine, mean windspeed and maximum gust is unknown for the first half of May 1987 for the UK cities
  - The data should be cleaned before samples are taken
- The three international cities only contain data for:
  - Daily mean temperature, daily total rainfall, daily mean pressure and daily mean windspeed

What are some of the important features?

- Consider which locations are closer to the equator
- Consider which locations are near a coast
  - Jacksonville, Perth, Camborne, Hurn, Leuchars are near the coast
- Consider which locations are in each hemisphere


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- Perth is in the southern hemisphere so have winter when UK has summer
- Consider which variables are discrete and which are continuous
  - Cloud cover is discrete
- You can use 0 or 0.025 for rainfall that is listed as 'tr'
- The great storm of 1987 happened 15–16 October in UK
  - The wind speeds were high at this time
  - The south and south-east of England was affected
  - This will skew some variables (wind/gust/rainfall)
  - This won't have much impact some variables (sunshine/cloud cover)
    - October in the UK is normally cloudy and has less sunshine
  - Don't worry about remembering the exact dates of this but it is something to be aware of
- Consider the number of days in each month
  - 30 days in June and September
  - 31 days in May, July, August and October
  - In total the LDS covers 184 days


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Worked example

Using the large data set, Dylan collects data on the daily total sunshine in Leuchars from May to October 1987 by taking a random sample of 30 days.

(a) Using your knowledge of the large data set, explain why Dylan will have to first clean the data before taking a sample.

(b) Dylan calculates the mean value from his sample to be 25.3 hours. Using your knowledge of the large data set, explain how you know Dylan has made a mistake.

(a) Using your knowledge of the large data set, explain why Dylan will have to first clean the data before taking a sample.

a) There are some dates where no data on daily total sunshine was recorded. Therefore the data needs to be cleaned by removing these dates.

(b) Dylan calculates the mean value from his sample to be 25.3 hours. Using your knowledge of the large data set, explain how you know Dylan has made a mistake.

b) The daily total sunshine is the amount of time that there is sunshine in a 24-hour period. Therefore 25.3 hours is incorrect as it is more than 24 hours.