Your notes

GCSE Statistics: revision notes

The normal distribution and standardised scores

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The normal distribution

- Many measurements, such as heights and exam marks, follow a **normal distribution**: a symmetrical, **bell-shaped curve**.
- The mean, median and mode are equal and lie at the centre.
- About 68% of the data lies within 1 standard deviation of the mean, about 95% within 2 standard deviations, and almost all (about 99.7%) within 3 standard deviations.
- Example: IQ scores with mean 100 and standard deviation 15. About 95% lie between 70 and 130.

Standardised scores

- A **standardised score** (z-score) shows how many standard deviations a value is from the mean: z = (value – mean) ÷ standard deviation.
- Example: mean 60, standard deviation 8, value 76. z = 16 ÷ 8 = 2.
- **Standardised scores** compare values from different distributions. Maths 70 (mean 60, SD 5) gives z = 2; English 75 (mean 65, SD 10) gives z = 1. So the maths result was relatively better.
- A negative z-score means the value is below the mean.

Quality control

- Quality assurance uses **control charts**. Samples are taken regularly and their means plotted.
- **Warning limits** are usually 2 standard deviations from the target mean, and **action limits** 3 standard deviations away. A point beyond an action limit means the process should be stopped and checked.

Key terms

Normal distribution	A symmetrical, bell-shaped distribution.
Standardised score	The number of standard deviations a value is from the mean.
Control chart	A chart used to check that a process stays on target.
Warning limits	Lines 2 standard deviations from the target mean on a control chart.
Action limits	Lines 3 standard deviations from the target mean on a control chart.
Bell-shaped curve	The shape of a normal distribution.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What shape is a normal distribution?
2. About what percentage of normal data lies within 2 standard deviations of the mean?
3. About what percentage lies within 1 standard deviation of the mean?
4. Mean 60, standard deviation 8, value 76. What is the standardised score?
5. What does a negative standardised score mean?
6. IQ has mean 100 and standard deviation 15. Between which values do about 95% of scores lie?
7. In a normal distribution, how do the mean, median and mode compare?
8. What happens if a point is beyond an action limit on a control chart?

Answers

1. A symmetrical bell shape
2. 95%
3. 68%
4. 2
5. The value is below the mean
6. 70 and 130
7. They are equal
8. The process should be stopped and checked

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

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