Write your name here

| Surname | Other names |
| --- | --- |
| | |

**Edexcel GCSE**

| Centre Number | Candidate Number |
| --- | --- |
| | |

# Statistics
# The Normal Distribution

**You must have:**
Ruler graduated in centimetres and millimetres, protractor, pen
HB pencil, eraser, electronic calculator.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

## Information

- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Higher Tier Formulae

**You must not write on this page.**
**Anything you write on this page will gain NO credit.**

Mean of a frequency distribution $= \dfrac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \dfrac{\sum fx}{\sum f}$, where $x$ is the mid-interval value.

Variance $= \dfrac{\sum (x-\bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\dfrac{\sum x^2}{n} - \left(\dfrac{\sum x}{n}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum (x-\bar{x})^2}{n}\right]}$

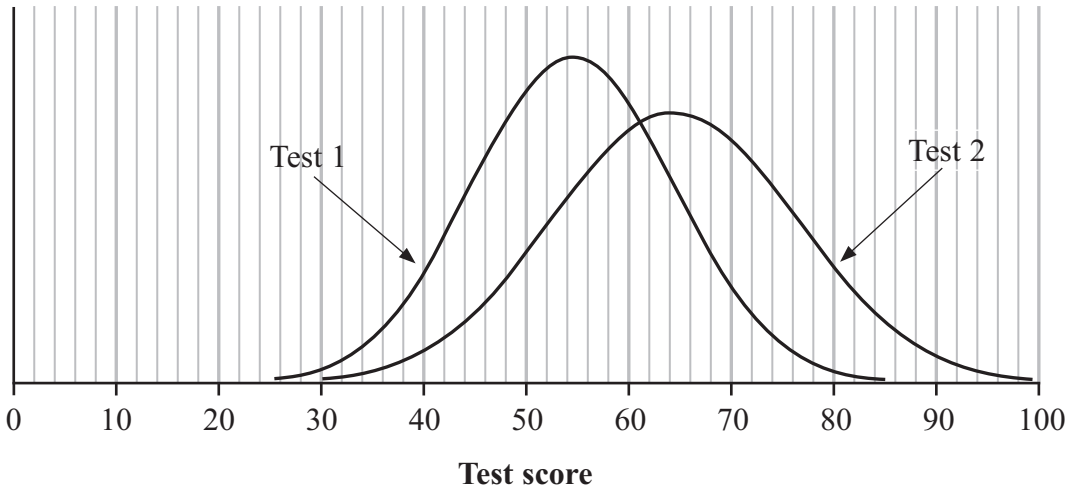
where $\bar{x}$ is the mean set of values.

Standard deviation (discrete frequency distribution) $\sqrt{\left[\dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f}\right)^2\right]}$

or $\sqrt{\left[\dfrac{\sum f(x-\bar{x})^2}{\sum f}\right]}$

Spearman's Rank Correlation Coefficient $1 - \dfrac{6\sum d^2}{n(n^2-1)}$

**1** Some students did two mathematics tests.
The students' marks for the tests are normally distributed.
The diagram shows the distribution of marks for Test 1 and Test 2




(a) Estimate the mean and standard deviation of the marks for Test 1

Mean .....

Standard deviation .....

**(3)**

For Test 2 the mean mark is 64 and the standard deviation is 12

One student got 60 marks on both Test 1 and Test 2

(b) Find this student's standardised scores and compare how well the student did on the two tests.

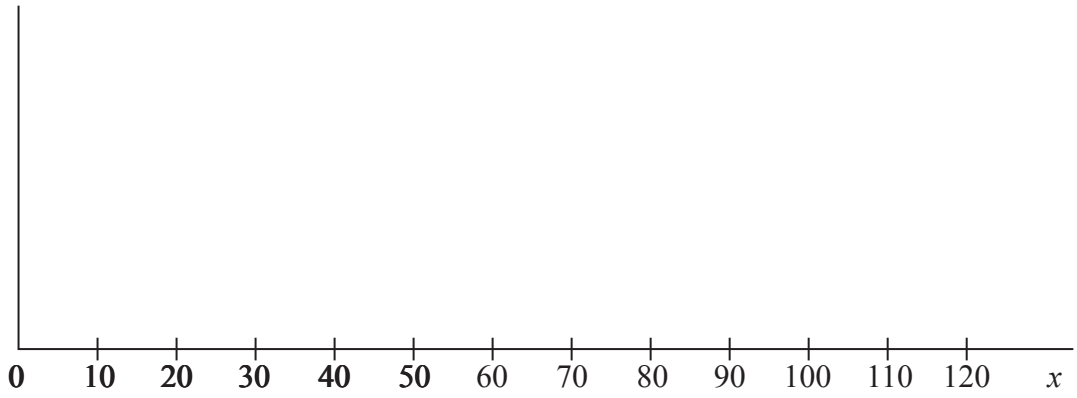
**(5)**

**(Total for Question 1 is 8 marks)**

**2** A variable, $X$, has a normal distribution with mean 60

95% of the values of $X$ lie between 45 and 75

(a) Sketch a diagram to show this distribution.




**(3)**

Ross wants to find out how long it takes boys and girls in different year groups to complete jigsaw puzzles.

He collects the following information for each child.

| |
|---|
| Gender |
| Year group |
| Number of pieces in the jigsaw puzzle |
| Time taken to complete the puzzle |
| Favourite subject |

(b) Which of these variables is most likely to be modelled by a normal distribution? Give a reason for your answer.

.....

.....

.....

**(2)**

**(Total for Question 2 is 5 marks)**