Write your name here

| Surname | | Other names |
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## Edexcel GCSE

# Mathematics B
### Unit 1: Statistics and Probability (calculator)

**Higher Tier**

**Practice paper**
Time: 1 hour 15 minutes                                    **5MB1/1H**

**You must have:**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total marks

**Instructions**

- Use black ink or ballpoint pen.
- Answer all the questions.
- Calculators may be used.
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

**Information**

- The total mark for this paper is 60.
- The mark for each question are shown in brackets.
- Questions labelled with an asterisk (*) are those where the quality of your written communication will be assessed.
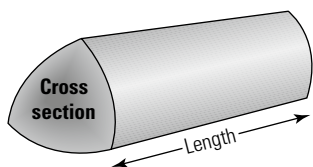
**Advice**

- 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.

# GCSE Mathematics 2MB01
# Formulae: Higher Tier

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

**Volume of a prism** = area of cross section × length



**Volume of sphere** = $\frac{4}{3}\pi r^3$

**Surface area of sphere** = $4\pi r^2$
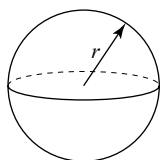


**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi r l$
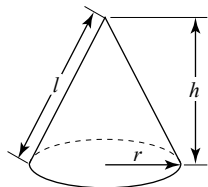


**Area of trapezium** = $\frac{1}{2}(a + b)h$
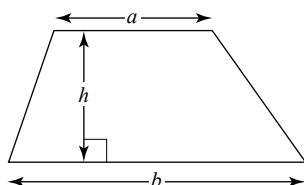


**In any triangle ABC**
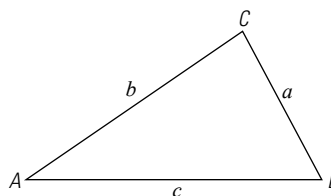


**Sine rule** $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

**Cosine rule** $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** $\dfrac{1}{2}ab \sin C$

**The quadratic equation**

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

**Answer ALL the questions.**
**Write your answers in the spaces provided.**
**You must write down all the stages in your working.**
**Calculator permitted.**

1.   Wing wants to find out how often people use the 'Twitter' website.

He uses this question on a questionnaire:

'How many times did you use the "Twitter" website?'

| 1 to 10 | | 11 to 20 | | 20 to 30 | | more than 30 |

**a** Write down two things that are wrong with this question.

1

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2

...................................................................................................................

................................................................................................................... (2)

Wing asks 10 of the students in his class to complete his questionnaire.

**b** Give one reason why this may not be a suitable sample.

...................................................................................................................

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................................................................................................................... (1)

(Total for Question 1 = 3 marks)

2.    The tables show the train times between Barrow-in-Furness and Lancaster and between
      Lancaster and London Euston.

| Barrow-in-Furness | 07 00 | 08 00 | 09 22 | 10 16 | 11 25 | 12 11 | 13 25 | 14 26 |
|---|---|---|---|---|---|---|---|---|
| Roose | 07 04 | 08 04 | 09 26 | 10 20 | | 12 15 | | 14 20 |
| Dalton | 07 10 | 08 10 | 09 32 | 10 26 | | 12 21 | | 14 26 |
| Ulverston | 07 19 | 08 19 | 09 41 | 10 35 | 11 40 | 12 29 | 13 40 | 14 35 |
| Cark | 07 27 | 08 27 | 09 49 | 10 43 | | 12 37 | | 14 43 |
| Kents Bank | 07 32 | 08 32 | 09 53 | 10 47 | | 12 41 | | 14 47 |
| Grange-over-Sands | 07 36 | 08 36 | 09 57 | 10 51 | 11 53 | 12 45 | 13 53 | 14 51 |
| Arnside | 07 43 | 08 43 | 10 03 | 10 57 | 11 59 | 12 51 | 13 59 | 14 57 |
| Silverdale | 07 48 | 08 48 | 10 07 | 11 02 | | 12 56 | | 15 02 |
| Carnforth | 07 54 | 08 54 | 10 15 | 11 08 | 12 08 | 13 02 | 14 08 | 15 08 |
| Lancaster | 08 03 | 09 07 | 10 25 | 11 20 | 12 18 | 13 15 | 14 18 | 15 20 |

| Lancaster | 08 38 | 09 38 | 10 38 | 11 38 | 12 38 | 13 39 |
|---|---|---|---|---|---|---|
| Preston | 08 58 | 09 58 | 10 58 | 11 58 | 12 58 | 13 59 |
| Wigan North Western | 09 09 | 10 09 | 11 09 | 12 09 | 13 09 | 14 10 |
| Warrington Bank Quay | 09 20 | 10 20 | 11 20 | 12 20 | 13 20 | 14 21 |
| London Euston | 11 12 | 12 12 | 13 12 | 14 12 | 15 12 | 16 11 |

Barry wants to travel from Ulverston to London Euston.

**a** If he catches the first train from Ulverston that leaves after 09 00 hours, at what time will he
   reach London Euston?

................................................ . (1)

**b** If he has to be in London by 15 00 hours, what is the latest time that he can leave Ulverston?

................................................ . (2)

(Total for Question 2 = 3 marks)

3.    Three types of variable are:

- **A** qualitative
- **B** quantitative and continuous
- **C** quantitative and discrete

Tick the box that best describes each of the following:

**a** the lengths of cars                                    **A** ☐       **B** ☐       **C** ☐

**b** the colours of cars                                    **A** ☐       **B** ☐       **C** ☐

**c** the total number of cars in a car park       **A** ☐       **B** ☐       **C** ☐                (3)

(Total for Question 3 = 3 marks)

4.    The pie chart shows how the average number of viewers was shared out between some television channels.
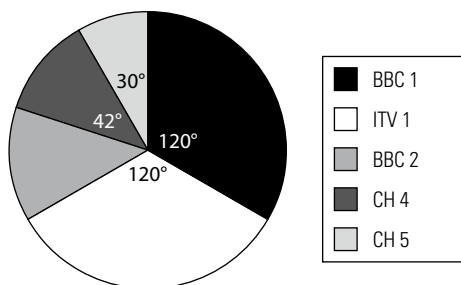


**a** Calculate the angle for BBC 2.

……………………………….. °   (1)

**b** Calculate the percentage of viewers who watched Channel 4.

……………………………….. %   (2)

(Total for Question 4 = 3 marks)

5.  The two-way table shows the percentages at each pair of grades for students who took both GCSE Geography and GCSE English Language.

|  |  | GCSE Geography | | | | | |
|---|---|---|---|---|---|---|---|
|  |  | A–A* | B–C | D–E | F–G | U | Total |
| **GCSE English Language** | A–A* | 10 | 6 | 1 | 0 | 0 |  |
|  | B–C | 3 | 30 | 16 |  | 0 | 51 |
|  | D–E |  | 3 | 19 | 7 | 3 | 32 |
|  | Total | 13 |  | 36 | 9 | 3 |  |

Data source: www.tda.gov.uk

**a** Complete the two-way table. (2)

A student who sat both papers is picked at random.

**b** Work out the probability that the student got either an A or A* in both subjects.

................................................. . (2)

**c** Given that the student got either a B or C in Geography, what is the probability that she also got either a B or C in English Language?

................................................. . (2)

(Total for Question 5 = 6 marks)

6.    Here are the ingredients needed to make 12 scones:

> 225 g of self-raising flour
> 40 g butter
> $1\frac{1}{2}$ tablespoons of salt
> 150 ml of milk
> $\frac{1}{2}$ teaspoon of salt

Stephanie makes 30 scones.

**a** Work out how much flour she uses.

..................................... grams     (1)

Graham has 1 kg of flour.

**b** How many scones can he make, assuming that he has plenty of the other ingredients?

............................................ .     (3)

(Total for Question 6 = 4 marks)

7.    **a** Explain what is meant by a random sample.

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Julie wants to do a survey of the voting intentions of people.

Julie thinks that voting intentions will differ between different age groups.

The ages and totals of the population she is interested in are shown in the table:

| Age | 16–20 | 21–30 | Over 30 |
|-----|-------|-------|---------|
| **Number of people** | 150 | 250 | 100 |

Julie uses a sample of 50 people.

*\***b** Describe a suitable sampling method.

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(Total for Question 7 = 5 marks)

8. The scatter diagram gives information about the population density, $d$, and the distance, $x$, from the centre of a particular city.
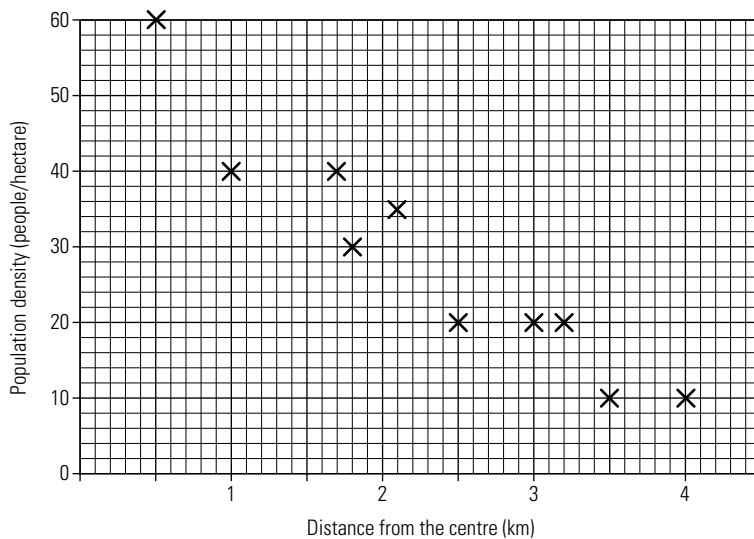


**a** Describe the correlation between the population density and the distance from the centre of the city.

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............................................................................................................................. (1)

**b** Draw a line of best fit on the scatter graph. (1)

The equation of the line of best fit is $d = mx + c$

**c i** Find the values of $m$ and $c$

.................................................. . (2)

**ii** Write down an interpretation of $m$ and $c$ in this context.

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(Total for Question 8 = 6 marks)

9.    The blood glucose level of 50 males is recorded. The results, in mmol/litre, are summarised below:

      lowest value = 2.3
      lower quartile = 3.4
      median = 4.0
      upper quartile = 4.6
      highest value = 5.3

      The box plot below shows the results for women:



Blood glucose level (mmol/litre)
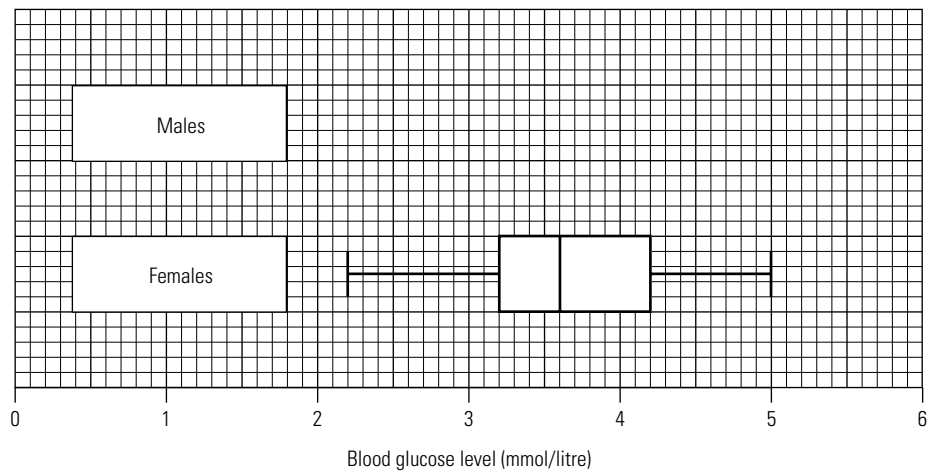
  **a** On the same diagram, draw a box plot for men.                                          (2)

  *b Compare the distribution of the blood glucose levels in males and females.

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  ......................................................................................................................   (3)

                                                              (Total for Question 9 = 5 marks)

10. The table shows the number of people who had different amounts of sleep at night.

| Hours of sleep ($s$ h) | $2 < s \leqslant 4$ | $4 < s \leqslant 6$ | $6 < s \leqslant 8$ | $8 < s \leqslant 10$ | $10 < s \leqslant 12$ |
|---|---|---|---|---|---|
| **Frequency** | 4 | 10 | 54 | 26 | 6 |

**a** Write down the class interval that contains the median.

.................................................. (1)

**b** Estimate the mean number of hours of sleep.

.................................................. (3)

(Total for Question 10 = 4 marks)

11. A shop has a workforce of 50, of which 20 are men and 30 are women.

Two people are to be drawn at random from the workforce to attend a training course.

**a** Complete the probability tree diagram.

First draw          Second draw

```
                              ┌──┐
                              └──┘ ── M
                 ┌───┐    M  <
                 │0.4│ ──        ┌──┐
                 └───┘           └──┘ ── W

     <
                              ┌──┐
                 ┌───┐        └──┘ ── M
                 └───┘    W  <
                              ┌──┐
                              └──┘ ── W
```
(2)

**b** Work out the probability that there will be one man and one woman attending the training course.

.................................................. (2)

(Total for Question 11 = 4 marks)

*12. The scatter diagram shows information about the average heights of boys and girls at different ages.



Using the information on this diagram, investigate the differences in the ways in which children grow.

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(Total for Question 12 = 5 marks)

13.     You have the choice of two savings accounts:

**Account A**
Earns 3.5% per annum.
Interest paid yearly.

**Account B**
Earns 3.25% compound
interest per annum.

You have a sum of £10 000 to invest for 3 years.

Decide which of these is the better investment.
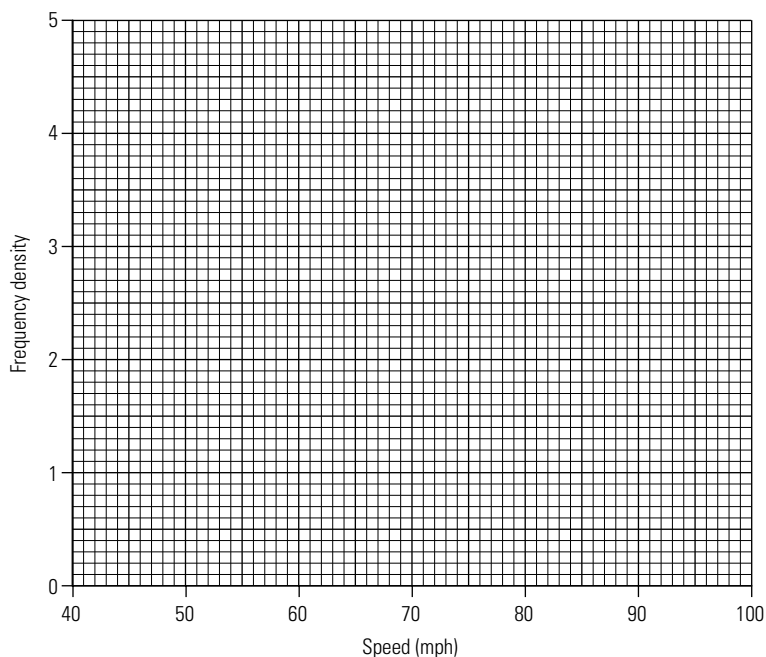
You must show your working

.................... is the better investment     (3)

(Total for Question 13 = 3 marks)

14.  The table shows the numbers of cars travelling at different speeds on a motorway that had a 70 miles per hour speed limit.

| Speed (mph) | $45 \leqslant s \leqslant 50$ | $50 < s \leqslant 65$ | $65 < s \leqslant 70$ | $70 < s \leqslant 75$ | $75 < s \leqslant 90$ | $90 < s < 95$ |
|---|---|---|---|---|---|---|
| **Frequency** | 5 | 27 | 19 | 20 | 27 | 2 |

**a** Draw a histogram for this information.



(3)

**b** Estimate the number of cars travelling between 60 and 80 miles per hour.

.............................................. .

(2)

**c** What conclusions can you draw about the speeds of cars on this motorway?

................................................................................................................................. .

(1)

(Total for Question 14 = 6 marks)

TOTAL FOR PAPER = 60 MARKS