Edexcel GCSE

Centre Number

Candidate Number

Mathematics B
Unit 1: Statistics and Probability (Calculator)

Higher Tier

Monday 13 June 2011 – Afternoon
Time: 1 hour 15 minutes

Paper Reference
5MB1H/01

Total Marks

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

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*.
- **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 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.
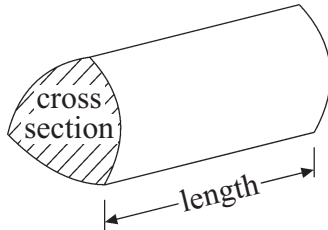- Try to answer every question.
- Check your answers if you have time at the end.
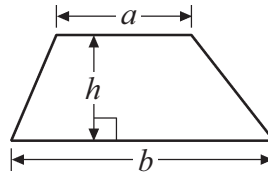
Turn over ▶

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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

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

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

Surface area of sphere $= 4\pi r^2$
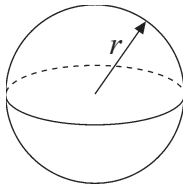
Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$
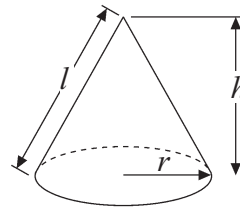
In any triangle *ABC*
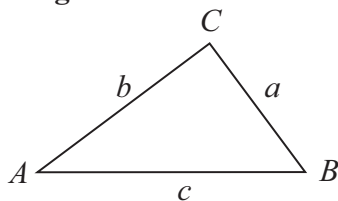
The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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 $= \dfrac{1}{2}ab \sin C$

P 3 8 9 7 9 A 0 2 1 6

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 There are a total of 96 children in Years 4, 5 and 6
37 of these children cannot swim.

11 children in Year 4 cannot swim.
21 children in Year 5 can swim.

There are 30 children in Year 6
18 of these 30 children can swim.

(i) Work out the number of children in Year 4 who can swim.

....

(ii) Work out the total number of children in Year 5

....

(Total for Question 1 is 4 marks)

2 Mr Kent's students did a maths test and a science test.
The scatter graph shows the marks of 12 of these students.
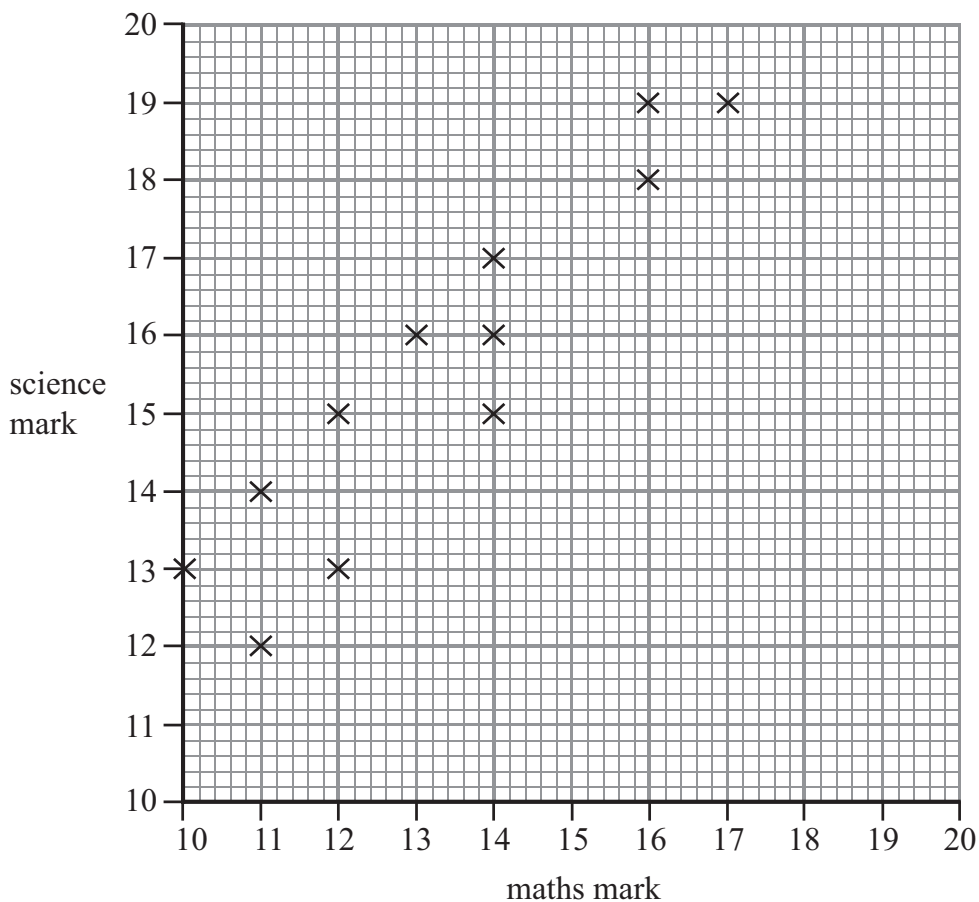
The table shows the marks of two more students.

Name	maths	science
Masood	12	14
Nimer	17	20

(a) Show this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

....
(1)

David did the maths test.
He was absent for the science test.

David's mark in the maths test was 15

(c) Estimate a science mark for David.

....
(2)

(Total for Question 2 is 4 marks)

P 3 8 9 7 9 A 0 4 1 6

3 Build-a-mix makes concrete.

1 cubic metre of concrete has a weight of 2400 kg.

15% of the concrete is water.

The rest of the ingredients of concrete are cement, sand and stone.
The weights of these ingredients are in the ratio 1 : 2 : 5

(a) Work out the weight of cement, of sand and of stone in 1 cubic metre of concrete.

cement = ... kg

sand = ... kg

stone = ... kg

(4)

Build-a-mix needs to make 30 cubic metres of concrete.
Build-a-mix has only got 6.5 tonnes of cement.

*(b) Will this be enough cement for Build-a-mix to make 30 cubic metres of concrete?
You must show all of your working.

(3)

(Total for Question 3 is 7 marks)

Turn over ▶

4 There are 25 students in a class.
12 of the students are girls.

Here are the heights, in cm, of the 12 girls.

160   173   148   154   152   164   179   164   162   174   168   170

(a) Show this information in an ordered stem and leaf diagram.

14 |
――――――――――――――――――――
15 |
――――――――――――――――――――
16 |
――――――――――――――――――――
17 |

(3)

There are 13 boys in the class.

Here are the heights, in cm, of the 13 boys.

157   159   162   166   168   169   170   173   174   176   176   181   184

*(b) Compare the heights of the boys with the heights of the girls.

(3)

(Total for Question 4 is 6 marks)

5 Denzil has a 4-sided spinner.
The sides of the spinner are numbered 1, 2, 3 and 4
The spinner is biased.

The table shows each of the probabilities that the spinner will land on 1, on 3 and on 4
The probability that the spinner will land on 3 is x.

Number	1	2	3	4
Probability	0.3		x	0.1

(a) Find an expression, in terms of x, for the probability that the spinner will land on 2
Give your answer in its simplest form.

....
(2)

(b) Write down the probability that the spinner will land on either 1 or 4

....
(1)

Denzil spins the spinner 300 times.

(c) Write down an expression, in terms of x, for the number of times the spinner is likely to land on 3

....
(1)

(Total for Question 5 is 4 marks)

Turn over ▶

6 Helen carries out a survey on healthy eating.

She uses these two questions in a questionnaire.

question 1	What is your age?

☐ under 20   ☐ 20 to 40   ☐ 40 to 60   ☐ over 60

question 2   You should eat fruit every day. You do agree, don't you?

☐ Yes   ☐ No   ☐ Don't know

(a) Write down **one** thing wrong with each of these questions.

question 1

....

....

question 2

....

....

(2)

Helen wants to find out the amount of fruit people eat.

(b) Design a question that Helen could use in her questionnaire.

(2)

The table shows some information about the people at Helen's college.

	Student	**Teacher**
Male	536	48
Female	384	73

Helen is going to ask people at her college to do her questionnaire.
She asks a sample of 100 people stratified by type and gender.

(c) Work out the number of female teachers in her sample.

....

(2)

(Total for Question 6 is 6 marks)

7   Charlie invests £1200 at 3.5% per annum compound interest.

Work out the value of Charlie's investment after 3 years.

£ ....

(Total for Question 7 is 3 marks)

Turn over ▶

8 The table shows information about midday temperatures.

Temperature (t °C)	Number of days
$10 \leqslant t < 15$	6
$15 \leqslant t < 20$	4
$20 \leqslant t < 25$	24
$25 \leqslant t < 30$	44
$30 \leqslant t < 35$	10
$35 \leqslant t < 40$	4

(a) Write down the modal class interval.

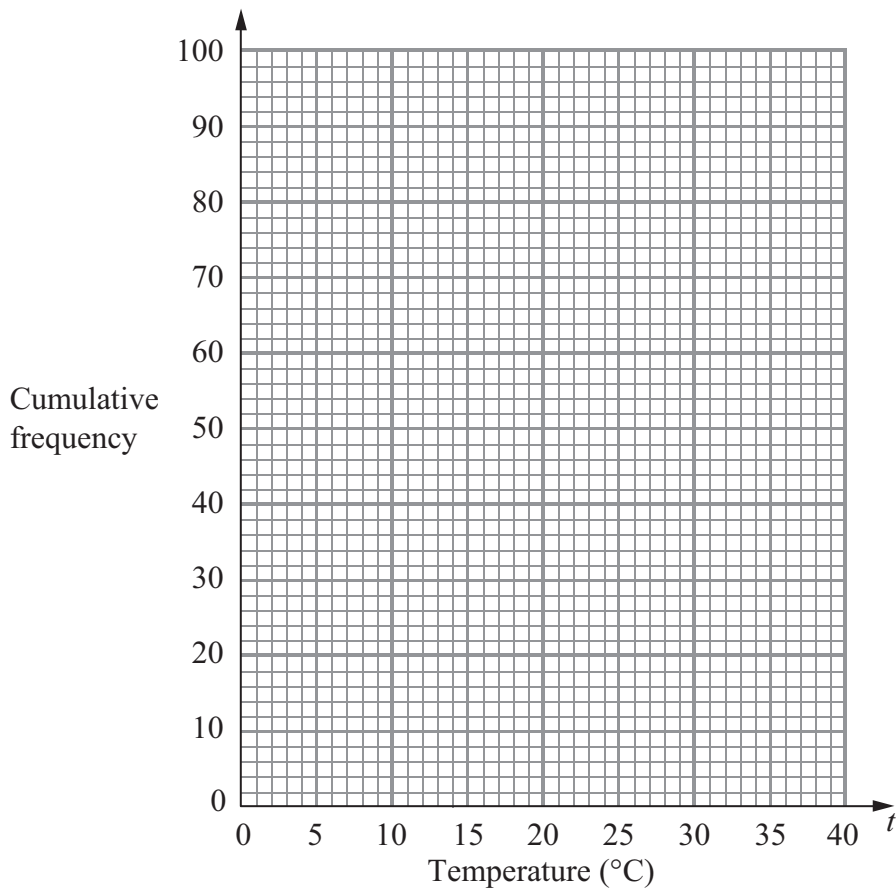...

(1)

(b) Work out an estimate for the mean midday temperature.
Give your answer correct to 3 significant figures.

.... °C

(4)

(c) On the grid opposite, draw a cumulative frequency graph for the information from
the table about the midday temperatures.

(3)

(d) Find estimates for the median **and** the interquartile range of these midday temperatures.
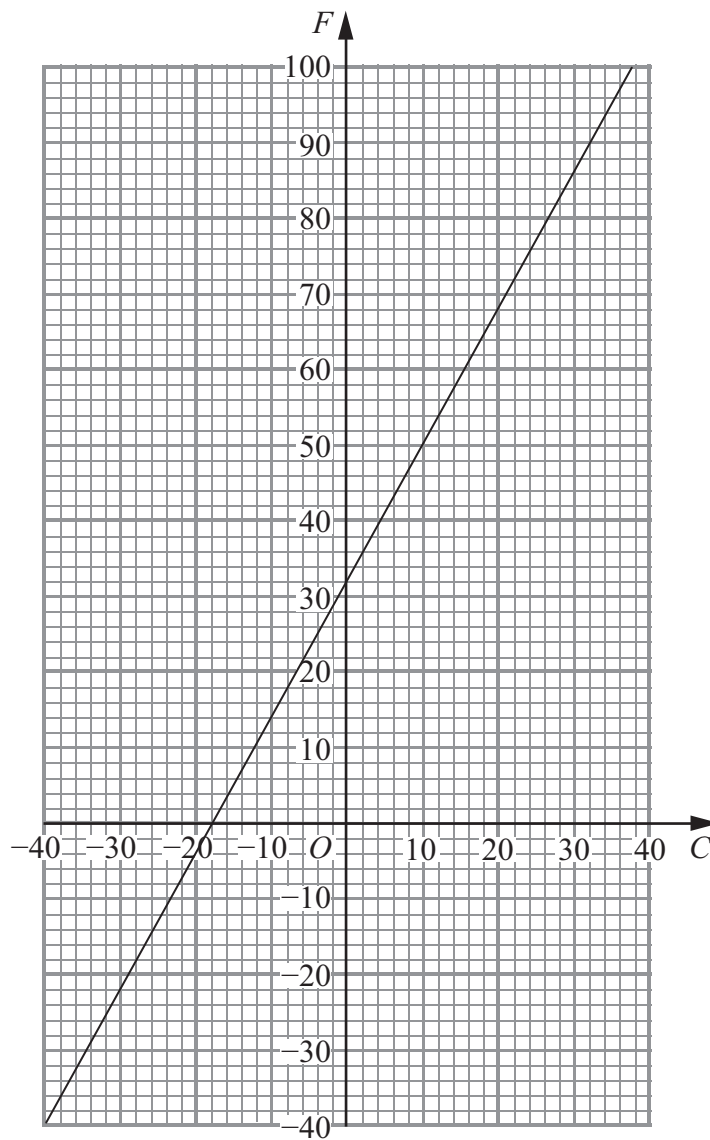
Median .... °C

Interquartile range .... °C

(3)

(Total for Question 8 is 11 marks)

9 This graph can be used to convert between degrees Celsius (C) and degrees Fahrenheit (F).

Find the values of m and k such that

$$F = mC + k$$

$m =$ ....

$k =$ ....
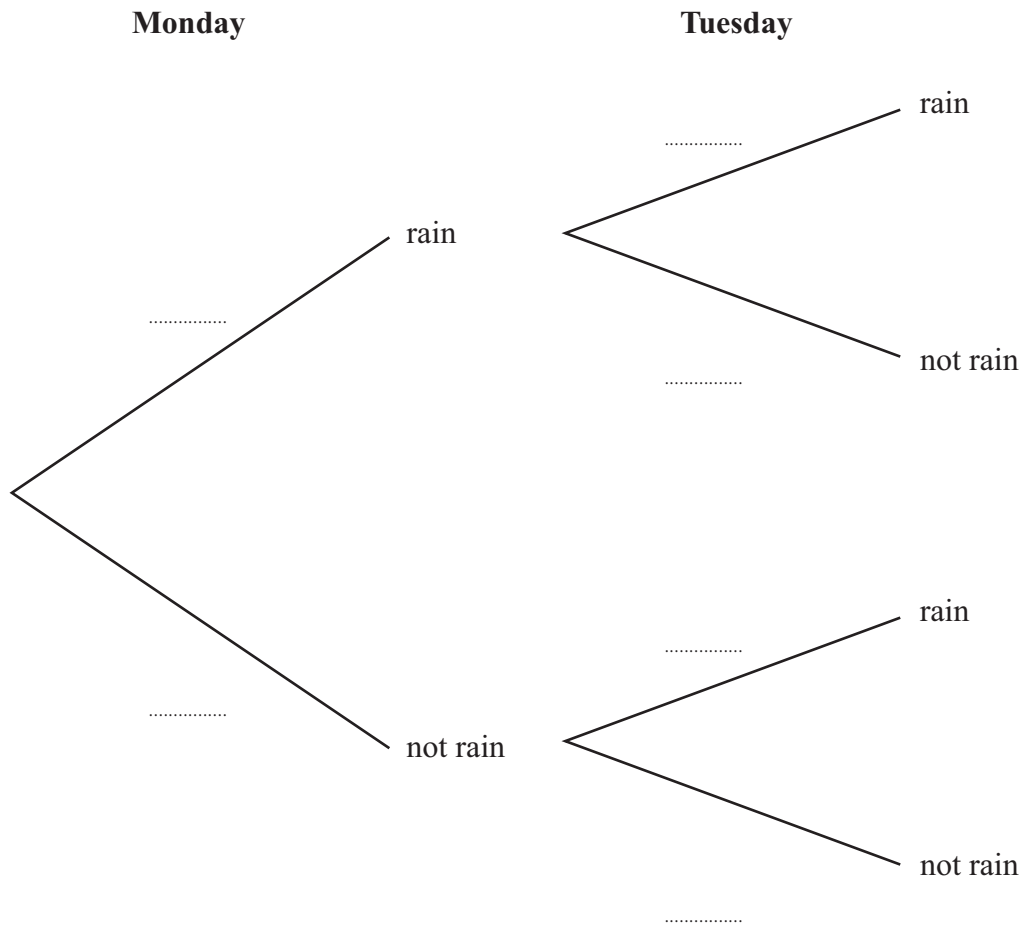
(Total for Question 9 is 3 marks)

10 The probability that it will rain on Monday is 0.6

When it rains on Monday, the probability that it will rain on Tuesday is 0.8
When it does **not** rain on Monday, the probability that it will rain on Tuesday is 0.5

Monday   **Tuesday**

```
                                                      rain
                          ...........
                   rain
        ...........              ...........
                                                      not rain


                                                      rain
                          ...........
                   not rain
        ...........
                                                      not rain
                                ...........
```

(a) Complete the probability tree diagram.

(2)

(b) Work out the probability that it will rain on both Monday and Tuesday.

....

(2)

(c) Work out the probability that it will rain on at least one of the two days.

....

(3)

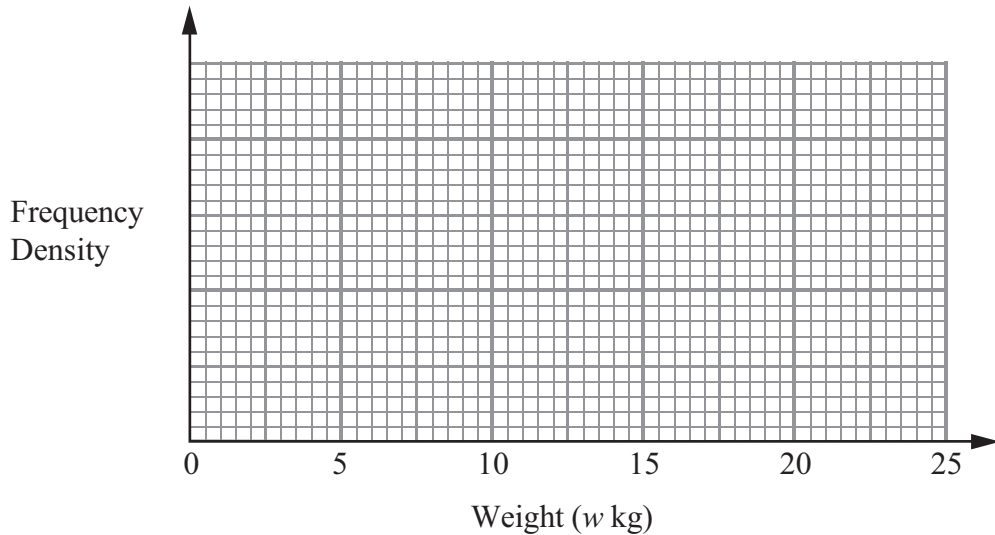**(Total for Question 10 is 7 marks)**

Turn over ▶

11 Tommy grows tomatoes.

The table shows some information about the weight, w kg, of tomatoes produced by each tomato plant.

Weight (w kg)	$5 < w \leqslant 10$	$10 < w \leqslant 12$	$12 < w \leqslant 16$	$16 < w \leqslant 20$	$20 < w \leqslant 25$
Number of tomato plants	8	15	24	16	10

(a) On the grid, draw a histogram to show this information.

Frequency Density

Weight (w kg)

(3)

(b) Work out an estimate for the number of tomato plants that produced more than 15 kg of tomatoes.

....

(2)

(Total for Question 11 is 5 marks)

TOTAL FOR PAPER IS 60 MARKS

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