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.

	Year 4	Year 5	Year 6	Total
Can swim :		21	18	59
Cannot swim :	11	14	12	37
Total :		35	30	96

96-37 = 59

59 − (21+18) = 59-39 = 20

Or fill in year 5 boxes, year 4 total etc.

20

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

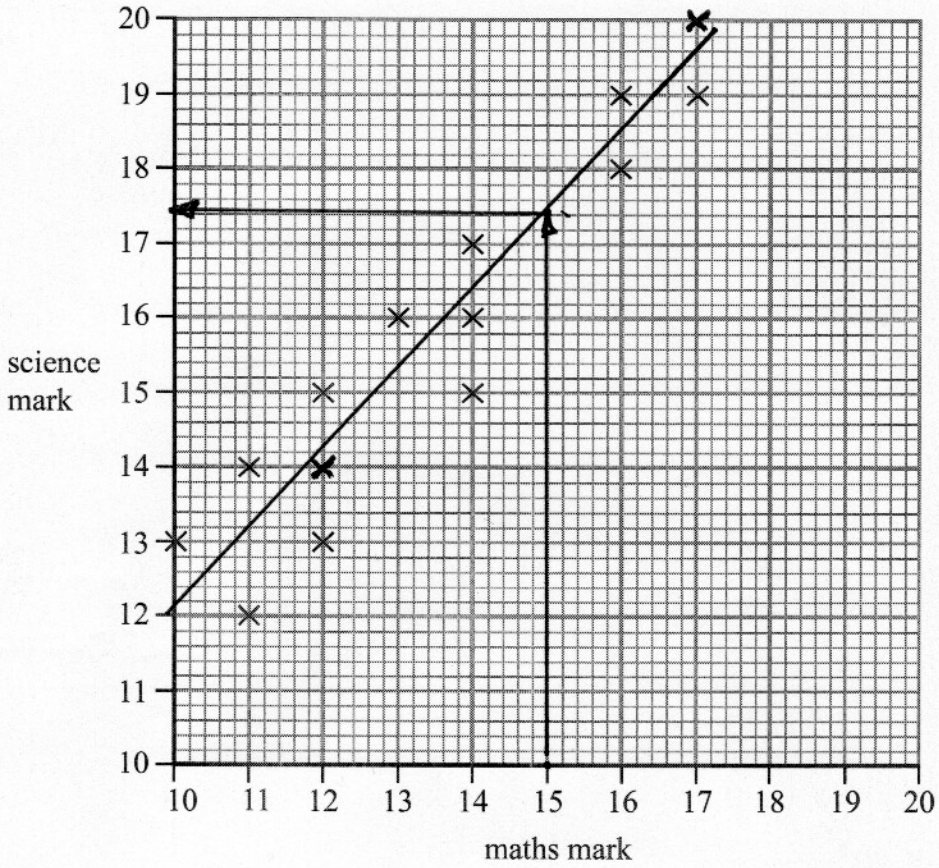
37 − (11+12) = 37-23 = 14

21 + 14 = 35

35

(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?

Positive correlation

(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.

Best fit line suggests 17.4
→ round down to 17

17

(2)

(Total for Question 2 is 4 marks)

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.

2400 × 0.15 = 360 kg water

2400 − 360 = 2040 kg cement, sand & stone

1 + 2 + 5 = 8 parts, 1 part = 2040/8 = 255 kg

cement = 255 kg

2 × 255 = 510 sand = 510 kg

5 × 255 = 1275 stone = 1275 kg

check: 360 + 255 + 510 + 1275 = 2400 ✓.

(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.

For 30 m^3 of concrete they will need 30 × 255
= 7650 kg cement

1 tonne = 1000 kg ∴ they have got 6.5 × 1000
= 6500 kg of cement.

6500 < 7650 so they do <u>not</u> have enough cement.

(3)

(Total for Question 3 is 7 marks)

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	8
15	2 4
16	0 2 4 4 8
17	0 3 4 9

14 | 8 means height = 148 cm

(3)

There are 13 boys in the class.

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

(check: in order ✓)

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.

* Must calculate mean or median } then compare
* Must calculate range or IQR

GIRLS Median = 164 (from stem & leaf)
Range = 179 − 148 = 31

BOYS Median = 170
Range = 184 − 157 = 27

The boys are generally taller than the girls (higher median) but the girls have more variation in their height (larger range).

(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	y	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.

$0.3+y+x+0.1 = 1$

$y+x = 1-0.4 = 0.6$

$P(2) = y = 0.6-x$

$0.6-x$

(2)

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

$0.3+0.1 = 0.4$

0.4

(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

$300x$

(1)

(Total for Question 5 is 4 marks)

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

Categories overlap – should a person aged 40 tick "20 to 40" or "40 to 60"?

question 2

It is a leading question. "You do agree" attempts to influence people.

(2)

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

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

How many pieces of fruit do you eat each day?

☐ 0 ☐ 1 ☐ 2-3 ☐ 4 or more

(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.

Total people in college = 536 + 384 + 48 + 73 = 1041

$\frac{73}{1041}$ of the total are female teachers.

She needs $\frac{73}{1041} \times 100 = 7.01$

$= 7$ female teachers

7

(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.

$1200 \times 1.035^3 = 1330.46$

£ 1330.46

(Total for Question 7 is 3 marks)

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

cum. freq
6
10
34
78
88
92

(a) Write down the modal class interval.

$25 \leqslant t < 30$

(1)

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

Mid-class temperature x	frequency f	fx
12.5	6	75
17.5	4	70
22.5	24	540
27.5	44	1210
32.5	10	325
37.5	4	150
	$\Sigma f = 92$	$\Sigma fx = 2370$

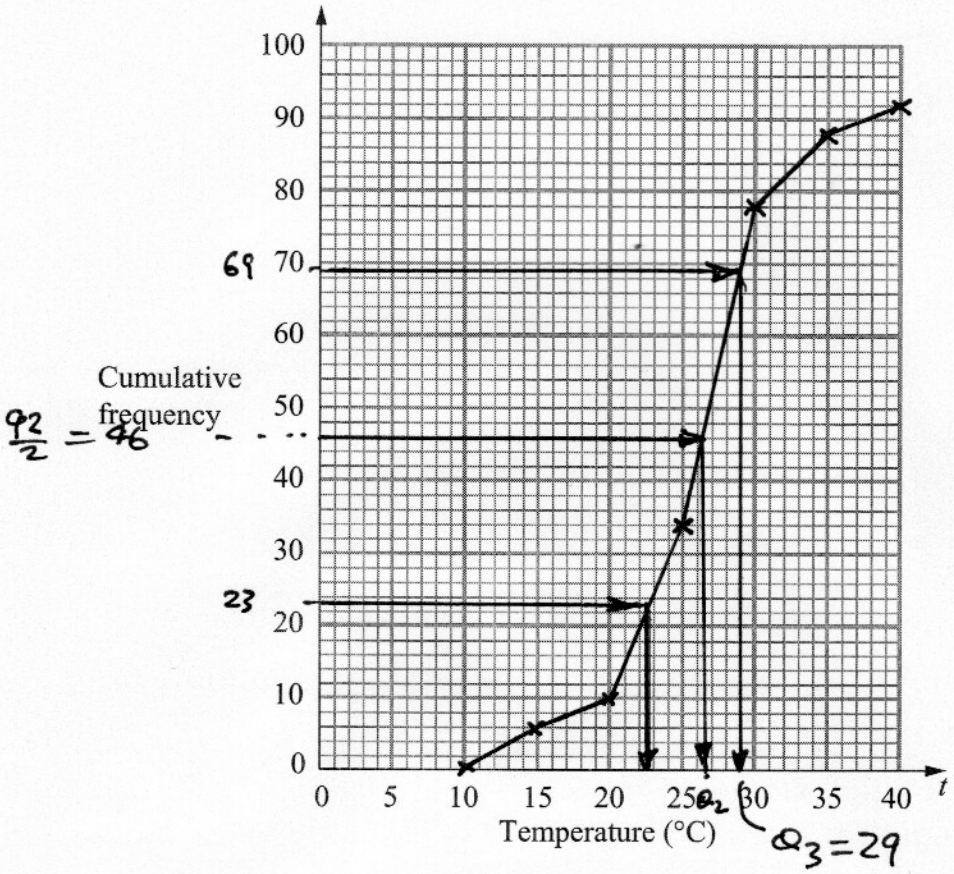
$\bar{x} = \frac{\Sigma fx}{\Sigma f} = \frac{2370}{92} = 25.76$

$= 25.8$ to 3 s.f.

25.8 °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 = 26°C [allow 24.5 → 26.5]
[a curve would give a slightly lower value].
$Q_1 = 22.5°C$, $Q_3 = 29°C$, IQR = 6.5°C

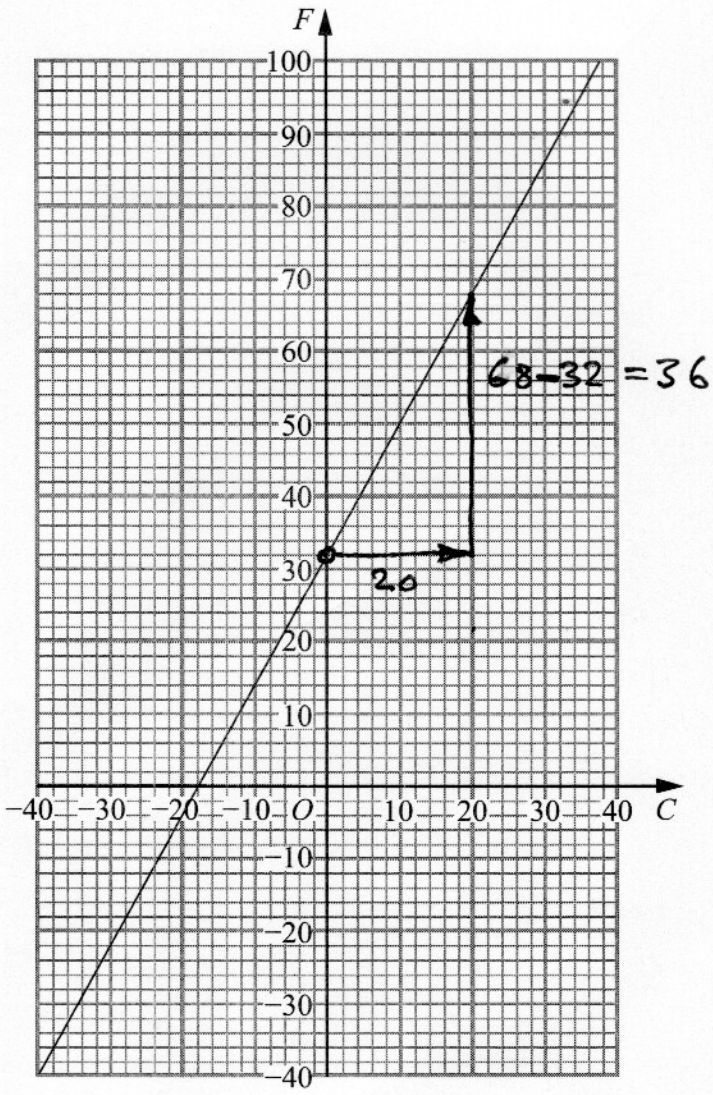
Median ..... 26 ..... °C

Interquartile range ..... 6.5 ..... °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

$$F = mC + k$$

y-intercept = 32°F = k

gradient $m = \frac{\text{up}}{\text{across}} = \frac{36}{20} = 1.8$

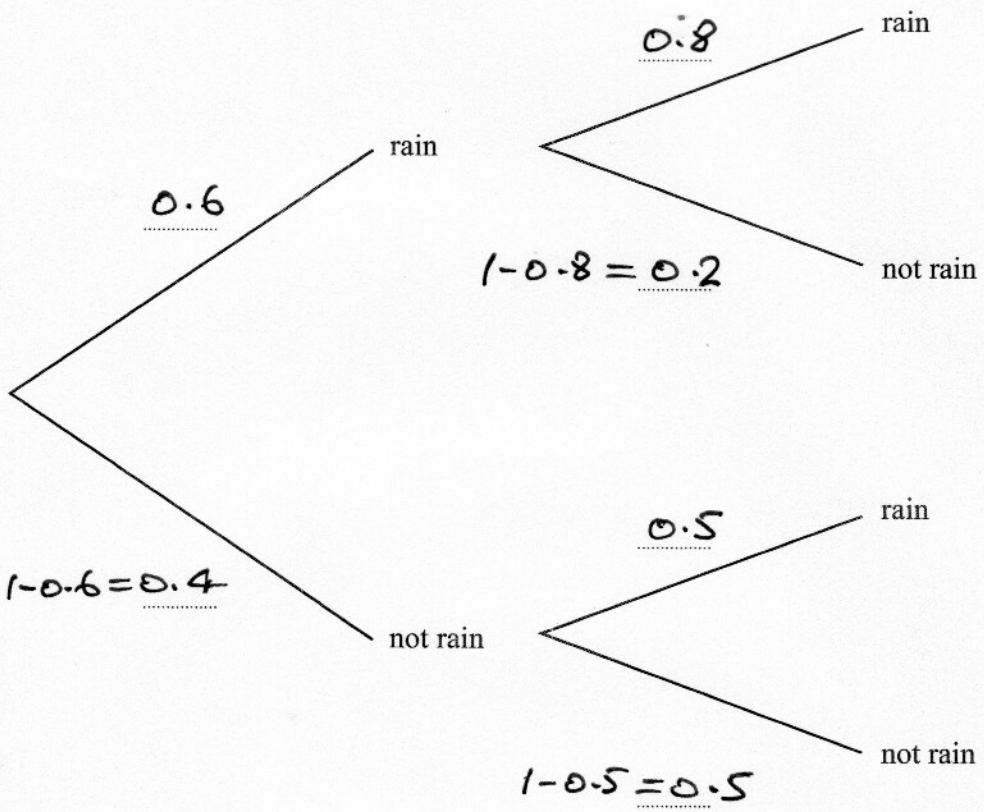
$m =$ 1.8

$k =$ 32 °F

(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



(a) Complete the probability tree diagram.

(2)

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

$0.6 \times 0.8 = 0.48$

0.48

(2)

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

P(does not rain at all) $= 0.4 \times 0.5 = 0.2$

P(rains on at least one day) $= 1 - 0.2 = 0.8$

0.8

(3)

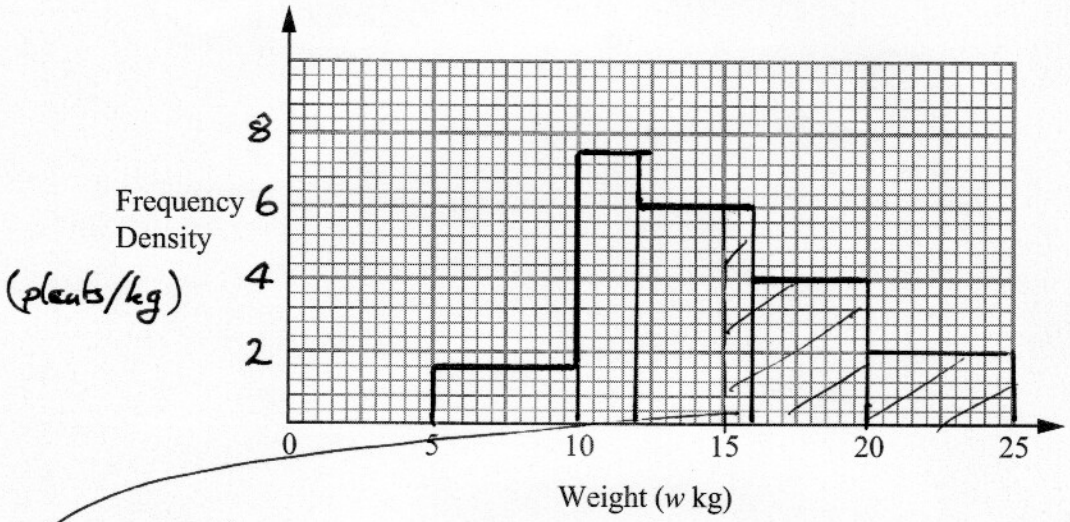
(Total for Question 10 is 7 marks)

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.



(3)

Class width	5	2	4	4	5
Freq. density	$8/5 = 1.6$	$\frac{15}{2} = 7.5$	$\frac{24}{4} = 6$	$\frac{16}{4} = 4$	$\frac{10}{5} = 2$

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

$6 \times 1 + 16 + 10 = 32$

32

(2)

(Total for Question 11 is 5 marks)

TOTAL FOR PAPER IS 60 MARKS