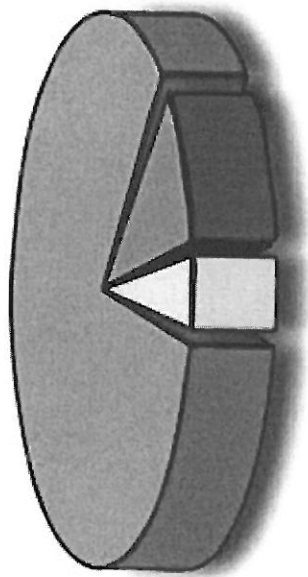
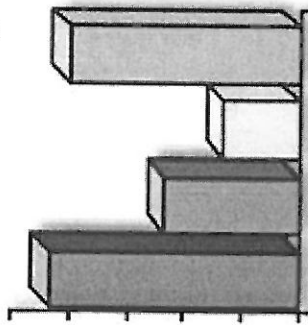
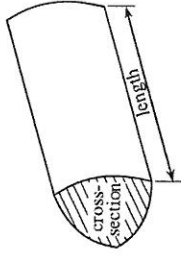


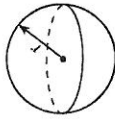
# Handling Data Non Calculator Higher



## Formula List

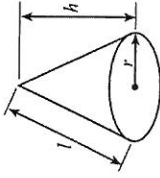


Volume of prism = area of cross-section  $\times$  length



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

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



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

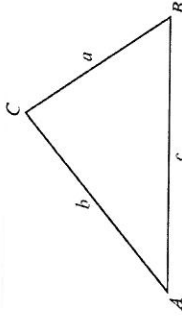
Curved surface area of cone =  $\pi r l$

In any triangle ABC

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

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

Area of triangle =  $\frac{1}{2} ab \sin C$



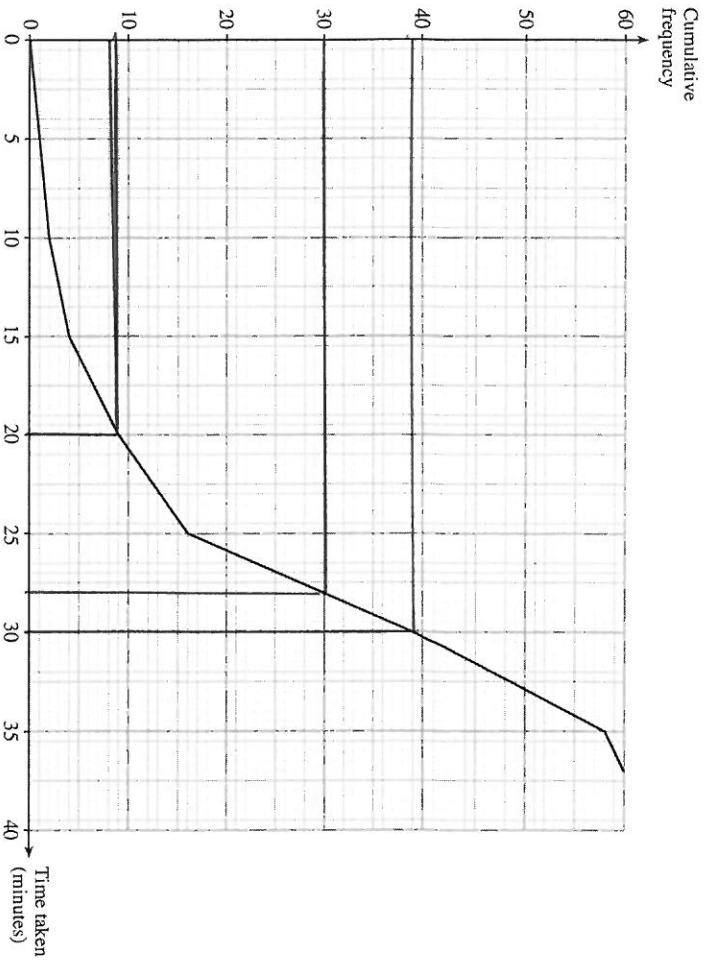
The Quadratic Equation

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

where  $a \neq 0$  are given by

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

17. Each of 60 pupils is given a task and the time taken to complete the task is recorded. The results are summarised in the cumulative frequency polygon below.



Use the cumulative frequency polygon to answer the following questions.

- (a) Find an estimate for the interquartile range.

[2]

- (b) Giving full details, find an estimate for the number of pupils that take between 20 and 30 minutes to complete the task.

$$\leq 20 = 20$$

$$\leq 30 = 39$$

Between 20 & 30 is 30 pupils

[2]

10. Customers collect reward points for shopping at a local supermarket. The following table shows a grouped frequency distribution of the number of points collected by 60 different customers.

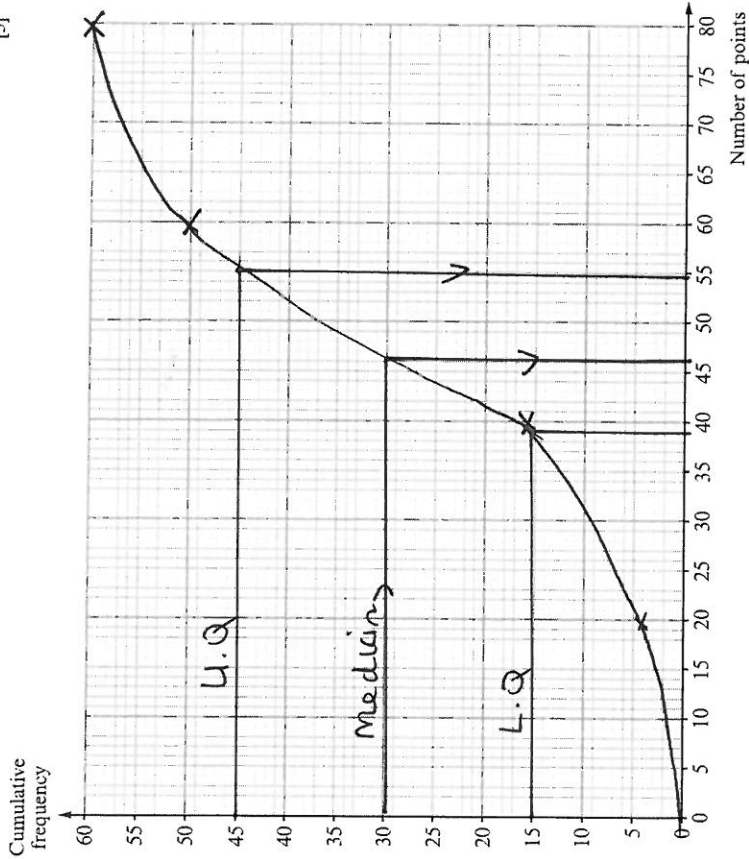
Number of points collected	1 - 20	21 - 40	41 - 60	61 - 80
Number of customers	4	12	34	10

- (a) Complete the following cumulative frequency table.

Number of points collected	$\leq 20$	$\leq 40$	$\leq 60$	$\leq 80$
Cumulative frequency	4	16	50	60

[1]

(b) On the graph paper below, draw a cumulative frequency diagram to show this information. [3]



(c) Use your cumulative frequency diagram to find an estimate for

(i) the median,

46

(ii) the interquartile range.

= 55 - 39

= 16

[3]

13. The table gives the grouped frequency distribution for the masses, each measured to the nearest kilogram, of 60 dogs.

Mass, to the nearest kg	16-20	21-25	26-30	31-35	36-40
Number of dogs	8	26	10	14	2

(a) A dog with a mass of 30.52 kg was included in the grouped frequency distribution. In which group would you expect this mass to be recorded?

31-35

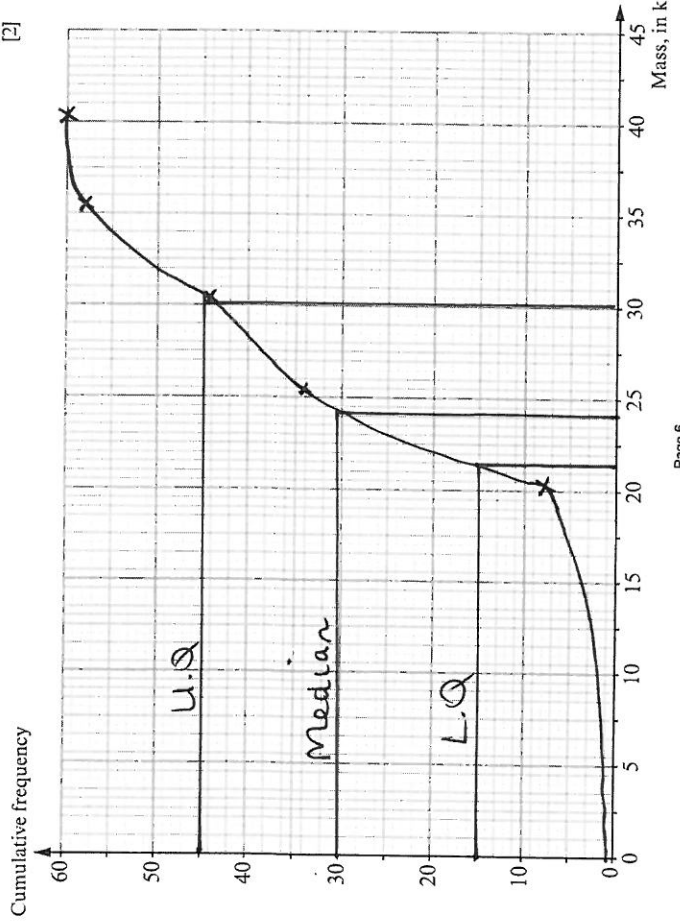
[1]

(b) Complete the following cumulative frequency table.

Mass, kg	<15.5	<20.5	<25.5	<30.5	<35.5	<40.5
Cumulative frequency	0	8	34	44	58	60

[1]

(c) On the graph paper below, draw a cumulative frequency diagram to show this information. [2]



(d) Use your cumulative frequency diagram to find

(i) the median, 24

(ii) the interquartile range, 1.9.8 = 30.8 - 21.5

8.5

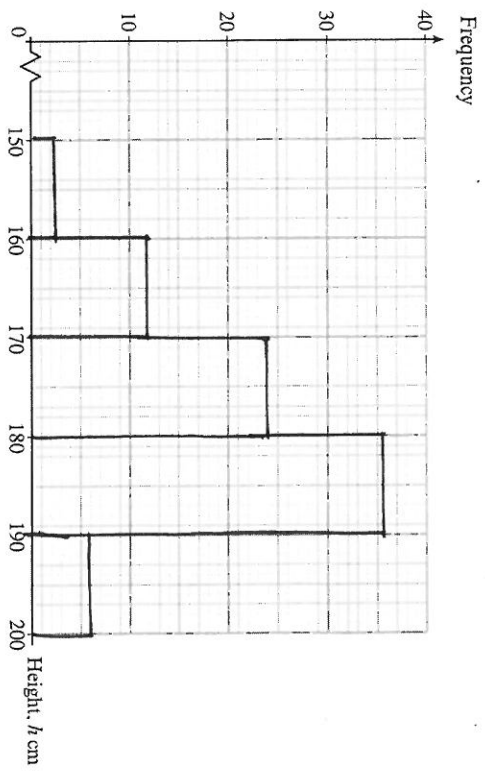
[3]

9. The heights of 80 men were measured in centimetres. The table below shows a grouped frequency distribution of the results.

Height, $h$ cm	$150 < h \leq 160$	$160 < h \leq 170$	$170 < h \leq 180$	$180 < h \leq 190$	$190 < h \leq 200$
Frequency	2	12	24	36	6

(a) On the graph paper below, draw a frequency polygon to show this data.

[2]

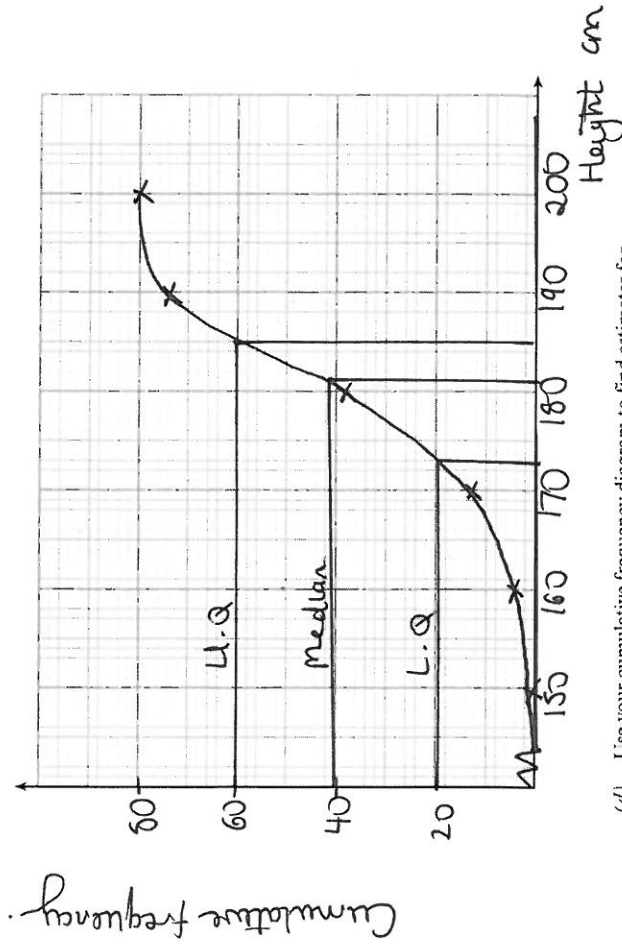


(b) Complete the following cumulative frequency table.

Height, $h$ cm	$h \leq 150$	$h \leq 160$	$h \leq 170$	$h \leq 180$	$h \leq 190$	$h \leq 200$
Cumulative frequency	0	2	14	36	74	80

[1]

(c) Use the graph paper below to draw a cumulative frequency diagram for these heights. [4]



(d) Use your cumulative frequency diagram to find estimates for

(i) the median,

181

(ii) the interquartile range,

$$= 185 - 173$$

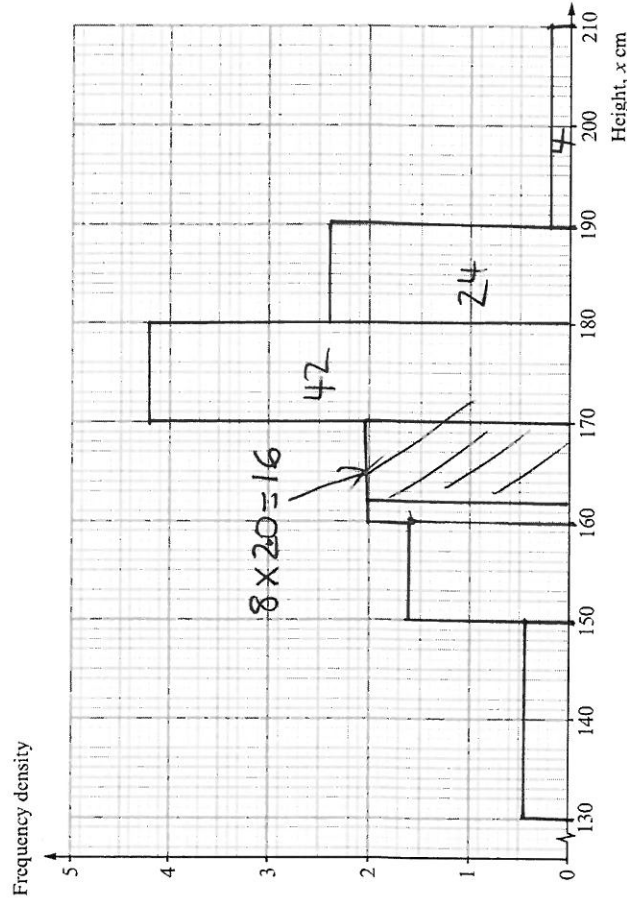
12

[3]

12. The heights of a group of people are summarised in the grouped frequency distribution below.

Width	Height, $x$ cm	Number of people	Frequency density
20	$130 \leq x < 150$	8	0.4
10	$150 \leq x < 160$	16	1.6
10	$160 \leq x < 170$	20	2
10	$170 \leq x < 180$	42	4.2
10	$180 \leq x < 190$	24	2.4
20	$190 \leq x < 210$	4	0.2

(a) Complete the frequency density column in the table and draw a histogram. [3]



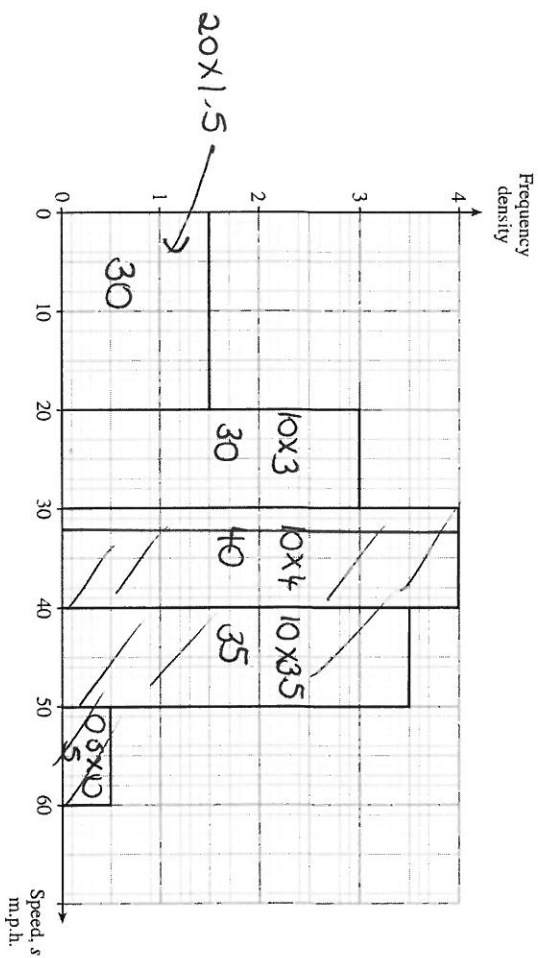
(b) Calculate an estimate for the number of people in the group whose heights are at least 162 cm.

$$16 + 42 + 24 + 4 = 86 \text{ people}$$

are 162 cm or taller

[3]

13. A survey was carried out to record the speeds of cars entering a village. The histogram illustrates the results of the survey.



(a) Use the histogram to complete the grouped frequency table below.

Speed, $s$ m.p.h.	$0 < s \leq 20$	$20 < s \leq 30$	$30 < s \leq 40$	$40 < s \leq 50$	$50 < s \leq 60$
Frequency	30	30	40	35	5

[2]

(b) Calculate an estimate of the number of cars with speeds exceeding 32 m.p.h.

$$8 \times 4 = 32$$

$$35$$

$$5$$

$$\frac{72}{5} \text{ cars}$$

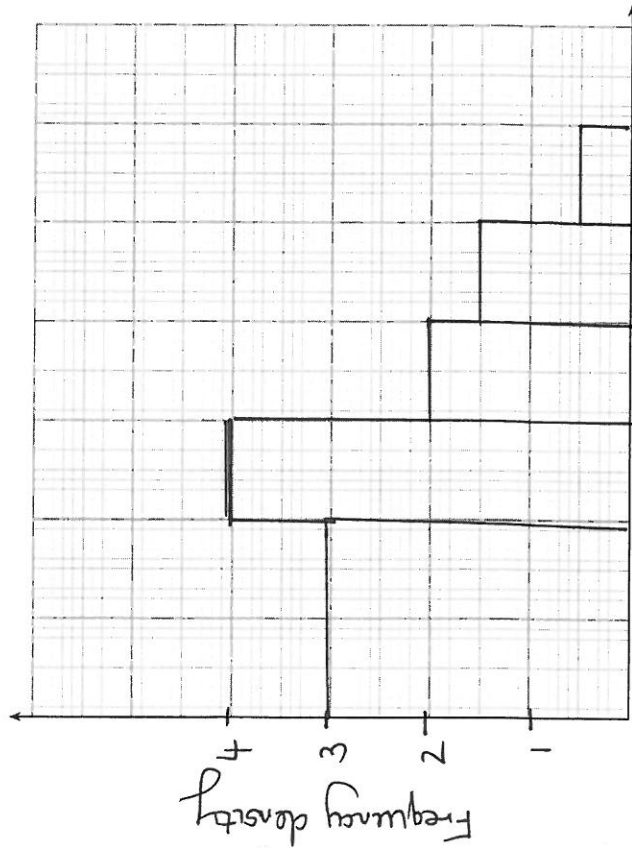
[3]

- (c) A further survey was carried out after the placement of a speed camera warning sign. The results are summarised in the grouped frequency distribution below.

Speed, $s$ m.p.h.	$0 < s \leq 20$	$20 < s \leq 30$	$30 < s \leq 40$	$40 < s \leq 50$	$50 < s \leq 60$
Frequency	60	40	20	15	5
Frequency density	$60 \div 20 = 3$	$40 \div 10 = 4$	$20 \div 10 = 2$	$15 \div 10 = 1.5$	$5 \div 10 = 0.5$

Draw a histogram to illustrate the results of this survey.

[3]



- (d) Compare the two histograms. Do you consider the speed camera warning sign to have been effective? Give a reason for your answer.

Before cameras, 50 cars above 30mph.  
Now cameras 40 cars above 30mph.  
Therefore warning sign has reduced speeding by half.

[1]

14. A bag contains 11 marbles. There are 3 yellow, 3 blue and 5 red marbles in the bag. Two marbles are selected at random from the bag.

(a) Calculate the probability that both the selected marbles are blue.

BB.

$$\frac{3}{11} \times \frac{2}{10} = \frac{6}{110}$$

[2]

(b) Calculate the probability that exactly one of the selected marbles is red.

(Red anything) RA =  $\frac{5}{11} \times \frac{6}{10} = \frac{30}{110}$

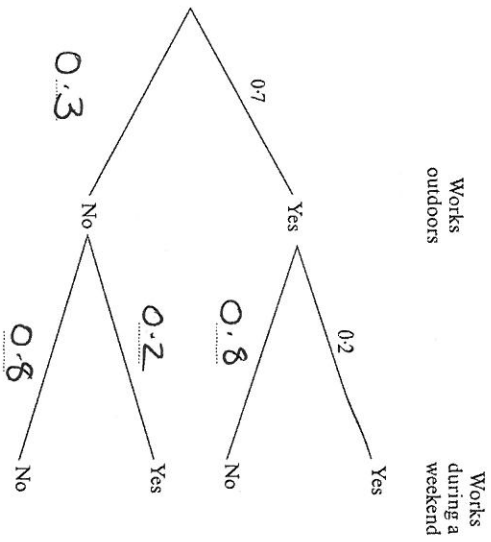
(Anything red) AR =  $\frac{6}{11} \times \frac{5}{10} = \frac{30}{110}$

So 1 red =  $\frac{60}{110} = \frac{6}{11}$ .

[3]

7. Sasha works for a garden centre.  
 In any given week the probability that she works outdoors is 0.7.  
 The probability that she works during a weekend is 0.2.  
 Working outdoors and working weekends are independent events.

(a) Complete the following tree diagram.



[2]

(b) Calculate the probability that next weekend Sasha will work outdoors.

Outdoor & works weekend

$$= 0.7 \times 0.2$$

$$= 0.14$$

[2]

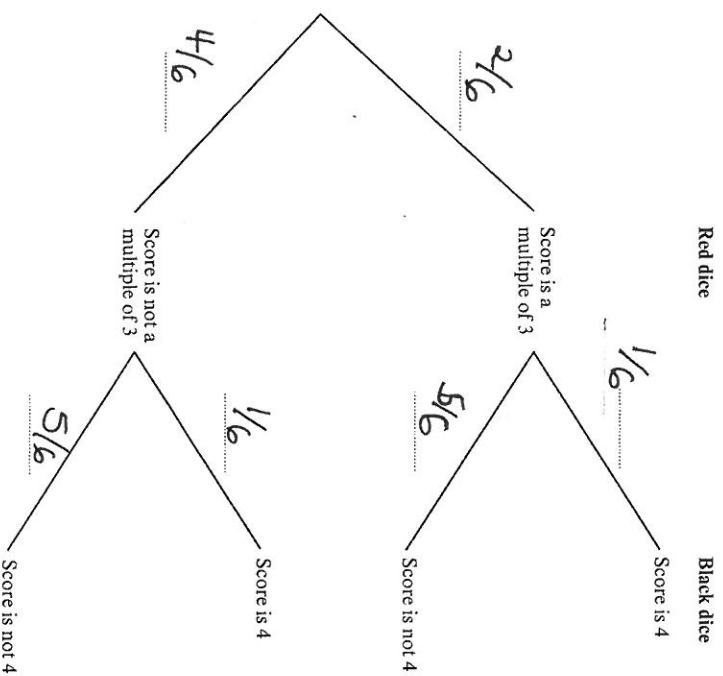
11. Katlyn throws two fair dice, one coloured red and the other coloured black.  
 She makes a note of the score on each dice.

(a) Calculate the probability that Katlyn gets a double five.

$$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$$

[2]

(b) (i) Complete the following probability tree diagram to show the probabilities of events.



[3]



- (ii) Calculate the probability of Katlyn scoring a multiple of 3 on the red dice and getting a score of 4 on the black dice.

$$\frac{2}{6} \times \frac{1}{6} = \frac{2}{36}$$

[2]

24. A box contains 2 strawberry yogurts, 4 vanilla yogurts and 6 cherry yogurts. Three yogurts are selected at random from the box. Calculate the probability that at least one of the selected yogurts is a cherry yogurt.

$$2S \quad 4V \quad 6C$$

$$\text{No cherrys} = \frac{6 \times 5 \times 4}{12 \times 11 \times 10}$$

$$= \frac{120}{1320}$$

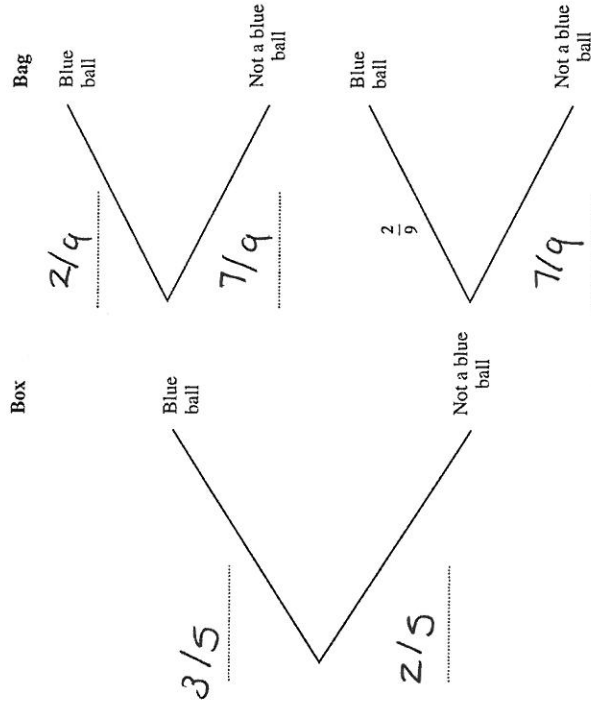
$$\text{At least one cherry} = \frac{1200}{1320}$$

$$\left(1 - \frac{120}{1320}\right)$$

[3]

17. A box and a bag contain coloured balls identical except for their colour. When a ball is drawn at random from the box the probability that the ball is blue is  $\frac{3}{5}$ . When a ball is drawn at random from the bag the probability that the ball is blue is  $\frac{2}{9}$ . Hywel draws one ball at random from the box and one ball at random from the bag.

- (a) Complete the following tree diagram.



- (b) Calculate the probability that neither of the balls drawn is blue.

$$\bar{B}\bar{B} = \frac{2}{5} \times \frac{7}{9} = \frac{14}{45}$$

[2]

12. A box contains 20 marbles, of which 2 are red, 3 are yellow and 15 are black. Two marbles are selected at random, without replacement, from the box. What is the probability that exactly one of the marbles is black?

ZR 3Y 15B

$$AB = \frac{5}{20} \times \frac{15}{19} = \frac{75}{380}$$

$$BA = \frac{15}{20} \times \frac{5}{19} = \frac{75}{380} \quad \left. \vphantom{BA} \right\} \text{add.}$$

$$\text{One Black} = \frac{150}{360}.$$

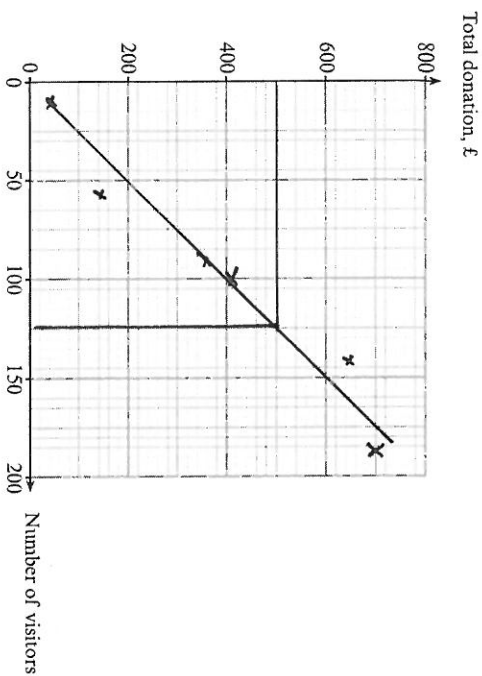
[4]

1. The number of visitors to a historical site and the total donation given were recorded each weekend for 6 weeks. The table below shows the results.

Number of visitors	90	140	10	60	100	180
Total donation, £	360	650	40	150	410	700

- (a) On the graph paper provided draw a scatter diagram of these results.

[2]



- (b) Describe the correlation between the number of visitors and the total donation.

Positive correlation

[1]

- (c) Draw, by eye, a line of best fit on your scatter diagram.

[1]

- (d) Use your line of best fit to find an estimate for the number of visitors to the historical site on a weekend when the total donation was £500.

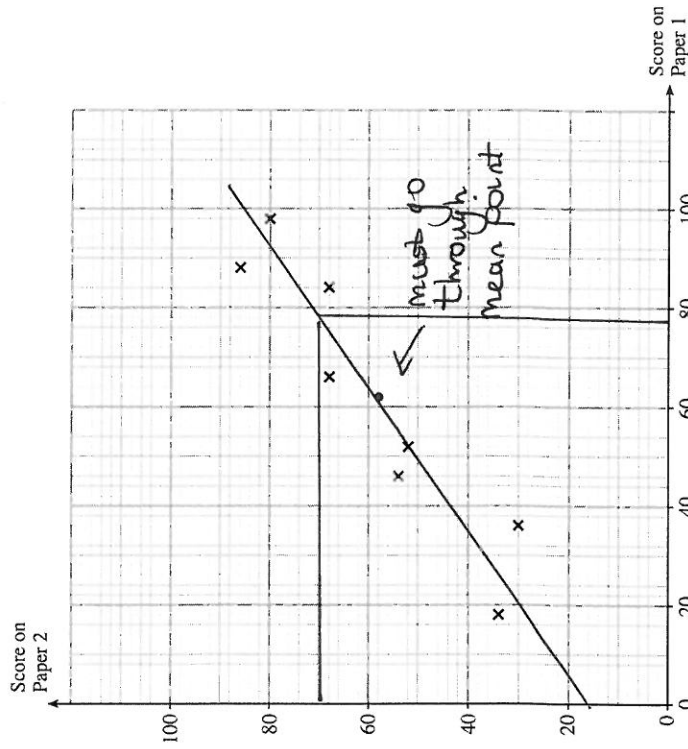
125 visitors

[1]

8. The table shows the pairs of scores obtained by 8 pupils on Paper 1 and Paper 2 of a mathematics examination.

Pupil	1	2	3	4	5	6	7	8
Paper 1	18	36	88	66	98	46	52	84
Paper 2	34	30	86	68	80	54	52	68

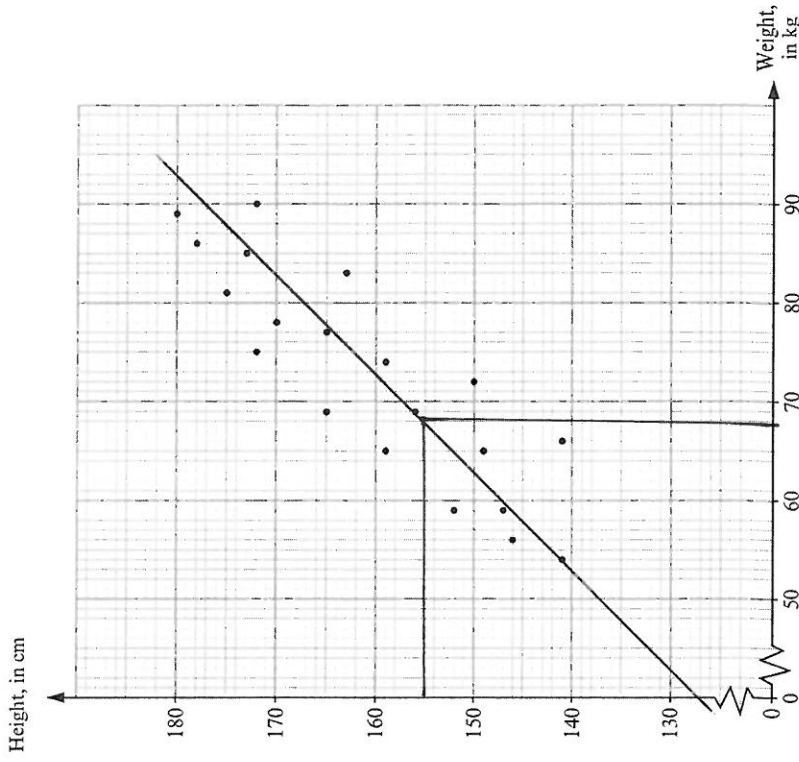
A scatter diagram for these results is shown below.



- (a) The mean mark for the pupils on Paper 1 is 61 and the mean mark on Paper 2 is 59. Draw a line of best fit on your scatter diagram. [2]
- (b) Another pupil sat Paper 1 and was given a mark of 78, but was absent for Paper 2. Use your line of best fit to estimate the mark on Paper 2 for this pupil. [1]

72

2. The scatter diagram shows the height, in cm, and the weight, in kg, for each of 20 members of a sports club.



- (a) Write down the height and weight of the heaviest of the 20 members of the sports club.

Weight ..... kg  
 Height 90 ..... cm  
 Height 174 ..... cm [2]

(b) Write down the type of correlation shown by the scatter diagram.

Positive correlation

[1]

(c) Draw, by eye, a line of best fit on the scatter diagram.

[1]

(d) Estimate the weight of a person of height 155 cm.

68 kg

[1]

(e) Is it possible to estimate the weight of a person with a height of 210 cm from the scatter diagram? You must give a reason for your answer.

No outside range of correlation

[1]