Chapter 9

Statistics

01. 0580_m24_qp_42 Q: 3

(a) The table shows information about the marks gained by each of 10 students in a test.

Mark	15	16	17	18	19	20
Frequency	4	1	2	1	0	2

(i) Calculate the range.

..... [1]

(ii) Calculate the mean.

..... [3]

(iii) Find the median.

..... [1]

(iv) Write down the mode.

..... [1]

(b) Paulo's mean mark for 7 homework tasks is 17.
After completing the 8th task, his mean mark is 17.5 .

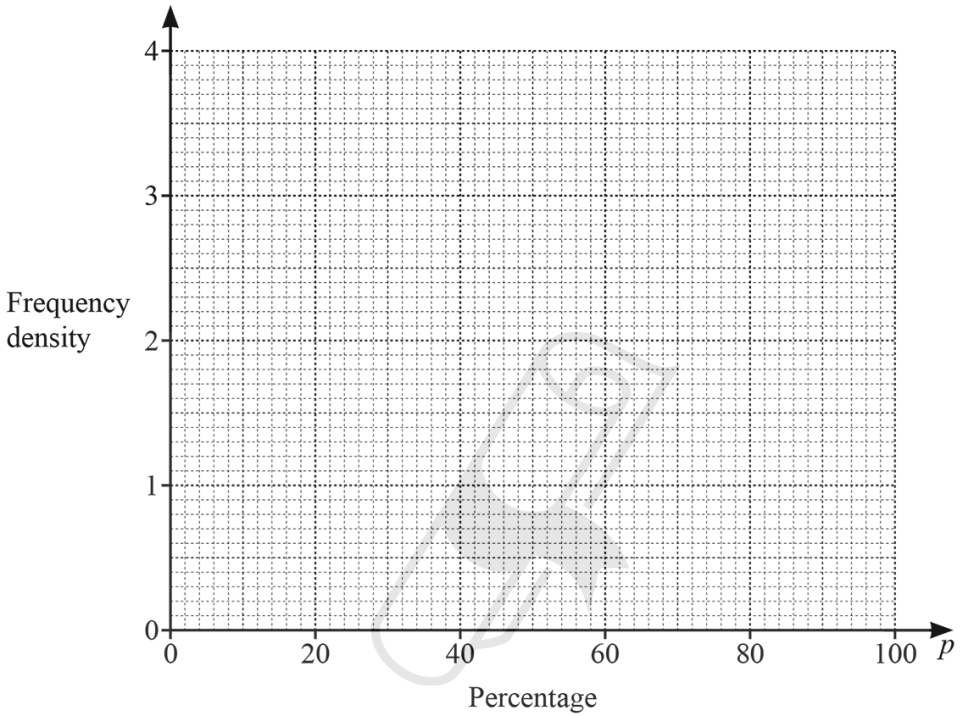
Calculate Paulo's mark for the 8th task.

..... [3]

(c) The table shows the percentage scored by each of 100 students in their final exam.

Percentage (p)	$0 < p \leqslant 30$	$30 < p \leqslant 50$	$50 < p \leqslant 60$	$60 < p \leqslant 70$	$70 < p \leqslant 100$
Frequency	12	18	35	20	15

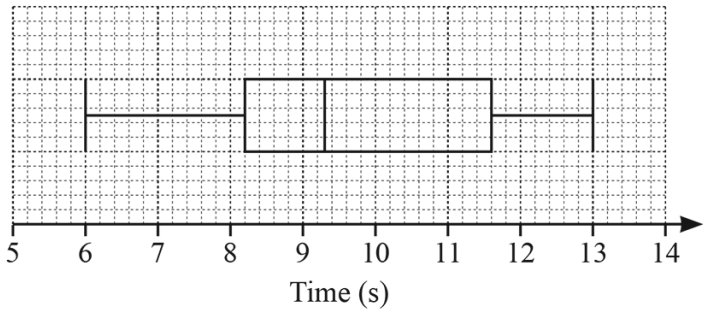
On the grid, draw a histogram to show this information.



[4]

02. 0580_s24_qp_41 Q: 4

(a) Jianyu records the time, in seconds, that some cars take to travel 195 m.
The box and whisker plot shows this information.



(i) Find the median time.

..... s [1]

(ii) Find the interquartile range.

..... s [1]

(iii) Find the difference between the average speed of the fastest car and the average speed of the slowest car.
Give your answer in **kilometres per hour**.

..... km/h [5]

(b) Matilda records the distances that 80 different cars can travel with a full tank of fuel.
The table shows this information.

Distance (d km)	$250 < d \leqslant 300$	$300 < d \leqslant 400$	$400 < d \leqslant 420$	$420 < d \leqslant 450$	$450 < d \leqslant 500$
Frequency	7	13	19	21	20

(i) Write down the class interval that contains the median.

..... $< d \leqslant$ ..... [1]

(ii) Calculate an estimate of the mean.

..... km [4]

(iii) A histogram is drawn to show the information in the table.
The height of the bar for the interval $250 < d \leqslant 300$ is 2.8 cm.

Calculate the height of the bar for each of the following intervals.

$300 < d \leqslant 400$ ..... cm

$400 < d \leqslant 420$ ..... cm

$420 < d \leqslant 450$ ..... cm [3]

(iv) Two of the 80 cars are chosen at random.

Find the probability that, with a full tank of fuel, one of the cars can travel more than 450 km and the other car can travel **not** more than 300 km.

..... [3]

03. 0580_s24_qp_43 Q: 3

(a) Rahul rolls a dice 60 times.
The results are shown in the table.

Score	1	2	3	4	5	6
Frequency	10	6	11	13	14	6

Find the mode, the median and the mean.

mode = ...

median = ...

mean = ... [5]

(b) Sangita measures the speed of each of 100 cars.
The results are shown in the table.

Speed (v km/h)	$20 < v \leqslant 30$	$30 < v \leqslant 50$	$50 < v \leqslant 75$
Frequency	10	72	18

(i) Calculate an estimate of the mean speed.

..... km/h [4]

(ii) Sangita draws a histogram to show the information in the table.
The height of the bar that represents $20 < v \leqslant 30$ is 3 cm.

Calculate the height of each of the other two bars on this histogram.

height of bar for $30 < v \leqslant 50$ ..... cm

height of bar for $50 < v \leqslant 75$ ..... cm [2]

04. 0580_m23_qp_42 Q: 2

(a) 100 students take part in a reaction test.
The table shows the results.

Reaction time (seconds)	6	7	8	9	10	11
Number of students	3	32	19	29	11	6

(i) Write down the mode.

..... s [1]

(ii) Find the median.

..... s [1]

(iii) Calculate the mean.

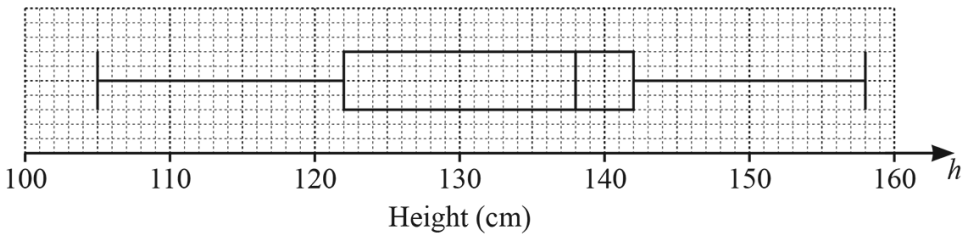
..... s [3]

(iv) Two students are chosen at random.

Find the probability that both their reaction times are greater than or equal to 9 seconds.

..... [2]

(b) The box-and-whisker plot shows the heights, h cm, of some students.



(i) Find the range.

..... cm [1]

(ii) Find the interquartile range.

..... cm [1]

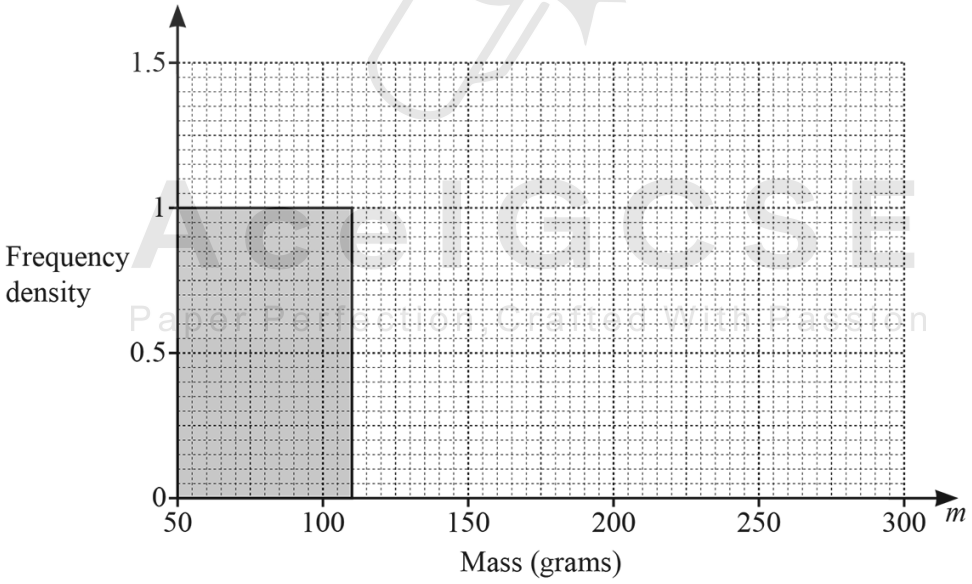
(c) The mass of each of 200 potatoes is measured.
The table shows the results.

Mass (m grams)	$50 < m \leqslant 110$	$110 < m \leqslant 200$	$200 < m \leqslant 300$
Frequency	60	99	41

(i) Calculate an estimate of the mean.

..... g [4]

(ii) Complete the histogram to show the information in the table.



[2]

05. 0580_s23_qp_41 Q: 1

(a) An orchard has 1250 trees.
The trees are in the ratio apple : pear : cherry = 12 : 9 : 4.

(i) Calculate the number of apple trees.

..... [2]

(ii) Last year in the orchard, the mean mass of fruit produced was 64 kg per tree.

Calculate the total mass of fruit produced last year.
Give your answer in tonnes.
[1 tonne = 1000 kg]

..... tonnes [2]

(iii) Last year, the mean mass of pears produced was 54 kg per tree.
This was a decrease of 10% on the mean mass of pears produced per tree from the year before.

Calculate the mean mass of pears produced by each pear tree the year before.

..... kg [2]

(iv) The orchard loses $\frac{1}{5}$ of its total number of trees in a storm.

Calculate the number of trees that remain.

..... [2]

(b) Paulo buys some pears from a market.
Pears cost \$0.54 each or 0.51 euros each.

(i) Paulo pays **in dollars** for 12 pears.

Calculate the change he receives from \$10.

\$ ..... [2]

(ii) The exchange rate is \$1 = 0.826 euros.

Calculate how much more Paulo pays for **each** pear when he pays in euros.
Give your answer in dollars, correct to the nearest cent.

\$ ..... [3]

06. 0580_s23_qp_41 Q: 3

(a) The table shows information about the mass of each of 1000 eggs.

Mass (m grams)	$40 < m \leqslant 50$	$50 < m \leqslant 56$	$56 < m \leqslant 64$	$64 < m \leqslant 70$
Frequency	126	520	154	200

(i) Calculate an estimate of the mean.

..... g [4]

(ii) An egg is picked at random from the 1000 eggs.

Find the probability that this egg has a mass greater than 56 g.
Give your answer as a fraction in its simplest form.

..... [2]

(b) One year, a farmer makes a profit of $24 730 selling eggs.

Write this profit

(i) correct to 2 significant figures

$ ..... [1]

(ii) in standard form.

$ ..... [1]

(c) On a farm, there are 500 hens, correct to the nearest 10.

(i) In one year, the mean number of eggs laid per hen was 320 eggs, correct to the nearest 20.

Calculate the upper bound for the total number of eggs all the hens lay in that year.

..... [3]

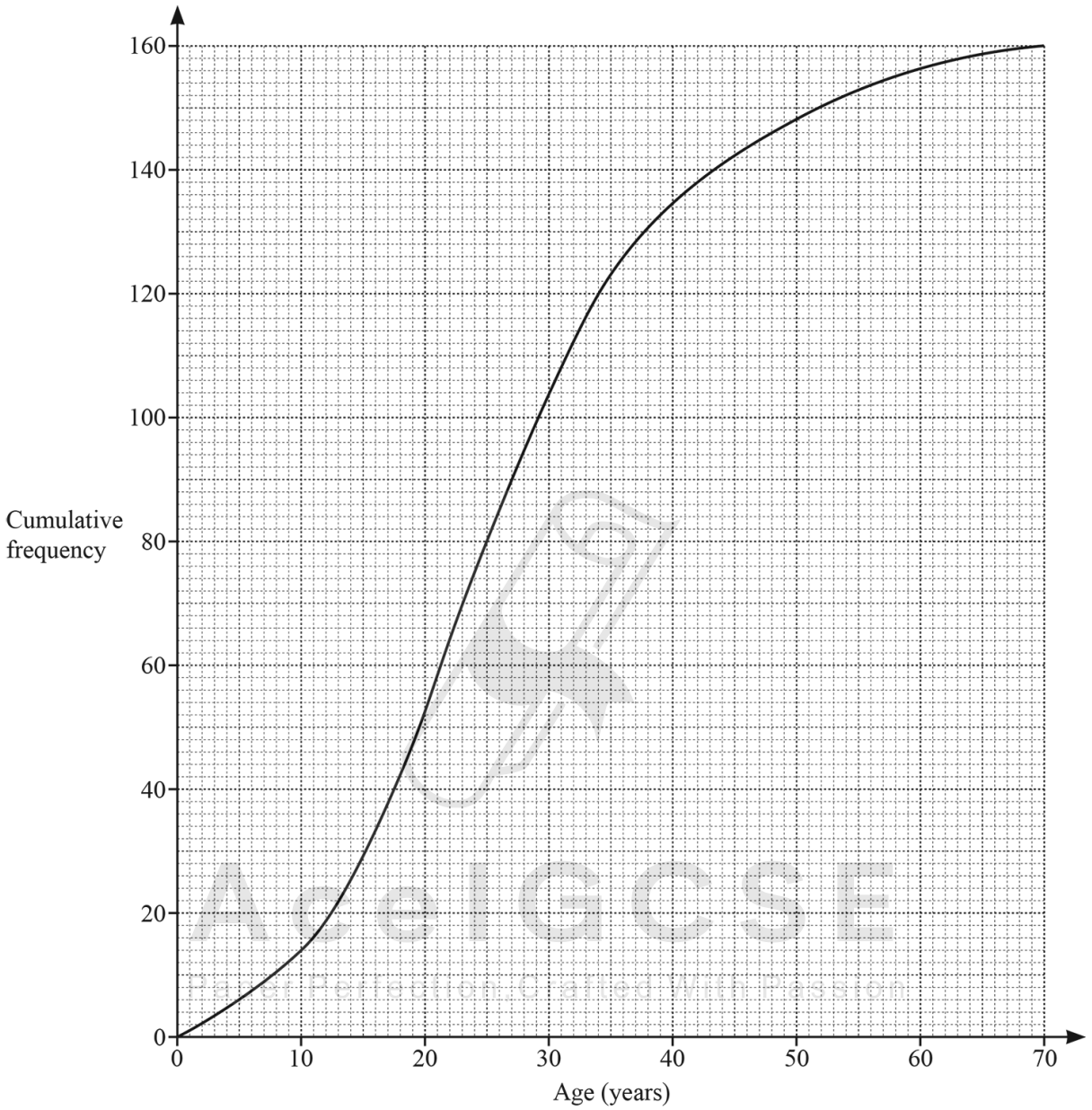
(ii) Another farm has 800 hens, correct to the nearest 20.

Calculate the lower bound for the difference between the number of hens on the two farms.

..... [2]

07. 0580_s23_qp_41 Q: 5

(a) There are 160 people in a village.
The cumulative frequency diagram shows information about their ages.



(i) Find an estimate for

(a) the median age

..... [1]

(b) the lower quartile

..... [1]

(c) the number of people who are 50 or more years of age

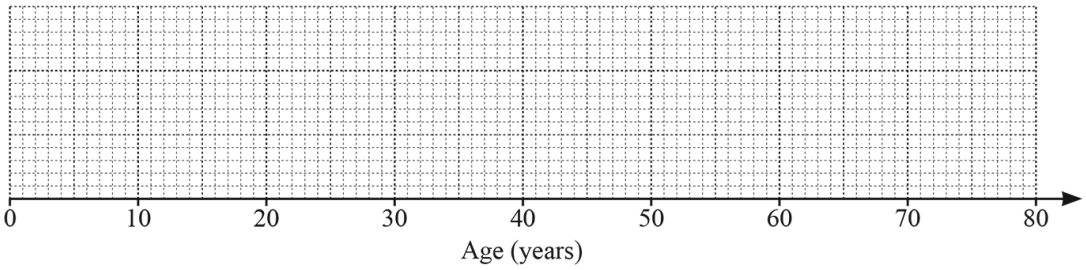
..... [2]

(d) the 65th percentile.

..... [2]

(ii) The youngest person in the village is 1 year old and the oldest is 70 years old.

(a) Draw a box-and-whisker plot to show the distribution of ages in the village.



[3]

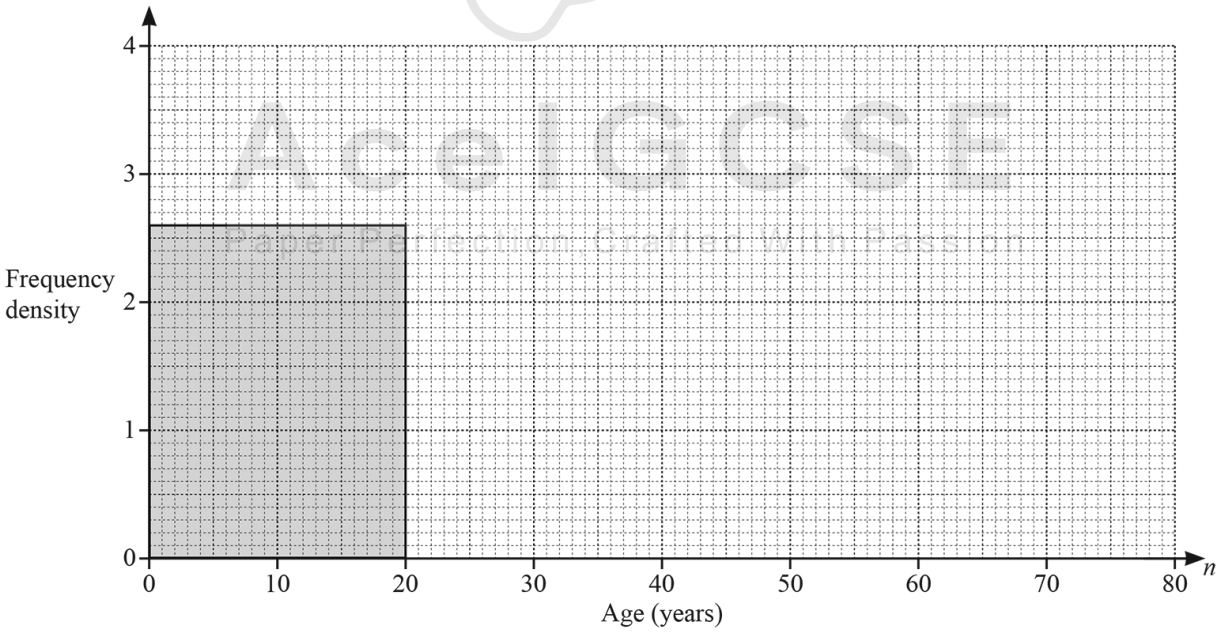
(b) Write down an estimate of the percentage of people in the village that are younger than the median age.

..... % [1]

(b) The frequency table shows information about the age of each person in another village.

Age (n years)	$0 < n \leqslant 20$	$20 < n \leqslant 30$	$30 < n \leqslant 50$	$50 < n \leqslant 80$
Frequency	52	37	24	60

On the grid, complete the histogram to show this information.
The first block has been drawn for you.



[3]

08. 0580_s23_qp_42 Q: 4
The table shows information about the heights of 80 children.

Height (h metres)	$1.2 < h \leqslant 1.4$	$1.4 < h \leqslant 1.5$	$1.5 < h \leqslant 1.65$	$1.65 < h \leqslant 1.8$	$1.8 < h \leqslant 1.9$
Frequency	2	13	24	32	9

(a) (i) Write down the interval containing the median.

..... $< h \leqslant$ ..... [1]

(ii) Calculate an estimate of the mean height.

..... m [4]

(b) (i) One of these children is chosen at random.
Calculate the probability that they have a height of 1.4 m or less.

..... [1]

(ii) Two of these children are chosen at random.
Calculate the probability that both children are taller than 1.5 m but only one of them is taller than 1.8 m.

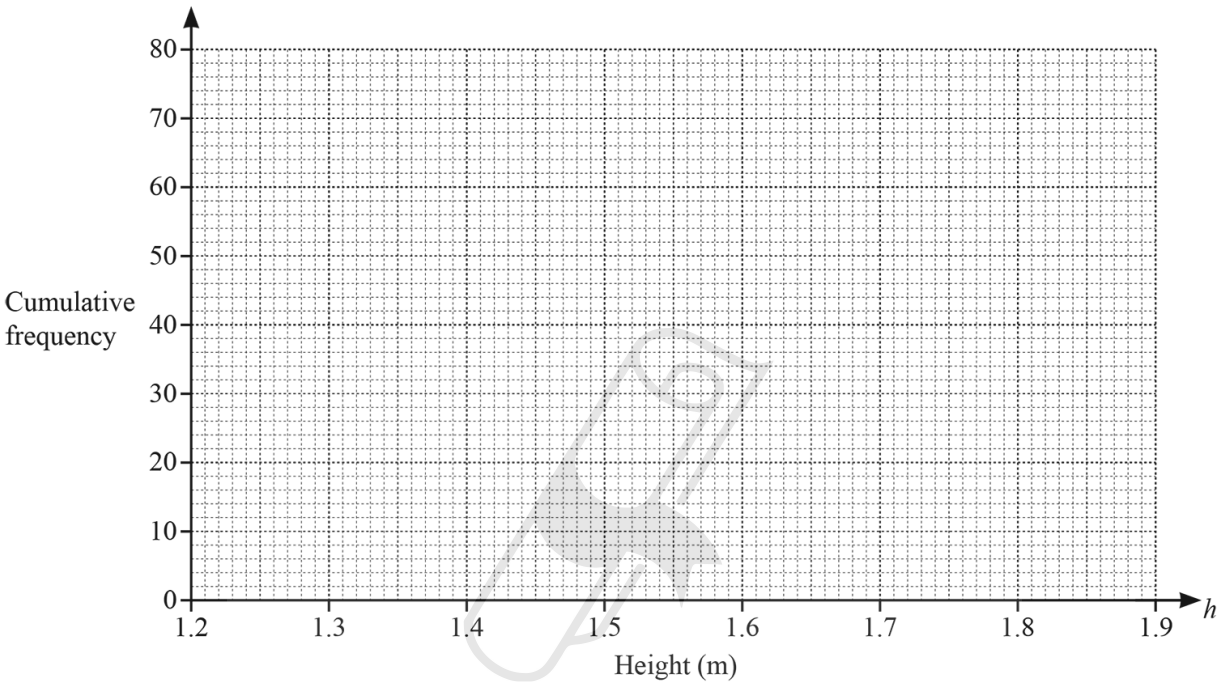
..... [3]

(c) **(i)** Complete the cumulative frequency table for the heights.

Height (h metres)	$h \leqslant 1.4$	$h \leqslant 1.5$	$h \leqslant 1.65$	$h \leqslant 1.8$	$h \leqslant 1.9$
Cumulative frequency	2				

[2]

(ii) On the grid, draw the cumulative frequency diagram.



[3]

(d) Use your diagram to find an estimate of

(i) the interquartile range

..... m [2]

(ii) the 60th percentile.

..... m [2]

09. 0580_s23_qp_43 Q: 2

(a) Anna records the number of text messages she receives for 14 days.

17	15	31	38	31	22	13
18	21	27	28	21	31	29

(i) Complete the stem-and-leaf diagram.

1	
2	
3	

Key: .....

[3]

(ii) Find the median.

..... [1]

(iii) Find the mode.

..... [1]

(iv) Find the range.

..... [1]

(b) In a shop, there are 4 red and 8 grey phones.
Anna and Pete each pick one of these phones at random.

Work out the probability that they both pick a grey phone.

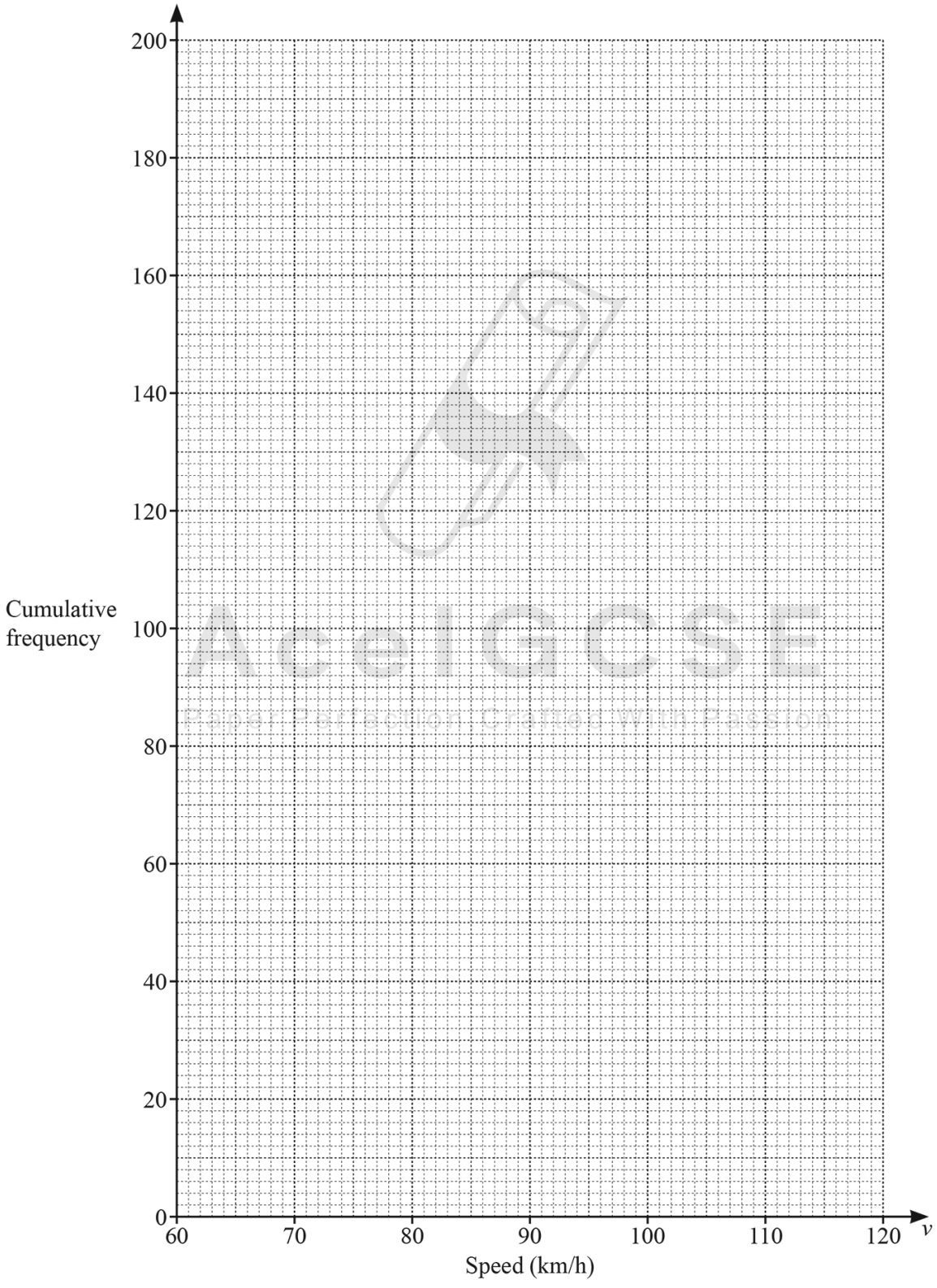
..... [2]

10. 0580_s23_qp_43 Q: 6

(a) The cumulative frequency table shows information about the speed of each of 200 cars as they pass a speed camera.

Speed (v km/h)	$v \leqslant 70$	$v \leqslant 80$	$v \leqslant 90$	$v \leqslant 95$	$v \leqslant 100$	$v \leqslant 120$
Cumulative frequency	12	46	115	155	177	200

(i) On the grid, draw the cumulative frequency diagram.



[3]

(ii) Use your cumulative frequency diagram to find an estimate of

(a) the median

..... km/h [1]

(b) the interquartile range

..... km/h [2]

(c) the number of cars with a speed greater than 110 km/h.

..... [2]

(b) The frequency table shows information about the mass of each of 50 trucks.

Mass (m kg)	$2000 < m \leqslant 2600$	$2600 < m \leqslant 3500$	$3500 < m \leqslant 5000$	$5000 < m \leqslant 5700$
Frequency	12	15	16	7

(i) Calculate an estimate for the mean mass of the trucks.

..... kg [4]

(ii) In a histogram showing this information, the height of the first block is 6 cm.

Calculate the heights of the remaining three blocks.

Height of block for $2600 < m \leqslant 3500$ ..... cm

Height of block for $3500 < m \leqslant 5000$ ..... cm

Height of block for $5000 < m \leqslant 5700$ ..... cm [3]

11. 0580_w23_qp_41 Q: 7

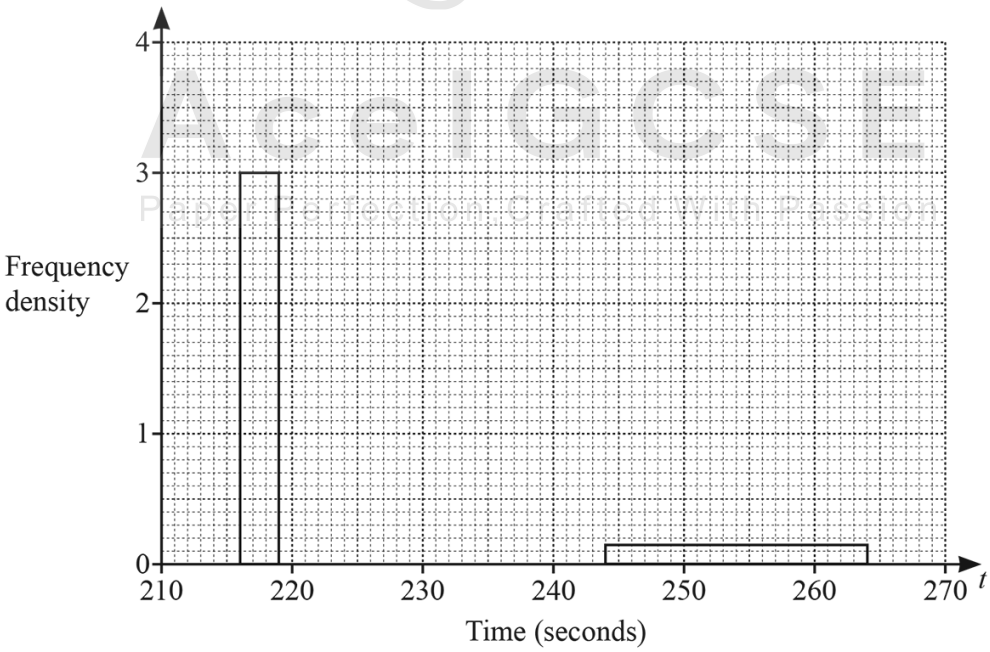
The frequency table shows the time of each of 42 athletes in a race.

Time (t seconds)	Number of athletes
$216 < t \leqslant 219$	9
$219 < t \leqslant 224$	14
$224 < t \leqslant 234$	14
$234 < t \leqslant 244$	2
$244 < t \leqslant 264$	3

(a) Calculate an estimate of the mean time.

..... seconds [4]

(b) Complete the histogram to show the information in the frequency table.
Two of the blocks have been drawn for you.



[3]

12. 0580_w23_qp_42 Q: 2

(a) Daisy records her 50 homework marks.
The table shows the results.

Homework mark	15	16	17	18	19	20
Frequency	1	3	19	11	10	6

(i) Write down the range.

..... [1]

(ii) Write down the mode.

..... [1]

(iii) Find the median.

..... [1]

(iv) Calculate the mean.

..... [3]

(b) 21 33 20 25 21 34 22 21 20 30 18

The list shows Ed's scores in 11 tests.

(i) Complete the stem-and-leaf diagram to show this information.

1	
2	
3	

Key: 2|5 represents 25

[2]

(ii) Find the median.

..... [1]

(iii) Find the interquartile range.

..... [2]

13. 0580_w23_qp_43 Q: 2

The table shows the number of each type of bird seen in a garden on Monday.

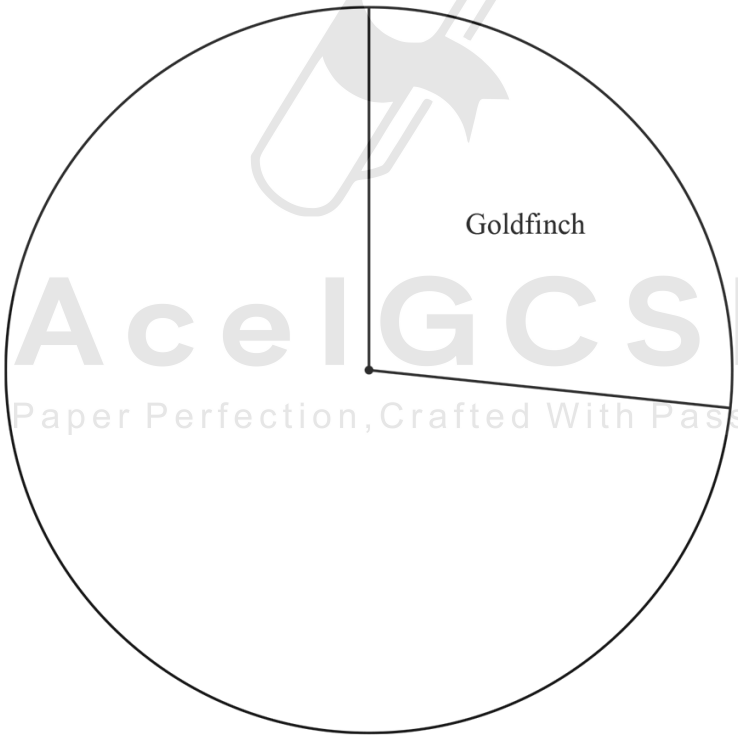
Type of bird	Frequency	Pie chart sector angle
Goldfinch	8	96°
Jay	6	
Starling	11	
Robin	5	

(a) Find the percentage of the birds that are Starlings.

..... % [2]

(b) **(i)** In the table, complete the column for the pie chart sector angle. [2]

(ii) Complete the pie chart to show the information in the table.



[2]

(c) On Tuesday, the number of Goldfinches seen in the garden increased by 262.5%.

Calculate the number of Goldfinches seen on Tuesday.

..... [2]

(d) One of the most common birds in the world is the Red-Billed Quelea which lives in Sub-Saharan Africa.
There are approximately 1500 million of these birds in this area.

(i) Write 1500 million in standard form.

..... [1]

(ii) The land area of Sub-Saharan Africa is approximately 21.2 million square kilometres.

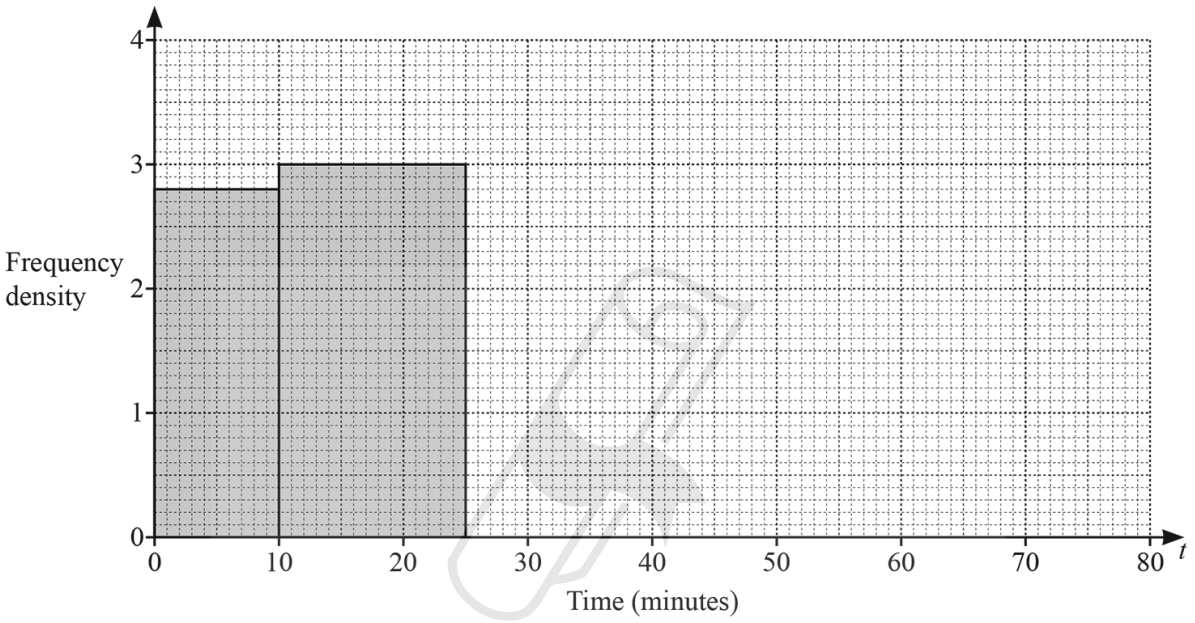
Work out the average number of these birds per square kilometre.

..... birds/km^2 [2]

14. 0580_w23_qp_43 Q: 5

Indira records the time taken for workers in her company to travel to work.
The table and the histogram each show part of this information.

Time (t minutes)	$0 < t \leqslant 10$	$10 < t \leqslant 25$	$25 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 80$
Frequency			57	38	12



(a) Complete the table and the histogram.

[5]

(b) Calculate an estimate of the mean time.

..... min [4]

(c) Rashid says:

'The longest time that any of these workers take to travel to work is 80 minutes.'

Give a reason why Rashid may be wrong.

.....

..... [1]

(d) Indira picks three workers at random from those who take longer than 25 minutes to travel to work.

Calculate the probability that one worker takes 60 minutes or less and the other two each take more than 60 minutes.

..... [4]

15. 0580_m22_qp_42 Q: 5

The table shows information about the mass, m grams, of each of 120 letters.

Mass (m grams)	$0 < m \leqslant 50$	$50 < m \leqslant 100$	$100 < m \leqslant 200$	$200 < m \leqslant 500$
Frequency	43	31	25	21

(a) Calculate an estimate of the mean mass.

..... g [4]

(b) Iraj draws a histogram to show this information.
He makes the height of the first bar 17.2 cm.

Calculate the height of each of the remaining bars.

height of bar for $50 < m \leqslant 100$ ..... cm

height of bar for $100 < m \leqslant 200$ ..... cm

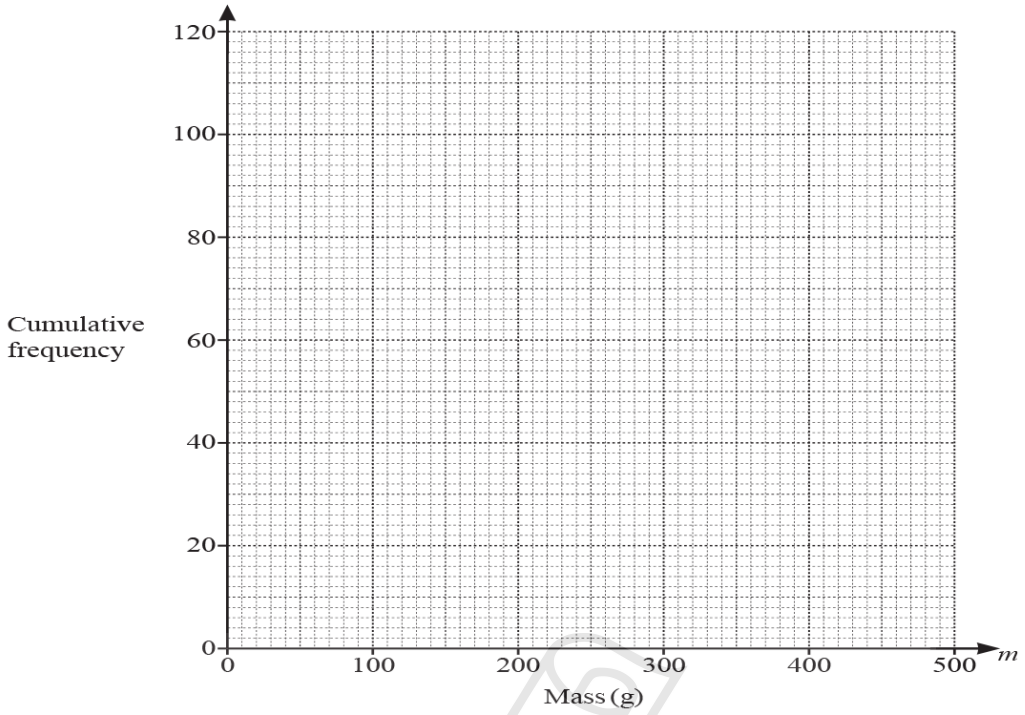
height of bar for $200 < m \leqslant 500$ ..... cm [3]

(c) Complete the cumulative frequency table.

Mass (m grams)	$m \leqslant 50$	$m \leqslant 100$	$m \leqslant 200$	$m \leqslant 500$
Cumulative frequency				

[2]

(d) Draw a cumulative frequency diagram.



[3]

(e) Use the cumulative frequency diagram to find an estimate for

(i) the median,

..... g [1]

(ii) the upper quartile,

..... g [1]

(iii) the 40th percentile,

..... g [2]

(iv) the number of letters with a mass m where $250 < m \leqslant 400$.

..... [2]

16. 0580_s22_qp_41 Q: 1

(a) The list shows 15 midday temperatures, in degrees Celsius, in Suntown.

17 21 21 18 23 22 25 19

21 17 19 18 21 24 23

(i) Complete the stem-and-leaf diagram to show this information.

1	7
2	

Key: 1|7 represents 17 °C

[2]

(ii) Find the median.

..... °C [1]

(iii) Find the upper quartile.

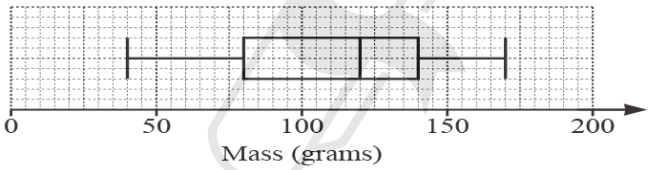
..... °C [1]

(iv) Rahul draws a pie chart to show this information.

Calculate the sector angle for the number of days the temperature is 18 °C.

..... [2]

(b)



The box-and-whisker plot shows information about the masses, in grams, of some apples.

(i) Find the median.

..... g [1]

(ii) Find the range.

..... g [1]

(iii) Find the interquartile range.

..... g [1]

(c) (i) The time, t minutes, spent on homework in one week by each of 200 students is recorded. The table shows the results.

Time (t minutes)	$40 < t \leqslant 60$	$60 < t \leqslant 80$	$80 < t \leqslant 90$	$90 < t \leqslant 100$	$100 < t \leqslant 150$
Frequency	6	10	70	84	30

Calculate an estimate of the mean.

..... min [4]

(ii) A new table with different class intervals is completed.

Time (t minutes)	$40 < t \leqslant 90$	$90 < t \leqslant 150$
Frequency	86	114

On a histogram the height of the bar for the $40 < t \leqslant 90$ interval is 17.2 cm.

Calculate the height of the bar for the $90 < t \leqslant 150$ interval.

..... cm [2]

17. 0580_s22_qp_42 Q: 7

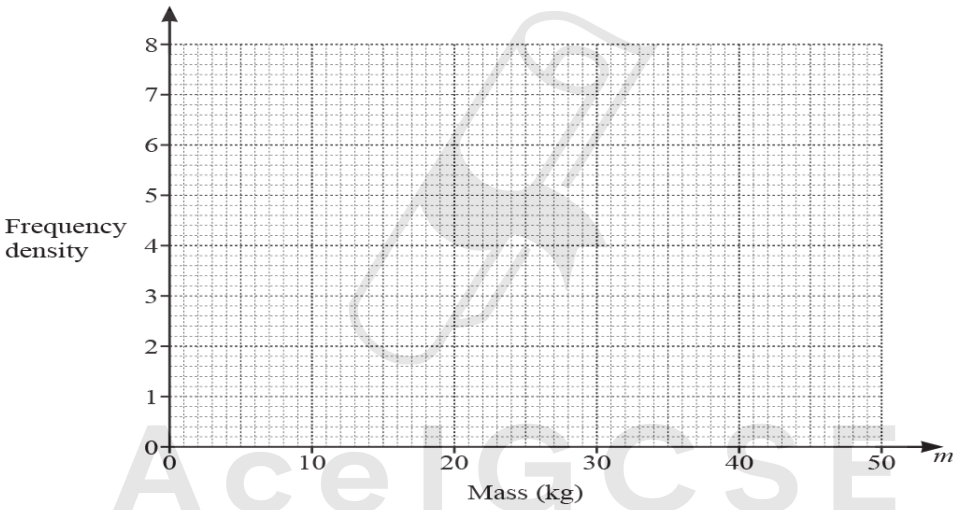
Information about the mass, m kg, of each of 150 children is recorded in the frequency table.

Mass (m kg)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 25$	$25 < m \leqslant 40$	$40 < m \leqslant 50$
Frequency	12	38	32	50	18

(a) Calculate an estimate of the mean mass.

..... kg [4]

(b) Draw a histogram to show the information in the table.



[4]

(c) **(i)** Use the frequency table to complete this cumulative frequency table.

Mass (m kg)	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 25$	$m \leqslant 40$	$m \leqslant 50$
Cumulative frequency					

[2]

(ii) Calculate the percentage of children with a mass greater than 10 kg.

..... % [2]

18. 0580_s22_qp_43 Q: 5

The time, t minutes, taken by each of 80 people to travel to work is recorded.
The table shows information about these times.

Time (t minutes)	$0 < t \leqslant 5$	$5 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 35$	$35 < t \leqslant 60$
Frequency	3	7	18	28	24

(a) (i) Write down the class interval containing the median time.

..... $< t \leqslant$ ..... [1]

(ii) Calculate an estimate of the mean time.

..... min [4]

(b) (i) One of these 80 people is chosen at random.

Find the probability that this person took longer than 10 minutes to travel to work.
Give your answer as a fraction in its simplest form.

..... [2]

(ii) Two people are chosen at random from those taking 20 minutes or less to travel to work.

Calculate the probability that one of these people took 5 minutes or less and the other took more than 5 minutes.

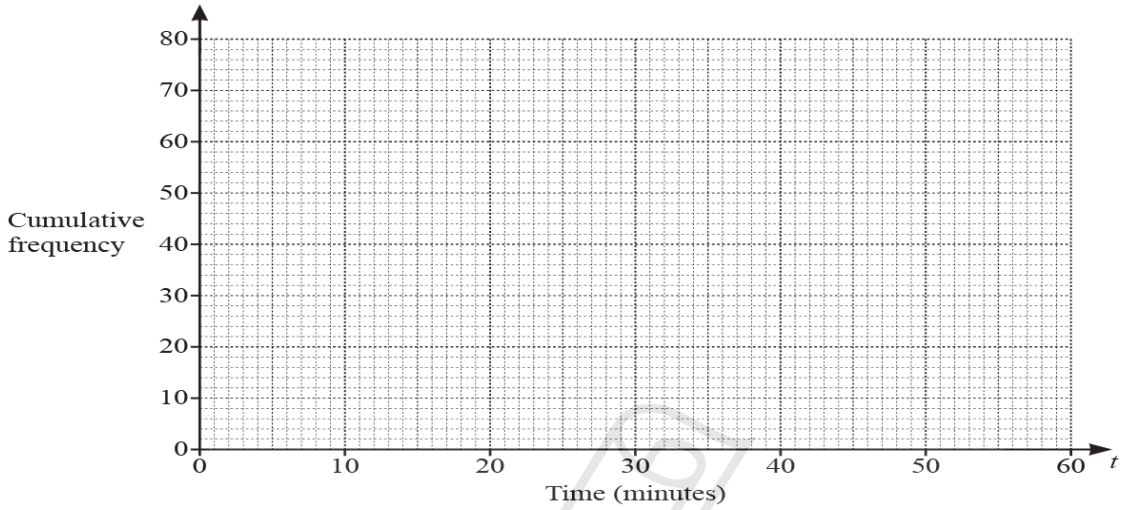
..... [3]

(c) (i) Use the frequency table on page 8 to complete the cumulative frequency table.

Time (t minutes)	$t \leqslant 5$	$t \leqslant 10$	$t \leqslant 20$	$t \leqslant 35$	$t \leqslant 60$
Cumulative frequency	3	10			80

[1]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Find an estimate for the 80th percentile.

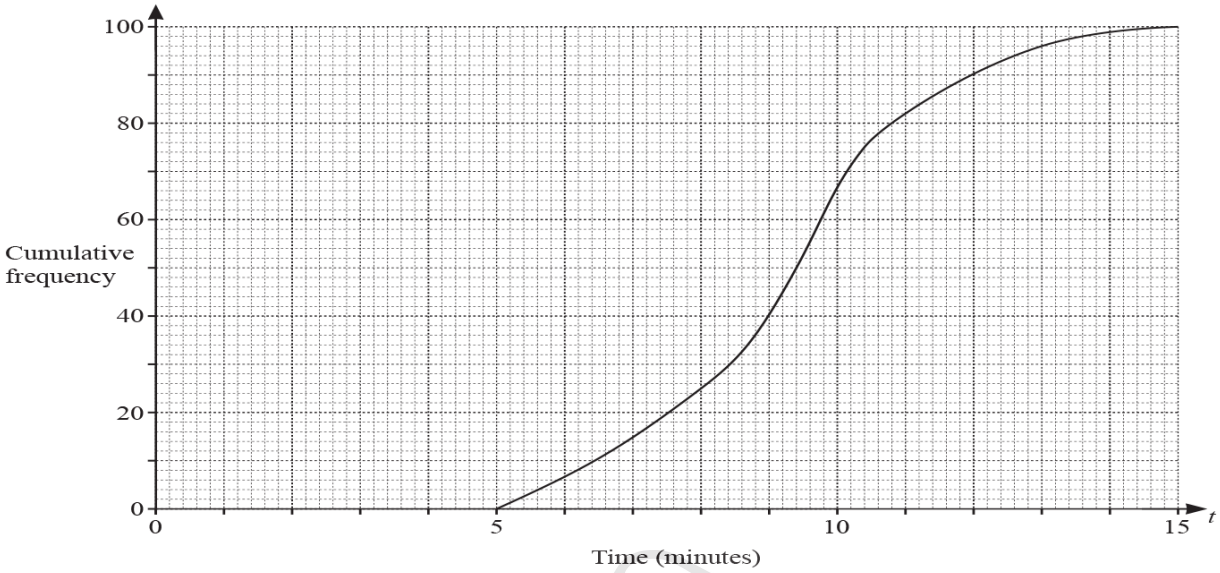
..... min [2]

(iv) Find an estimate for the percentage of people who took longer than 45 minutes to travel to work.
Show all your working.

..... % [3]

19. 0580_w22_qp_41 Q: 5

(a) 100 students each record the time, t minutes, taken to eat a pizza.
The cumulative frequency diagram shows the results.



Find an estimate of

(i) the median,

..... min [1]

(ii) the interquartile range,

..... min [2]

(iii) the number of students taking more than 11 minutes to eat a pizza.

..... [2]

(b) 150 students each record how far they can throw a tennis ball.
The table shows the results.

Distance (d metres)	$0 < d \leqslant 20$	$20 < d \leqslant 30$	$30 < d \leqslant 35$	$35 < d \leqslant 45$	$45 < d \leqslant 60$
Frequency	4	38	40	53	15

(i) Calculate an estimate of the mean.

..... m [4]

(ii) A histogram is drawn to show this information.
The height of the bar representing $30 < d \leqslant 35$ is 12 cm.

Calculate the height of each of the other bars.

Distance (d metres)	Frequency	Height of bar (cm)
$0 < d \leqslant 20$	4	
$20 < d \leqslant 30$	38	
$30 < d \leqslant 35$	40	12
$35 < d \leqslant 45$	53	
$45 < d \leqslant 60$	15	

[3]

(iii) Two students are chosen at random.

Find the probability that they both threw the ball more than 45 m.

..... [2]

20. 0580_w22_qp_42 Q: 3

Kai and Ann carry out a survey on the distances travelled, in kilometres, by 200 cars.

Kai completes this frequency table for the data collected.

Distance (d km)	$80 < d \leqslant 100$	$100 < d \leqslant 150$	$150 < d \leqslant 200$	$200 < d \leqslant 300$	$300 < d \leqslant 400$
Frequency	7	33	76	52	32

(a) (i) Calculate an estimate of the mean.

..... km [4]

(ii) Ann uses this frequency table for the same data.
There is a different interval for the final group.

Distance (d km)	$80 < d \leqslant 100$	$100 < d \leqslant 150$	$150 < d \leqslant 200$	$200 < d \leqslant 300$	$300 < d \leqslant 360$
Frequency	7	33	76	52	32

Without calculating an estimate of the mean for this data, find the difference between Ann's and Kai's estimate of the mean.
You must show all your working.

..... km [2]

(iii) A histogram is drawn showing the information in **Kai's** frequency table.
The height of the block for the interval $200 < d \leqslant 300$ is 2.6 cm.

Calculate the height of the block for each of the following intervals.

$80 < d \leqslant 100$ ..... cm

$150 < d \leqslant 200$ ..... cm

$300 < d \leqslant 400$ ..... cm [3]

(b) One car is picked at random.

Find the probability that the car has travelled more than 300 km.

..... [1]

(c) Two of the 200 cars are picked at random.

Find the probability that

(i) both cars have travelled 150 km or less,

..... [2]

(ii) one car has travelled more than 200 km and the other car has travelled 100 km or less.

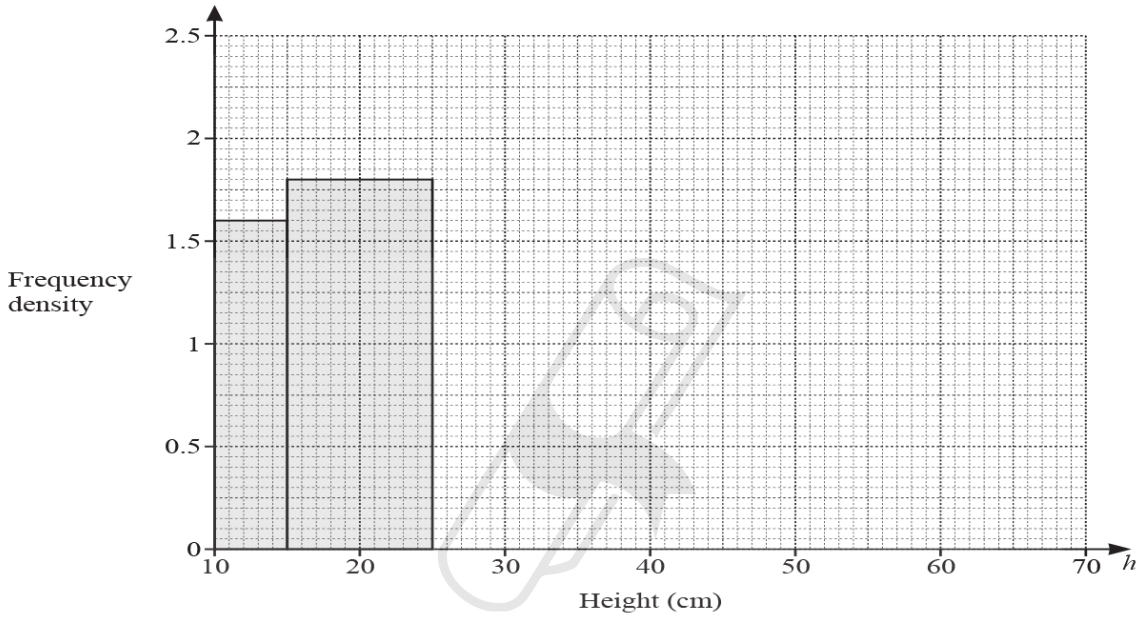
..... [3]

21. 0580_w22_qp_43 Q: 3

The height, h cm, of each of 100 plants is recorded.
The table shows information about the heights of these plants.

Height (h cm)	$10 < h \leqslant 15$	$15 < h \leqslant 25$	$25 < h \leqslant 40$	$40 < h \leqslant 60$	$60 < h \leqslant 70$
Frequency	8	18	28	33	13

(a) Complete the histogram to show this information.
The first two blocks have been drawn for you.



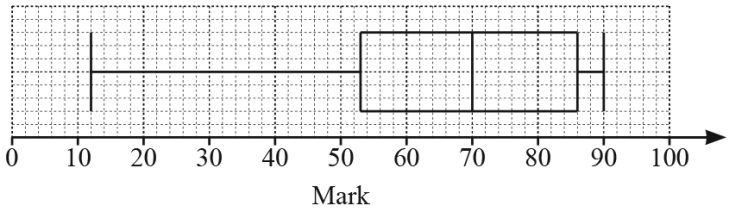
[3]

(b) Calculate an estimate of the mean height.

..... cm [4]

22. 0580_m21_qp_42 Q: 7

(a) The box-and-whisker plot shows information about the marks scored by some students in a test.



(i) Write down the median mark. ..... [1]

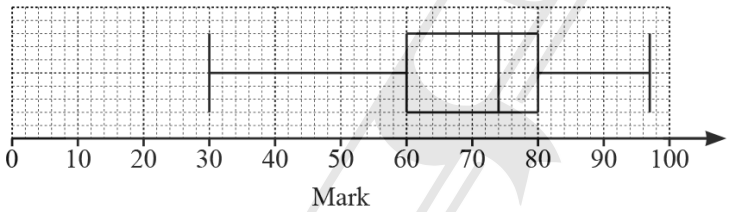
(ii) Work out the range.

..... [1]

(iii) Jais scored a mark in the test that was higher than the marks scored by 75% of the students.

Write down a possible mark for Jais. ..... [1]

(iv) This box-and-whisker plot shows information about the marks scored by the same students in a second test.



Make one comparison between the distributions of marks in the two tests.

.....

..... [1]

(b) The table shows information about the height, h cm, of each of 50 plants.

Height (h cm)	$0 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 34$	$34 < h \leqslant 40$	$40 < h \leqslant 60$
Frequency	4	9	20	15	2

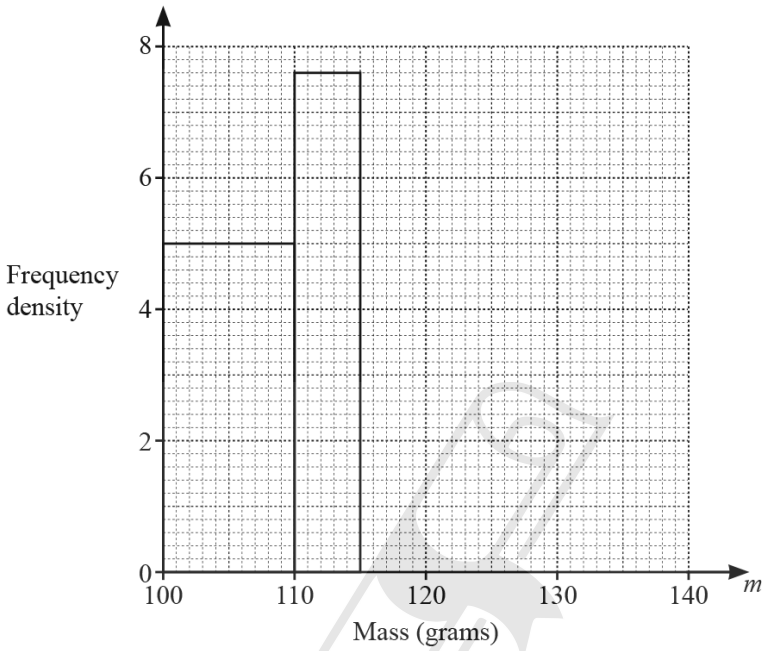
Calculate an estimate of the mean.

..... cm [4]

(c) Some apples are weighed and the mass, m grams, of each apple is recorded.
The table shows the results.

Mass (m grams)	$100 < m \leqslant 110$	$110 < m \leqslant 115$	$115 < m \leqslant 125$	$125 < m \leqslant 140$
Frequency	50	x	44	51

The histogram shows some of the information from the table.



(i) Work out the value of x.

$x =$ ..... [1]

(ii) Complete the histogram.

[2]

23. 0580_s21_qp_41 Q: 8

(a) The table shows information about the mass, in kilograms, of each of 50 children.

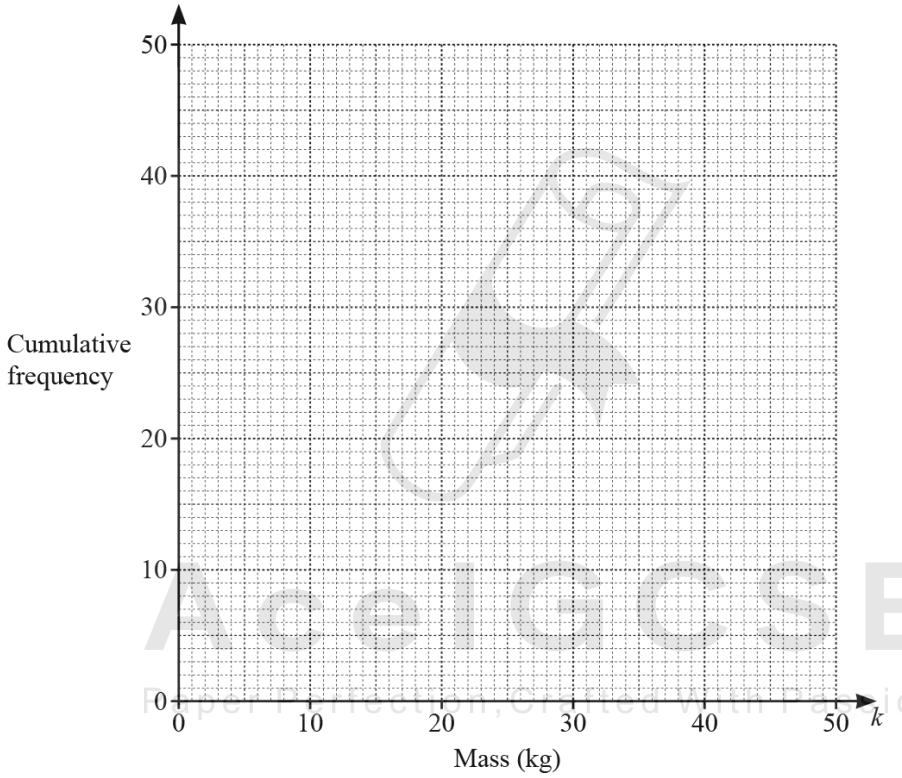
Mass ($k$kg)	$0 < k \leqslant 10$	$10 < k \leqslant 25$	$25 < k \leqslant 35$	$35 < k \leqslant 40$	$40 < k \leqslant 50$
Frequency	3	19	21	5	2

(i) Complete the cumulative frequency table.

Mass ($k$kg)	$k \leqslant 10$	$k \leqslant 25$	$k \leqslant 35$	$k \leqslant 40$	$k \leqslant 50$
Cumulative frequency					

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.

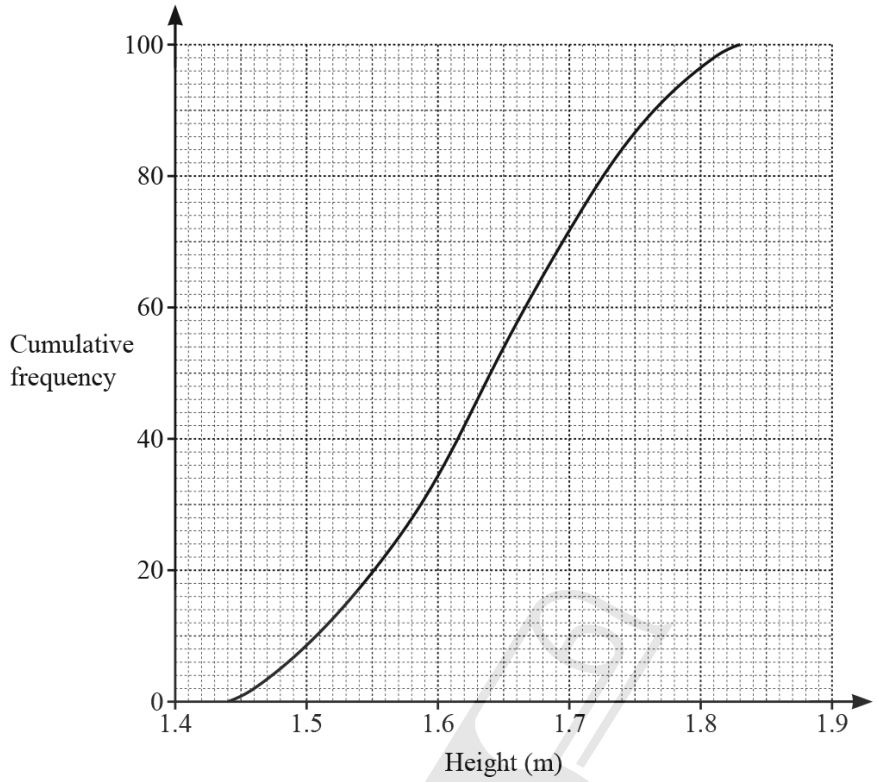


[3]

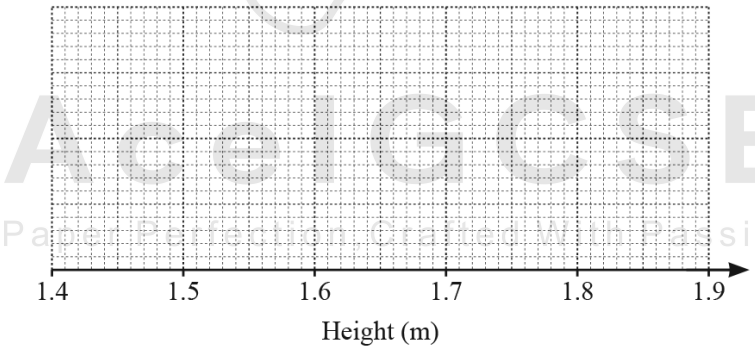
(iii) Use your diagram to find an estimate of the number of children with a mass of 32 kg or less.

..... [1]

(b) This cumulative frequency diagram shows information about the height, in metres, of each of 100 students.



The height of the tallest student is 1.83 metres.
The height of the shortest student is 1.45 metres.



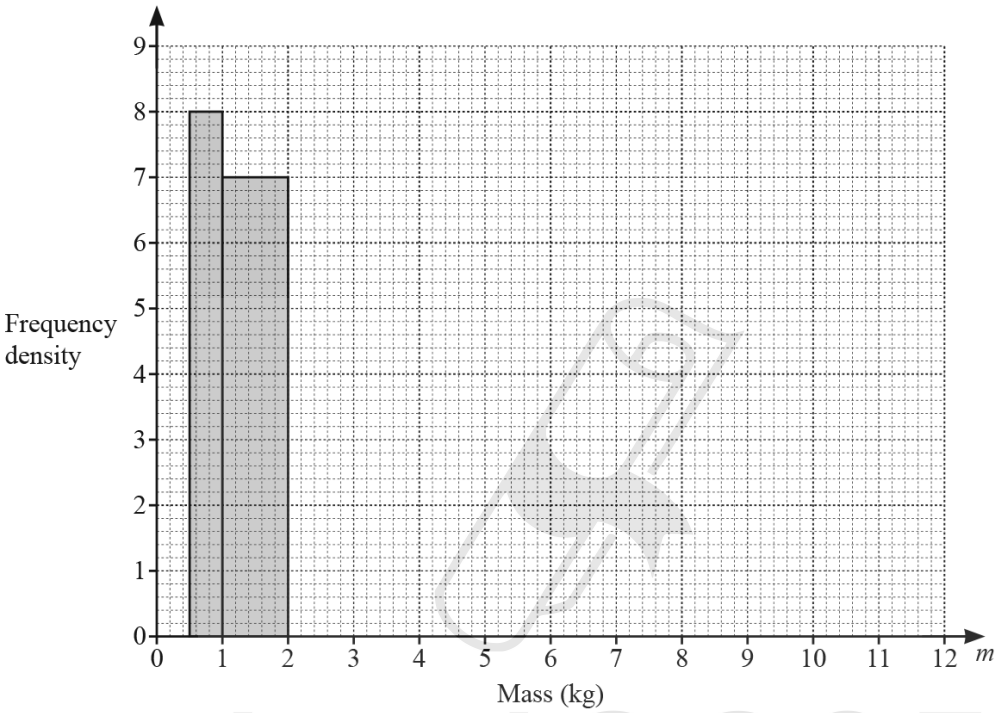
On this grid, draw a box-and-whisker plot for the heights of the 100 students. [4]

24. 0580_s21_qp_42 Q: 4

(a) The mass, m kg, of each of 40 parcels in a warehouse is recorded.
The table shows information about the masses of these parcels.

Mass (m kg)	$0.5 < m \leqslant 1$	$1 < m \leqslant 2$	$2 < m \leqslant 4$	$4 < m \leqslant 7$	$7 < m \leqslant 12$
Frequency	4	7	15	10	4

(i) Complete the histogram to show this information.



[3]

(ii) Calculate an estimate of the mean mass of the parcels.

..... kg [4]

(iii) A parcel is picked at random from the 40 parcels.

Find the probability that this parcel has a mass of 2 kg or less.

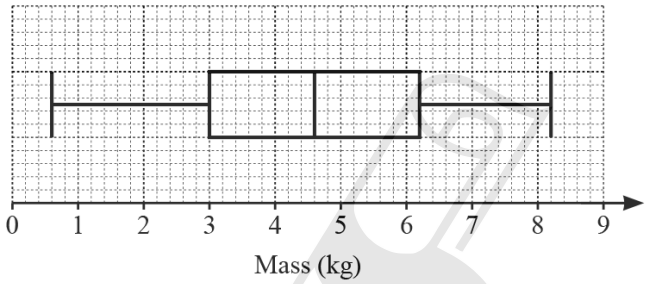
..... [1]

(iv) Two parcels are picked at random without replacement from those with a mass **greater than** 2 kg.

Work out the probability that one of them has a mass greater than 7 kg and the other has a mass of 4 kg or less.

..... [3]

(b) A van delivers parcels from a different warehouse.
The box-and-whisker plot shows information about the masses of the parcels in the van.



(i) Find the median.

..... kg [1]

(ii) Find the interquartile range.

..... kg [1]

(iii) Two parcels are removed from the van at the first delivery.
The masses of these parcels are 2.4 kg and 5.8 kg.

Describe the effect that removing these parcels has on the median mass of the remaining parcels.
Give a reason for your answer.

.....

..... [2]

25. 0580_s21_qp_43 Q: 3

(a) Zoe's test scores last term were 6 7 7 7 8 9 9 10 10.

Find

(i) the range,

..... [1]

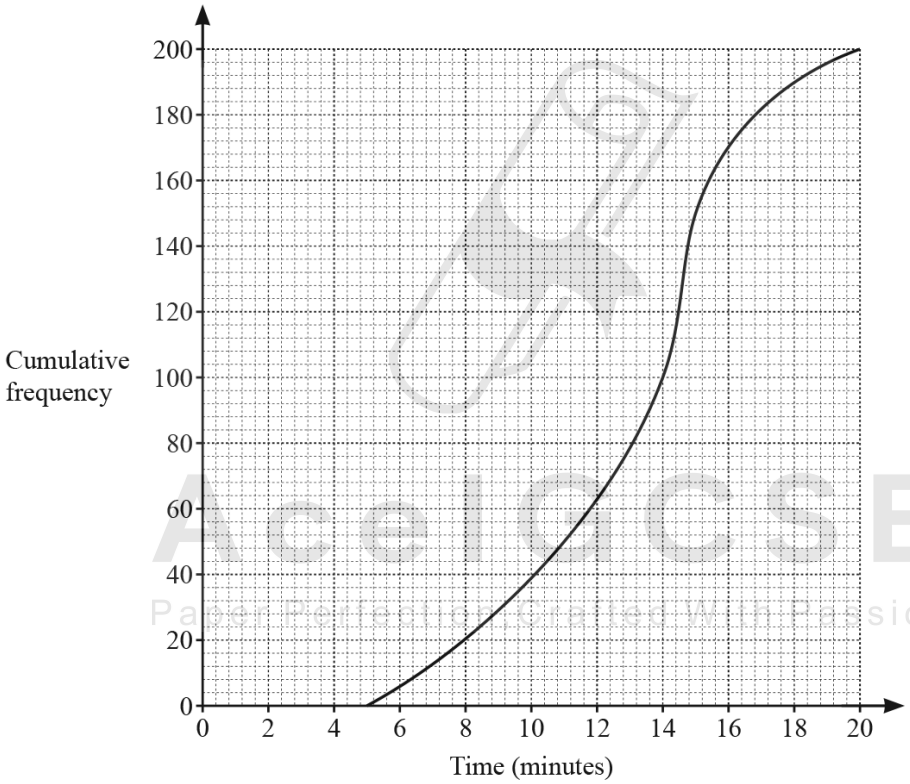
(ii) the mode,

..... [1]

(iii) the median.

..... [1]

(b) The cumulative frequency diagram shows information about the time taken by each of 200 students to solve a problem.



Use the diagram to find an estimate of

(i) the median,

..... min [1]

(ii) the interquartile range.

..... min [2]

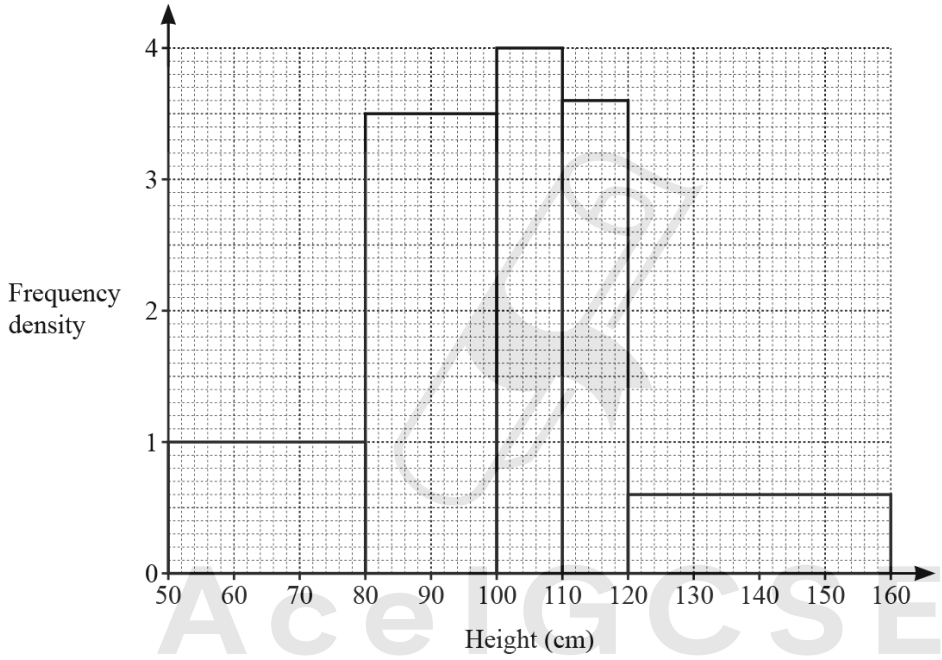
(c) The test scores of 200 students are shown in the table.

Score	5	6	7	8	9	10
Frequency	3	10	43	75	48	21

Calculate the mean.

..... [3]

(d) The height, in cm, of each of 200 plants is measured.
The histogram shows the results.

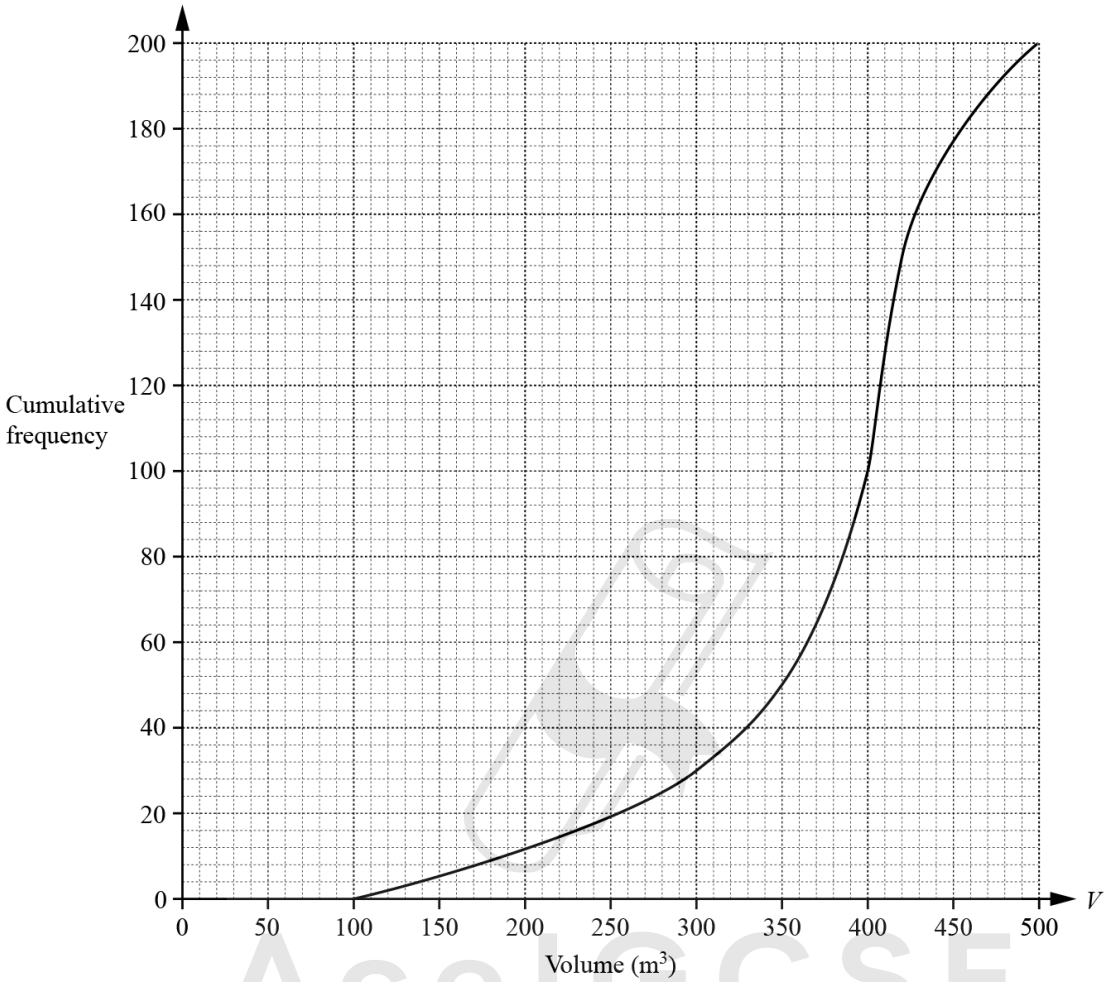


Calculate an estimate of the mean height.
You must show all your working.

..... cm [6]

26. 0580_p20_qp_40 Q: 2

(a) 200 students estimate the volume, $V\,m^3$, of a classroom.
The cumulative frequency diagram shows their results.



Use the graph to find an estimate of

(i) the median,

..... m^3 [1]

(ii) the interquartile range,

..... m^3 [2]

(iii) the 60th percentile,

..... m^3 [1]

(iv) the number of students who estimate that the volume is greater than $300\,m^3$.

..... [2]

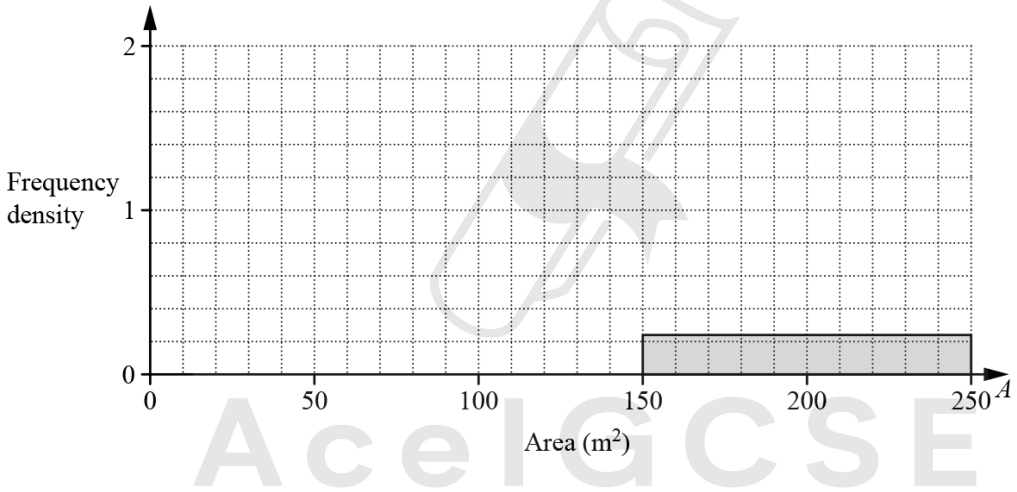
(b) The 200 students also estimate the total area, $A\,m^2$, of the windows in the classroom.
The table shows their results.

Area ($A\,m^2$)	$20 < A \leqslant 60$	$60 < A \leqslant 100$	$100 < A \leqslant 150$	$150 < A \leqslant 250$
Frequency	32	64	80	24

(i) Calculate an estimate of the mean.
You must show all your working.

..... m^2 [4]

(ii) Complete the histogram to show the information in the table.



[4]

(iii) Two students are chosen at random from those students that estimated the area of the windows to be more than $100\,m^2$.

Find the probability that one of the two students estimates the area to be greater than $150\,m^2$ and the other student estimates the area to be $150\,m^2$ or less.

..... [3]

27. 0580_s20_qp_41 Q: 2

The heights, h metres, of the 120 boys in an athletics club are recorded.
The table shows information about the heights of the boys.

Height (h metres)	$1.3 < h \leqslant 1.4$	$1.4 < h \leqslant 1.5$	$1.5 < h \leqslant 1.6$	$1.6 < h \leqslant 1.7$	$1.7 < h \leqslant 1.8$	$1.8 < h \leqslant 1.9$
Frequency	7	18	30	24	27	14

(a) (i) Write down the modal class.

..... $< h \leqslant$ ..... [1]

(ii) Calculate an estimate of the mean height.

..... m [4]

(b) (i) One boy is chosen at random from the club.

Find the probability that this boy has a height greater than 1.8 m.

..... [1]

(ii) Three boys are chosen at random from the club.

Calculate the probability that one of the boys has a height greater than 1.8 m and the other two boys each have a height of 1.4 m or less.

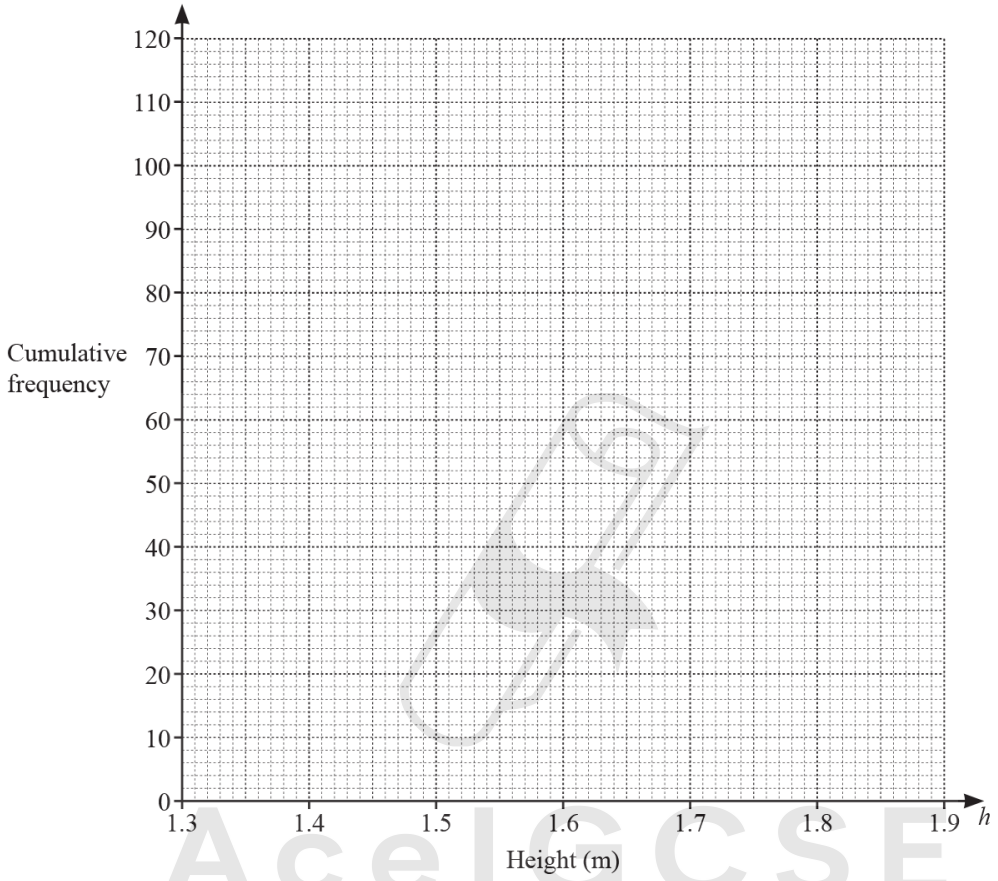
..... [4]

(c) **(i)** Use the frequency table on page 4 to complete the cumulative frequency table.

Height (h metres)	$h \leqslant 1.4$	$h \leqslant 1.5$	$h \leqslant 1.6$	$h \leqslant 1.7$	$h \leqslant 1.8$	$h \leqslant 1.9$
Cumulative frequency	7	25				

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(d) Use your diagram to find an estimate for

(i) the median height,

..... m [1]

(ii) the 40th percentile.

..... m [2]

28. 0580_s20_qp_42 Q: 3

The speed, v km/h, of each of 200 cars passing a building is measured.
The table shows the results.

Speed (v km/h)	$0 < v \leqslant 20$	$20 < v \leqslant 40$	$40 < v \leqslant 45$	$45 < v \leqslant 50$	$50 < v \leqslant 60$	$60 < v \leqslant 80$
Frequency	16	34	62	58	26	4

(a) Calculate an estimate of the mean.

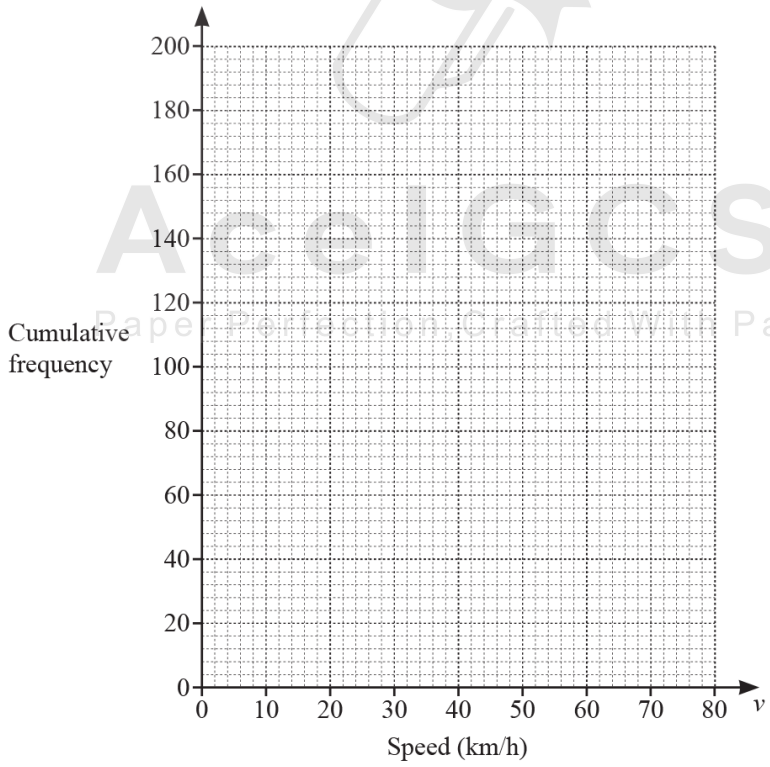
..... km/h [4]

(b) **(i)** Use the frequency table to complete the cumulative frequency table.

Speed (v km/h)	$v \leqslant 20$	$v \leqslant 40$	$v \leqslant 45$	$v \leqslant 50$	$v \leqslant 60$	$v \leqslant 80$
Cumulative frequency	16	50			196	200

[1]

(ii) On the grid, draw a cumulative frequency diagram.



[3]

(iii) Use your diagram to find an estimate of

(a) the upper quartile,

..... km/h [1]

(b) the number of cars with a speed greater than 35 km/h.

..... [2]

(c) Two of the 200 cars are chosen at random.

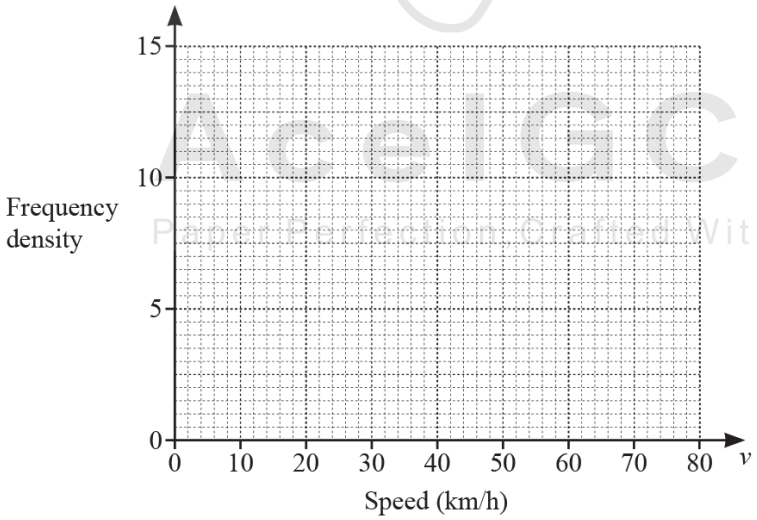
Find the probability that they both have a speed greater than 50 km/h.

..... [2]

(d) A new frequency table is made by combining intervals.

Speed (v km/h)	$0 < v \leqslant 40$	$40 < v \leqslant 50$	$50 < v \leqslant 80$
Frequency	50	120	30

On the grid, draw a histogram to show the information in this table.



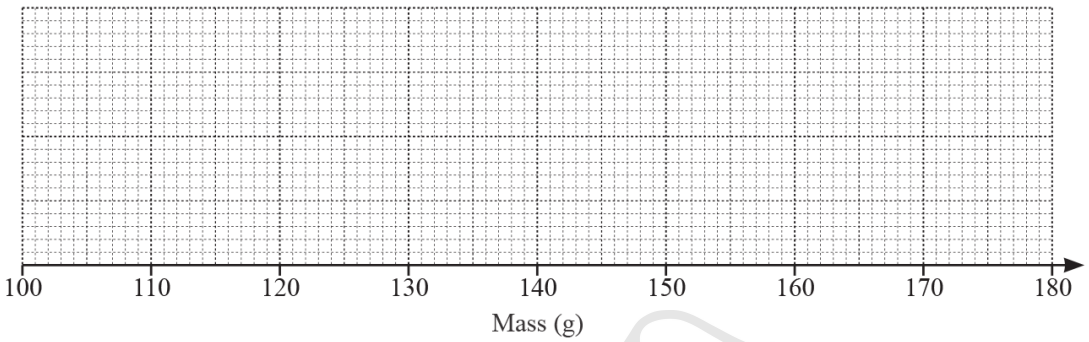
[3]

29. 0580_s20_qp_43 Q: 3

(a) Here is some information about the masses of potatoes in a sack:

- The largest potato has a mass of 174 g.
- The range is 69 g.
- The median is 148 g.
- The lower quartile is 121 g.
- The interquartile range is 38 g.

On the grid below, draw a box-and-whisker plot to show this information.



[4]

(b) The table shows the marks scored by some students in a test.

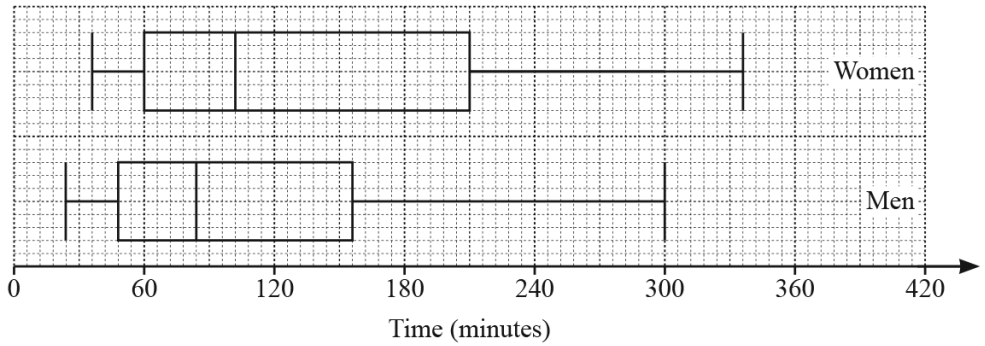
Mark	5	6	7	8	9	10
Frequency	8	2	12	2	0	1

Calculate the mean mark.

..... [3]

30. 0580_w20_qp_41 Q: 3

(a)



The box-and-whisker plots show the times spent exercising in one week by a group of women and a group of men.

Below are two statements comparing these times.
For each one, write down whether you agree or disagree, giving a reason for your answer.

Statement	Agree or disagree	Reason
On average, the women spent less time exercising than the men.		
The times for the women show less variation than the times for the men.		

[2]

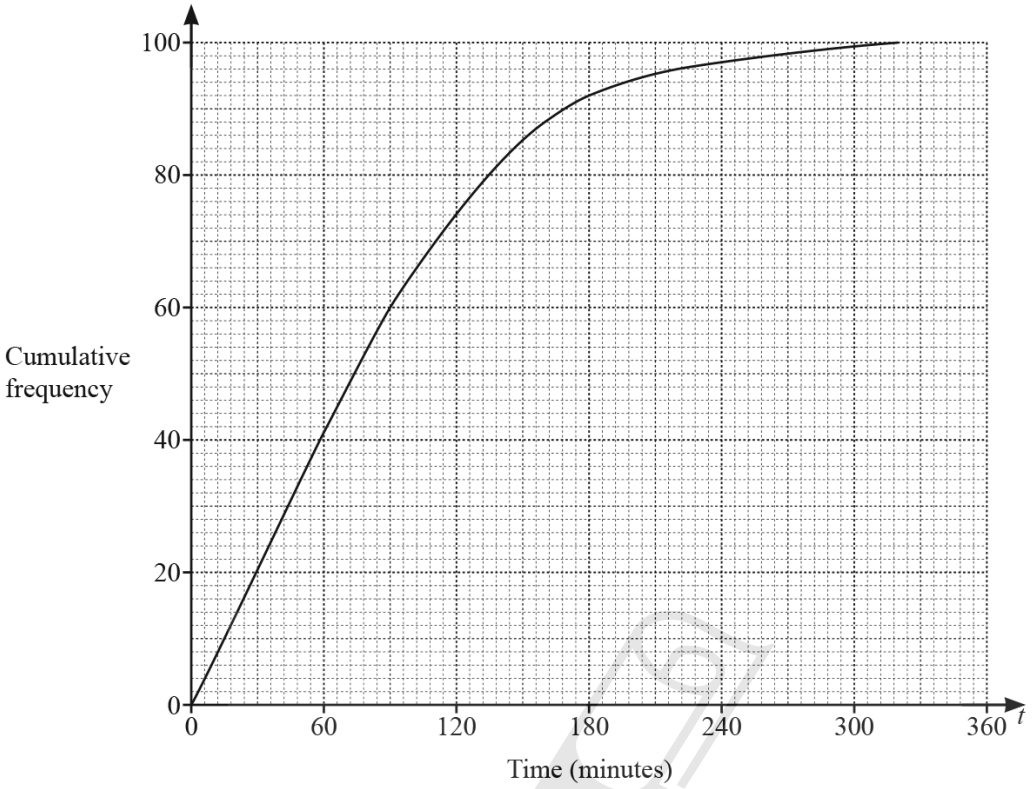
(b) The frequency table shows the times, t minutes, each of 100 children spent exercising in one week.

Time (t minutes)	$0 < t \leqslant 60$	$60 < t \leqslant 100$	$100 < t \leqslant 160$	$160 < t \leqslant 220$	$220 < t \leqslant 320$
Frequency	41	24	23	8	4

(i) Calculate an estimate of the mean time.

..... min [4]

(ii) The information in the frequency table is shown in this cumulative frequency diagram.



Use the cumulative frequency diagram to find an estimate of

(a) the 60th percentile,

..... min [1]

(b) the number of children who spent more than 3 hours exercising.

..... [2]

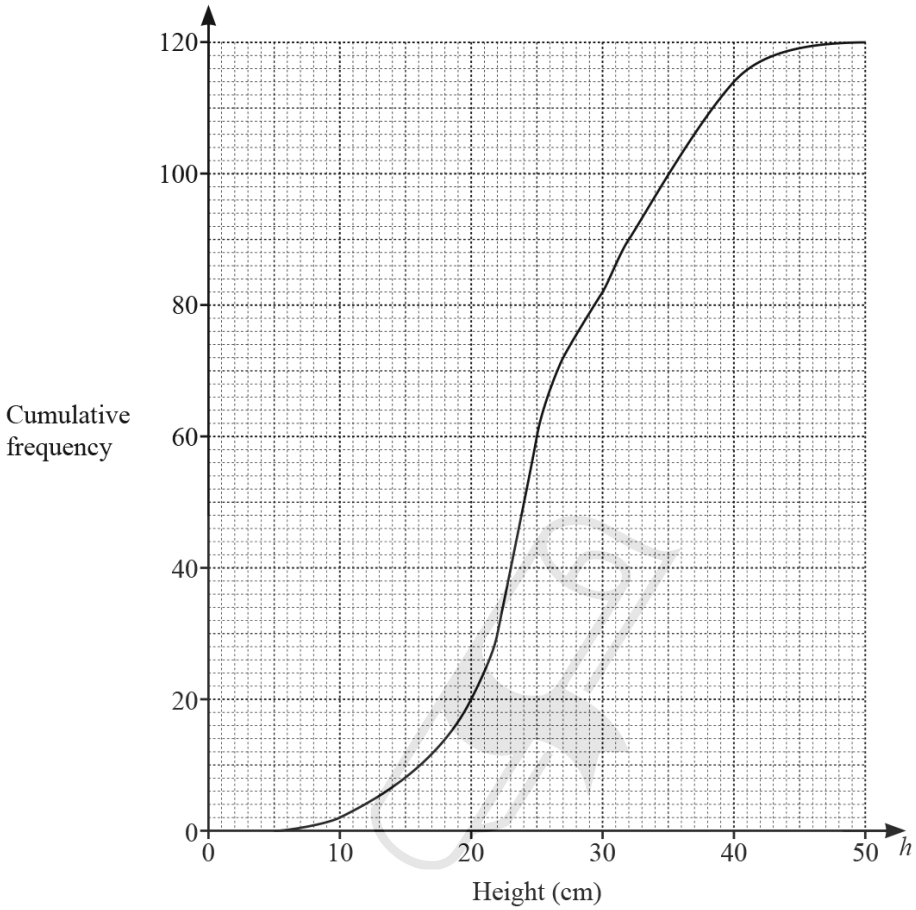
(iii) A histogram is drawn to show the information in the frequency table.
The height of the bar for the interval $60 < t \leqslant 100$ is 10.8 cm.

Calculate the height of the bar for the interval $160 < t \leqslant 220$.

..... cm [2]

31. 0580_w20_qp_42 Q: 4

The height, h cm, of each of 120 plants is measured.
The cumulative frequency diagram shows this information.



(a) Use the cumulative frequency diagram to find an estimate of

(i) the median,

..... cm [1]

(ii) the interquartile range,

..... cm [2]

(iii) the 60th percentile,

..... cm [1]

(iv) the number of plants with a height greater than 40 cm.

..... [2]

(b) The information in the cumulative frequency diagram is shown in this frequency table.

Height, h cm	$0 < h \leqslant 10$	$10 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 50$
Frequency	2	18	62	38

(i) Calculate an estimate of the mean height.

..... cm [4]

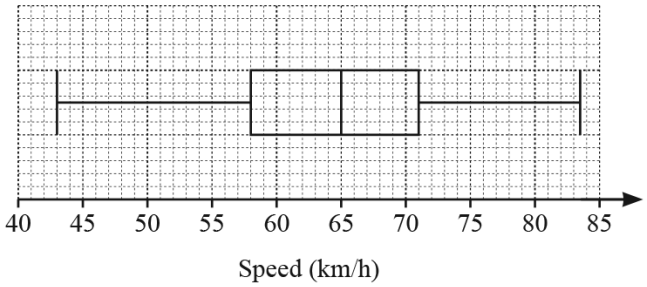
(ii) A histogram is drawn to show the information in the frequency table.
The height of the bar representing the interval $10 < h \leqslant 20$ is 7.2 cm.

Calculate the height of the bar representing the interval $30 < h \leqslant 50$.

..... cm [2]

32. 0580_w20_qp_43 Q: 3

(a) The average speeds, in km/h, of cars travelling along a road are recorded.
The box-and-whisker plot shows this information.



Find

(i) the lowest speed recorded,

..... km/h [1]

(ii) the median,

..... km/h [1]

(iii) the interquartile range.

..... km/h [1]

(b) Another car takes 18 seconds to travel 400 m along this road.

Calculate the average speed of this car in km/h.

..... km/h [3]

33. 0580_m19_qp_42 Q: 7

(a) 20 students each record the mass, p grams, of their pencil case.
The table below shows the results.

Mass (p grams)	$0 < p \leqslant 50$	$50 < p \leqslant 100$	$100 < p \leqslant 125$	$125 < p \leqslant 150$	$150 < p \leqslant 200$
Frequency	2	5	4	6	3

(i) Calculate an estimate of the mean mass.

..... g [4]

(ii) Use the frequency table above to complete the cumulative frequency table.

Mass (p grams)	$p \leqslant 50$	$p \leqslant 100$	$p \leqslant 125$	$p \leqslant 150$	$p \leqslant 200$
Cumulative frequency					20

[2]

(iii) A student is chosen at random.

Find the probability that this student has a pencil case with a mass greater than 150 g.

..... [1]

(b) Some students each record the mass, m kg, of their school bag.
Adil wants to draw a histogram to show this information.

Complete the table below.

Mass (m kg)	$0 < m \leqslant 4$	$4 < m \leqslant 6$	$6 < m \leqslant 7$	$7 < m \leqslant 10$
Frequency	32			42
Height of bar on histogram (cm)	1.6	2	1.2	2.8

[2]

(c) The frequency table below shows information about the number of books read by some students in a reading marathon.

Number of books read	1	2	3	4	5	6	7	8
Frequency	2	2	16	10	9	4	x	2

(i) The mean number of books read is 4.28 .

Find the value of x.

$x =$ ..... [3]

(ii) Write down the mode.

..... [1]

(iii) Write down the median.

..... [1]

34. 0580_s19_qp_41 Q: 4

(a) The test scores of 14 students are shown below.

21 21 23 26 25 21 22 20 21 23 23 27 24 21

(i) Find the range, mode, median and mean of the test scores.

Range = ...

Mode = ...

Median = ...

Mean = ... [6]

(ii) A student is chosen at random.

Find the probability that this student has a test score of more than 24.

..... [1]

(b) Petra records the score in each test she takes.

The mean of the first n scores is x.
The mean of the first $(n - 1)$ scores is $(x + 1)$.

Find the nth score in terms of n and x.
Give your answer in its simplest form.

..... [3]

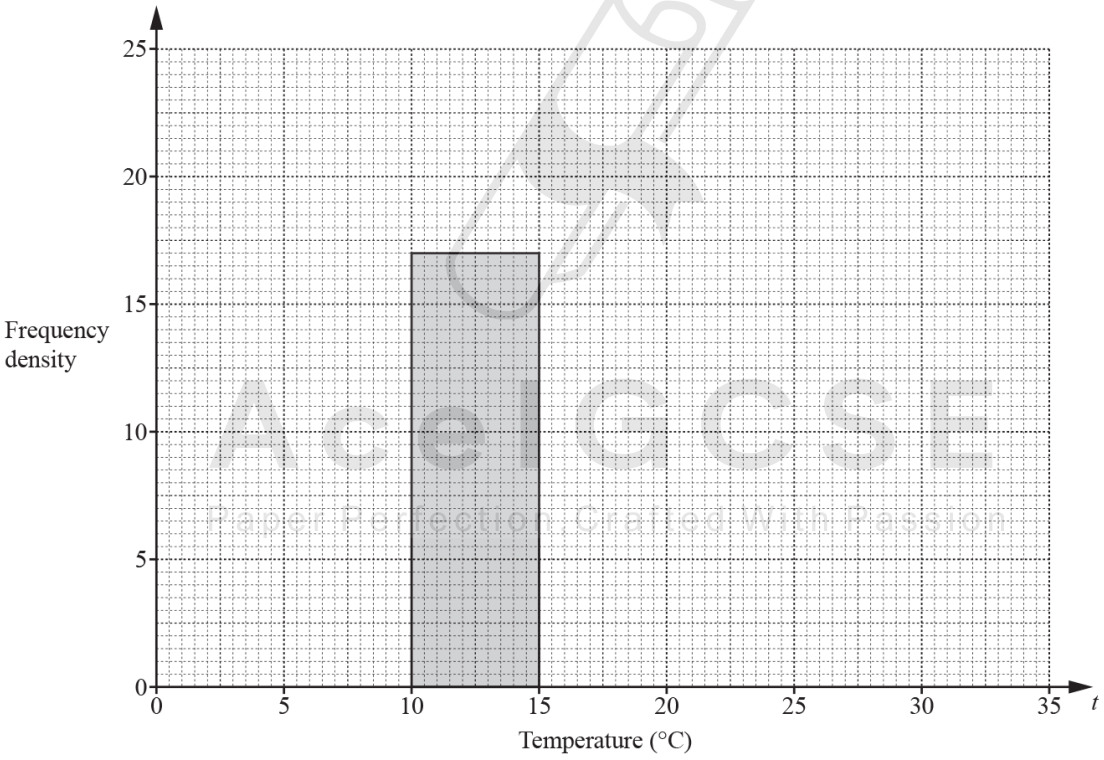
(c) During one year the midday temperatures, t°C, in Zedford were recorded.
The table shows the results.

Temperature (t°C)	$0 < t \leqslant 10$	$10 < t \leqslant 15$	$15 < t \leqslant 20$	$20 < t \leqslant 25$	$25 < t \leqslant 35$
Number of days	50	85	100	120	10

(i) Calculate an estimate of the mean.

..... °C [4]

(ii) Complete the histogram to show the information in the table.



[4]

35. 0580_s19_qp_42 Q: 9

100 students were each asked how much money, $\$m$, they spent in one week.
The frequency table shows the results.

Amount ($\$m$)	$0 < m \leqslant 5$	$5 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 30$	$30 < m \leqslant 50$
Frequency	16	38	30	9	7

(a) Calculate an estimate of the mean.

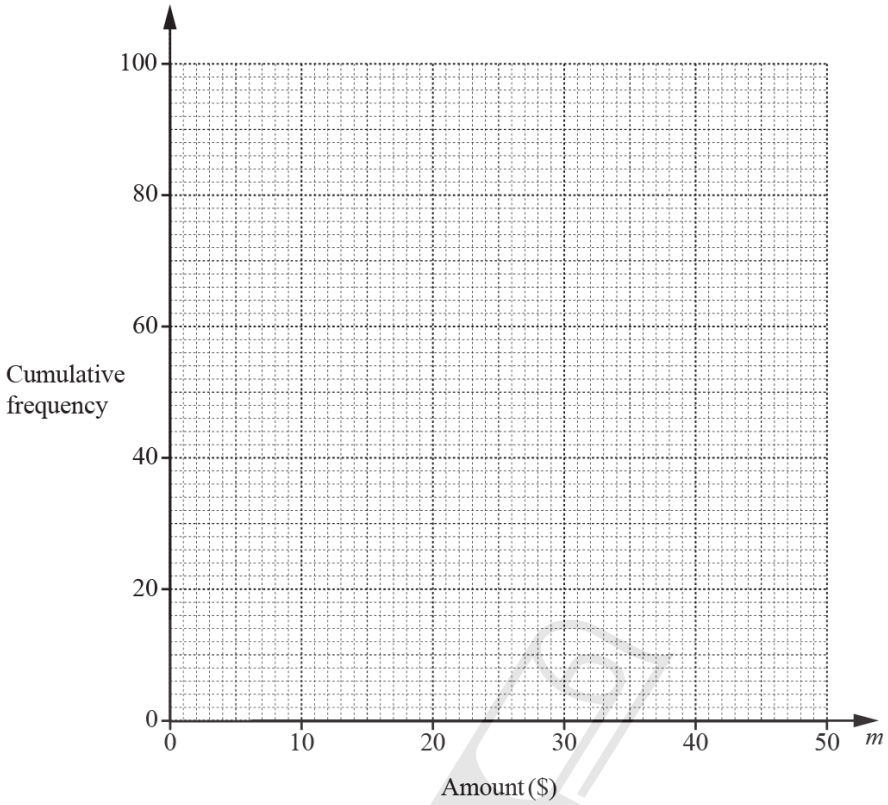
$ ..... [4]

(b) Complete the cumulative frequency table below.

Amount ($\$m$)	$m \leqslant 5$	$m \leqslant 10$	$m \leqslant 20$	$m \leqslant 30$	$m \leqslant 50$
Cumulative frequency	16				100

[2]

(c) On the grid, draw the cumulative frequency diagram.



[3]

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

(i) the median,

$ ..... [1]

(ii) the interquartile range,

$ ..... [2]

(iii) the number of students who spent more than $25.

..... [2]

36. 0580_s19_qp_43 Q: 6

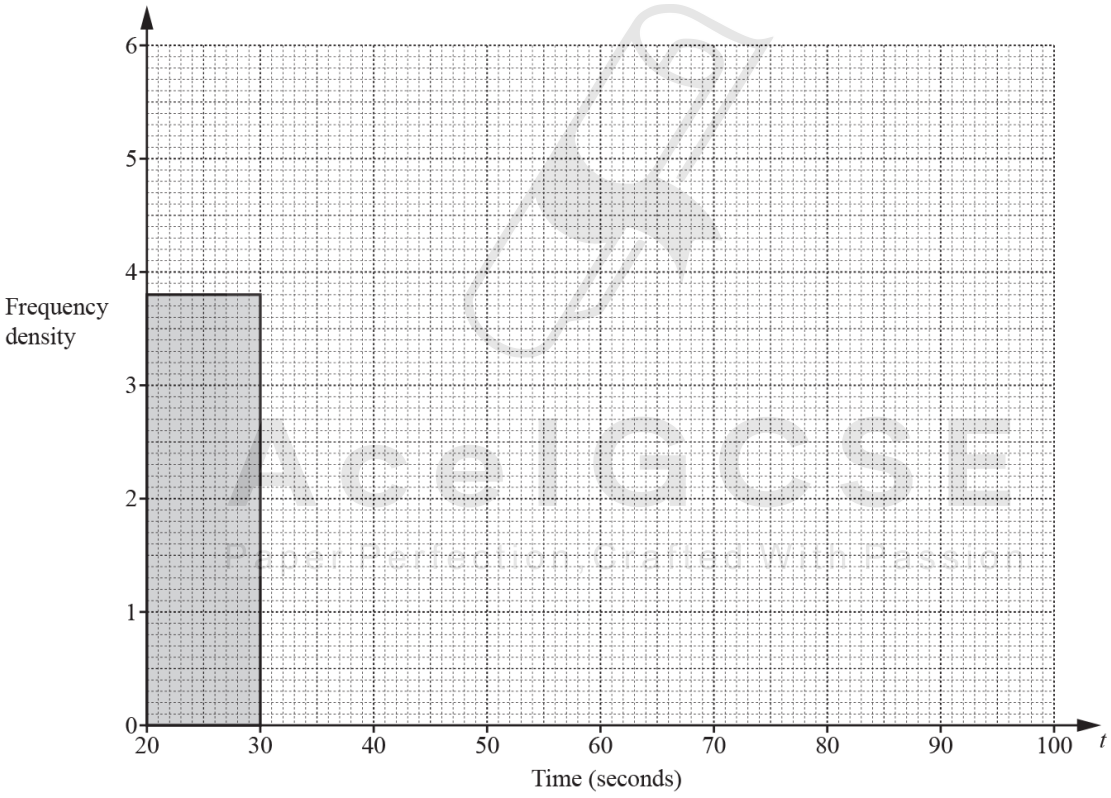
The table shows the time, t seconds, taken by each of 120 boys to solve a puzzle.

Time (t seconds)	$20 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 100$
Frequency	38	27	21	16	18

(a) Calculate an estimate of the mean time.

..... s [4]

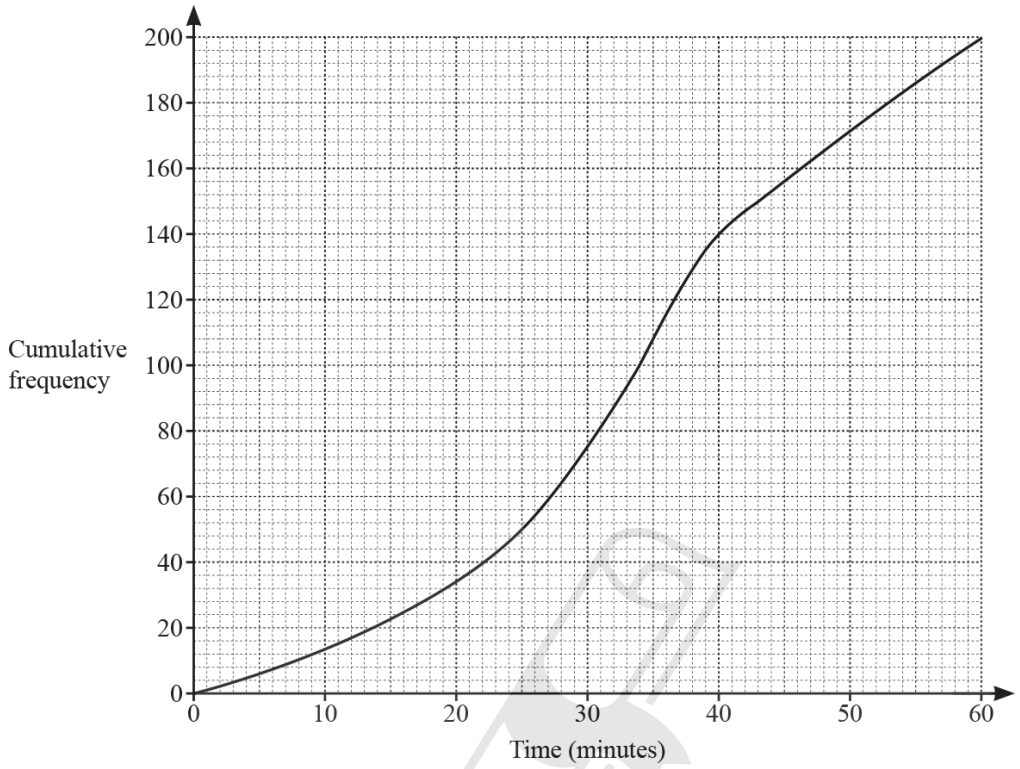
(b) On the grid, complete the histogram to show the information in the frequency table.



[4]

37. 0580_w19_qp_41 Q: 6

(a) The cumulative frequency diagram shows information about the times taken by 200 students to solve a problem.



Use the cumulative frequency diagram to find an estimate for

(i) the median, ... min [1]

(ii) the interquartile range,

..... min [2]

(iii) the number of students who took more than 40 minutes.

..... [2]

(b) Roberto records the value of each of the coins he has at home.
The table shows the results.

Value (cents)	1	2	5	10	20	50
Frequency	3	1	3	2	4	2

(i) Find the range. ..... cents [1]

(ii) Find the mode. ..... cents [1]

(iii) Find the median.

..... cents [1]

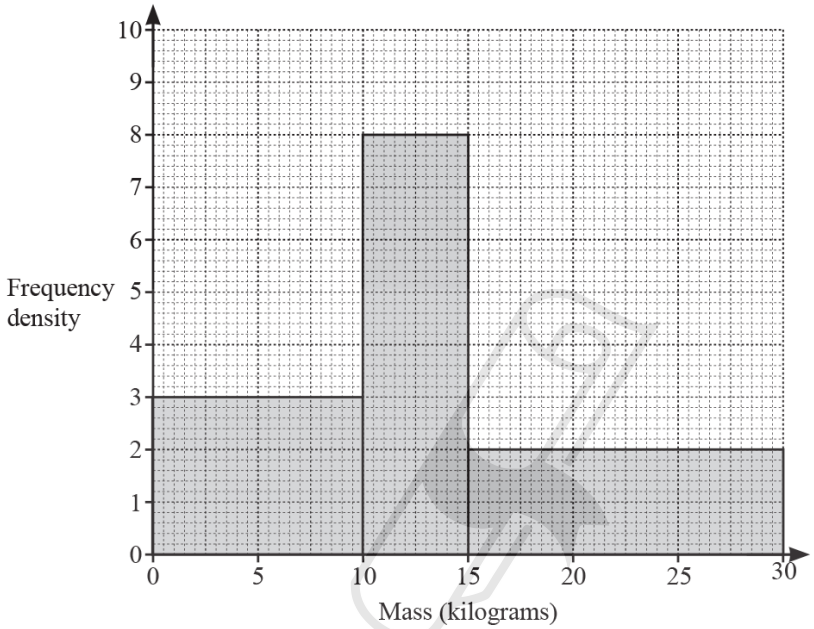
(iv) Work out the total value of Roberto's coins.

..... cents [2]

(v) Work out the mean.

..... cents [1]

(c) The histogram shows information about the masses of 100 boxes.

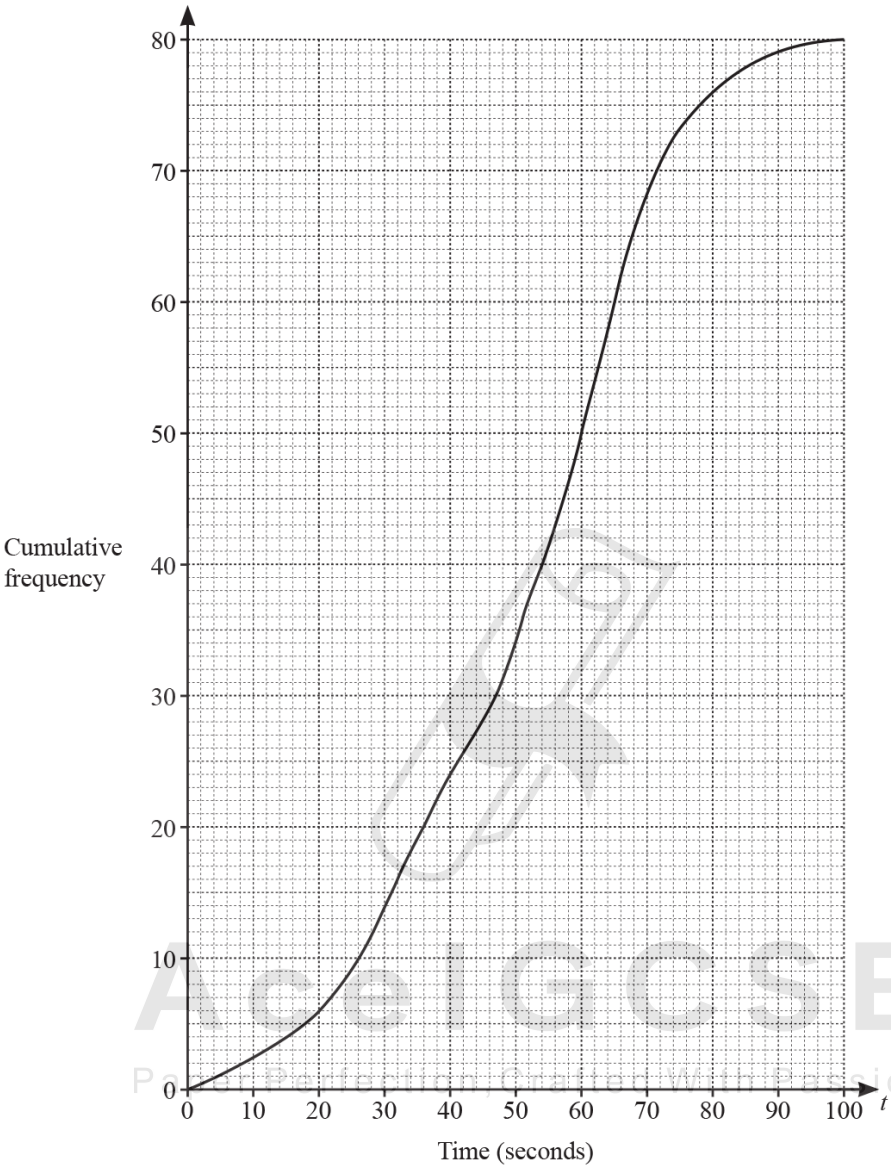


Calculate an estimate of the mean.

..... kg [6]

38. 0580_w19_qp_42 Q: 2

The cumulative frequency diagram shows information about the time taken, t seconds, for a group of girls to each solve a maths problem.



(a) Use the cumulative frequency diagram to find an estimate for

(i) the median,

..... s [1]

(ii) the interquartile range,

..... s [2]

(iii) the 20th percentile,

..... s [1]

(iv) the number of girls who took more than 66 seconds to solve the problem.

..... [2]

(b) **(i)** Use the cumulative frequency diagram to complete the frequency table.

Time (t seconds)	$0 < t \leqslant 20$	$20 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 80$	$80 < t \leqslant 100$
Frequency	6				4

[2]

(ii) Calculate an estimate of the mean time.

..... s [4]

(c) A group of boys solved the same problem.
The boys had a median time of 60 seconds, a lower quartile of 46 seconds and an upper quartile of 66 seconds.

(i) Write down the percentage of boys with a time of 66 seconds or less.

..... % [1]

(ii) Howard says

The boys' times vary more than the girls' times.

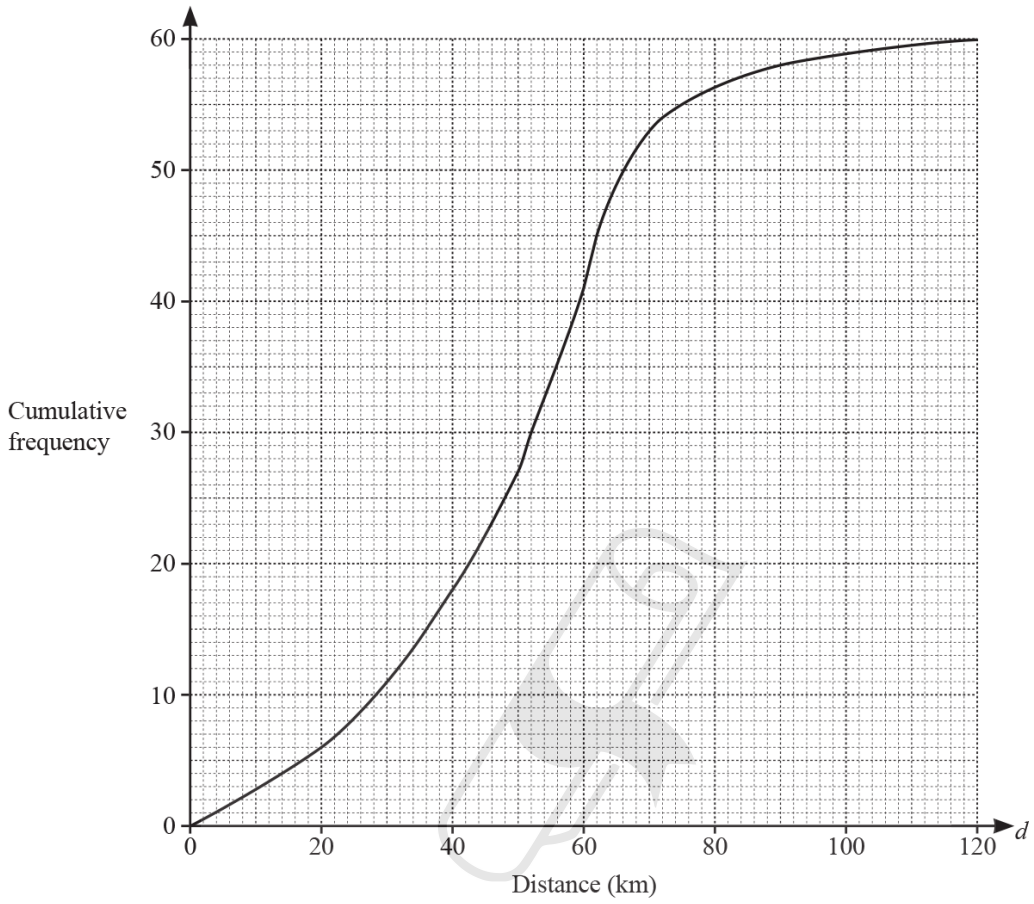
Explain why Howard is incorrect.

.....

..... [2]

39. 0580_w19_qp_43 Q: 5

The cumulative frequency diagram shows information about the distance, $d$km, travelled by each of 60 male cyclists in one weekend.



(a) Use the cumulative frequency diagram to find an estimate of

(i) the median,

..... km [1]

(ii) the lower quartile,

..... km [1]

(iii) the interquartile range.

..... km [1]

(b) For the same weekend, the interquartile range for the distances travelled by a group of female cyclists is 40 km.

Make one comment comparing the distribution of the distances travelled by the males with the distribution of the distances travelled by the females.

.....

..... [1]

(c) A male cyclist is chosen at random.

Find the probability that he travelled more than 50 km.

..... [2]

(d) **(i)** Use the cumulative frequency diagram to complete this frequency table.

Distance (d km)	Number of male cyclists
$0 < d \leqslant 40$	18
$40 < d \leqslant 50$	9
$50 < d \leqslant 60$	
$60 < d \leqslant 70$	
$70 < d \leqslant 90$	
$90 < d \leqslant 120$	2

[2]

(ii) Calculate an estimate of the mean distance travelled.

..... km [4]

40. 0580_m18_qp_42 Q: 7

The frequency table shows information about the time, m minutes, that each of 160 people spend in a library.

Time (m minutes)	$0 < m \leqslant 10$	$10 < m \leqslant 40$	$40 < m \leqslant 60$	$60 < m \leqslant 90$	$90 < m \leqslant 100$	$100 < m \leqslant 120$
Frequency	3	39	43	55	11	9

(a) (i) Find the probability that one of these people, chosen at random, spends more than 100 minutes in the library.

..... [1]

(ii) Calculate an estimate of the mean time spent in the library.

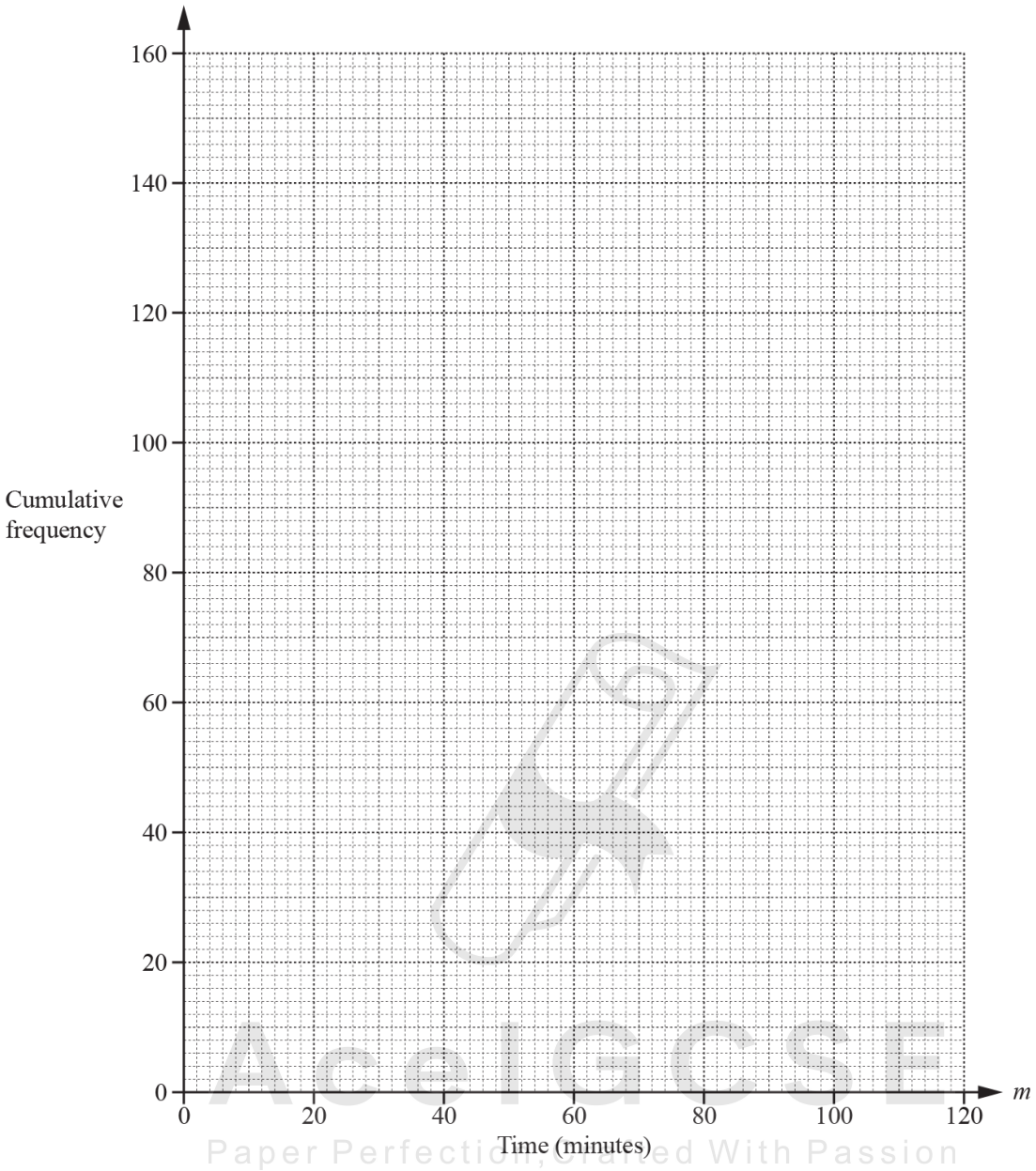
..... min [4]

(b) Complete the cumulative frequency table below.

Time (m minutes)	$m \leqslant 10$	$m \leqslant 40$	$m \leqslant 60$	$m \leqslant 90$	$m \leqslant 100$	$m \leqslant 120$
Cumulative frequency	3	42				

[2]

(c) On the grid opposite, draw the cumulative frequency diagram.



[3]

(d) Use your cumulative frequency diagram to find

(i) the median,

..... min [1]

(ii) the interquartile range,

..... min [2]

(iii) the 90th percentile,

..... min [2]

(iv) the number of people who spend more than 30 minutes in the library.

..... [2]

41. 0580_s18_qp_42 Q: 2

The time taken for each of 120 students to complete a cooking challenge is shown in the table.

Time (t minutes)	$20 < t \leqslant 25$	$25 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 40$	$40 < t \leqslant 45$
Frequency	44	32	28	12	4

(a) (i) Write down the modal time interval.

..... $< t \leqslant$ ..... [1]

(ii) Write down the interval containing the median time.

..... $< t \leqslant$ ..... [1]

(iii) Calculate an estimate of the mean time.

..... min [4]

(iv) A student is chosen at random.

Find the probability that this student takes more than 40 minutes.

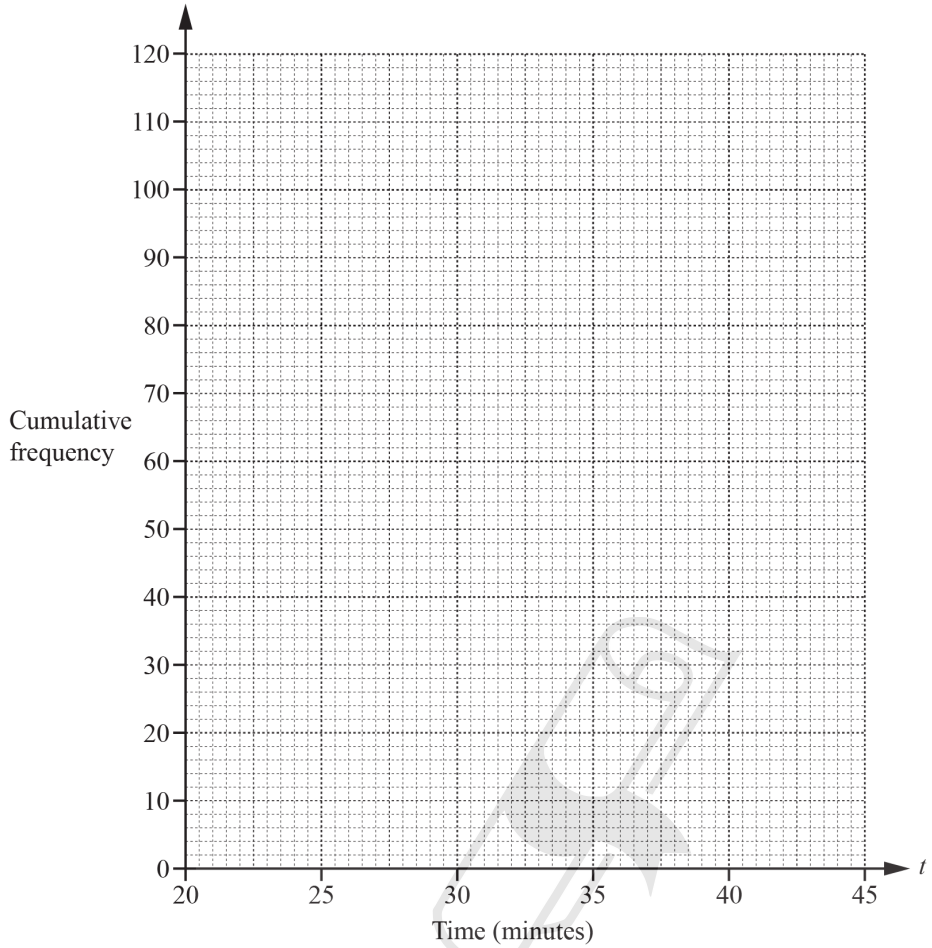
..... [1]

(b) (i) Complete the cumulative frequency table.

Time (t minutes)	$t \leqslant 20$	$t \leqslant 25$	$t \leqslant 30$	$t \leqslant 35$	$t \leqslant 40$	$t \leqslant 45$
Cumulative frequency	0	44				

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Find the median time.

..... min [1]

(iv) Find the interquartile range.

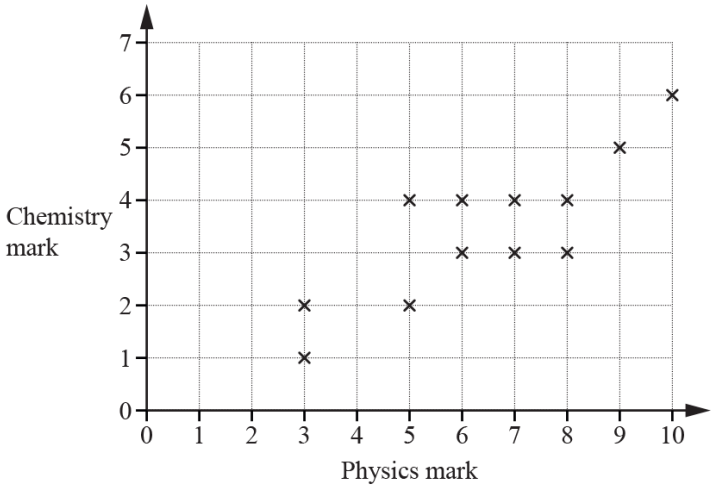
..... min [2]

(v) Find the number of students who took more than 37 minutes to complete the cooking challenge.

..... [2]

42. 0580_s18_qp_43 Q: 3

(a) The scatter diagram shows the physics mark and the chemistry mark for each of 12 students.



(i) What type of correlation is shown in the scatter diagram?

..... [1]

(ii) On the scatter diagram, draw a line of best fit. [1]

(iii) Find an estimate of the chemistry mark for another student who has a physics mark of 4.

..... [1]

(b) A teacher records the number of days each of the 24 students in her class are absent.
The frequency table shows the results.

Number of days	0	1	2	3	4	5
Frequency	10	8	3	2	0	1

Find the mode, the median and the mean.

Mode = ...

Median = ...

Mean = ... [5]

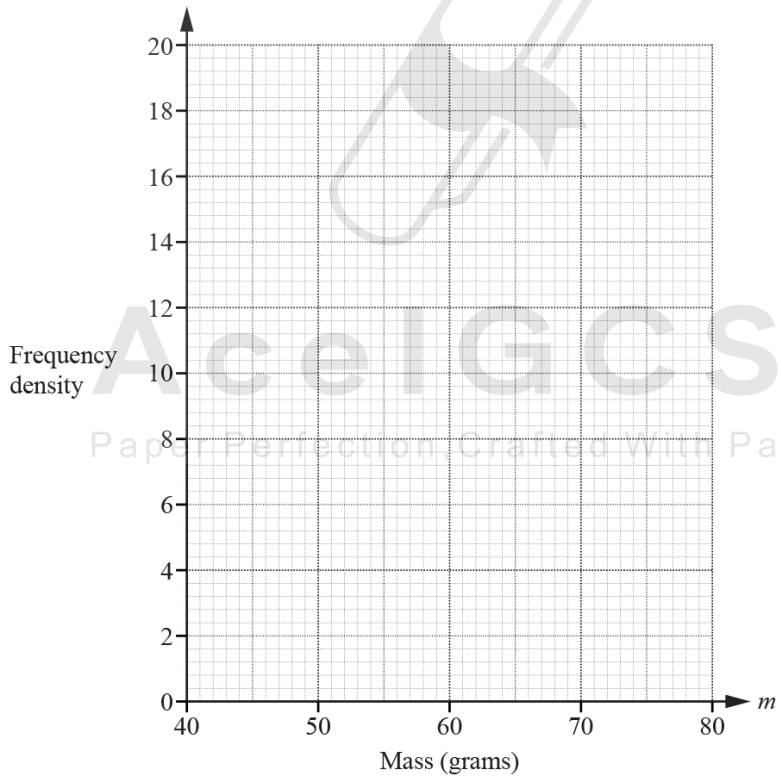
(c) Three sizes of eggs are sold in a shop.
The table shows the number of eggs of each size sold in one day.

Size	Small	Medium	Large
Mass (m grams)	$46 < m \leqslant 52$	$52 < m \leqslant 62$	$62 < m \leqslant 80$
Number of eggs sold	78	180	162

(i) Calculate an estimate of the mean mass.

..... g [4]

(ii) On the grid, draw a histogram to show the information in the table.



[4]

43. 0580_w18_qp_41 Q: 4

A school nurse records the height, h cm, of each of 180 children.
The table shows the information.

Height (h cm)	$60 < h \leqslant 70$	$70 < h \leqslant 90$	$90 < h \leqslant 100$	$100 < h \leqslant 110$	$110 < h \leqslant 115$	$115 < h \leqslant 125$
Frequency	8	26	35	67	28	16

(a) Calculate an estimate of the mean.
Give your answer correct to 1 decimal place.

..... cm [4]

(b) In a histogram showing the information, the height of the bar for the interval $60 < h \leqslant 70$ is 0.4 cm.

Calculate the height of the bar for each of the following intervals.

$115 < h \leqslant 125$ ..... cm

$110 < h \leqslant 115$ ..... cm

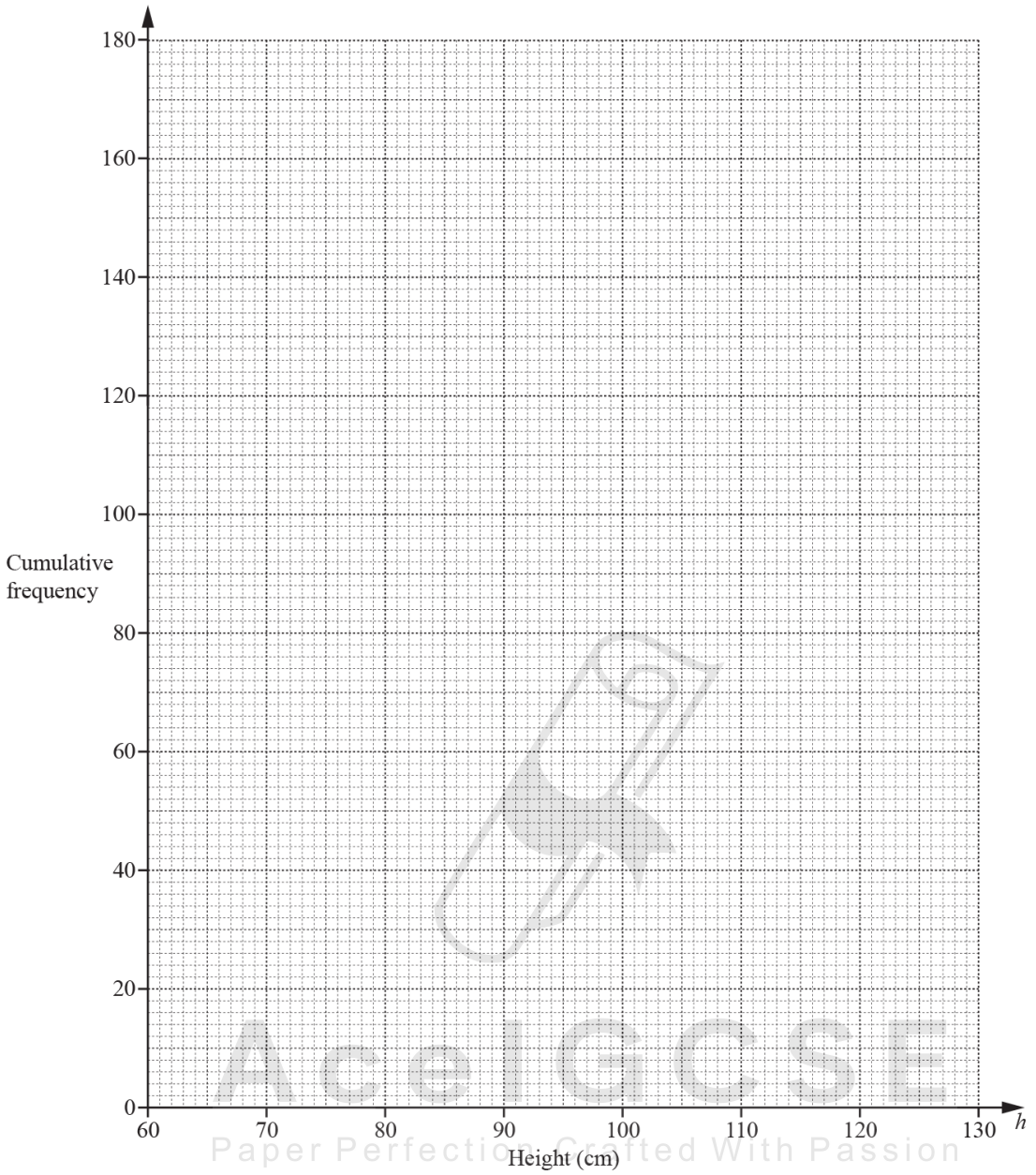
$70 < h \leqslant 90$ ..... cm [3]

(c) Complete the cumulative frequency table below.

Height (h cm)	$h \leqslant 70$	$h \leqslant 90$	$h \leqslant 100$	$h \leqslant 110$	$h \leqslant 115$	$h \leqslant 125$
Cumulative frequency						180

[2]

(d) On the grid opposite, draw a cumulative frequency diagram.



[3]

(e) Use your cumulative frequency diagram to find an estimate of

(i) the interquartile range,

..... cm [2]

(ii) the 70th percentile,

..... cm [2]

(iii) the number of children with height greater than 106 cm.

..... [2]

44. 0580_w18_qp_42 Q: 9

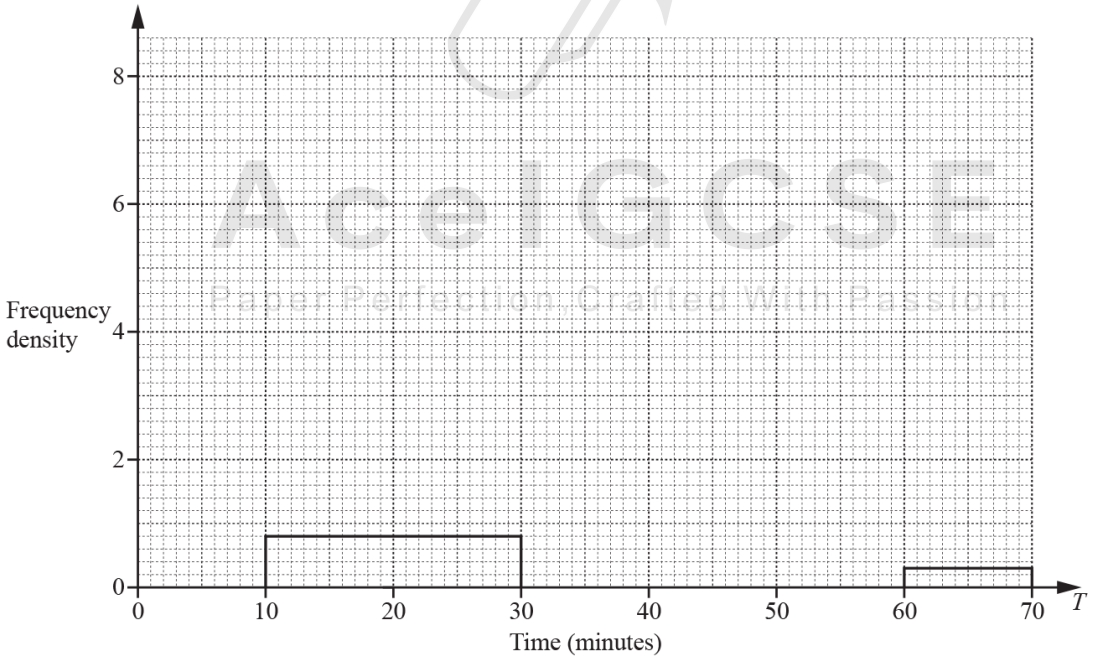
(a) The table shows the amount of time, T minutes, 120 people each spend in a supermarket one Saturday.

Time (T minutes)	Number of people
$10 < T \leqslant 30$	16
$30 < T \leqslant 40$	18
$40 < T \leqslant 45$	22
$45 < T \leqslant 50$	40
$50 < T \leqslant 60$	21
$60 < T \leqslant 70$	3

(i) Use the mid-points of the intervals to calculate an estimate of the mean.

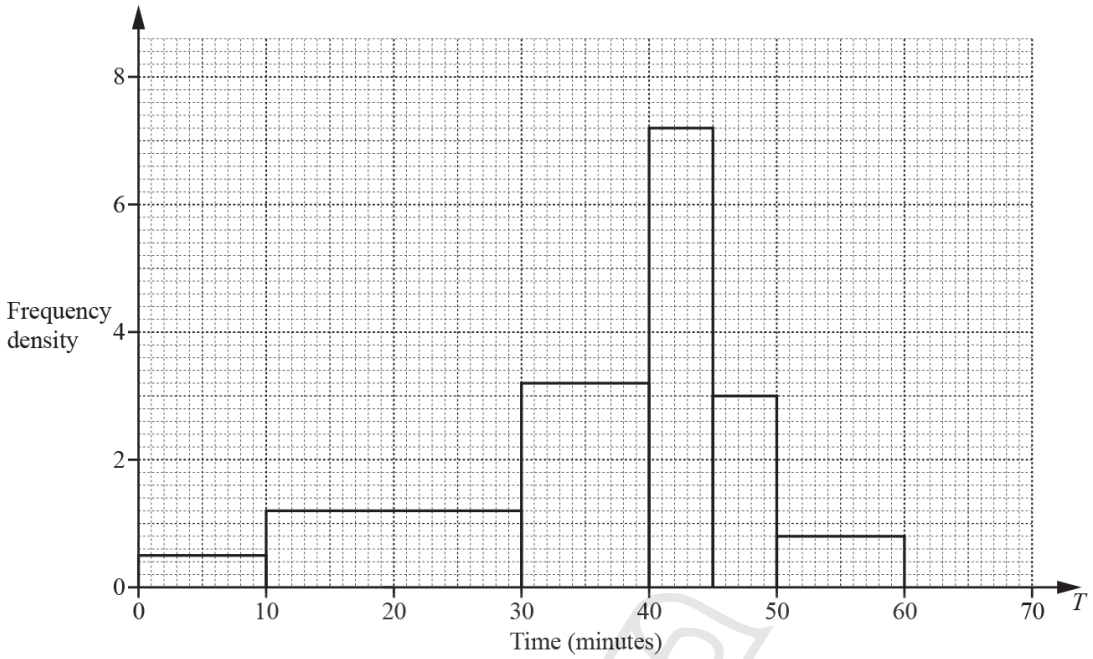
..... min [4]

(ii) Complete this histogram to show the information in the table.



[4]

(b) This histogram shows the amount of time, T minutes, 120 people each spend in the supermarket one Wednesday.



Make a comment comparing the distributions of the times for the two days.

.....

..... [1]

45. 0580_w18_qp_43 Q: 5

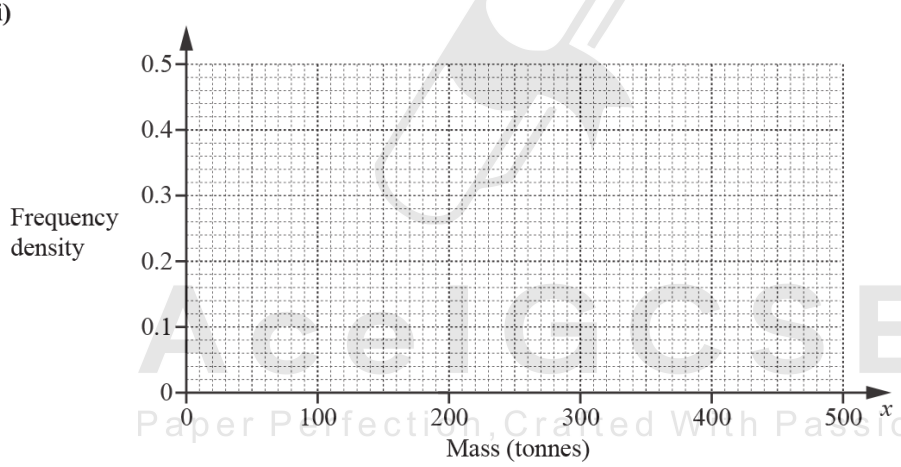
(a) A factory recycles metal.
The mass, x tonnes, of metal is measured each week.
The table shows the results for 52 weeks.

Mass (x tonnes)	$100 < x \leqslant 200$	$200 < x \leqslant 250$	$250 < x \leqslant 300$	$300 < x \leqslant 500$
Frequency	8	20	12	12

(i) Calculate an estimate of the mean.

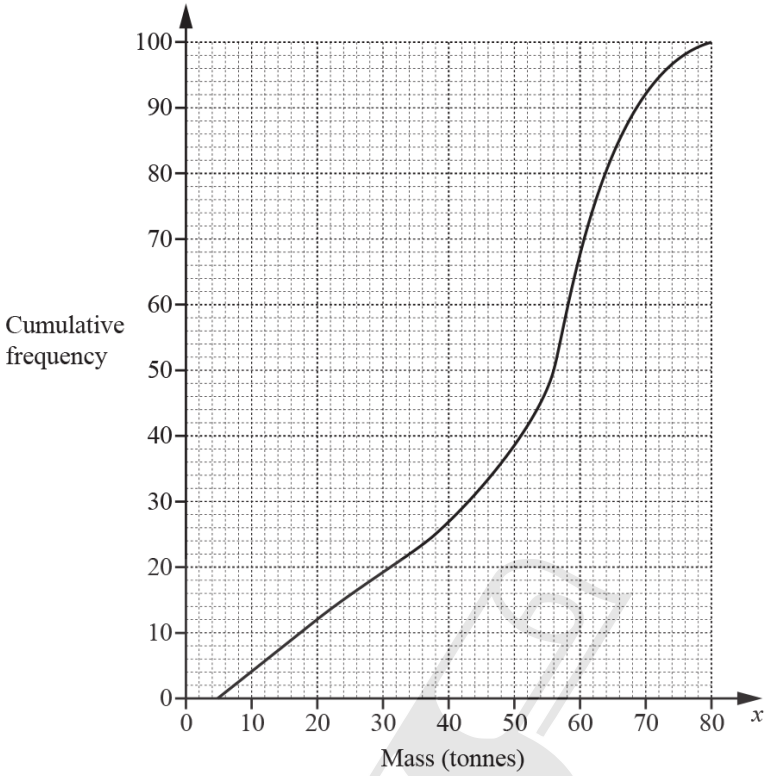
..... tonnes [4]

(ii)



On the grid, draw a histogram to show the information in the table. [4]

(b) Another factory also recycles metal.
The mass, x tonnes, of metal is measured each day for a number of days.
The cumulative frequency diagram shows the results.



(i) For how many days was the mass measured?

..... [1]

(ii) Find an estimate of the median.

..... tonnes [1]

(iii) Find an estimate of the upper quartile.

..... tonnes [1]

(iv) Find an estimate of the interquartile range.

.....tonnes [1]

(v) Find an estimate of the number of days when the mass was greater than 20 tonnes.

..... [2]

46. 0580_m17_qp_42 Q: 7

The table shows information about the time taken by 400 people to complete a race.

Time taken (m minutes)	$45 < m \leqslant 50$	$50 < m \leqslant 60$	$60 < m \leqslant 70$	$70 < m \leqslant 90$	$90 < m \leqslant 100$	$100 < m \leqslant 120$
Frequency	23	64	122	136	26	29

(a) Calculate an estimate of the mean time taken.

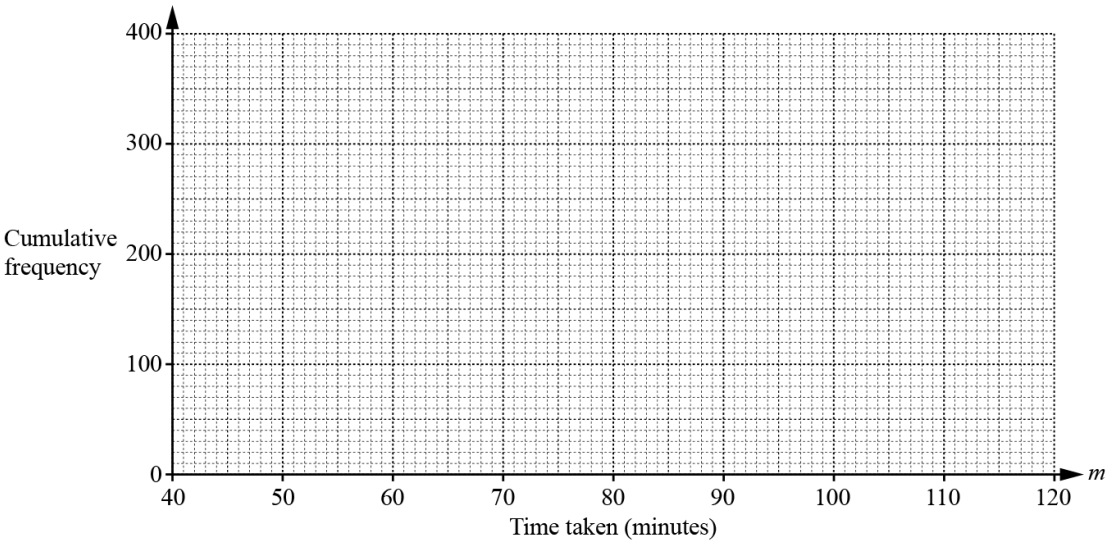
..... min [4]

(b) (i) Complete the cumulative frequency table.

Time taken (m minutes)	$m \leqslant 50$	$m \leqslant 60$	$m \leqslant 70$	$m \leqslant 90$	$m \leqslant 100$	$m \leqslant 120$
Cumulative frequency	23					400

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Use your diagram to estimate

(a) the median,

..... min [1]

(b) the inter-quartile range,

..... min [2]

(c) the 60th percentile.

..... min [2]

47. 0580_s17_qp_41 Q: 2

The time taken for each of 90 cars to complete one lap of a race track is shown in the table.

Time (t seconds)	$70 < t \leqslant 71$	$71 < t \leqslant 72$	$72 < t \leqslant 73$	$73 < t \leqslant 74$	$74 < t \leqslant 75$
Frequency	17	24	21	18	10

(a) Write down the modal time interval.

..... $< t \leqslant$ ..... [1]

(b) Calculate an estimate of the mean time.

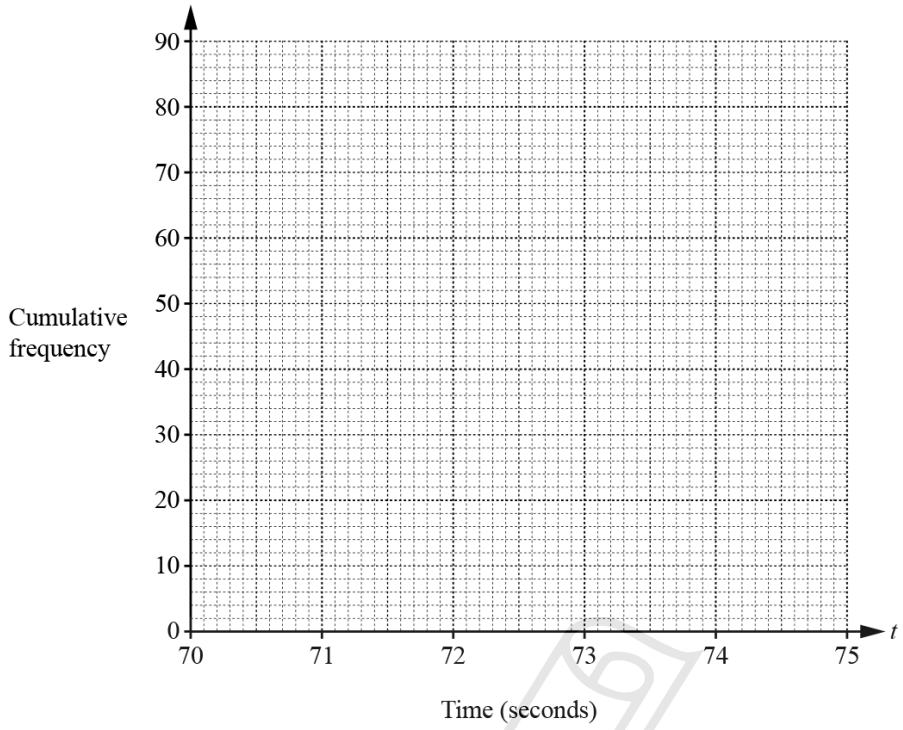
..... s [4]

(c) **(i)** Complete the cumulative frequency table.

Time (t seconds)	$t \leqslant 71$	$t \leqslant 72$	$t \leqslant 73$	$t \leqslant 74$	$t \leqslant 75$
Cumulative frequency	17				

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Find the median time.

..... s [1]

(iv) Find the inter-quartile range.

..... s [2]

(d) One lap of the race track measures 3720 metres, correct to the nearest 10 metres.
A car completed the lap in 75 seconds, correct to the nearest second.

Calculate the upper bound for the average speed of this car.
Give your answer in kilometres per hour.

..... km/h [4]

48. 0580_s17_qp_42 Q: 3

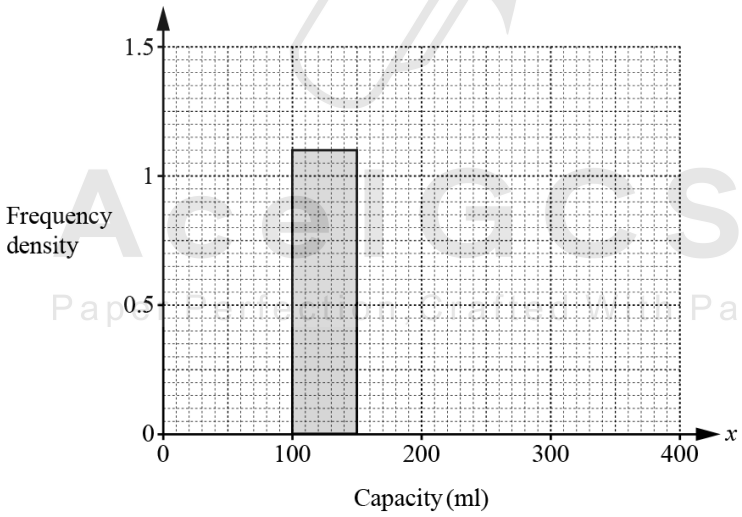
(a) 200 students estimate the capacity, x millilitres, of a cup.
The results are shown in the frequency table.

Capacity (x ml)	$0 < x \leqslant 100$	$100 < x \leqslant 150$	$150 < x \leqslant 200$	$200 < x \leqslant 250$	$250 < x \leqslant 400$
Frequency	20	55	66	35	24

(i) Calculate an estimate of the mean.

..... ml [4]

(ii) Complete the histogram.

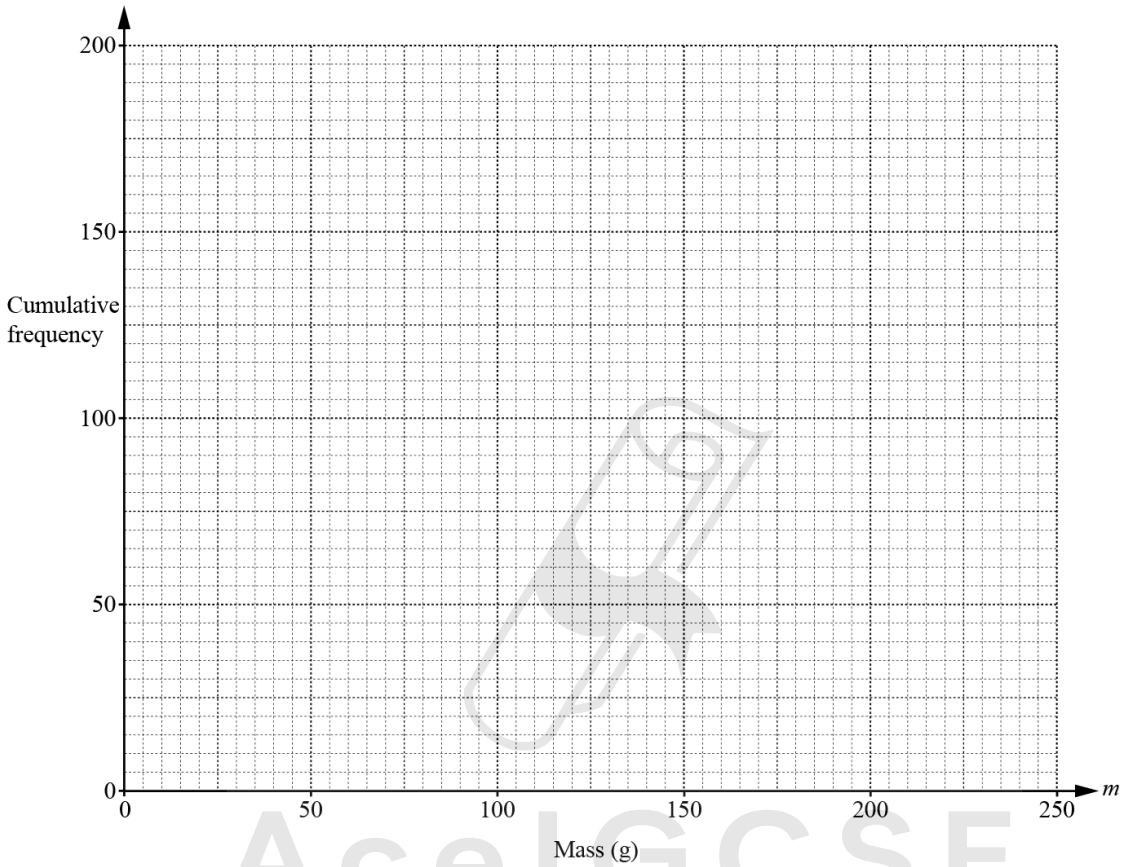


[4]

(b) The 200 students also estimate the mass, m grams, of a small rock.
The results are shown in the cumulative frequency table.

Mass (m grams)	$m \leqslant 50$	$m \leqslant 100$	$m \leqslant 150$	$m \leqslant 200$	$m \leqslant 250$
Cumulative frequency	28	64	104	168	200

(i) On the grid, draw a cumulative frequency diagram.



[3]

(ii) Find

(a) the 65th percentile,

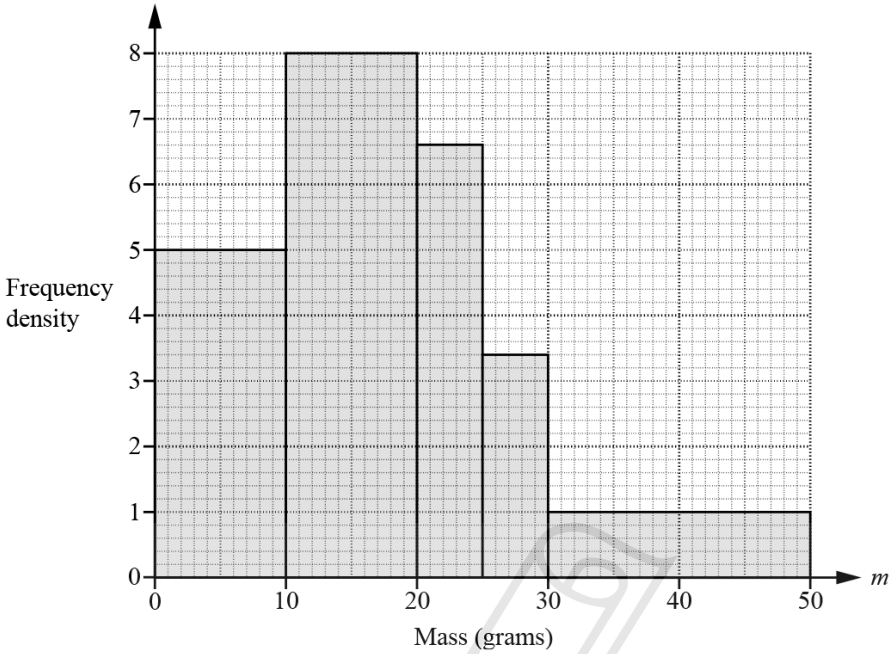
..... g [1]

(b) the number of students who estimated more than 75 g.

..... [2]

49. 0580_s17_qp_43 Q: 5

(a) Haroon has 200 letters to post.
The histogram shows information about the masses, m grams, of the letters.



(i) Complete the frequency table for the 200 letters.

Mass (m grams)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 25$	$25 < m \leqslant 30$	$30 < m \leqslant 50$
Frequency	50			17	

[3]

(ii) Calculate an estimate of the mean mass.

..... g [4]

(b) Haroon has 15 parcels to post.
The table shows information about the sizes of these parcels.

Size	Small	Large
Frequency	9	6

Two parcels are selected at random.

Find the probability that

(i) both parcels are large,

..... [2]

(ii) one parcel is small and the other is large.

..... [3]

(c) The probability that a parcel arrives late is $\frac{3}{80}$.
4000 parcels are posted.

Calculate an estimate of the number of parcels expected to arrive late.

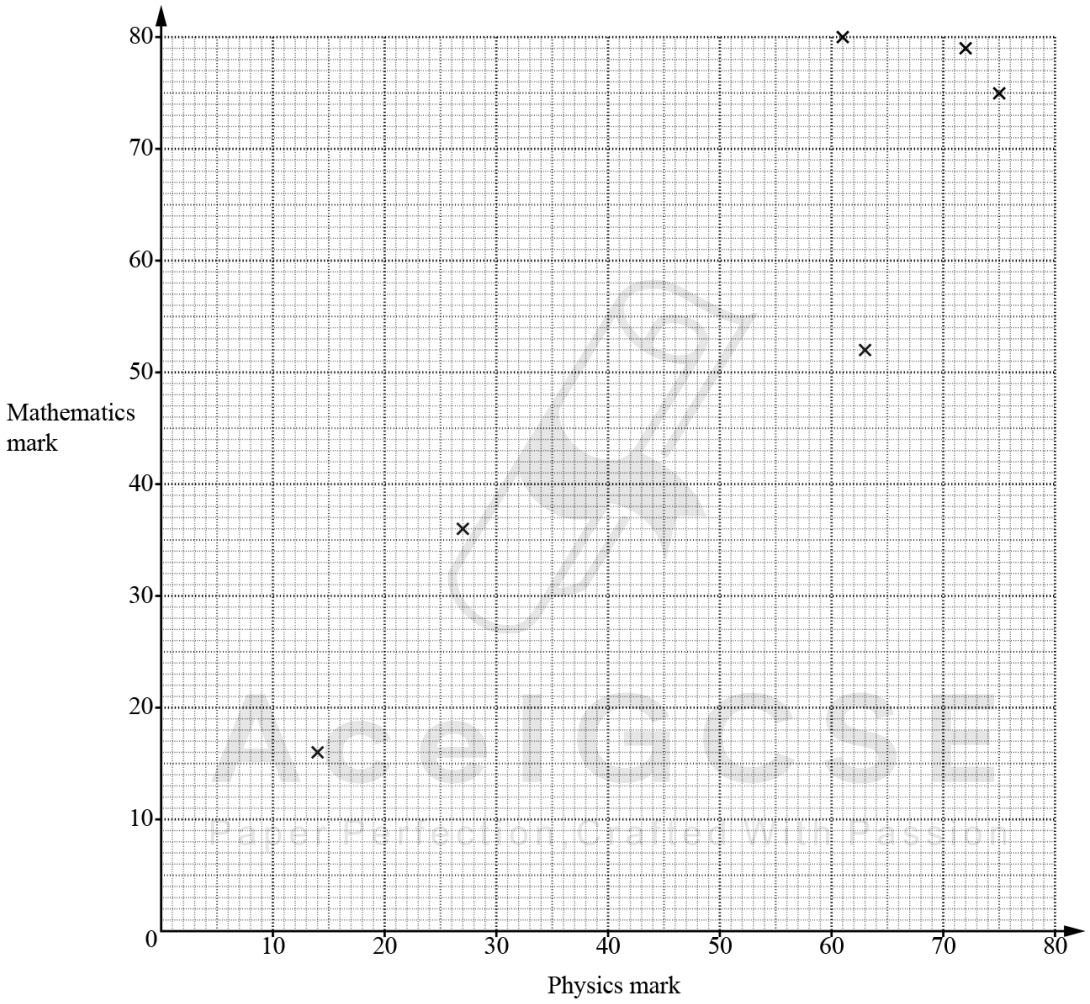
..... [1]

50. 0580_s17_qp_43 Q: 8

(a) The table shows the marks gained by 10 students in their physics test and their mathematics test.

Physics mark	63	61	14	27	72	75	44	40	28	50
Mathematics mark	52	80	16	36	79	75	51	35	24	63

(i) Complete the scatter diagram below.
The first six points have been plotted for you.



[2]

(ii) What type of correlation is shown in the scatter diagram?

..... [1]

(b) The marks of 30 students in a spelling test are shown in the table below.

Mark	0	1	2	3	4	5
Frequency	2	4	5	5	6	8

Find the mean, median, mode and range of these marks.

Mean = ...

Median = ...

Mode = ...

Range = ... [7]

(c) The table shows the marks gained by some students in their English test.

Mark	52	75	91
Number of students	x	45	11

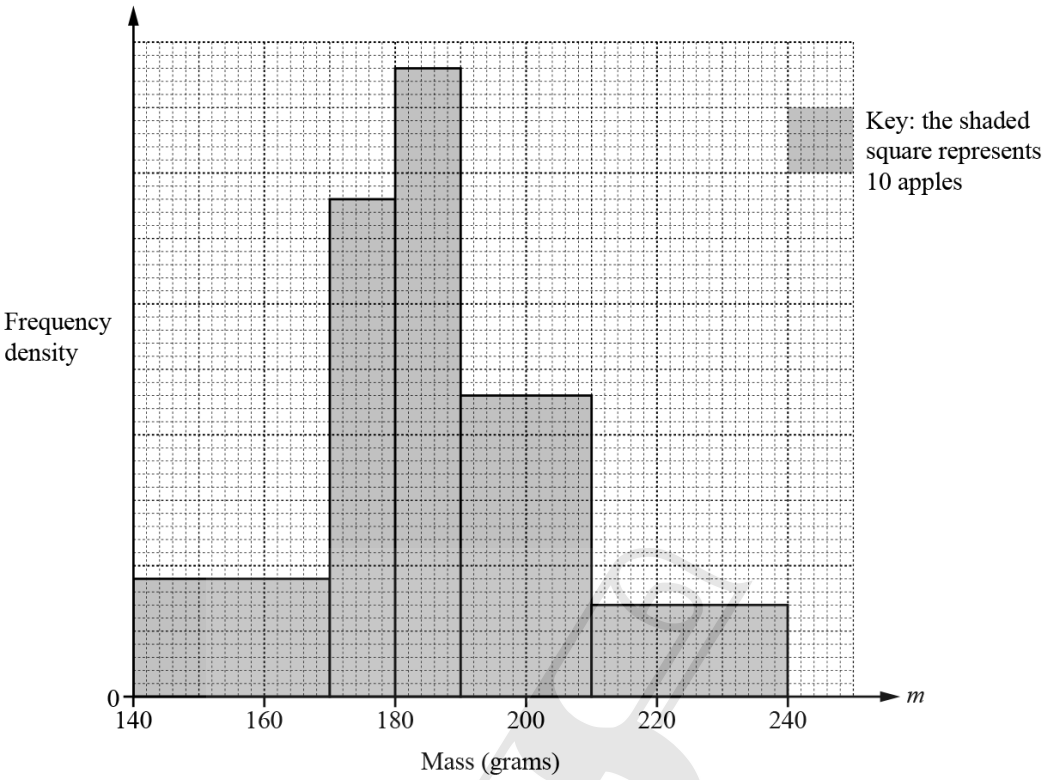
The mean mark for these students is 70.3 .

Find the value of x.

x = ... [3]

51. 0580_w17_qp_41 Q: 5

The histogram shows the distribution of the masses, m grams, of 360 apples.



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

Mass (m grams)	Number of apples
$140 < m \leqslant 170$	
$170 < m \leqslant 180$	
$180 < m \leqslant 190$	
$190 < m \leqslant 210$	92
$210 < m \leqslant 240$	42

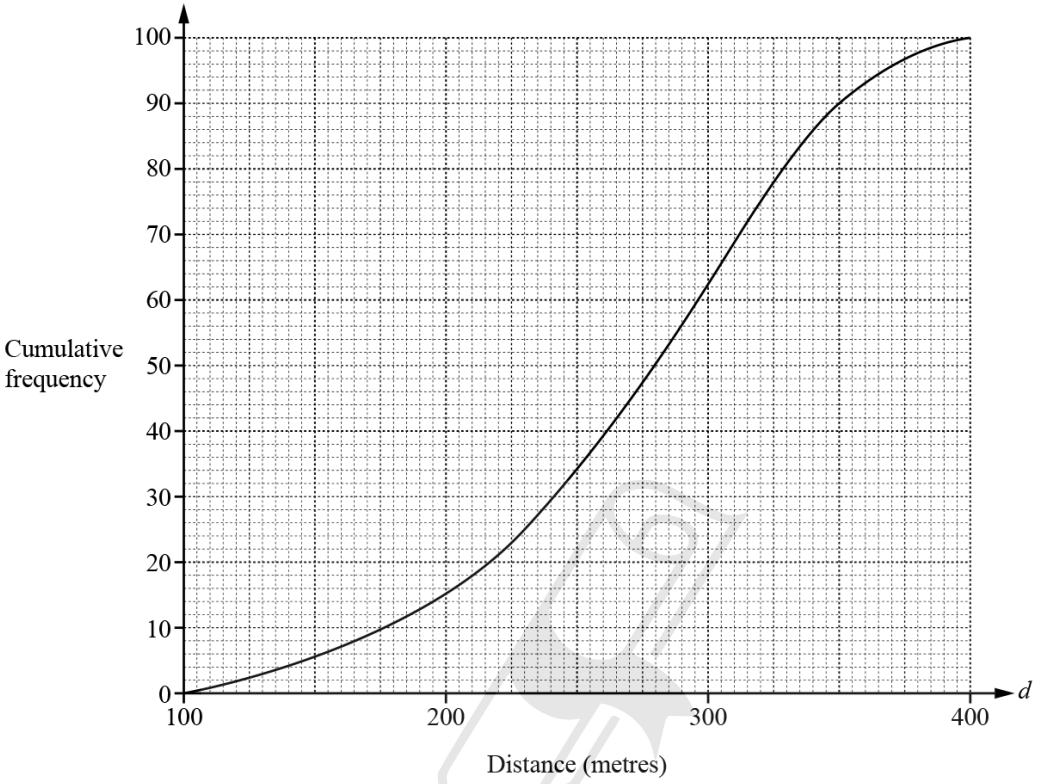
[3]

(b) Calculate an estimate of the mean mass of the 360 apples.

..... g [4]

52. 0580_w17_qp_42 Q: 6

(a) There are 100 students in group A.
The teacher records the distance, d metres, each student runs in one minute.
The results are shown in the cumulative frequency diagram.



Find

(i) the median,

..... m [1]

(ii) the upper quartile,

..... m [1]

(iii) the inter-quartile range,

..... m [1]

(iv) the number of students who run more than 350 m.

..... [2]

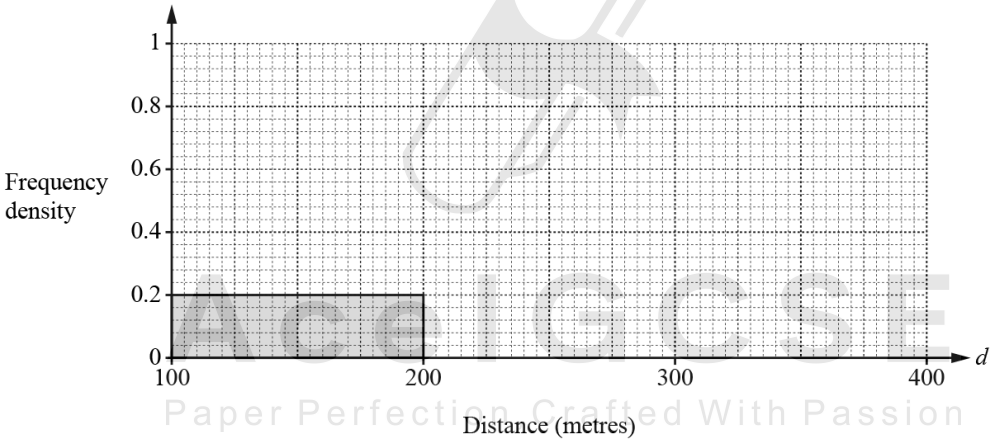
(b) There are 100 students in group *B*.
The teacher records the distance, *d* metres, each of these students runs in one minute.
The results are shown in the frequency table.

Distance (*d* metres)	$100 < d \leqslant 200$	$200 < d \leqslant 250$	$250 < d \leqslant 280$	$280 < d \leqslant 320$	$320 < d \leqslant 400$
Number of students	20	22	30	16	12

(i) Calculate an estimate of the mean distance for group *B*.

..... m [4]

(ii) Complete the histogram to show the information in the frequency table.



[4]

(c) For the 100 students in group *B*, the median is 258 m.

Complete the statement.

On average, the students in group *A* run ..... than the students in group *B*. [1]

53. 0580_w17_qp_43 Q: 4

The table shows information about the time, t minutes, taken for each of 150 girls to complete an essay.

Time (t minutes)	$60 < t \leqslant 65$	$65 < t \leqslant 70$	$70 < t \leqslant 80$	$80 < t \leqslant 100$	$100 < t \leqslant 150$
Frequency	10	26	34	58	22

(a) Write down the interval that contains the median time.

..... $< t \leqslant$ ..... [1]

(b) Calculate an estimate of the mean time.

.....min [4]

(c) Rafay looks at the frequency table.

(i) He says that it is not possible to work out the range of the times.

Explain why he is correct.

.....

..... [1]

(ii) He draws a pie chart to show this information.

Calculate the sector angle for the interval $65 < t \leqslant 70$ minutes.

..... [2]

(d) A girl is chosen at random.

Work out the probability that she took more than 100 minutes to complete the essay.

..... [1]

(e) Two girls are chosen at random.

Work out the probability that, to complete the essay,

(i) they both took 65 minutes or less,

..... [2]

(ii) one took 65 minutes or less and the other took more than 100 minutes.

..... [3]

(f) The information in the frequency table is shown in a histogram.
The height of the block for the $60 < t \leqslant 65$ interval is 5 cm.

Complete the table.

Time (t minutes)	$60 < t \leqslant 65$	$65 < t \leqslant 70$	$70 < t \leqslant 80$	$80 < t \leqslant 100$	$100 < t \leqslant 150$
Height of block (cm)	5				

[3]

01. 0580_m24_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	5	**1**	
(a)(ii)	16.8	**3**	**M1** for 15 × 4 + 16 [× 1] + 17 × 2 + 18 [× 1] [+ 19 × 0] + 20 × 2 oe **M1** dep on previous M1 for *their* $\Sigma fx \div 10$
(a)(iii)	16.5	**1**	
(a)(iv)	15	**1**	
(b)	21	**3**	**M2** for 8×17.5 and 7×17 oe or **M1** for 7×17 or 8×17.5 oe seen
(c)	5 correct blocks, with correct widths, heights 0.8cm, 1.8cm 7cm, 4cm, 1cm	**4**	**B3** for 4 correct blocks or **B2** for 3 correct blocks or **B1** for 2 correct blocks If 0 scored **SC1** for correct frequency densities (0.4 0.9 3.5 2 0.5) soi

02. 0580_s24_ms_41 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	9.3	**1**	
(a)(ii)	3.4	**1**	
(a)(iii)	63	**5**	**M4** for $\frac{195}{6}\times\frac{3600}{1000}-\frac{195}{13}\times\frac{3600}{1000}$ oe or **M3** for $\frac{195}{6}\times\frac{3600}{1000}$ oe or $\frac{195}{13}\times\frac{3600}{1000}$ oe or for $(\frac{195}{6}-\frac{195}{13})[\times k]$ oe OR **M1** for $\frac{195}{6}$ or $\frac{195}{13}$ or *their* speed $\times\frac{3600}{1000}$ seen **M1** for selecting 6 and 13

Question	Answer	Marks	Partial Marks
(b)(i)	$420 < d \leqslant 450$	**1**	
(b)(ii)	411.25	**4**	**M1** for 275, 350, 410, 435, 475 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div 80$
(b)(iii)	2.6 19 14	**3**	**B1** for each If 0 scored, **SC1** for 3 of 0.14, 0.13, 0.95 or 0.7 oe
(b)(iv)	$\frac{7}{158}$ oe	**3**	**M2** for $[2\times]\frac{20}{80}\times\frac{7}{79}$ oe or **M1** for $\frac{20}{80}$ or $\frac{7}{79}$ or $\frac{7}{80}$ or $\frac{20}{79}$ oe seen After 0 scored, **SC1** for $\frac{7}{160}$ oe

03. 0580_s24_ms_43 Q: 3

Question	Answer	Marks	Partial Marks
(a)	5	**B1**	
	4	**B1**	
	3.55	**3**	**M2** for $(10 \times 1 + 6 \times 2 + 11 \times 3 + 13 \times 4 + 14 \times 5 + 6 \times 6) \div 60$ oe or **M1** for $10 \times 1 + 6 \times 2 + 11 \times 3 + 13 \times 4 + 14 \times 5 + 6 \times 6$ oe
(b)(i)	42.55 or 42.6	**4**	**M1** for 25, 40, 62.5 soi **M1** for Σfx with x values in correct intervals, including boundaries **M1 dep** on second M1 for $\frac{\Sigma fx}{100}$
(b)(ii)	10.8 2.16	**2**	**B1** for each or for frequency densities 3.6 and 0.72 seen

04. 0580_m23_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)(i)	7	**1**	
(a)(ii)	8	**1**	
(a)(iii)	8.31	**3**	**M1** for $3\times6 + 32\times7 + 19\times8 + 29\times9 + 11\times10 + 6\times11$ oe **M1dep on M1** for $\frac{\Sigma fx}{100}$
(a)(iv)	$\frac{23}{110}$ oe	**2**	**M1** for $\frac{k}{100}\times\frac{k-1}{99}$ oe, $k < 100$ or **B1** for $\frac{46}{100}$ and $\frac{45}{99}$
(b)(i)	53	**1**	
(b)(ii)	20	**1**	

Question	Answer	Marks	Partial Marks
(c)(i)	151.975	4	**M1** for 80, 155, 250 soi **M1** for $\sum fx$ where x is in correct interval including boundaries **M1 dep** for $\frac{\sum fx}{200}$ dep on second M1
(c)(ii)	Correct histogram completed with widths 110 to 200 and 200 to 300 and heights 1.1 and 0.41	2	**B1** for one correct block If 0 scored, **SC1** for 1.1 and 0.41 seen

05. 0580_s23_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	600	2	**M1** for $\frac{1250}{12+9+4} \times k$ where $k = 1, 4, 9, 12$ oe
(a)(ii)	80	2	**M1** for 1250 × 64 [÷ 1000]
(a)(iii)	60	2	**M1** for $x \times \left(1 - \frac{10}{100}\right) = 54$ oe
(a)(iv)	1000	2	**M1** for 1250 – (1250 ÷ 5) oe or **B1** for 250
(b)(i)	3.52	2	**M1** for [10 –] 12 × 0.54 or **B1** for 6.48
(b)(ii)	0.08	3	**B2** for 0.077[4...] or **M1** for 0.51 ÷ 0.826 If 0 or 1 scored award instead **SC2** for 0.93 final answer OR If 0 scored **SC1** for 0.06 as answer

06. 0580_s23_ms_41 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	55.87	**4**	**M1** for midpoints soi **M1** for use of $\sum fm$ where m is in the correct interval including boundaries **M1** (dep on 2nd M1) for $\sum fm \div 1000$
(a)(ii)	$\frac{177}{500}$ cao	**2**	**M1** for $\frac{154+200}{1000}$ oe
(b)(i)	25000	**1**	
(b)(ii)	2.473×10^4	**1**	
(c)(i)	166 650 or 165816 nfww	**3**	**M2** for (500 + 5) × '320 to 340' or '500 to 510' × (320 + 10) or **M1** for 500 − 5 or 500 + 5 or 320 −10 or 320 +10 Alternative method **M2** for 504 × '320 to 340' or '500 to 510' × 329 or **M1** for 504 or 329
(c)(ii)	285 or 286 nfww	**2**	**M1** for 800 −10

07. 0580_s23_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)(a)	25	**1**	
(a)(i)(b)	17 to 18	**1**	
(a)(i)(c)	12	**2**	**B1** for 148 seen
(a)(i)(d)	30	**2**	**B1** for 104 seen
(a)(ii)(a)	correct diagram or correct for *their* median and LQ	**3**	**B1** for whiskers at 1 **and** at 70 **B1** for with median **and** LQ at *their* **(a)(i)(a)** and **(a)(i)(b)** **B1** for UQ at 34 Maximum 2 marks if diagram incorrect If 0 scored **SC1** for *their* 5 correct ages plotted
(a)(ii)(b)	50	**1**	
(b)	correct histogram	**3**	**B1** for each correct block width 10 height 3.7 width 20 height 1.2 width 30 height 2 If 0 scored **SC1** for correct frequency densities 3.7, 1.2, 2 oe

08. 0580_s23_ms_42 Q: 4

Question	Answer	Marks	Partial Marks
(a)(i)	$1.65 < h \leq 1.8$	**1**	
(a)(ii)	1.63875	**4**	**M1** for midpoints **soi** **M1** for use of $\sum fh$ with h in correct interval including both boundaries **M1dep on 2nd M1** for $\sum fh \div 80$
(b)(i)	$\frac{1}{40}$ oe	**1**	
(b)(ii)	$\frac{63}{395}$ oe	**3**	**M2** for $\frac{56}{80} \times \frac{9}{79}$ [×2] oe or **B1** for $\frac{56}{80}$ or $\frac{9}{79}$ or $\frac{9}{80}$ or $\frac{56}{79}$ oe seen If 0 or B1 scored, instead award **SC2** for answer $\frac{117}{632}$ oe or **SC1** for answer $\frac{63}{400}$ oe
(c)(i)	15, 39, 71, 80	**2**	**B1** for 3 correct or **M1** for 1 error in addition with other values then consistent

Question	Answer	Marks	Partial Marks
(c)(ii)	Correct curve	**3**	**B1** for correct horizontal placement for 5 plots **B1FT** for correct vertical placement for 5 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 5 points If 0 scored **SC1 FT** for 4 out of 5 points correctly plotted
(d)(i)	Strict FT *their* UQ – *their* LQ	**2dep**	**B1dep** for *their* UQ or *their* LQ seen Dep on increasing curve/polygon for 2 marks or B1
(d)(ii)	Strict FT *their* reading at 48	**2dep**	**B1** for 48 written

09. 0580_s23_ms_43 Q: 2

Question	Answer	Marks	Partial Marks
(a)(i)	1 | 3 5 7 8 2 | 1 1 2 7 8 9 3 | 1 1 1 8 1 | 7 represents 17 [messages]	3	**B2** for fully correct stem-and-leaf diagram OR **B1** for two rows correct or for fully correct unordered stem-and-leaf diagram or for a correct diagram with one error or omission **B1** for correct key
(a)(ii)	24.5	1	
(a)(iii)	31	1	
(a)(iv)	25	1	
(b)	$\frac{14}{33}$ oe	2	**M1** for $\frac{8}{12} \times \frac{7}{11}$

10. 0580_s23_ms_43 Q: 6

Question	Answer	Marks	Partial Marks
(a)(i)	Correct curve	**3**	**B1** for correct horizontal placement for 6 plots **B1** for correct vertical placement for 6 plots **B1 dep on at least B1** for reasonable increasing curve through *their* 6 points If 0 scored, **SC1** for 4 out of 6 points correctly plotted
(a)(ii)(a)	87 to 89.5	**1**	
(a)(ii)(b)	12.5 to 14	**2**	**B1** for [LQ =] 80.5 to 81.5 or [UQ =] 94 to 94.5
(a)(ii)(c)	Strict FT, 200 – *their* cumul freq reading from *their* graph at 110 given to nearest integer	**2**	**B1FT** for correct cumul freq at 110 seen or for non-integer answer
(b)(i)	3576	**4**	**M1** for midpoints soi **M1** for use of $\sum fx$ where x is in the correct interval including boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 50$
(b)(ii)	5 3.2 3	**3**	**B1** for each If 0 scored, **SC1** for 3 frequency densities $\frac{12}{600}, \frac{15}{900}, \frac{16}{1500}, \frac{7}{700}$ seen oe to 3sf or better or multiplier 3 or 300

11. 0580_w23_ms_41 Q: 7

Question	Answer	Marks	Partial Marks
(a)	226 nfww or 226.2 to 226.3[0] nfww	**4**	**M1** for mid-points **soi** (217.5, 221.5, 229, 239, 254) **M1** for use of Σfm with m in correct interval including both boundaries **M1** (dep on 2nd M1) for $\Sigma fm \div$ (9 + 14 + 14 + 2 + 3)
(b)	Blocks with heights 2.8, 1.4, 0.2 and with correct widths	**3**	**B1** for each correct block If 0 scored, **SC1** for two correct frequency densities soi

12. 0580_w23_ms_42 Q: 2

Question	Answer	Marks	Partial Marks
(a)(i)	5	**1**	
(a)(ii)	17	**1**	
(a)(iii)	18	**1**	
(a)(iv)	17.88	**3**	**M2** for (1×15 + 3×16 + 19×17 + 11×18 + 10×19 + 6×20) ÷ 50 oe or **M1** for 1×15 + 3×16 + 19×17 + 11×18 + 10×19 + 6×20 oe
(b)(i)	1 | 8 2 | 0 0 1 1 1 2 5 3 | 0 3 4	**2**	**B1** for two rows correct or for fully correct unordered stem-and-leaf diagram
(b)(ii)	21	**1**	
(b)(iii)	10 nfww	**2**	**B1** for [upper qtile] = 30 or [lower qtile] = 20 soi

13. 0580_w23_ms_43 Q: 2

Question	Answer	Marks	Partial Marks
(a)	36.7 or 36.66 to 36.67 or $36\frac{2}{3}$	2	**M1** for $\frac{11}{8+6+11+5}$ [× 100] oe
(b)(i)	72, 132 and 60	2	**M1** for 360 ÷ (8 + 6 + 11 + 5) oe or 96 ÷ 8
(b)(ii)	Correct pie chart drawn	2	For 2 marks, strict **FT** *their* angles for correct pie chart only if angles add up to 360. **B1FT** for one correct sector
(c)	29	2	**M1** for $8 \times \left(1+\frac{262.5}{100}\right)$ oe or **B1** for 21
(d)(i)	1.5×10^9	1	
(d)(ii)	70.8 or 70.75…	2	**M1** for 1500 [million] ÷ 21.2 [million]

14. 0580_w23_ms_43 Q: 5

Question	Answer	Marks	Partial Marks
(a)	28 and 45 on table	**B2**	**B1** for each
	Histogram correctly completed	**B3**	**B1** for each correct bar If 0 scored, **SC1** for two of FD's 3.8, 1.9 or 0.6 oe soi
(b)	30.7 or 30.66 to 30.67	**4**	**M1** for midpoints **soi** **M1** for use of $\sum fh$ with h in correct interval including both boundaries **M1** (dep on 2nd M1) for $\sum fh \div$ (*their* 28 + *their* 45 + 57 + 38 + 12)
(c)	Exact values are not known oe	**1**	
(d)	$\frac{1254}{39\,697}$ oe	**4**	**M3** for $N\left(\frac{38+57}{57+38+12}\times\frac{12}{56+38+12}\times\frac{11}{56+38+11}\right)$ oe where $N = 1$, 2 or 3 or **M2** for $\frac{38+57}{57+38+12}$ and $\frac{12}{56+38+12}$ or $\frac{12}{57+38+12}$ and $\frac{11}{57+38+11}$ oe seen or **M1** for $\frac{38+57}{57+38+12}$ or $\frac{12}{57+38+12}$ oe seen If 0 scored **SC1** for answer $\frac{41040}{1225043}$ or 0.0335…

15. 0580_m22_ms_42 Q: 5

Question	Answer	Marks	Partial Marks
(a)	121 or 120.8… or $120\frac{5}{6}$	**4**	**M1** for midpoints soi **M1** for use of $\sum fx$ with x in correct interval including both boundaries but **not** if x is 50, 50, 100 and 300 **M1** (dep on 2nd M1) for $\sum fx \div 120$

Question	Answer	Marks	Partial Marks
(b)	12.4 5 1.4	3	**B1** for each If 0 scored **SC1** for fd's [0.86,] 0.62, 0.25 and 0.07 oe
(c)	43 74 99 120	2	**B1** for 2 or 3 correct
(d)	Correct diagram	3	**B1** for correct horizontal placement for 4 plots **B1FT** for correct vertical placement for 4 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 4 points If 0 scored **SC1 FT** for 3 out of 4 points correctly plotted
(e)(i)	Strict FT *their* **median** reading	1	
(e)(ii)	Strict FT *their* **UQ** reading	1	
(e)(iii)	Strict FT *their* reading at **40th percentile**	2	**B1** for 48 written or mark at cf = 48 on graph
(e)(iv)	Strict FT *their* reading at 400 – *their* reading at 250	2	**B1** for either correct reading at 250 or 400

16. 0580_s22_ms_41 Q: 1

Question	Answer	Marks	Partial Marks
(a)(i)	1 | 7 7 8 8 9 9 2 | 1 1 1 1 2 3 3 4 5	2	**B1** for one row correctly ordered or for fully correct unordered stem-and-leaf diagram or for a correct diagram with one error or omission
(a)(ii)	21	1	
(a)(iii)	23	1	
(a)(iv)	48	2	**M1** for $\frac{2}{15}[\times 360]$ or $\frac{360}{15}[\times 2]$
(b)(i)	120	1	
(b)(ii)	130	1	
(b)(iii)	60	1	
(c)(i)	93.4	4	**M1** for mid-values soi **M1** for Σfx **M1 dep on second M** for $\Sigma fx \div 200$
(c)(ii)	19	2	**M1** for $\frac{86}{50}$ or $\frac{114}{60}$

17. 0580_s22_ms_42 Q: 7

Question	Answer	Marks	Partial Marks
(a)	25.2 or 25.23…	**4**	**M1** for midpoints **soi** **M1** for use of $\sum fx$ with x in correct interval including both boundaries **M1** (**dep** on 2nd M1) for $\sum fx \div 150$
(b)	5 correct blocks	**4**	**B3** for 4 correct blocks or **B2** for 3 correct blocks or **B1** for 2 correct blocks or block widths 10, 10, 5, 15, 10 If 0 scored **SC1** for 4 correct frequency densities from 1.2, 3.8, 6.4, 3.33[3…] and 1.8 oe soi
(c)(i)	12, 50, 82, 132, 150	**2**	**B1** for 3 or 4 correct

Question	Answer	Marks	Partial Marks
(c)(ii)	92	**2**	**M1** for 150 −12 oe seen If 0 scored, **SC1** for answer 8[%]

18. 0580_s22_ms_43 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	$20 < t \leqslant 35$	**1**	

Question	Answer	Marks	Partial Marks
(a)(ii)	28 nfww	4	**M1** for midpoints **soi** **M1** for use of $\sum fm$ with m in correct interval including both boundaries **M1** (dep on 2nd M1) for $\sum fm \div 80$
(b)(i)	$\frac{7}{8}$ cao	2	**M1** for $\frac{18+28+24}{80}$ oe
(b)(ii)	$\frac{25}{126}$ oe	3	**M2** for $[2\times]\left(\frac{3}{28}\times\frac{25}{27}\right)$ or $[2\times]\left(\frac{25}{28}\times\frac{3}{27}\right)$ oe or **M1** for either $\frac{3}{28}$ or $\frac{25}{27}$ or $\frac{25}{28}$ or $\frac{3}{27}$ If 0 scored, **SC1** for answer $\frac{75}{392}$ oe
(c)(i)	28 and 56	1	
(c)(ii)	Correct diagram	3	**B1FT** *their* **(c)(i)** for plots at 5 correct heights **B1** for 5 plots at upper ends of intervals on correct vertical line **B1FT** (dep on at least B1) for increasing curve or polygon through 5 points After 0 scored, **SC1FT** for 4 correct points plotted
(c)(iii)	Strict FT *their* reading at 80th percentile for an increasing curve/polygon	2	**B1** for 64 written or a mark at cf = 64 on graph or a mark on curve at $(t, 64)$
(c)(iv)	Correct integer reading at $t = 45$	M1	**FT** *their* cf graph for all three marks
	$\frac{80-(\textit{their reading at } t=45)}{80}$ [× 100] or $\frac{(\textit{their reading at } t=45)}{80}\times 100$	M1	
	Percentage consistent with *their* reading	A1	If no working shown then SC1 for a correct percentage that follows from a correct reading from *their* graph.

19. 0580_w22_ms_41 Q: 5

Question	Answer	Marks	Partial Marks
(a)(i)	9.4	1	
(a)(ii)	2.4	2	**B1** for [uq =] 10.4 or [lq =] 8 but not as final answer
(a)(iii)	18	2	**B1** for 82 seen
(b)(i)	34.65 or $34\frac{13}{20}$	4	**M1** for midpoints 10, 25, 32.5, 40, 52.5 soi **M1** for Σfx where values of x are in interval or on boundary **M1 dep on second M** for $\frac{\Sigma fx}{150}$
(b)(ii)	0.3, 5.7, ..., 7.95, 1.5	3	**B2** for any two correct or **B1** for one correct or for at least three frequency densities seen 0.2, 3.8, 8, 5.3, 1 oe or **M1** for [factor] 1.5
(b)(iii)	$\frac{7}{745}$ oe	2	**M1** for $\frac{15}{150} \times \frac{14}{149}$

20. 0580_w22_ms_42 Q: 3

Question	Answer	Marks	Partial Marks
(a)(i)	211.275	4	**M1** for mid-points **soi** (90, 125, 175, 250, 350) **M1** for use of Σfm with m in correct interval including both boundaries **M1** for (dep on 2nd M1) for $\Sigma fm \div 200$
(a)(ii)	$32 \times 350 - 32 \times 330$ oe or better, or the reverse of this	M1	
	3.2 or – 3.2 final answer	B1	
(a)(iii)	1.75 7.6 1.6	3	**B2** for two correct heights or **B1** for one correct height or 3 correct frequency densities or **M1** for scale factor of 5 or 0.2
(b)	$\frac{4}{25}$ oe	1	
(c)(i)	$\frac{39}{995}$ oe	2	**M1** for $\frac{40}{200} \times \frac{39}{199}$ oe
(c)(ii)	$\frac{147}{4975}$ oe	3	**M2** for [2×] $\frac{84}{200} \times \frac{7}{199}$ oe or **B1** for $\frac{84}{200}$ and $\frac{7}{199}$ or $\frac{84}{199}$ and $\frac{7}{200}$ oe If 0 scored, **SC1** for answer $\frac{147}{5000}$ oe

21. 0580_w22_ms_43 Q: 3

Question	Answer	Marks	Partial Marks
(a)	Correct histogram	3	**B1** for each correct block If 0 scored, **SC1** for two of $\frac{28}{15}$, $\frac{33}{20}$, $\frac{13}{10}$ or 1.87 or 1.866 to 1.867, 1.65, 1.3
(b)	38.65	4	**M1** for 12.5, 20, 32.5, 50, 65 soi **M1** for $\sum fx$ where x is in the correct interval including boundaries **M1dep** for $\sum fx \div 100$

22. 0580_m21_ms_42 Q: 7

	Answer	Mark	Partial Marks
(a)(i)	70	**1**	
(a)(ii)	78	**1**	
(a)(iii)	Value in range $86 < V \leq 90$	**1**	

	Answer	Mark	Partial Marks
(a)(iv)	One general comment interpreting the median comparison nfww e.g. Students did better on second test oe OR One general comment interpreting IQR/range comparison nfww e.g. Students marks were more consistent on the 2nd test oe	**1**	
(b)	31.2	**4**	**M1** for mid-values soi **M1** for Σfm where m is any value in interval including boundaries **M1** (dep on second **M1**) for *their* $\Sigma fm \div 50$
(c)(i)	38	**1**	
(c)(ii)	Blocks of heights 4.4 and 3.4 with correct widths	**2**	**B1** for each correct block If **B0** scored, **SC1** for both correct frequency densities soi

23. 0580_s21_ms_41 Q: 8

	Answer	Marks	Partial Marks
(a)(i)	3 22 43 48 50	**2**	**B1** for 4 correct or **M1** for one error in adding.
(a)(ii)	correct diagram	**3**	**B1FT** *their* **(a)(i)** for 5 correct heights **B1** for 5 points at upper ends of intervals on correct vertical line **B1FT dep on at least B1** for increasing curve through *their 5* points After 0 scored, **SC1** for 4 of *their* points correctly plotted
(a)(iii)	35 to 38	**1**	
(b)	Correct box-and-whisker diagram  1.45 1.57 1.64 1.71 1.83	**4**	**B1** for median 1.64 drawn **B1** for LQ 1.57 drawn **B1** for UQ 1.71 drawn If 0 scored **SC1** for 1.64, 1,57 or 1.71 seen

24. 0580_s21_ms_42 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	Correct histogram	**3**	**B1** for each correct block If 0 scored, **SC1** for any two of fds 7.5, 3.33…, 0.8 oe soi
(a)(ii)	3.7875 or 3.79 or 3.787 or 3.788	**4**	**M1** for 0.75, 1.5, 3, 5.5, 9.5 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div 40$
(a)(iii)	$\frac{11}{40}$ oe	**1**	
(a)(iv)	$\frac{30}{203}$ oe	**3**	**M2** for $[2\times]\frac{4}{29}\times\frac{15}{28}$ oe or **M1** for $\frac{4}{29}$ or $\frac{15}{29}$ oe seen After 0 scored, **SC1** for $[2\times]\left(\frac{4}{40}\times\frac{26}{39}\right)$ oe or for answer $\frac{120}{841}$ oe
(b)(i)	4.6	**1**	
(b)(ii)	3.2	**1**	

	Answer	Mark	Partial Marks
(b)(iii)	[median] remains the same oe and one is below [the median/middle] and one is above oe	**2**	**B1** for each statement

25. 0580_s21_ms_43 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	4	**1**	
(a)(ii)	7	**1**	
(a)(iii)	8	**1**	
(b)(i)	14	**1**	
(b)(ii)	4	**2**	**B1** for [l.q. =] 11 or [u.q =] 15
(c)	8.09	**3**	**M1** for $5 \times 3 + 10 \times 6 + 43 \times 7 + 75 \times 8 + 48 \times 9 + 21 \times 10$ **M1 dep** ÷ 200
(d)	30, 70, 40, 36, 24 seen	**B2**	**B1** for 3 or 4 correct or **M1** for $1 \times (80 - 50)$, $3.5 \times (100 - 80)$, $4 \times (110 - 100)$, $3.6 \times (120 - 110)$ and $0.6 \times (160 - 120)$ oe
	(their 30×65 + *their* 70×90 + *their* 40×105 + *their* 36×115 + *their* $24 \times 140) \div 200$	**M3**	**M1** for midpoints soi **M1** for Σfx, x in interval or boundary of interval **M1 dep on second M1** for ÷ 200
	99.75	**A1**	

26. 0580_p20_ms_40 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	400	**1**	
(a)(ii)	70	**2**	**M1** for upper quartile = 420 or lower quartile = 350
(a)(iii)	405 to 410	**1**	
(a)(iv)	170	**2**	**B1** for 30 seen
(b)(i)	Mid-values 40, 80, 125, 200 soi	**M1**	
	Σfx with correct frequencies and x's in correct intervals or on boundaries of correct intervals	**M1**	
	÷ 200	**M1**	Dep on second **M1**
	106 nfww	**A1**	**SC2** for correct answer without working
(b)(ii)	Correct histogram	**4**	**B1** for correct widths **and** **B1** for each rectangle of correct height at 0.8, 1.6, 1.6 (up to **B3**) After 0 scored, **SC1** for 3 correct frequency densities seen
(b)(iii)	$\frac{3840}{10\,712}$ oe isw $\left[\frac{480}{1339}\right]$	**3**	**M2** for $[2\times]\left(\frac{24}{104} \times \frac{80}{103}\right)$ oe or **M1** for $\frac{24}{104}, \frac{80}{103}$ seen

27. 0580_s20_ms_41 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	$1.5 < h \leqslant 1.6$	**1**	
(a)(ii)	1.62 or 1.623… nfww	**4**	**M1** for 1.35, 1.45, 1.55, 1.65, 1.75 1.85 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div 120$

	Answer	Mark	Partial Marks
(b)(i)	$\frac{14}{120}$ oe	**1**	
(b)(ii)	$\frac{21}{20060}$ oe	**4**	**M3** for $3\left(\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}\right)$ or **M2** for $\frac{14}{120}\times\frac{7}{119}\times\frac{6}{118}$ isw or **M1** for $\frac{14}{120},\frac{7}{119},\frac{6}{118}$ After 0 scored, **SC1** for answer $\frac{343}{864000}$ or $\frac{343}{288000}$ oe
(c)(i)	55, 79, 106, 120	**2**	**B1** for 2 or 3 correct
(c)(ii)	Correct diagram	**3**	**B1** for correct horizontal plots **B1FT** for correct vertical plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If 0 scored **SC1** for 5 out of 6 points correctly plotted
(d)(i)	1.62 to 1.63	**1**	
(d)(ii)	1.57 to 1.58	**2**	**B1** for 48 soi

28. 0580_s20_ms_42 Q: 3

	Answer	Mark	Partial Marks
(a)	41.4	4	**M1** for 10, 30, 42.5, 47.5, 55, 70 **M1** for Σfx where x lies in or on the boundary of each interval. **M1 dep** for $\frac{\Sigma fx}{200}$ dep on second M1
(b)(i)	112, 170	1	
(b)(ii)	Correct diagram	3	**B1** for correct horizontal plot **B1FT** for correct vertical plots **B1 FT** dep on at least B1 earned for reasonable increasing curve or polygon through their 6 points If 0 scored **SC1FT** for 5 out of 6 points plotted correctly
(b)(iii)(a)	48	1	
(b)(iii)(b)	160	2	**M1** for 40 seen
(c)	$\frac{87}{3980}$ oe	2	**M1** for $\frac{30}{200}\times\frac{29}{199}$ oe
(d)	Correct histogram	3	**B1** for each column If 0 scored **SC1** for correct frequency densities soi 1.25, 12, 1

29. 0580_s20_ms_43 Q: 3

	Answer	Mark	Partial Marks
(a)	correct diagram	4	**B1** for median line correctly drawn at 148 **B1** for 105 soi **B1** for whisker at 159 soi
(b)	6.48	3	**M1** for $(5 \times 8) + (6 \times 2) + (12 \times 7) + \ldots$ **M1dep** for *their* $\sum fx \div$ *their* $(8 + 2 + 12 + 2 + 0 + 1)$

30. 0580_w20_ms_41 Q: 3

	Answer	Mark	Partial Marks
(a)	Disagree: the median for the women is greater (than the median for the men) oe Disagree: the men have a smaller [interquartile] range of times oe	**2**	**B1** for each correct statement oe
(b)(i)	87.4 nfww	**4**	**M1** for mid-points **soi** (30, 80, 130, 190, 270) **M1** for use of Σfm with m in correct interval including both boundaries **M1** (dep on 2nd M1) for $\Sigma fm \div (41 + 24 + 23 + 8 + 4)$
(b)(ii)(a)	90	**1**	
(b)(ii)(b)	8	**2**	**B1** for 92 seen

	Answer	Mark	Partial Marks
(b)(iii)	2.4	**2**	**M1** for $\frac{24}{40}$ or $\frac{8}{60}$ Or **B1** for [multiplier] 18 or $\frac{1}{18}$

31. 0580_w20_ms_42 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	25	**1**	
(a)(ii)	10 nfww	**2**	**B1** for [lq =] 22 or [uq =] 32
(a)(iii)	27	**1**	
(a)(iv)	6	**2**	**B1** for 114 written
(b)(i)	27.9 or 27.91 to 27.92 nfww	**4**	**M1** for mid-values **M1** for $\sum fx$ where x lies within or on boundary of correct interval **M1 dep** $\sum fx \div 120$ dep on second M1
(b)(ii)	7.6	**2**	**M1** for $\frac{18}{10}$ oe or $\frac{38}{20}$ oe or **B1** for [multiplier] 4 or ¼

32. 0580_w20_ms_43 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	43	**1**	
(a)(ii)	65	**1**	
(a)(iii)	13	**1**	

	Answer	Mark	Partial Marks
(b)	80	**3**	**M2** for $\frac{400}{18} \times \frac{60 \times 60}{1000}$ oe Or **M1** for $\frac{400}{18}$ or for *their* speed in m/s $\times \frac{60 \times 60}{1000}$ or for $\frac{400}{1000}$ and $\frac{18}{60 \times 60}$ soi

33. 0580_m19_ms_42 Q: 7

	Answer	Mark	Partial Marks
(a)(i)	111.25	**4**	**M1** for midpoints **soi** (25, 75, 112.5, 137.5, 175) **M1** for $\sum fx$ with x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 20$
(a)(ii)	2 7 11 17	**2**	**B1** for three correct
(a)(iii)	$\frac{3}{20}$ oe	**1**	
(b)	20 6	**2**	**B1** for one correct value or [SF =] 5 or $\frac{1}{5}$ oe
(c)(i)	5 nfww	**3**	**M2** for $\sum fx \div \sum f = 4.28$ oe or **M1** for $179 + 7x$ oe or $4.28 \times (45 + x)$ oe seen
(c)(ii)	3	**1**	
(c)(iii)	4	**1**	

34. 0580_s19_ms_41 Q: 4

	Answer	Mark	Partial Marks
(a)(i)	range = 7	**1**	
	mode = 21	**1**	
	median = 22.5	**2**	**M1** for evidence of middle value
	mean = 22.7 or 22.71…	**2**	**M1** for use of $\Sigma x \div 14$
(a)(ii)	$\frac{3}{14}$ oe	**1**	
(b)	$x - n + 1$ final answer	**3**	**M2** for $nx - (n-1)(x+1)$ or **M1** for $(n-1)(x+1)$
(c)(i)	16.6 or 16.60 to 16.61 nfww	**4**	**M1** for 5, 12.5, 17.5, 22.5, 30 soi **M1** for Σfx where x is in correct interval, including boundaries **M1 dep** on second M1 for $\frac{\Sigma fx}{50+85+100+120+10}$

	Answer	Mark	Partial Marks
(c)(ii)	Correct histogram	**4**	**B1** for each correct block If 0 scored, **SC1** for 5, 20, 24, 1 seen

35. 0580_s19_ms_42 Q: 9

	Answer	Mark	Partial Marks
(a)	12.8[0]	**4**	**M1** for midpoints **soi** **M1** for use of $\sum fm$ with m in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fm \div 100$
(b)	54 84 93	**2**	**B1** for 2 correct or 1 error and 2 correct or **FT**
(c)	correct diagram with all points correctly plotted	**3**	**B1FT** *their* **(b)** for plots at 5 correct heights **B1** for 5 points at upper ends of intervals on correct vertical line **B1FT** (dep on at least **B1**) for increasing curve or polygon through 5 points After 0 scored, **SC1FT** for 4 correct points plotted
(d)(i)	9 to 9.8 final answer	**1**	
(d)(ii)	8.5 to 11.5	**2**	**B1** for [UQ =] 15.5 to 17.5 or [LQ =] 6 to 7 seen
(d)(iii)	10, 11 or 12	**2**	**B1** for 88 to 90 seen or for answer between 10 and 12

36. 0580_s19_ms_43 Q: 6

	Answer	Mark	Partial Marks
(a)	40.5 or 40.45[8..] or 40.46 nfww	**4**	**M1** for 25, 32.5, 37.5, 50, 80 soi **M1** for Σft **M1 dep** for their $\Sigma ft \div 120$
(b)	Fully correct histogram	**4**	**B1** for each correct bar If 0 scored, **SC1** for frequency densities of 5.4, 4.2, 0.8 and 0.45 seen

37. 0580_w19_ms_41 Q: 6

	Answer	Mark	Partial Marks
(a)(i)	34	**1**	
(a)(ii)	18	**2**	**B1** for [l.q. =] 25 or [u.q. =] 43 seen
(a)(iii)	60	**2**	**M1** for 140 written
(b)(i)	49	**1**	
(b)(ii)	20	**1**	
(b)(iii)	10	**1**	
(b)(iv)	220	**2**	**M1** for $3 \times 1 + 1 \times 2 + 3 \times 5 + 2 \times 10 + 4 \times 20 + 2 \times 50$
(b)(v)	14.7 or 14.66 to 14.67	**1**	**FT** *their* (iv) ÷ 15

	Answer	Mark	Partial Marks
(c)	13.25 nfww	**6**	**B2** for frequencies 30, 40, 30 soi or **B1** for 2 of these **M1** for 5, 12.5, 22.5 **M1** Σfx with *their* frequencies (if seen) and each x in correct interval including boundaries **M1 dependent** for $\frac{\Sigma fx}{100}$ (dependent on second M1) **OR** **Alternative Method** **B2** for frequencies 15, 15, 40, 10, 10, 10 soi or **B1** for 2 of 15, 40, 10 **M1** for 2.5, 7.5, 12.5, 17.5, 22.5, 27.5 **M1** Σfx with *their* frequencies (if seen) and each x in correct interval including boundaries **M1 dependent** for $\frac{\Sigma fx}{100}$ (dependent on second M1)

38. 0580_w19_ms_42 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	54	**1**	
(a)(ii)	29	**2**	**M1** for [UQ =] 65 or [LQ =] 36
(a)(iii)	32	**1**	
(a)(iv)	17, 18 or 19	**2**	**M1** for 61 to 63 written or for decimal answer in range 17 to 19
(b)(i)	18, 26, 26	**2**	**B1** for 1 or 2 correct
(b)(ii)	51 nfww	**4**	**M1** for 10 , 30 , 50 , 70 , 90 soi **M1** for Σfx **M1 dep** for *their* $\Sigma fx \div \Sigma f$
(c)(i)	75	**1**	
(c)(ii)	IQR is bigger for the girls with [boys =] 20 seen oe	**2**	**FT** *their* IQR from (a)(ii) **M1** for IQR for boys = 20 isw or for girls IQR is bigger than boys IQR oe isw **FT** *their* IQR from (a)(iii)

39. 0580_w19_ms_43 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	52	**1**	
(a)(ii)	36	**1**	
(a)(iii)	26	**1**	**FT** 62 – *their* (a)(ii) evaluated correctly
(b)	Valid comment	**1**	Strict **FT** *their* (a)(iii), e.g. distances for females are more varied
(c)	$\frac{11}{20}$ oe	**2**	**M1** for 27 written or answer of $\frac{27}{60}$ oe
(d)(i)	[18 9] 14 12 5 [2]	**2**	**B1** for 1 correct value

	Answer	Mark	Partial Marks
(d)(ii)	48.75 nfww	**4**	**M1** for midpoints soi **M1** for use of $\sum fx$ with *their* frequencies **M1** (dep on 2nd M1) for $\sum fx \div$ (60 or by *their* $\sum f$)

40. 0580_m18_ms_42 Q: 7

	Answer	Mark	Partial Marks
(a)(i)	$\frac{9}{160}$ oe	**1**	
(a)(ii)	58.125 nfww	**4**	**M1** for mid-points soi **M1** for use of Σfx with x in correct interval including both boundaries **M1** (dep on 2nd M1) for $\Sigma fx \div 160$
(b)	[3 42] 85 140 151 160	**2**	**B1** for 1 error **FT** other values

	Answer	Mark	Partial Marks
(c)	correct curve	**3**	**B1FT** *their* **(b)** for 6 correct heights **B1** for 6 points at upper ends of intervals on correct vertical line **B1FT dep on at least B1** for increasing curve through *their* 6 points After 0 scored, **SC1** for *their* 5 correct points plotted
(d)(i)	57 to 59	**1**	
(d)(ii)	36 to 42	**2**	**B1** for UQ = 76 to 80 or LQ = 38 to 40 soi
(d)(iii)	92 to 94	**2**	**B1** for 144 seen
(d)(iv)	130 to 137	**2**	**B1** for 23 to 30 seen

41. 0580_s18_ms_42 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	20 [< $t \leqslant$] 25	**1**	
(a)(ii)	25 [< $t \leqslant$] 30	**1**	
(a)(iii)	28.3 or 28.33..	**4**	**M1** for 22.5, 27.5, 32.5, 37.5, 42.5 soi **M1** for $\sum fx$ where x is in the correct interval including boundaries **M1**dep for $\sum fx \div 120$ or $\sum fx \div (44 + 32 + 28 + 12 + 4)$
(a)(iv)	$\frac{4}{120}$ oe isw	**1**	
(b)(i)	76, 104, 116, 120	**2**	**B1** for one error FT other values or for 3 correct
(b)(ii)	Correct curve	**3**	**B1** for correct horizontal placement for 6 plots **B1FT** for correct vertical placement for 6 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If 0 scored **SC1FT** for 5 out of 6 points correctly plotted
(b)(iii)	27 to 27.5	**1**	
(b)(iv)	8.5 to 9.5	**2**	**B1** for [UQ=] 32 to 32.5 or [LQ=] 23 to 23.5
(b)(v)	8, 9, 10, 11 or 12	**2**	**B1** for 108 to 112 seen or **B1FT** *their* graph reading at 37 mins seen

42. 0580_s18_ms_43 Q: 3

	Answer	Mark	Partial Marks
(a)(i)	Positive	**1**	Ignore strong, weak, etc.
(a)(ii)	Correct ruled line	**1**	
(a)(iii)	2	**1**	
(b)	[mode =] 0 [median =] 1 [mean =] 1.04 or 1.041 to 1.042	**5**	**B1** **B1** **B3** or **M2** for ([10 × 0] + 8 × 1 + 3 × 2 + 2 × 3 + [0 × 4] + 1 × 5) ÷ 24 oe or **M1** for [10 × 0] + 8 × 1 + 3 × 2 + 2 × 3 + [0 × 4] + 1 × 5 oe
(c)(i)	60.9 or 60.91... nfww	**4**	**M1** for 49, 57, 71 correct **M1** for use of Σfx with x in the correct interval including both boundaries **M1** (dep on 2nd **M1**) for *their* (78 × 49 + 180 × 57 + 162 × 71) ÷ (78 + 180 + 162)
(c)(ii)	Correct histogram	**4**	**B1** for correct widths in correct position **B1** height 13 **B1** height 18 **B1** height 9 If 0 scored **B1** for 13, 18 and 9 seen

43. 0580_w18_ms_41 Q: 4

	Answer	Mark	Partial Marks
(a)	100.2 nfww	**4**	**M1** for midpoints soi 65, 80, 95, 105, 112.5, 120 **M1** for use of $\sum fx$ with x in correct interval including both boundaries **M1**dep for $\sum fx \div 180$ dep on previous **M1**
(b)	0.8 2.8 0.65	**3**	**B1** for each If zero scored, **SC1** for 1.6, 5.6 and 1.3 seen

	Answer	Mark	Partial Marks
(c)	8 34 69 136 164	**2**	**B1** for one error **FT** other values or for 3 or 4 correct
(d)	Correct diagram	**3**	**B1FT** for correct vertical placement for 6 plots **B1** for correct horizontal placement for 6 plots **B1FT dep on at least B1** for reasonable increasing curve or polygon through *their* 6 points If zero scored, **SC1FT** for 5 out of 6 correct plots
(e)(i)	15 to 17	**2**	**B1** for [LQ =] 93 to 94 or [UQ =] 109 to 110
(e)(ii)	107 to 109	**2**	**B1** for 126 seen
(e)(iii)	66 to 72	**2**	**FT** their graph for 2 marks **B1** for answer 106 to 114 or **B1FT** *their* graph reading at 106 cm seen

44. 0580_w18_ms_42 Q: 9

	Answer	Mark	Partial Marks
(a)(i)	42.8 or 42.79 … nfww	**4**	**M1** for mid-values soi **M1** for Σfm where m is any value in interval including boundaries **M1** (dep on second **M1**) for *their* $\Sigma fm \div 120$
(a)(ii)	Blocks of height 1.8 4.4 8 2.1 with correct widths	**4**	**B1** for each correct block If **B0**, **SC1** for correct frequency densities seen
(b)	Valid general comment about distributions	**1**	e.g. [On average], shoppers spend less time shopping on Wednesday oe

45. 0580_w18_ms_43 Q: 5

	Answer	Mark	Partial Marks
(a)(i)	265 or 265.3 to 265.4 nfww	**4**	**M1** for mid-values 150, 225, 275, 400 soi **M1** for Σfx where x is in correct interval including boundaries **M1 dep** for $\Sigma fx \div 52$ dependent on second **M1**
(a)(ii)	Correct histogram	**4**	**B1** for each correct block If 0 scored, **SC1** for the four frequency densities seen
(b)(i)	100	**1**	
(b)(ii)	56	**1**	
(b)(iii)	62	**1**	
(b)(iv)	24	**1**	
(b)(v)	88	**2**	**M1** for evidence of 12 written

46. 0580_m17_ms_42 Q: 7

		ANSWER	MARK	PARTIAL MARKS
(a)		72.7 or 72.70 to 72.71 nfww	**4**	**M1** for midpoints **soi** (condone 1 error or omission) (47.5, 55, 65, 80, 95, 110) **M1** for use of $\sum fx$ with x in correct interval including both boundaries (condone 1 further error or omission) (1092.5, 3520, 7930, 10880, 2470, 3190) **M1** (dep on 2nd M1) for $\sum fx \div 400$
(b)	**(i)**	[23] 87 209 345 371 [400]	**2**	**B1** for 2 or 3 correct
	(ii)	Correct graph	**3**	**B1FT** *their* **(b)(i)** for 6 correct heights **B1** for 6 points at upper ends of intervals on correct vertical line **B1FT** (dep on at least B1) for increasing curve or polygon through 6 points After 0 scored, **SC1FT** *their* **(b)(i)** for 5 correct points plotted
	(iii) **(a)**	69 to 70	**1**	
	(b)	20 to 23	**2FT**	**FT** *their* cumulative freq curve **M1** for correct UQ or LQ for *their* cumulative freq curve
	(c)	72 to 75	**2**	**M1** for 240 soi

47. 0580_s17_ms_41 Q: 2

	ANSWER	MARK	PARTIAL MARKS
(a)	$71 < t \leqslant 72$	**1**	
(b)	72.3 or 72.27 to 72.28 nfww	**4**	**M1** for midpoints soi (condone 1 error or omission) **M1** for use of $\sum fx$ with x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 90$
(c)(i)	41, 62, 80, 90	**2**	**B1** for 2 correct values

	ANSWER	MARK	PARTIAL MARKS
(c)(ii)	Correct curve	**3**	**B1FT** *their* **(c)(i)** for 5 correct heights **B1** for 5 points plotted at upper ends of intervals **B1FT** (dep on at least **B1**) for increasing curve or increasing polygon through 5 points If zero scored, **SC1FT** for 4 correct points plotted
(c)(iii)	72.1 to 72.4	**1**	
(c)(iv)	1.9 to 2.2	**2**	**M1** for UQ = 73.2 to 73.4 or LQ = 71.2 to 71.3
(d)	180 cao nfww	**4**	**B3** for 50 [m/s] nfww OR **M3** for $\frac{3725 \div 1000}{74.5 \div 3600}$ OR **M2** for 3725 ÷ 74.5 or **M1** for 3725 or 74.5 seen or for (3715 to 3725) ÷ (74.5 to 75.5) **M1** indep for multiply by 3.6 oe

48. 0580_s17_ms_42 Q: 3

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	175.5 nfww	**4**	**M1** for at least four of 50, 125, 175, 225, 325 soi **M1** for Σfx with x inside or on boundary of each interval **M1** (dep on second **M1**) for $\frac{their\ \Sigma fx}{200}$
(a)(ii)	Fully correct histogram	**4**	**B1** for each correct bar If zero scored, **B1** for 0.2, 1.32, 0.7, 0.16 seen
(b)(i)	Fully correct cumulative frequency diagram	**3**	**B1** for correct horizontal plots **B1** for correct vertical plots **B1FT** dep on at least **B1** earned for points joined with smooth increasing curve or polygon If zero scored, **SC1** for 4 correct plotted points
(b)(ii)(a)	170 to 175	**1**	
(b)(ii)(b)	152 to 158	**2**	**M1** for 42 to 48 written

49. 0580_s17_ms_43 Q: 5

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	80 33 20	**1, 1, 1**	
(a)(ii)	17.3 nfww	**4**	**M1** for 5, 15, 22.5, 27.5, 40 soi **M1** for $\sum fx$ with *their f* s and x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\sum fx \div 200$

	ANSWER	MARK	PARTIAL MARKS
(b)(i)	$\frac{30}{210}$ oe	2	**M1** for $\frac{6}{15}\times\frac{5}{14}$ If zero scored, **SC1** for answer $\frac{36}{225}$ oe
(b)(ii)	$\frac{108}{210}$ oe	3	**M2** for $\frac{6}{15}\times\frac{9}{14}+\frac{9}{15}\times\frac{6}{14}$ oe or $1-\frac{9}{15}\times\frac{8}{14}-\frac{6}{15}\times\frac{5}{14}$ or **M1** for $\frac{6}{15}\times\frac{9}{14}$ or $\frac{9}{15}\times\frac{6}{14}$ or $\frac{9}{15}\times\frac{8}{14}+\frac{6}{15}\times\frac{5}{14}$ If zero scored, **SC1** for answer $\frac{108}{225}$ oe
(c)	150	1	

50. 0580_s17_ms_43 Q: 8

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	4 points correctly plotted	2	**B1** for 2 or 3 points correctly plotted
(a)(ii)	Positive	1	
(b)	mean 3.1	3	**M2** for $\frac{\text{sum of products}}{30}$ or **M1** for at least 4 correct products soi
	median 3	2	**M1** for 15.5 oe indicated
	mode 5	1	
	range 5	1	
(c)	24 nfww	3	**M1** for $\frac{x\times52+45\times75+11\times91}{x+45+11}$ [= 70.3] **M1** for clearing *their* fraction

51. 0580_w17_ms_41 Q: 5

	ANSWER	MARK	PARTIAL MARKS
(a)	54, 76, 96	**3**	**B1** for each
(b)	187 or 186.8 to 186.9 nfww	**4**	**M1** for 155, 175, 185, 200, 225 soi **M1** for Σfm with *their* frequencies from **(a)** 155 × *their* 54 + 175 × *their* 76 + 185 × *their* 96 + 200 × 92 + 225 × 42 **M1** (dep on second **M1**) for *their* $\Sigma fm \div 360$

52. 0580_w17_ms_42 Q: 6

	ANSWER	MARK	PARTIAL MARKS
(a)(i)	280	**1**	
(a)(ii)	320	**1**	
(a)(iii)	90	**1**	
(a)(iv)	10	**2**	**M1** for 90 written
(b)(i)	250.2 nfww cao	**4**	**M1** for at least 4 correct mid-values **M1** for Σfx **M1 dep on second M1** for $\Sigma fx \div 100$
(b)(ii)	Correct completion of histogram	**4**	**B1** for each correct block If zero scored, then **SC1** for correct frequency densities seen
(c)	[22 m] further oe	**1**	

53. 0580_w17_ms_43 Q: 4

	ANSWER	MARK	PARTIAL MARKS
(a)	$80 < t \leqslant 100$	**1**	
(b)	86 nfww	**4**	**M1** for midpoints soi **M1** for use of Σfx with x in correct interval including both boundaries **M1** (dep on 2nd **M1**) for $\Sigma fx \div 150$
(c)(i)	Reference to not knowing the individual values so we do not know the highest or the lowest values	**1**	
(c)(ii)	62.4	**2**	**M1** for $26 \div 150$ or $360 \div 150$ soi
(d)	$\frac{22}{150}$ oe	**1**	

	ANSWER	MARK	PARTIAL MARKS
(e)(i)	$\frac{90}{22350}$ oe	**2**	**M1** for $\frac{10}{150} \times \frac{9}{149}$ After zero scored, **SC1** for answer $\frac{100}{22500}$ oe
(e)(ii)	$\frac{440}{22350}$ oe	**3**	**M2** for $\frac{10}{150} \times \frac{22}{149} + \frac{22}{150} \times \frac{10}{149}$ oe or **M1** for $\frac{10}{150} \times \frac{22}{149}$ or $\frac{22}{150} \times \frac{10}{149}$ oe After zero scored, **SC1** for answer $\frac{440}{22500}$ oe
(f)	13, 8.5, 7.25, 1.1	**3**	**B2** for 3 correct or **B1** for 1 correct or for 3 correct FD.s 5.2, 3.4, 2.9, 0.44 oe