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EDEXCEL INTERNATIONAL GCSE MATHS: QUESTIONS BY TOPIC

Statistics (S1)

International GCSE Mathematics A (4MA1) · Higher tier

123 questions · 511 marks · Mark schemes included

Past papers June 2018 - June 2025 · 5 sub-topics

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.
Click any row below to jump straight to that sub-topic or question.
On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.
A gold bar in the left margin marks exactly where the question sits on the original page.
Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.
Each question is filed under its main topic; longer questions may also test skills from other topics.

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	No questions on this sub-topic in the available past papers.			
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QUESTIONS

123 questions · 511 marks · 3 sub-topics

SUB-TOPIC S1b

AVERAGES & RANGE

Sub-topic S1b · 52 questions · 194 marks · lowest tariff first

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 x, 10 and y are three integers written in order of size, starting with the smallest integer.

The mean of x, 10 and y is 11
The range of x, 10 and y is 7

Work out the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total for Question 1 is 2 marks)

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

2 A box is put on a table.

The face of the box in contact with the table is in the shape of a rectangle, 2 m by 1.25 m.
The pressure on the table due to the box is 42 newtons/m^2

Work out the force exerted by the box on the table.

..... newtons

(Total for Question 2 is 3 marks)

3 Here is a list of four numbers written in ascending order of size

$$x \quad x \quad y \quad 15$$

where x and y are integers.

The numbers have

a median of 12.5
a range of 4

Find the value of x and the value of y

$x =$ .....

$y =$ .....

(Total for Question 3 is 2 marks)

4 a, a, b and 40 are four numbers.

a is the least number.
40 is the greatest number.

The range of the four numbers is 14
The median of the four numbers is 30

Work out the value of a and the value of b.

$a =$

$b =$

(Total for Question 4 is 3 marks)

11 There are 12 boys and 8 girls in a class.
The boys and the girls have some coins.

The mean number of coins that the boys have is 5.5
The girls have a total of 18 coins.

Work out the mean number of coins the 20 children have.

(Total for Question 11 is 3 marks)

8 There are 10 people in a lift.
These 10 people have a mean weight of 79.2 kg.

3 of these people get out of the lift.
These 3 people have a mean weight of 68 kg.

Work out the mean weight of the 7 people left in the lift.

.....kg

(Total for Question 8 is 3 marks)

9 (a) Simplify $t^9 \div t^3$

.....

(1)

(b) Simplify $w^5 \times w^7$

.....

(1)

(c) Simplify $(5xy^2)^3$

.....

(2)

(Total for Question 9 is 4 marks)

7 30 students in a class sat a Mathematics test.
The mean mark in the test for the 30 students was 26.8

13 of the 30 students in the class are boys.
The mean mark in the test for the boys was 25

Find the mean mark in the test for the girls.
Give your answer correct to 3 significant figures.

.....

(Total for Question 7 is 3 marks)

8 Change a speed of x kilometres per hour into a speed in metres per second.
Simplify your answer.

..... m/s

(Total for Question 8 is 3 marks)

8 5 children are playing on a trampoline.
The mean weight of the 5 children is 28 kg.

2 of the children get off the trampoline.
The mean weight of these 2 children is 26.5 kg.

Work out the mean weight of the 3 children who remain on the trampoline.

..... kg

(Total for Question 8 is 3 marks)

2 The table gives information about the amount of money, in £, that Fiona spent in a grocery store each week during 2019

Amount spent (£x)	Frequency
$0 \leqslant x < 20$	5
$20 \leqslant x < 40$	11
$40 \leqslant x < 60$	8
$60 \leqslant x < 80$	19
$80 \leqslant x < 100$	9

Work out an estimate for the total amount of money that Fiona spent in the grocery store during 2019

£.....

(Total for Question 2 is 3 marks)

4 Alexa has five cards.
Each card has a number on it.

The table gives information about the numbers on the five cards.

Total	Median	Mode	Range
45	8	5	10

Using the information in the table, complete each card by writing its number on it.

☐ ☐ ☐ ☐ ☐

(Total for Question 4 is 3 marks)

5 The length of a book is 33.8 cm, correct to one decimal place.

(a) Write down the lower bound of the length of the book.

..... cm
(1)

(b) Write down the upper bound of the length of the book.

..... cm
(1)

(Total for Question 5 is 2 marks)

8 Alison buys 2 boxes of strawberries, box **A** and box **B**.

Box **A** contains 15 strawberries.
The strawberries in box **A** have a mean weight of 24 grams.

Box **B** contains 25 strawberries.
The strawberries in box **B** have a mean weight of 18 grams.

Alison puts all 40 strawberries into a bowl.
Work out the mean weight of the 40 strawberries.

..... grams

(Total for Question 8 is 3 marks)

2 Ava writes down five whole numbers.

For these five numbers

the median is 7

the mode is 8

the range is 5

Find a possible value for each of the five numbers that Ava writes down.

.....

(Total for Question 2 is 3 marks)

7 There are 5 cocoa pods in a bag.
The mean weight of the 5 cocoa pods is 398 grams.

A sixth cocoa pod is put into the bag.
The mean weight of the 6 cocoa pods is 401 grams.

Work out the weight of the sixth cocoa pod that is put into the bag.

..... grams

(Total for Question 7 is 3 marks)

9 (a) Factorise fully $25a^4c^7d + 45a^9c^3h$

.....

(2)

(b) Solve $(2x + 5)^2 = (2x + 3)(2x - 1)$

$x =$ .....

(3)

(Total for Question 9 is 5 marks)

10 Jethro has sat 5 tests.
Each test was marked out of 100 and Jethro's mean mark for the 5 tests is 74

Jethro has to sit one more test that is also to be marked out of 100

Jethro wants his mean mark for all 6 tests to be at least 77

Work out the least mark that Jethro needs to get for the last test.

.....

(Total for Question 10 is 3 marks)

8 A scientist is investigating the weight of 50 tigers.

Here is some information about these tigers.

	Type of tiger	
	Siberian	**Bengal**
Number of tigers	22	28
Mean weight of tigers (kg)	260	

The mean weight of all 50 tigers is 218 kg

Work out the mean weight of the Bengal tigers.

..... kg

(Total for Question 8 is 3 marks)

3 Here are five cards.

Each card has a number written on it.

15	7	–2	23	x

The mean of the five numbers is 12

Work out the value of x

$x =$ .....

(Total for Question 3 is 3 marks)

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are some integers where $a < b < c < d$

a b c d d d

The mode of the integers is 9
The median of the integers is 8
The range of the integers is 4

Work out the value of a, the value of b, the value of c and the value of d

$a =$ .....

$b =$ .....

$c =$ .....

$d =$ .....

(Total for Question 1 is 3 marks)

12 Larry is a delivery man.

He has 7 parcels to deliver.
The mean weight of the 7 parcels is 2.7 kg

Larry delivers 3 of the parcels.
Each of these 3 parcels has a weight of W kg

The mean weight of the other 4 parcels is 3.3 kg

Work out the value of W

$W =$ .....

(Total for Question 12 is 3 marks)

3 Alberto, Bill, Candela and Diana are four friends.

Here is some information about the height of each of these friends.

Alberto's height is 158 cm.
Bill's height is 175 cm.
Candela's height is greater than Diana's height.

The median height of these four friends is 160 cm.
The range of the heights of these four friends is 21 cm.

Work out Candela's height and Diana's height.

Candela ..... cm

Diana ..... cm

(Total for Question 3 is 3 marks)

3 Here is a list of six numbers written in order of size.

x 5 y z 10 12

The numbers have
a range of 9
a median of 8
a mode of 10

Find the value of x, the value of y and the value of z

$x =$ .....

$y =$ .....

$z =$ .....

(Total for Question 3 is 3 marks)

8 60 students sat a Mathematics exam.

The mean mark for the 32 students in Class A was 55
The mean mark for the 28 students in Class B was 52

Find the mean mark for all 60 students.

.....

(Total for Question 8 is 3 marks)

2 The table gives information about the number of minutes that Abby spent walking each day in September.

Number of minutes (M)	Frequency
$0 < M \leqslant 30$	5
$30 < M \leqslant 60$	6
$60 < M \leqslant 90$	8
$90 < M \leqslant 120$	9
$120 < M \leqslant 150$	2

Work out an estimate for the total number of minutes that Abby spent walking in September.

..... minutes

(Total for Question 2 is 3 marks)

10 Gemara works as a taxi driver.
Last week, he recorded the following information about the distances he drove.

For the 5 days from Monday to Friday, the mean number of kilometres he drove was 104
For the 7 days from Monday to Sunday, the mean number of kilometres he drove was 127

On Saturday, Gemara drove 132 kilometres.

Work out the number of kilometres he drove on Sunday.

..... kilometres

(Total for Question 10 is 3 marks)

11 Express $\left(\frac{m^6k^{10}}{25}\right)^{\frac{3}{2}}$ in the form $\frac{m^ak^b}{c}$ where a, b and c are integers to be found.

.....

(Total for Question 11 is 2 marks)

8 The mean number of goals scored by a hockey team in 8 matches is 6
The team plays 2 more matches and scores k goals in each match.
The mean number of goals scored by the hockey team in the 10 matches is 7

Work out the value of k

$k =$ .....

(Total for Question 8 is 3 marks)

9 A straight line passes through the points with coordinates (0, –3) and (2, 0)

Find an equation of the line.

.....

(Total for Question 9 is 2 marks)

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are six cards.

Five of the cards have a number written on them.

16	15	3	2	9	

Work out the number that should be written on the last card so that the mean of the six numbers will be 11

.....

(Total for Question 1 is 3 marks)

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Here are eight numbers written in order of size

$$h \quad 6 \quad 7 \quad 8 \quad j \quad 16 \quad k \quad k$$

where h, j and k are integers.

The median of the eight numbers is 10

The mode of the eight numbers is 18

The range of the eight numbers is 13

Work out the value of h, the value of j and the value of k

$h =$ .....

$j =$ .....

$k =$ .....

(Total for Question 1 is 3 marks)

12 Ali uses a fitness tracker to count the number of steps he walks each day for 7 days.

For the first 4 days, his mean number of steps is 11 800
For the next 3 days, his mean number of steps is 13 207

Work out his mean number of steps for the 7 days.

.....

(Total for Question 12 is 3 marks)

8 Kim puts 4 bananas in a bag.
The mean weight of the 4 bananas in the bag is 145 grams.

Andy puts one more banana into the bag.
The mean weight of the 5 bananas in the bag is 142 grams.

Work out the weight of the banana that Andy puts into the bag.

..... grams

(Total for Question 8 is 3 marks)

9 Nisha invests 20 000 euros for 3 years in a savings account.
She gets 3.5% per year compound interest.

Work out how much money Nisha will have in her savings account at the end of the 3 years.
Give your answer correct to the nearest euro.

..... euros

(Total for Question 9 is 3 marks)

Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Rio has six cards.
He writes a number on each card so that

the range of the numbers is 10
the median of the numbers is 7.5
the mode of the numbers is 6

Rio arranges the cards so that the numbers are in order of size.

		6		10	14

Three of the numbers are hidden.

Complete the cards above to show the three numbers that are hidden.

(Total for Question 1 is 3 marks)

7 The mass of a silver coin is 48.3 g
The density of silver is 10.5 g/cm^3

Work out the volume of the silver coin.

..... cm^3

(Total for Question 7 is 2 marks)

8 The mean of 7 numbers is 60

The mean of 3 of the numbers is 46

Work out the mean of the other 4 numbers.

.....

(Total for Question 8 is 3 marks)

2 The table gives information about the times, in hours, some students spent doing sport one week.

Time (T hours)	Frequency
$0 < T \leqslant 2$	5
$2 < T \leqslant 4$	9
$4 < T \leqslant 6$	24
$6 < T \leqslant 8$	40
$8 < T \leqslant 10$	7

Calculate an estimate for the mean time these students spent doing sport.
Give your answer in hours, correct to 1 decimal place.

..... hours

(Total for Question 2 is 4 marks)

13 The frequency table gives information about the numbers of mice in some nests.

Number of mice	Frequency
5	4
6	13
7	16
8	x
9	6

The mean number of mice in a nest is 7

Work out the value of x.

$x =$

(Total for Question 13 is 4 marks)

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the heights, in cm, of 48 sunflowers in a garden centre.

Height of sunflower (h cm)	Frequency
$90 < h \leqslant 100$	8
$100 < h \leqslant 110$	12
$110 < h \leqslant 120$	15
$120 < h \leqslant 130$	10
$130 < h \leqslant 140$	3

Work out an estimate for the mean height of the sunflowers.

.....cm

(Total for Question 1 is 4 marks)

4 Here is a list of six numbers written in order of size.

4 7 x 10 y y

The numbers have

a median of 9
a mean of 11

Find the value of x and the value of y.

$x =$ .....

$y =$ .....

(Total for Question 4 is 4 marks)

2 Given that $a < b < c$

the four whole numbers a, a, b and c have

a mode of 7
a median of 8.5
a mean of 9

Work out the value of a, the value of b and the value of c.

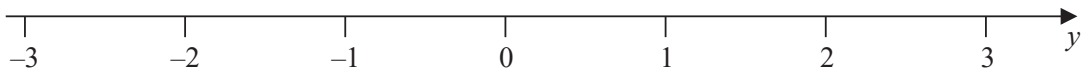
$a =$ .....

$b =$ .....

$c =$ .....

(Total for Question 2 is 4 marks)

3 (a) On the number line, show the inequality $-2 \leqslant y < 1$



(2)

n is an integer.

(b) Write down all the values of n that satisfy $-3.4 < n \leqslant 2$

.....

(2)

(Total for Question 3 is 4 marks)

10 A mathematics teacher at a school asked a group of students how far, in kilometres, each student had travelled to get to school that day.

The table gives information about their answers.

Distance travelled (d km)	**Number of students**
$0 < d \leqslant 2$	x
$2 < d \leqslant 4$	11
$4 < d \leqslant 6$	8
$6 < d \leqslant 8$	6
$8 < d \leqslant 10$	5

The teacher calculated that an estimate for the mean distance travelled by the whole group of students was 4.25 km.

Work out the value of x.
Show your working clearly.

$x =$.....

(Total for Question 10 is 4 marks)

5 Yusuf sat 8 examinations.

Here are his marks for 5 of the examinations.

68 72 75 77 80

For his results in all 8 examinations

the mode of his marks is 80
the median of his marks is 74
the range of his marks is 16

Find Yusuf's marks for each of the other 3 examinations.

.....

.....

.....

(Total for Question 5 is 4 marks)

9 The frequency table gives information about the number of points scored by a player.

Number of points	Frequency
0	13
1	17
2	8
3	x
4	11

The mean number of points scored is 2

Work out the value of x

$x =$ .....

(Total for Question 9 is 4 marks)

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 80 students entered a dancing competition.

The table gives information about the length of time, in minutes, for which each student spent dancing.

Time (m)	Frequency
$0 < m \leqslant 12$	11
$12 < m \leqslant 24$	25
$24 < m \leqslant 36$	23
$36 < m \leqslant 48$	15
$48 < m \leqslant 60$	6

Work out an estimate for the mean length of time the students spent dancing.

..... minutes

(Total for Question 1 is 4 marks)

10 Team **A** and Team **B** take part in a quiz league.

After 11 rounds, Team **A** has a mean score per round of 17
After 9 rounds, Team **B** has a mean score per round of 18

Both teams take part in a further round.
After this round, both teams have a mean score per round of 18.5

In the further round, Team **A** scored more points than Team **B**.

How many more?

.....

(Total for Question 10 is 4 marks)

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the lengths, in minutes, of 50 telephone calls.

Length of telephone call (m minutes)	**Frequency**
$0 < m \leqslant 5$	8
$5 < m \leqslant 10$	2
$10 < m \leqslant 15$	6
$15 < m \leqslant 20$	4
$20 < m \leqslant 25$	12
$25 < m \leqslant 30$	18

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the total length, in minutes, of these telephone calls.

..... minutes

(3)

(Total for Question 1 is 4 marks)

Answer all TWENTY questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the weights, in kg, of 40 parcels.

Weight of parcel (p kg)	Frequency
$0 < p \leqslant 1$	19
$1 < p \leqslant 2$	12
$2 < p \leqslant 3$	5
$3 < p \leqslant 4$	2
$4 < p \leqslant 5$	2

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean weight of the parcels.

..... kg

(4)

(Total for Question 1 is 5 marks)

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table gives information about the number of days that 100 cars were in an airport car park.

Number of days (d)	Frequency
$0 < d \leqslant 4$	16
$4 < d \leqslant 8$	18
$8 < d \leqslant 12$	19
$12 < d \leqslant 16$	27
$16 < d \leqslant 20$	20

(a) Write down the modal class.

(1)

(b) Work out an estimate for the mean number of days.

days

(4)

(Total for Question 1 is 5 marks)

4 The table gives information about the length of time, in minutes, that each of 60 students took to travel to school on Monday.

Length of time (t minutes)	Frequency
$0 < t \leqslant 10$	4
$10 < t \leqslant 20$	10
$20 < t \leqslant 30$	15
$30 < t \leqslant 40$	25
$40 < t \leqslant 50$	6

(a) Write down the modal class interval.

.....

(1)

(b) Work out an estimate for the mean length of time taken by these 60 students to travel to school on Monday.
Give your answer correct to one decimal place.

..... minutes

(4)

(Total for Question 4 is 5 marks)

2 The table shows information about the lengths of time, in minutes, 120 customers spent in a supermarket.

Length of time (L minutes)	Frequency
$20 < L \leqslant 30$	6
$30 < L \leqslant 40$	26
$40 < L \leqslant 50$	31
$50 < L \leqslant 60$	40
$60 < L \leqslant 70$	17

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean length of time spent by the 120 customers in the supermarket.

..... minutes

(4)

(Total for Question 2 is 5 marks)

2 The table gives information about the speeds, in kilometres per hour, of 80 motorbikes as each pass under a bridge.

Speed (s kilometres per hour)	**Frequency**
$40 < s \leqslant 50$	10
$50 < s \leqslant 60$	16
$60 < s \leqslant 70$	19
$70 < s \leqslant 80$	23
$80 < s \leqslant 90$	12

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean speed of the motorbikes as they pass under the bridge. Give your answer correct to 3 significant figures.

..... kilometres per hour

(4)

(Total for Question 2 is 5 marks)

3 The table gives information about the amounts of money, in euros, that 70 of Anjali's friends spent last Saturday.

Money spent (S euros)	Frequency
$0 < S \leqslant 8$	6
$8 < S \leqslant 16$	14
$16 < S \leqslant 24$	19
$24 < S \leqslant 32$	25
$32 < S \leqslant 40$	6

One of Anjali's 70 friends is going to be chosen at random.

(a) Find the probability that this friend spent more than 24 euros last Saturday.

.....

(1)

(b) Work out an estimate for the mean amount of money spent by Anjali's friends last Saturday. Give your answer correct to 2 decimal places.

..... euros

(4)

(Total for Question 3 is 5 marks)

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the frame size, in cm, of 60 bicycles sold in a shop.

Frame size (S cm)	**Frequency**
$30 < S \leqslant 36$	4
$36 < S \leqslant 42$	14
$42 < S \leqslant 48$	18
$48 < S \leqslant 54$	19
$54 < S \leqslant 60$	5

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean frame size.

..... cm

(4)

(Total for Question 1 is 5 marks)

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows some information about the hourly rates of pay of 60 workers.

Hourly rate of pay (p dollars)	Frequency
$10 < p \leqslant 15$	18
$15 < p \leqslant 20$	16
$20 < p \leqslant 25$	14
$25 < p \leqslant 30$	8
$30 < p \leqslant 35$	4

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean hourly rate of pay of the 60 workers.

..... dollars

(4)

(Total for Question 1 is 5 marks)

Answer ALL TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table gives information about the distances 100 adults travel to work.

Distance (d km)	Frequency
$0 < d \leqslant 5$	26
$5 < d \leqslant 10$	40
$10 < d \leqslant 15$	16
$15 < d \leqslant 20$	10
$20 < d \leqslant 25$	8

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean distance.

..... km

(4)

(Total for Question 1 is 5 marks)

5 Jenny has six cards.

Each card has a whole number written on it so that

the smallest number is 5
the largest number is 24
the median of the six numbers is 14
the mode of the six numbers is 8

Jenny arranges her cards so that the numbers are in order of size.



(a) For the remaining four cards, write on each dotted line a number that could be on the card.

(3)

A basketball team plays 6 games.
After playing 5 games, the team has a mean score of 21 points per game.
After playing 6 games, the team has a mean score of 23 points per game.

(b) Work out the number of points the team scored in its 6th game.

.....

(3)

(Total for Question 5 is 6 marks)

7 The students in Class A and in Class B take the same examination.

There are 28 students in Class A and 32 students in Class B.
The mean score for all the students in both classes is 72.6
The mean score for the students in Class A is 75

(a) Work out the mean score for the students in Class B.

.....

(4)

The lowest score in Class A is 39
The range of scores for Class A is 57
The lowest score in Class B is 33
The range of scores for Class B is 60

(b) Find the range of scores for all the students in both classes.

.....

(3)

(Total for Question 7 is 7 marks)

4 The table shows information about the weights, in kilograms, of 40 babies.

Weight (w kg)	Frequency
$2 < w \leqslant 3$	12
$3 < w \leqslant 4$	16
$4 < w \leqslant 5$	9
$5 < w \leqslant 6$	2
$6 < w \leqslant 7$	1

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean weight of the 40 babies.

..... kg

(4)

One of the 40 babies is going to be chosen at random.

(c) Find the probability that this baby has a weight of more than 5 kg.

.....

(2)

(Total for Question 4 is 7 marks)

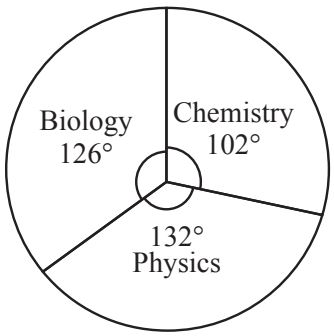
SUB-TOPIC S1c

CHARTS & DIAGRAMS

Sub-topic S1c · 1 question · 5 marks · lowest tariff first

10 All the students in year 10 and all the students in year 11 named their favourite science subject from Biology, Chemistry and Physics.

The pie chart shows information about the results for the year 10 students.
The table shows information about the results for the year 11 students.



Pie chart for year 10

science subject	number of students
Biology	$3x + 6$
Chemistry	$5x + 8$
Physics	$7x - 9$

Table for year 11

There are 300 students in year 10
There are 320 students in year 11

More students in year 10 than in year 11 said Biology was their favourite science subject.

How many more?

.....

(Total for Question 10 is 5 marks)

SUB-TOPIC S1e

CUMULATIVE FREQUENCY, BOX PLOTS & HISTOGRAMS

Sub-topic S1e · 70 questions · 312 marks · lowest tariff first

11 Twenty students took a Science test and a Maths test.

Both tests were marked out of 50

The table gives information about their results.

	Median	Interquartile range
Science	27	18
Maths	24.5	11

Use this information to compare the Science test results with the Maths test results.
Write down **two** comparisons.

1

2

(Total for Question 11 is 2 marks)

11 Simplify fully $\left(\frac{9t^4w^9}{18t^6w^{10}}\right)^{-2}$

.....

(Total for Question 11 is 3 marks)

12 15 people were asked how long, in minutes, they had been waiting for a bus.

Here are the results.

2 3 3 4 5 6 6 8 9 10 11 13 14 15 18

Find the interquartile range of these times.

..... minutes

(Total for Question 12 is 2 marks)

13 Expand and simplify $4x(3x + 1)(2x - 3)$
Show your working clearly.

.....

(Total for Question 13 is 3 marks)

14 Here is the number of goals that Henri's team scored one summer in each water polo match.

5 8 9 11 13 13 14 15 16 17 20

Find the interquartile range of the numbers of goals.
Show your working clearly.

.....

(Total for Question 14 is 2 marks)

13 Here is the number of runs scored by a baseball team in each of its 15 games this season.

The number of runs have been arranged in order of size.

0 1 1 3 5 6 7 7 8 9 9 12 12 15 16

Work out the interquartile range of the number of runs.

.....

(Total for Question 13 is 2 marks)

9 Solve the simultaneous equations

$$2x + 9y = 14.5$$
$$7x + 3y = 8$$

Show clear algebraic working.

$x =$ .....

$y =$ .....

(Total for Question 9 is 3 marks)

10 Here are the test marks of 15 students.

7 10 14 15 16 17 18 19 20 20 23 25 30 39 40

Find the interquartile range of these marks.

.....

(Total for Question 10 is 2 marks)

12 $2^7 \times 4^5 = 4^x$

(a) Calculate the value of x

$x =$ .....

(2)

(b) Simplify fully $\left(125p^6y^{24}\right)^{\frac{2}{3}}$

.....

(2)

(Total for Question 12 is 4 marks)

13 Robert asked 11 people how many meetings they attended last week.

Here are the results in numerical order.

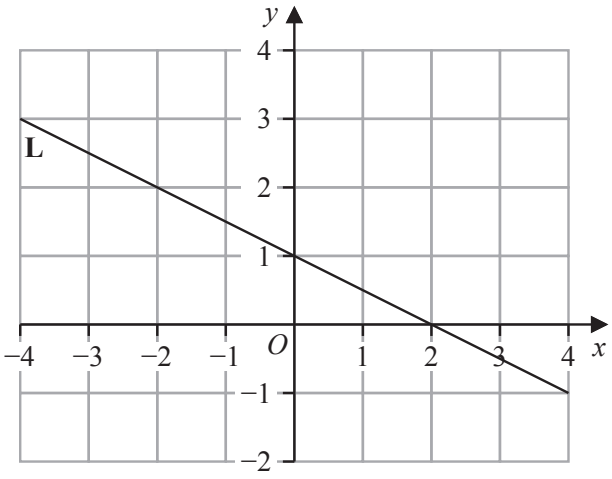
1 2 4 6 6 8 11 12 13 14 17

Find the interquartile range of the number of meetings.

.....

(Total for Question 13 is 2 marks)

9 Line **L** is drawn on the grid.



Find an equation for **L**
Give your answer in the form $y = mx + c$

.....

(Total for Question 9 is 3 marks)

10 Here are the numbers of goals scored by a hockey team in its 11 games this season.

0 1 2 2 3 4 4 6 7 9 11

Work out the interquartile range of the numbers of goals.

.....

(Total for Question 10 is 2 marks)

13 Here are the numbers of eggs laid by some hens on each of 11 days in June.

9 10 12 15 17 18 19 19 20 25 26

Work out the interquartile range of the numbers of eggs.

.....

(Total for Question 13 is 2 marks)

14 Work out $6.7 \times 10^{135} + 3 \times 10^{134}$

Give your answer in standard form.

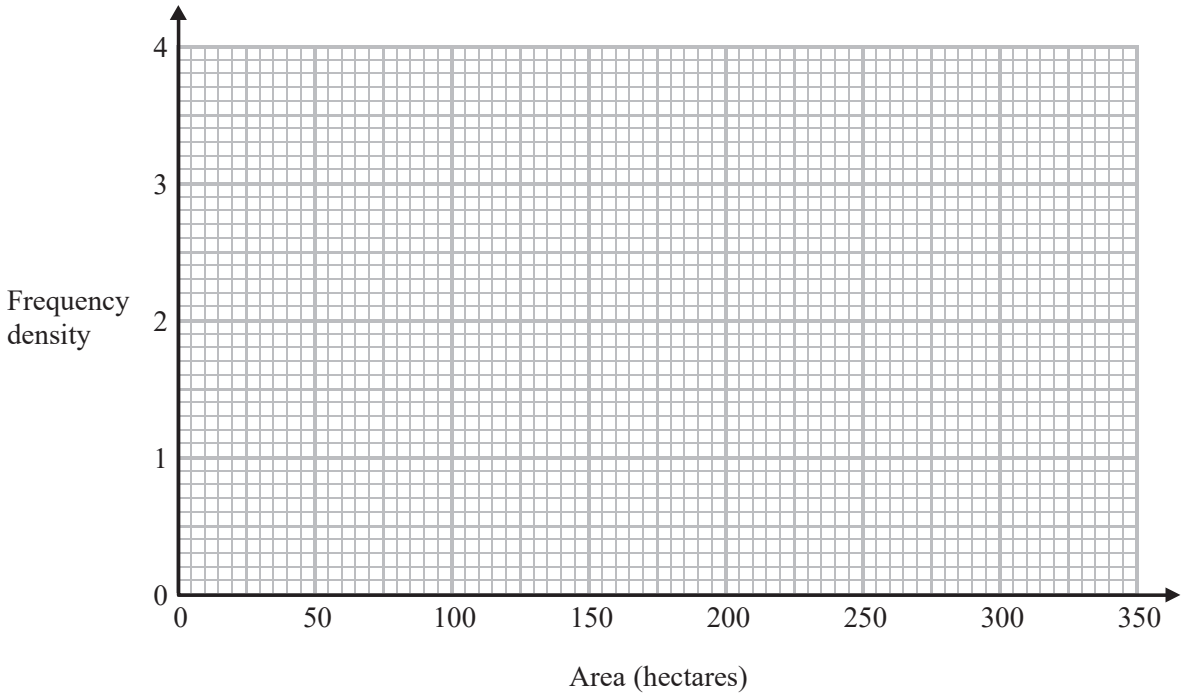
.....

(Total for Question 14 is 2 marks)

17 The table gives information about the areas, in hectares, of some farms in Spain.

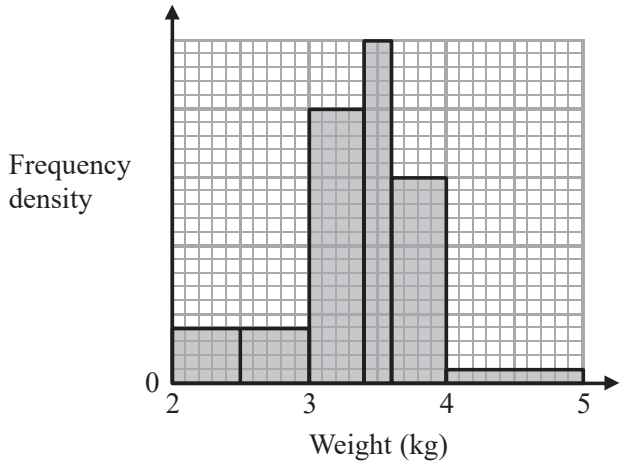
Area (A hectares)	Frequency
$0 < A \leqslant 20$	40
$20 < A \leqslant 50$	90
$50 < A \leqslant 100$	140
$100 < A \leqslant 300$	140
$300 < A \leqslant 350$	40

On the grid, draw a histogram for this information.



(Total for Question 17 is 3 marks)

20 The histogram shows information about the birth weights of some babies.



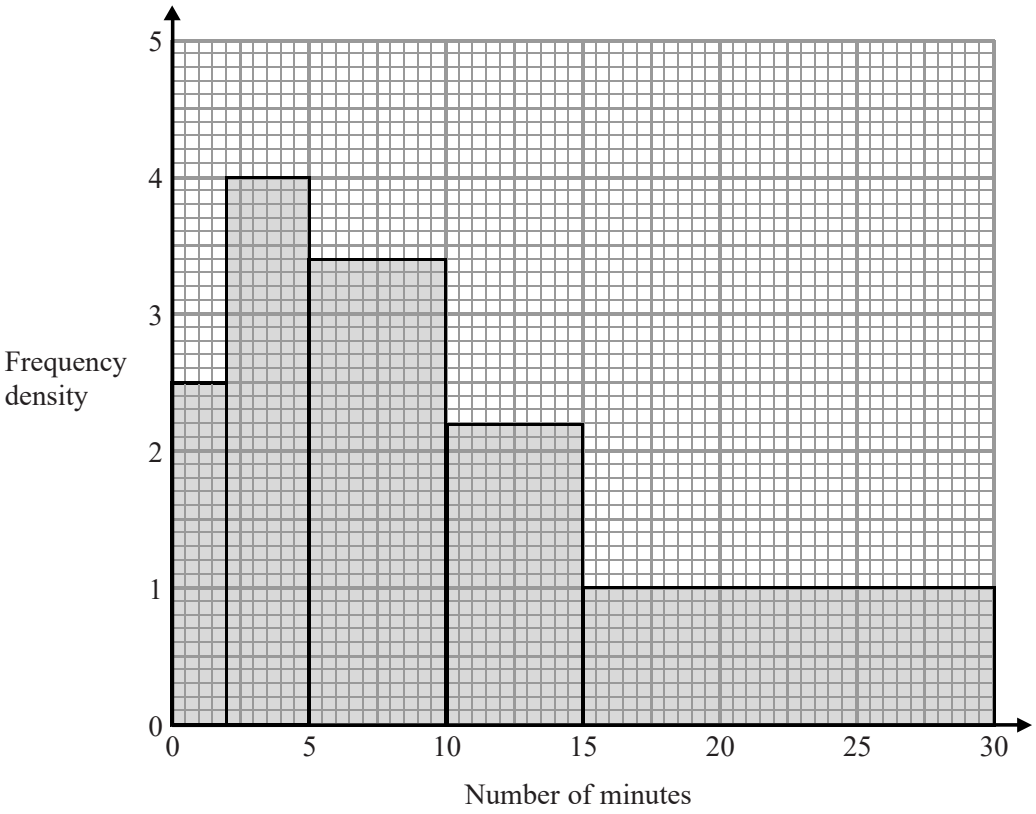
6 of these babies had a birth weight less than 2.5 kg or greater than 4 kg.

Work out the number of babies who had a birth weight between 2.5 kg and 4 kg.

.....

(Total for Question 20 is 3 marks)

19 The histogram shows information about the numbers of minutes some people waited to be served at a Post Office.



Work out an estimate for the proportion of these people who waited longer than 20 minutes to be served.

(Total for Question 19 is 3 marks)

12 Freddie recorded the number of runs he scored in each of 11 cricket matches.
Here are his results.

4 0 21 32 51 6 102 69 17 9 42

Find the interquartile range of his results.

(Total for Question 12 is 3 marks)

13 Carlos, Flavia and Tazia shared £861 between themselves.

The amount of money Flavia got is 65% of the amount of money Carlos got.
The amount of money Tazia got is 22% **more** than the amount of money Carlos got.

Work out how much money Carlos got.

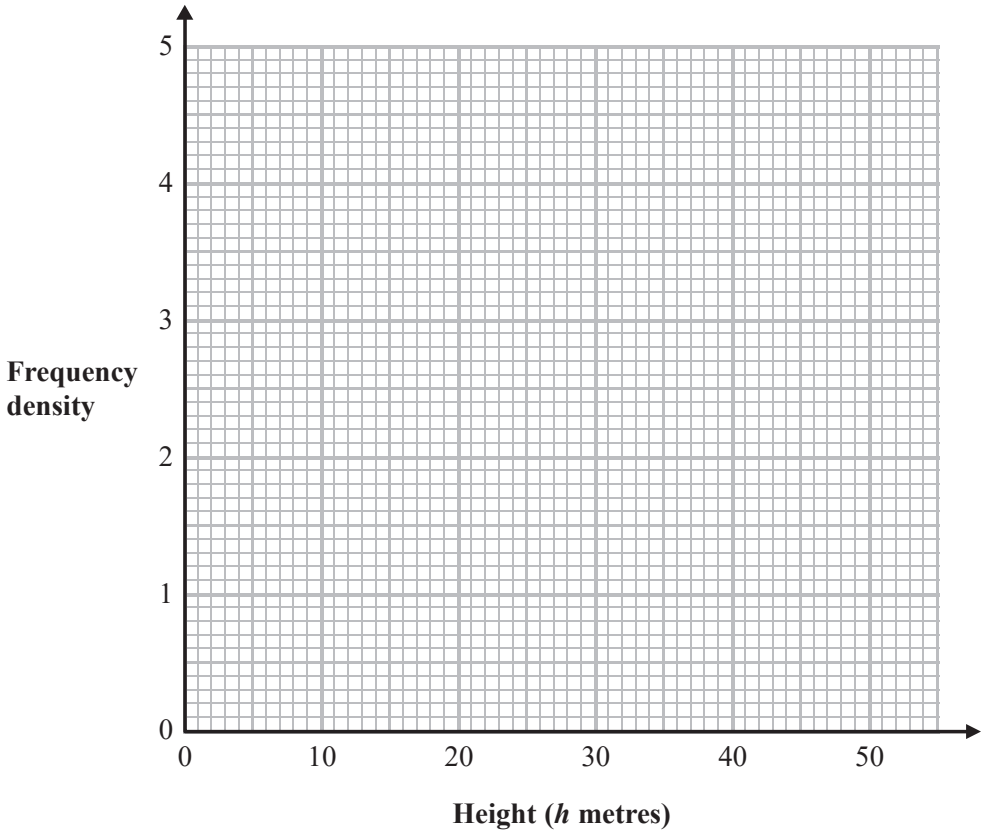
£

(Total for Question 13 is 3 marks)

19 The table gives information about the heights of some trees.

Height (h metres)	Frequency
$0 < h \leqslant 20$	15
$20 < h \leqslant 35$	48
$35 < h \leqslant 40$	21
$40 < h \leqslant 50$	16

On the grid, draw a histogram for this information.



(Total for Question 19 is 3 marks)

14 Max kept a record of the marks he scored in each of the 11 spelling tests he took one term.

Here are his marks.

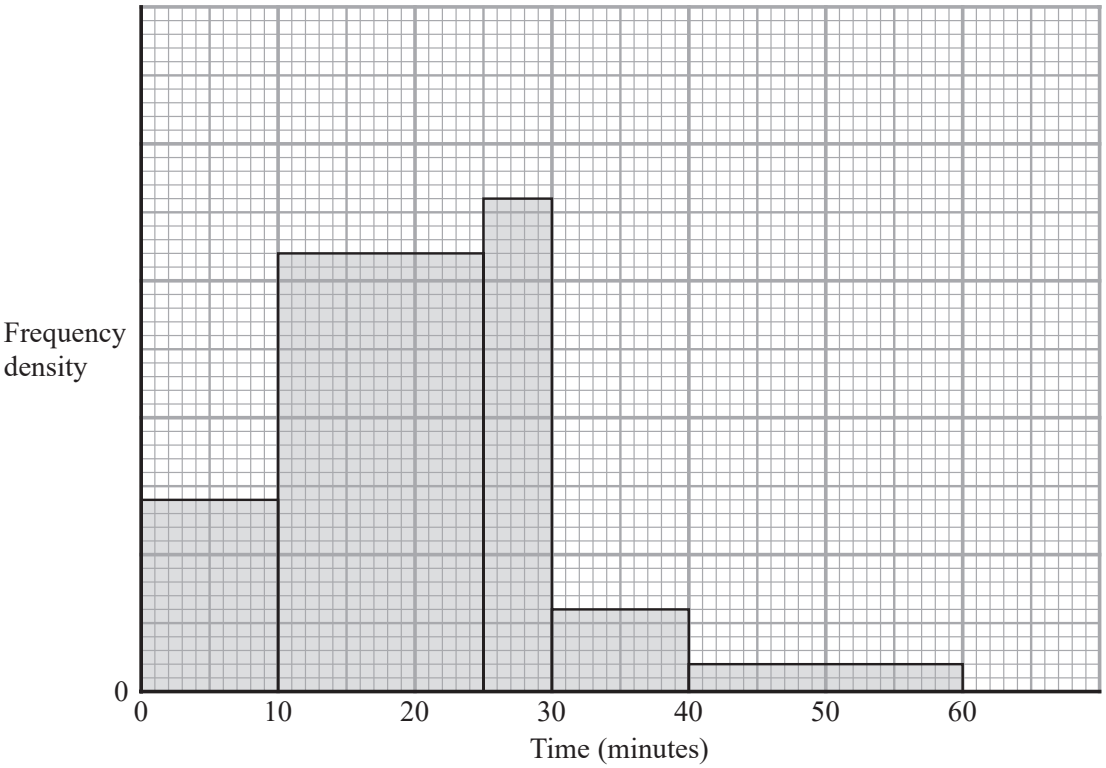
18 5 7 12 11 18 15 16 17 13 14

Find the interquartile range of the marks.

.....

(Total for Question 14 is 3 marks)

21 The histogram gives information about the times, in minutes, some customers had to wait to be served in a restaurant.



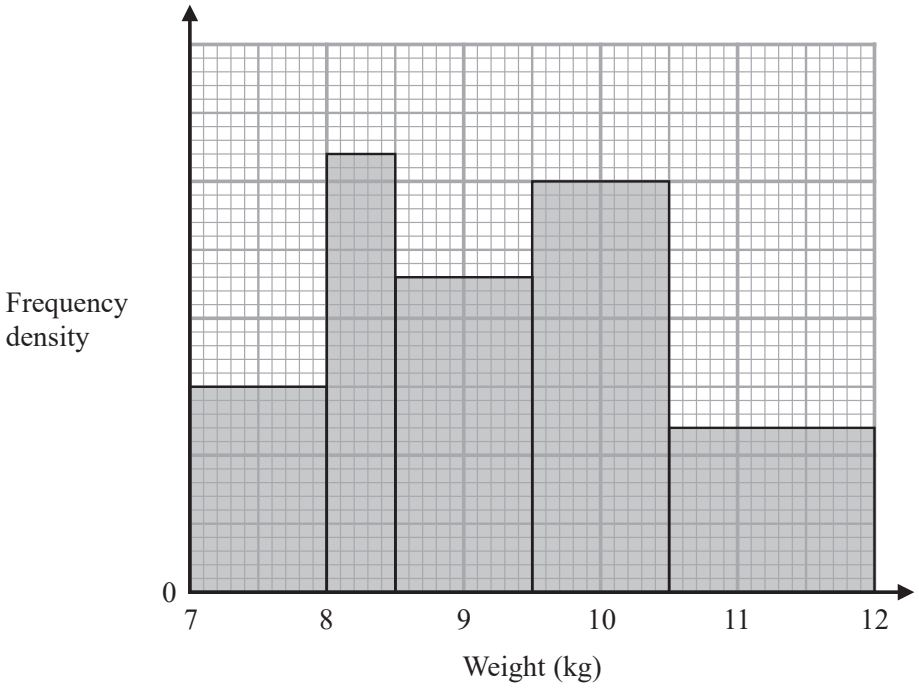
14 customers had to wait less than 10 minutes to be served.

Work out the number of customers who had to wait less than 60 minutes to be served.

.....

(Total for Question 21 is 3 marks)

21



The histogram gives information about the weights, in kg, of all the watermelons in a field.

There are 16 watermelons with a weight between 8 kg and 8.5 kg

Work out the total number of watermelons in the field.

.....

(Total for Question 21 is 3 marks)

15 Diyar recorded the distance, in kilometres, that he cycled each day for 11 days.
Here are his results.

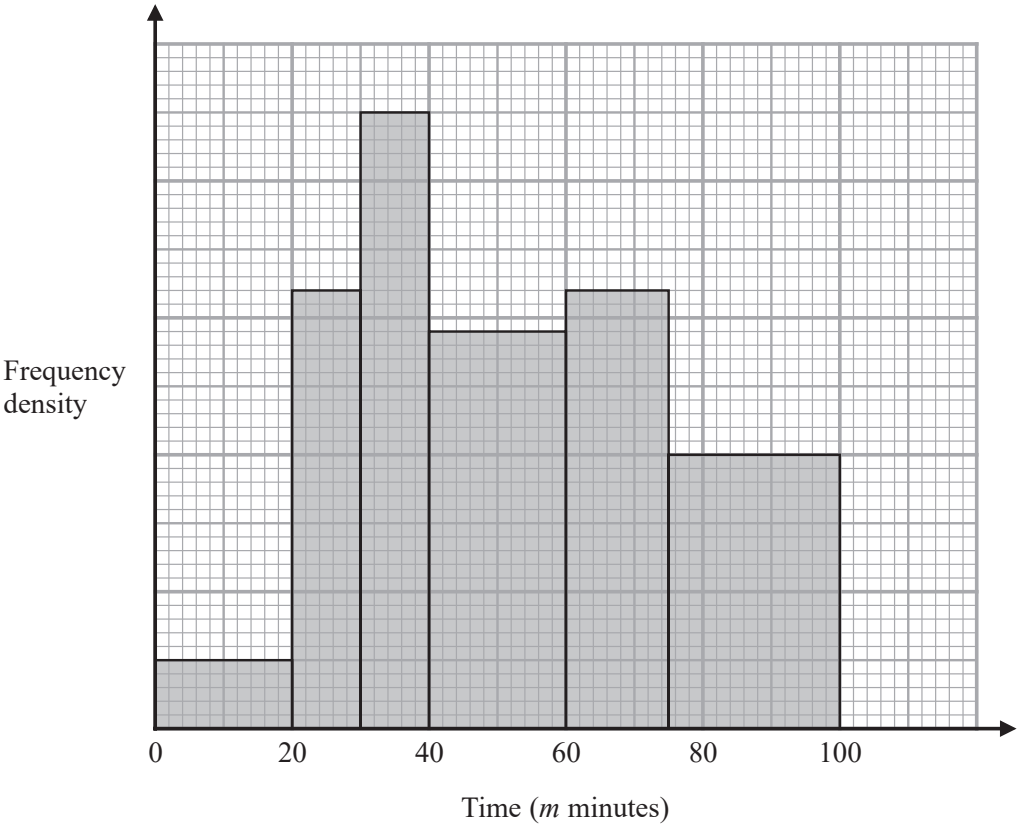
8 10 12 13 5 23 21 7 5 16 14

Find the interquartile range of his results.

..... km

(Total for Question 15 is 3 marks)

21 The histogram shows information about the total time, m minutes, taken by each child in a school to walk to school every day for one week.



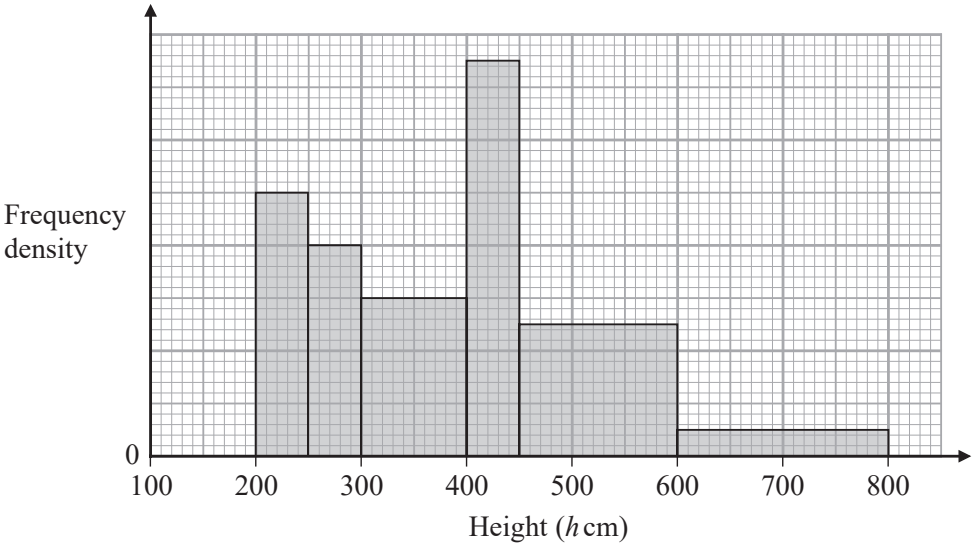
There are no children for whom $m > 100$
There are 10 children for whom $m \leqslant 20$

Work out an estimate for the number of children for whom $50 < m \leqslant 80$

.....

(Total for Question 21 is 3 marks)

19 The histogram gives information about the height, h cm, of each tree in part of a forest.



There are no trees for which $h \leqslant 200$ and for which $h > 800$

The number of trees for which $300 < h \leqslant 400$ is 8 fewer than the number of trees for which $400 < h \leqslant 500$

Work out an estimate for the number of trees in this part of the forest that have a height greater than 500 cm.

.....

(Total for Question 19 is 3 marks)

15 Here is a list giving the numbers of runs scored last week by the eleven members of cricket team **A**.

2 3 4 6 21 26 27 32 34 61 72

The interquartile range of the numbers of runs scored last week by the eleven members of cricket team **B** was 42

Using a suitable calculation, write down one comparison between the numbers of runs scored by the members of cricket team **A** and the members of cricket team **B**.
Show your working clearly.

.....

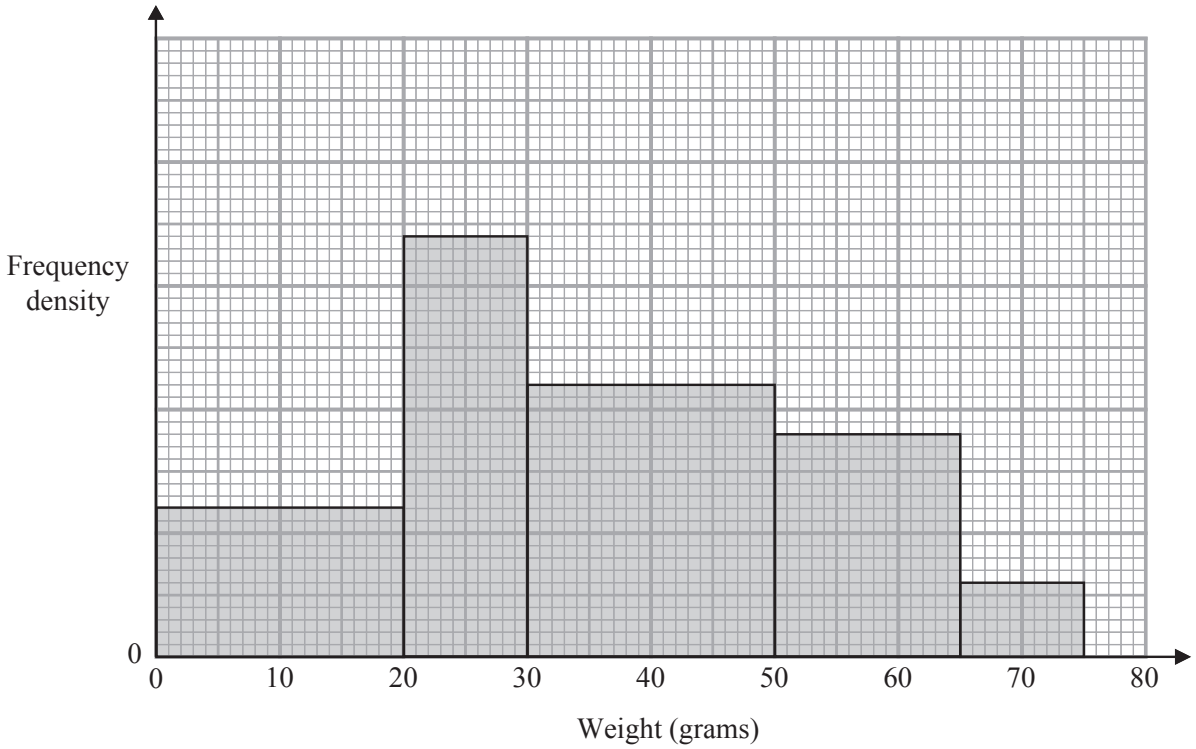
.....

(Total for Question 15 is 3 marks)

16 Use algebra to show that $0.4\dot{3}\dot{8} = \frac{217}{495}$

(Total for Question 16 is 2 marks)

17 The histogram gives information about the weights, in grams, of some oranges in a box.



24 of these oranges weigh less than 20 grams.

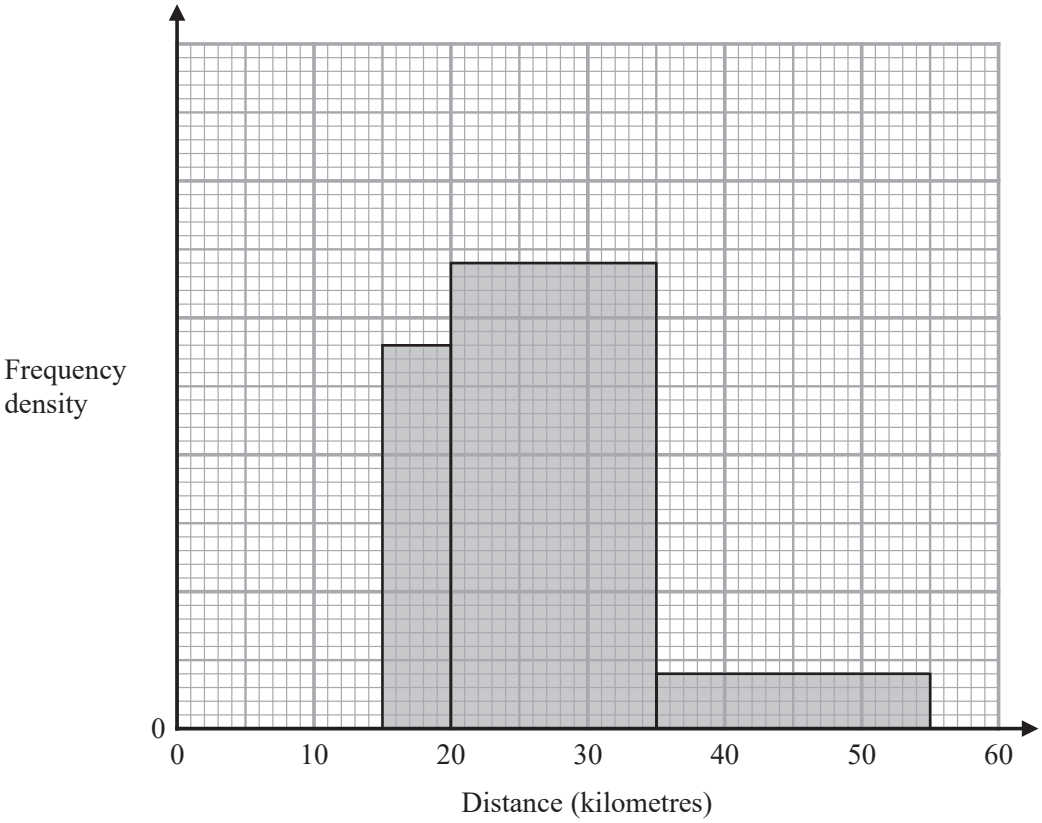
Medium oranges weigh between 35 grams and 55 grams.

Work out an estimate for the number of medium oranges in the box.

.....

(Total for Question 17 is 3 marks)

22 The incomplete histogram shows some information about the distances, in kilometres, that 100 adults ran last week.



All of the adults ran at least 5 kilometres.
None of the adults ran more than 55 kilometres.
14 adults ran between 15 kilometres and 20 kilometres.

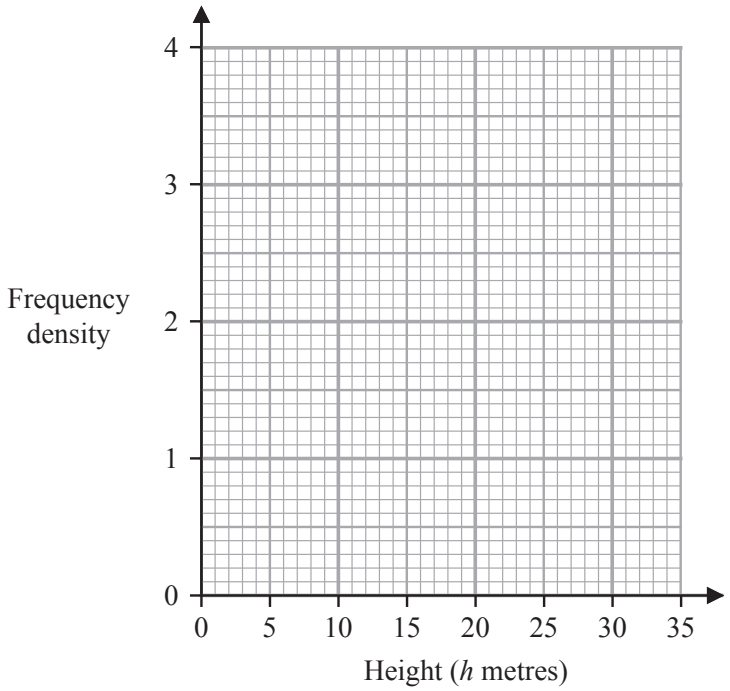
Complete the histogram.

(Total for Question 22 is 3 marks)

16 The table gives information about the heights, in metres, of the trees in a park.

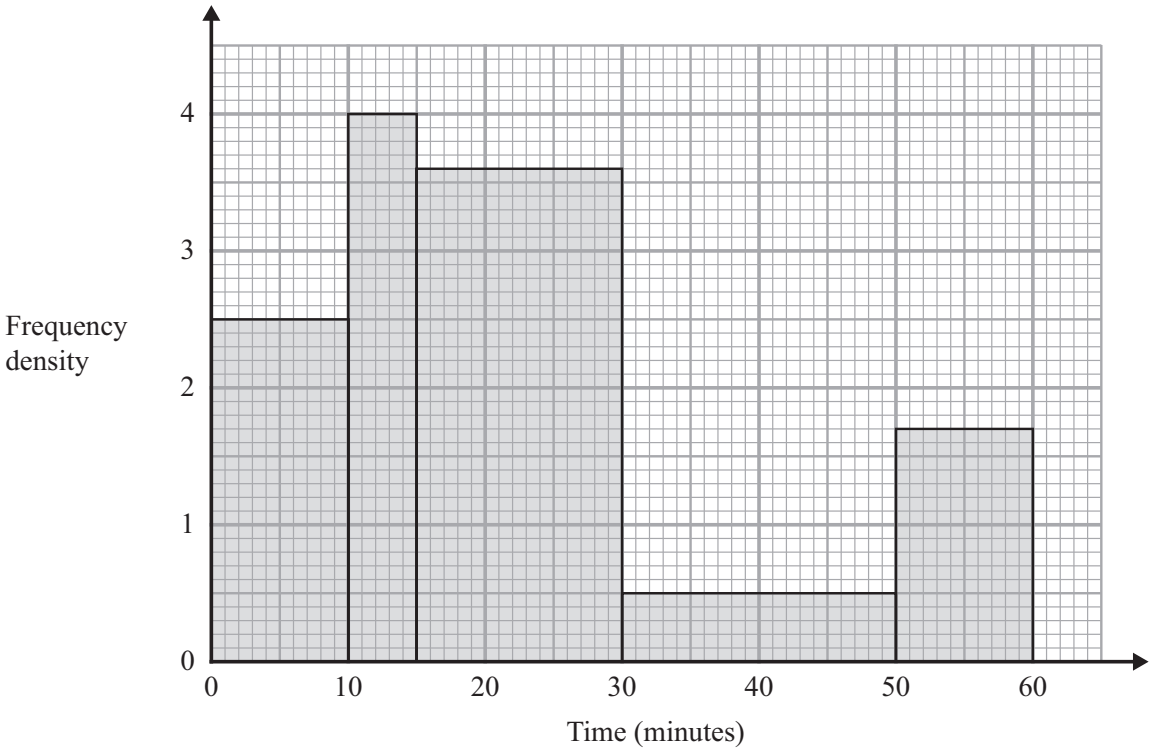
Height (h metres)	Frequency
$0 < h \leqslant 2$	5
$2 < h \leqslant 5$	12
$5 < h \leqslant 10$	18
$10 < h \leqslant 20$	14
$20 < h \leqslant 35$	9

On the grid, draw a histogram for this information.



(Total for Question 16 is 3 marks)

17 The histogram shows information about the times, in minutes, that some people were in a shop.

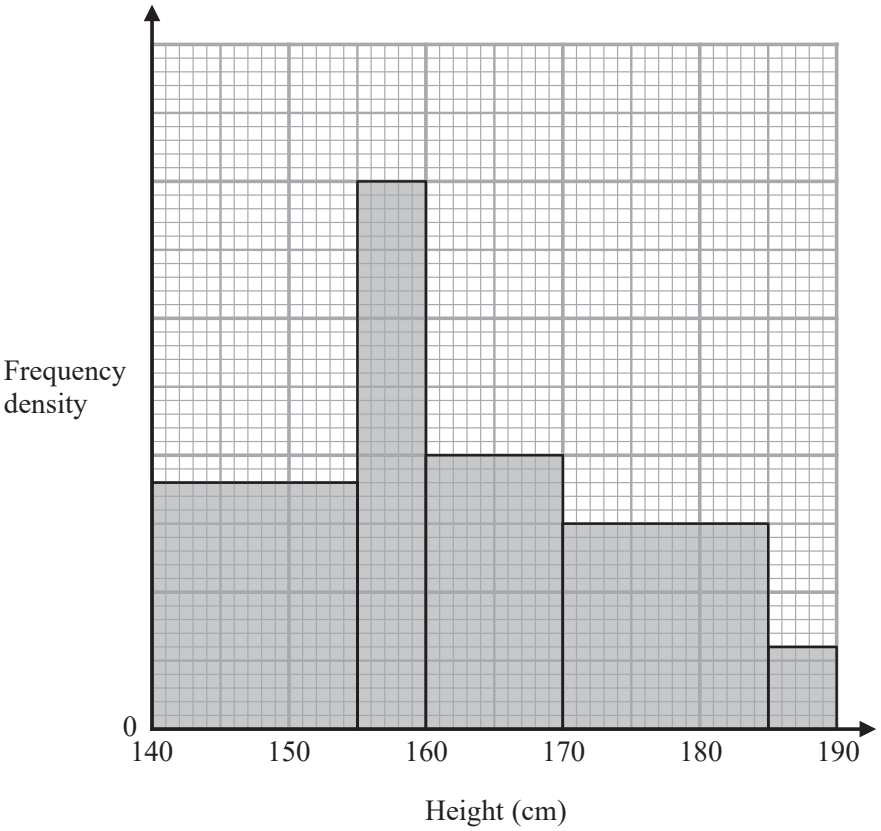


Work out an estimate for the proportion of these people who were in the shop for more than 40 minutes.

.....

(Total for Question 17 is 3 marks)

19



The histogram gives information about the heights of all the Year 11 students at a school.

There are 160 students in Year 11 with a height between 155 cm and 170 cm.

Work out the total number of students in Year 11 at the school.

.....

(Total for Question 19 is 4 marks)

14 Sandeep sat 11 tests in January 2020
Each test was marked out of 60

Here are his test results.

45 41 35 44 38 47 47 39 37 43 42

(a) Find the interquartile range of these test results.
Show your working clearly.

.....

(3)

Sandeep also sat some tests in May 2020
Each test was marked out of 60

The median of the May 2020 test results is 42
The interquartile range of the May 2020 test results is 12

(b) In which month, January or May, were Sandeep's test results more consistent?
Give a reason for your answer.

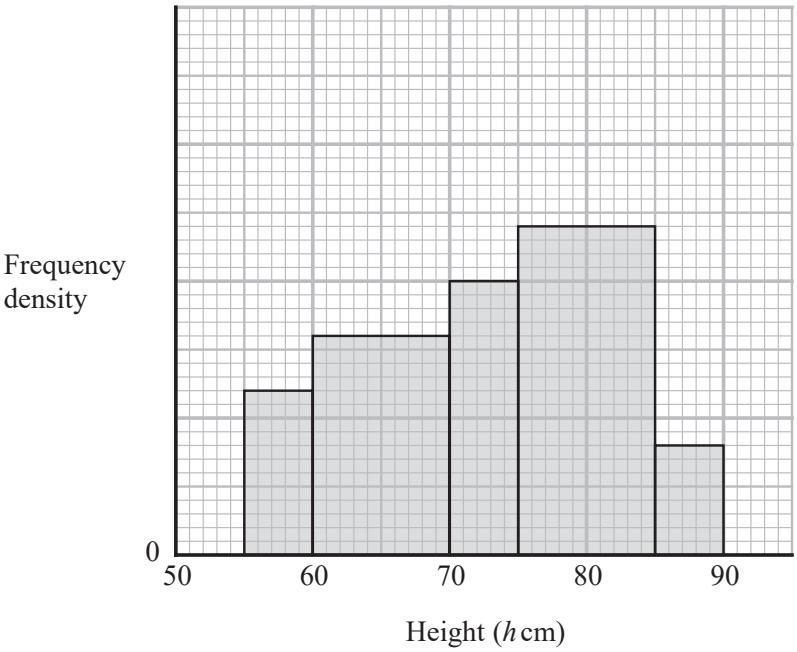
.....

.....

(1)

(Total for Question 14 is 4 marks)

20 The histogram gives information about the heights, h cm, of some tomato plants.



There are 12 tomato plants for which $75 < h \leqslant 85$
One of the tomato plants is selected at random.

Find an estimate for the probability that this tomato plant has a height greater than 82.5 cm

.....

(Total for Question 20 is 4 marks)

15 Here are the numbers of aces that Rutger served in each of 11 tennis matches.

1 1 2 4 6 8 8 9 11 12 15

(a) Find the interquartile range of the numbers of aces.
Show your working clearly.

.....

(2)

Kim also plays in 11 tennis matches.

For Kim
the median number of aces is 11
the interquartile range of the numbers of aces is 5

(b) State, giving a reason, whether Rutger or Kim

(i) served more aces on average,

.....

.....

.....

(1)

(ii) was more consistent with the number of aces served.

.....

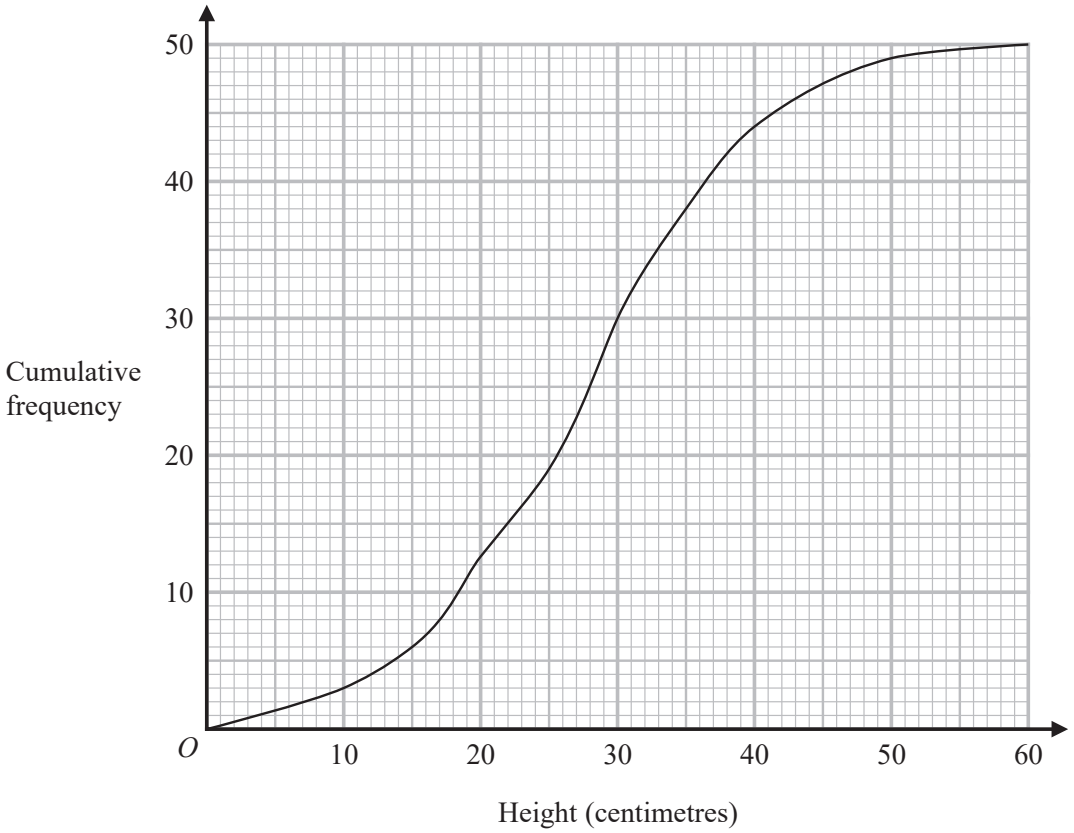
.....

.....

(1)

(Total for Question 15 is 4 marks)

12 The cumulative frequency graph shows information about the heights, in centimetres, of 50 plants in a flowerbed.



(a) Use the graph to find an estimate for the median height of these plants.

..... centimetres

(1)

(b) Use the graph to find the frequency for the class interval $30 < \text{Height} \leqslant 40$

.....

(1)

(c) Use the graph to find an estimate for the number of plants with a height greater than 35 centimetres.

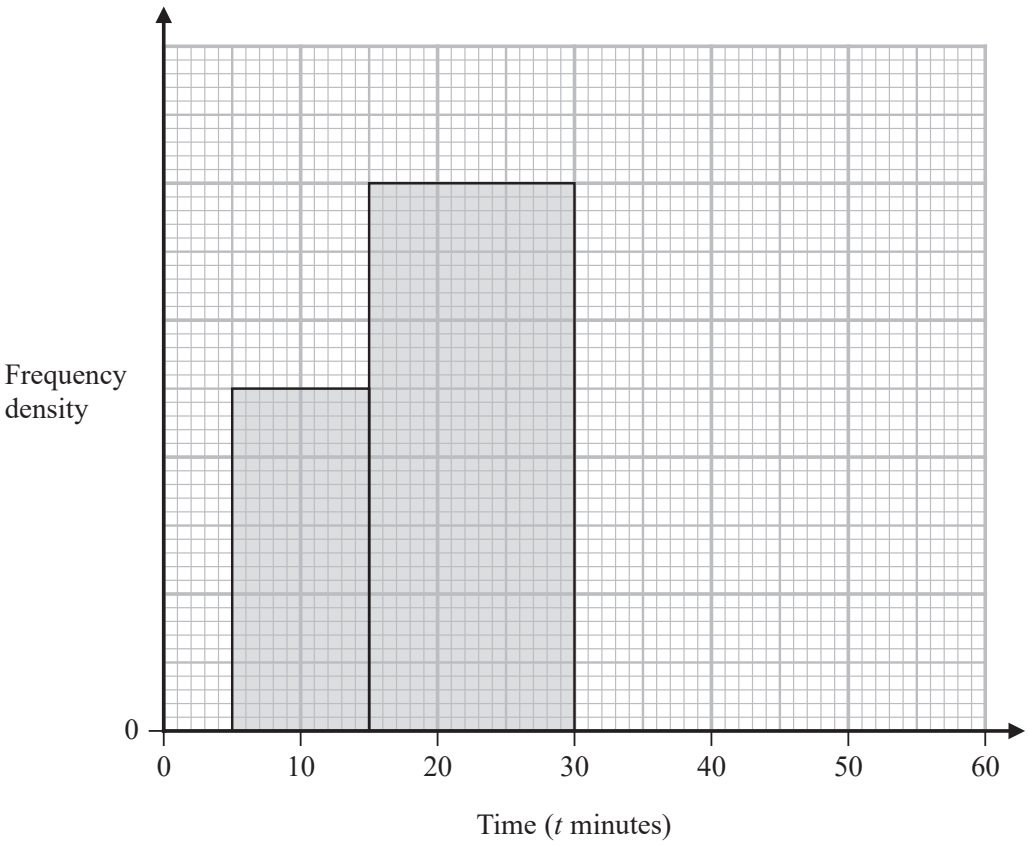
.....

(2)

(Total for Question 12 is 4 marks)

18 The incomplete table and incomplete histogram give information about the times, in minutes, that 140 people waited at a station for a train.

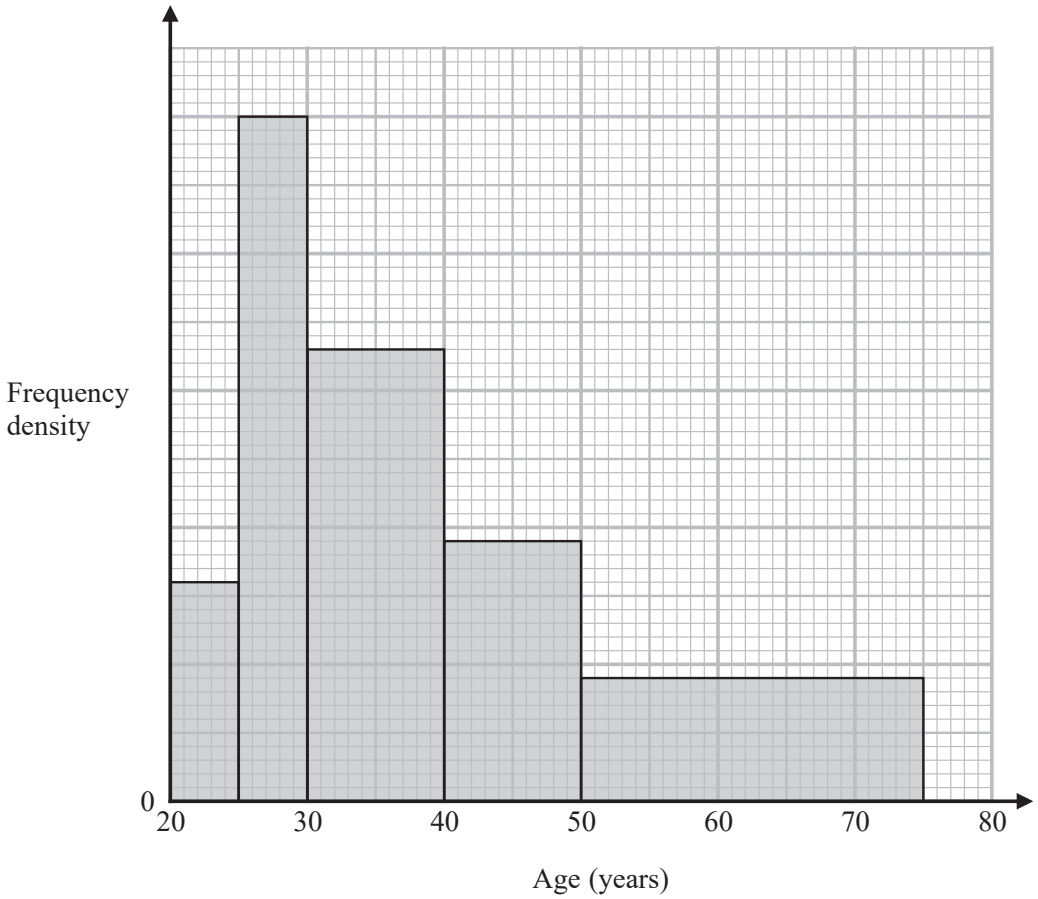
Time (t minutes)	Frequency
$0 < t \leqslant 5$	23
$5 < t \leqslant 15$	
$15 < t \leqslant 30$	
$30 < t \leqslant 40$	18
$40 < t \leqslant 60$	14



Complete the table and the histogram.

(Total for Question 18 is 4 marks)

22 Some people attend a concert.
The histogram shows information about the ages of these people.



Work out an estimate for the percentage of these people who are aged more than 55 years.
Give your answer correct to one decimal place.

.....%

(Total for Question 22 is 4 marks)

Turn over for Question 23

14 Akari played a computer game eleven times.
Here are her scores.

25 20 28 27 26 22 23 29 20 29 26

(a) Find the interquartile range of her scores.

.....

(3)

Machi played the same computer game eleven times.

The interquartile range for Machi's scores was 9

(b) Who had the more consistent scores, Akari or Machi?
Give a reason for your answer.

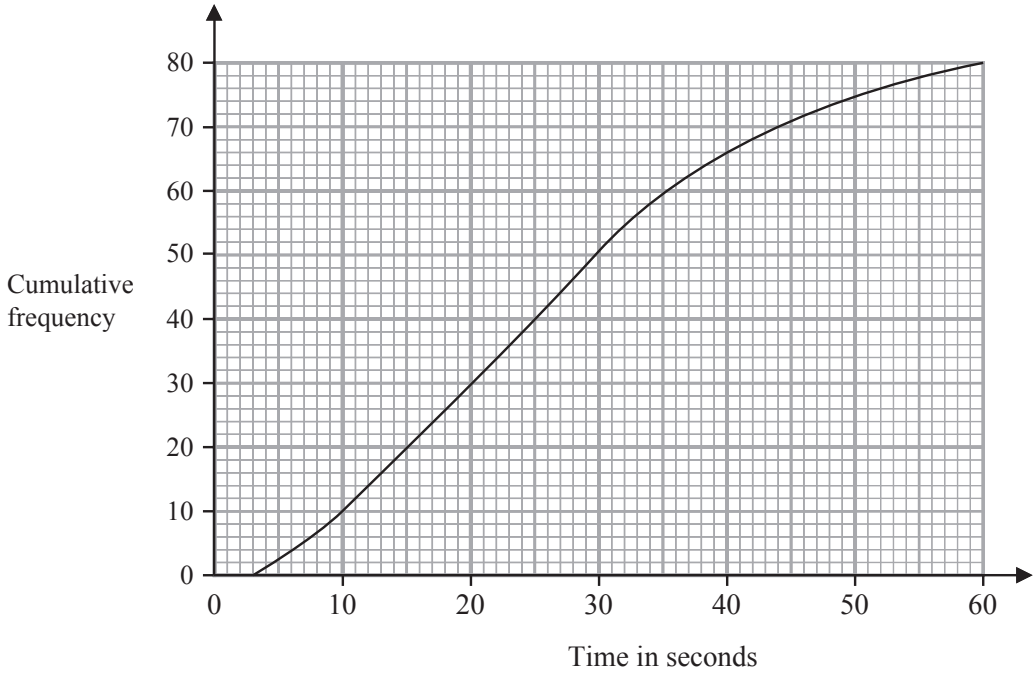
.....

.....

(1)

(Total for Question 14 is 4 marks)

13 The cumulative frequency graph gives information about the times, in seconds, that 80 adults took to log in to an online bank.



(a) Find an estimate for the median time.

..... seconds

(1)

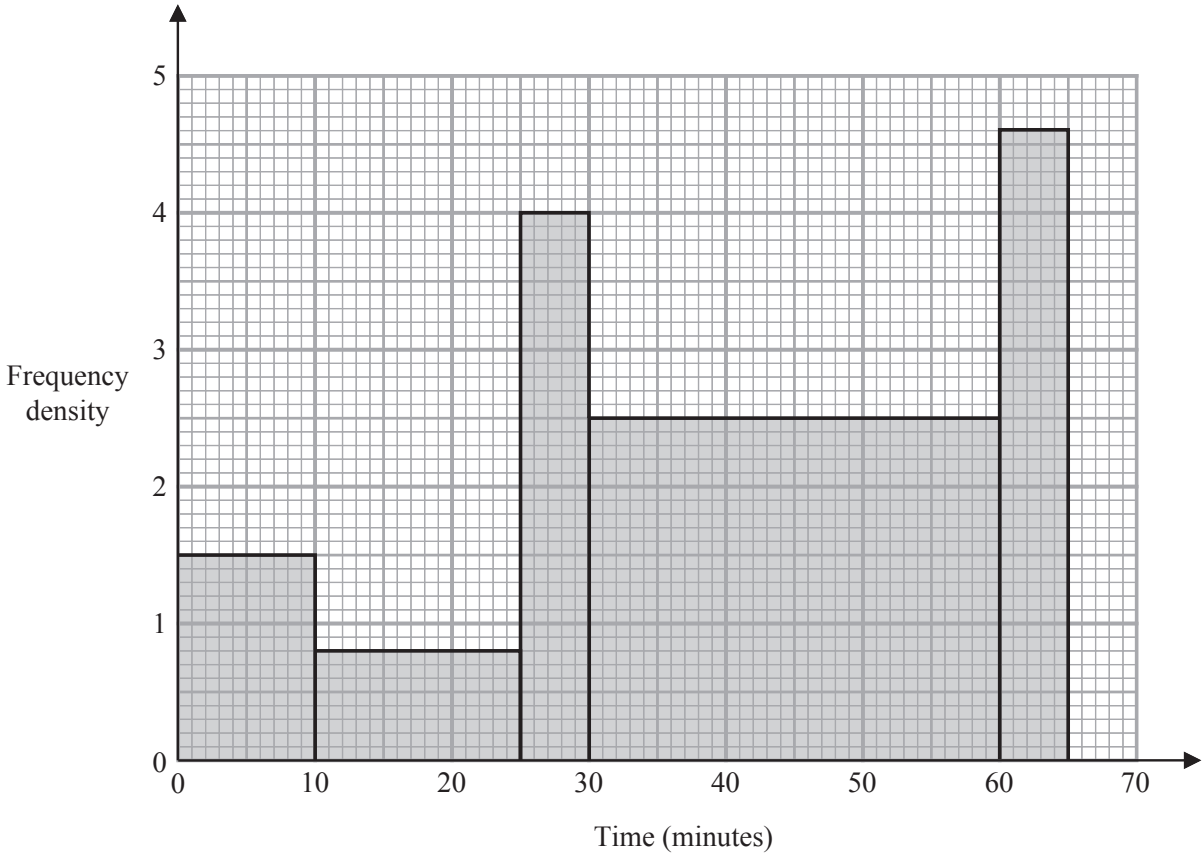
(b) Work out the percentage of these adults that took longer than 50 seconds to log in.
Show your working clearly.

.....%

(3)

(Total for Question 13 is 4 marks)

18 The histogram shows information about the times some students took to complete a puzzle.

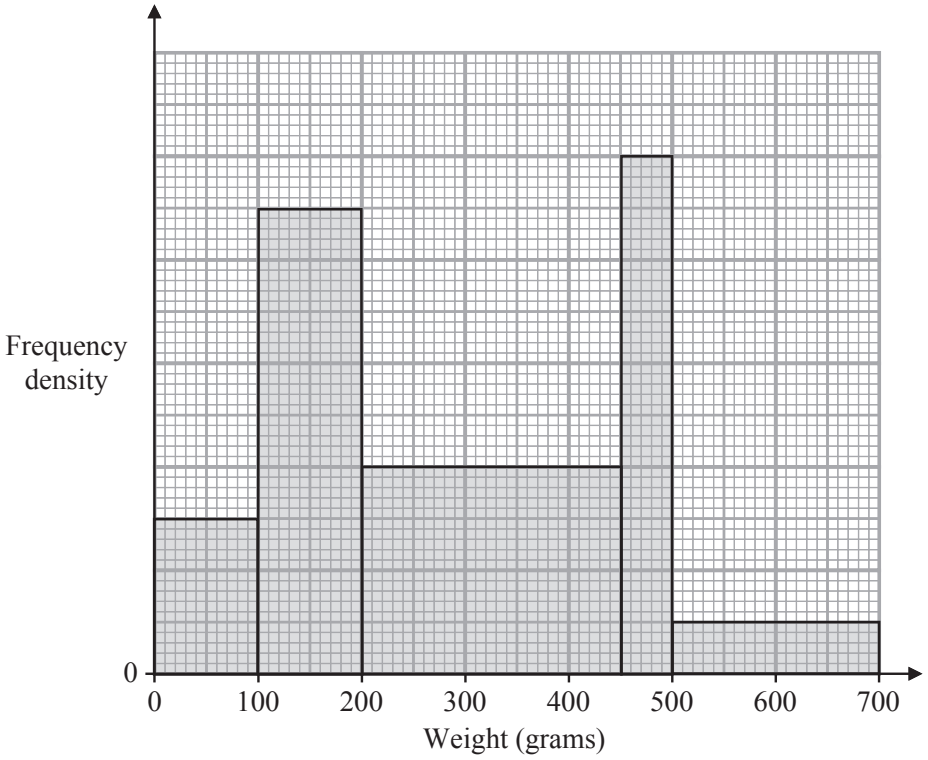


Work out an estimate for the fraction of these students who took between 20 minutes and 60 minutes to complete the puzzle.

.....

(Total for Question 18 is 4 marks)

20 The histogram gives some information about the weights, in grams, of some books.



75 books weigh less than 100 grams.

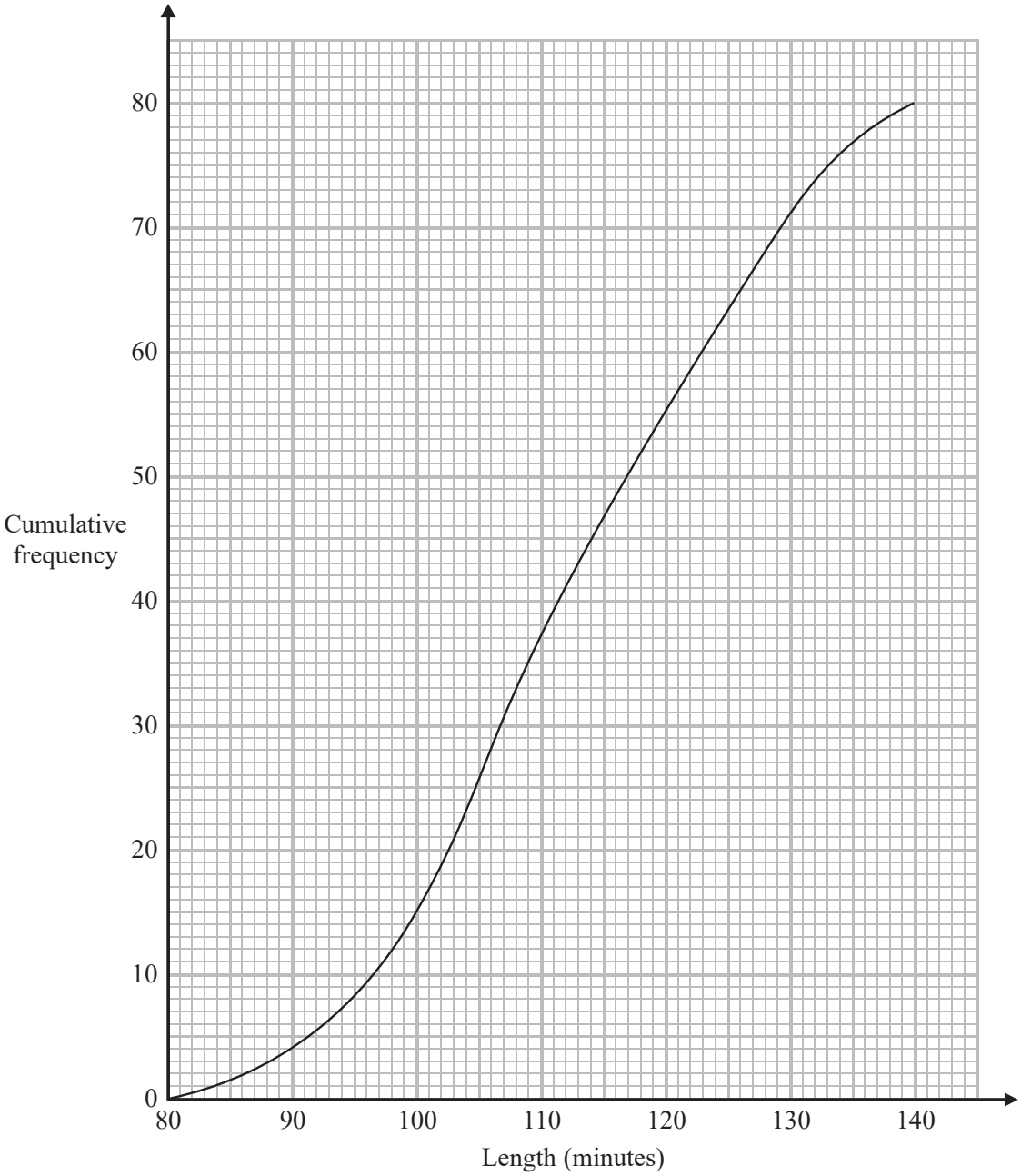
A book is chosen at random.

Find an estimate for the probability that this book weighs between 400 grams and 600 grams.

.....

(Total for Question 20 is 4 marks)

10 The cumulative frequency graph shows information about the length, in minutes, of each of 80 films.



(a) Use the graph to find an estimate for the interquartile range.

..... minutes

(2)

Clare says,

"More than 35% of these films are over 120 minutes long."

(b) Is Clare correct?
Give a reason for your answer.

.....

.....

(3)

(Total for Question 10 is 5 marks)

9 The table shows information about the speeds of 60 cycles.

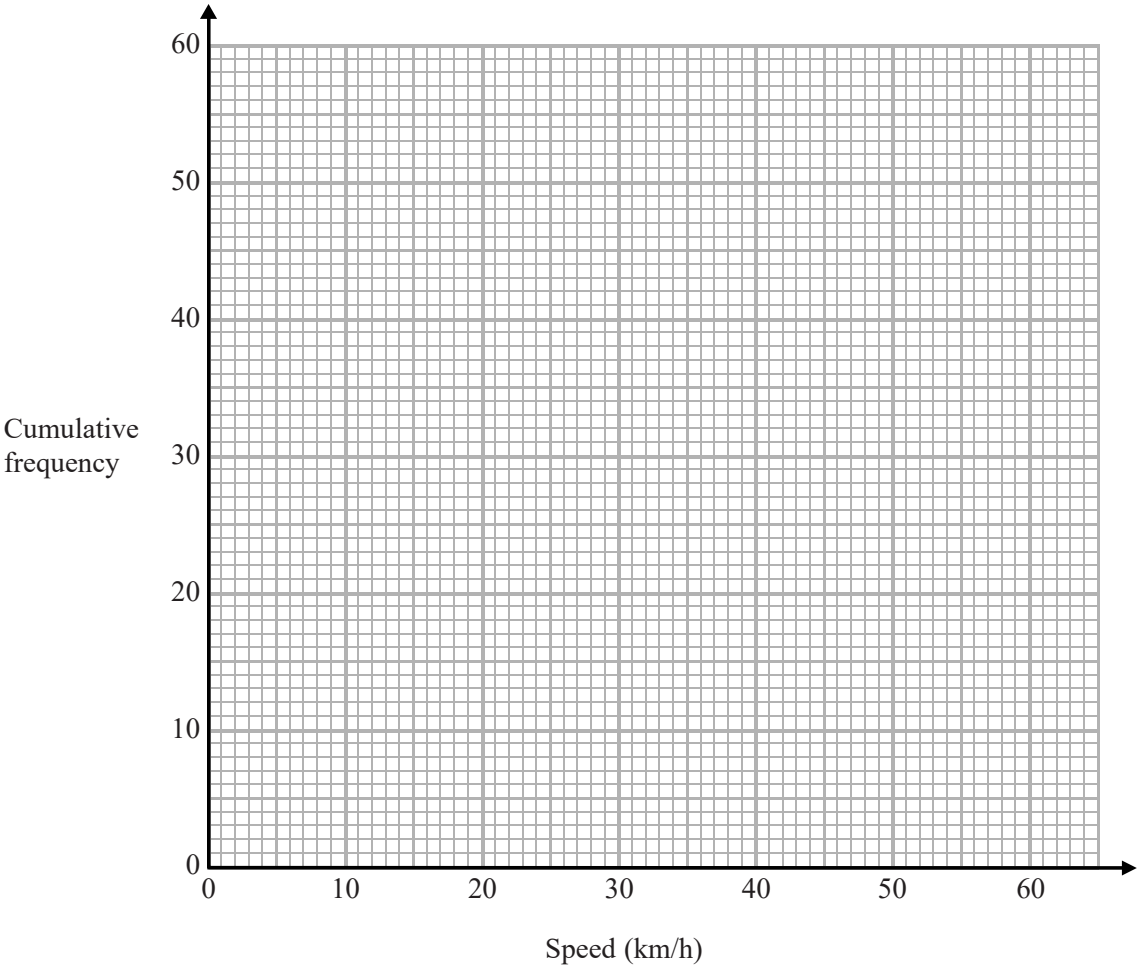
Speed (s km/h)	Frequency
$0 < s \leqslant 10$	3
$10 < s \leqslant 20$	16
$20 < s \leqslant 30$	24
$30 < s \leqslant 40$	10
$40 < s \leqslant 50$	5
$50 < s \leqslant 60$	2

(a) Complete the cumulative frequency table.

Speed (s km/h)	Cumulative frequency
$0 < s \leqslant 10$	
$0 < s \leqslant 20$	
$0 < s \leqslant 30$	
$0 < s \leqslant 40$	
$0 < s \leqslant 50$	
$0 < s \leqslant 60$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

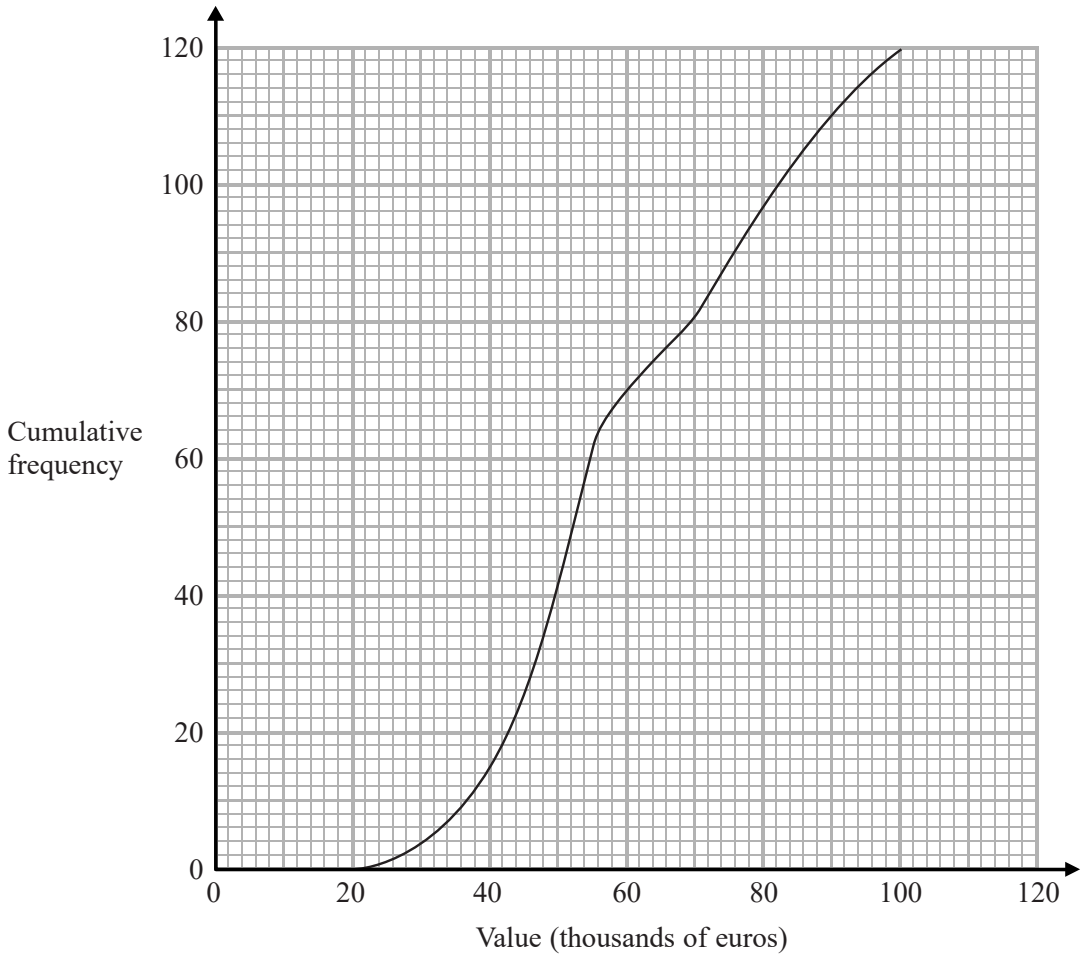
(c) Use your graph to find an estimate for the interquartile range of the speeds.

km/h

(2)

(Total for Question 9 is 5 marks)

14 The cumulative frequency diagram gives information about the values, in thousands of euros, of 120 apartments in 2015



(a) Find an estimate for the number of these apartments with a value of 80 thousand euros or less in 2015

(1)

The table gives information about the values, in thousands of euros, of the same 120 apartments in 2018

Value in thousands of euros (v)	Cumulative frequency
$0 < v \leqslant 20$	0
$0 < v \leqslant 40$	15
$0 < v \leqslant 60$	44
$0 < v \leqslant 80$	85
$0 < v \leqslant 100$	102
$0 < v \leqslant 120$	120

(b) On the grid opposite, draw a cumulative frequency diagram for this information.

(2)

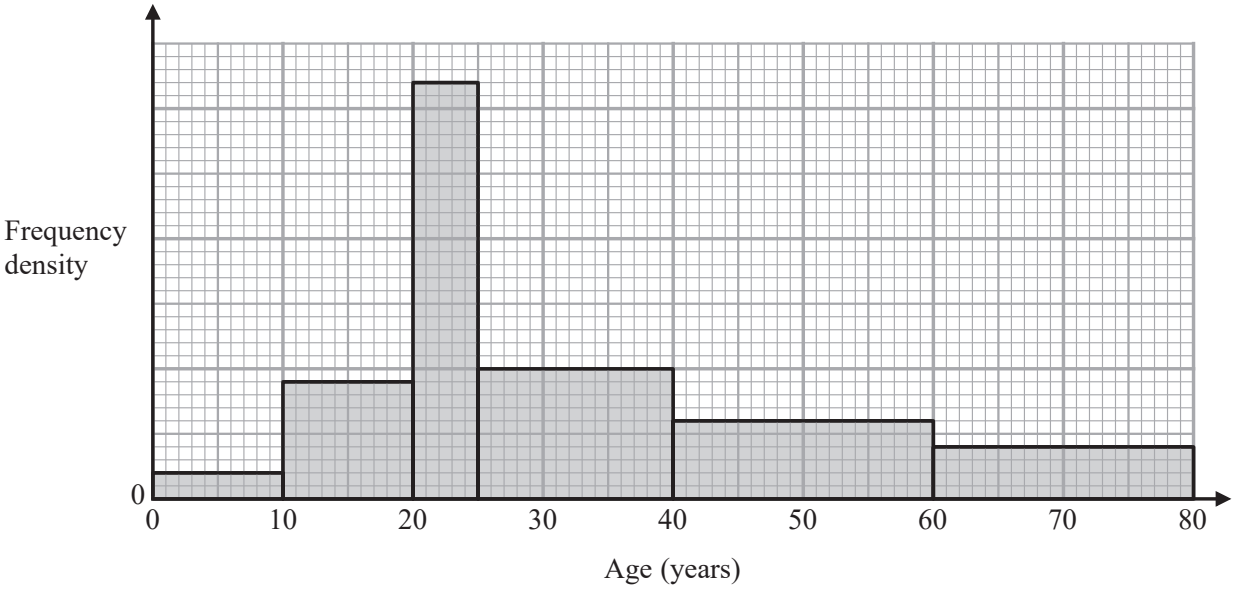
(c) Find an estimate for the increase in the median value for these apartments from 2015 to 2018

thousand euros

(2)

(Total for Question 14 is 5 marks)

17 The histogram shows information about the ages of all the passengers travelling on a plane.
No one on the plane is older than 80 years.



24 passengers on the plane are aged between 40 years and 60 years.

(a) Work out the total number of passengers on the plane.

.....

(3)

A passenger on the plane is picked at random.

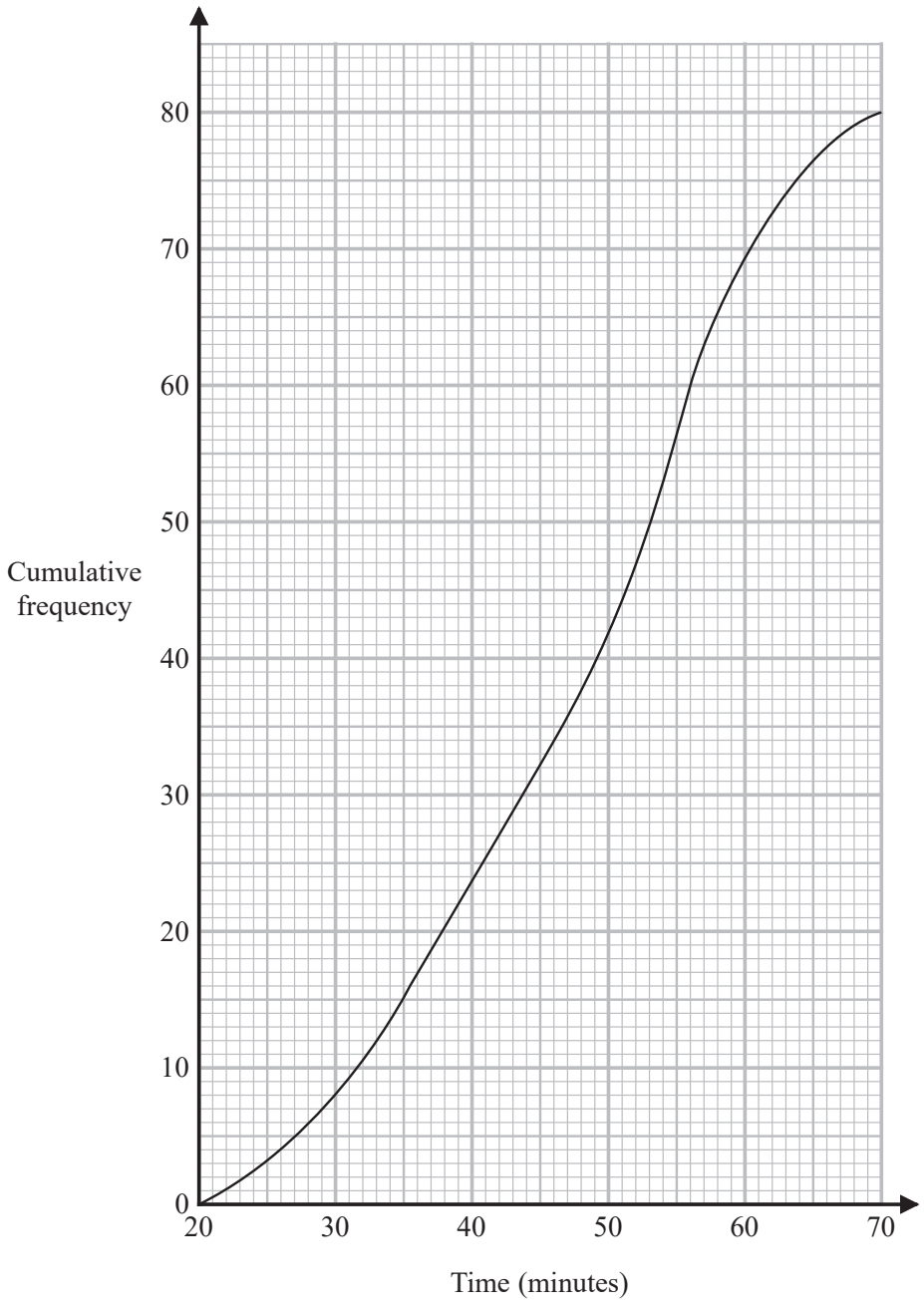
(b) Work out an estimate for the probability that this person is older than 55 years.

.....

(2)

(Total for Question 17 is 5 marks)

12 A total of 80 men and women took part in a race.
The cumulative frequency graph gives information about the times, in minutes, they took for the race.



(a) Use the graph to find an estimate for the interquartile range.

..... minutes
(2)

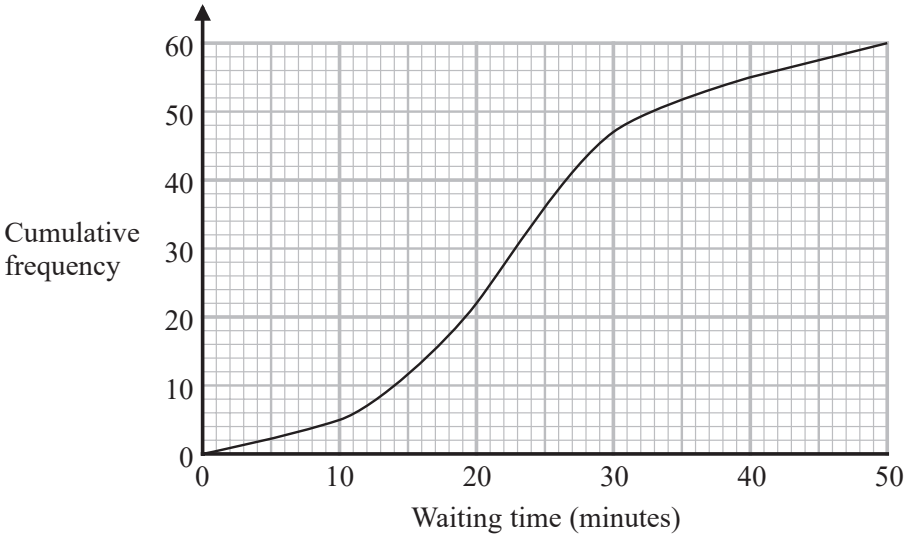
60% of the men took 50 minutes or less for the race.
No women took 50 minutes or less for the race.

(b) Work out an estimate for the number of men who took part in the race.

.....
(3)

(Total for Question 12 is 5 marks)

12 The cumulative frequency graph gives information about the waiting times, in minutes, of people with appointments at Hospital A.



(a) Use the graph to find an estimate of the median waiting time at Hospital A.

..... minutes

(1)

(b) Use the graph to find an estimate of the interquartile range of the waiting times at Hospital A.

..... minutes

(2)

At a different hospital, Hospital B, the median waiting time is 28 minutes and the interquartile range of the waiting times is 19 minutes.

(c) Compare the waiting times at Hospital A with the waiting times at Hospital B.

.....

.....

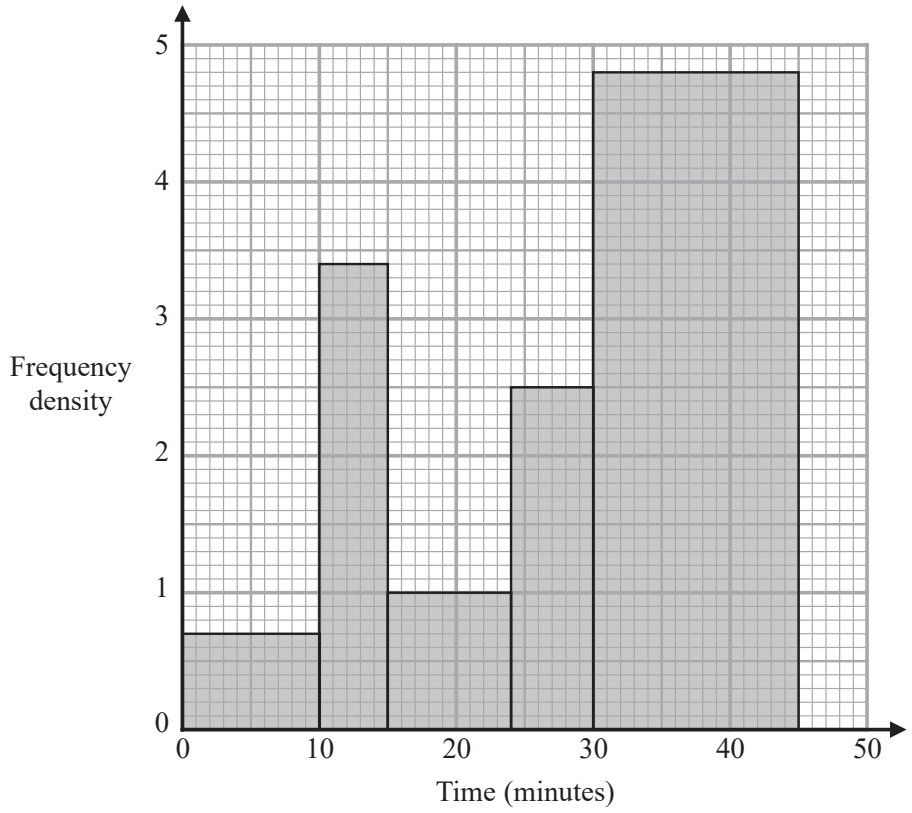
.....

.....

(2)

(Total for Question 12 is 5 marks)

18 The histogram gives information about the times, in minutes, that some customers spent in a supermarket.



(a) Work out an estimate for the proportion of these customers who spent between 17 minutes and 35 minutes in the supermarket.

.....

(3)

One of the customers is selected at random.

Given that this customer had spent more than 30 minutes in the supermarket,

(b) find the probability that this customer spent more than 36 minutes in the supermarket.

.....

(2)

(Total for Question 18 is 5 marks)

19 (a) Write down an equation of a line that is parallel to the line with equation $y = 7 - 4x$

.....

(1)

The line **L** passes through the points with coordinates (–3, 1) and (2, –2)

(b) Find an equation of the line that is perpendicular to **L** and passes through the point with coordinates (–6, 4)
Give your answer in the form $ax + by + c = 0$ where a, b and c are integers.

.....

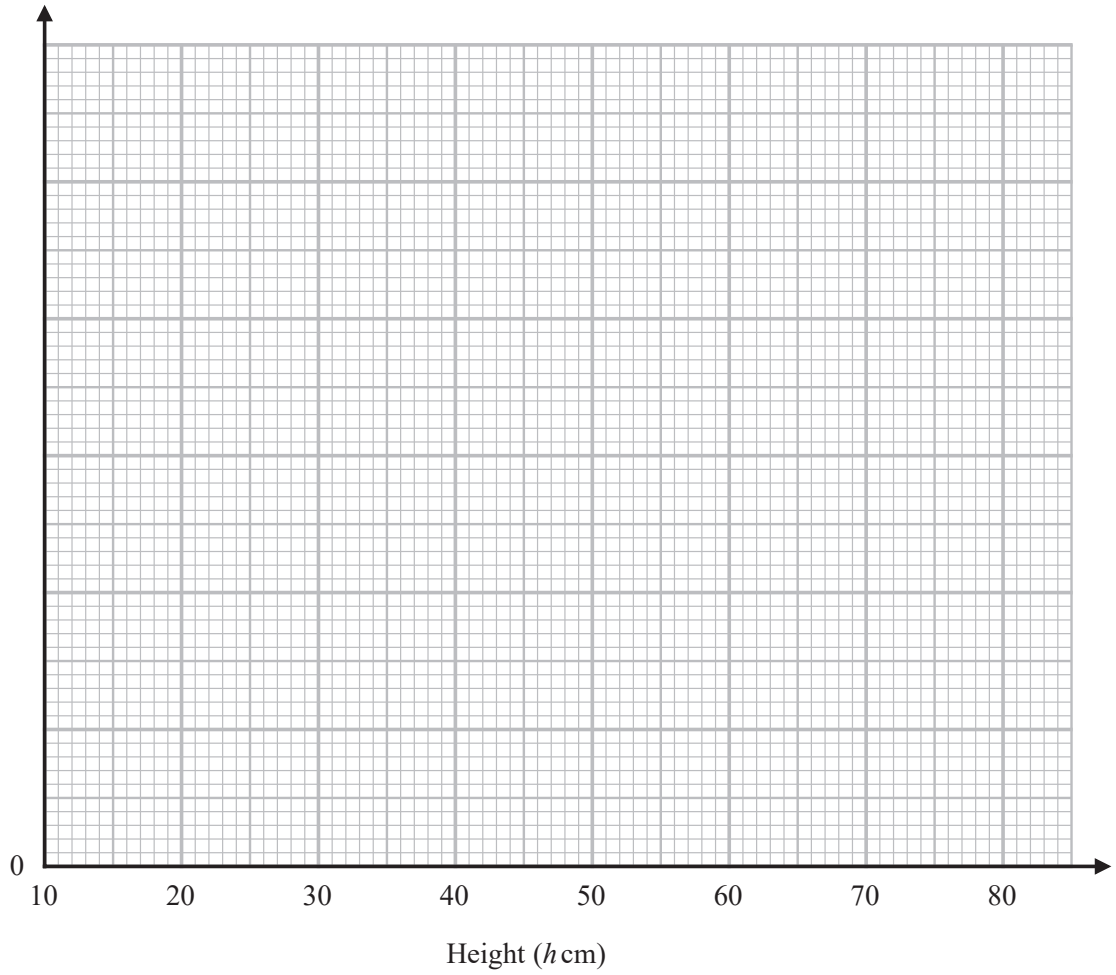
(4)

(Total for Question 19 is 5 marks)

18 The table gives information about the heights, in centimetres, of some plants.

Height (h cm)	Frequency
$10 < h \leqslant 20$	35
$20 < h \leqslant 35$	45
$35 < h \leqslant 50$	75
$50 < h \leqslant 70$	40
$70 < h \leqslant 80$	8

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



(3)

(b) Work out an estimate for the number of these plants with a height greater than 40 cm.

.....

(2)

(Total for Question 18 is 5 marks)

19 Without using a calculator, rationalise the denominator of $\frac{6}{3-\sqrt{7}}$

Simplify your answer.
You must show each stage of your working.

.....

(Total for Question 19 is 3 marks)

11 The frequency table gives information about the ages of the 80 people in a train carriage.

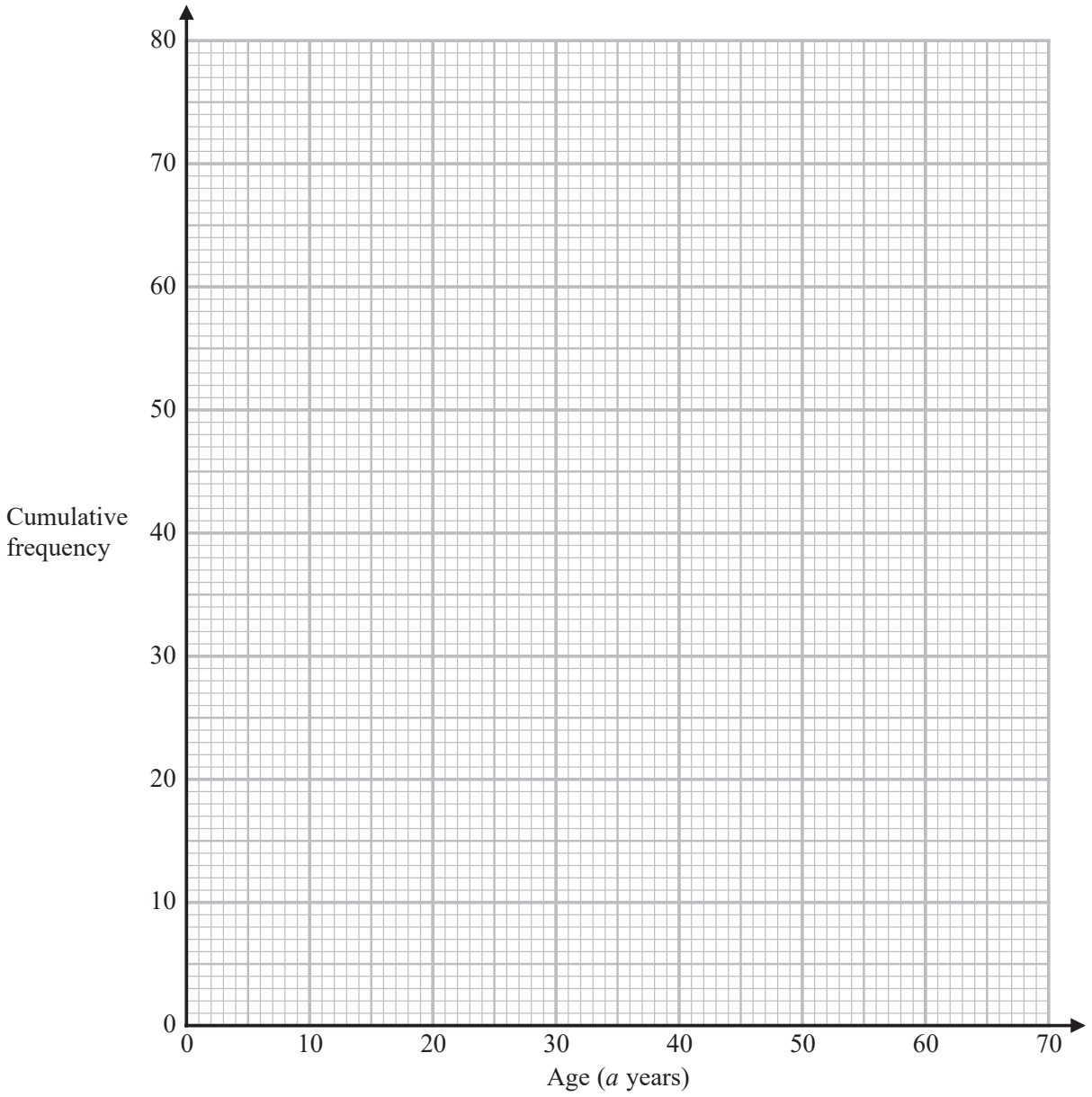
Age (a years)	Frequency
$0 < a \leqslant 20$	9
$20 < a \leqslant 30$	19
$30 < a \leqslant 40$	17
$40 < a \leqslant 50$	18
$50 < a \leqslant 60$	13
$60 < a \leqslant 70$	4

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	
$0 < a \leqslant 30$	
$0 < a \leqslant 40$	
$0 < a \leqslant 50$	
$0 < a \leqslant 60$	
$0 < a \leqslant 70$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

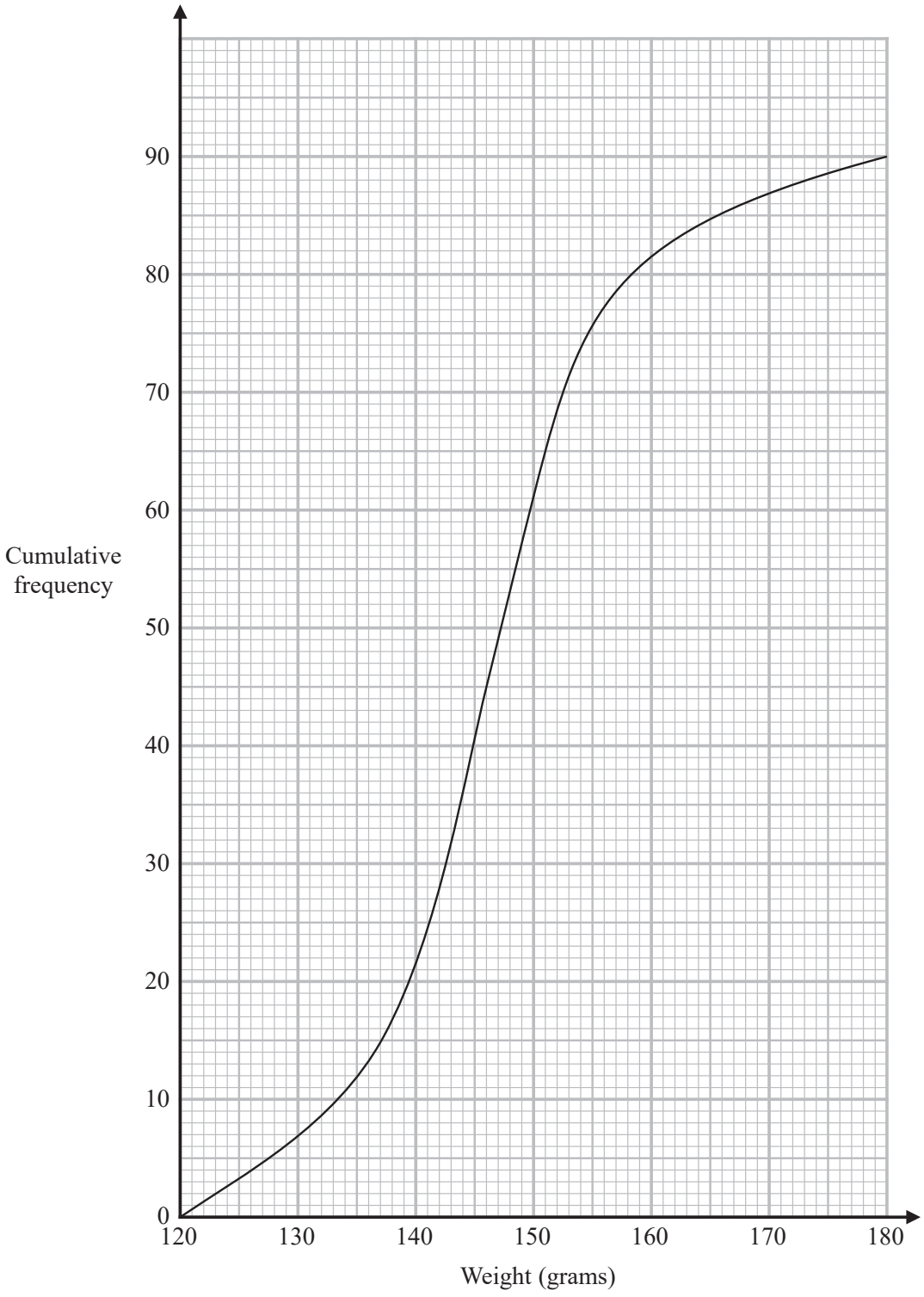
(c) Use your graph to find an estimate for the median age of the people in the train carriage.

..... years

(2)

(Total for Question 11 is 5 marks)

11 The cumulative frequency graph gives information about the weights, in grams, of 90 bags of sweets.



(a) Find an estimate for the median of the weights of these bags of sweets.

..... grams

(2)

Roberto sells the bags of sweets to raise money for charity.
Bags with a weight greater than d grams are labelled large bags and sold for 3.75 euros each bag.

The total amount of money he receives by selling all the large bags is 93.75 euros.

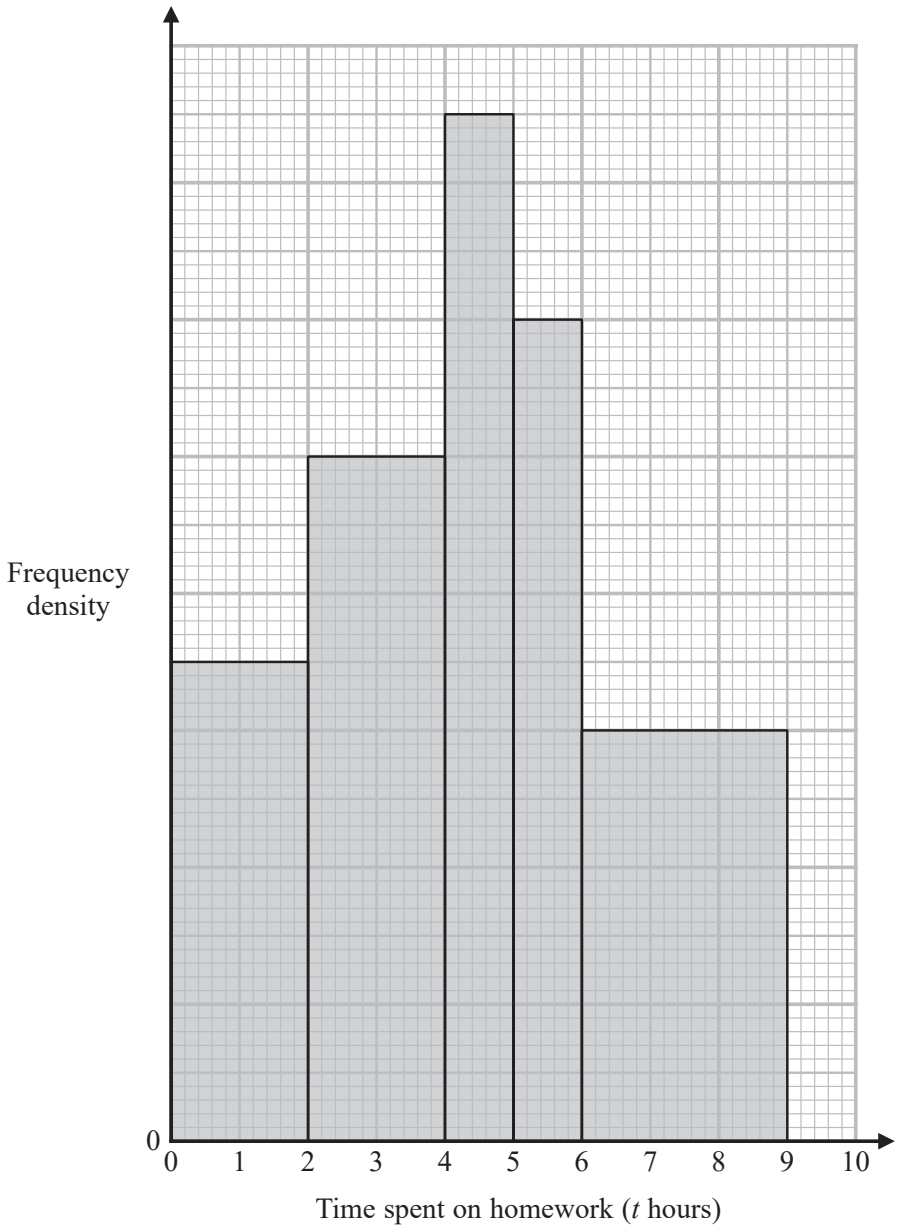
(b) Find the value of d.

d = ...

(3)

(Total for Question 11 is 5 marks)

18 The histogram and the table give some information about the amounts of time, in hours, that Year 11 students at Bergdesh Academy spent, in total, on their homework last week. No student in Year 11 spent longer than 9 hours on their homework.



Time spent on homework (t hours)	Frequency
$0 < t \leqslant 2$	28
$2 < t \leqslant 4$	
$4 < t \leqslant 5$	
$5 < t \leqslant 6$	
$6 < t \leqslant 9$	

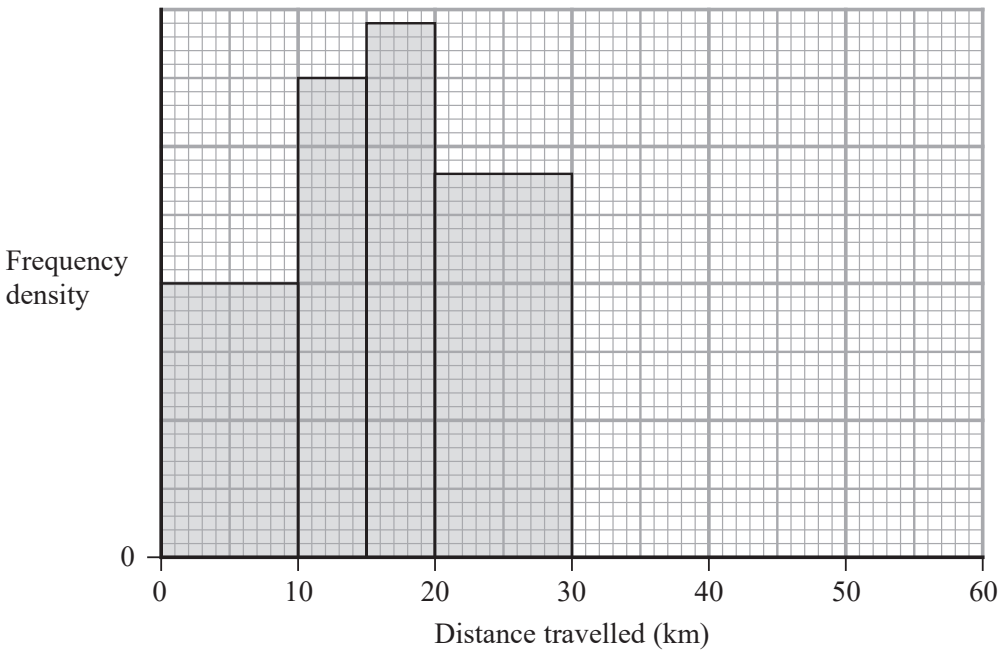
Using the information in the histogram and in the table, work out an estimate for the mean amount of time the Year 11 students spent on their homework last week.
Give your answer in hours correct to 3 significant figures.

..... hours

(Total for Question 18 is 5 marks)

18 The table and histogram give information about the distance travelled, in order to get to work, by each person working in a large store.

Distance (d km)	Frequency
$0 \leqslant d < 10$	40
$10 \leqslant d < 15$	
$15 \leqslant d < 20$	
$20 \leqslant d < 30$	
$30 \leqslant d < 60$	30



Using the information in the table and in the histogram,

(a) complete the table,

(2)

(b) complete the histogram.

(1)

One of the people working in the store is chosen at random.

(c) Work out an estimate for the probability that the distance travelled by this person, in order to get to work, was greater than 25 km.

.....

(2)

(Total for Question 18 is 5 marks)

11 The table gives information about the times taken by 90 runners to complete a 10 km race.

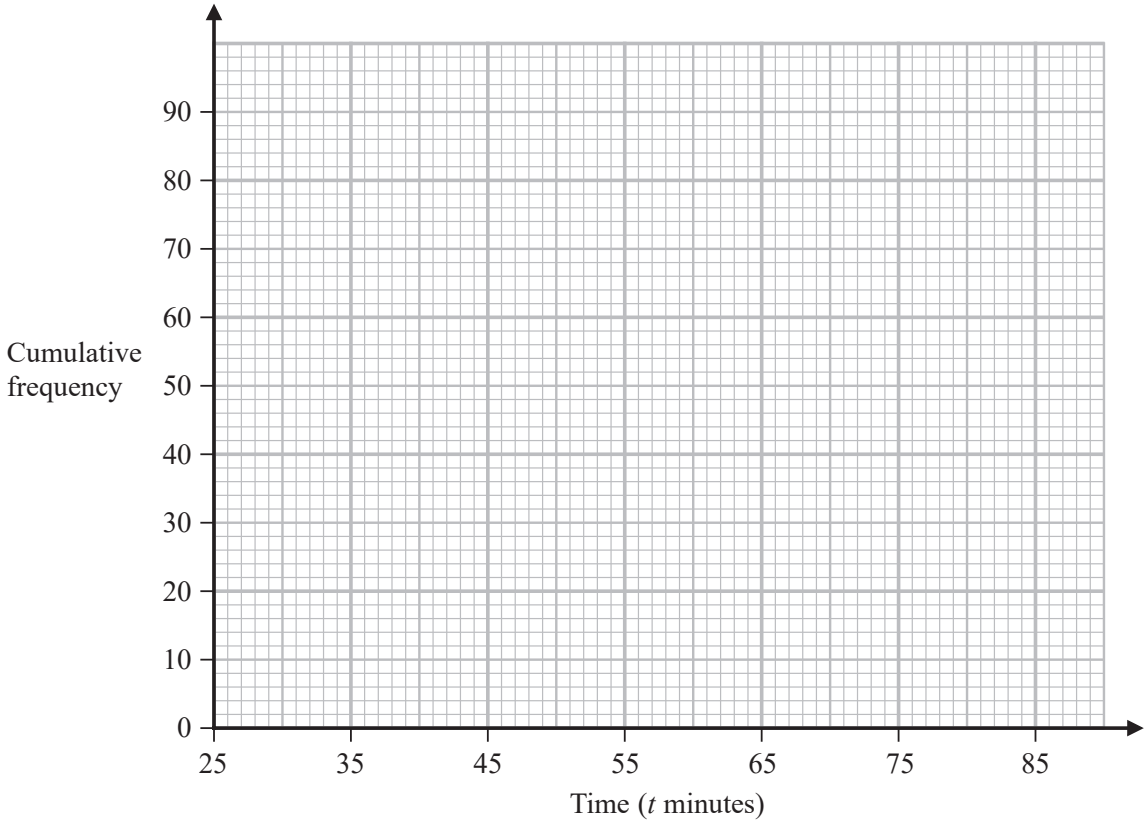
Time (t minutes)	Frequency
$25 < t \leqslant 35$	12
$35 < t \leqslant 45$	24
$45 < t \leqslant 55$	28
$55 < t \leqslant 65$	12
$65 < t \leqslant 75$	10
$75 < t \leqslant 85$	4

(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$25 < t \leqslant 35$	12
$25 < t \leqslant 45$	
$25 < t \leqslant 55$	
$25 < t \leqslant 65$	
$25 < t \leqslant 75$	
$25 < t \leqslant 85$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

Any runner who completed the race in a time T minutes such that $42 < T \leqslant 52$ minutes was awarded a silver medal.

(c) Use your graph to find an estimate for the number of runners who were awarded a silver medal.

..... runners

(2)

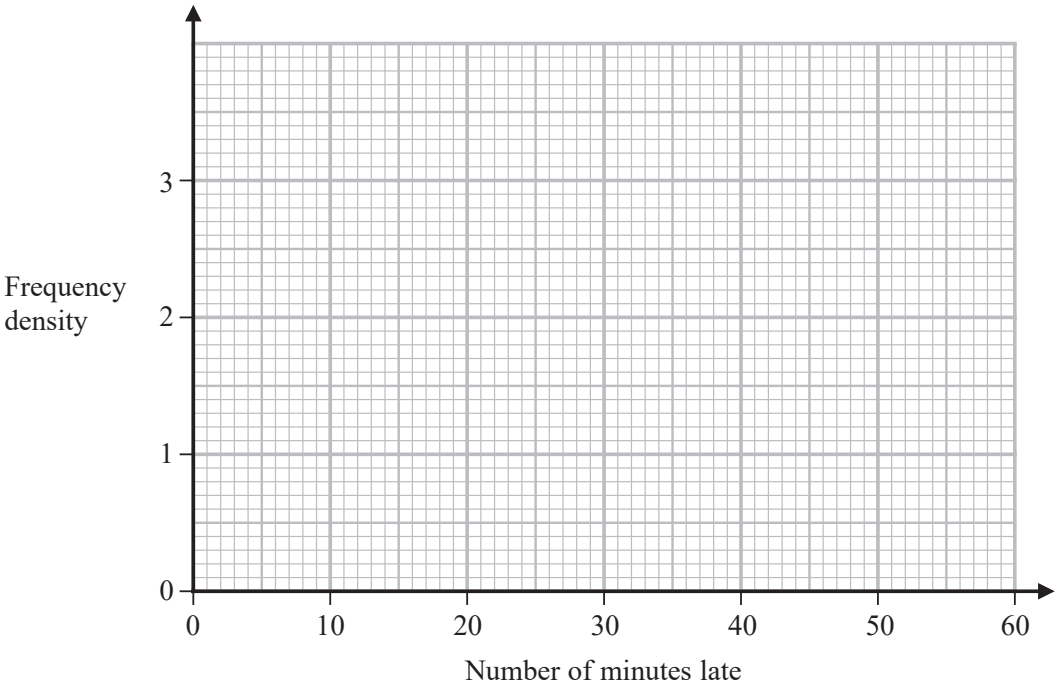
(Total for Question 11 is 5 marks)

14 Manuel collected information about the flights that arrived late at an airport last month.

The table gives information about the number of minutes that these flights were late.

Minutes late (L minutes)	Frequency
$0 < L \leqslant 10$	8
$10 < L \leqslant 15$	13
$15 < L \leqslant 25$	19
$25 < L \leqslant 40$	24
$40 < L \leqslant 60$	6

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



(3)

Manuel selected at random a flight that was late by 25 minutes or less from his results.

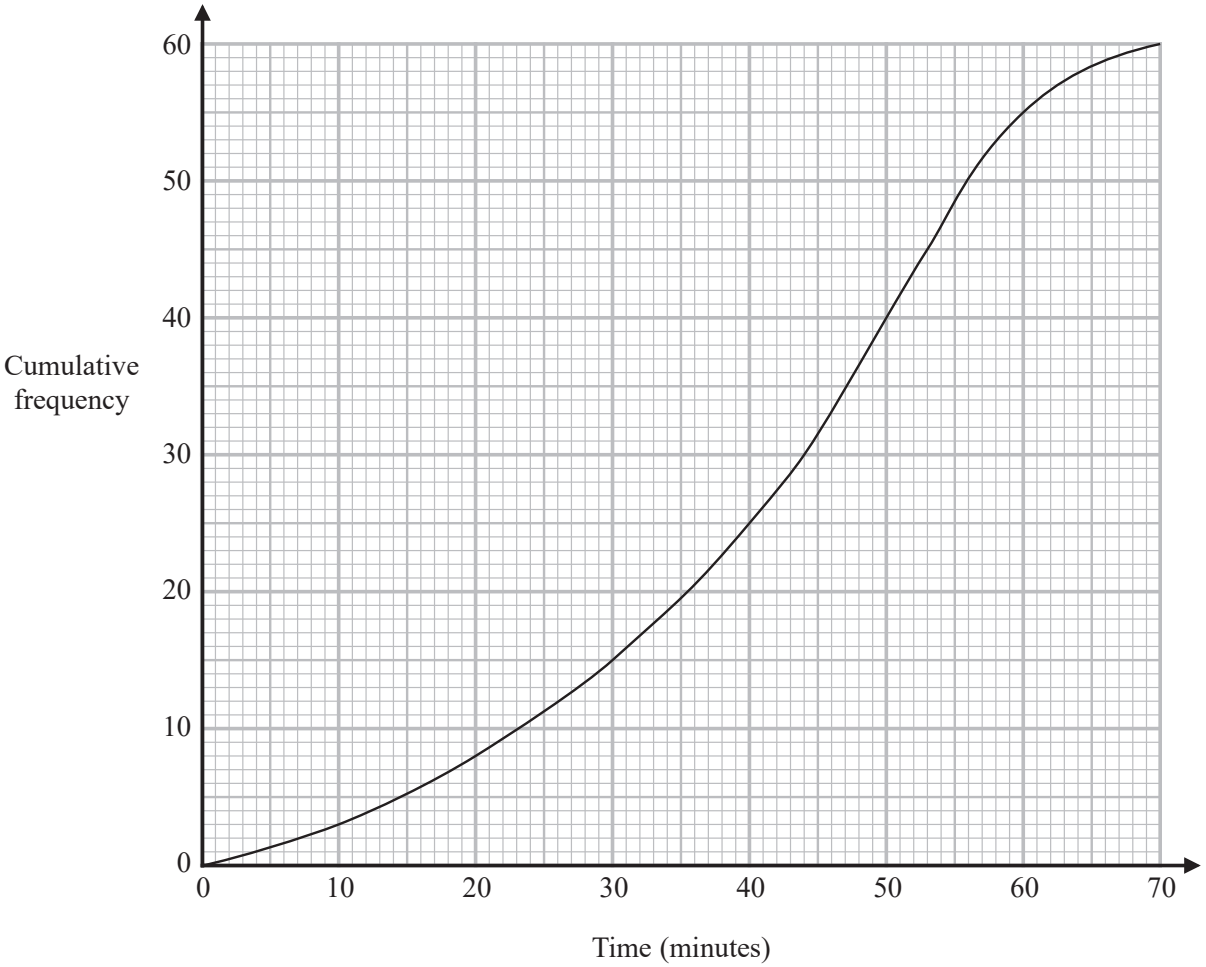
(b) Work out an estimate for the probability that this flight was late by 5 minutes or less.

.....

(2)

(Total for Question 14 is 5 marks)

12 The cumulative frequency graph gives information about the time, in minutes, each of 60 people took to shop in a market.



(a) Use the graph to find an estimate for the median time people took to shop in the market.

..... minutes

(1)

(b) Use the graph to find an estimate for the number of people who took longer than 55 minutes to shop in the market.

.....

(2)

(c) Use the graph to complete the frequency table to give information about the time, in minutes, each of the 60 people took to shop in the market.

Time taken to shop in the market (m minutes)	Frequency
$0 < m \leqslant 10$	3
$10 < m \leqslant 20$	5
$20 < m \leqslant 30$	
$30 < m \leqslant 40$	
$40 < m \leqslant 50$	
$50 < m \leqslant 60$	
$60 < m \leqslant 70$	

(2)

(Total for Question 12 is 5 marks)

13 Solve $\frac{x+3}{4} - \frac{7-x}{5} = 4.3$

Show clear algebraic working.

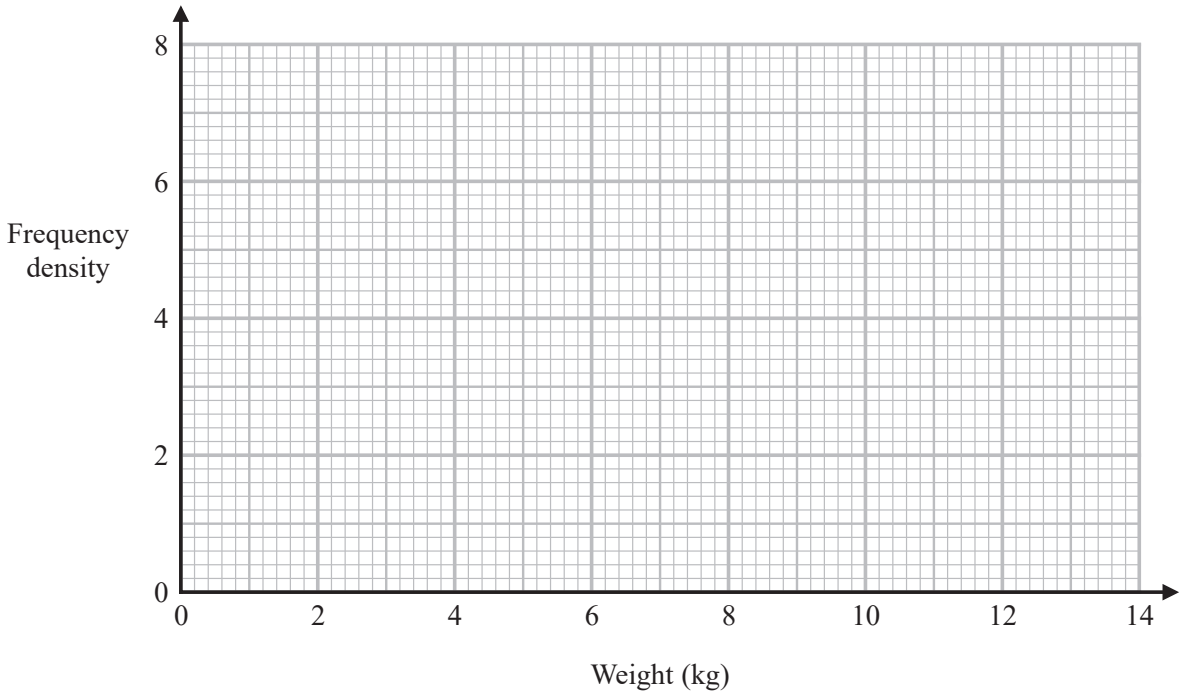
$x =$ .....

(Total for Question 13 is 3 marks)

18 The table gives information about the weights, in kg, of the parcels that Pedro delivers on Monday.

Weight (w kg)	Frequency
$0 < w \leqslant 2$	12
$2 < w \leqslant 3$	7
$3 < w \leqslant 6$	15
$6 < w \leqslant 9$	12
$9 < w \leqslant 14$	9

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



(3)

One of the parcels that Pedro delivered on Monday is chosen at random.

(b) Using the information in the table, find an estimate for the probability that this parcel weighs more than 7 kg.

.....

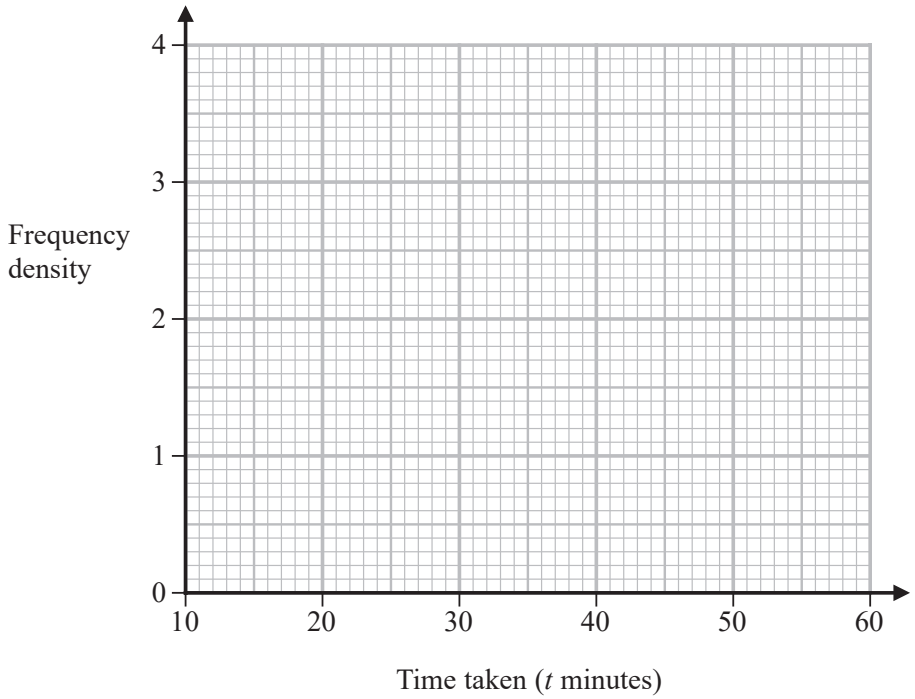
(2)

(Total for Question 18 is 5 marks)

17 The table gives information about the time taken by each student in Year 11 to complete a homework task.

Time taken (t minutes)	Frequency
$10 < t \leqslant 25$	15
$25 < t \leqslant 30$	18
$30 < t \leqslant 50$	32
$50 < t \leqslant 60$	4

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



(3)

One of these students who took 50 minutes or less and more than 25 minutes to complete this homework task is chosen at random.

(b) Find an estimate for the probability that this student took 45 minutes or less to complete this homework task.

.....

(2)

(Total for Question 17 is 5 marks)

13 The table gives information about the times taken, in minutes, for 80 taxi journeys.

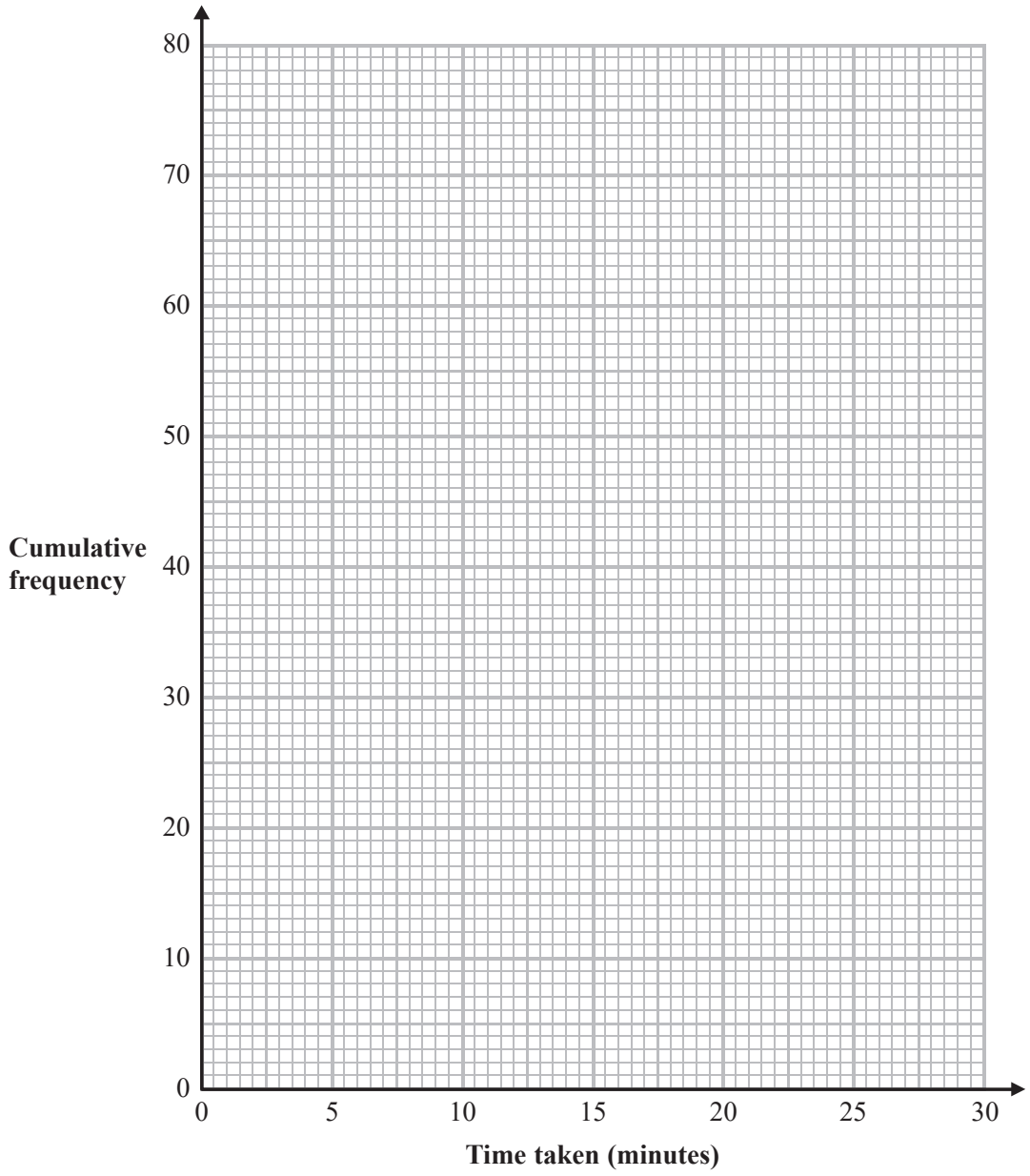
Time taken (t minutes)	Frequency
$0 < t \leqslant 5$	7
$5 < t \leqslant 10$	10
$10 < t \leqslant 15$	12
$15 < t \leqslant 20$	19
$20 < t \leqslant 25$	18
$25 < t \leqslant 30$	14

(a) Complete the cumulative frequency table.

Time taken (t minutes)	Cumulative frequency
$0 < t \leqslant 5$	
$0 < t \leqslant 10$	
$0 < t \leqslant 15$	
$0 < t \leqslant 20$	
$0 < t \leqslant 25$	
$0 < t \leqslant 30$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median.

.....minutes

(1)

(d) Use your graph to find an estimate for the interquartile range.

.....minutes

(2)

(Total for Question 13 is 6 marks)

11 The manager of a call centre asked the 120 people, who rang the call centre last week, how long they each waited before their call was answered.

The table gives information about their replies.

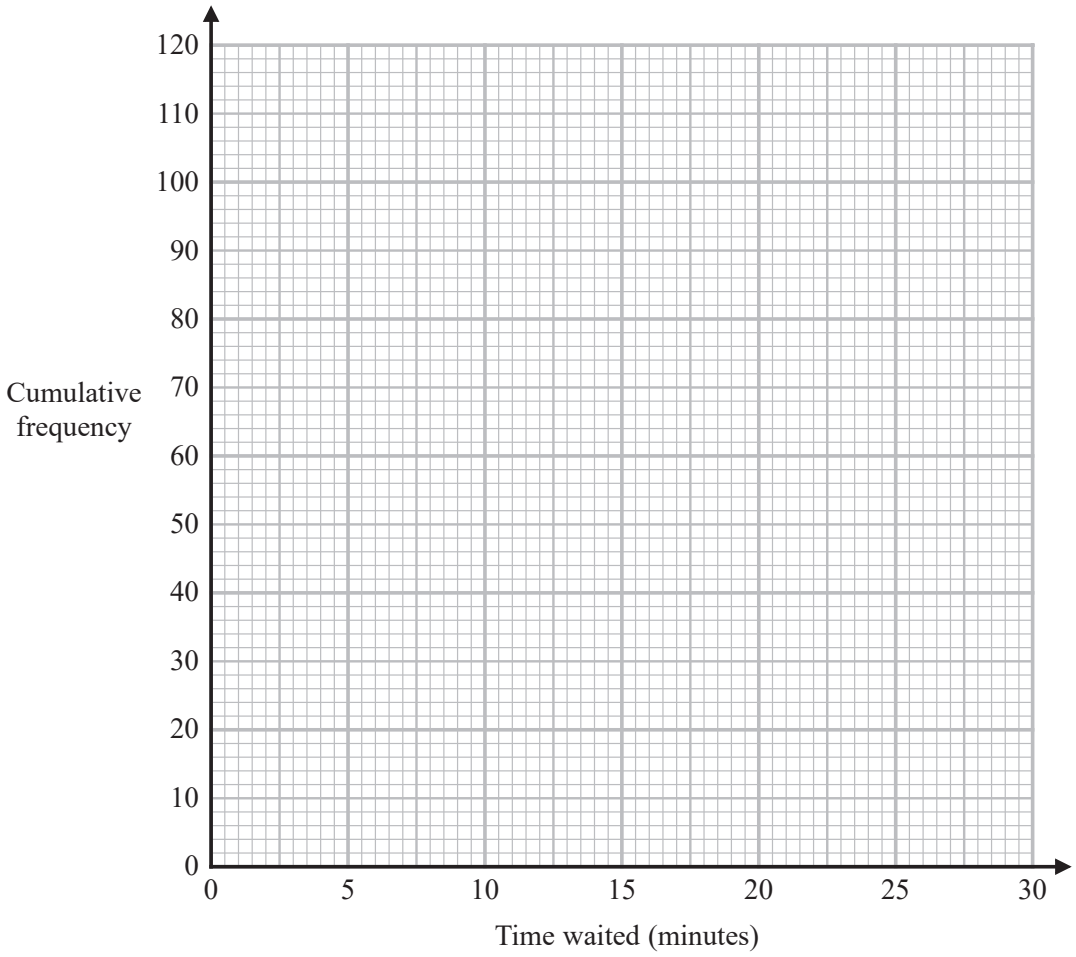
Time waited (t minutes)	Frequency
$0 < t \leqslant 5$	8
$5 < t \leqslant 10$	15
$10 < t \leqslant 15$	17
$15 < t \leqslant 20$	28
$20 < t \leqslant 25$	33
$25 < t \leqslant 30$	19

(a) Complete the cumulative frequency table.

Time waited (t minutes)	Cumulative frequency
$0 < t \leqslant 5$	
$0 < t \leqslant 10$	
$0 < t \leqslant 15$	
$0 < t \leqslant 20$	
$0 < t \leqslant 25$	
$0 < t \leqslant 30$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median of the times waited.

..... minutes

(1)

(d) Using your graph, find an estimate for the percentage of the 120 people who said that they waited longer than 23 minutes before their call was answered.
Show your working clearly.

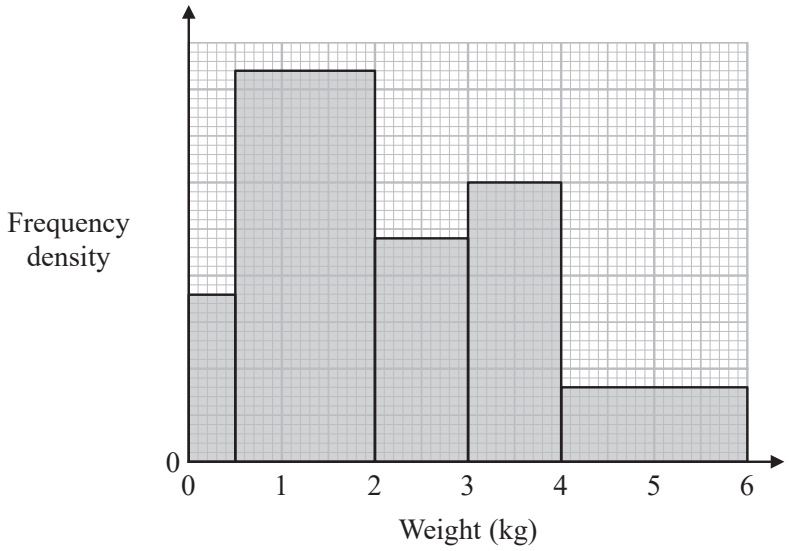
..... %

(2)

(Total for Question 11 is 6 marks)

15 A postman records the weight of each parcel that he delivers.

The histogram shows information about the weights of all the parcels that the postman delivered last Monday. No parcels weighed more than 6 kg.



63 of the parcels that the postman delivered last Monday each had a weight between 0.5 kg and 2 kg.

(a) Work out the total number of parcels the postman delivered last Monday.

.....

(3)

The postman picks at random two of the records of the parcels he delivered last Monday.

(b) Work out an estimate for the probability that each parcel weighed more than 2.25 kg.

.....

(3)

(Total for Question 15 is 6 marks)

12 The table gives information about the times, in minutes, taken by 80 customers to do their shopping in a supermarket.

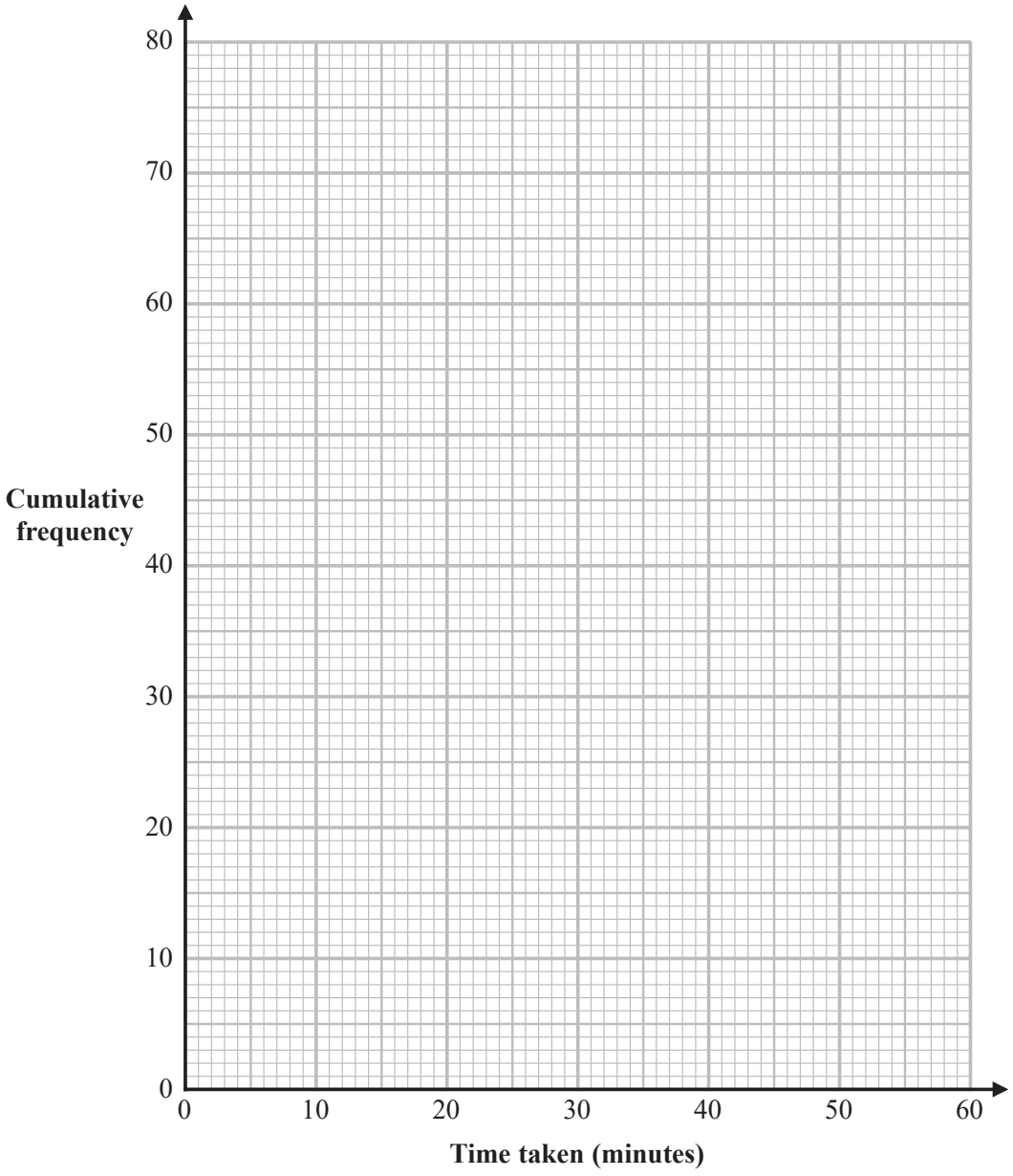
Time taken (t minutes)	Frequency
$0 < t \leqslant 10$	7
$10 < t \leqslant 20$	26
$20 < t \leqslant 30$	24
$30 < t \leqslant 40$	14
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	2

(a) Complete the cumulative frequency table.

Time taken (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	
$0 < t \leqslant 20$	
$0 < t \leqslant 30$	
$0 < t \leqslant 40$	
$0 < t \leqslant 50$	
$0 < t \leqslant 60$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median time taken.

..... minutes

(1)

One of the 80 customers is chosen at random.

(d) Use your graph to find an estimate for the probability that the time taken by this customer was more than 42 minutes.

.....

(2)

(Total for Question 12 is 6 marks)

11 The table shows information about the times, in minutes, that 80 patients had to wait to see a doctor.

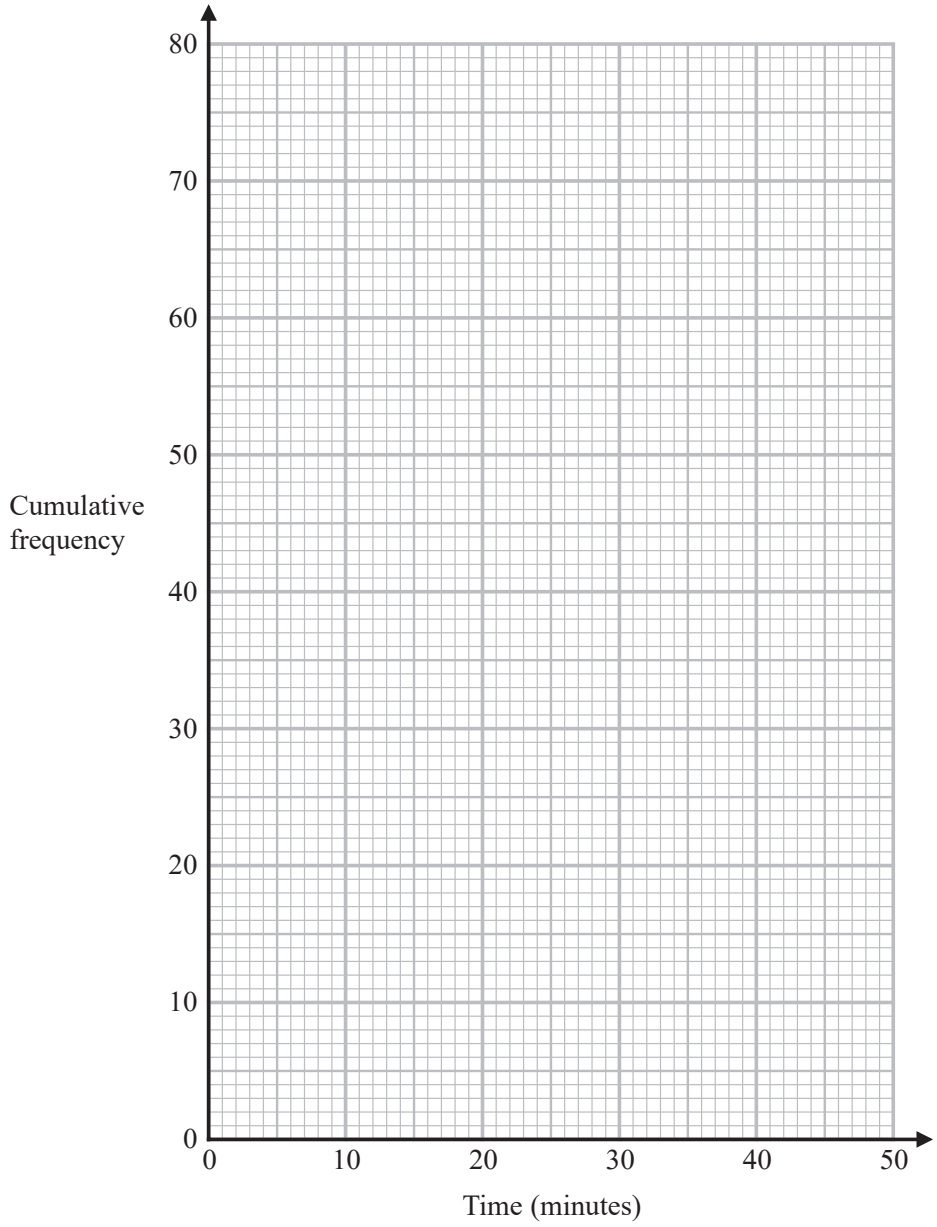
Time (W minutes)	Frequency
$0 < W \leqslant 10$	7
$10 < W \leqslant 20$	10
$20 < W \leqslant 30$	15
$30 < W \leqslant 40$	32
$40 < W \leqslant 50$	16

(a) Complete the cumulative frequency table below.

Time (W minutes)	Cumulative frequency
$0 < W \leqslant 10$	
$0 < W \leqslant 20$	
$0 < W \leqslant 30$	
$0 < W \leqslant 40$	
$0 < W \leqslant 50$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median.

..... minutes

(1)

(d) Use your graph to find an estimate for the interquartile range.

..... minutes

(2)

(Total for Question 11 is 6 marks)

14 The table gives information about the times taken by 80 people to run a race.

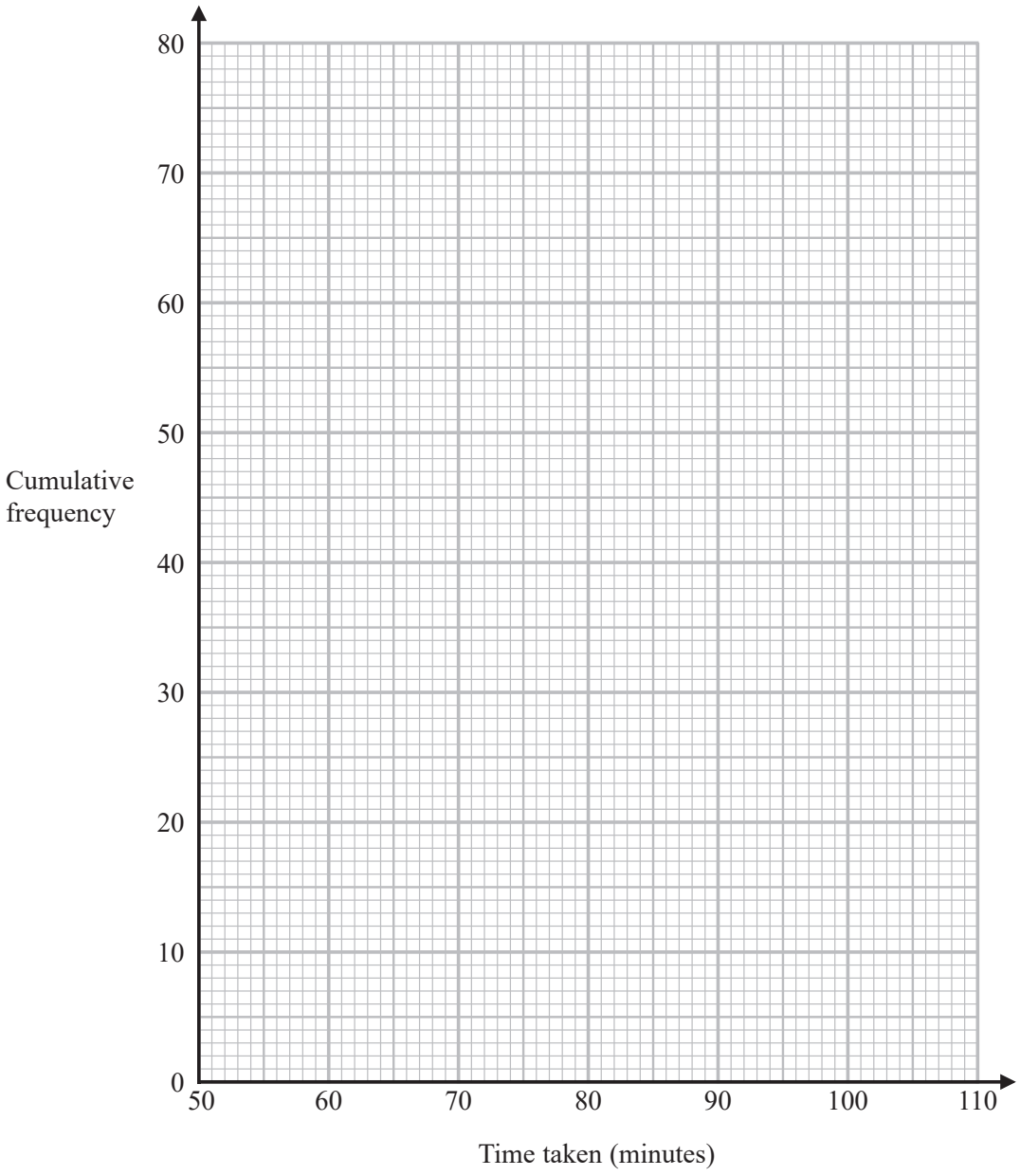
Time taken (t minutes)	Frequency
$50 < t \leqslant 60$	15
$60 < t \leqslant 70$	16
$70 < t \leqslant 80$	21
$80 < t \leqslant 90$	14
$90 < t \leqslant 100$	8
$100 < t \leqslant 110$	6

(a) Complete the cumulative frequency table.

Time taken (t minutes)	Cumulative frequency
$50 < t \leqslant 60$	
$50 < t \leqslant 70$	
$50 < t \leqslant 80$	
$50 < t \leqslant 90$	
$50 < t \leqslant 100$	
$50 < t \leqslant 110$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median time taken.

..... minutes

(1)

(d) Use your graph to find an estimate for the interquartile range of the times taken.

..... minutes

(2)

(Total for Question 14 is 6 marks)

13 The frequency table gives information about the weights, in kilograms, of 60 parcels in a delivery van.

Weight (w kilograms)	Frequency
$0 < w \leqslant 1$	4
$1 < w \leqslant 2$	15
$2 < w \leqslant 3$	20
$3 < w \leqslant 4$	11
$4 < w \leqslant 5$	6
$5 < w \leqslant 6$	4

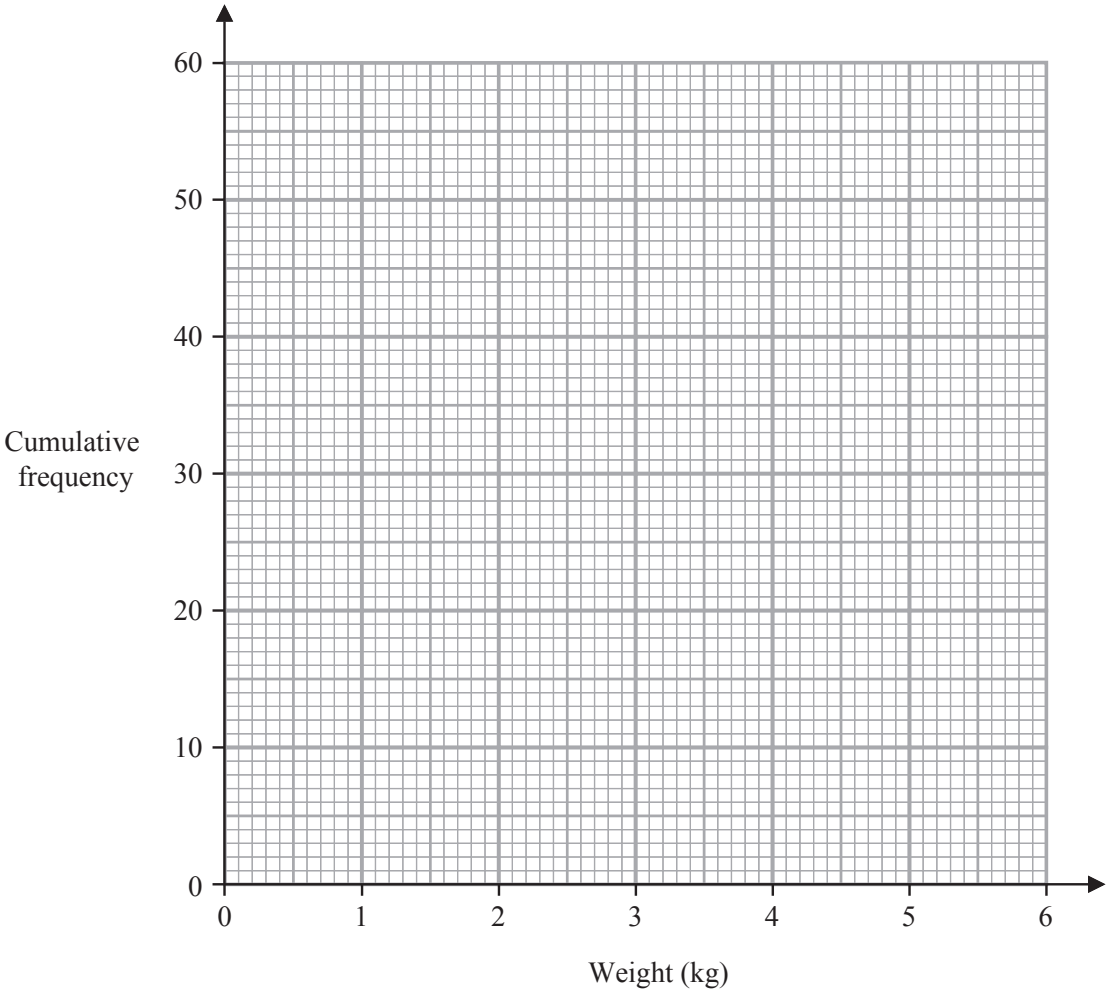
(a) Complete the cumulative frequency table.

Weight (w kilograms)	Cumulative frequency
$0 < w \leqslant 1$	
$0 < w \leqslant 2$	
$0 < w \leqslant 3$	
$0 < w \leqslant 4$	
$0 < w \leqslant 5$	
$0 < w \leqslant 6$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)



(c) Use your graph to find an estimate for the median weight of the 60 parcels.

..... kilograms

(1)

(d) Use your graph to find an estimate for the number of these parcels that weigh more than 3.7 kilograms.

.....

(2)

(Total for Question 13 is 6 marks)

12 The table gives information about the ages of 80 people in a cinema.

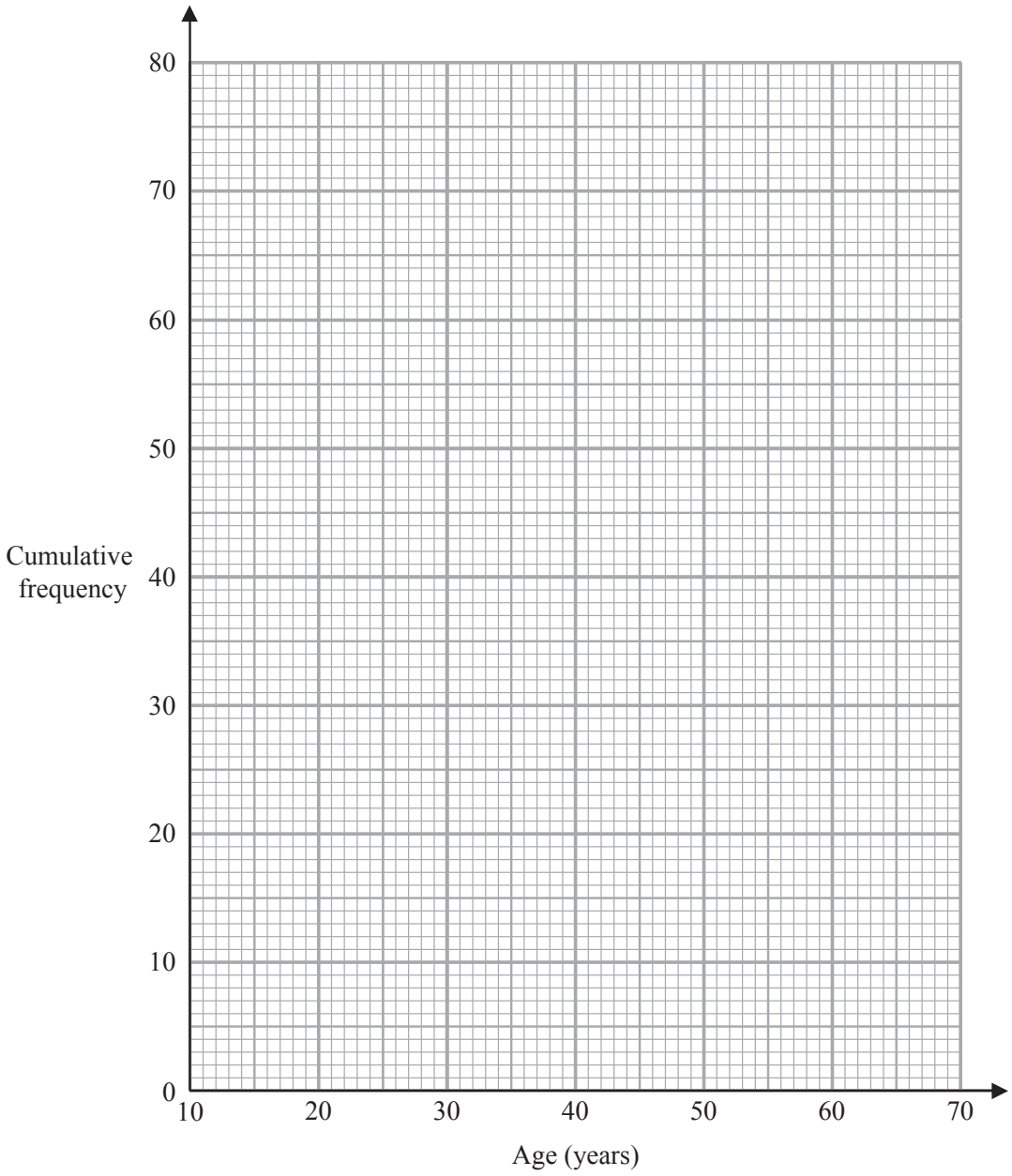
Age (n years)	Frequency
$10 < n \leqslant 20$	12
$20 < n \leqslant 30$	15
$30 < n \leqslant 40$	20
$40 < n \leqslant 50$	18
$50 < n \leqslant 60$	9
$60 < n \leqslant 70$	6

(a) Complete the cumulative frequency table.

Age (n years)	Cumulative frequency
$10 < n \leqslant 20$	
$10 < n \leqslant 30$	
$10 < n \leqslant 40$	
$10 < n \leqslant 50$	
$10 < n \leqslant 60$	
$10 < n \leqslant 70$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the percentage of the 80 people who are more than 46 years of age.
Give your answer correct to the nearest whole number.

.....%

(3)

(Total for Question 12 is 6 marks)

13 The frequency table gives information about the times, in minutes, that 60 people took to complete a puzzle.

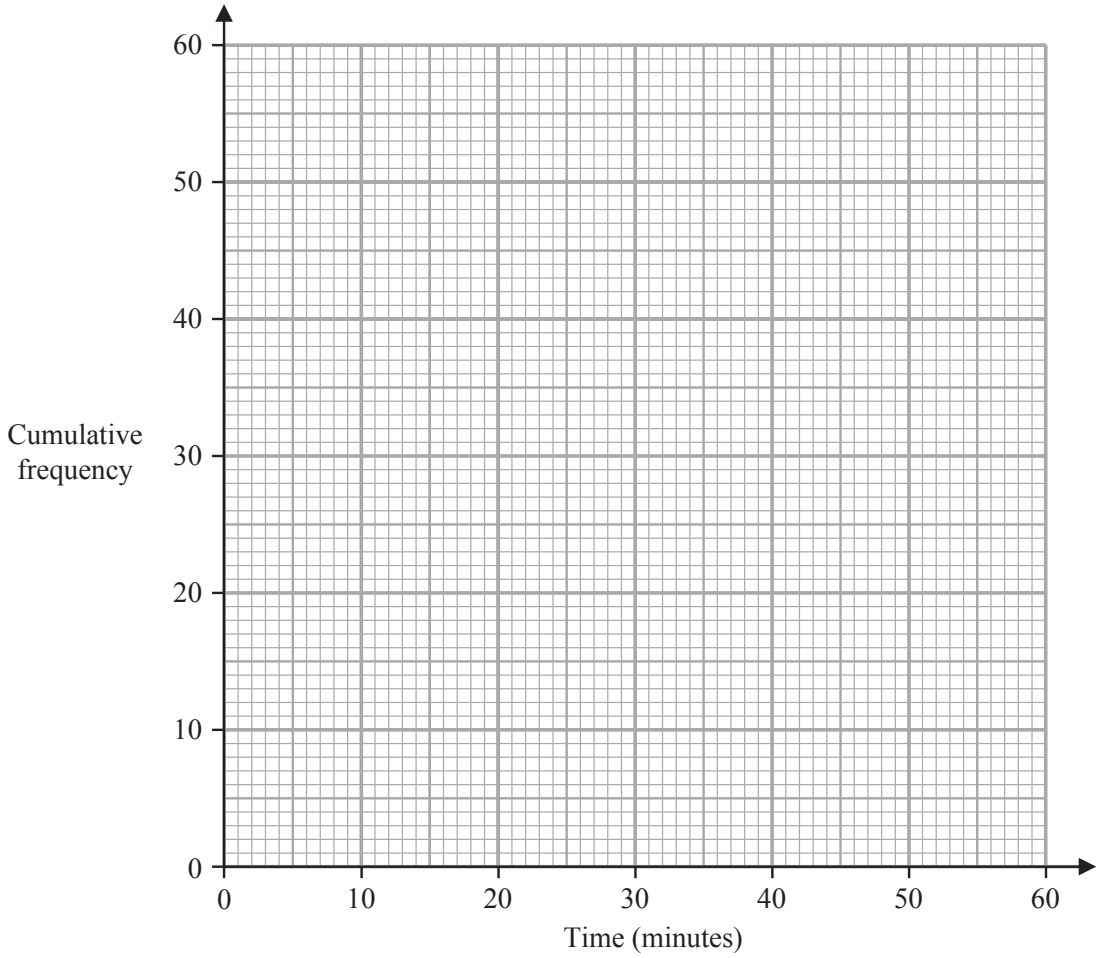
Time (t minutes)	Frequency
$0 < t \leqslant 10$	8
$10 < t \leqslant 20$	13
$20 < t \leqslant 30$	12
$30 < t \leqslant 40$	17
$40 < t \leqslant 50$	7
$50 < t \leqslant 60$	3

(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	
$0 < t \leqslant 20$	
$0 < t \leqslant 30$	
$0 < t \leqslant 40$	
$0 < t \leqslant 50$	
$0 < t \leqslant 60$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median time.

..... minutes

(1)

(d) Use your graph to find an estimate for the number of these people who took more than 45 minutes to complete the puzzle.

.....

(2)

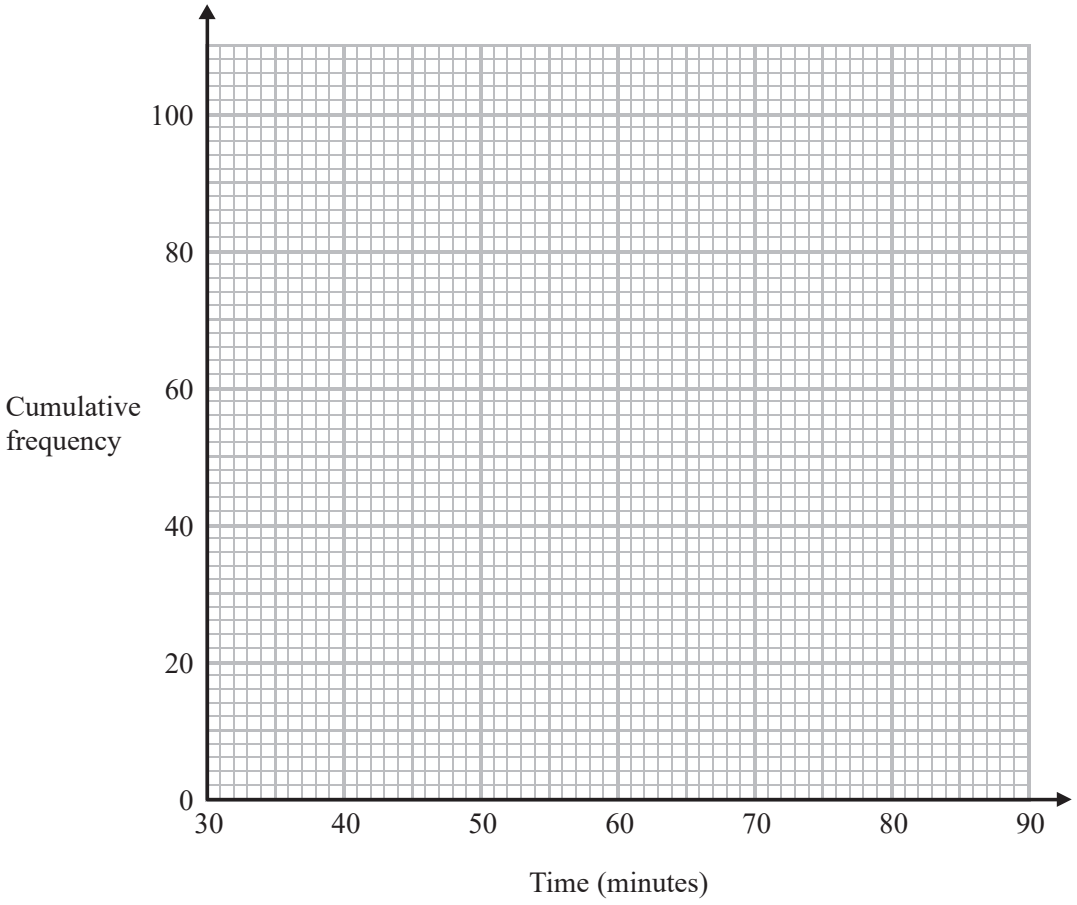
(Total for Question 13 is 6 marks)

13 Sandeep recorded the length of time, in minutes, that each of 100 adults went for a walk one Saturday afternoon.

The cumulative frequency table gives information about these times.

Time (t minutes)	Cumulative frequency
$30 < t \leqslant 40$	6
$30 < t \leqslant 50$	20
$30 < t \leqslant 60$	56
$30 < t \leqslant 70$	84
$30 < t \leqslant 80$	95
$30 < t \leqslant 90$	100

(a) On the grid, draw a cumulative frequency graph for the information in the table.



(2)

(b) Use your graph to find an estimate for the median length of time that these adults went for a walk.

..... minutes

(2)

One of the 100 adults is chosen at random.

(c) Use your graph to find an estimate for the probability that this adult went for a walk for more than 72 minutes.

.....

(3)

(Total for Question 13 is 7 marks)

10 The table shows information about the number of minutes each of 120 buses was late last Monday.

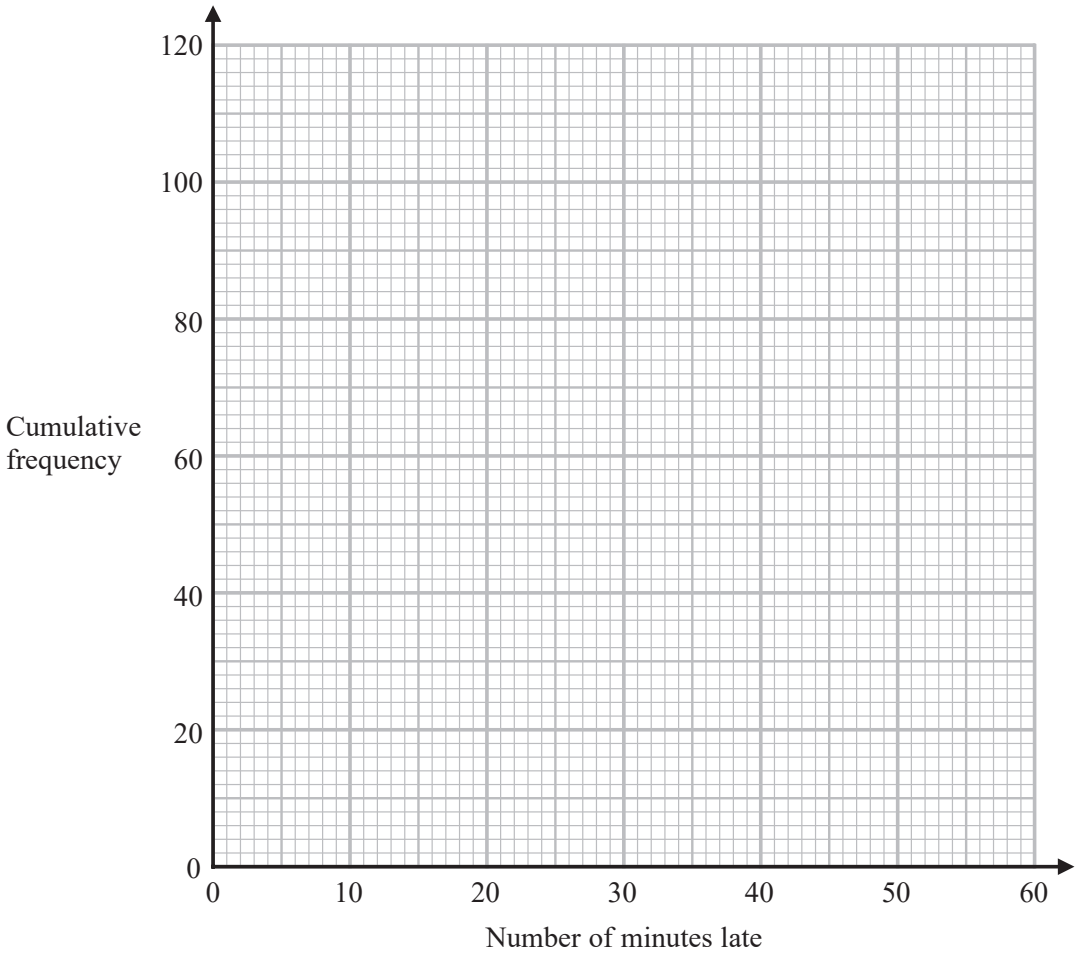
Number of minutes late (L)	Frequency
$0 < L \leqslant 10$	10
$10 < L \leqslant 20$	16
$20 < L \leqslant 30$	44
$30 < L \leqslant 40$	29
$40 < L \leqslant 50$	15
$50 < L \leqslant 60$	6

(a) Complete the cumulative frequency table below.

Number of minutes late (L)	Cumulative frequency
$0 < L \leqslant 10$	
$0 < L \leqslant 20$	
$0 < L \leqslant 30$	
$0 < L \leqslant 40$	
$0 < L \leqslant 50$	
$0 < L \leqslant 60$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the interquartile range.

.....minutes

(2)

(d) Use your graph to find an estimate for the number of buses that were more than 48 minutes late last Monday.

.....

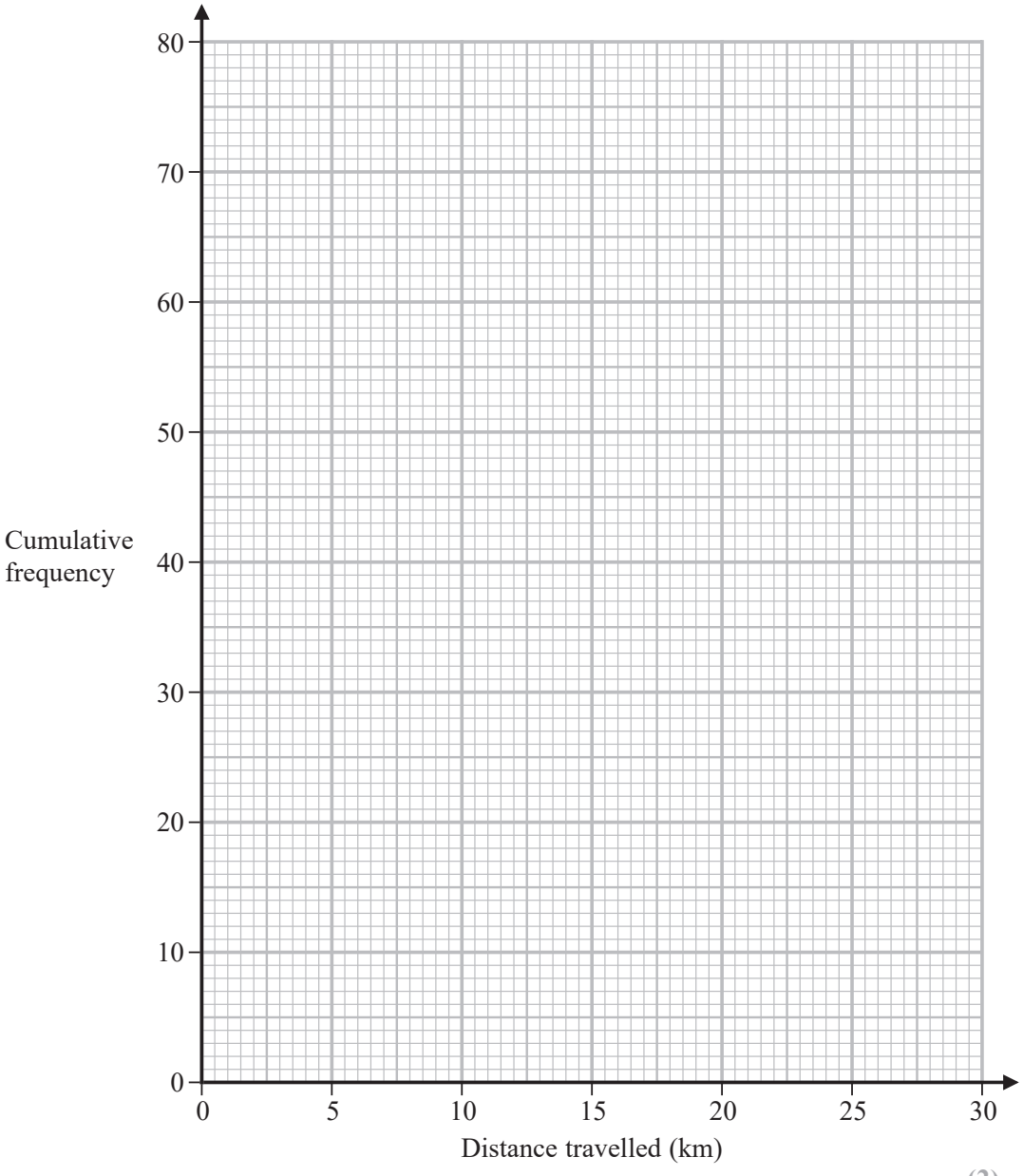
(2)

(Total for Question 10 is 7 marks)

12 The cumulative frequency table gives information about the distance, in kilometres, that each of 80 workers travel from home to work at Office *A*.

Distance travelled (d km)	Cumulative frequency
$0 < d \leqslant 5$	17
$0 < d \leqslant 10$	32
$0 < d \leqslant 15$	57
$0 < d \leqslant 20$	70
$0 < d \leqslant 25$	76
$0 < d \leqslant 30$	80

(a) On the grid below, draw a cumulative frequency graph for the information in the table.



(2)

(b) Use your graph to find an estimate for the median distance travelled.

..... km

(1)

(c) Use your graph to find an estimate for the interquartile range of the distances travelled.

..... km

(2)

For Office *B*, the median distance workers travel from home to work is 15 km and the interquartile range is 5 km.

(d) Use the information above to compare the distances that workers at Office *A* and workers at Office *B* travel from home to work.
Write down **two** comparisons.

1 .....

.....

.....

2 .....

.....

.....

(2)

(Total for Question 12 is 7 marks)

13 The table gives information about the ages, in years, of 80 people in a train carriage.

Age (a years)	Frequency
$0 < a \leqslant 20$	7
$20 < a \leqslant 30$	25
$30 < a \leqslant 40$	20
$40 < a \leqslant 50$	14
$50 < a \leqslant 60$	8
$60 < a \leqslant 70$	6

(a) Complete the cumulative frequency table.

Age (a years)	Cumulative frequency
$0 < a \leqslant 20$	
$0 < a \leqslant 30$	
$0 < a \leqslant 40$	
$0 < a \leqslant 50$	
$0 < a \leqslant 60$	
$0 < a \leqslant 70$	

(1)

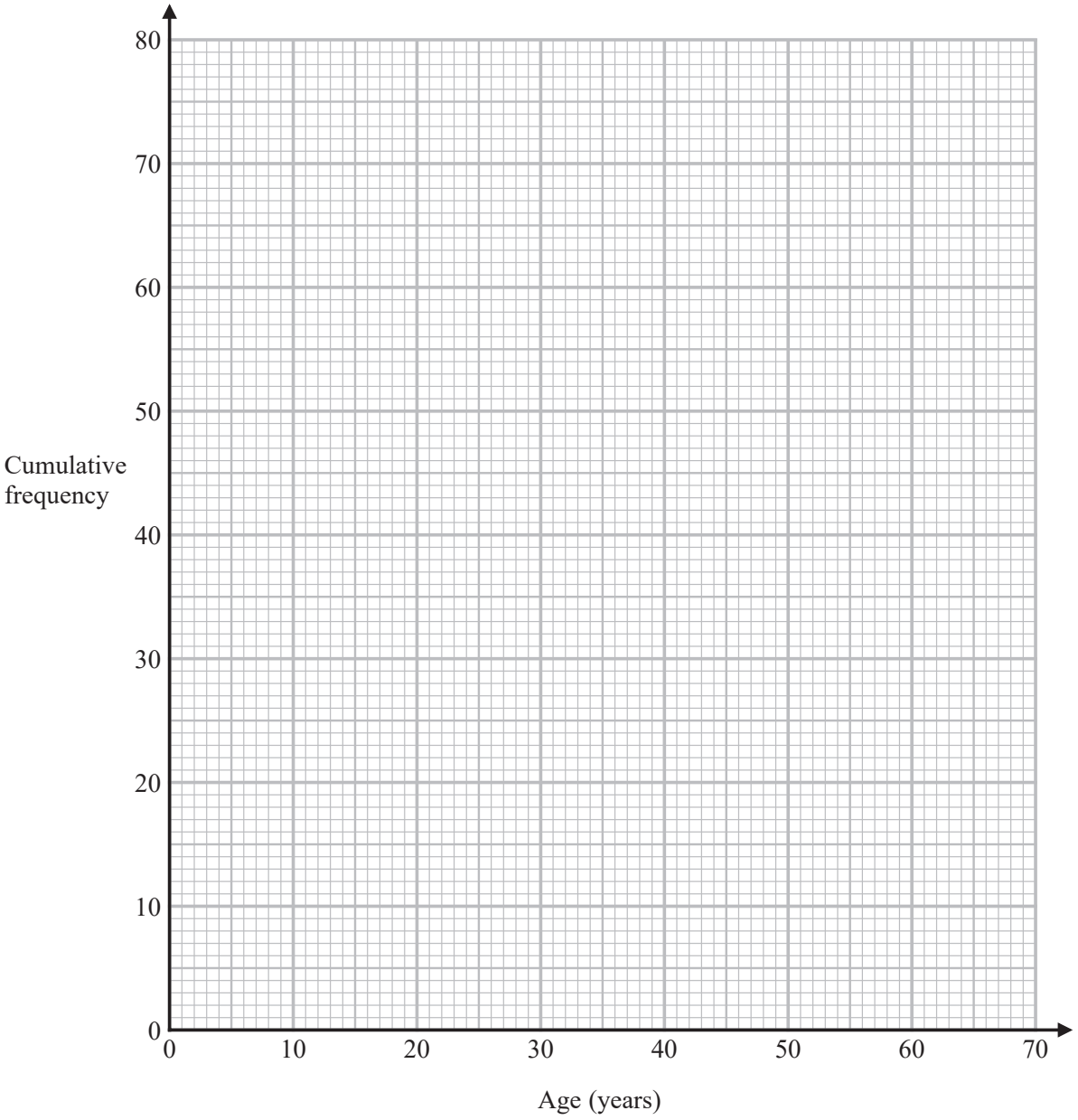
(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for the median age of the 80 people.

..... years

(1)



Of the people in the train carriage, 60% of those who are aged between 18 and 65 are going to work. None of the other people in the train carriage are going to work.

(d) Use your graph to find an estimate for the number of people in the train carriage who are going to work.

.....

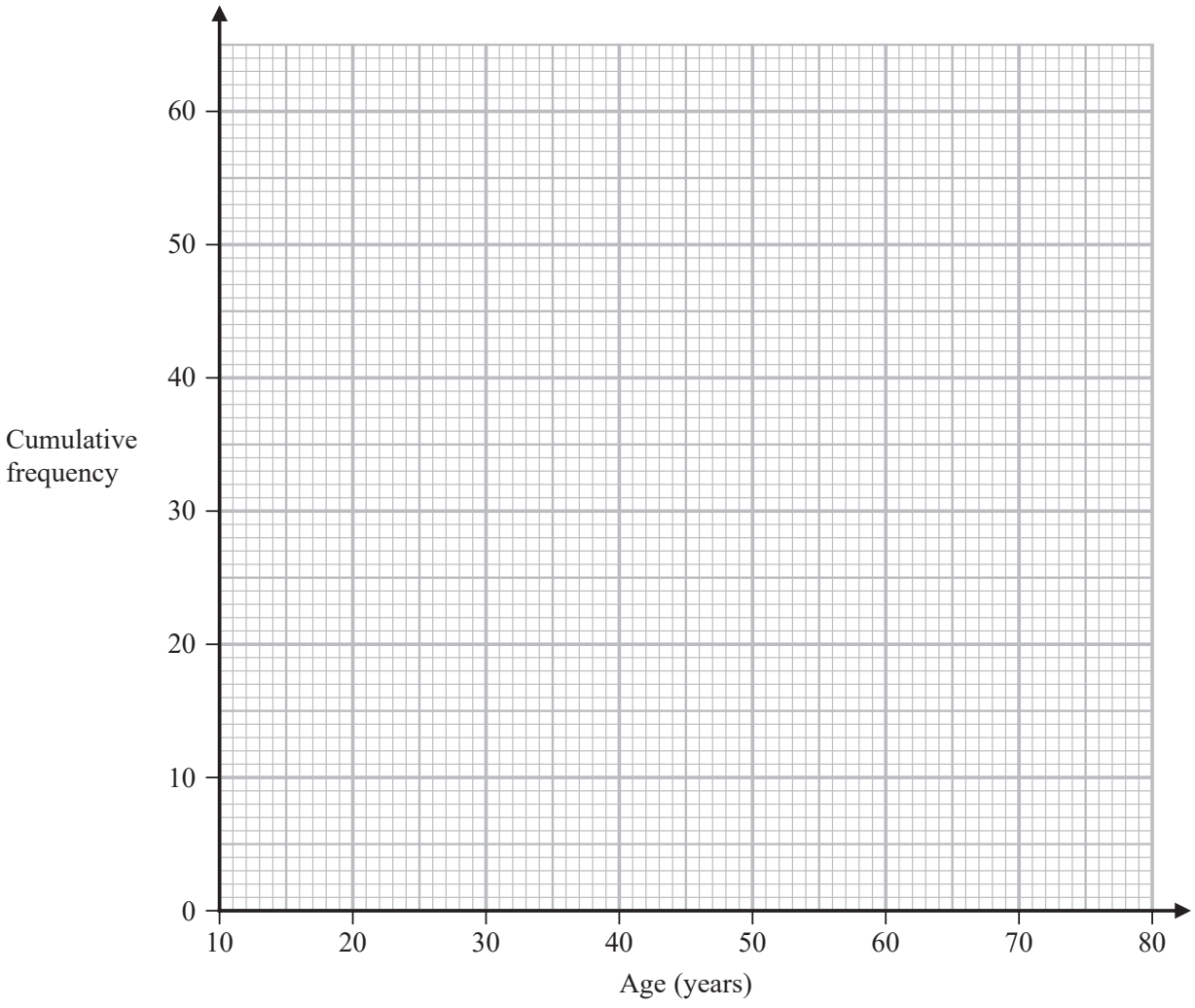
(3)

(Total for Question 13 is 7 marks)

11 The cumulative frequency table shows information about the ages of 60 people who went to a gym on Saturday.

Age (a years)	Cumulative frequency
$10 < a \leqslant 20$	13
$10 < a \leqslant 30$	36
$10 < a \leqslant 40$	42
$10 < a \leqslant 50$	47
$10 < a \leqslant 60$	52
$10 < a \leqslant 70$	56
$10 < a \leqslant 80$	60

(a) On the grid, draw a cumulative frequency graph for the information in the table.



(2)

Question 11 continued

(b) Use your graph to find an estimate for the median of the ages of these people.

..... years

(1)

(c) Use your graph to find an estimate for the interquartile range of the ages of these people.

..... years

(2)

(d) Use your graph to find an estimate for the number of these people who are older than 55 years.

.....

(2)

(Total for Question 11 is 7 marks)

13 The table gives information about the distances, in km, that 70 teachers travel to school.

Distance (d km)	Frequency
$0 < d \leqslant 10$	7
$10 < d \leqslant 20$	17
$20 < d \leqslant 30$	18
$30 < d \leqslant 40$	14
$40 < d \leqslant 50$	10
$50 < d \leqslant 60$	4

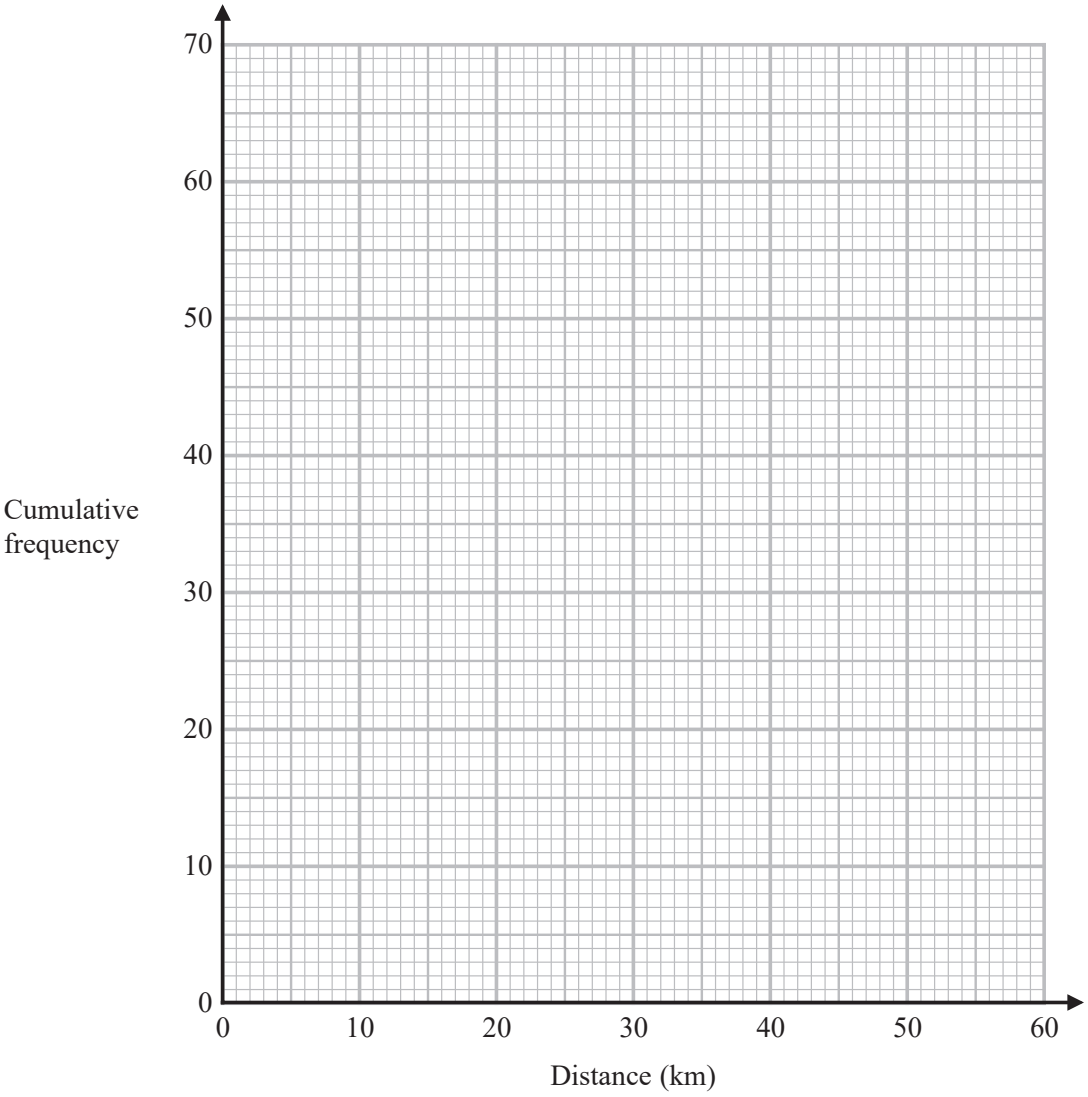
(a) Complete the cumulative frequency table.

Distance (d km)	Cumulative frequency
$0 < d \leqslant 10$	
$0 < d \leqslant 20$	
$0 < d \leqslant 30$	
$0 < d \leqslant 40$	
$0 < d \leqslant 50$	
$0 < d \leqslant 60$	

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)



(c) Use your graph to find an estimate for the interquartile range of the distances.

..... km

(2)

(d) Use your graph to find an estimate for the number of teachers who travel more than 46 km.

.....

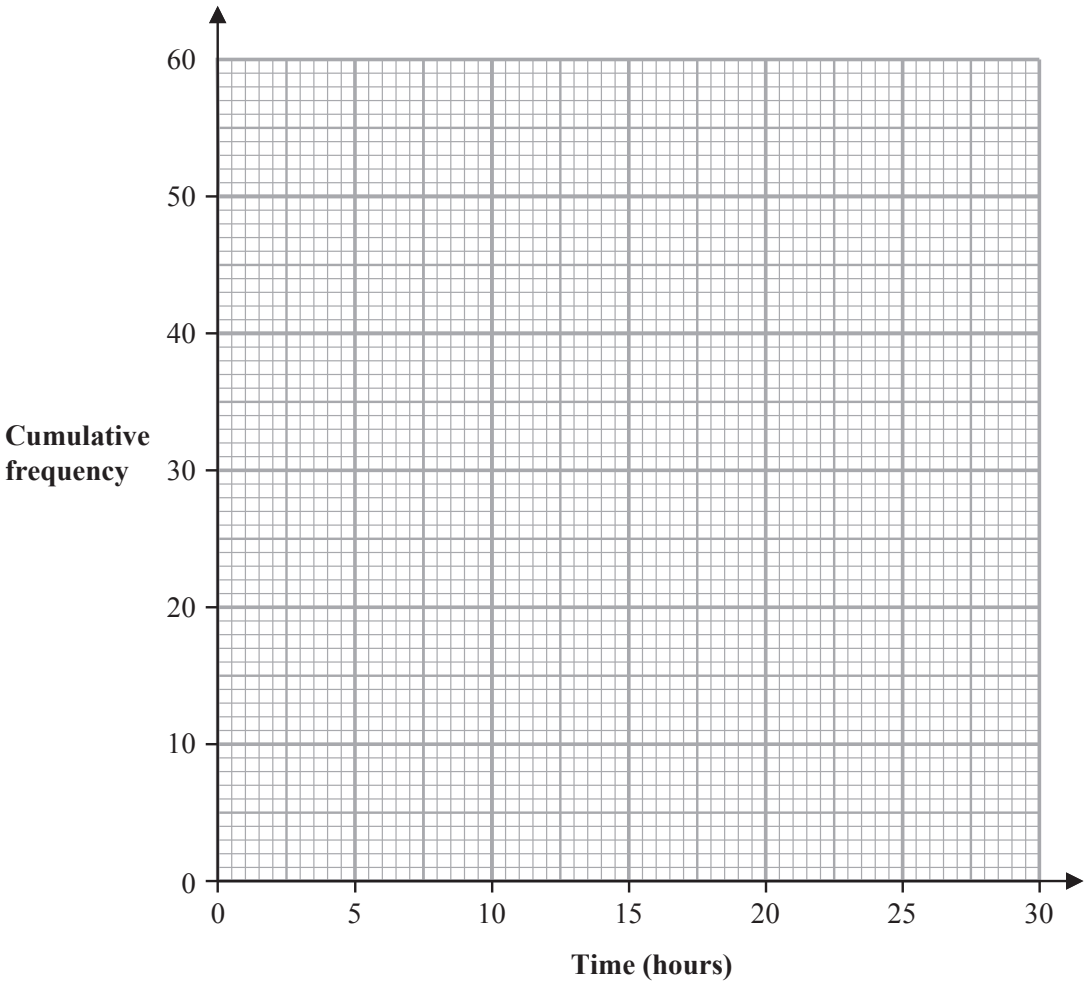
(2)

(Total for Question 13 is 7 marks)

11 The cumulative frequency table gives information about the time, in hours, that each of 60 workers spent working from home in one week.

Time (t hours)	Cumulative frequency
$0 < t \leqslant 5$	6
$0 < t \leqslant 10$	17
$0 < t \leqslant 15$	27
$0 < t \leqslant 20$	42
$0 < t \leqslant 25$	53
$0 < t \leqslant 30$	60

(a) On the grid below, draw a cumulative frequency graph for the information in the table.



(2)

(b) Use your graph to find an estimate for the interquartile range of the times.

..... hours

(2)

25 workers spent more than W hours working from home.

(c) Use your graph to find an estimate for the value of W

$W =$ .....

(2)

One of the 60 workers is chosen at random.
This worker spent H hours working from home.

(d) Find the probability that $5 < H \leqslant 10$

.....

(1)

(Total for Question 11 is 7 marks)

11 The table shows information about the amount of money spent on holiday by each of 120 families.

Money spent (£m)	Frequency
$0 < m \leqslant 100$	10
$100 < m \leqslant 200$	36
$200 < m \leqslant 300$	34
$300 < m \leqslant 400$	20
$400 < m \leqslant 500$	15
$500 < m \leqslant 600$	5

(a) Write down the modal class.

.....

(1)

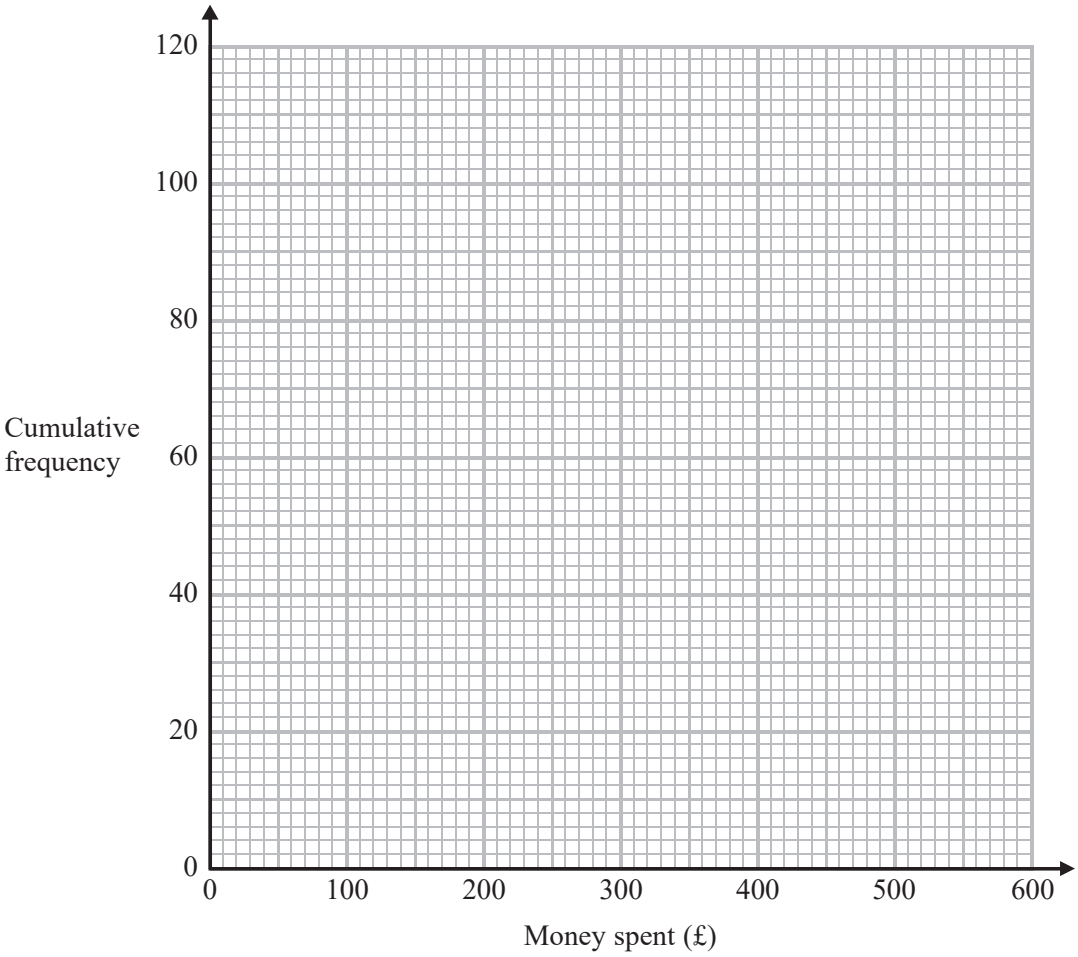
(b) Complete the cumulative frequency table for the information in the table.

Money spent (£m)	Cumulative frequency
$0 < m \leqslant 100$	
$0 < m \leqslant 200$	
$0 < m \leqslant 300$	
$0 < m \leqslant 400$	
$0 < m \leqslant 500$	
$0 < m \leqslant 600$	

(1)

(c) On the grid, draw a cumulative frequency graph for your table.

(2)



(d) Use your graph to find an estimate for the interquartile range.

£.....

(2)

(e) Use your graph to find an estimate for the number of families that spent more than £450 on holiday.

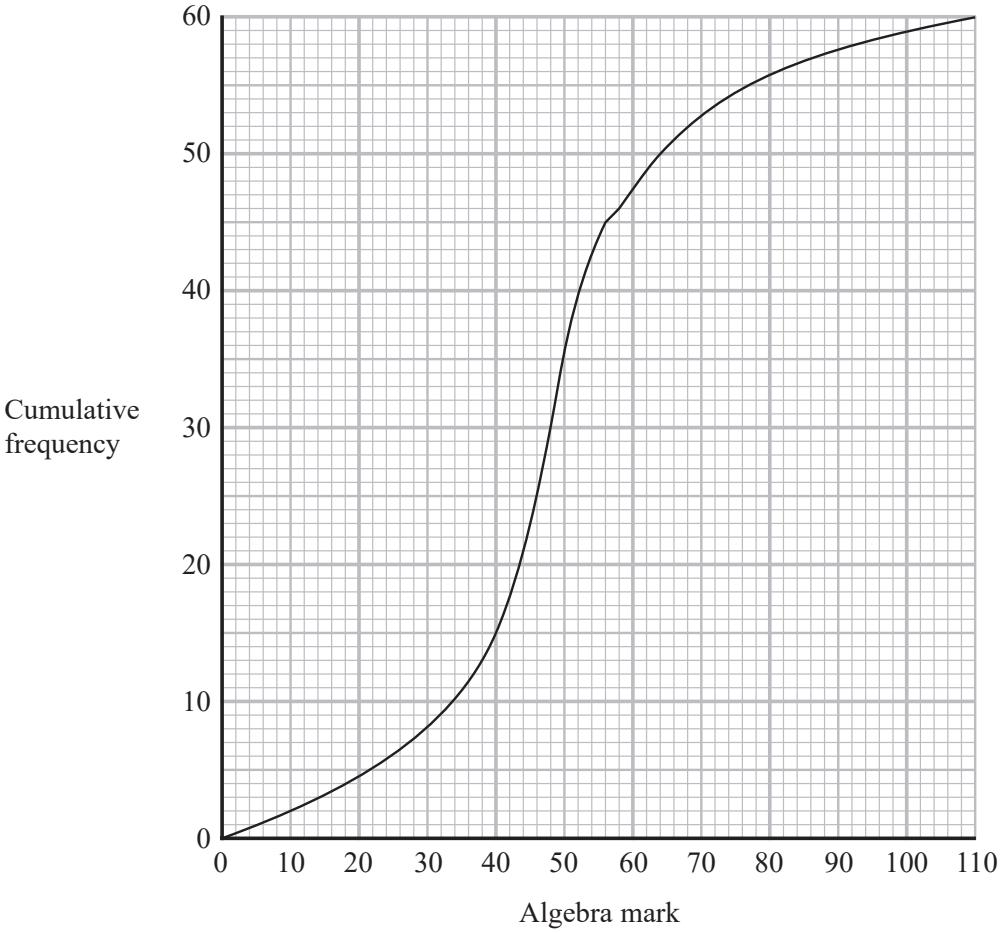
.....

(2)

(Total for Question 11 is 8 marks)

14 A group of 60 students each sat an algebra test and a geometry test.
Each test was marked out of 110

The cumulative frequency graph gives information about the marks gained by the 60 students in the algebra test.



(a) Use the graph to find an estimate for the median mark in the algebra test.

.....

(1)

(b) Use the graph to find an estimate for the number of students who gained 58 marks or less in the algebra test.

.....

(1)

(c) Use the graph to find an estimate for the interquartile range of the marks gained in the algebra test.

.....

(2)

The interquartile range of the marks gained in the geometry test is 9

Luis says

"The students' marks are more spread out in the algebra test than in the geometry test."

(d) Is Luis correct?
Give a reason for your answer.

.....

.....

(1)

To be awarded a grade A in the algebra test, a student had to gain a mark greater than 64

Two students are to be selected at random from the 60 students in the group.

(e) Use the graph to find an estimate for the probability that both of these students were awarded a grade A in the algebra test.

.....

(3)

(Total for Question 14 is 8 marks)

MARK SCHEMES

official mark schemes, in the same order as the questions

International GCSE Maths

Apart from questions 4d, 17a, 17b, 18, 19, 23 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1	eg $\frac{x+10+y}{3}=11$ oe **or** $y - x = 7$ oe 3 × 11 (=33)		2	M1 for one correct equation in x and y **OR** finding the total of x, 10 and y **OR** two numbers with a sum of 23 **OR** two numbers with a range of 7 Note: condone non-integers for the award of M1
		$x = 8,\ y = 15$		A1
				Total 2 marks

2	(area =) 2 × 1.25 (=2.5)		3	M1
	(*F* =) 42 × "2.5" or 42 = $\frac{F}{"2.5"}$			M1 Correct substitution into pressure formula
		105		A1 cao
				Total 3 marks

2	(a)	Allow translated translating translate Allow misspelling of the word eg translat	Translation	2	B1	for translation (with none of reflection, rotation, enlargement, mirrored, turned, move or flipped stated) NB Move with translation is acceptable
			$\begin{pmatrix}3\\-5\end{pmatrix}$		B1	for (vector =) $\begin{pmatrix}3\\-5\end{pmatrix}$
	(b)		Shape drawn at (−6, −1) (−4, −1) (−4, −2) (−5, −2)	2	B2	condone missing label If not B2 then B1 for a correct trapezium drawn with correct orientation in wrong position **or** 3 points plotted correctly)
						Total 4 marks

3		(x =) 11 (and) (y =) 14	2	B2 (B1	for x = 11 and y = 14 for x = 11 or y = 14) SC B1 for x = 14 and y = 11
					Total 2 marks

Question	Working	Answer	Mark	Notes
2	$\frac{3}{4}\times 60$ (= 45) **or** $\frac{1}{4}\times 60 (=15)$ **OR** $\frac{3}{4}\times\frac{3}{5}\left(=\frac{9}{20}\right)$ $\frac{3}{5}\times$"45" (= 27) **or** $\frac{4}{5}\times$"15" (= 12) **OR** $\frac{1}{4}\times\frac{4}{5}\left(=\frac{4}{20}\right)$ $\frac{\text{"27"+"12"}}{60}$ **OR** "$\frac{9}{20}$"+"$\frac{4}{20}$"	$\frac{13}{20}$	4	M1 M1 M1 For a complete method A1 oe
3	$14^2 - 10^2$ (= 96) "96"+ 5^2 (= 121) $\sqrt{\text{"121"}}$	11	4	M1 M1 M1 A1
4	(a =) 40 − 14 (=26) e.g. $\frac{\text{"26"}+b}{2}=30$ **or** 30 + (30 – "26")	26 34	3	M1 Method to find a M1 Method to find b A1

Question	Working	Answer	Mark	Notes
11	12×5.5 (= 66)	4.2	3	M1
	$\frac{"66"+18}{20}$			M1 for a complete method
				A1
12 (a)		$\frac{n}{2n-1}$	2	M1 for $2n \pm k$ oe as the denominator
				A1 oe
(b)	$(2n-1)^2 = 4n^2 - 4n + 1$	Proved	3	M1 or $(2n+1)^2 = 4n^2 + 4n + 1$ ft on $2n \pm k$ (k non zero)
	$4(n^2 - n) + 1$ **or** $\frac{4n^2-4n+1}{4} = n^2 - n + \frac{1}{4}$			M1 or $4(n^2 + n) + 1$ **or** $\frac{4n^2+4n+1}{4} = n^2 + n + \frac{1}{4}$
				A1 Conclusion

8	10 × 79.2 (= 792) **or** 3 × 68 (= 204)		3	M1
	(10 × 79.2 − 3 × 68) ÷ 7			M1
		84		A1
				Total 3 marks

9	(a)		t^6	1	B1
	(b)		w^{12}	1	B1
	(c)		$125x^3y^6$	2	B2 (B1) for 2 correct terms as part of a product
					Total 4 marks

10	22 × 60 × 60 (= 79 200) oe **or** 22 ÷ 1000 (= 0.022) oe		3	M1 for converting from m/s to m/h **or** from m to km	M2 for 22 × 3.6 oe
	22 × 60 × 60 ÷ 1000 oe			M1 for a complete method	
		79.2		A1 oe, dep on at least M1	
				Total 3 marks	

6	(a)	$\frac{15}{6}$ **or** $\frac{6}{15}$ **or** $\frac{4.2}{6}$ **or** $\frac{6}{4.2}$ oe 2.5 **or** 0.4 **or** 0.7 **or** 1.4(2857.....)			M1 for a correct scale factor, accept ratio notation eg 6 : 15
			10.5	2	A1 oe
	(b)	19.5 ÷ 2.5 **or** 19.5 × 0.4 oe **or** $4.2\times\frac{19.5}{(a)}$			M1 If using *DF* ft their answer from part (a)
			7.8	2	A1 oe
					Total 4 marks

7		e.g. 30 × 26.8 (= 804) **or** 13 × 25 (= 325) **or** (26.8 – 25) × 30 **or** 1.8 × 30			M1 for finding the total marks for the boys or the total test marks
		e.g. (30 × 26.8 − 13 × 25) ÷ (30 – 13) (= 28.1764...) **or** ('804' – '325') ÷ (30 – 13) (= 28.1764...) **or** ('804' – '325' ÷ 17) (= 28.1764...) **or** ((26.8 – 25) × 30) ÷ 17 + 25 (= 28.1764...) **or** '1.8' × 30 ÷ 17 + 25 (= 28.1764...)			M1 for a complete method to find the mean mark for the girls
			28.2	3	A1 accept 28.15 – 28.2 (accept without working) (Accept 28 from complete working)
					Total 3 marks

8	28 × 5 (= 140) **OR** 26.5 × 2 (= 53)			M1	or 87
	(28 × 5 − 26.5 × 2) ÷ (5 – 2)			M1	for a complete method
		29	3	A1	
					Total 3 marks

9	1.5 × 2 × 8 (= 24 (cm^3))			M1	for finding the volume of the cuboid
	e.g. $(V =) \frac{5.73\times1000}{19.32}$ (= 296.58...) **or** (*M* =) 19.32 × "24" (= 463.68)			M2	complete method to find the volume of statue **or** the mass of one block, could work in g or kg (if not M2 then award M1 for correct use of density formula e.g. $19.32 = \frac{5.73\times1000}{V}$ **or** $19.32 = \frac{M}{"24"}$)
	e.g. "296.58" ÷ "24" (= 12.3576...) **or** "5730" ÷ "463.68" (= 12.3576...)			M1	could work in g or kg
		13	5	A1	cao
					Total 5 marks

10	e.g. 6(*x* – 1) (= 6*x* – 6)			M1	method to find expression for perimeter of hexagon
	e.g. 2(*x* + 5) + 2*x* – 3 (= 4*x* + 7)			M1	method to find expression for perimeter of triangle
	"6*x* – 6" = "4*x* + 7"			M1	(dep on at least M1) for equating both expressions
	e.g. 6*x* – 4*x* = 7 + 6			M1	(dep on previous M1 and equation of the form $ax + b = cx + d$) for rearranging the *x* terms on one side and the numerical terms on the other and all expansions correct.
		5.5	5	A1	oe (dep on M2)
					Total 5 marks

International GCSE Maths A January 2020 – Paper 2HR Mark scheme					
Apart from Questions 1b, 7, 16c, 19a, 21b, 24 and 25 where the mark scheme states otherwise, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.					
Question	**Working**	**Answer**	**Mark**	**Notes**	
1 (a)		5^{19}	1	B1	
(b)			2	M1	A factor tree / division ladder of 3 or more factors (≠1), multiplying to 800, which must include 2 and 5. Condone 1 error when product ≠ 800
		$2\times2\times2\times2\times5\times5$		A1	dep on M1 oe eg $2^5 \times 5^2$
					Total 3 marks
2	$10 \times 5 + 30 \times 11 + 50 \times 8 + 70 \times 19 + 90 \times 9$ $(50 + 330 + 400 + 1330 + 810)$		3	M2	Correct products using midpoints (allowing one error) with intention to add. M1 for products using frequency and a consistent value within the range (allowing one error) with intention to add. or correct products using midpoints without addition (allow 1 error)
		2920		A1	N.B. 2920 ÷ 52 (=56.2..) scores M2A0
					Total 3 marks
3	$4x$ or $x - 7$		4	M1	Correct expression for B or C
	$x + 4x + x - 7 = 137$ oe			M1	Correct equation
	$x = 144 \div 6$ (=24) or $6x = 144$ or $6x - 144 = 0$			M1	Gathering up the x's and numbers Dep on previous M1
		17		A1	
					Total 4 marks

3	(a)		2 460 000	1	B1	accept 2,460,000 or 246 0000
	(b)		7.4×10^{-4}	1	B1	
	(c)			2	M1	for correct value not in standard form e.g. 58.3×10^5 or 583×10^4 or 0.583×10^7 oe
			5 830 000		A1	5 830 000 or 5.83×10^6 do not isw.
						Total 4 marks

4			3	M1	for one of - 5 numbers with a median of 8 - 5 numbers with a mode of 5 - 5 numbers with a range of 10 - 5 numbers with a sum of 45
				M1	for two of - 5 numbers with a median of 8 - 5 numbers with a mode of 5 - 5 numbers with a range of 10 - 5 numbers with a sum of 45
		5, 5, 8, 12, 15		A1	Note: The numbers can be in any order SC If no marks awarded, give B1 for 8 in the middle cell, not contradicted.
					Total 3 marks

7	$4.3^2 + 6.4^2$ or 59.45		4	M1	for squaring and adding
	$\sqrt{4.3^2 + 6.4^2}$ or $\sqrt{59.45}$ or 7.71(038…) or 7.7			M1	dep 1st M1 for square rooting
	e.g ('7.71' + 4.3 + 6.4) × 22 or '18.4' × 22 (=404.8) or ('8' + 4.3 + 6.4) × 22 or '18.7' × 22 or '19' × 22 or '20' × 22			M1	dep M2 for a non-rounded perimeter × 22 or 19 × 22 accept 20 × 22 oe
		$418		A1	cao
					Total 4 marks

8	15 × 24 (= 360) **or** 25 × 18 (= 450)		3	M1	may be implied by 810 seen
	$\frac{'360'+'450'}{40}$ $(=\frac{810}{40})$			M1	dep on M1
		20.25 oe		A1	for 20.25 accept 20.3 (allow 20 from correct working)
					Total 3 marks

International GCSE Maths

Apart from questions 14a, 21 where the mark scheme states otherwise, the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1	6 hrs 39 mins = 6.65 (hrs) or $6\frac{39}{60}$ or $6\frac{13}{20}$ or $\frac{133}{20}$ or 399 (mins)		3	B1
	Average speed = $\frac{429}{6.65}$ oe eg $\frac{429}{399}\times 60$			M1 Use of $S = D \div T$ (use of their time in hours) [allow 429 ÷ 6.39 if B0 awarded]
		64.5		A1 Awrt 64.5
				Total 3 marks

2		3, 7, 8, 8 and one of 4 or 5 or 6	3	B3 For a list of 5 correct numbers (B2 for a list of 5 numbers with 2 of: median of 7, mode of 8, range of 5 B1 for a list of 5 or 6 numbers with 1 of: median of 7, mode of 8, range of 5)
				Total 3 marks

6	(a)		1	1	B1	
	(b)	$3\times10^{125}+2\times10^{124}$ **or** digits 1024×10^{n} oe		3	M1	
		32×10^{124} **or** $3\times10^{125}+0.2\times10^{125}$ **or** $30\times10^{124}+2\times10^{124}$			M1	oe 'correct' answer in incorrect form.
			3.2×10^{125}		A1	
						Total 4 marks

7		5×398 (= 1990) or 6×401 (= 2406)		3	M1	Correct total for 5 or for 6 cocoa pods
		"2406" – "1990"			M1	(M2 for $398+6\times3$ or $401+5\times3$)
			416		A1	
						Total 3 marks

9	(a)		$5a^4c^3(5c^4d + 9a^5h)$	2	B2	If not B2 then award B1 for any **correct** factorisation with at least 2 of: the 5, a term in a, a term in c, outside the bracket eg $5ac(5a^3c^6d + 9a^8c^2h)$ **or** $a^2c(25a^2c^6d + 45a^7c^2h)$ (NB: not just a^4 etc as we want to know students have considered more than just one letter or the number) **or** the correct common factor **and** a 2 term expression inside the bracket eg $5a^4c^3(5c^4 + 9a^5)$ (this is missing d in first term and h in the second but the common factor is correct)
	(b)	$4x^2 + 10x + 10x + 25 = 4x^2 - 2x + 6x - 3$ $4x^2 + 20x + 25 = 4x^2 + 4x - 3$		3	M1	Correct expansion of $(2x + 5)^2$ **or** $(2x + 3)(2x - 1)$ **or** expansion of **both** sets of brackets with at least 3 of 4 terms correct in both (NB: if written as a 3 term quadratic (and not seen as 4 terms) then the middle term must be correct as it is equivalent to 2 correct terms) (eg (RHS) $4x^2 + 4x + 3$ has 1 error, $2x^2 + 4x - 3$ has 1 error, $4x^2 + 10x - 3$ has 2 errors)
		$10x + 10x - 6x + 2x = -3 - 25$ **or** $3 + 25 = -16x$ **or** $16x = -28$ oe			M1	ft if previous mark awarded. For terms in x on one side and number terms on the other side in a correct ft equation dependent on a linear equation
		Working not required, so correct answer scores full marks (unless from obvious incorrect working eg -1.75 oe from $2x^2 + 20x + 25 = 2x^2 + 4x - 3$ scores M2A0)	-1.75		A1	**or** $-1\frac{3}{4}$ **or** $-\frac{7}{4}$ **or** $-\frac{28}{16}$ **or** $-1\frac{12}{16}$ oe
						Total 5 marks

10		5 × 74 (= 370) **or** 6 × 77 (= 462) **or** 5 × 0.74 (= 3.7) **or** 6 × 0.77 (= 4.62)		3	M1 one correct product	M2 for 74 + (3 × 6) oe **or** 77 + (3 × 5) oe
		6 × 77 – 5 × 74 **or** "462" – "370" **or** (6 × 0.77 – 5 × 0.74) × 100 **or** ("4.62" – "3.7") × 100			M1 from correct working	(where 3 = 77 – 74)
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	92		A1 allow 92/100 **or** 92% **or** 92 out of 100 (trial and error scores no marks unless correct – and then it gains full marks)	
						Total 3 marks

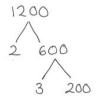
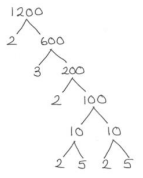
8	22 × 260 (= 5720) or 50 × 218 (= 10 900)		3	M1
	$\frac{'10900' - '5720'}{28}$ $\left(= \frac{5180}{28}\right)$			M1
		185		A1
				Total 3 marks

9	$\cos 30 = \frac{24}{(AC)}$ or $\sin'60' = \frac{24}{(AC)}$ **or** $\frac{\sin'60'}{24} = \frac{\sin 90}{(AC)}$ oe		5	M1 for correct trig ratio involving *AC*	M2 for use of tan **and** Pythagoras to obtain *AC* $(AB =)\ 24\tan 30\ (=13.856...)$ **and** $\sqrt{'13.856...'^2 + 24^2}\ (=27.712...)$ If not M2, then M1 for use of tan and Pythagoras to obtain AC^2 $(AB =)\ 24\tan 30\ (=13.856...)$ **and** $'13.856...'^2 + 24^2\ (=768)$
	$(AC =) \frac{24}{\cos 30}\ (= 16\sqrt{3} = 27.712\ldots)$ or $(AC =) \frac{24}{\sin'60'}\ (= 16\sqrt{3} = 27.712\ldots)$ **or** $(AC =) \frac{24\times\sin 90}{\sin'60'}$			M1 for a correct trig ratio for *AC*	
	$\frac{1}{2}\times 2\times\pi\times 3\ (= 3\pi = 9.424\ldots)$			M1 for using $\pi\times 2\times 3$ or $2\pi\times 3$	
	'27.712…' + '9.424…' – 2×3			M1 for a complete method to find the length *AFEDC*	
		31		A1 accept answers in range from 31 to 31.15	
				Total 5 marks	

3	5×12 (= 60) **or** $\frac{15+7-2+23+x}{5} = 12$ oe **or** $\frac{x+"43"}{5} = 12$		3	M1	for a method to find the total of the 5 numbers **or** setting up an equation in x "43" comes from 15 + 7 – 2 + 23
	x + 15 + 7 – 2 + 23 = "60" **or** x + "43" = "60" **or** "60" – (15 + 7 – 2 + 23)			M1	for forming an equation with their 60 **or** for a complete calculation to find the value of x "43" comes from 15 + 7 – 2 + 23
		17		A1	
					Total 3 marks

International GCSE Maths				
Apart from questions 4, 10, 14a,15a, 15b, 18, 24 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	**Working**	**Answer**	**Mark**	**Notes**
1			3	M1 for $d = 9$ **or** $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) **or** $d - a = 4$ (algebraically or clearly labelled integers)
				M1 for at least two of $a = 5$ or $c = 7$ or $d = 9$ **or** $(c + d) \div 2 = 8$ (algebraically or clearly labelled integers) **or** or $d - a = 4$ (algebraically or clearly labelled integers)
		$a = 5$, $b = 6$, $c = 7$, $d = 9$		A1 All correct
				Total 3 marks

12	7×2.7 (=18.9) or 4×3.3 (= 13.2) or $\frac{3W+4\times3.3}{7} = 2.7$ oe eg $3W + 13.2 = 18.9$		3	M1 For one correct product or for a correct equation for W
	$\frac{7\times2.7-4\times3.3}{3}$ or $\frac{"18.9"-"13.2"}{3}$ or $\frac{5.7}{3}$ or $3W = 5.7$			M1
	If you see 1.9 from correct working and they do further work to this value, award M2	1.9		A1
				Total 3 marks

2	eg $2 \times 2 \times 300$ $2 \times 5 \times 120$ $2 \times 3 \times 200$ $3 \times 5 \times 80$ or eg  or 2 | 1200 3 | 600 | 200		3	M1	for at least 2 correct stages in prime factorisation which give 2 prime factors – may be in a factor tree or a table or listed eg 2, 2, 300 (allow no more than one mistake ft (eg *one mistake* with 2 prime factors ft $1200 = 20 \times 600 = 2 \times 10 \times 3 \times 200$))
	2, 2, 2, 2, 3, 5, 5 or  oe 2 | 1200 3 | 600 2 | 200 5 | 100 2 | 20 5 | 10 2 | 2 | (1)			M1	for finding the correct prime factors condone inclusion of 1 (may be seen in a fully correct factor tree or ladder)
		$2^4 \times 3 \times 5^2$		A1	(dep on M2 as working requested) Can be in any order (allow $2^4 \cdot 3 \cdot 5^2$) but must be in index form as asked for.
					Total 3 marks

3	eg $\frac{158+C}{2}=160$ **or** (C =) 160 + (160 – 158) (= 162) oe **or** C = 162		3	M1	for method to find Candela's height or Candela's height or Candela's height in the wrong place on the answer line
	eg (D =) 175 – 21 **(=** 154) oe			M1	indep for method to find Diana's height or Diana's height or Diana's height in the wrong place on the answer line
		Candela 162 Diana 154		A1	Correctly attributed If no marks awarded, SCB1 for Candela's height 179
					Total 3 marks

2			3	M1	For area of 2 different faces (ie not 2 triangles)
	0.5 × 4.8 × 3.6 (= 8.64) oe or 4.8 × 3.6 if clear intention for this to be 2 triangles 7 × 3.6 (= 25.2) 7 × 4.8 (= 33.6) 7 × 6 (= 42) (**all measurements with intention to add**)			M1	For adding together 5 areas , at least 4 of which are correct NB: (3.6 + 4.8 + 6) × 7 (= 100.8) is 3 faces
	Correct answer scores full marks (unless from obvious incorrect working)	118		A1	118.1 or 118.08
					Total 3 marks

3		(x =) 3	3	B1	
		(y =) 6		B1	
		(z =) 10		B1	
					Total 3 marks

4	1600 × 0.16 (= 256) oe or 1 – 0.16 (= 0.84) oe		4	M1	
	1600 – "256" or 1600 × "0.84" (= 1344)			M1	
	$\frac{"1344"}{1400}(=0.96)$ **or** $\frac{1400-"1344"}{1400}(=0.04)$ **or** $\frac{"1344"}{1400}\times 100(=96)$ **or** $\frac{1400-"1344"}{1400}\times 100$			M1	
	Correct answer scores full marks (unless from obvious incorrect working)	4		A1	SCB1 for 1856 seen if no other marks awarded
					Total 4 marks

8	55 × 32 (= 1760) **or** 52 × 28 (= 1456) **or** 55 × 32 + 52 × 28 (= 3216)		3	M1	for one correct product or method to find the total mark for both classes
	eg $\frac{"1760"+"1456"}{32+28}$ **or** $\frac{3216}{60}$			M1	for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	53.6		A1	
					Total 3 marks

International GCSE Maths

Apart from questions 8ab, 9, 11b, 15a, 19b, 20 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method

Q	Working	Answer	Mark	Notes	
1	12 ÷ (5 – 2) (= 4) **or** 2 : 5 = 8 : 20 **or** A = 8 **or** S = 20 **or** eg $\frac{5}{15}x-\frac{2}{15}x=12$ **or** x = 60		3	M1 for method to find the value of one share **or** working with the ratio for Arjun or Simon **or** setting up an equation **or** for finding the total number of goals (= 60)	M2 for $\frac{8}{5-2}\times 12$ oe
	eg 8 × "4" **or** $8\times\frac{8}{2}$ **or** 8 + 12 + 12 **or** $8\times\frac{20}{5}$ **or** 20 + 12 **or** "60"$\times\frac{8}{15}$			M1 for a complete method	
	Correct answer scores full marks (unless from obvious incorrect working)	32		A1 SCB1 for $\frac{8}{15}\times 12 (=6.4)$	
					Total 3 marks

2	15 × 5 + 45 × 6 + 75 × 8 + 105 × 9 + 135 × 2 **or** 75 + 270 + 600 + 945 + 270 [lower bound products are: 0, 180, 480, 810, 240] [upper bound products are: 150, 360, 720, 1080, 300]		3	M2	for correct products using midpoints (allow one error or omission) with attempt to add (M1 for products using a consistent value within range and attempt to add **or** for at least 4 correct products without addition)
	Correct answer scores full marks (unless from obvious incorrect working)	2160		A1	(an answer of 72 loses the final A mark but gains M2)
					Total 3 marks

10	104 × 5 (= 520) or 127 × 7 (= 889) or $\frac{m+tu+w+th+f}{5} = 104$ oe		3	M1
	"889" – "520" – 132 or "369" – 132 or $\frac{"520"+132+x}{7} = 127$ oe or $\frac{132+x}{2} = \frac{369}{2}$ oe $652 + x = 127 \times 7$			M1 (x = Sunday)
	Correct answer scores full marks (unless from obvious incorrect working)	237		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes	
8	8 × 6 (= 48) or 10 × 7 (= 70)		3	M1	M2 for a correct equation in k that if rearranged correctly should give the correct answer eg $\frac{48+2k}{10}=7$ or allow for $\frac{48+x}{10}=7$ (use of mean increased by 1 so) 8 + 7 + 7 (= 22) oe
	"70" – "48"(= 22) oe eg $\frac{8\times6+22}{10}=7$ oe			M1	
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	11		A1	
					Total 3 marks

International GCSE Maths

Apart from questions 4, 12, 17b, 19, 21, 23 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method

Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.

Q	Working	Answer	Mark	Notes
1	11 × 6 (= 66) **or** $\frac{16+15+3+2+9+x}{6}=11$		3	M1 for a correct calculation for the total **or** a correct equation for the last card eg using 'x'
	16 + 15 + 3 + 2 + 9 + x = "66" oe eg 45 + x = "66" **or** "66" **–** (16 + 15 + 3 + 2 + 9)			M1 for a correct equation for 'x' with no fraction **or** a correct calculation for the number on the last card
	Correct answer scores full marks (unless from obvious incorrect working)	21		A1 if the answer line is blank, check the card
				Total 3 marks

International GCSE Maths

Apart from questions 4, 10, 14ab, 15b, 19, 22, 23, 24 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method
Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.

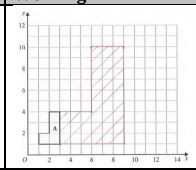
Q	Working	Answer	Mark	Notes
1	for $k = 18$ or eg $(8 + j) \div 2 = 10$ or $(j =) \ 10 \times 2 - 8$ or $8 + j = 2 \times 10$ or $j = 12$ or eg $k - h = 13$ or "18" $- h = 13$ or $h = 5$		3	M1 For a correct value for h, j or k or for a correct statement for one of these
	for two of the above			M1 for 2 correct values from h, j or k or for 2 correct statements for them
	Correct answer scores full marks (unless from obvious incorrect working)	$h = 5$ $j = 12$ $k = 18$		A1 All correct
				Total 3 marks

11 (i)	$(x \pm 2)(x \pm 11)$		2	M1	Or $(x + a)(x + b)$ where $ab = -22$ **or** $a + b = 9$
	Correct answer scores full marks (unless from obvious incorrect working)	$(x - 2)(x + 11)$		A1	
(ii)		2, −11	1	B1ft	**Must** ft from their factors in (i)
					Total 3 marks

12	4 × 11 800 (= 47 200) or 3 × 13 207 (= 39 621) or 86 821		3	M1	for one correct product or for the sum of the products
	$\frac{"47\,200" + "39\,621"}{7} \left(= \frac{86821}{7}\right)$			M1	for a fully correct method to find the mean for the 7 days
	Correct answer scores full marks (unless from obvious incorrect working)	12 403		A1	cao
					Total 3 marks

8	4×145 (= 580) or 5×142 (= 710) or $\frac{145+145+145+145+x}{5} = 142$ oe		3	M1 for one correct product or for a correct equation for the weight of the last banana
	$5 \times 142 - 4 \times 145$ or "710" – "580" or $145+145+145+145+x = 5 \times 142$			M1 A fully correct method to find the weight of the 5th banana or a fully correct equation to find the missing weight with no denominator
	Correct answer scores full marks (unless from obvious incorrect working)	130		A1
				Total 3 marks

International GCSE Maths					
Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.					
Question	**Working**	**Answer**	**Mark**	**Notes**	
1*		1st card = 4	3	B1	
		2nd card = 6		B1	or a list of 6 numbers with a mode of 6
		4th card = 9		B1	
				SCB2 for 4, 6 and 9 in the incorrect order	
				Total 3 marks	

Question		Working	Answer	Mark	Notes	
2	(a)		Correct shape drawn in correct position	2	B2	Shape drawn with coordinates (3, 1), (9, 1), (9, 10), (6, 10), (6, 4), (3, 4) (B1 for a shape of the correct size but in the wrong position) NB Overlay is available
	(b)	'Turn' is not sufficient	Rotation	3	B1	with no mention of any other transformation words or move, flip, transform, up, right etc
			180°		B1	allow 'half turn'
			(centre) (5, 5)		B1	must be a coordinate and not a vector
					Total 5 marks	

B2 for enlargement SF –1 (Ignore any reference to clockwise or anticlockwise)

7		$10.5=\frac{48.3}{v}$ **or** $10.5v=48.3$ **or** $\left(v=\right)\frac{48.3}{10.5}$		2	M1 oe for substituting 10.5 and 48.3 correctly into a correct formula for density; may use any letter for the volume
		Correct answer scores full marks (unless from obvious incorrect working)	4.6		A1 allow $\frac{23}{5}$ **or** $4\frac{3}{5}$ oe
					Total 2 marks

8		60 × 7 (= 420) **or** 46 × 3 (= 138)		3	M1 may be embedded within an equation
		"420" – "138" (= 282)			M1 for a method to find the sum of the 4 numbers Allow this mark if they do further incorrect work using 282
		Correct answer scores full marks (unless from obvious incorrect working)	70.5		A1 allow $\frac{141}{2}$ oe eg $\frac{282}{4}$ or $70\frac{1}{2}$
					Total 3 marks

9		1 – 0.15 (= 0.85) **or** 100(%) – 15(%) (= 85(%)) **or** $\frac{612}{85}$ (= 7.2) oe		3	M1 may be seen embedded Do not allow (1 – 15%) unless processed correctly
		612 ÷ "0.85" oe **or** 612 ÷ "85" × 100 oe **or** "7.2" × 100			M1 for a complete method
		Correct answer scores full marks (unless from obvious incorrect working)	720		A1
					Total 3 marks

International GCSE Maths 4MA1 1HR

Q	Working	Answer	Mark	Notes
1	20 × 14 (= 280)	460	4	M1
	$\frac{20+16}{2} \times (24-14)$ (= 180)			M1
	"280" + "180"			M1 (dep) on at least one of the previous M marks
				A1
				Total 4 marks
	Alternative scheme 1			
	(24 +14)÷2 (= 19) **and** (20−16)÷2 (=2)	460	4	M1
	2 × 19 (= 38) **and** 16 × 24 (= 384)			M1
	"38" + "38" + "384"			M1 (dep) on at least one of the previous M marks
				A1
				Total 4 marks
	Alternative scheme 2			
	20 × 24 (= 480)	460	4	M1
	(20−16)÷2 (=2) **and** 24 − 14 (= 10) 2 × 10 = 20			M1
	"480" – "20"			M1 (dep) on at least one of the previous M marks
				A1
				Total 4 marks

2	1 × 5 + 3 × 9 + 5 × 24 + 7 × 40 + 9 × 7 (= 495) **or** 5 + 27 + 120 + 280 + 63 (= 495)	5.8	4	M2	for at least 4 correct products added (need not be evaluated) If not M2 then award M1 for consistent use of value within interval (including end points) for at least 4 products which must be added **OR** correct mid-points **used** for at least 4 products and not added
	"495" ÷ 85			M1	dep on at least M1 Allow division by their $\sum f$ provided addition or total under column seen
				A1	for 5.8 − 5.824
					Total 4 marks

3	(a)		Correct **R** (5,6), (3,6), (3,5)	2	B2 fully correct If not B2 then B1 for correct orientation of **R** but in wrong position
	(b)		Correct **T** (2,−1), (2,−3), (1,−3)	1	B1
					Total 3 marks

4	675 ÷ (5 + 4) × 5 (= 375)	225	3	M1	M2 675 ÷ (5 + 4) × 3
	"375" ÷ 5 × 3			M1 dep M1	
				A1	
					Total 3 marks

Question	Working	Answer	Mark	Notes
13	$4 \times 5 + 13 \times 6 + 16 \times 7 + 8x + 6 \times 9$ $(20 + 78 + 112 + 8x + 54)$ **or** $264 + 8x$ $(4 + 13 + 16 + 6 + x) \times 7$ $(=7(39 + x) = 273 + 7x)$ **or** $(4 + 13 + 16 + 6) \times 7 (=273)$ oe **or** $\frac{"264+8x"}{"39+x"}$ $\frac{"264+8x"}{"39+x"} = 7$ oe eg "$264 + 8x$" = "$(39 + x)$" $\times 7$ **or** "273" – "264"	9	4	M1 at least 3 products correct with intention to add M1 for use of mean M1 A1

Question		Working	Answer	Mark	Notes
Apart from questions 9, 16, 20, 23 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method					
1		95 × 8 + 105 × 12 + 115 × 15 + 125 × 10 + 135 × 3 (= 5400) **or** 760 + 1260 + 1725 + 1250 + 405 (= 5400)			M2 for at least **4** correct products added (need not be evaluated) **or** If not M2 then award M1 for consistent use of value within interval (including end points) for at least **4** products which must be added **or** correct midpoints used for at least **4** products and not added
		'5400' ÷ '48'			M1 dep on at least M1 Allow division by their Σf provided addition or total under column seen
			112.5	4	A1 oe accept 112 **or** 113 from complete working Accept 112.5 with no working Do not accept 112 **or** 113 with no working
					Total 4 marks

2		Two pairs of intersecting arcs with equal radius centre D and E			M1 for 2 pairs of arcs that intersect within guidelines **or** correct perpendicular bisector without arcs.

3	<table><tr><td>***x***</td><td>−2</td><td>−1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>***y***</td><td>15</td><td>11</td><td>7</td><td>3</td><td>−1</td><td>−5</td></tr></table> (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5)	Correct line between $x = -2$ and $x = 3$	3	B3 for a correct line between $x = -2$ and $x = 3$ (B2 for a correct straight line segment through at least 3 of (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5) **or** for all of (−2, 15) (−1, 11) (0, 7) (1, 3) (2, −1) (3, −5) plotted but not joined) (B1 for at least 2 correct points stated (may be in a table) **or** plotted **or** for a line drawn with a negative gradient through (0, 7) **or** for a line with a gradient of −4)
				Total 3 marks

4	$\frac{x+10}{2} = 9$ **or** $x = 8$		4	M1 (indep)
	$\frac{4+7+x+10+y+y}{6} = 11$ oe **or** '66' – 4 – 7 – 10 (= 45)			M1 where x may be a number $7 < x < 10$
	(y =) (6 × 11 – 4 – 7 – 10 – '8') ÷ 2			M1 ft their median provided $7 < x < 10$ for a fully correct method
		$x = 8$ and $y = 18.5$ oe		A1
				Total 4 marks

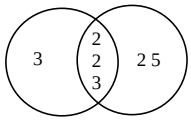
2	$a = 7$		4	B1
	$\frac{b + \text{their } a}{2} = 8.5$ oe **or** $b = 10$			M1 ft their value of a **or** for setting up an equation for b **or** $b = 10$
	$\frac{\text{their } a + \text{their } a + \text{their } b + c}{4} = 9$ oe or ($c =$) $9 \times 4 - (2 \times \text{their } a + \text{their } b)$ oe			M1 for a calculation involving c using their values **or** for a calculation leading to c using their values
		7, 10, 12		A1
				Total 4 marks

3	a		Correct number line	2	B2 for a fully correct number line e.g. shaded circle at −2, unshaded circle at 1 and a line drawn between them B1 for a shaded circle at −2 **or** an unshaded circle at 1 **or** circles at −2 and 1 with line in between but shading incorrect
	b		−3, −2, −1, 0, 1, 2	2	B2 fully correct values with no extras B1 for 5 correct values and none incorrect **or** all 6 correct values with no more than one additional incorrect value
					Total 4 marks

10	$(11 \times 3) + (8 \times 5) + (6 \times 7) + (5 \times 9)$ (= 160) (= 33 + 40 + 42 + 45 = 160)		4	M1	Correct numerical products using midpoints (allowing one error) with intention to add. May be seen in table.
	"160" + x = 4. 25 × (11 + 8 + 6 + 5 + x) oe or $\frac{\text{"160"}+x}{\text{"30"}+x} = 4.25$ or "160" + x = 4.25 × "30" + 4.25x			M1	dep M1 for correct equation ft *their* 160.
	"160" – "127.5" = 4.25x – x or 32.5 = 3.25x			M1	Isolating x and number terms
		10		A1	dep 1st M1
					Total 4 marks

Alternative Mark Scheme for question 10					
10	$(11 \times 3) + (8 \times 5) + (6 \times 7) + (5 \times 9)$ (= 33 + 40 + 42 + 45 =160)		4	M1	Correct numerical products using midpoints (allowing one error) with intention to add. May be seen in table.
	4.25y = "160" + [y – (11 + 8 + 6 + 5)] oe 4.25y = "160" + y – 30			M1	dep M1 for correct equation ft *their* 160, where y = total number of pupils
	4.25y – y = "160" – 30 or 3.25y = 130 or y = 40			M1	Isolating y and number terms **or** y = 40
		10		A1	dep 1st M1
					Total 4 marks

5			4	B1 for 80
	for $\frac{a+75}{2} = 74$ oe **or** 73			M1 for setting up an equation using the median **or** for 73
	for 80 – 16 (= 64) oe			M1 for using the range correctly **or** for 64
		64, 73, 80		A1 answers can be in any order
				Total 4 marks

6 (a)	36, 72, 108, ... **and** 120, 240, 360, ... **or** 2, 2, 3, 3 **and** 2, 2, 2, 3, 5 **or**  **or** $\frac{36\times120}{12}$ **or** 2, 2, 2, 3, 3, 5 oe	**2** 36 120 **2** 18 60 **3** 9 30 **3** **10**	2	M1for any correct valid method e.g. for starting to list at least **three** multiples of each number 2, 2, 3, 3 **and** 2, 2, 2, 3, 5 seen (may be in a factor tree or a ladder diagram and ignore 1) (Allow 2 × 2 as 4) **or** a fully correct "Venn" diagram
		360		A1 or $2^3 \times 3^2 \times 5$ oe (allow $2^3 \,.\, 3^2 \,.\, 5$)
(b)		$5^2 \times 7^4 \times 11$	2	B2 for $5^2 \times 7^4 \times 11$ (in any order) (B1 for 660 275 or correct unsimplified product or $5^a \times 7^b \times 11^c$ where 2 of a, b and c are correct)
				Total 4 marks

8 (a)	(231 776 – 228 314) ÷ 228 314 **or** 3462 ÷ 228 314 (= 0.01516…) **or** 231 776 ÷ 228 314 (= 1.01516…)		2	M1	
		1.5		A1	for 1.5 or better (1.516…) (be careful: 3462 ÷ 231 776 × 100 = 1.49….)
(b)	231 776 ÷ 1.077 oe		3	M2	If not M2 then M1 for 100 + 7.7 (=107.7) or 1 + 0.077(=1.077) seen but not 1 + 7.7%
		215 000		A1	for 215 000 or better (215 205.19…) (if no marks awarded SCB1 for 212000 or better (211990.71…))
					Total 5 marks

9	$(0\times13)+1\times17+2\times8+3x+4\times11$ or (0 +) 17 + 16 + 3x + 44 (= 77 + 3x)			M1	at least **3** correct products with intention to add. eg award for 77 seen as this is sum of 3 products
	$(13+17+8+x+11)$ oe eg 49 + x **or** $98+2x$			M1	Sum for total frequency or (frequency × 2)
	$\frac{"77+3x"}{"49+x"} = 2$ oe e.g. $"77+3x" = 2("49+x")$			M1	for use of mean in valid equation (ft their values for sum of products and their total frequency if M2 awarded previously)
		21		A1	
					Total 4 marks

International GCSE Maths				
Apart from Questions 2, 3, 13, 19, 22, 23 and 24 (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.				
Q	**Working**	**Answer**	**Mark**	**Notes**
1	6 × 11 + 18 × 25 + 30 × 23 + 42 × 15 + 54 × 6 (= 2160) **or** 66 + 450 + 690 + 630 + 324 (= 2160) [lower bound products are: 0, 300, 552, 540, 288] [upper bound products are: 132, 600, 828, 720, 360]		4	M2 for at least **4** correct products added (need not be evaluated) **or** If not M2 then award: M1 for consistent use of value within interval (including end points) for at least **4** products which must be added or correct midpoints used for at least **4** products and not added
	"2160" ÷ "80"			M1 dep on at least M1 Allow division by their Σf provided addition or total under column seen
	Correct answer scores full marks (unless from obvious incorrect working)	27		A1
				Total 4 marks

10	17 × 11 (= 187) **or** 18.5 × 12 (=222) **or** 18 × 9 (=162) **or** 18.5 × 10 (= 185)		4	M1 Expression for total of **A** or **B** either including or excluding last round	M2 for 1.5 × 11 + 18.5 (= 35) **or** 9 × 0.5 + 18.5 (= 23) OR 1.5 × 11 (= 16.5) **or** 0.5 × 9 (= 4.5)
	18.5 × 12 − 17 × 11 (“222” – “187”)(= 35) **or** 18.5 × 10 − 18 × 9 (“185” – “162”)(= 23) **or** $\frac{"187"+x}{12}=18.5$ (x = 35) **or** $\frac{"162"+y}{10}=18.5$ (y = 23) **or** Diff between **A** and **B** in first rounds “187” – “162” (= 25) **or** Diff between **A** and **B** after further round “222” – “185” (= 37) [or 2 ×18.5 (= 37) (2 must come from correct working)]			M1 expression for number of points gained by **A** or **B** in the last round or for an equation that could lead to the number of points gained by **A** or **B** in the last round	
	“35” – “23” or “37” – “25” or “16.5” – “4.5”			M1 calculation for difference between number of points scored in last round	
	Correct answer scores full marks (unless from obvious incorrect working)	12		A1	
					Total 4 marks

The 2 is 2 further rounds of 18.5 ie 37 comes from 18.5 ×12 – 18.5 × 10 so the 2 × 18.5 is (12 – 10)×18.5

International GCSE Maths

Apart from questions 4a, 6, 14, 15ab, 17, 21, 22b, 23, 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1 (a)		$25 < m$ „ 30	1	B1 Allow $25 < m < 30$ or $25 – 30$ oe
(b)	2.5.× 8 + 7.5 × 2 + 12.5 × 6 + 17.5 × 4 + 22.5 × 12 + 27.5× 18 (= 20 + 15 + 75 +70 + 270 + 495) [total using lower boundary = 820 (gains M1] [total using upper boundary = 1070 (gains M1)]		3	M2 For correct products using midpoints (allowing one error) with intention to add. M1 for products using frequency and a consistent value within the range (allowing one error) with intention to add or correct products using midpoint without addition.
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	945		A1 An answer of 18.9 gains M2 only [mean from lower boundary = 16.4 (M1)] [mean from upper boundary = 21.4 (M1)]
				Total 4 marks

International GCSE Maths 4MA1 1H					
Apart from questions 3c, 11b and 20 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	a		$0 < p \leq 1$	1	B1
	b	$0.5 \times 19 + 1.5 \times 12 + 2.5 \times 5 + 3.5 \times 2 + 4.5 \times 2$ (=56) **or** $9.5 + 18 + 12.5 + 7 + 9$ (=56)	1.4	4	M2 for at least 4 correct products added (need not be evaluated) If not M2 then award M1 for consistent use of value within interval (including end points) for at least 4 products which must be added **OR** correct mid-points used for at least 4 products and not added
		"56" ÷ 40			M1 dep on at least M1 Allow division by their $\sum f$ provided addition or total under column seen A1 for 1.4 or $1\frac{2}{5}$

Question	Working	Answer	Mark	Notes
2	170 ÷ 2 (=85) **or** 170 ÷ 2 × 7 (=595) **or** 7 ÷ 2 (=3.5) 7 × "85" + 170 (=765) **or** 9 × "85" (=765) **or** "595" + 170 (=765) **or** 170 × "3.5" + 170 (=765) "765" ÷ 3 (=255) **or** "765" ÷ 3 × 5 (=1275) "255" × 2 **or** "1275" – "765" **or** "1275" ÷ 5 × 2	510	5	M1 M1 award of this mark implies the first M1 M1 dep on M2 M1 A1
	Alternative scheme			
2	(girls =) $\frac{2}{9}$ (of children) (girls =) $\frac{2}{9}\times\frac{3}{5}\left(=\frac{2}{15}\right)$ (of total) **or** G : C : A = $\frac{2}{9}\times\frac{3}{5}:\frac{3}{5}:\frac{2}{5}\left(=\frac{2}{3}:3:2\right)$ "$\frac{15}{2}$"$\times 170$ (=1275) **or** G : A = 2 : 6 oe "1275" ÷ 5 × 2 **or** 3 × 170	510	5	M1 M1 award of this mark implies the first M1 M1 dep on M2 M1 A1

Apart from questions 10b, 11, 12, 21, 22 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question		Working	Answer	Mark	Notes	
1	(a)		$12 < d \leq 16$	1	B1	
	(b)	$2 \times 16 + 6 \times 18 + 10 \times 19 + 14 \times 27 + 18 \times 20$ $= 32 + 108 + 190 + 378 + 360$ (=1068)	10.68	4	M2	$f \times d$ for at least 4 products with correct mid- interval values and intention to add. If not M2 then award M1 for d used consistently for at least 4 products within interval (including end points) and intention to add or for at least 4 correct products with correct mid-interval values with no intention to add
		'1068' ÷ 100			M1	dep on at least M1 Allow division by their $\sum f$ provided addition or total under column seen
					A1	Accept 10, 10.7 and 11

3	(a)		h^9	1	B1	
	(b)	$(-5)^2 - 4 \times -5$ oe e.g. $25 + 20$		2	M1	for a correct substitution
			45		A1	
	(c)	$5x - 3 = 4(2x + 3)$ oe **or** $\frac{5x}{4} - \frac{3}{4} = 2x + 3$ oe		3	M1	for correctly removing the denominator, condone missing brackets
		e.g. $5x - 8x = 12 + 3$ **or** $-3x = 12 + 3$ **or** $8x - 5x = -12 - 3$ **or** $3x = -12 - 3$ **or** $-\frac{3}{4} - 3 = 2x - \frac{5x}{4}$ **or** $-\frac{15}{4} = \frac{3x}{4}$			M1	for a correct rearrangement with terms in x on one side and numbers on the other, allow correct rearrangement of their equation in the form $ax + b = cx + d$
			-5		A1	dep on at least M1 SCB2 for an answer of $x = -2$ coming from $5x - 3 = 8x + 3$ **or** $x = 5$ coming from $5x - 3 = 2x + 12$
						Total 6 marks

4	(a)		$30 < t \leq 40$	1	B1	
	(b)	e.g. $5 \times 4 + 15 \times 10 + 25 \times 15 + 35 \times 25 + 45 \times 6$ (= 1690) **or** $20 + 150 + 375 + 875 + 270$ (= 1690)		4	M2	For correct products using midpoints (allowing one error) with intention to add. If not M2 then award M1 for products using frequency and a consistent value within the range (allowing one error) with intention to add or correct products using midpoint without addition.
		"1690" ÷ 60			M1	dep on M1
			28.2		A1	accept 28.1 – 28.2
						Total 5 marks

International GCSE Maths						
Apart from question 11c, 12, 13, 16, 19, 20 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.						
Q		**Working**	**Answer**	**Mark**		**Notes**
1	a		g^{10}	1	B1	
	b		k^{7}	1	B1	
	c		$9c^2d^8$	2	B2	B1 for 2 out of 3 terms correct in a product
	d	$4x > 2 - 7$ oe			M1	accept as an equation or with wrong inequality sign.
			$x > -1.25$	2	A1	oe allow $(-1.25, (+)\infty)$ Note: award M1A0 for an answer on the answer line of −1.25 with no sign or the incorrect sign eg $x = -1.25$, $x < -1.25$
						Total 6 marks

2	a		$50 < L \leq 60$	1	B1	oe eg 50 - 60
	b	25 × 6 + 35 × 26 + 45 × 31 + 55 × 40 + 65 × 17 (150 + 910 + 1395 + 2200 + 1105)(= 5760)			M2	For correct products using midpoints (allow one error) with intention to add. M1 for products using frequency and a consistent value within the range (allow one error) with intention to add or correct products using midpoints (allow one error) without addition
		"5760" ÷ "120"			M1	dep on M1
			48	4	A1	
						Total 5 marks

2	(a)		$70 < s \leq 80$	1	B1	
	(b)	$10 \times 45 + 16 \times 55 + 19 \times 65 + 23 \times 75 + 12 \times 85$ **or** $450 + 880 + 1235 + 1725 + 1020$ (= 5310)		4	M2	$f \times d$ for at least 4 products with correct mid-interval values and intention to add. If not M2 then award M1 for d used consistently for at least 4 products within interval (including end points) and intention to add **or** for at least 4 correct products with correct mid-interval values with no intention to add
		"5310" ÷ 80			M1	dep on at least M1 allow division by their $\sum f$ provided addition or total under column seen
			66.4		A1	accept 66.37 – 66.4
						Total 5 marks

3	(a)		$\frac{31}{70}$	1	B1 31/70 Accept 0.44(28571…..) or 44.(2…)%
	(b)	4 × 6 + 12 × 14 + 20 × 19 + 28 × 25 + 36 × 6 (= 1488) **or** 24 + 168 + 380 + 700 + 216 (= 1488)		4	M2 for at least **4** correct products added (need not be evaluated) If not M2 then award: (M1 for consistent use of value within interval (including end points) for at least **4** products which must be added or correct midpoints used for at least **4** products and not added)
		$\frac{4 \times 6 + 12 \times 14 + 20 \times 19 + 28 \times 25 + 36 \times 6}{70}$ oe eg '1488' ÷ 70			M1 dep on at least M1 Allow division by their Σf provided addition or total under column seen
		Correct answer scores full marks (unless from obvious incorrect working)	21.26		A1 awrt 21.26 accept 21.3
					Total 5 marks

International GCSE Maths						
Apart from questions 6, 13, 14, 15c, 18, 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.						
1	(a)		$48 < S \leqslant 54$	1	B1	Allow $48 - 54$ oe
	(b)	$(33 \times 4) + (39 \times 14) + (45 \times 18) + (51 \times 19) + (57 \times 5)$ or $132 + 546 + 810 + 969 + 285$ (= 2742) [lower bound products are: 120, 504, 756, 912, 270] [upper bound products are: 144, 588, 864, 1026, 300]		4	M2	M2 for at least **4** correct products added (need not be evaluated) **or** If not M2 then award: M1 for consistent use of value within interval (including end points) for at least **4** products which must be added or correct midpoints used for at least **4** products and not added
		$\frac{"2742"}{60}$			M1	dep on M1 Allow division by their Σf provided addition or total under column seen
		Correct answer scores full marks (unless from obvious incorrect working)	45.7		A1oe	$45\frac{7}{10}$ or $\frac{457}{10}$ (accept 46 from correct working)
						Total 5 marks

International GCSE Maths					
Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.					
Q		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		$10 < p \leqslant 15$	1	B1 allow $10 \leqslant p \leqslant 15$ or $10 < p < 15$ or $10 \leqslant p < 15$ or $10 – 15$
	(b)	$12.5 \times 18 + 17.5 \times 16 + 22.5 \times 14 + 27.5 \times 8 + 32.5 \times 4$ (= 1170) or 225 + 280 + 315 + 220 + 130 (= 1170) [lower bound products are: 180, 240, 280, 200, 120] [upper bound products are: 270, 320, 350, 240, 140] Sum of lower bound products = 1020 Sum of upper bound products = 1320 Sum of products using 11, 16, 21, 26 and 31 = 1080 Sum of products using 12, 17, 22, 27 and 32 = 1140 Sum of products using 13, 18, 23, 28 and 33 = 1200 Sum of products using 14, 19, 24, 29 and 34 = 1260		4	M2 for at least **4** correct products added (need not be evaluated) **or** If not M2 then award: M1 for consistent use of value within interval (including end points) for at least **4** products which must be added or correct midpoints used for at least **4** products and not added
		"1170" ÷ 60			M1 dep on at least M1 Allow division by their Σf provided addition or total under column seen
		Correct answer scores full marks (unless from obvious incorrect working)	19.5		A1 oe
					Total 5 marks

International GCSE Mathematics

Values in quotation marks must come from a correct method previously seen unless clearly stated otherwise.

Q		Working	Answer	Mark	Notes
1	(a)		$5 < d \leq 10$	1	B1 allow 5 – 10 or 5 to 10 or $5 < d < 10$ or $5 \leq d \leq 10$ or $5 \leq d < 10$
	(b)	2.5 × 26 + 7.5 × 40 + 12.5 × 16 + 17.5 × 10 + 22.5 × 8 (= 920) or 65 + 300 + 200 + 175 + 180 (= 920) [lower bound products are: 0, 200, 160, 150, 160] [sum of lower bound products is: 670] [products using 3, 8, 13, 18, 23 are: 78, 320, 208, 180, 184] [sum of products using 3, 8, 13, 18, 23 is: 970] [upper bound products are: 130, 400, 240, 200, 200] [sum of upper bound products is: 1170]		4	M2 for at least **4** correct products added (need not be evaluated ie can be in the form 2.5 × 26 + 7.5 × 40 +…) If not M2 then award: M1 for consistent use of values within interval (including end points) for at least **4** products added (need not be evaluated ie can be in the form 5 × 26 + 10 × 40 +…) or correct midpoints used for at least **4** products and not added
		"920" ÷ "100"			M1 (dep on at least M1) Allow division by their Σf provided addition or total under column seen
		Correct answer scores full marks (unless from obvious incorrect working)	9.2		A1 oe eg $9\frac{1}{5}$ or $\frac{46}{5}$ SCB2 for answer of 6.7 or 9.7 or 11.7
					Total 5 marks

5 (a)		(5), 8, 8, 20, *x*, (24)	3	B3	for (5), 8, 8, 20, *x*, (24) where *x* = 21 **or** 22 **or** 23
				(B2	for (5), 8, 8, 20, *x*, (24) where *x* is blank or **any** value other than 21, 22 or 23)
				(B1	for a list with a median of 14 **or** a mode of 8 **or** the 3rd and 4th cards having a sum of 28 (ignoring other cards))
(b)	eg 5 × 21 (= 105) **or** 6 × 23 (= 138)		3	M1	
	eg 6 × 23 – 5 × 21			M1	
		33		A1	
				Total 6 marks	

Question	Working	Answer	Mark	Notes
5	$\angle OQT = 90^\circ$ **and** $\angle OQP = 18^\circ$ **or** 90 – 18		3	M1 For 90° **and** 18° correctly identified in the working or on the diagram **or** for 90 – 18 **or** for other fully correct method
		72		A1
	Angle between tangent and radius(or diameter) is 90 degrees			B1 Correct reason for 90° angle [If used alternate segment theorem]
				Total 3 marks

6	(a)	$2 \times \pi \times 0.56 \times 1.6$		2	M1 Award even if part of a calculation including 1 or 2 circles
			5.63		A1 awrt 5.63
	(b)	$\frac{0.6}{1.6}$ (=0.375) **or** $\frac{1.6}{0.6}$ $(=\frac{8}{3}=2.\dot{6})$ **or** $\frac{r}{0.56}=\frac{0.6}{1.6}$ **or** $(r=)\frac{0.56\times0.6}{1.6}$ **or** $0.56 \div 2.\dot{6}$ oe		2	M1 Correct scale factor (given as a fraction or ratio) or correct equation in r or a correct expression for r. Allow 2.6666... to 1 dp rounded or truncated
			0.21		A1 Allow 21 cm oe if units shown
					Total 4 marks

7	(a)	(28 + 32) × 72.6 (=4356) **or** 28 × 75 (=2100)		4	M1 Expression for total of both classes together or total for class A
		(28 + 32) × 72.6 – 28 × 75 (=2256)			M1 Expression for total of class B
		$\frac{(28+32)\times72.6-28\times75}{32}$ (="2256" ÷ 32)			M1 Correct calculation for mean of class B
			70.5		A1
	(b)	Highest in A = 39 + 57 (= 96) Highest in B = 33 + 60 (= 93)		3	M1 for 39 + 57(=96) **or** 33 + 60(=93)
		(39 + 57) – 33			M1 or for 33 – "96" or 33 to "96" oe
			63		A1
					Total 7 marks

4	(a)		$3 < w \leq 4$	1	B1
	(b)	$(12 \times 2.5) + (16 \times 3.5) + (9 \times 4.5) + (2 \times 5.5) + (1 \times 6.5)$ **or** $30 + 56 + 40.5 + 11 + 6.5$ (= 144)		4	M2 for at least **4** correct products added (need not be evaluated) **or** If not M2 then award M1 for consistent use of value within interval (including end points) for at least **4** products which must be added **or** correct midpoints used for at least **4** products and not added
		$[(12 \times 2.5) + (16 \times 3.5) + (9 \times 4.5) + (2 \times 5.5) + (1 \times 6.5)] \div 40$ **or** '144' ÷ 40			M1 (dep on at least M1) Allow division by their Σf provided addition or total under column seen
			3.6		A1 oe
	(c)	$\frac{2}{40} + \frac{1}{40}$		2	M1 for $\frac{a}{40}$ where $0 < a < 40$ or $\frac{3}{b}$ where $b > 3$ where a and b are integers
			$\frac{3}{40}$		A1 0.075 oe
					Total 7 marks

10	$3x+6+5x+8+7x-9=320$ oe eg $15x + 5 = 320$ Could be implied by $(320 – 5) \div 15$ oe		5	M1	a correct method to find the correct value of x for year 11 students eg an equation
	(x =) 21 or ($3x$ =) 63 *Correct answer of 21 or 63 scores 2 marks (unless from obvious incorrect working)*			A1	For the correct value for x or $3x$
	3 × "their 21" + 6 (= 69) or "their 63" + 6 (= 69) **Look for 69 by the side of the table**			M1ft	dep on M1 a correct method to find the number for year 11 Biology ft their value of x as long as only one value of x is offered and it is a clear intention to be x
	$\frac{126}{360}\times 300 (=105)$ oe eg $\frac{300}{360}(=\frac{5}{6})$ **and** $\frac{5}{6}\times 126(=105)$ or $\frac{360}{300}=1.2$ **and** 126 ÷ 1.2 (= 105) oe			M1	indep for a correct method to find the number of year 10 whose favourite is Biology $\frac{300}{360}=0.8\dot{3}$ (so allow 0.83)
		36		A1	cao dep on A1 previously scored
					Total 5 marks

Question	Working	Answer	Mark	Notes
11	**Basic comparisons from information:** eg The median is greater for Science/less for Maths The IQR (or range) is higher for Science/less for Maths The median is 2.5 marks higher for Science The IQR (or range) is 7 marks more for Science **Comparisons in context:** eg On the whole students have higher marks in Science The spread of results is greater for Science Results are more consistent for Maths	Two comparisons one for IQR and one for median	2	B2 For 2 comparisons in context **or** 1 basic comparison and 1 comparison in context (B1 for 1 or 2 basic statements or for 1 statement in context) NB; any numbers used must be correct for the award of the mark

11		(definition of part: there are 3 parts: one part is the number, one part the letter t and one part the letter w Definition of terms: there are 6 terms: 2 number terms, 2 terms in t and 2 terms in w)		3	M1 indep	Fully correct cancellation of any two parts of their fraction at any stage of working
					M1 indep	correctly apply the negative power to the whole of their bracket (all parts or all terms) **or** correctly square all parts or terms of their bracket **or** correctly apply the negative power AND square of at least two parts (maybe 4 terms) of their bracket
			$4t^4w^2$		A1	Allow $(2t^2w)^2$ after the correct answer
		ALTERNATIVE				
			$4t^4w^2$	3	M2	2 correct terms (M1 for 1 correct term)
					A1	Allow $(2t^2w)^2$ after the correct answer
						Total 3 marks

12		$13 - 4$		2	M1 For selecting 4 and 13
			9		A1
					Total 2 marks

14		16 — 9		2	M1	9 and 16 clearly identified either in list or stated. Some may have also identified the second 13 which we will allow as working so long as not intended as the LQ or UQ
		Working required	7		A1	Dep on M1
						Total 2 marks

13	12 (−) 3		2	M1 for both values unambiguously identified
		9		A1
				Total 2 marks

14	**Elimination** eg $9x-15y=75$ $20x+15y=70$ + $(29x=145)$ or $12x-20y=100$ $12x+9y=42$ − $(-29y=58)$	**Substitution** eg $4\left(\frac{25+5y}{3}\right)+3y=14$ or $4x+3\left(\frac{25-3x}{-5}\right)=14$ or $3\left(\frac{14-3y}{4}\right)-5y=25$ or $3x-5\left(\frac{14-4x}{3}\right)=25$		4	M1 for a correct method to eliminate x or y: coefficients of x or y the same **and** correct operation to eliminate selected variable (condone 1 arithmetical error) **or** for correctly writing x or y in terms of the other variable and correctly substituting
					A1 dep on M1 for $x = 5$ **or** $y = -2$
	eg $3x - 5 \times$ "−2" = 25 **or** $4x + 3 \times$ "−2" = 14 **or** $3 \times$ "5" $- 5y = 25$ **or** $4 \times$ "5" $+ 3y = 14$				M1 dep on M1 for substitution of found variable **or** repeating the steps in first M1 for the second variable
		$x = 5$ $y = -2$			A1 cao, dep on M1 a correct answer without working scores no marks
					Total 4 marks

9	eg $21x + 9y = 24$ _ $2x + 9y = 14.5$ or $14x + 63y = 101.5$ _ $14x + 6y = 16$ **or** eg $7\times\left(\frac{14.5-9y}{2}\right)+3y=8$		3	M1	for a correct method to eliminate x or y: multiplication of one or both equation(s) with correct operation selected (allow one arithmetic error) (if + or – is not shown then assume it is the operation that at least 2 of the 3 terms have been calculated for) **or** correct rearrangement of one equation with substitution into second
				M1	(dep on previous M1 but not on a correct first value) correct method to find second unknown – this could be a correct substitution into one of the equations given or calculated or starting again with the same style of working as for the first method mark
	Working required	$x = 0.5$ **and** $y = 1.5$		A1	oe, dep on M1
					Total 3 marks

10	Correctly identifying 15 and 25		2	M1	could be clearly shown in list (condone 19 also being indicated)
	Correct answer scores full marks (unless from obvious incorrect working)	10		A1	
					Total 2 marks

Question	Working	Answer	Mark	Notes
13			2	M1 For identifying 4 and 13 (may also indicate 8 as part of their working)
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	9		A1
				Total 2 marks

9		$y=-\frac{1}{2}x+1$	3	B3 for $y=-\frac{1}{2}x+1$ oe but must be in form $y = mx + c$ eg $y=-0.5x+1$ (B2 for $(L=)\ -\frac{1}{2}x+1$ **or** for $y=-\frac{1}{2}x+c$ **or** for $y=mx+1$ where $m\neq 0$ **or** for a correct equation in the incorrect form eg $2y + x = 2$) (B1 for $(L=)\ -\frac{1}{2}x+c$ **or** $(L=)\ mx+1$ where $m\neq 0$ **or** $m=-\frac{1}{2}$ **or** gradient = $-\frac{1}{2}$ oe eg $\frac{3-(-1)}{-4-4}$)
				Total 3 marks

10	2 **and** 7 correctly identified		2	M1 may also identify median (4)
	Correct answer scores full marks (unless from obvious incorrect working)	5		A1
				Total 2 marks

12	(a)		12, 27, 47, 65, 74, 80	1	B1	
	(b)			2	M1	ft from table for at least 5 points plotted correctly at end of interval **or** ft from sensible table (ft from a table with only one arithmetic error that may be continued through table) for all 6 points plotted consistently within each interval in the **freq table** at the correct height
		Correct answer scores full marks (unless from obvious incorrect working)	correct cf graph		A1	accept curve or line segments accept curve that is not joined at (10, 0)
	(c)			3	M1ft	a line up from 46 to their graph **and** a line across to the vertical axis **or** a mark on the curve at the correct point **and** a mark on the vertical axis at the correct point **or** a reading of 57 - 59 from their cf graph **or** a value of 21 – 23 **or** a correct value for their graph must be ascending (could be a lobf)
		eg (over 46 =) $\frac{80-"58"}{80}(\times 100)(=0.275)$ **or** (under 46 =) $\frac{"58"}{80}(\times 100)(=0.725 \text{ or } 72.5)$			M1ft	method to find the fraction or percentage of people aged over or under 46 ft from their graph **or** a value in the range 0.26 - 0.29 or 0.71 - 0.74 or 71 (%) - 74(%)
		Correct answer scores full marks (unless from obvious incorrect working)	28		A1ft	accept 26 – 29, ft their cf graph
						Total 6 marks

13	20 (−) 12		2	M1	for both values unambiguously identified
	Correct answer scores full marks (unless from obvious incorrect working)	8		A1	
					Total 2 marks

16	(a)	$x(x+4)=12(12+x)$	Shown	3	M1
		$x^2+4x=144+12x$			M1 for at least one correct expression
					A1 for completion
	(b)	$x=\frac{--8\pm\sqrt{(-8)^2-4\times1\times(-144)}}{2}$ or $\frac{8\pm\sqrt{8^2-4\times1\times(-144)}}{2}$ or $\frac{8\pm\sqrt{-8^2-4\times1\times(-144)}}{2}$	20.6	4	M1 M1 for correctly substituting into the quadratic formula condone one sign error in substitution; allow partial correct evaluation
		$\frac{8\pm\sqrt{640}}{2}$ **or** $\frac{--8\pm\sqrt{(-8)^2--576}}{2\times1}$ **or** $\frac{8\pm8\sqrt{10}}{2}$ NB denominator must be 2×1 or 2 **and** there must be evidence for correct order of operations in the numerator Allow + instead of ± in the formula			M1 If the first M1 is awarded and an answer of 16.6.... or $4+4\sqrt{10}$ seen award this M mark
					A1 (dep on M1) 16.6….
					B1 (dep on M1) 20.6 - 20.65 ft
					Total 7 marks

17	FDs are 2, 3, 2.8, 0.7, 0.8	Correct histogram	3	M1 for any two correct FD calculations (can be implied by at least two correct bars)
				M1 for any three correct FDs (can be implied by at least three correct bars)
				A1 fully correct histogram
				(SC: B2 for all five bars of correct width with heights in the correct ratio)
				(SC:B1 for three bars of correct width with heights in the correct ratio)
				Total 3 marks

Question	Working	Answer	Mark	Notes
20	eg 4 × 5 + 1 × 10 = 30 small squares for 6 babies **or** 30 ÷ 6 **or** 5 small squares represent 1 baby **or** height of first bar $=\frac{4}{0.5}$ (= 8) **or** height of last bar $=\frac{2}{1}$ (=2) **or** 1 small square vertically = FD of 2 **or** 1cm vertically = FD of 10 oe		3	M1 Start working with area being proportional to frequency or show the height of the first or last bar or show a correct scale on the frequency density scale, with no inconsistent values. eg could be awarded by seeing total of little squares ÷ 5 oe
	eg (4 × 5 + 20 × 4 + 25 × 2 + 15 × 4) ÷ 5 **or** 4 + 40 × 0.4 + 50 × 0.2 + 30 × 0.4 **or** 4 + 16 + 10 + 12 oe			M1 Fully correct method, allow one error in products but must be the sum of 4 parts
		42		A1
				Total 3 marks

Question	Working	Answer	Mark	Notes
19	At least 2 of: 2.5 × 2 (=5) **or** 4 × 3 (=12) **or** 3.4 × 5 (=17) **or** 2.2 × 5 (=11) **or** (1 ×) 15 **or** (1 ×) 10 (=10) **or** e.g. at least 2 of 100, 240, 340, 220, 300 or 200			M1 for working with area of at least 2 bars could be using freq density × mins **or** use of counting squares or blocks
	2.5 × 2 + 4 × 3 + 3.4 × 5 + 2.2 × 5 + (1 ×) 15 **or** 5 + 12 + 17 + 11 + 15 (=60) **or** e.g. 100 + 240 + 340 + 220 + 300 (=1200)			M1 for method to find total number of people (allow one error) **or** total number of squares/blocks for method used (allow one error)
		$\frac{1}{6}$ oe	3	A1 for $\frac{1}{6}$ **or** $16.\dot{6}\%$ **or** $0.\dot{1}\dot{6}$ or 1 in 6 (percentage or decimal rounded or truncated to 3 or more sig figs)

Question	Working	Answer	Mark	Notes
12	0, 4, 6, 9, 17, 21, 32, 42, 51, 69, 102	45	3	M1 for identifying 6 or 51 from ordered list **or** attempt to find 3rd and 9th seen (from an ordered list) M1 for identifying 6 **and** 51 A1 for 45
13	1 + 0.65 + 1.22 (=2.87) or 100 + 65 + 122 (=287) 861 ÷ 2.87 or (861 ÷ 287) × 100 oe	300	3	M1 oe Note: 861÷3=287 is M0 M1 A1
14 (a)(i)		a^2	1	B1
(ii)		ab^4	1	B1
(iii)		$\frac{1}{3}b$	1	B1oe
(b)	177 147 ÷ 2187 (= 81) or $a = 81$ 2187 ÷ 81 (= 27) or $b = 27$	$x = 4$, $y = 3$	3	M1 or $x + y = 7$, M1 $2x + y = 11$ A1 $x = 4$ **and** $y = 3$

19		15 ÷ 20 (=0.75) 48 ÷ 15 (=3.2) 21 ÷ 5 (=4.2) 16 ÷ 10 (=1.6)	correct histogram	3	B3	For a fully correct histogram [If not B3 then B2 for 3 correct frequency densities (can be implied by heights) or 3 correct bars drawn If not B2 then B1 for 2 correctly calculated frequency densities (can be implied by heights) or 2 correct bars drawn.]
						Total 3 marks

Question	Working	Answer	Mark	Notes
12	180 – 2 × 66 (= 48) (360 – "48") ÷ 2 (= 156) 180 – "156" (= 24) 360 ÷ "24"		3	M1 Could be marked on diagram M1ft Final stage of calculation
	Alt : 180 – 2 × 66 (= 48) 360 ÷ (0.5 × "48")			M1 Could be marked on diagram M1ft Final stage of calculation
	Alt:180 – 2 × 66 (= 48) (360 – "48") ÷ 2 (= 156) $\frac{180\,(n-2)}{n}$ = "156" "24"n = 360 or $\frac{180\,(15-2)}{15}$ (= 156)			M1 Could be marked on diagram M1ft Final stage of calculation or embedded correct answer.
		15		A1
				Total 3 marks

13	$\frac{h}{2}$ × (7+12) × 10 = 608 oe		3	M2 M1 for $\frac{h}{2}$ × (7 + 12) × 10
		6.4		A1
				Total 3 marks

14	5, 7, 11, 12, 13, 14, 15, 16, 17, 18, 18		3	M1 Ordering marks (allow 1 error)
	11 and 17 selected			M1 LQ = 11 and UQ =17 identified
		6		A1
				Total 3 marks

15 (a)		2, −1.5, −3, 0	2	B2 B1 for 2 or 3 values correct
(b)			2	M1ft At least 5 points plotted correctly ft from table dep on B1 in part (a)
				A1 For correct smooth curve.
				Total 4 marks

21	14 ÷ 10 (= 1.4) **or** at least two of (3.2 × 15 (=48) or 3.6 × 5 (=18) or 0.6 × 10 (=6) or 0.2 × 20 (=4) **or** at least two of (140, 480, 180, 60, 40) **or** $\frac{14}{140} = \left(\frac{1}{10}\right)$		3	M1	for any one correct frequency density or $1cm^2 = 2.5$ or association of area with frequency eg one small square = 0.1 (on vertical axis)
	14 + 3.2 × 15 + 3.6 × 5 + 0.6 × 10 + 0.2 × 20 **or** 14 + 48 + 18 + 6 + 4 **or** (140 + 480 + 180 + 60 + 40) × $\frac{1}{10}$ **or** 900 × $\frac{1}{10}$			M1	for any correct method Allow one error in their total (error may include missing a total for a bar)
		90		A1	answer from correct working
					Total 3 marks

20	(a)(i)		(−6, 1)	2	B1
	(ii)		(−2, −4)		B1
	(b)	(−1, 6), (3, −2), (7, 6)	Fully correct graph	2	B2 for a fully correct graph (B1 for a V shape with least value at (3, −2))
	(c)		−3, 4	2	B2 for 2 correct values in any order (B1 for 1 correct value)
					Total 6 marks

21	16 ÷ 0.5 (= 32) or a correct value on the FD scale or 10 small squares =1 watermelon oe 25 small squares (1 large square) =16 ÷ 6.4 = 2.5 watermelon oe			M1 for use of area to represent frequency or one correct frequency from the 4 remaining bars
	15 × 1 + 16 + 23 × 1 + 30 × 1 + 12 × 1.5 **or** 15 + 16 + 23 + 30 + 18 **or** 16 + 0.1 × (15 × 10 + 23 × 10 + 30 × 10 + 12 × 15) oe **or** (150 + 160 + 230 +300 +180) × 0.1 oe **or** (6 + 6.4 + 9.2 + 12 + 7.2) × 2.5 oe			M1 (dep on M1) for a fully correct method, allow one error in products or number of squares but must be the sum of 5 parts
		102		A1
				Total 3 marks

12	216 or 2.16 or 10^{120} or 10^{122} or $6^3 \times 10^{40\times3}$		3	M1 or for digits 216
	216×10^{120} oe or or 2.16×10^n where $n \neq 122$			M1
		2.16×10^{122}		A1
				Total 3 marks

13		$x \geq -1$	1	B1 oe condone > in place of ≥
		$y \geq x$	1	B1 oe condone > in place of ≥
		$x + 2y \leq 8$	1	B1 oe condone < in place of ≤
				SCB1 if all inequalities reversed
				Total 3 marks

14	$12 \times \tan 5$ (=1.05) **or** $\tan 5 = \frac{'y'}{12}$ **or** $12\tan5$ **or** $\tan 85 = \frac{12}{'y'}$ **or** $\frac{12}{\tan 85}$ $\frac{y}{\sin 5} = \frac{12}{\sin 85}$ oe **or** (y =) 1.04986… oe		3	M1 oe correct expression using tan or the sine rule or $\sqrt{\left(\frac{12}{\cos 5}\right)^2 - 12^2}$ (= 1.04986…)
	(AB =) 2.6 + "1.05" oe			M1
		3.65		A1 allow awrt 3.65
				Total 3 marks

15	5 5 7 8 10 12 13 14 16 21 23		3	M1 For ordering the numbers Allow one error or omission in the list.
	16 & 7 identified for LQ and UQ			M1 For identifying 16 and 7 – may also have identified the median (12)
		9		A1
				Total 3 marks

20	(i)		(s + 2, t)	1	B1oe accept (2 + s, t)
	(ii)		(s, 3t)	1	B1oe accept (s, 3 × t) or (s, t × 3)
					Total 2 marks

21	10 ÷ 20 (= 0.5) or a correct value on the FD scale and no errors or 25 small squares = 5 children or 5 small squares = 1 child oe or 1 small square = 0.2 children oe or 29 oe or 48 oe or 10 (associated with 75-80 bar)		3	M1
	(10 × 2.9) + (15 × 3.2) + (5 × 2) or 29 + 48 + 10 or (5.8 + 9.6 + 2) × 5 oe or (145 + 240 + 50) × 0.2 oe			M1for a fully correct method
		87		A1
				Total 3 marks

19	eg (7.5+2.5) − 6 = 4 large squares represents 8 trees **or** 5 × 37.5 + 5 × 12.5 – 10 × 15 = 100 small squares represents 8 trees 200 – 250 = 10 250 – 300 = 8 300 – 400 = 12 400 – 450 = 15 450 – 600 = 15 (or 450 – 500 = 5 or 500 – 600 = 10) 600 – 800 = 4		3	M1	oe eg 1 large square represents 2 trees **or** 12.5 small squares represents 1 tree **or** a frequency density axis scale where one large square vertically is FD of 0.04 with no contradictions **or** a correct frequency for any bar (could be seen on the diagram)
	$5 \times 2 + 2 \times 2$ **or** $\frac{10\times12.5+20\times2.5}{100}\times8$ oe **or** 100 × 0.1 + 200 × 0.02			M1	for a correct method to find the total number of trees greater than 500 cm.
		14		A1	
					Total 3 marks

Question	Working	Answer	Mark	Notes	
15			3	M1	4 and 34 clearly indicated – either in list or in working (condone 26 also indicated in list)
				A1	For IQR for team **A** = 34 – 4 (= 30)
		The IQR for Team **B** was higher than the IQR for Team **A** oe or Team **B** had an interquartile range of "12" more than team **A** **or** The runs scored were more spread out for Team **B** than for Team **A** oe **or** The runs for Team **A** were more consistent oe		B1ft	Must ft dep on IQR stated for team **A** Either comparing the IQR correctly or for giving a comparison in context about spread as long as not contradicted by further statements as this would be choice **NOT** Team **B** scored more runs than team **A** The average score of **B** is higher than the average score of **A** The IQR of **A** was 30 while the IQR of **B** was 42 The range of **B** was more than the range of **A**
					Total 3 marks

17	24 ÷ 20 (= 1.2) or a correct value on the FD scale or 10 small squares = 1 orange or 25 small squares (1 large square) = 24 ÷ 9.6 = 2.5 oranges oe **or** 9 or 18 or 27 correctly assigned **or** $\frac{3x}{4}+\frac{y}{3}$ where x is their frequency of 3rd bar and y is their frequency of 4th bar		3	M1 for use of area to represent frequency **or** one correct frequency from the $\frac{1}{3}$ of 4th bar (9) or $\frac{2}{3}$ of 4th bar (18) or The 4th bar (27) [NOT 3rd bar = 44] or A method to show the student is finding $\frac{3}{4}$ of 3rd bar + $\frac{1}{3}$ of 4th bar (frequencies to be seen on diagram or identified in working)
	eg (15 × 2.2) + (5 × 1.8) oe or 33 + 9 or 44 + 27 – 11 – 18 or (330 + 90) ÷ 10 oe or (13.2 + 3.6) × 2.5 oe			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	42		A1
				Total 3 marks

22	eg 14 ÷ 5 (= 2.8) or a correct value on the FD scale or 10 small squares =1 adult oe or 1 large square = 2.5 adults oe or 51 **and** 8 assigned to correct bars (distances)		3	M1 for finding the frequency density **or** for finding the number of adults for squares **or** use of counting squares or blocks
	eg 14 + (15 × "3.4") + (20 × "0.4") (= 73) oe or 100 – [14 + (15 × "3.4") + (20 × "0.4")] (= 27) oe 14 + 51 + 8 (= 73) oe or 100 – [14 + 51 + 8] (= 27) oe or (140 + 510 + 80) × 0.1 (= 73) oe or [1000 – (140 + 510 + 80)] × 0.1 (= 27) oe or (140 + 510 + 80) (= 730) oe or [1000 – (140 + 510 + 80)] (= 270) oe or (5.6 + 20.4 + 3.2) × 2.5 (= 73) oe or [40 – (5.6 + 20.4 + 3.2)] × 2.5 (= 27) oe			M1 for a method to find the area of the bars given or for a method to find the missing area
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	Correct height of bar at 2.7 and correct width		A1 for correct bar(s) with frequency of 27 SC B2 for a bar of height 2.7 from 0 – 15 SC B2 for a bar of height 1.8 from 0 – 15
				Total 3 marks

16	5 ÷ 2 (= 2.5) oe 12 ÷ 3 (= 4) 18 ÷ 5 (= 3.6) oe 14 ÷ 10 (= 1.4) oe 9 ÷ 15 (= 0.6) oe		3	M1	for 3 correct frequency densities or 3 correct bars
				M1	for 4 correct frequency densities or 4 correct bars
	Correct answer scores full marks (unless from obvious incorrect working)	completely correct histogram		A1	completely correct histogram use overlay **SC**: award B2 for all 5 bars of correct width with heights in the correct ratio (eg drawn at 1.25, 2, 1.8, 0.7, 0.3)
					Total 3 marks

17	freq density × mins 10 × 2.5 (= 25) 5 × 4 (= 20) 15 × 3.6 (= 54) 20 × 0.5 (= 10) 10 × 1.7 (= 17) 10 × 0.5 (= 5) (area of 40 to 50 bar) counting cm^2 2 × 5 (= 10) 1 × 8 (= 8) 3 × 7.2 (= 21.6) 4 × 1 (= 4) 2 × 3.4 (= 6.8) 2 × 1 (= 2) (area of 40 to 50 bar)	counting small squares 10 × 25 (= 250) 5 × 40 (= 200) 15 × 36 (= 540) 20 × 5 (= 100) 10 × 17 (= 170) 10 × 5 (= 50) (area of 40 to 50 bar)		3	M1 for finding the area of at least 2 bars either using freq density × mins **or** use of counting small squares or cm^2 Values may be seen on the diagram 22 or 220 or 8.8 implies M1
	(10 × 2.5) + (5 × 4) + (15 × 3.6) + (20 × 0.5) + (10 × 1.7) (= 126) **or** "25" + "20" + "54" + "10" + "17" (= 126) **or** "250" + "200" + "540" + "100" + "170" (= 1260) **or** "10" + "8" + "21.6" + "4" + "6.8" (= 50.4)				M1 for method to find total number of people (allow one error or omission) **or** total number of small squares/ cm^2 for method used (allow one error or omission)
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{11}{63}$			A1 oe eg $\frac{22}{126}$ or $\frac{220}{1260}$ or 0.174(60…) or 0.175 or 17.4(60…)% or 17.5% or 22 out of 126 If $\frac{22}{126}$ is seen in the workings and 22 is on the answer line, award M2A0
					Total 3 marks

19	eg $5 \times 2x + 10 \times x = 160$ **OR** $160 \div 2$ (= 80) [freq of one bar] **OR** $40 \times 5 + 20 \times 10$ (= 400) [total no. of sml squares] **OR** $160 \div 16$ (= 10) [students per $1cm^2$] **OR** $1cm^2 = 10$ students **OR** **e.g.** 5 small squares = 2 students oe			M1	for setting up an appropriate equation **OR** finding the area of the 2nd or 3rd bar **OR** finding the total number of small squares **OR** for finding the number of students per $1cm^2$ **or** $1cm^2 = 10$ students **OR** other appropriate scale e.g. 5 small squares = 2 students
	'x' = 8 **OR** 8 or 16 seen in the correct position on the vertical scale **OR** $160 \div$ "400" (= 0.4 oe)			M1	for finding frequency density **OR** method to find the frequency of the 1st, 4th or 5th bar (1st is 108, 4th is 90, 5th is 12)
	"7.2" × 15 + 160 + "6" × 15 + "2.4" × 5 **OR** 160 + "0.4" × (18 × 15 + 15 × 15 + 5 × 6)			M1	(dep on at least M1) for a complete method to find the total frequency (allow one error or one repeat but no omission)
		370	4	A1	
					Total 4 marks

Alternative Mark Scheme for Q13 [do not mix and match with above MS]					
13	15 × 4 (= 60)		5	M1	
	$\cos 35° = \frac{'60'}{AE}$ or $\sin 55° = \frac{'60'}{AE}$			M1	
	$(AE =) \frac{'60'}{\cos 35°}$ (= 73.2) or $(AE =) \frac{'60'}{\sin 55°}$ (= 73.2)			M1	dep 1st M1
	80 – '73.2'			M1	
		6.75		A1	accept 6.75 – 6.8
					Total 5 marks

14	(a)	35 37 38 39 41 42 43 44 45 47 47		3	M1	Ordering values (allow 1 error) error may include missing a value May be implied by correct values for LQ **and** UQ.
					M1	LQ = 38 **and** UQ = 45 identified
			7		A1	
	(b)		January and reason using IQR	1	B1	ft from part (a) January as the IQR is lower oe ignore irrelevant statements about the median if given in addition to correct statements about IQR.
						Total 4 marks

20	at least **two** of 3, 8, 5, 2 seen **or** at least **two** correct frequency densities from 0.6, 0.8, 1, 1.2, 0.4 **or** eg one cm on FD axis = 0.25 **or** eg top of FD axis labelled 2 **or** eg 1 plant = 20 small squares **or** total small squares in at least 2 bars (60, 160, 100, 240, 40) **or** total number of 1 cm squares for at least 2 bars (2.4, 6.4, 4, 9.6, 1.6) oe		4	M1 At least 2 frequencies for other bars **or** scale on FD axis **or** eg 20 small squares represents 1 plant oe
	3 + 8 + 5 + 12 + 2 (= 30) **or** adding the number of small squares in all bars: 60 + 160 + 100 + 240 + 40 (= 600) **or** adding the number of 1 cm squares in all bars: 2.4 + 6.4 + 4 + 9.6 + 1.6 (= 24) oe			M1 add up 5 frequencies (allow one error) or adding the number of small squares in all bars (allow one error) or adding the number of 1 cm squares in all bars (allow one error) oe
	$\frac{0.25\times"12"+"2"}{"30"}$ **or** $\frac{0.25\times"240"+"40"}{"600"}$ **or** $\frac{0.25\times"9.6"+1.6}{"24"}$ **oe**			M1 ft their figures dep on the previous M1
		$\frac{1}{6}$		A1 oe eg $\frac{100}{600}$ allow 0.16(66…) ie 2 dp truncated or rounded or better
				Total 4 marks

15 (a)	11 – 2		2	M1 2 and 11 clearly identified either in list or stated
	Working required	9		A1 dep on M1
(b) (i)		Kim as she has a higher median	1	B1 oe, ft their median if value given **Acceptable examples** Kim as she has a higher median Kim as/because her median is 11 and/but/whereas Rutger's is 8 Kim's median is 3 more (than Rutger's) Kim as Rutger's median is 3 less **Not acceptable examples** Kim's median is 11 and Rutger's is 8 Kim as she has a higher median and a lower IQR
(ii)		Kim as she has a smaller IQR	1	B1 oe, ft their part (a) **Acceptable examples** Kim as she has a smaller IQR Kim as/because her IQR is 5 and/but/whereas Rutger's is 9 Kim's IQR is 4 less (than Rutger's) Kim as Rutger's IQR is 4 more **Not acceptable examples** Kim's IQR is 5 and Rutger's is 9 Kim as she has a higher median and a lower IQR
				Total 4 marks

11	(a)			2	M1	for at least 2 of $12x^2$, $2x$, -20
			$12x^2 + 2x - 20$		A1	
	(b)	$12x^2 + 2x - 20 = 4$ oe		4	M1	ft, for equating their dy/dx to 4
		$12x^2 + 2x - 24 (= 0)$ **or** $6x^2 + x - 12 (= 0)$			M1	(dep on M1) ft their dy/dx in the form $ax^2 + bx$ $(+ c)$
		eg $(6x - 8)(2x + 3) (= 0)$ **or** $(3x - 4)(2x + 3) (= 0)$ **or** $x = \frac{-2 \pm \sqrt{(2)^2 - (4 \times 12 \times -24)}}{2 \times 12}$			M1	for solving their three-term quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as eg $\frac{-2 \pm \sqrt{4 + 1152}}{24}$ oe)
		Working required	$\frac{4}{3}, -\frac{3}{2}$		A1	(dep on M2) oe, allow 1.33(3...) for $\frac{4}{3}$, both values – isw any attempt to find y coordinates
						Total 6 marks

12	(a)		28	1	B1	allow 27.5 − 28.5
	(b)		14	1	B1	cao
	(c)			2	M1	for a reading of 38 from vertical axis **or** 50 – (their reading from a height of 35)
		Correct answer scores full marks (unless from obvious incorrect working)	12		A1	cao
						Total 4 marks

18	140 – (23 + 18 + 14) (= 85) **and** state the area of the 2 given bars, eg 34 (1 cm) squares or 8.5 large squares or 850 small squares oe **OR** 23 ÷ 5 (= 4.6 oe) **or** 18 ÷ 10 (= 1.8 oe) **or** 14 ÷ 20 (= 0.7 oe)		4	M1
	Use of frequency density for the given bars eg "85" ÷ 34 = 2.5 [(1 cm) square = 2.5 people] or "85" ÷ 8.5 = 10 [1 large square = 10 people] or "85" ÷ 850 = 0.1 [1 small square = 0.1 people] or 10 small squares = 1 person **OR** 23 ÷ 5 (= 4.6 oe) **and** 18 ÷ 10 (= 1.8 oe) **and** 14 ÷ 20 (= 0.7 oe)			M1 **or** 2 correct values in the table **or** 2 or 3 correct bars
	Correct answer scores full marks (unless from obvious incorrect working)	$5 < t \leq 15$ has frequency 25 $15 < t \leq 30$ has frequency 60 Bars of 4.6, 1.8, 0.7 correctly drawn to scale		A2 (A1 for **4** of $5 < t \leq 15$ has frequency 25 $15 < t \leq 30$ has frequency 60 bar of 4.6, bar of 1.8, bar of 0.7)
				Total 4 marks

22	e.g. 20 × 9 (= 180) or 20 × 0.9 (= 18) or 20 × 1.8 (= 36) or (4 × 25) + (4 × 20) (= 180) oe or 4 × 0.9 (= 3.6) or 4 × 1.8 (7.2)		4	M1	for a method to find the area of the 55 - 75 bar
	e.g. 5 × 16 + 5 × 50 + 10 × 33 + 10 × 19 + 25 × 9 (= 1075) or 5 × 1.6 + 5 × 5 + 10 × 3.3 + 10 × 1.9 + 25 × 0.9 (= 107.5) or 5 × 3.2 + 5 × 10 + 10 × 6.6 + 10 × 3.8 + 25 × 1.8 (= 215) or (3×25 + 5) + (10×25) + (12×25 + 2×15) + (6×25 + 2×20) + (5×25 + 5×20) (= 1075) or 1 × 1.6 + 1 × 5 + 2 × 3.3 + 2 × 1.9 + 5 × 0.9 (= 21.5) or 1 × 3.2 + 1 × 10 + 2 × 6.6 + 2 × 3.8 + 5 × 1.8 (= 43)			M1	for a method to find the total area **Using 5 bars** (products or areas) eg 80 + 250 + 330 + 190 + 225 or 16 + 50 + 66 + 38 + 45 allow one error or omission **Using 6 bars** (products or areas) eg 80 + 250 + 330 + 190 + 45 + "180" or 16 + 50 + 66 + 38 + 9 + "36" allow one error or omission
	e.g. $\frac{180}{1075}(\times 100)$ or $\frac{18}{107.5}(\times 100)$ or $\frac{36}{215}(\times 100)$ or $\frac{3.6}{21.5}(\times 100)$ or $\frac{7.2}{43}(\times 100)$ or 0.167(441…) (× 100)			M1	for a method to find a fraction aged 55+ or percentage aged 55+ using all **correct** values only
	Correct answer scores full marks (unless from obvious incorrect working)	16.7		A1	awrt 16.7
					Total 4 marks

14	(a)	20 20 22 23 25 26 26 27 28 29 29		3	M1 for ordering the numbers Allow one omission or error in the list
		22 and 28 identified for LQ and UQ eg 20 20 <u>22</u> 23 25 26 26 27 <u>28</u> 29 29			M1 for identifying 22 **and** 28 (22 **and** 28 implies the first M1)
		Correct answer scores full marks (unless from obvious incorrect working)	6		A1
	(b)		<u>Akari</u> and reason using IQR	1	B1 ft from part (a) Akari as the IQR is lower/smaller oe (IQR must be part of the statement) Must have a value in (a) to compare the IQRs
					Total 4 marks

15	$\sqrt[3]{\frac{27}{64}}\left(=\frac{3}{4}=0.75\right)$		3	M1 for finding the probability of a head
	$\left(1-"\frac{3}{4}"\right)^3$ or $\left(\frac{1}{4}\right)^3$ or 0.25^3			M1 for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{1}{64}$		A1 oe Accept 0.015(625) or 1.55(625)% truncated or rounded
				Total 3 marks

13	(a)		25	1	B1 Allow 25 – 25.5
	(b)	80 – [74, 76] (= [4, 6]) or 80 – (their value from a correct method) $\frac{"[74,76]"}{80}\times 100 (=[92.5,95])$		3	M1 Allow a clear method to read off from cf diagram at 50 seconds and subtract this value from 80 **or** read the value and use a method to find this as a percentage of 80
		$\frac{"[4,6]"}{80}\times 100$ (=[5, 7.5]) oe or $100-\left(\frac{"[74,76]"}{80}\times 100\right)$ oe or "[4, 6]" ÷ 0.8 oe			M1ft if previous M1 awarded
		Working required	6.25		A1 dep on M1 Allow range 5 – 7.5
					Total 4 marks

18	eg two from 1.5 × 10 (= 15) or 0.8 × 15 (= 12) or 4 × 5 (= 20) or 2.5 × 30 (= 75) or 4.6 × 5 (= 23) or eg two from 15 or 12 or 20 or 75 or 23 **or** eg two from 150 or 120 or 200 or 750 or 230 or eg two from 6 or 4.8 or 8 or 30 or 9.2		4	M1 for at least two correct frequencies **or** for counting squares or blocks
	eg 1.5 × 10 + 0.8 × 15 + 4 × 5 + 2.5 × 30 + 4.6 × 5 (= 145) or 15 + 12 + 20 + 75 + 23 (= 145) **or** 150 + 120 + 200 + 750 + 230 (= 1450) 6 + 4.8 + 8 + 30 + 9.2 (= 58) **or** $\frac{1}{3}\times"12"+"20"+"75"(=99)$ 4 + 20 + 75 (= 99)			M1 for a method to find the number of students in each time interval with an intention to add Allow one error **or** for a method to find the total number of squares or blocks oe with an intention to add Allow one error **or** for a correct method to find the frequency between 20 and 60 minutes eg 4 + 20 + 75 M2 for a value of 99 for 20 – 60 minute interval
	eg $\frac{0.8\times5+"20"+"75"}{"15"+"12"+"20"+"75"+"23"}$ or $\frac{\frac{1}{3}\times"12"+"20"+"75"}{"145"}$ **or** $\frac{\frac{1}{3}\times"120"+"200"+"750"}{"1450"}$ or $\frac{\frac{1}{3}\times"4.8"+"8"+"30"}{"58"}\left(=\frac{39.6}{58}\right)$			M1 for a complete method Allow the one error in the previous M mark to follow through
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{99}{145}$		A1 oe but must be a fraction
				Total 4 marks

20	(frequency density =) 75 ÷ 100 (= 0.75) **or** any one correct value marked on the FD axis **or** uses their own linear FD scale to find the area of at least one of the third, fourth or fifth bars **OR** eg 1 (large) box / 1 (large) square = 12.5 books oe **or** 5 (sml) squares = 2.5 books **or** 1 (sml) square / 1 box = 0.5 books		4	M1	for a correct calculation of frequency density **or** a correct value on the frequency density axis **or** use of their own linear frequency density scale to find the area of at least one of the third, fourth or fifth bars **OR** or a correct measure of scale Implied by a correct frequency for the third (250), fourth (125) or fifth (50) bar	M3 for any complete method that relies only on counting squares, eg counting large squares: $\frac{4+10+2}{6+18+20+10+4}$ Allow one error in number of squares in each of numerator and denominator but do not allow any omissions Must use a consistent method for the award of more than one mark
	eg using frequency densities 75 + (“2.25” × 100) + (“1” × 250) + (“2.5” × 50) + (“0.25” × 200) (= 75 + 225 + 250 + 125 + 50 = 725) **OR** eg using a measure of scale (eg large squares) (6 + 18 + 20 + 10 + 4) × “12.5” (=725) oe **OR** eg total no. of large squares = 6 + 18 + 20 + 10 + 4 (=58) **or** total no. of sml squares = 150 + 450 + 500 + 250 + 100 (=1450)			M1	for a method to work out the total number of books **OR** the total number of squares Allow one error in a frequency density value, class width value or number of squares but not an omission Allow ft their own linear frequency density scale	
	eg using frequency densities (“1” × 50) + (“2.5” × 50) + (“0.25” × 100) (= 50 + 125 + 25 = 200) **OR** eg using a measure of scale (eg large squares) (4 + 10 + 2) × “12.5” (=200) oe **OR** eg no. of large squares = 4 + 10 + 2 (= 16) **or** no. of sml squares = 100 + 250 + 50 (= 400)			M1	for a method to estimate the number of books between 400g and 600 g **OR** the total number of squares between 400 g and 600 g Allow one error in a frequency density value, class width value or number of squares but not an omission Allow ft their own linear frequency density scale	
	Correct answer only scores full marks (unless from obviously incorrect working)	$\frac{200}{725}$		A1	oe eg $\frac{8}{29}$ or any correct decimal or correct percentage rounded or truncated to 2sf. NB $\frac{200}{725}$ = 0.27(58…)	
						Total 4 marks

Question	Working	Answer	Mark	Notes
10 a	Readings from graph at cf 20 and cf 60 eg. readings of 103 and 123	20.5	2	M1 A1 for answer in range 19 – 21
b	Reading from graph from time = 120 (=55) **or** 80 – 55 (=25) 0.35 × 80 (=28) **or** e.g. $\frac{80-"55"}{80}\times 100$ oe (=31(.25)) **or** $\frac{"55"}{80}\times 100$ oe (= 68(.75))	No with correct figures	3	M1 accept reading in range 55 – 56 M1 accept a value in the range 30 – 31.25 **or** a value in the range 68 – 70 for this mark unless clearly from incorrect working A1 eg. No with 28 and 25 **or** No with 31.25% (accept value in range 30% – 31.25%) **or** No with 68.75% and 65% (accept value in range 68% – 70%)
	Alternative scheme 0.65 × 80 (=52) Reading from graph from cf = 52 (=118) **or** Reading from graph from time = 120 (=55)	No with correct figures	3	M1 M1 accept reading in range 55 – 56 A1 eg. No with 118 (minutes) **or** No with 52 and 55

Question	Working	Answer	Mark	Notes
9 (a)		3, 19, 43, 53, 58, 60	1	B1
(b)				M1 ft from (a) if only one addition error for at least 4 points plotted correctly at end of interval **or** for all 6 points plotted consistently within each interval in the frequency table at the correct height (Eg. using values of 5, 15, 25 etc on *x* axis)
		correct cf graph	2	A1 accept curve or line segments accept curve which is not joined to (0,0)
(c)	15 and 45 indicated on the cumulative frequency axis and readings taken from speed axis			M1 ft from a cf graph for a correct method to find LQ and UQ and intention to subtract Eg for a correct reading from 45/45.75 and 15/15.25 from vertical axis to find LQ and UQ **and** an intention to subtract
		13 – 15	2	A1 accept 13 – 15 ft from a cf graph

Question		Working	Answer	Mark	Notes	
14	(a)		97	1	B1	96 - 98
	(b)		Correct graph	2	M1	for at least 4 points plotted correctly at end of interval **or** for all 6 points plotted consistently within each interval at the correct height
					A1	accept curve or line segments accept curve that is not joined to (0, 0)
	(c)		14	2	M1	A line drawn at CF = 60 to meet at least one curve or sight of "55" or "69"
					A1	13 - 15 ft candidate's CFD

17	(a)	e.g. one correct value on the vertical scale e.g. 1 at 1 cm high **or** 1 cm^2 = 5 passengers **or** 5 small squares = 1 passenger **or** (FD =) 24 ÷ 20 (= 1.2)		3	M1	For a correct scale on the vertical axis **or** a 1 cm × 1 cm square = 5 passengers **or** other correct scale **or** one correct product or frequency (other than the 24) **or** (FD =) 24 ÷ 20 (= 1.2)
		10×0.4 (= 4) 10×1.8 (= 18) 5×6.4 (= 32) 15×2 (= 30) 20×0.8 (= 16)			M1	At least 3 correct products or frequencies (other than the 24) stated (could be seen on diagram)
			124		A1	
	(b)	e.g. 0.25 × 24 + 20 × 0.8 (= 22) **or** "1.2" × 5 + 20 × 0.8 (= 22)		2	M1	ft from (a)
			$\frac{"22"}{"124"}$		A1ft	oe (0.17(741...))
						Total 5 marks

12	(a)	E.g. 56 – 38		2	M1 for subtracting readings from 60 and 20 oe
			18		A1 for answer in the range 17 – 19
	(b)	[40.5, 43]		3	B1
		'42' ÷ 0.6 oe			M1 for complete method to find the number of men
			70		A1
					Total 5 marks

13		$0.14 = \frac{56}{w^2}$ oe **or** 56 ÷ 0.14 (= 400)		4	M1 for using the given formula correctly
		$\sqrt{\frac{56}{0.14}}$ **or** $\sqrt{'400'}$ (=20)			M1 for a method to find w
		'20' × '20' × '20' oe			M1 (dep on M2) for a method to find the volume of the cube
			8000		A1
					Total 4 marks

14	(a)	(0.5 ×) 9.3 × 14.7 × sin106 **or** (9.3 × cos 16) × 14.7 **or** (9.3 × sin 74) × 14.7		2	M1 for applying the area of a triangle formula using correct values (to find half of the area of the parallelogram) **or** for a correct method to find the area of the parallelogram
			131		A1 awrt 131
	(b)	(GE^2 =) $9.3^2 + 14.7^2 - 2 \times 9.3 \times 14.7 \times \cos 106$		3	M1 for the correct use of the cosine rule
		377(.9….) **or** 378 **or** 86.49 + 216.09 + 75.3… **or** 302.58 + 75.3….			M1 (dep on M1)for the correct order of operations
			19.4		A1 for 19.4 – 19.5
					Total 5 marks

11	a		4.35	1	B1 accept 4.349
	b		4.25	1	B1 cao
	c	17.5 **or** 9.35 **or** $e - f$ where $17 < e \leq 17.5$ and $9.35 \leq f < 9.4$			M1
			8.15	2	A1
					Total 4 marks

12	a		23	1	B1 accept 22 – 24
	b	e.g. 29 − 17			M1 For subtracting readings from 15 and 45
			12	2	A1 accept 10 – 14
	c				B1 ft comparison of the medians
			Two comparisons (at least one of which must be in context)	2	B1 ft comparison of the IQR **Note: to award 2 marks at least one comparison must be in context**
					Total 5 marks

18 (a)	$(0.7 \times 10) + (3.4 \times 5) + (1 \times 9) + (2.5 \times 6) + (4.8 \times 15)$ $= 7 + 17 + 9 + 15 + 72 (= 120)$ no. of sml squares = $(10 \times 7) + (5 \times 34) + (9 \times 10) + (6 \times 25) + (15 \times 48)$ $= 70 + 170 + 90 + 150 + 720 (= 1200)$ **or** all correct values in bars oe not added		3	M1	for a correct method to work out the total area eg total frequency or number of small squares or other correct method (allow one error in method) [count use of 25 for 24 as one error] **or** all correct values in bars oe not added
	$(1 \times 7) + (2.5 \times 6) + (5 \times 4.8) = 7 + 15 + 24 (= 46)$ or no. of sml squares $(48 \times 5) + (6 \times 25) + (7 \times 10) = 240 + 150 + 70 (=460)$			M1	for a correct method to work out the area between 17 minutes and 35 minutes eg using frequency density or number of small squares oe
	$\frac{46}{120}$	$\frac{46}{120}$		A1	for $\frac{46}{120}$ oe (allow 2 dp or better 0.3833... or 38% or better)
(b)			2	M1	for $\frac{n}{15}$ where $n < 15$ or $\frac{q}{720}$ where $q < 720$ or $\frac{r}{72}$ where $r < 72$ or $\frac{9}{m}$ where $m > 9$ or $\frac{432}{p}$ where $p > 432$ $\frac{43.2}{t}$ where $t > 43.2$
		$\frac{9}{15}$		A1	$\frac{9}{15}$ oe
					Total 5 marks

18	(a)	35 ÷ 10 (=3.5), 45 ÷ 15 (=3), 75 ÷ 15 (=5), 40 ÷ 20 (=2), (8 ÷ 10) = 0.8		3	M1	for any two correct fd **or** two correct bars drawn of different widths
		35 ÷ 10 (=3.5) **and** 45 ÷ 15 (=3) **and** 75 ÷ 15 (=5) **and** 40 ÷ 20 (=2) **and** (8 ÷ 10) = 0.8			M1	for all correct fd **or** at least 3 correct bars drawn
					A1	for a fully correct histogram with 'frequency density' (or fd) and scale on the axis labelled or appropriate key (SC: B2 for all five bars drawn of correct width with heights in the correct ratio) (SC: B1 for three bars drawn of correct width with heights in the correct ratio)
	(b)	10 × 5 + 40 + 8 or $\frac{2}{3}$ × 75 + 40 + 8		2	M1	ft from their histogram in (a) for a correct method
			98		A1	
						Total 5 marks

11	(a)		9, 28, 45, 63, 76, 80	1	B1	
	(b)			2	B2	for a correct cf graph with points at ends of intervals and joined with a curve or line segments If not B2 then B1 for 5 or 6 of their points (ft from a table with only one arithmetic error) at ends of intervals and joined with a curve or line segments **OR** for 5 or 6 points plotted correctly at ends of intervals not joined **OR** for 5 or 6 of their points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with a curve or line segments
	(c)	e.g. reading across from 40 and reading down		2	M1	ft reading from a cf graph provided method is shown
			35 - 38		A1	ft from their cf graph
						Total 5 marks

11 (a)			2	M1	for use of cf at 45
		146		A1	accept in the range 145 – 147
(b)	93.75 ÷ 3.75 (= 25)		3	M1	
	Using cf diagram at 90 – "25" (= 65)			M1	for use of cf at "65"
		151		A1	accept in the range 150 – 152
					Total 5 marks

18	E.g. 28 ÷ 2 (= 14) **or** 1cm^2 = 2 students		5	M1	for method to find the frequency density for the first bar **or** any correct value on the fd axis **or** can be implied by a correct frequency (30 or 24 or 36)
	2 × 20 (= 40) 1 × 30 (= 30) 1 × 24 (= 24) 3 × 12 (= 36) **or** 40, 30, 24, 36			M1	for method to find the missing frequencies (at least 3 correct)
	1 × 28 + 3 × '40' + 4.5 × '30' + 5.5 × '24' + 7.5 × '36' (= 685) or 28 + 120 + 135 + 132 + 270 (= 685)			M1	(indep ft) for a method to find the total (mid value × frequency) for at least **4** products using **their** values in the table (need not be evaluated) Allow consistent use of end points for at least **4** products which must be added
	'685' ÷ (28 + '40' + '30' + '24' + '36') (= 4.335...) or '685' ÷ 158 (= 4.335...)			M1	(dep on previous M1)
		4.34		A1	accept 4.33 - 4.34
					Total 5 marks

18	(a)	eg height of first bar labelled as FD 4 **or** one 1 cm by 1 cm square = 5 people **or** 1 line of 5 small squares = 1 person **or** one 2cm by 2 cm square = 20 people etc		2	M1	for the use of frequency density – ie that area is proportional to frequency – with either a correct frequency density unambiguously labelled on axis **or** for an area representing a correct number of people **or** 2 correct frequencies completed
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	35, 39, 56		A1	All 3 correct
	(b)		Correct bar	1	B1	Width from 30 – 60 and height 1 cm
	(c)	0.5 × "56" + 30 (= 58) **or** 40 + "35" + "39" + "56" + 30 (= 200)		2	M1ft	follow through **their** stated value for $20 \leq d < 30$ for total greater than 25 or ft **their** 3 values in the table for total
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{58}{200}$		A1ft	ft dep on a completed table oe eg $\frac{29}{100}$ **or** 0.29 **or** 29%
						Total 5 marks

11	(a)		(12), 36, 64, 76, 86, 90	1	B1
	(b)			2	M1 ft from table for at least 5 points plotted correctly (± 0.5 squares) at end of interval **or** ft from (CF) table for all 6 points plotted consistently (± 0.5 squares) within each interval in the **freq table** at the correct height
			Correct cf diagram		A1 accept curve or line segments accept graph that is not joined to (25, 0)
	(c)	E.g. reading at 42 minutes and reading at 52 minutes		2	M1 for correct use of 42 and 52, ft from a cum freq graph provided method is shown – e.g. a line vertically drawn to the graph from readings of 42 and 52 on the Time axis to meet the graph and then a horizontal line to the CF axis (even if wrongly read scale) **or** clear marks on the graph and CF axis that correspond to the correct readings **or** correct values from the CF axis
		Correct answer scores full marks (unless from obvious incorrect working)	25 – 29		A1 ft Accept a single value in range 25 to 29 or ft from their cumulative frequency graph provided method is shown
					Total 5 marks

14	(a)	0.8, 2.6, 1.9, 1.6, 0.3	Correct histogram	3	B3 fully correct histogram (B2 for at least 3 correct frequency densities or at least 3 correct bars **or** all five bars of correct width with heights in the correct ratio B1 for 2 correct frequency densities or 2 correct bars – but these bars must be of different widths, ie not 1st and 3rd) **or** three bars of correct width with heights in the correct ratio)
	(b)			2	M1 for $\frac{n}{40}$ where $n < 40$ or for $\frac{4}{m}$ where $m > 4$
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{4}{40}$		A1 for $\frac{4}{40}$ oe If M0 then SCB1 for $\frac{2}{35}$ (or 0.057…)
					Total 5 marks

<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th colspan="2">Notes</th></tr>
<tr><td>12</td><td>(a)</td><td></td><td>43.5 - 44.5</td><td>1</td><td>B1</td><td>±0.5 small square</td></tr>
<tr><td></td><td>(b)</td><td>eg reading of 48 - 49</td><td></td><td>2</td><td>M1</td><td>For correct method to start the question eg a vertical line from 55 up to the line and a horizontal line from the correct point on the curve or a mark on the curve at the correct point and a mark on the vertical axis at the correct point or a correct reading of 48 to 49</td></tr>
<tr><td></td><td></td><td>Correct answer scores full marks (unless from obvious incorrect working)</td><td>11 or 12</td><td></td><td>A1</td><td>Allow an answer of 11 or 12 (ie must be whole number)</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th>Time taken to shop in the market (m minutes)</th><th>Frequency</th></tr><tr><td>$0 < m \leq 10$</td><td>3</td></tr><tr><td>$10 < m \leq 20$</td><td>5</td></tr><tr><td>$20 < m \leq 30$</td><td>7</td></tr><tr><td>$30 < m \leq 40$</td><td>10</td></tr><tr><td>$40 < m \leq 50$</td><td>15</td></tr><tr><td>$50 < m \leq 60$</td><td>15</td></tr><tr><td>$60 < m \leq 70$</td><td>5</td></tr></table></td><td></td><td>2</td><td>B2</td><td>All values correctly filled in (NB: first 2 are already completed)
(B1 for 3 or 4 correct values from 7, 10, 15, 15, 5)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">Total 5 marks</td></tr>
</table>

Question	Working	Answer	Mark	Notes
	USE OVERLAY PROVIDED			
18 (a)	FD are: 6, 7, 5, 4, 1.8		3	M1 For at least two frequency densities correct or at least two correct bars
				M1 For at least 4 correct frequency densities or 4 correct bars
	A fully correct histogram gains full marks	Correct histogram		A1 Fully correct histogram SCB2 for all five bars of correct width with heights in the correct ratio (eg drawn at 0.6, 0.7, 0.5, 0.4, 0.18) SCB1 for three bars of correct width with heights in the correct ratio
(b)	$(9+\frac{2}{3}\times12)$ (= 17) oe eg 9 + 8 (= 17) or $55-(12+7+15+\frac{1}{3}\times12)$		2	M1 may be seen as numerator of fraction (ft their graph dep on M1 in (a))
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{17}{55}$		A1cao Or 0.30909…or 30.909….% (to at least 2 sf) SCB1 for $\frac{38}{55}$ (0.6909…)
				Total 5 marks

17	(a)	15 ÷ 15 (= 1) 18 ÷ 5 (= 3.6) 32 ÷ 20 (= 1.6) 4 ÷ 10 (= 0.4)	Correct histogram	3	B3	for a fully correct histogram If not B3 then B2 for 3 correct frequency densities (can be implied by heights) or 3 correct bars drawn If not B2 then B1 for 2 correctly calculated frequency densities (can be implied by heights) or 2 correct bars drawn
						SC: award B2 for all 4 bars of correct width with heights in the correct ratio (eg drawn at 0.5, 1.8, 0.8, 0.2) **SC:** award B1 for 3 bars of correct width with heights in the correct ratio
	(b)	eg $\frac{15}{20}\times 32(=24)$ **or** $\frac{5}{20}\times 32(=8)$ **or** $\frac{15}{20}\times 32+18(=42)$ **or** $32+18-\frac{5}{20}\times 32(=42)$		2	M1 ft	for a method to find an estimate for the number of students who took between 30 and 45 minutes **or** between 45 and 50 minutes **or** between 25 and 45 minutes ft incorrect histogram
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{42}{50}$		A1	oe eg $\frac{21}{25}$, 0.84, 84%
						Total 5 marks

13	(a)		7, 17, 29, 48, 66, 80	1	B1 cao
	(b)				M1 ft from (a) if only one addition error for at least 4 points plotted correctly at end of interval **or** for all 6 points plotted consistently within each interval in the frequency table at the correct height
			Correct cf graph	2	A1 accept curve or line segments accept curve that is not joined to (0,0)
	(c)		17 – 19	1	B1 ft from a cumulative frequency graph dep on M1 in (b)
	(d)	For correct use 20 and 60 (20.25 and 60.75) indicated (horizontal line or mark) on the cumulative frequency axis and their readings taken from time taken axis e.g. readings of 11–13 and 22–24 indicated on horizontal axis or 23 – 12			M1 for a complete method to ft from a cumulative frequency graph dep on M1 in (b)
			9 – 13	2	A1 accept 9 – 13 ft from a cumulative frequency graph dep on M1 in (b)
					Total 6 marks

11	a		8, 23, 40, 68, 101, 120	1	B1	
	b			2	M1	ft from table for at least 5 points plotted correctly at end of interval **or** ft from sensible table for all 6 points plotted consistently within each interval in the **freq table** at the correct height
			Correct cf graph		A1	accept curve or line segments accept graph that is not joined to (0,0)
	c		17 – 20	1	B1	ft their cf graph
	d	E.g. Reading at 23 minutes (= a) **and** then (120 – a) ÷ 120 × 100		2	M1	ft from their cf graph reading off at 23 minutes and a method to work out 120 minus this value as a percentage of 120
			25(%) – 29(%)		A1	ft from their cf graph dep on M1 seen
						Total 6 marks

15	(a)	63 ÷ 1.5 (= 42) **or** a correct value written on FD scale (10 small squares = FD 10) **or** 10 squares = 1 parcel or 1 big square = 2.5 parcels oe eg area = 18 × 5 + 15 × 42 + 10 × 24 + 10 × 30 + 20 × 8 (= 1420) 3.6 × 1 + 3 × 8.4 + 2 × 4.8 + 2 × 6 + 4 × 1.6 (= 56.8) (at least 3 bars correct for any method of summing area)		3	M1	For use of area related to frequency eg showing a correct unambiguous value on the frequency density scale or calculating the area in some form
		0.5 × 18 + 63 + 1 × 24 + 1 × 30 + 2 × 8 (9 + 63 + 24 + 30 + 16) oe eg "1420" ÷ 10 or "56.8" × 2.5 oe			M1	Total of 5 frequencies with just one error or Area of bars with just one error, with correct calculation to give frequency
			142		A1	
	(b)	0.75 × 24 (= 18) + 30 + 16 (= 64) oe Eg "their (a)" – (9 + 63 + 0.25 × 24) (= 64) (ft figures from (a) dep on M1 for (a))		3	M1ft	(dep on M1 in (a))if working with small squares they may get eg $\frac{640}{1420}$
		$\frac{"64"}{142}\times\frac{"63"}{141}$ (ft their value of 142 from (a))			M1	64 must come from correct working allow $\frac{"64"}{142}\times\frac{"64"}{142}$ (ft their value of 142 from (a))
			$\frac{672}{3337}$		A1	0.201 or better (0.20137…)
						Total 6 marks

12	(a)		7, 33, 57, 71, 78, 80	1	B1	
	(b)			2	B2	Fully correct cf graph – points at ends of intervals and joined with curve or line segments. If not B2 then B1(ft from a table with only one arithmetic error) for 5 or 6 of their points at ends of intervals and joined with curve or line segments **OR** for 5 or 6 points plotted correct at ends of intervals not joined **OR** for 5 or 6 points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments.
	(c)		21 – 24	1	B1ft	any value in range or ft their cf curve
	(d)			2	M1ft	eg reading of 72 – 74 or 6 – 8 could be seen as the numerator of a fraction ft their cf graph
			$\frac{8}{80}$		A1ft	oe, ft their cf graph fractional answers must have an integer numerator and denominator
						Total 6 marks

11	(a)		7, 17, 32, 64, 80	1	B1	values seen in table
	(b)			2	M1ft	for at least 4 points plotted correctly at end of interval **or** for all points plotted consistently within each interval of the associated frequency table (eg at 5, 15, 25, 35, 45 or 0, 10, 20, 30, 40) at the correct height. ft their table dep on one error only in the table
		(NB: a 'bar chart' type graph scores zero marks)	correct cf graph		A1	All points plotted correctly at end of interval (tolerance 1 small square – **there is an overlay**) and joined with a curve or line segments accept curve that is not joined at (0, 0).
	(c)	*Accept a single value in the range OR ft their cf graph*	33	1	B1ft	Accept a single value in range 32 – 34 **or** ft their cf graph
	(d)	NB: readings are 21 - 23 and 37 - 39 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Time axis at the correct points (or they can just show the correct readings))		2	M1ft	For correct use of LQ and UQ and subtraction, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Time axis(even if wrongly read scale) **or** clear marks on the graph and Time axis that correspond to the correct readings **or** correct values from the Time axis
		Accept a single value in the range OR ft their cf graph	16		A1ft	Accept a single value in range 15 to 17 or ft from their cumulative frequency graph provided method is shown eg subtraction of values that would be correct for their graph
						Total 6 marks

14	(a)		15, 31, 52, 66, 74, 80	1	B1	
	(b)			2	M1	ft from table for at least 5 points plotted correctly at end of interval **or** ft from sensible table for all 6 points plotted consistently within each interval in the **freq table** at the correct height
			Correct cf curve		A1	accept curve or line segments accept curve that is not joined at (50,0)
	(c)	*Correct answer scores full marks (unless from obvious incorrect working)*	73 – 75	1	B1ft	ft their cumulative frequency graph
	(d)	NB: readings are 62.5 – 64 and 85 – 86.5 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Time Taken axis at the correct points (or they can just show the correct readings))		2	M1ft	For correct use of LQ and UQ, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Time Taken axis (even if wrongly read scale) **or** clear marks on the graph and Time Taken axis that correspond to the correct readings **or** correct values from the Time Taken axis
		If answer is in the given range, then award the marks – unless from obvious incorrect working	21 to 24		A1ft	Accept a single value in range 21 to 24 or ft from their cumulative frequency graph provided method is shown
		Correct answer scores full marks (unless from obvious incorrect working)				**Total 6 marks**

13	(a)		4, 19, 39, 50, 56, 60	1	B1	
	(b)			2	B2	**(use overlay)** Fully correct cf graph – points at ends of intervals and joined with curve or line segments. If not B2 then B1(ft from a table with only one arithmetic error that may be continued through table) for 5 or 6 of their points at ends of intervals and joined with curve or line segments OR for 5 or 6 points plotted correctly at ends of intervals not joined OR for 5 or 6 points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments. (ignore part from 0 to first plotted point when looking at curve/line segments)
	(c)	*ft an increasing graph as student is asked to 'use your graph…'*	2.3 – 2.7	1	B1ft	Any value in range if an increasing graph is drawn (ft their graph reading across at 30 or 30.5)
	(d)	*ft an increasing graph (if reading can be taken) as student is asked to 'use your graph…'*		2	M1	For a correct method to take a reading at 3.7 kg eg 45 – 48 or a correct value for their graph (one square tolerance)
		*If a **correct** graph is drawn and answer is in the given range, then award the marks*	12, 13, 14 or 15		A1ft	Award full marks for an answer in the range if a correct cf graph is drawn and ft their increasing graph if value outside range Must be a whole number value (non-integer value gains M1 only)
						Total 6 marks

Question	Working	Answer	Mark	Notes
13* (a)		8, 21, 33, 50, 57, 60	1	B1
(b)	**USE OVERLAY** (NB A histogram/bar chart type graph scores zero marks unless a CF diagram is drawn over their histogram/bar chart) (Ignore any part of the graph before (10, 8))		2	M1 for at least 5 points plotted correctly at end of interval **or** ft from an ascending table (ft from a table with only one arithmetic error that may be continued through table) for all 6 points plotted consistently within each interval in the **freq table** at the correct height
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	Correct cf diagram		A1 for fully correct plotting with points joined accept curve or line segments accept curve that is not joined at (0, 0)
(c)		27 – 28	1	B1 accept answer in the range or ft an ascending graph
(d)	(60 –) 54		2	M1 ft for a line going up from the *x*-axis at 45 to the line and across to the *y*-axis **or** for a mark on the line at the correct point **or** for a correct reading from the vertical scale eg 54 or 53.5
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	5 or 6 or 7		A1 accept integer value 5 or 6 or 7 or ft from their ascending graph for an integer value
				Total 6 marks

Question		Working	Answer	Mark	Notes	
12		$\sin 32 = \frac{BD}{3.1}$ oe $(BD =) 3.1 \times \sin 32$ (= 1.6427...) $\cos 42 = \frac{"3.1\sin 32"}{AB}$ oe or $\frac{AB}{\sin 90} = \frac{"3.1 \sin 32"}{\sin 48}$ oe $AB = \frac{"3.1\sin 32"}{\cos 42}$ or $AB = \frac{"3.1 \sin 32"}{\sin 48}$	2.21	5	M1 M1 M1 M1 A1	A correct calculation involving *BD* Accept 1.6 or better Dep or (AD =) "1.6.. x tan 42 {= 1.479} Or (AB =) $\sqrt{"1.479"^2 + "1.6427"^2}$ 2.21053... (Accept 2.2 → 2.22)
						Total 5 marks

13	(a)	Plotting points from table at ends of interval (40, 6), (50, 20), (60, 56), (70, 84), (80,95), (90, 100) Points joined with curve or line segments	Correct cf diagram	2	M1 A1	$\pm{}^1/_2$ sq (at least 5 points plotted correctly) Or all points plotted consistently within each interval at the correct heights Accept cf graph which is not joined to (30,0)
	(b)	Use of graph at 50	58 – 59	2	M1 A1	Use of graph at 50 walkers No working shown and answer is within 58 – 59 award M1A1
	(c)	86 or 87 or 88 indicated on graph or stated 100 – "86" or 100 – "87" or 100 – "88"	$\frac{12}{100}$ oe $\frac{13}{100}$ oe $\frac{14}{100}$	3	M1 M1 A1	Use of their graph at 72 minutes Dep e.g. 12, 13 or 14 walkers 0.12 → 0.14 inc, oe
						Total 7 marks

14	(a)	x^0y^6	x^0y^6	2	B1B1	Allow B1 if $(x^3y^2)^3$ or $(x^{36}y^{24})^{0.25}$ seen on answer line
	(b)	$3^n = \frac{3^x}{3^{2y}}$	$n = x - 2y$	2	M1 A1	for a correct first step e.g. 3^{2y} or 3^{-2y}
						Total 4 marks

10	a		10, 26, 70, 99, 114, 120	1	B1
	b		correct cumulative frequency graph	2	B2 fully correct cf graph – points at ends of intervals and joined with curve or line segments If not B2 then B1 for 5 or 6 (ft from a table with only one arithmetic error) of their points at ends of intervals and joined with curve or line segments **OR** for 5 or 6 points plotted correctly at ends of intervals not joined **OR** for 5 or 6 of their points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments
	c				M1 For use of 30 and 90, or 30.25 and 90.75 (eg reading of 21 and 37 stated or indicated by marks on horizontal axis that correspond to 30 (or 30.25) and 90 (or 90.75) on the vertical axis or correct readings ft their cf graph provided method to show readings is shown)
			16	2	A1 accept 14 – 18, ft from their cf graph (ft provided method to show readings is shown)
	d				M1 For use of cf from number of minutes late being 48 (eg an indication by a mark on the vertical axis corresponding to 48 mins late or a correct reading ft their cf graph)
			9	2	A1 accept 7 – 10, ft from their cf graph
					Total 7 marks

Question		orking	Answer	Mark	Notes
12	(a)			2	M1 for at least 4 points plotted correctly at end of interval **or** for all points plotted consistently within each interval of the associated frequency table (eg at 2.5, 7.5, 12.5, 17.5, 22.5, 27.5 or 0, 5, 10, 15, 20, 25) at the correct height
		(NB: a 'bar chart' type graph scores zero marks)	correct cf graph		A1 All points plotted correctly at end of interval (tolerance 1 small square) and joined with a curve or line segments accept curve that is not joined at (0, 0).
	(b)	If answer is in the given range, then award the mark – unless from obvious incorrect working	10.5 to 12	1	B1ft accept answer in range 10.5 – 12 or ft *their* cumulative frequency graph (must be an ascending graph) (allow 1 small square tolerance)
	(c)	NB: readings are 5.5 – 7 and 15.5- 17 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 20 (or 20.25)and CF 60 (or 60.75) with an indication on the Distance axis at the correct points (or they can just show the correct readings))		2	M1ft For correct use of LQ and UQ, ft from a cum freq graph provided method is shown – eg a line horizontally to the graph from readings of CF 20 and CF 60 to meet the graph and then a vertical line to the Distance axis(even if wrongly read scale) **or** clear marks on the graph and Distance axis that correspond to the correct readings **or** correct values from the Distance axis
		If answer is in the given range, then award the marks – unless from obvious incorrect working	8.5 to 11.5		A1ft Accept a single value in range 8.5 to 11.5 or ft from their cumulative frequency graph provided method is shown
	(d)	**not in context**: office *B* workers have a higher median than office *A* workers oe **in context**: office *B* workers [tend to] travel further oe		2	B1 ft comparison of medians e.g. Office *B* workers travel further [but if they have a wrong median then correct comparison of this with the 15 km] (Must compare to median in (b))
		not in context: the IQR for office *A* workers is bigger than the IQR for office *B* workers oe **in context**: The distances for the office *A* workers are more spread out/more varied oe			B1 ft comparison of IQR eg Office *A* distances are more spread (must compare to IQR in (c)) **NB: To award both marks at least one comparison must be in context**
					Total 7 marks

13	(a)		7, 32, 52, 66, 74, 80	1	B1	
	(b)	*If a graph is ascending you can ft for the marks in parts (c) and (d)*		2	B2	**(use overlay)** Fully correct cf graph – points at ends of intervals and joined with curve or line segments. If not B2 then B1(ft from a table with only one arithmetic error) for 5 or 6 of their points **either** plotted correctly at ends of intervals not joined **or** plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments. (ignore curve/line from 0 to first plotted point)
	(c)		32-34	1	B1	Any value in range (ft their CF graph reading across at 40 or 40.5)
	(d)			3	M1	For a correct method to take readings at 18 and 65 (eg 6 and 77) even if not given values or error reading the CF scale (ft a CF graph if method shown)
		eg (77 – 6) × 0.6 oe			M1	ft dep on previous M1 for their **difference** (working must be shown if incorrect values used) ft finding 60% of their difference dep on previous M1
			42, 43, 44		A1	ft award full marks for an integer answer in the range if not from incorrect working and ft their CF graph if value outside range (but for this accuracy mark all readings must be correct) ft their graph but answer must be whole number (value rounded or truncated)
						Total 7 marks

11	(a)	*If a graph is ascending you can ft for the marks in parts (b), (c) an (d) – method should be shown by way of marks on the axes for all but the median in part (b)*	Correct cf graph	2	B2	**(use overlay)** Fully correct cf graph – points at ends of intervals and joined with curve or line segments. B1 for for 6 or 7 points plotted correctly at ends of intervals not joined OR for 6 or 7 points from table plotted consistently within each interval (eg at lower bound of interval or midpoint of interval) at their correct heights and joined with smooth curve or line segments. ignore the curve < age 20
	(b)		26 – 28	1	B1ft	If out of range ft their graph
	(c)	e.g. readings at 15 and 45 from the vertical axis eg LQ = 19 – 21 eg UQ = 45 - 47 (the reading at 45 is 45/46 so be careful with the award of this mark)		2	M1ft	For use of 15 and 45, or 15.25 and 45.75 (eg reading of 21 and 46 stated or indicated by marks on horizontal axis that correspond to 15 (or 15.25) and 45 (or 45.75) on the vertical axis or correct readings ft their cf graph provided method to show readings is shown)
			24 - 28		A1ft	Any value in range (if out of range ft their cf graph reading across at 15 and 45 oe but method must be shown)
	(d)	eg reading of 49 or 50 from cf axis		2	M1ft	For correct reading at 55 eg 50 (ft from incorrect graph if method shown (lines up and across))
		must be a whole number	10 or 11		A1ft	If out of range ft their cf curve if method shown
						Total 7 marks

13	(a)		7, 24, 42, 56, 66, 70	1	B1	Correct values for cumulative frequency
	(b)	**USE OVERLAY** (NB: a 'bar chart' type graph scores zero marks) (ignore any part of the graph before (10, 7))	6 points plotted at ends of intervals and joined with curve or line segments	2	B2	Fully correct graph. (B1 for 5 correct points plotted and joined or B1for 5 or 6 points plotted but not joined or B1 for 5 or 6 points plotted consistently within each interval (not at upper end) at their correct heights and joined eg plotted at 5, 15, 25, 35, 45, 55 For any of the B1 options, you can ft a table with just one error provided values are ascending)
	(c)	NB: readings are 16 – 18 and 36 – 38 (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating use of CF 17.5 and CF 52.5 with an indication on the distance axis at the correct points (or they can just show the correct readings))		2	M1ft	For a correct method to **allow** readings to be taken on the distance axis from cf 52.5 (or 53.25) and from cf 17.5 (or 17.75) oe Ft from their cf graph
		If a graph is drawn and answer is in the given range, then award the marks – unless from obvious incorrect working	18 - 22		A1ft	Accept a single value in range or ft from their cf graph
	(d)			2	M1ft	A line up from 46 to the line and reading across – or a reading of 61 – 64 (can be non-whole number) from their cf graph
		If a graph is drawn and answer is in the given range, then award the marks – unless from obvious incorrect working	6 or 7 or 8 or 9		A1ft	ft their cf graph, must be a whole number
						Total 7 marks

10	$23 \times 4.7\ (= 108.1)$ oe			5	B1	(indep) May be embedded in $23 \times (4.7 + 2.5)$ $(= 165.6)$
	$\sin 30 = \frac{(x)}{5}$ or $\frac{(x)}{\sin 30} = \frac{5}{\sin 90}$ oe where x = height of trapezium	$5\cos 30\left(= \frac{5\sqrt{3}}{2} = 4.33...\right)$ **and** $\left(x^2 =\right) 5^2 - "5\cos 30"^2 (= 6.25)$			M1	
	$(x =) 5\sin 30 (= 2.5)$ oe or $(x =) \frac{5}{\sin 90} \times \sin 30 (= 2.5)$ oe	$(x =) \sqrt{5^2 - "5\cos 30"^2}\ (= 2.5)$			M1	
	$\frac{1}{2} \times (11 + 23) \times "2.5" (= 42.5)$ oe or $\left(\frac{1}{2} \times "2.5" \times (23 - 11)\right) + (11 \times "2.5") (= 42.5)$ oe or $\left(\frac{1}{2} \times "2.5" \times (23 - 11 - "4.3")\right) + (11 \times "2.5") + \left(\frac{1}{2} \times "2.5" \times "4.3"\right) (= 42.5)$ oe or $(11 \times "2.5") + \left(\frac{1}{2} \times 5 \times (23 - 11) \times \sin 30\right) (= 42.5)$ oe or $(23 \times "2.5") - \left(\frac{1}{2} \times "2.5" \times (23 - 11 - "4.3")\right) - \left(\frac{1}{2} \times "2.5" \times "4.3"\right) (= 42.5)$ oe or $(23 \times ("2.5" + 4.7)) - \left(\frac{1}{2} \times "2.5" \times (23 - 11 - "4.3")\right) - \left(\frac{1}{2} \times "2.5" \times "4.3"\right)$ oe				M1	for a correct method to find the area of the trapezium or the whole shape
	Working required		150.6		A1	dep on M1 awrt 150.6 Allow 151 Accept $\frac{753}{5}$
						Total 5 marks

11	(a)	**USE OVERLAY** (NB: a 'bar chart' type graph scores zero marks) (ignore any part of the graph before (5, 6))		2	B2	for a fully correct cf graph – points at ends of intervals and joined with curve or line segments. (B1 for 5 correct points plotted and joined or B1 for 6 correct points plotted but not joined or B1 for 5 or 6 points plotted consistently within each interval (not at upper end) at their correct heights **and** joined eg plotted at 2.5, 7.5, 12.5, 17.5, 22.5, 27.5
	(b)	Readings are [8 – 9.5] and [21 – 23] (but for this M1 these do not have to be correct if correct working is shown – eg lines or marks indicating a **correct use** of CF 15 and CF 45 with an indication on the time axis at the correct points (or they can just show the correct readings))		2	M1ft	for a correct method to **allow** readings to be taken on the time axis from cf 45 (or 45.75) and from cf 15 (or 15.25) oe ft from their cf graph
		If a graph is drawn, answer is in the given range then award the marks	11.5 – 13.5		A1ft	Accept a single value in the range **or** ft from their cf graph
	(c)	35 or lines or marks indicating use of CF 35 or an indication on the time axis at the correct point (or they can just show the correct reading)		2	M1ft	for using or stating 35 (ft from incorrect graph if method shown)
		If a graph is drawn, answer is in the given range then award the marks	16.5 – 18.5		A1ft	ft from their cf graph
	(d)		$\frac{11}{60}$	1	B1	Accept 0.18(333….) or 18.(333…)%
						Total 7 marks

Question		Working	Answer	Mark	Notes
11	(a)		$100 < m \leq 200$	1	B1
	(b)		10, 46, 80, 100, 115, 120	1	B1
	(c)		Correct cumulative frequency graph	2	B2 fully correct cf graph – points at ends of intervals and joined with curve or line segments If not B2 then B1(ft from a table with only one arithmetic error) for 5 or 6 (ft from a table with only one arithmetic error) of their points at ends of intervals and joined with curve or line segments **OR** for 5 or 6 points plotted correctly at ends of intervals not joined **OR** for 5 or 6 of their points from table plotted consistently within each interval (not at upper ends of intervals) at their correct heights and joined with smooth curve or line segments
	(d)	eg reading of 155 and 350 stated or indicated on graph	175 – 205	2	M1ft For use of 30 and 90, or 30.25 and 90.75, or ft from a cf graph provided method is shown. A1ft from their cf graph
	(e)		12 or 13	2	M1 For reading off cf from money spent at £450 (108 ft) ft from cf graph A1
					Total 8 marks

14	(a)		48	1	B1 allow 47 – 49 Accept $\frac{n}{110}$ where n is in the range 47 – 49
	(b)		46	1	B1 allow 45.5 – 46.5
	(c)	40 **and** 56		2	M1 for both values. LQ of 40 – 41 and UQ in the range 56 – 58. **or** for use of 15 and 45 (eg indicated by marks on horizontal axis that correspond to 15 and 45 on the vertical axis.) **or** for use of 15.25 and 45.75 (eg indicated by marks on horizontal axis that correspond to 15.25 and 45.75 on the vertical axis.
			16 to 18		A1 accept 16 to 18
	(d)		Yes and correct reason	1	B1ft dep on M1 in (c) but ft their reading of the horizontal axis. For stating yes **and** the IQR for the Algebra test is greater than IQR for the Geometry test oe If using value in (c) less than 9, only accept 'no' and IQR for the Algebra test is less than the IQR for the Geometry test oe.
	(e)	60 – '50' (= 10)		3	M1 may be seen embedded as $\frac{10}{60}$ $(=\frac{1}{6})$ oe (eg reading of 50 from graph stated or indicated by marks on vertical axis that correspond to 64 on the horizontal axis). Allow 60 – '50' – 1 (= 9) oe
		$\frac{'10'}{60} \checkmark \frac{'10'-1}{59}$			M1 for use of $\frac{n}{60} \times \frac{n-1}{59}$ with any integer n such that $2 \leq n \leq 59$
			$\frac{3}{118}$		A1 oe (accept 0.025 or better) Allow $\frac{6}{295}$ (= 0.02 or better) if using $\frac{9}{60} \times \frac{8}{59}$
					Total 8 marks