Data and Probability

Maths Non-Calculator Past Paper Questions

(a) A fair, six-sided dice is rolled.
What is the probability that a 4 is shown on the dice?
Circle your answer. [1]

6% $\frac{1}{5}$ $\frac{1}{4}$ 6:1 $\frac{1}{6}$

(b) 50 raffle tickets were sold at a charity event.
Sian has a 20% chance of winning the top prize.
How many tickets did Sian buy?
Circle your answer. [1]

1 2 4 10 20

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(c) A bag contains a mixture of blue beads, yellow beads and pink beads.
One bead is taken at random from the bag.

The probability that the bead is pink is $\frac{1}{5}$.

Which of the following sets of beads could have been in the bag?
Circle your answer. [1]

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David, Jane and Mary are beach inspectors.
Three beaches, Harlech, Rhyl and Porthcawl, are all to be inspected on a certain day.
It is decided to share the work so that the inspectors will visit one beach each, chosen at random.

(a) List all the possible different ways they could share the work.
One has been done for you. [2]

David ⟶ Harlech, Jane ⟶ Rhyl and Mary ⟶ Porthcawl

(b) What is the probability that one of the female inspectors will visit Rhyl? [2]

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Ceri has a set of cards.
Each of her cards is labelled North, East, South or West.

(a) Ceri chooses one card at random from her set of cards.
Complete the table below to find the probability of Ceri choosing a card labelled West.
[2]

Label	North	East	South	West
Probability	0·4	0·25	0·2	

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(b) Ceri chooses one card at random from her set of cards.

What is the probability that the card is labelled East or South? [2]

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(c) Sasha has an identical set of cards.
Ceri and Sasha each choose one card at random from their set of cards.

What is the probability that they both choose a card labelled North? [2]

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Twenty-five balls have numbers printed on them.
Some of the balls are coloured yellow (Y), the others are coloured blue (B).
The list below shows both the colour of each ball and the number printed on it.

Y 76	Y 217	B 54	B 126	Y 21
Y 438	Y 32	B 561	B 194	Y 69
B 37	B 518	Y 94	Y 157	Y 208
Y 382	B 56	B 234	Y 72	B 84
Y 68	Y 271	Y 53	B 100	Y 321

(a) Complete the frequency table. [2]

Type of ball	Yellow		Blue	
	Number < 100	Number $\geqslant 100$	Number < 100	Number $\geqslant 100$
Frequency	8			

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(b) How can you use your table to check that all the balls have been counted? [1]

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(c) The 25 balls are placed in a box.
One ball is chosen at random.
What is the probability that it is a yellow ball numbered less than 100? [2]

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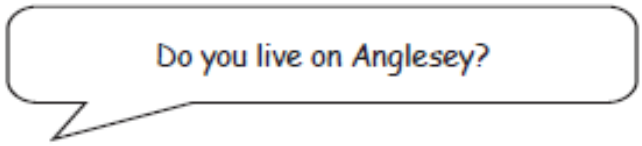
The Anglesey Show is a two-day event held every August.

(a) On the first day, a random sample of 2000 visitors at the show were asked:



640 of them answered 'Yes'.

What was the relative frequency of those who answered 'Yes'?
Give your answer as a decimal. [1]

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(b) On the second day a random sample of 3000 visitors at the show were asked the same question.
The relative frequency of those who answered 'Yes' on this day was 0·42.

Calculate the relative frequency of those who said they lived on Anglesey when the samples for **both** days were combined.
Give your answer as a decimal. [4]

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(c) Which of the following is most likely to give the best estimate for the relative frequency of visitors to the show living on Anglesey?
Circle your answer.

Your answer to part *(a)*	0·42	Your answer to part *(b)*

You **must** give an explanation for your choice. [1]

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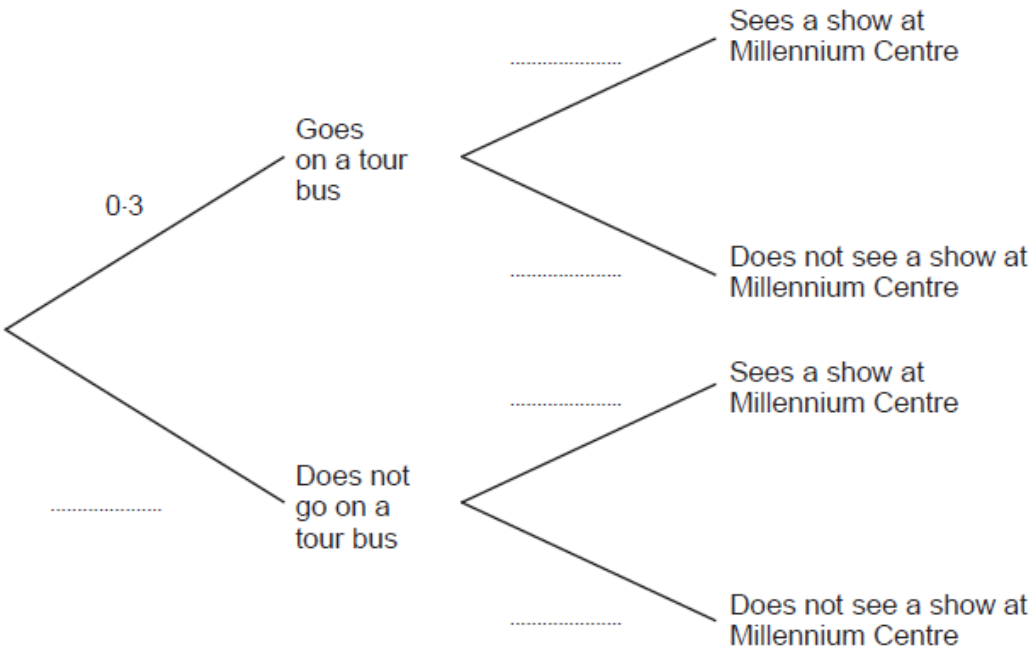
Leah is visiting Cardiff.
The probability that she will go on a tour bus is 0·3.
The probability of Leah seeing a show at the Millennium Centre is independent of her going on a tour bus.

The probability that she goes on a tour bus and sees a show at the Millennium Centre is 0·24.

(a) Complete the following tree diagram. [4]



(b) Calculate the probability that Leah does not go on a tour bus and does not see a show at the Millennium Centre. [2]

Three **red** cards have the following numbers written on them.

Four **green** cards have the following numbers written on them.

In a game, the cards are turned face down.
A player chooses one red card and one green card at random.
The player's score is the sum of the two numbers.

(a) Complete the following table. [1]

Red card \ Green card	1	2	3	4
9	.....	11	.....	.....
6	.....	8	.....	.....
3	4	5	6	7

Score

(b) A player wins a prize if the score is **more** than 9.
Safira plays the game once. What is the probability that she wins a prize? [2]

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(c) 60 people play the game once.
Approximately how many people would you expect to win a prize? [2]

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Write down five numbers that satisfy all of the following conditions:

- They are all between 1 and 9 inclusive.
- They have a median value of 6.
- They have a range of 7.
- Their mean is 5. [3]

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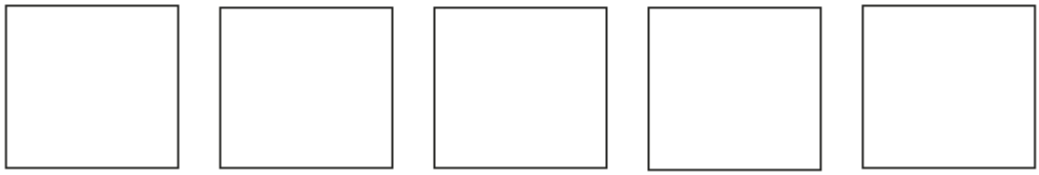

A fair six-sided dice and a fair coin are thrown together once.

Circle the correct answer for each of the following statements.

(a) The number of possible outcomes is [1]

2 6 8 12 24.

(b) The probability of getting a **4** on the dice and a **tail** on the coin is [1]

$\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

(c) The probability of getting a **multiple of 3** on the dice and a **head** on the coin is [1]

$\frac{1}{8}$ $\frac{1}{12}$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{24}$.

Space for working:

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Alwyn often drives from Bangor to Cardiff.
He always chooses one of two routes for these journeys.
He either travels through Rhayader or through Hereford.
The probability that he travels through Rhayader is 0·7.

Sometimes he decides to stop for a break during his journey.
His decision is independent of the route he takes.

The probability that he travels through Rhayader **and** stops for a break is 0·42.

(a) Complete the following tree diagram. [4]

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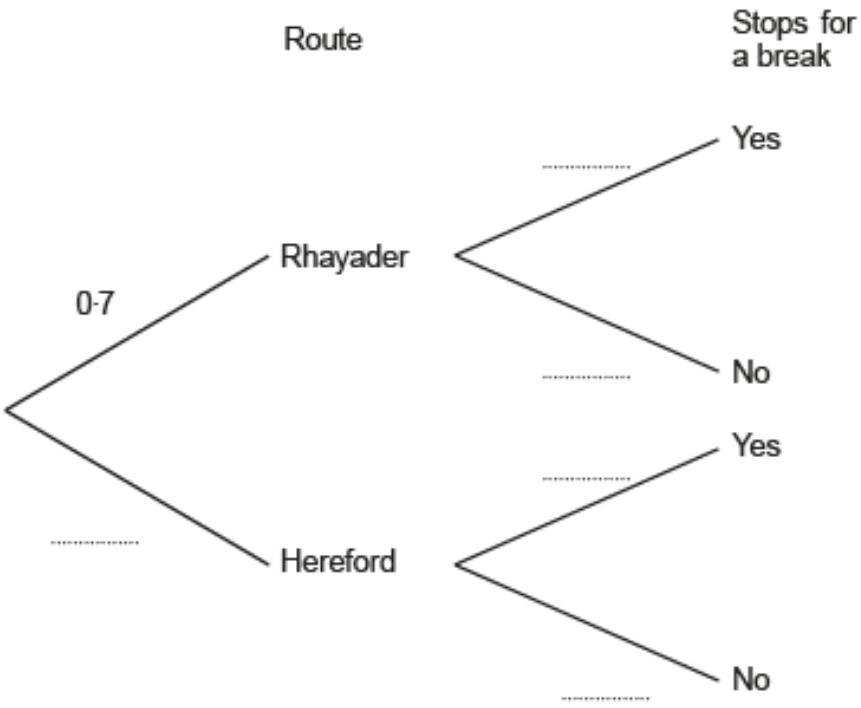

(b) Calculate the probability that Alwyn travels through Hereford but **does not** stop for a break. [2]

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The mean of two numbers is 7.
The range of these two numbers is 8.

What are these two numbers? [2]

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The numbers are ☐ and ☐

. 200 young people are taking part in a conference held at Aberystwyth.

(a) One of the young people is chosen at random to be the chairperson.

Complete the table below to find the probability that the person chosen lives outside the United Kingdom (UK). [2]

	North Wales	Mid Wales	South Wales	Elsewhere in the UK	Outside the UK
Probability	0·2	0·3	0·25	0·15	

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(b) How many of the 200 young people live in Mid Wales? [2]

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7. Dylan is having a weekend break in Wrexham.
The probability that he will visit *Erddig Gardens* is 0·7.
The probability of Dylan going to the *Bersham Heritage Centre* is independent of him visiting *Erddig Gardens*.

The probability that he visits *Erddig Gardens* **and** goes to the *Bersham Heritage Centre* is 0·28.

(a) Complete the following tree diagram. [4]

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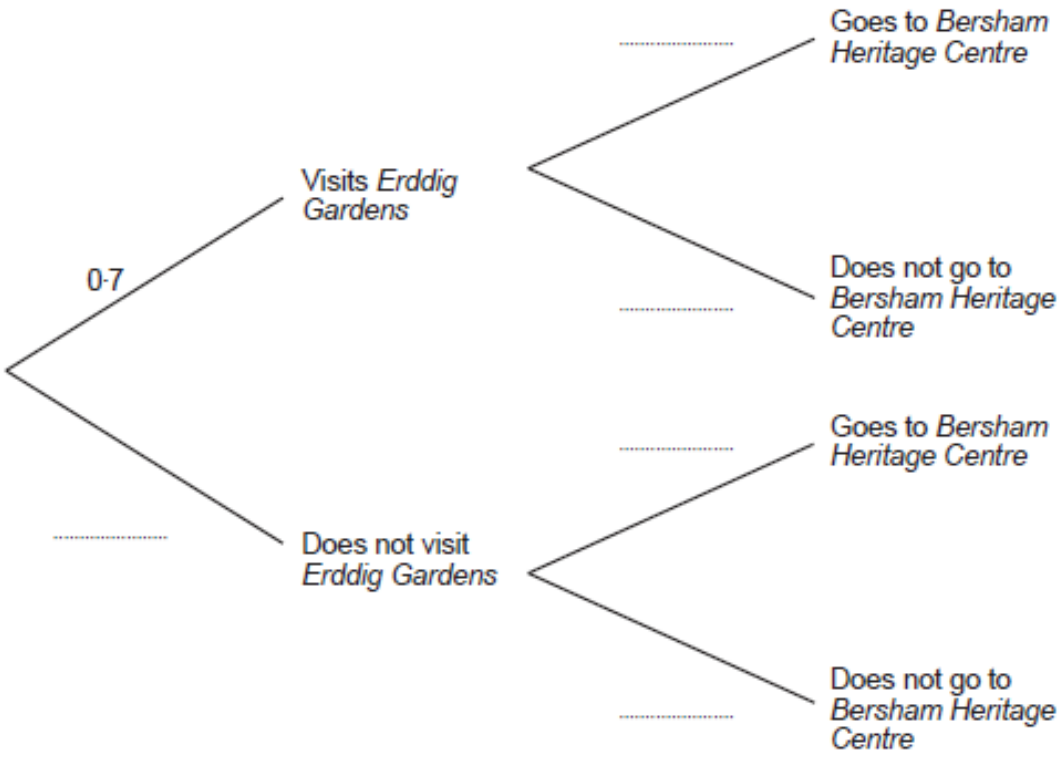

(b) Calculate the probability that Dylan visits *Erddig Gardens* but does not go to the *Bersham Heritage Centre*. [2]

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Data and Probability

Maths Calculator Past Paper Questions

Write down three integers, all less than 25, whose

- range is 8, and
- mean is 13. [2]

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The three integers are ..... , ... and .....

A dice is thrown 50 times.
The number shown on the dice is recorded after each throw.
The table below shows the results recorded.

Number shown on dice	1	2	3	4	5	6
Frequency	9	7	8	7	6	13

(a) The relative frequency of throwing a 1 was calculated as $\frac{9}{50} = 0{\cdot}18$.

What was the relative frequency of throwing a 6?
Give your answer as a decimal. [1]

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(b) The number 4 was thrown 7 times in the first 50 throws.
Using **this fact**, calculate how many times you would expect a 4 to be thrown when this dice is thrown 3000 times. [2]

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(c) How many times would you expect a 4 to be thrown when a **fair** dice is thrown 3000 times? [2]

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100 boxes each contain 10 balls.

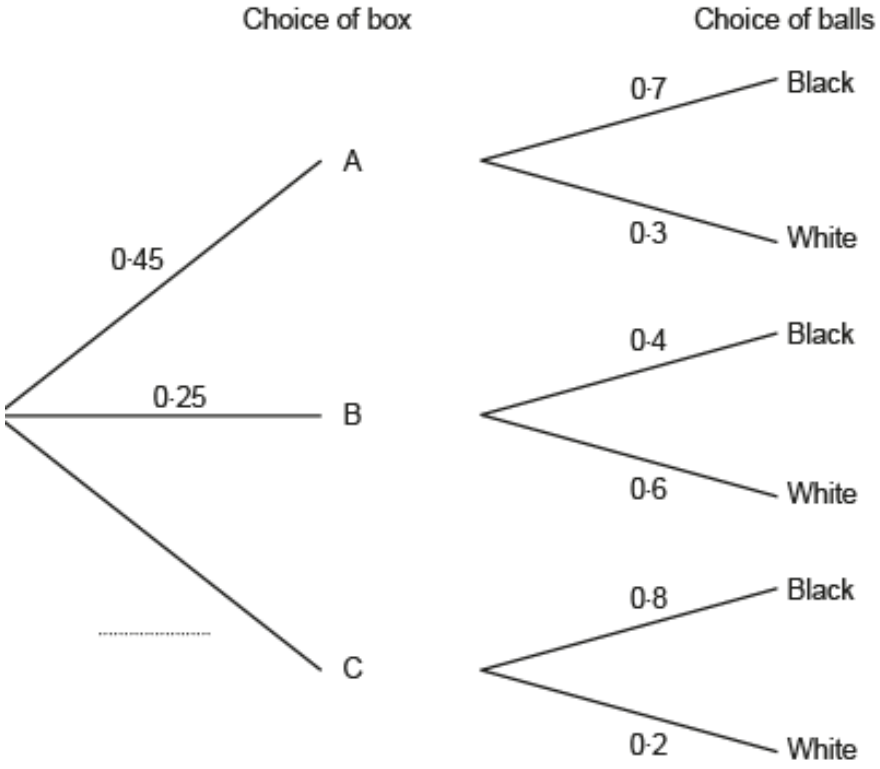
45 of the boxes are labelled A.
They each contain 7 black balls and 3 white balls.

25 of the boxes are labelled B.
They each contain 4 black balls and 6 white balls.

The rest of the boxes are labelled C.
They each contain 8 black balls and 2 white balls.

In a game, a player chooses a box at random, and then chooses a ball at random from that box.

(a) Complete the tree diagram shown below. [1]



(b) What is the probability that a player will select a black ball? [3]

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(c) If a large number of people played the game, approximately what fraction of them would you expect to choose a white ball?
Circle your answer. [1]

$\frac{1}{10}$ $\frac{1}{5}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

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Alison and Sarfraz play a game. They each have a different bag of cards.

Alison has the following cards in her bag.

Sarfraz has the following cards in his bag.

They each take a card at random from their own bag. They make a note of the letter, and return the card to the bag.

They each do this 100 times.

Who do you think is likely to choose the letter R more often?

Alison ☐ Sarfraz ☐

You must explain your decision and show all your working. [4]

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. Look at the following set of four numbers.

5 8 10 13

Find another set of four numbers so that:

- the range has increased by 2,
- the mean remains the same,
- the median has decreased by 1.

You may use some of the numbers from the original set, but **not** exactly the same four numbers. [3]

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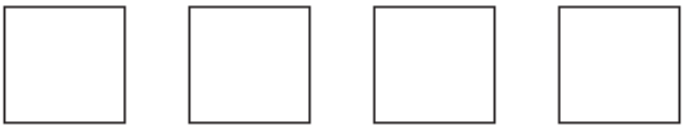
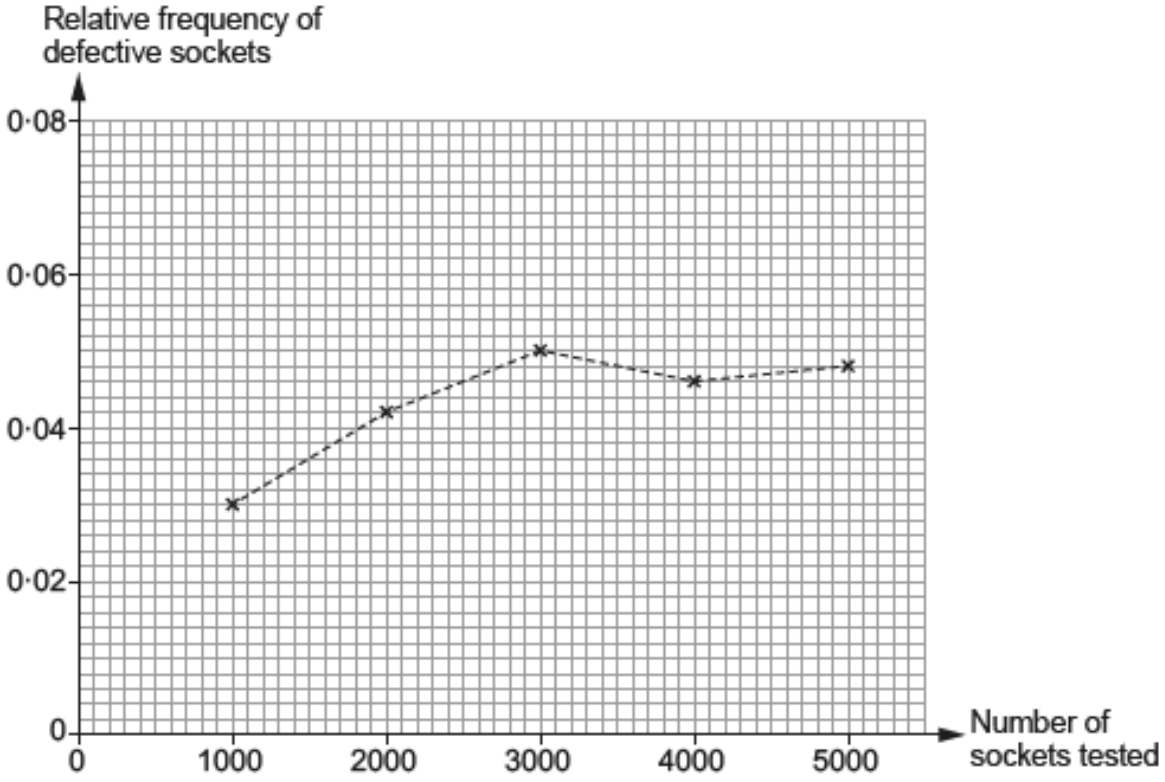
My four numbers are



A factory uses a machine to produce electrical sockets.
The manager carries out a survey to investigate the probability of the machine producing a defective socket.

The relative frequency of defective sockets produced was calculated after testing a total of 1000, 2000, 3000, 4000 and 5000 sockets.
The results are plotted on the graph below.



(a) How many of the first 3000 sockets tested were defective? [2]

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(b) Write down the best estimate for the probability that one socket, selected at random, will be defective.
You must give a reason for your choice. [2]

Probability: .....

Reason: .....

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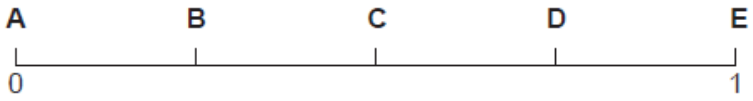
(a) A person is chosen at random.
Which is the best estimate for the probability that this person was born in the month of March?
Circle the correct answer. [1]

$\frac{1}{30}$ $\frac{1}{31}$ $\frac{12}{365}$ $\frac{1}{12}$ $\frac{12}{31}$

(b) A box contains four coloured cards.
One card is blue, one is red, one is green and one is white.
A card is drawn from the box at random.

Which letter, **A**, **B**, **C**, **D** or **E**, represents the probability that the card drawn is **not** blue?
Circle the correct letter on the probability scale below. [1]



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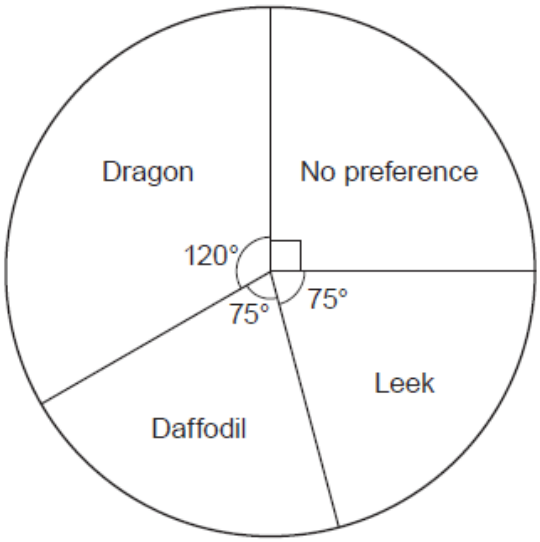
(c) The pupils at a school were asked the following question.

'What design would you like to have on the school's badge?'

Dragon ☐ Daffodil ☐ Leek ☐ No preference ☐

The results of the replies received are shown in the pie chart below.



A pupil who answered the question is chosen at random.
What is the probability that this pupil wanted the design to be a dragon?
Circle the correct answer. [1]

$\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{360}$ 4% $\frac{1}{120}$

A coach company runs trips to Llandudno and Aberystwyth.
The information kept by the company about the passengers on these trips includes:

- the destination of the trip,
- their ages.

The table below shows the number of passengers who went to Llandudno or Aberystwyth last Tuesday.

	Llandudno	Aberystwyth
Passengers 60 years old and over	323	217
Passengers under 60 years old	122	58

(a) What was the ratio of passengers 60 years old and over to passengers under 60 years old?
Give your answer in its simplest form. [3]

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Passengers 60 years old and over : passengers under 60 years old

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(b) One of these passengers was selected at random.
What is the probability that this passenger went on the trip to Llandudno? [2]

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(a) A biased coin is thrown 100 times.
The number of heads thrown is recorded after 20 throws, 40 throws, 60 throws, 80 throws and 100 throws.

Some of the results are recorded in the relative frequency table below.

Complete the table. [2]

Number of throws	20	40	60	80	100
Number of heads	11	18	24	30	
Relative frequency	0·55	0·45		0·375	0·37

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(b)

5 7 8 11 14 17 17 19 26 28

The sum of the ten numbers shown above is 152.
The numbers are displayed in the grouped frequency table shown below.

Number	0 - 9	10 - 19	20 - 29
Frequency	3	5	2

Consider the estimated mean calculated from the table and the actual mean of the ten numbers.
Calculate the difference between these two values.
You must show all your working. [5]

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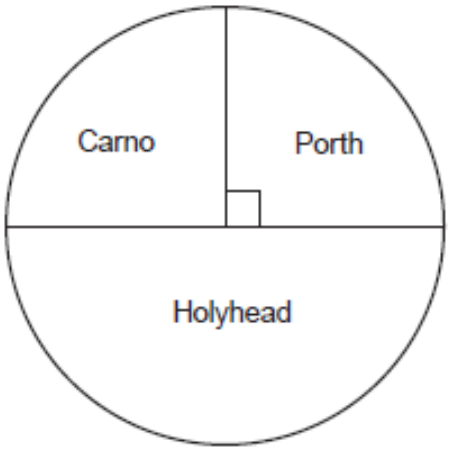
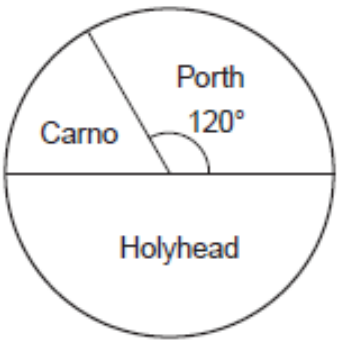
A company has 3 sites based in Wales.
One is in Carno, one is in Holyhead and one is in Porth.

The pie charts below show the distribution of its 128 female staff and 72 male staff.



128 female staff



72 male staff

A person is chosen at random from the company's 200 staff members.
What is the probability that this person works at the Porth site? [4]

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Data and Probability

Numeracy Non-Calculator Past Paper Questions

Sunflower seeds come in a packet.

Sunflower seeds

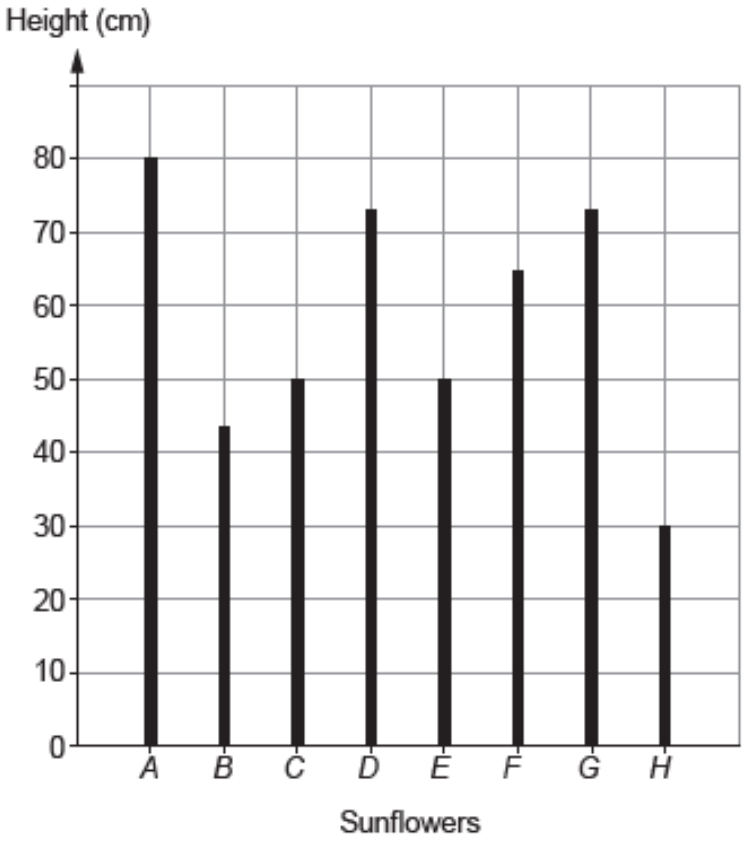
Plant in May

Grow to heights of up to 90 cm (36 inches)

Dieter planted 8 sunflower seeds in May.
He labelled the sunflowers *A*, *B*, *C*, *D*, *E*, *F*, *G* and *H*.

On 21st August, he measured the heights of all the sunflower plants in cm.

Dieter then drew a graph, as shown below.



(a) Use the graph to answer each of the following questions.

(i) What fraction of the height of the tallest sunflower is the height of the shortest sunflower?
Circle your answer. [1]

$\frac{3}{10}$ $\frac{3}{7}$ $\frac{3}{5}$ $\frac{3}{8}$ $\frac{3}{80}$

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(ii) What is the ratio of the number of sunflowers with heights less than 55 cm to the number of sunflowers with heights greater than 55 cm?
Circle your answer. [1]

5 : 3 3 : 5 1 : 3 3 : 1 1 : 1

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(b) Dieter's friend, Glyn, also planted sunflower seeds.
Glyn's tallest sunflower grew to a height of 24 inches.
Is this taller or shorter than Dieter's tallest sunflower?
You must show all your working to support your answer. [2]

Taller than Dieter's tallest sunflower ☐

Shorter than Dieter's tallest sunflower ☐

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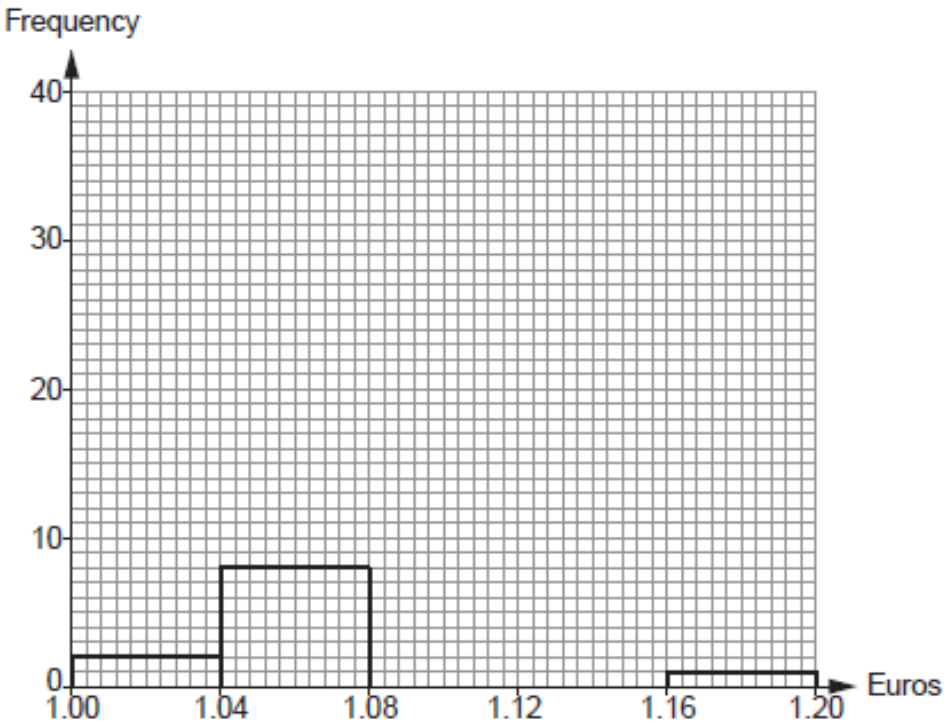
(d) Gareth looked at exchange rates for buying euros.
He recorded the exchange rates for the previous 60 days, as shown below.

£1 = b euros	Frequency
$1.00 \leqslant b < 1.04$	2
$1.04 \leqslant b < 1.08$	8
$1.08 \leqslant b < 1.12$	16
$1.12 \leqslant b < 1.16$	33
$1.16 \leqslant b < 1.20$	1

Gareth started to draw a frequency diagram to show this information.

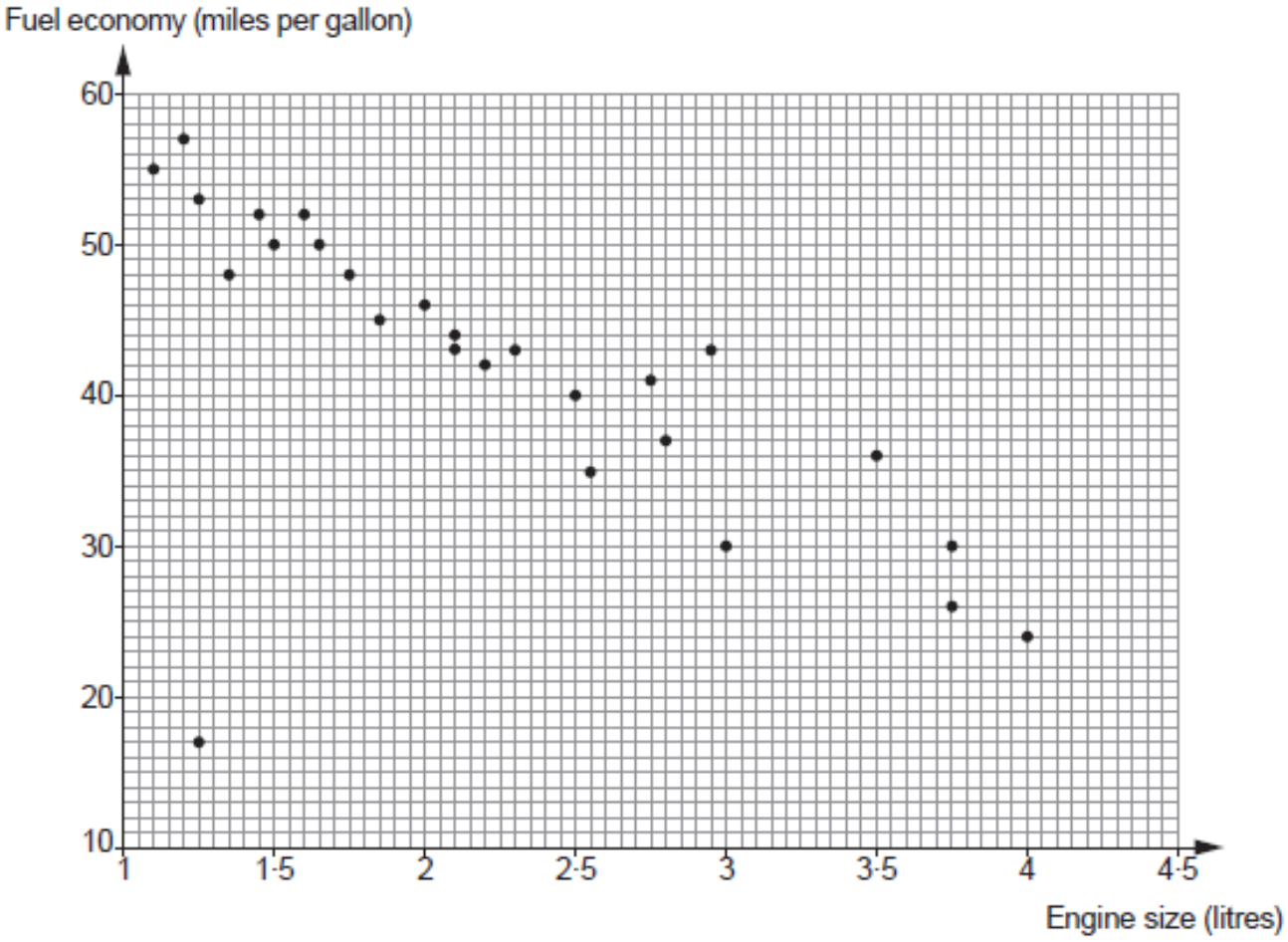


(i) Complete the frequency diagram. [1]

(ii) Which is the modal group?
Circle your answer. [1]

60 $1.08 \leqslant b < 1.12$ 33 $1.12 \leqslant b < 1.16$ 16

4. The distance a car will travel using 1 gallon of fuel is called its fuel economy.
The fuel economy of a number of cars with different engine sizes is shown below.



Use the scatter diagram to answer the following questions.

(a) State the fuel economy of the car with the largest engine size. [1]

Fuel economy ..... miles per gallon

(b) State the engine size of the car with a fuel economy of 42 miles per gallon. [1]

Engine size ..... litres

(c) (i) Calculate the mean fuel economy of the 5 cars with the **smallest** engine sizes. [3]

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Mean fuel economy is ..... miles per gallon

(ii) Why is this not a suitable average for cars with engine sizes of less than 1·5 litres? [1]

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(d) Draw, by eye, a line of best fit on the scatter diagram. [1]

(e) Siân says,

> The scatter diagram is more reliable to estimate the fuel economy of cars with engine sizes less than 2·5 litres.

Do you think Siân is correct?

Yes ☐ No ☐ Don't Know ☐

You must give a reason for your answer. [1]

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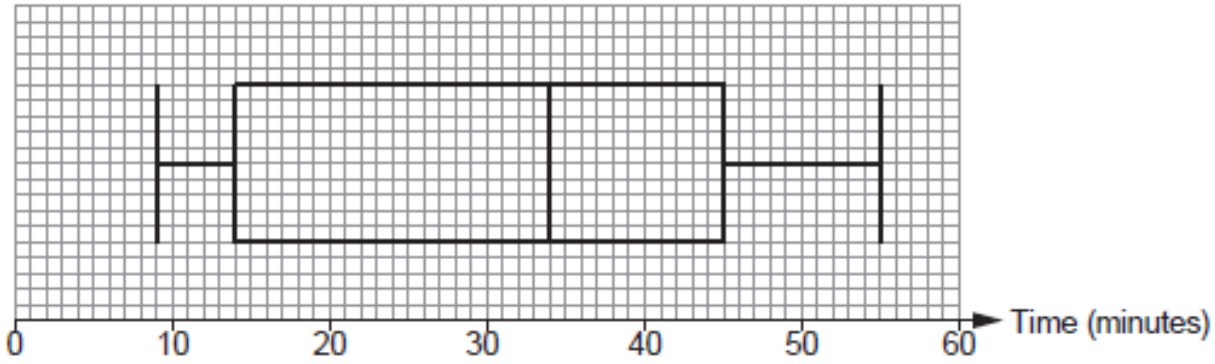
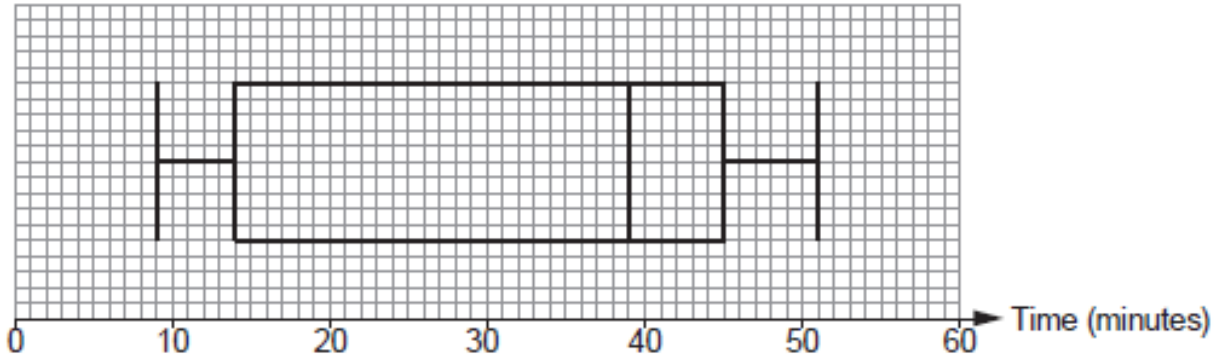
(a) Maesystrad, Rhewlteg and Glanmawr are three colleges.
Each college recorded the times Year 12 students took to travel to college.
The results are displayed in the box-and-whisker plots below.

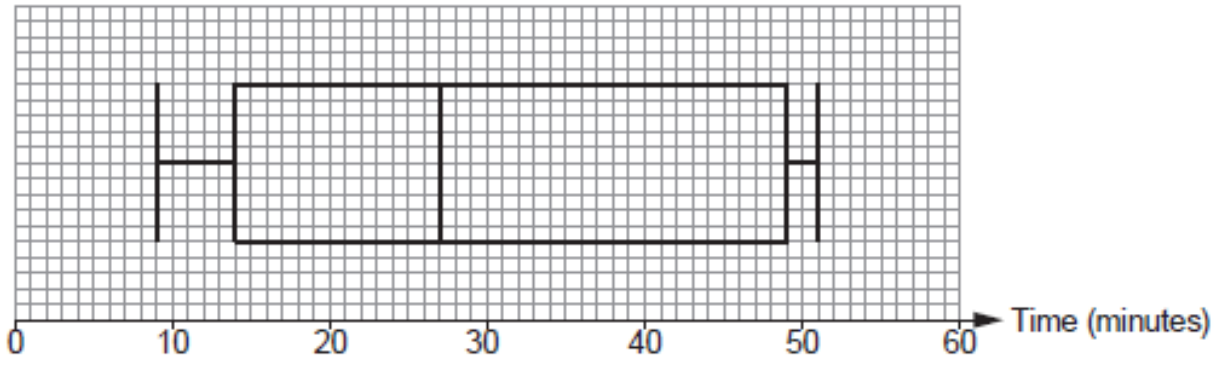
Maesystrad



Rhewlteg



Glanmawr



(i) Which of the three colleges has the greatest range of times?
What is the range of times for this college? [1]

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College ..... Range ..... minutes

(ii) On average, in which college did Year 12 students have the longest travel times? You must give a reason for your answer. [1]

College: .....

Reason: .....

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(iii) Which college has the greatest difference between the median and the lower quartile?
What is this difference? [1]

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College ..... Difference ..... minutes

(iv) Which of the three colleges has the greatest number of Year 12 students?
Give a reason for your answer. [1]

Maesystrad ☐ Rhewlteg ☐ Glanmawr ☐ Don't know ☐

Reason: .....

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) At another college, Wynne College, there are 240 students in Year 12.

The interquartile range of the times taken for these students to travel to college is 32 minutes.

(i) How many of these students have travel times within this interquartile range? [1]

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..... students

(ii) 75% of the Year 12 students at Wynne College take less than 55 minutes to travel to college.
Complete the following statement.

'25% of the Year 12 students at Wynne College take less than

..... minutes to travel to college.' [1]

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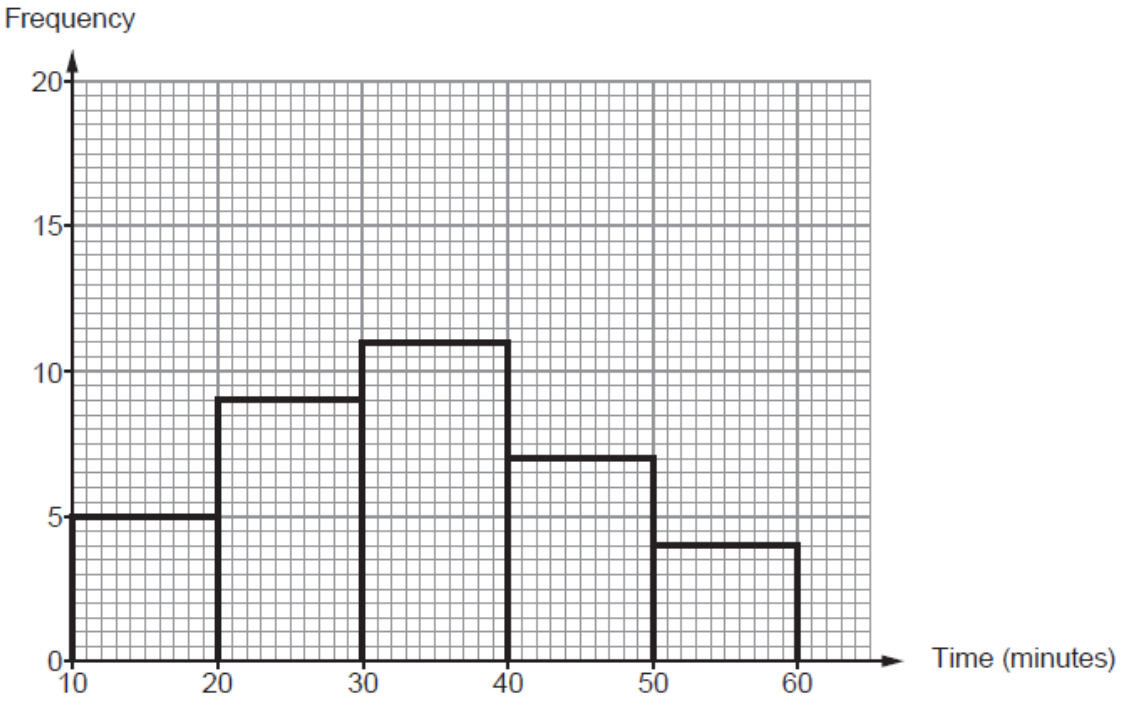
The students in Mr Griffin's mathematics class all recorded how long they spent on their last mathematics homework.
None of his students spent less than 10 minutes on this homework.
All of his students attempted the homework.

Mr Griffin has drawn a frequency diagram to display the times recorded by his students.
He used groups of width 10 minutes:

$$10 \leqslant \text{time} < 20, \quad 20 \leqslant \text{time} < 30, \quad \text{and so on.}$$



(a) Did any student get all their mathematics homework correct?

Yes ☐ No ☐ Can't tell ☐

You must give a reason for your answer. [1]

(b) How many students are there in Mr Griffin's mathematics class? [2]

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(c) Consider the students who spent less than 40 minutes on their homework.
What fraction of these students spent 30 minutes or more on their homework? [2]

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Catrin considers the data she needs to collect to find out if people are happy with their bank.

Catrin includes the following questions in her questionnaire.

Write down one set of possible groups that could be used as answer options for each of these questions. [2]

Question 1: How old are you?

Groups:

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Question 2: If you have a bank account, how happy are you with your bank?

Groups:

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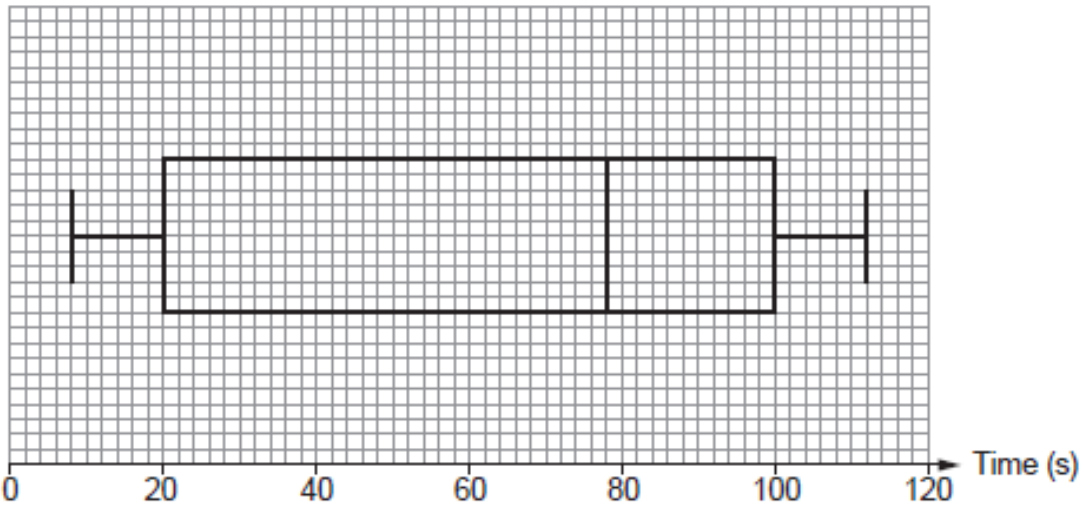
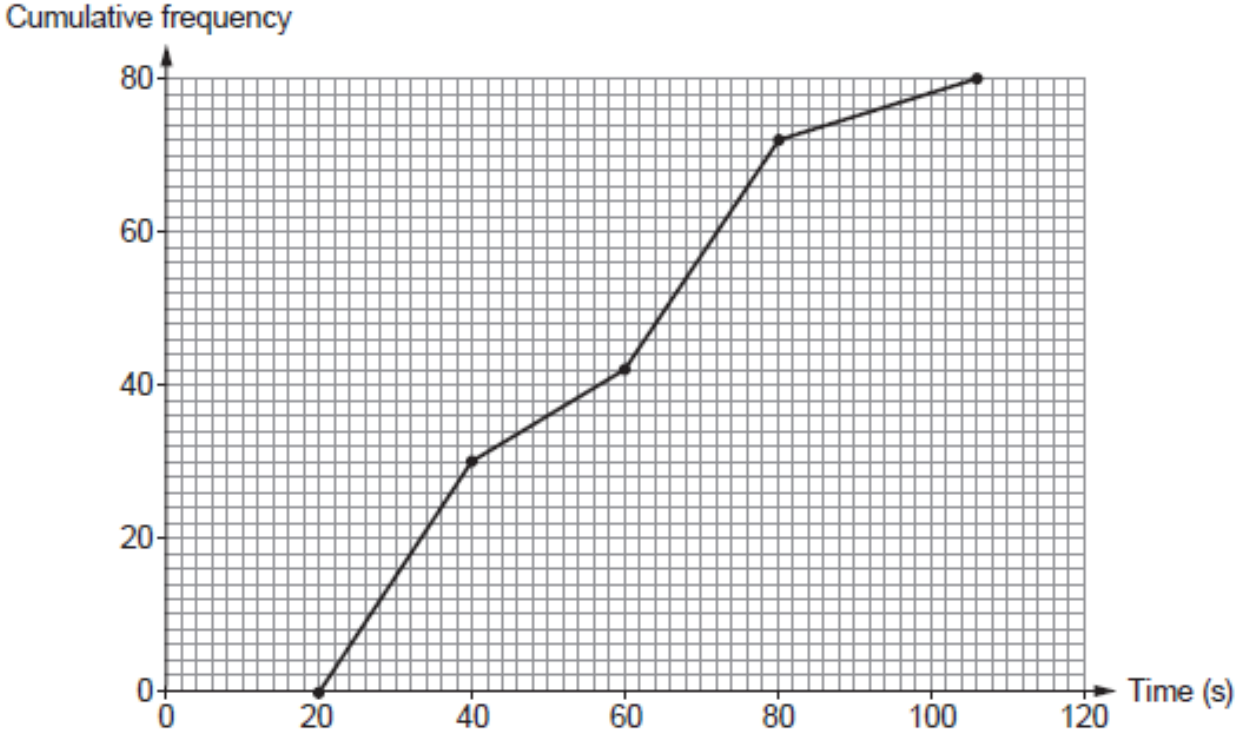
. On 1st July every year, *Trefor* estate agents record the time from when a phone rings to when it is answered.
The time taken to answer the phone is recorded in seconds.

Trefor displays the data for their agents to see.
The displays for 1st July 2018 and 1st July 2019 are shown below.

1st July 2018
Time taken to answer the phone in seconds



1st July 2019
Time taken to answer the phone in seconds



Use the diagrams on the previous page to answer the following questions.

(a) What is the range of times taken to answer the phone for 1st July 2018?
Circle your answer. [1]

101 seconds 80 seconds 78 seconds 106 seconds 104 seconds

.....

(b) What is the maximum possible range of times taken to answer the phone for 1st July 2019?
Circle your answer. [1]

86 seconds 106 seconds 80 seconds 56 seconds 83 seconds

.....

(c) The manager of *Trefor* estate agents claims that there has been an improvement in the median time taken to answer the phone from 1st July 2018 to 1st July 2019.
Is this true?

Yes ☐ No ☐

You must show all your working. [2]

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(d) Complete the following statements.

(i) 'On 1st July 2018, 75% of the phone calls were answered within ..... seconds.' [1]

.....

.....

(ii) 'On 1st July 2019, 75% of the phone calls were answered within ..... seconds.' [2]

.....

.....

Siân wrote the following:

'For the last 7 days I have recorded the number of cars parked in my local car park at 10 a.m. each day. This is what I found.

- The car park always had some cars parked in it.
- The greatest number of cars was 11.
- The range was 8 cars.
- The median was 9 cars.
- The mode was 10 cars.
- On one day, there were 6 cars in the car park.
- On another day, there were 7 cars in the car park.'

Gareth asked,

'What was the mean number of cars in the car park at 10 a.m. for these 7 days?'

Complete Siân's reply to Gareth's question.
You must list the 7 numbers Siân recorded and show all your working.

'The mean number of cars in the car park at 10 a.m. for these 7 days was

..... cars.'

[4]

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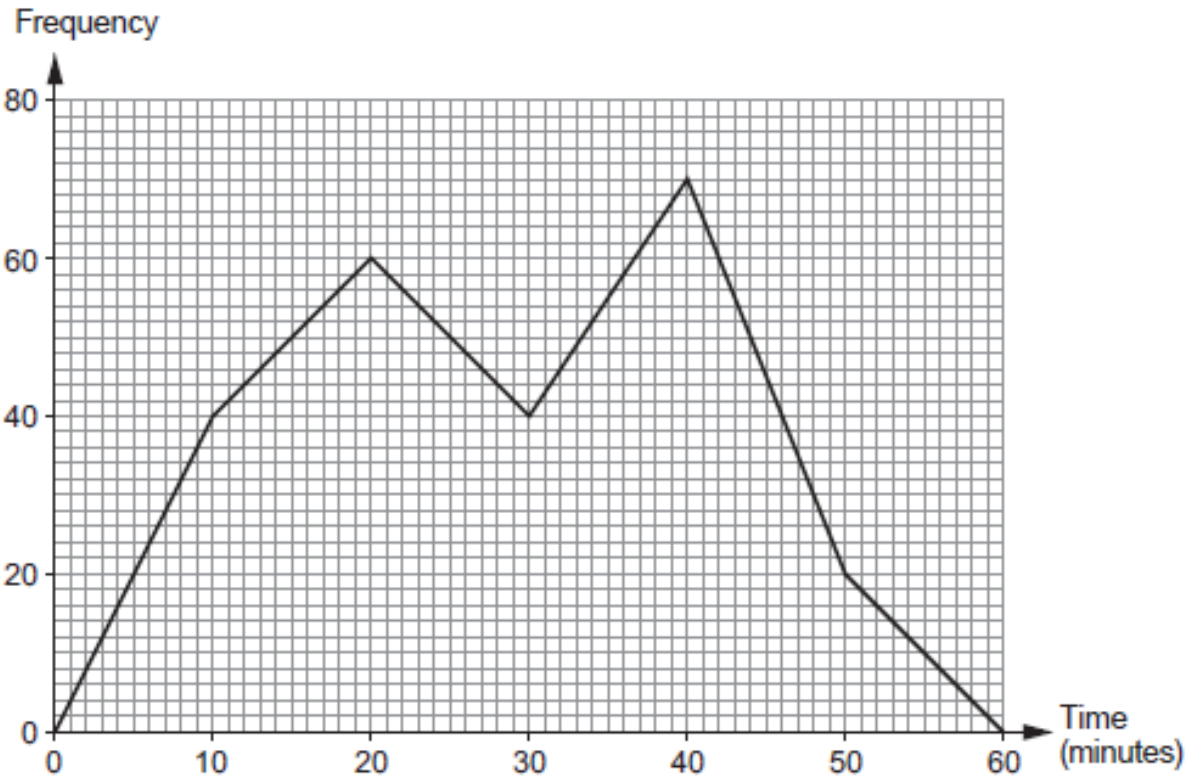
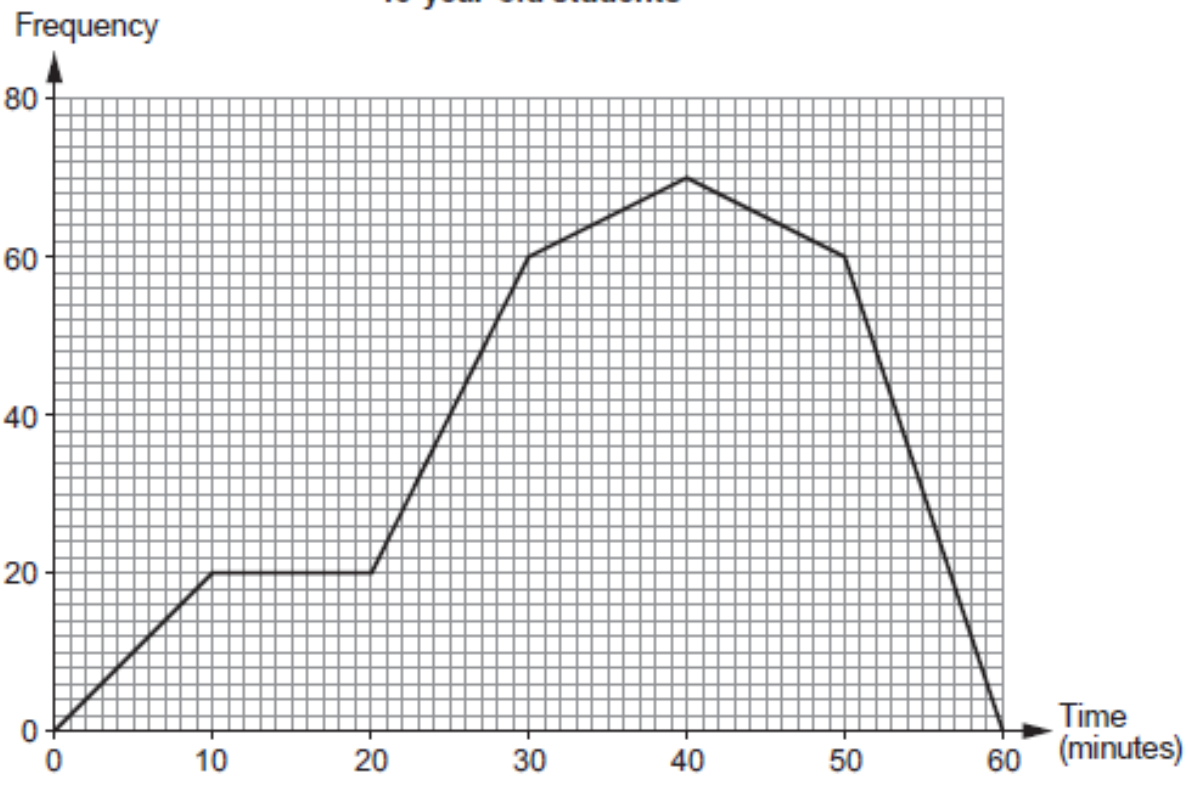
A survey was carried out to find how much time a group of 16-year-old students and a group of 18-year-old students spent using social media.
The frequency polygons below, which use equal time intervals, illustrate the results.

16-year-old students



18-year-old students



(a) How many 16-year-old students took part in the survey?
Circle your answer. [1]

60 70 210 230 2300

.....

(b) How many more 16-year-old students than 18-year-old students spent between 15 minutes and 25 minutes using social media?
Circle your answer. [1]

20 40 60 100 250

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(c) Wesley says,

'The 16-year-old students generally spent about the same time using social media as the 18-year-old students.'

Using the frequency polygons, how would you explain to Wesley that his statement is not true? [1]

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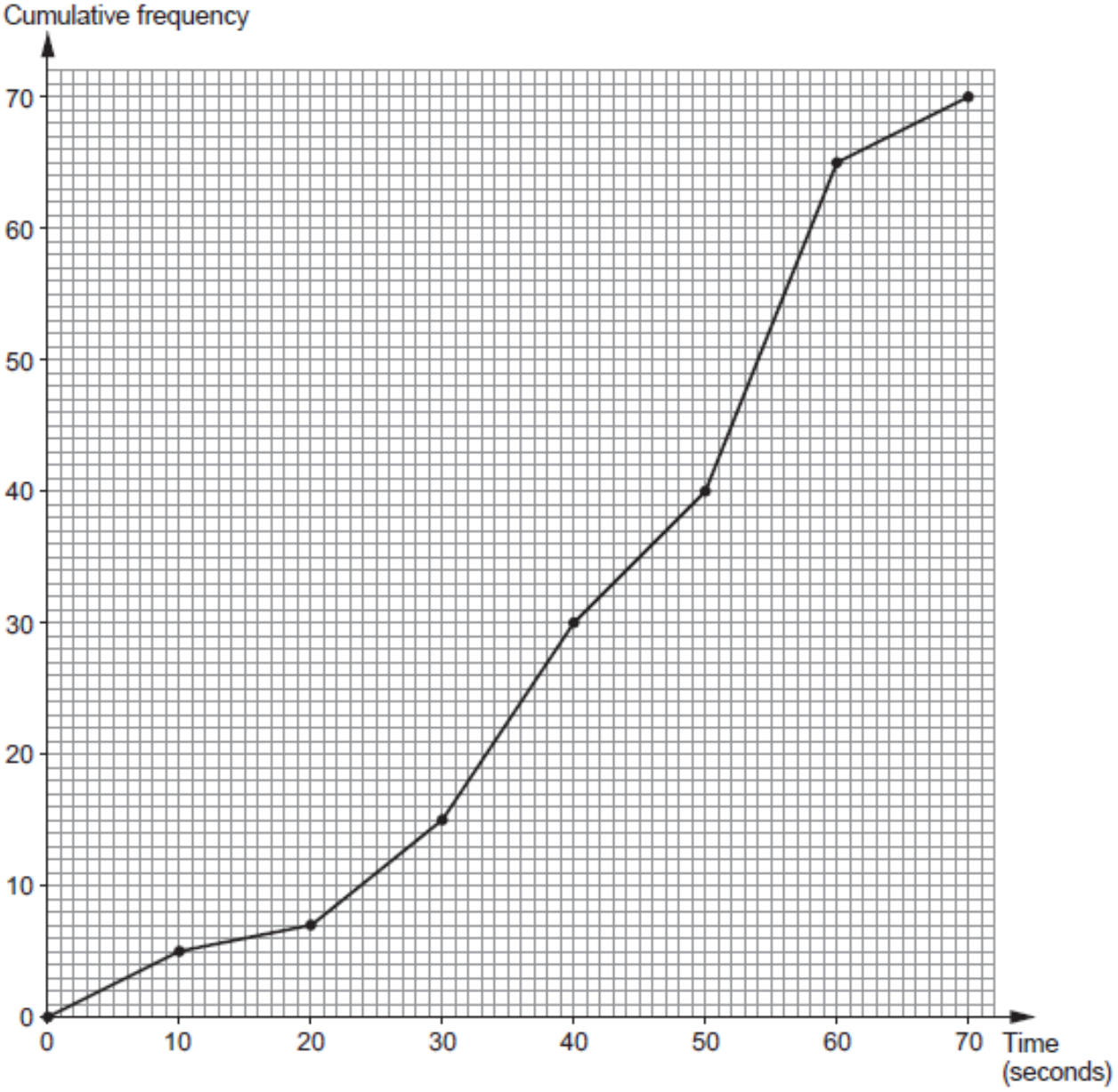
10. *Cambria Airlines* has planes that can carry up to 70 passengers.
For safety, the crew practise the emergency exit procedures with a group of 70 passengers.
Every 10 seconds the safety officer records the total number of passengers who have left the plane.
He has displayed the results in the cumulative frequency diagram shown below.



(a) Estimate the median time taken by the passengers to leave the plane. [1]

..... seconds

(b) How many passengers took more than 50 seconds to leave the plane?
Circle your answer. [1]

10 20 30 40 50

(c) *Cambria Airlines* has a policy that states the following.

'In the event of an emergency exit procedure, at least 90% of the 70 passengers must have left the plane within 1 minute.'

Did the practice emergency exit procedure meet the requirements of the airline's policy?
You must show all your working. [4]

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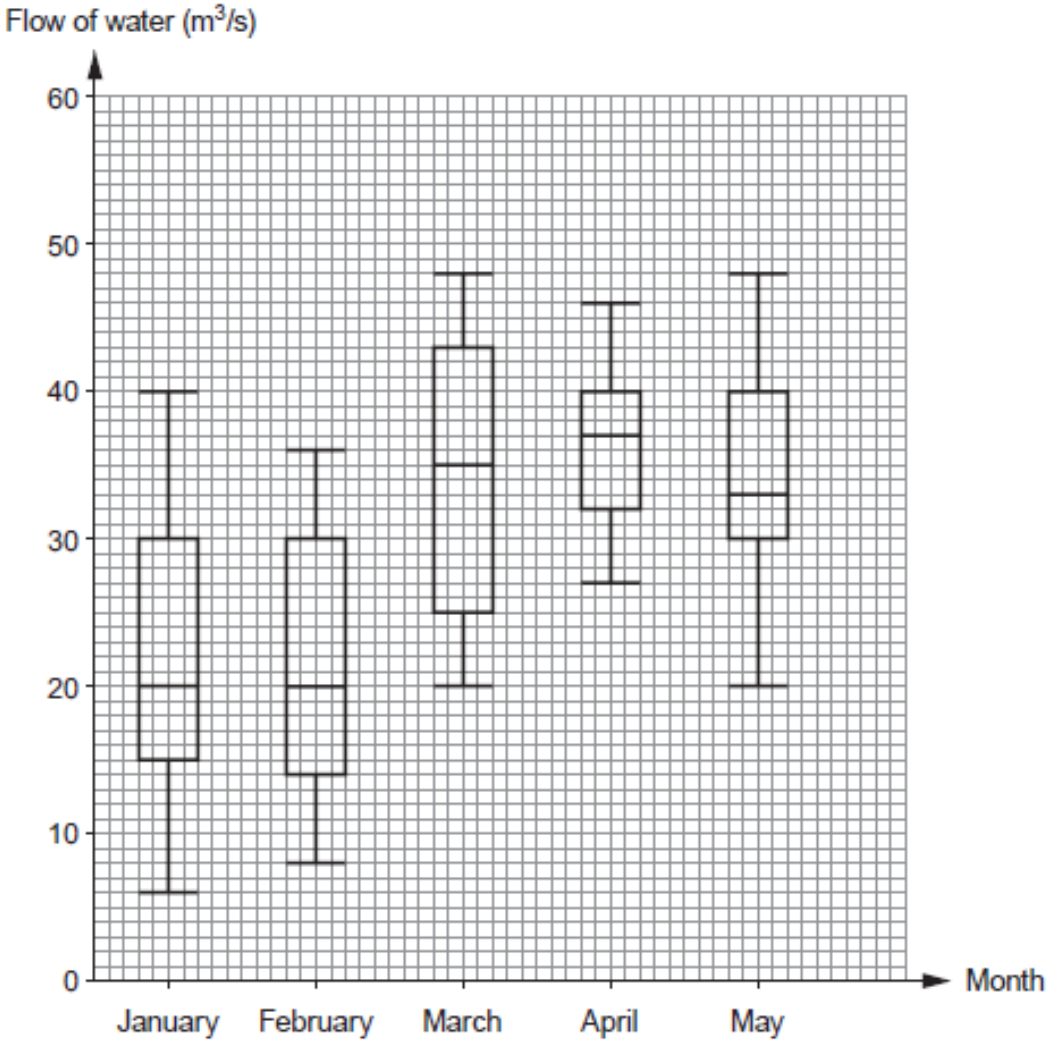
The following box and whisker plots show the flow of water through a drain, measured in m^3/s. The flow of water was measured at 11 a.m. each day for the first 5 months of the year.



(a) In which of the five months was the median flow of water the greatest? [1]

.....

.....

(b) In which of the five months was the range of the flow of water the greatest? [1]

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.....

(c) Iona is writing some statements for a report on the flow of water through the drain. Complete each of the statements given below.

(i) 'Both the upper quartiles and medians in the months of .....

and ..... were the same.' [1]

(ii) '25% of the results in March show the flow of water was greater than

..... m^3/s.' [1]

(d) Circle either TRUE or FALSE for each of the following statements. [2]

25% of the results in January show the flow of water was less than 6 m^3/s.	TRUE	FALSE
The units, m^3/s, measure the volume of water passing through the drain each second.	TRUE	FALSE
The mean flow of water in April was **certainly** greater than 36 m^3/s.	TRUE	FALSE
The month with the greatest difference between the lower quartile and the median was May.	TRUE	FALSE

A survey was carried out to find how often teenagers buy DVDs.

The following two questions were asked in a questionnaire.

Q1. Where do you live?

Q2. How often do you buy DVDs?

Never	*1-10 times*	*10-15 times*	*More than 15 times*
☐	☐	☐	☐

(a) For each question give **one** reason why it is **not** suitable. [2]

Q1. .....

.....

Q2. .....

.....

(b) The survey was carried out by leaving copies of the questionnaire on the DVD shelves in a supermarket.

Give **one** criticism of how the survey was carried out. [1]

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5. *(a)* Students are taking tests in English and Welsh.
The English test is marked out of 80.
The Welsh test is marked out of 70.

(i) Dyfed scores 35 in his English test.
Estimate Dyfed's score as a percentage.
Circle your answer. [1]

4% 20% 23% 44% 51%

.....

.....

(ii) Liam scores 22 in his Welsh test.
Estimate Liam's score as a percentage.
Circle your answer. [1]

0·3% 3% 22% 31% 40%

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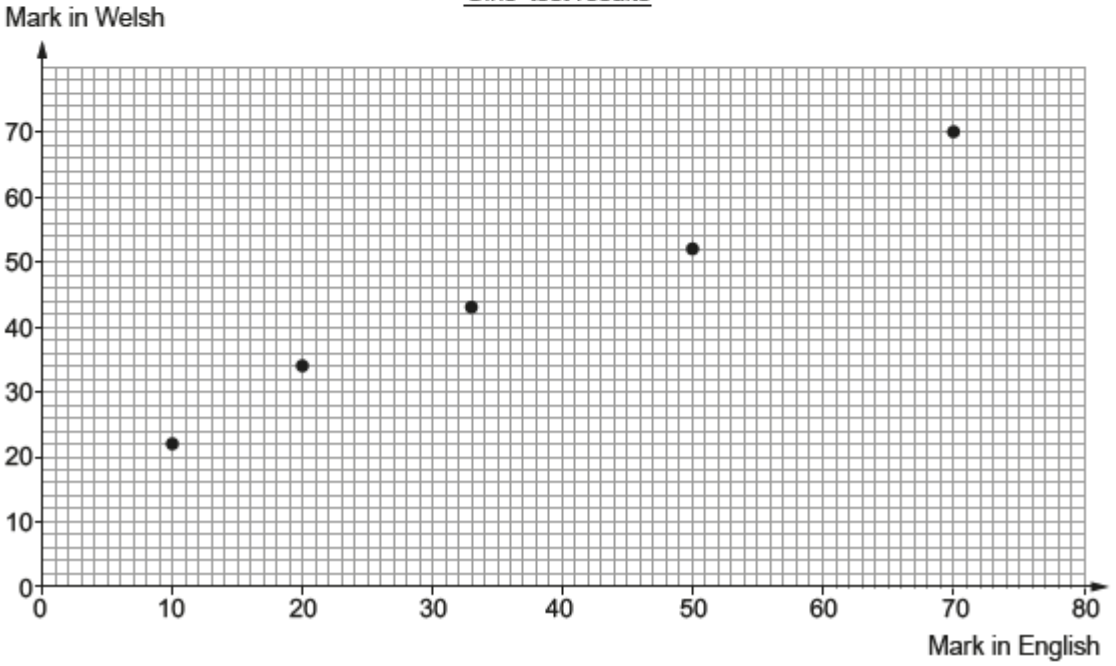
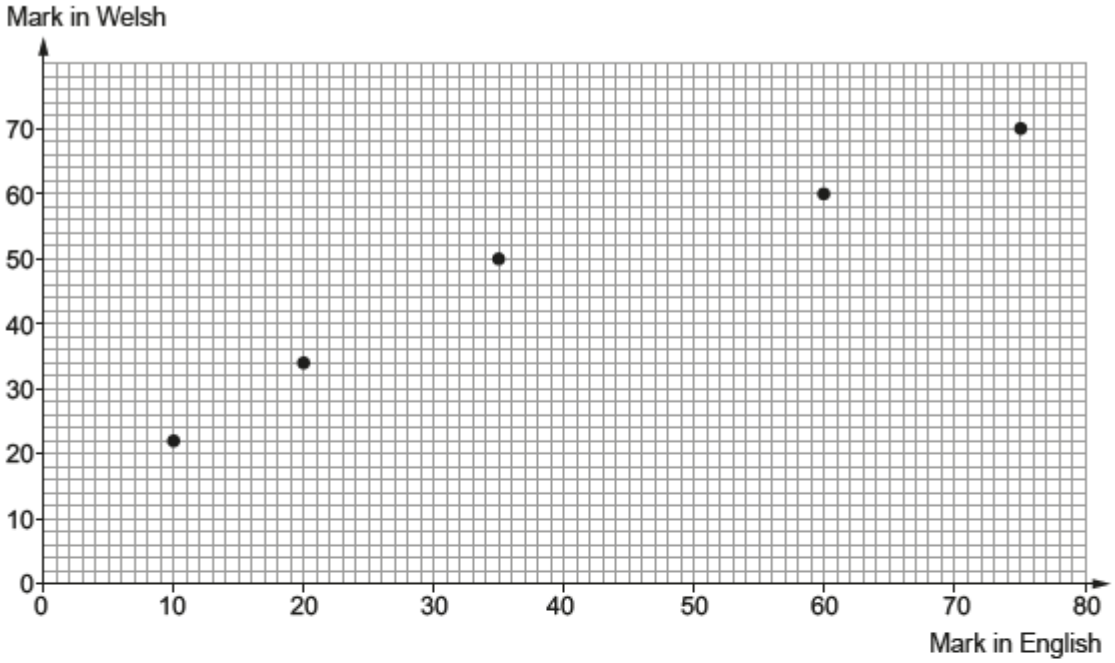
(b) Rowena states a hypothesis,
'Boys do better than girls in their English tests.'

She displays the test marks for 5 girls and 5 boys in scatter diagrams.

Girls' test results



Boys' test results



(i) Does the data support Rowena's hypothesis?
You must give a reason for your answer. [1]

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(ii) How could Rowena improve the testing of her hypothesis? [1]

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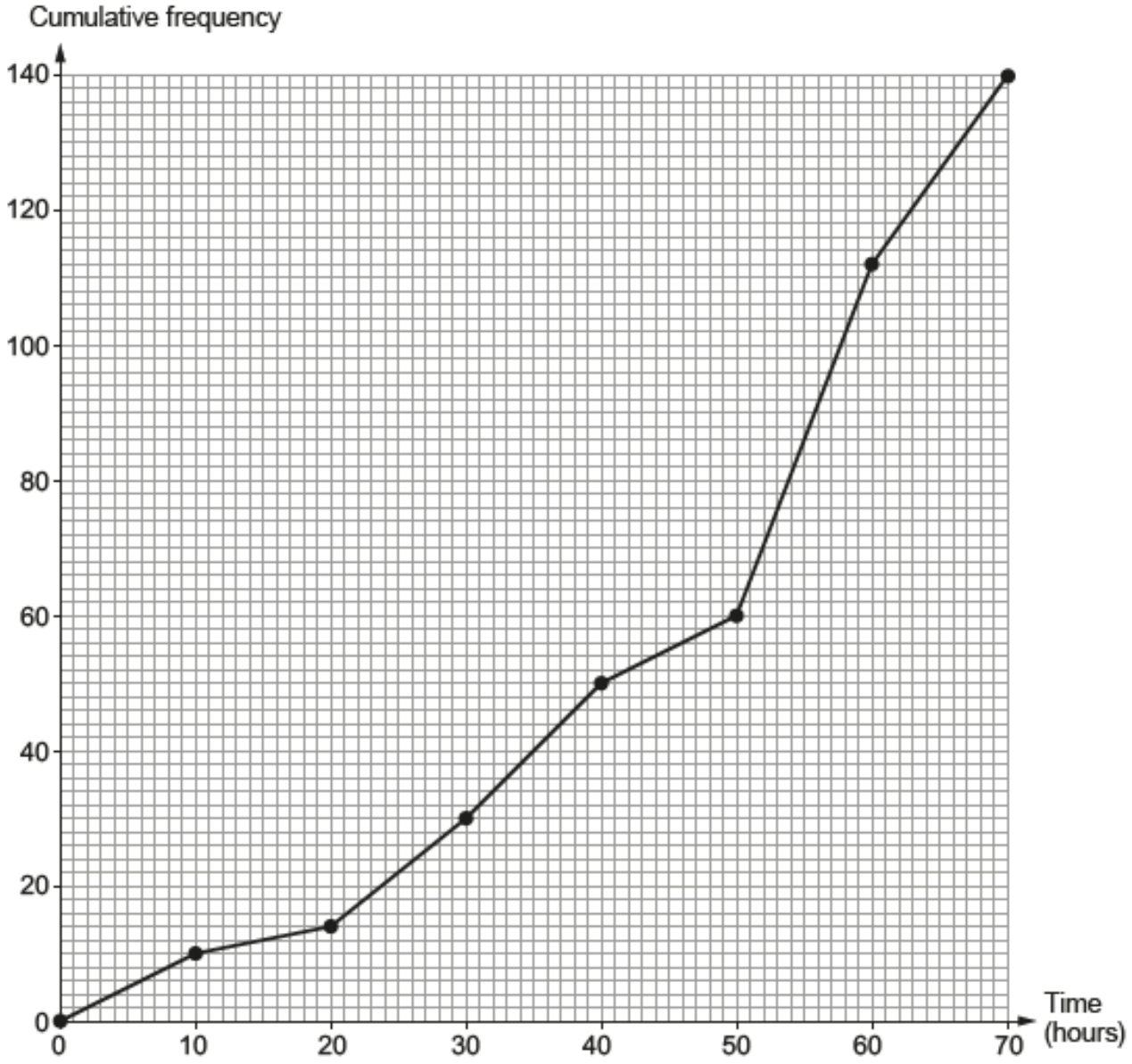
(c) Draw, by eye, a line of best fit to estimate how many marks you might expect a **boy** to score in a Welsh test if he scored 50 marks in his English test. [2]

..... marks

11. *(a)* 140 girls were asked how long they spent revising for their GCSE examinations. The cumulative frequency diagram shows the results.



(i) Estimate the median time the girls spent revising.
Circle your answer. [1]

35 hours 40 hours 48 hours 52 hours 70 hours

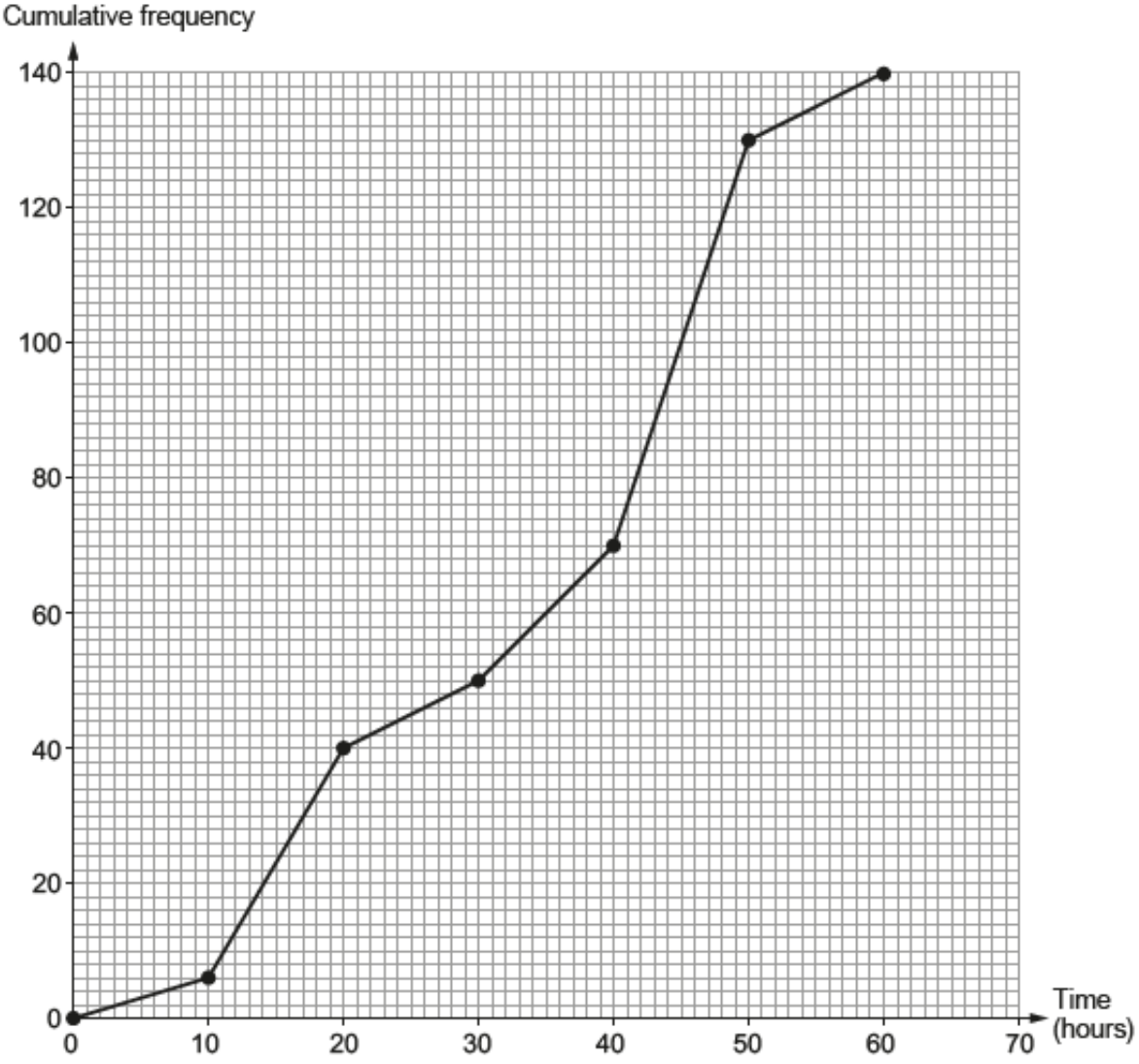
(ii) Calculate the number of girls who spent between 40 and 50 hours revising.
Circle your answer. [1]

0 girls 5 girls 10 girls 15 girls 20 girls

(iii) Circle either TRUE or FALSE for each of the following statements. [2]

25 girls spent between 30 and 50 hours revising.	TRUE	FALSE
No girls spent more than 80 hours revising.	TRUE	FALSE
The modal group is between 50 and 60 hours spent revising.	TRUE	FALSE
20 girls spent more than 60 hours revising.	TRUE	FALSE

(b) 140 boys were asked how long they spent revising for their GCSE examinations. The cumulative frequency diagram below shows the results.



Trefor makes two statements.

1. The boys' interquartile range is greater than the girls' interquartile range.

2. On average, boys spent more time revising.

Are both Trefor's statements correct?
Show calculations and give reasons to support your answers. [4]

Statement 1: .....

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Statement 2: .....

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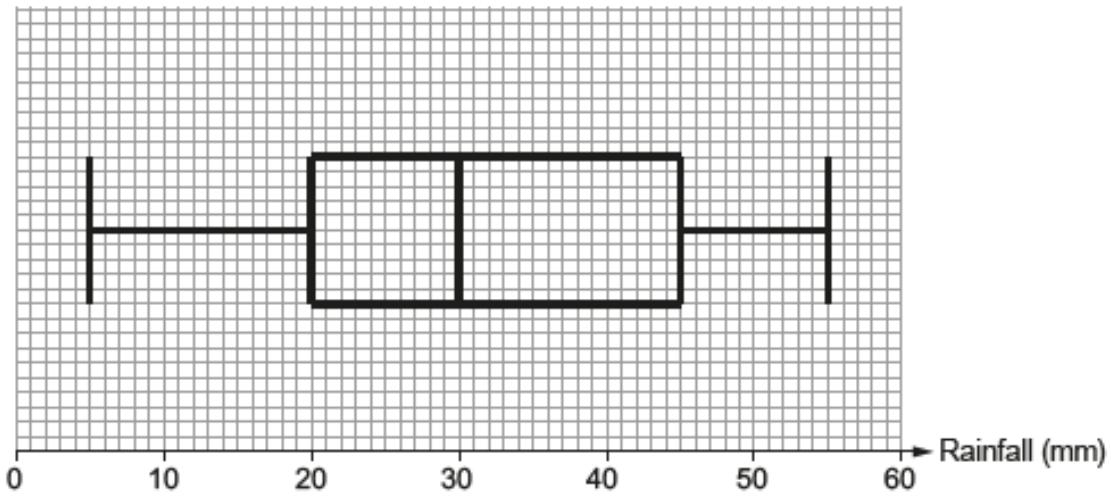
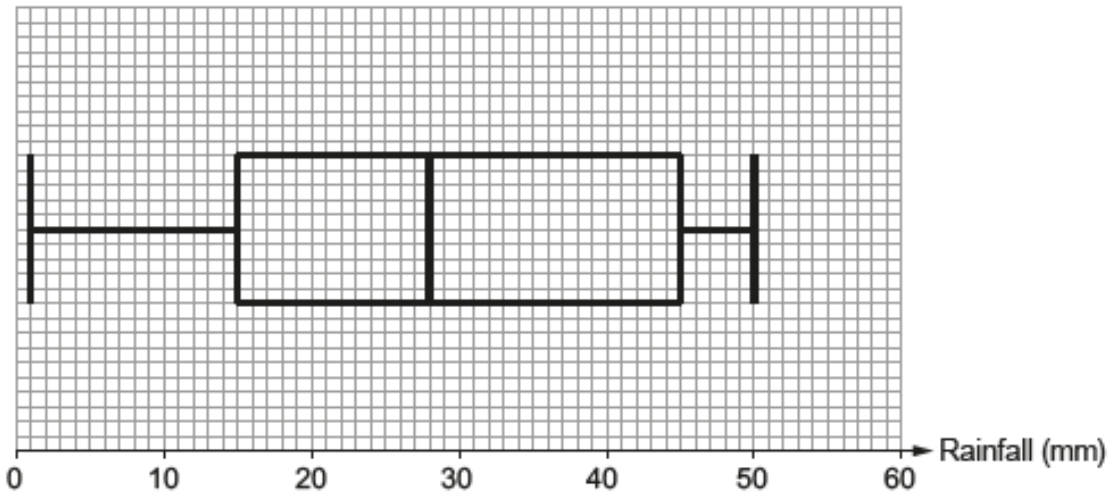
The following box-and-whisker plots illustrate the daily rainfall for April 2016 in Trefwen and in Nawrby.

April rainfall in Trefwen



April rainfall in Nawrby



(a) Complete the following table. [4]

	Range	Median	Interquartile range
Trefwen	..... mm	..... mm	..... mm
Nawrby	..... mm	..... mm	..... mm

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(b) Iona is going on holiday next April.
She is hoping for good weather, with hardly any rain.
She decides to go to Nawrby.
Give a reason to support Iona's decision.
Include values for both Trefwen and Nawrby. [1]

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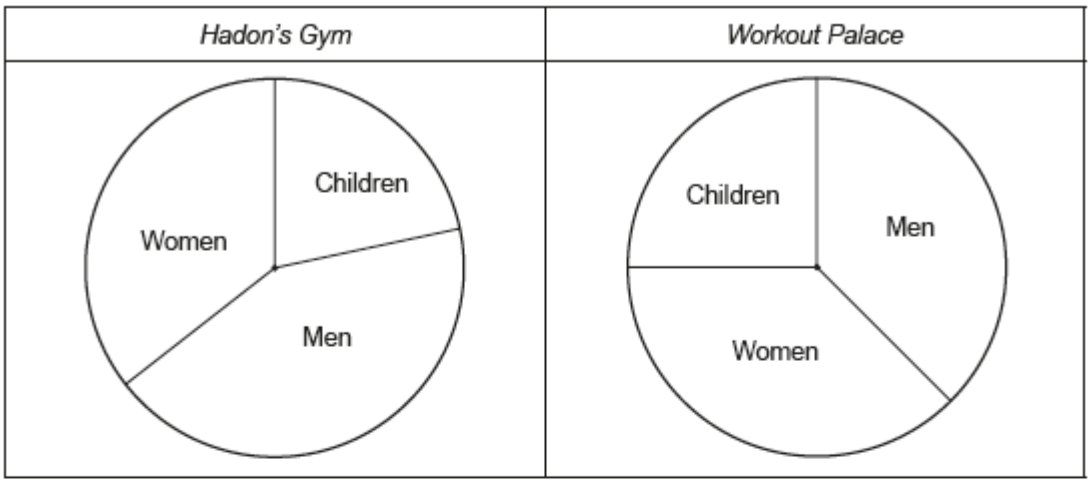
Data and Probability

Numeracy Calculator Past Paper Questions

3. Tomos is looking at gym memberships for *Hadon's Gym* and *Workout Palace*.
Each of these gyms displays its membership in a pie chart.



(a) About what percentage of the members at *Hadon's Gym* are children?
Circle your answer. [1]

10% 20% 30% 40% 50%

.....

.....

(b) Which of the following is the best estimate for the percentage of the members at *Workout Palace* who are women?
Circle your answer. [1]

25% 28% 30% 32% 38%

.....

.....

(c) Tomos says,
'There are more men with membership at *Hadon's Gym* than at *Workout Palace*.'

Is Tomos **certain** to be correct?
You must give a reason for your answer. [1]

Yes ☐ No ☐

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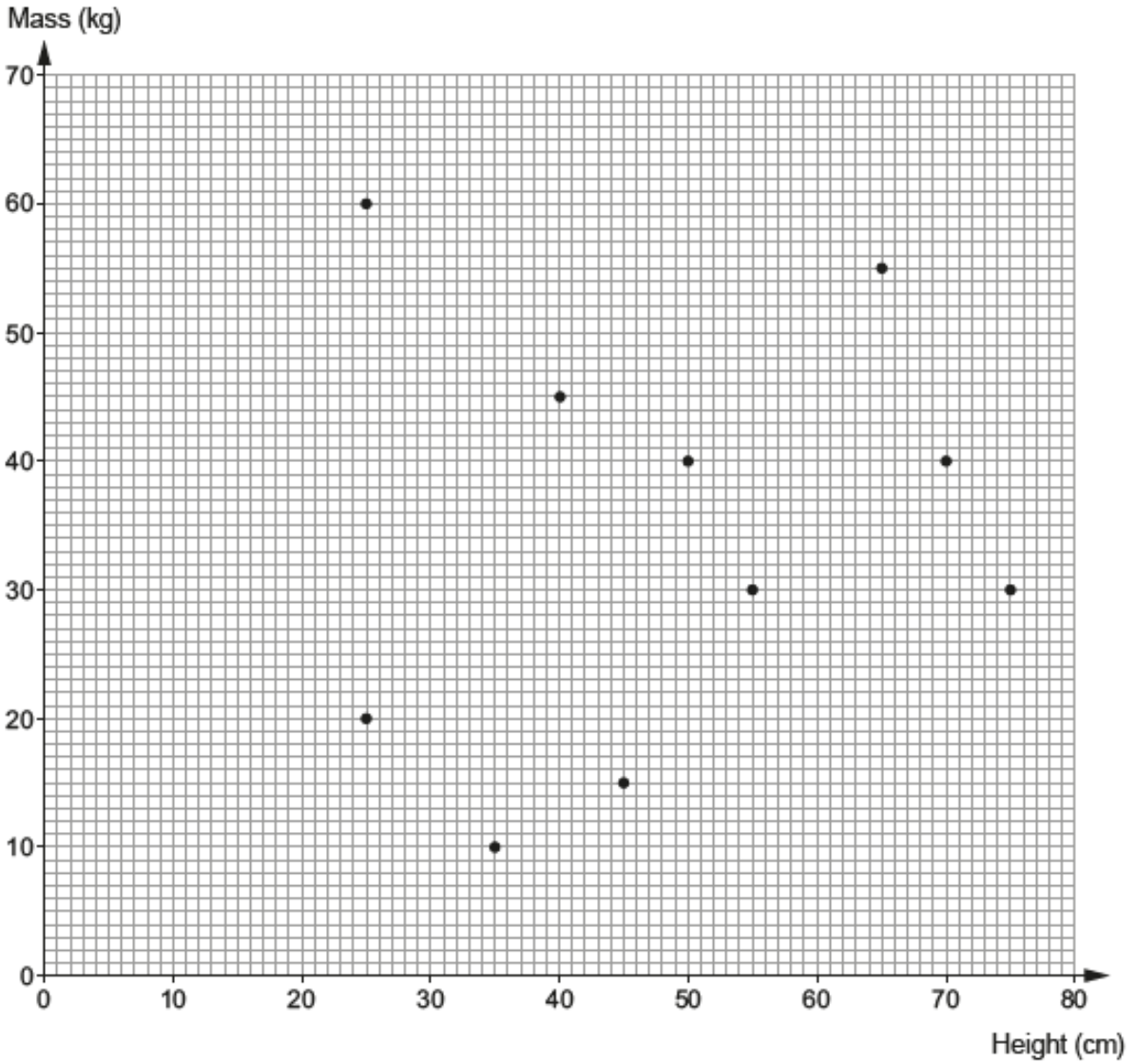
. A group of friends measured the heights and masses of their pets.
The scatter diagram shows the results.



(a) Describe the correlation shown by this scatter diagram. [1]

.....

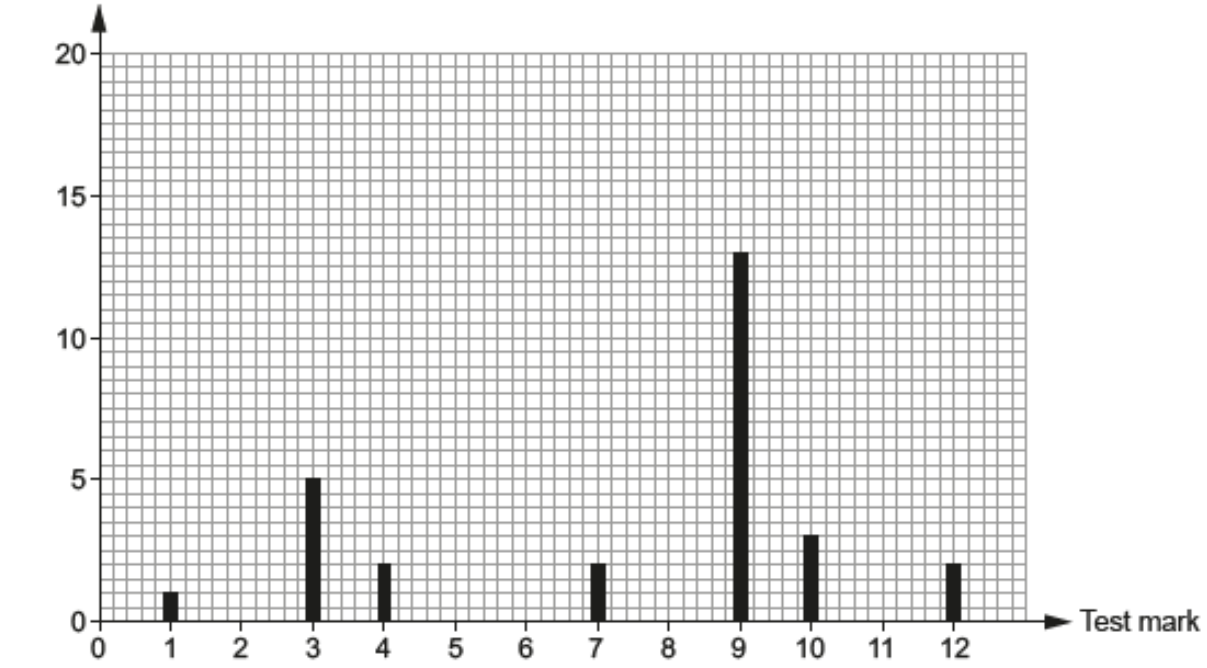
(b) The friends notice that the tallest pet has the same mass as another pet.
What is the height of this other pet? [1]

..... cm

8. *(a)* Miss Rashud gave her Year 9 French class a test on Wednesday.
She asked her class to spell 12 different words.

She displays the results as shown below.

Year 9 results



(i) How many pupils scored **more than** 9 in the test? [1]

.....

(ii) How many pupils are there in Miss Rashud's French class? [1]

.....

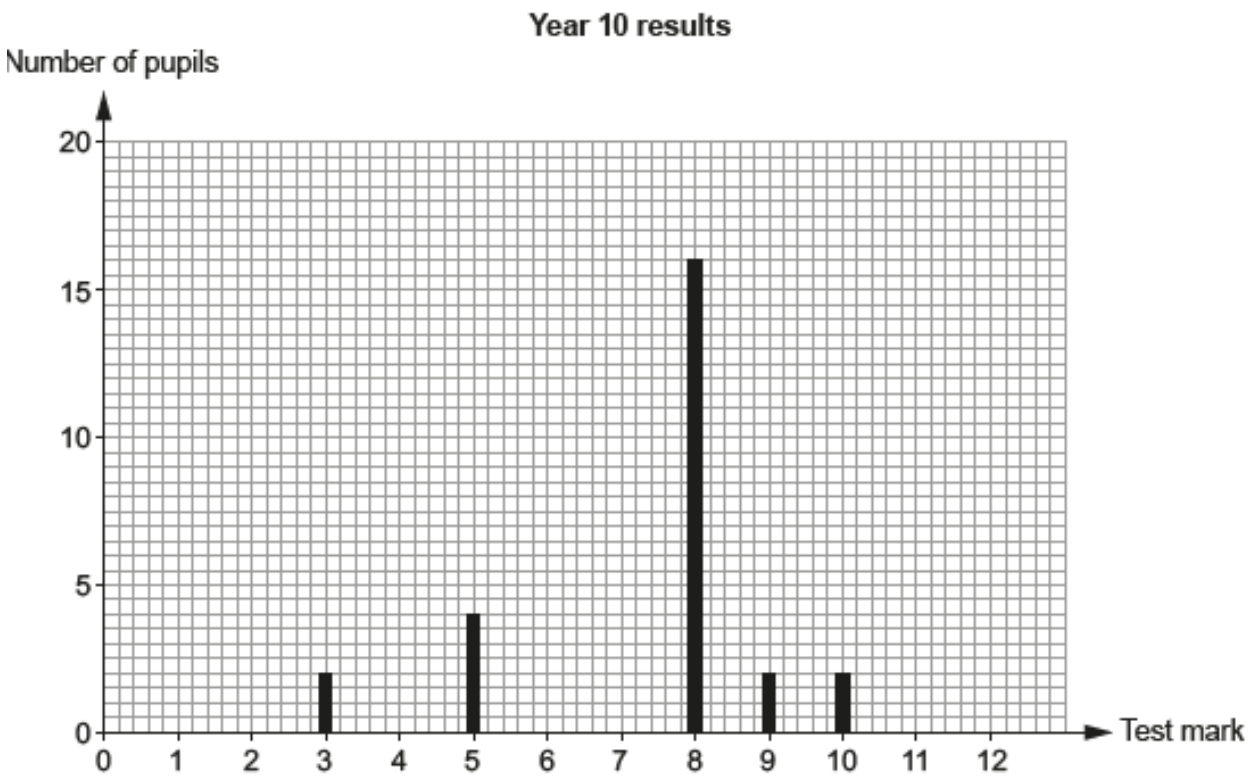
(iii) What assumption have you made in answering part (ii)? [1]

.....

.....

(b) Miss Rashud also gave the same test to her Year 10 French class on Wednesday.
She asked her class to spell the same 12 words.

She displays the results as shown opposite.



(i) Leon says,

'By looking at the **Year 10** graph, I think there is very little difference between the mode and the mean for these scores.'

Without calculating the mean, explain whether Leon is correct or not. [1]

Correct ☐ Not correct ☐

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(ii) Catrin looks at the two sets of data Miss Rashud has displayed.
She says,

'Year 10 are better at spelling than Year 9.'

Is Catrin's statement correct?
You must give values to support your answer. [1]

Catrin is correct ☐ Catrin is incorrect ☐

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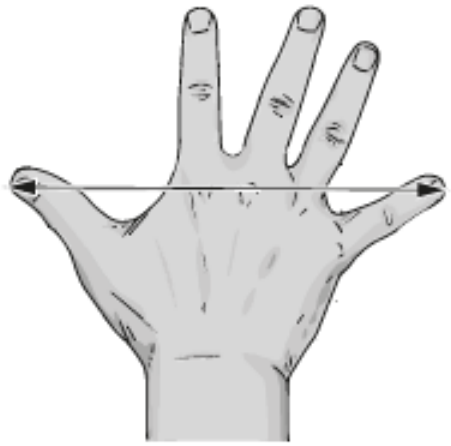
Simon plans to make gloves.

(a) One morning, Simon decided to carry out a survey to find the mean hand span of people in Wales.



He decided to sample systematically.
He decided to sample from the first 240 people who pass him in the street during the morning.

He wanted to take 20 people's hand span measurements.
Explain how Simon could use systematic sampling to obtain 20 measurements. [1]

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(b) Yesterday morning, Simon only managed to sample 10 people.
He calculated the mean hand span of these 10 people to be 22·8 cm.

Yesterday afternoon, Simon recorded the hand spans of a **further** 20 people.

The results for these 20 people are shown in the frequency table below.

Hand span, to the nearest mm	Frequency
20·0 cm to 20·8 cm	2
20·9 cm to 21·7 cm	3
21·8 cm to 22·6 cm	10
22·7 cm to 23·5 cm	5

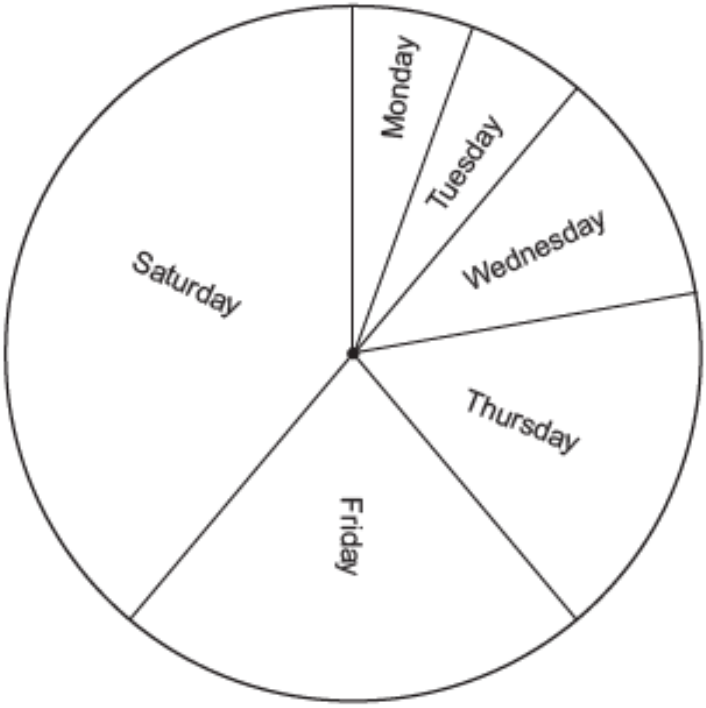
Calculate an estimate of the mean of all **30 hand spans** that Simon measured yesterday. [6]

(c) What could Simon do to improve his estimate of the mean hand span of people in Wales? [1]

Ian owns two shops. One is in Ffordd Owain and the other is in Arthur Avenue.
For each shop, Ian has been presented with the sunglasses sales for last week.

Ffordd Owain daily sunglasses sales for last week

In total, 90 pairs of sunglasses were sold.



Arthur Avenue daily sunglasses sales for last week

Key:  represents 4 pairs of sunglasses

(a) For each shop, what fraction of the sunglasses sold last week was sold on Friday? Express your answers as fractions in their simplest terms.

(i) Ffordd Owain: [2]

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.....

.....

Fraction, in its simplest terms .....

(ii) Arthur Avenue: [2]

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Fraction, in its simplest terms .....

(b) At the Arthur Avenue shop, what percentage of the sunglasses sold last week was sold on Tuesday? [2]

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(c) On Saturday, how many more sunglasses were sold in the Ffordd Owain shop than in the Arthur Avenue shop? [5]

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(a) A survey was carried out to find out how often people used the swimming pool in a sports centre.
The following two questions were asked in a questionnaire.

> Q1. How far away from the sports centre do you live?
>
> Q2. How often do you go swimming?

(i) Give **one** reason why question 1 is a useful question to ask. [1]

.....

.....

(ii) Explain why the answers to question 2 might be difficult to analyse. [1]

.....

.....

(iii) A person answers that they go swimming.
Write a question that could be used to find out how long this person spends in the pool, on average, each time they go swimming.
You must give groups for collecting the data. [2]

Question:

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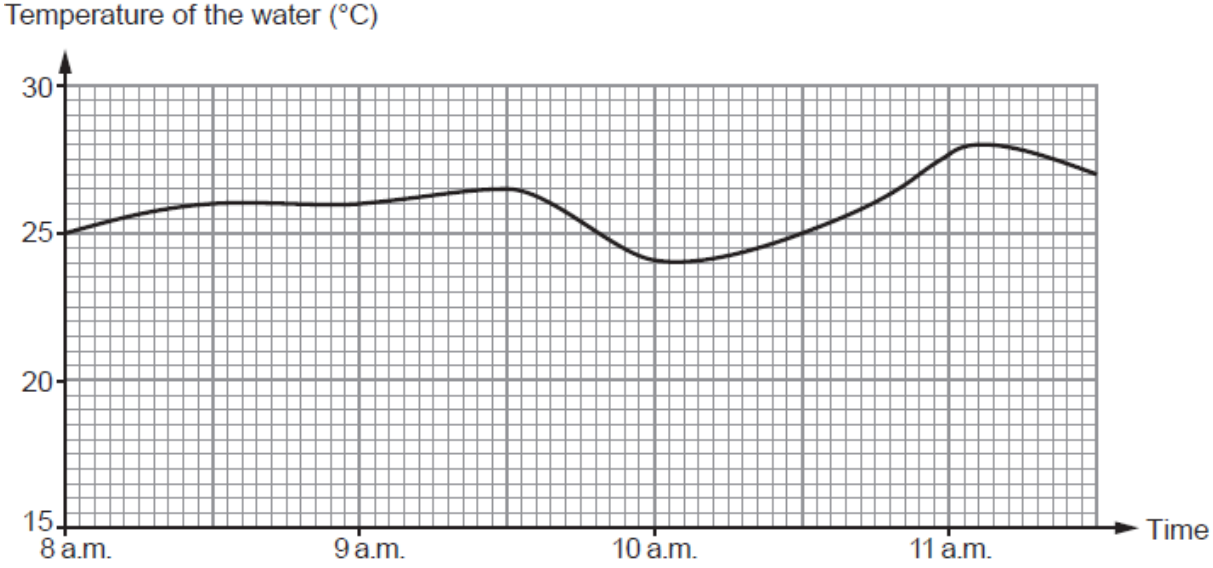
(b) Jamil works at the *Hafan Parc* swimming pool.
He records the temperature of the water in the pool from 8 a.m. to 11:30 a.m.
Jamil draws the following graph.



Use the graph to answer the following questions about the temperature of the water between 8 a.m. and 11:30 a.m.

(i) What is the range of the temperature of the water? [1]

.....

.....

(ii) For swimming, the most suitable temperature of the water in the pool is between 27°C and 28°C inclusive.
Find the length of time that the water in the pool was most suitable for swimming.
Give your answer in minutes. [1]

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(a) *Kenworth Electrical* specialises in wiring new houses.
The monthly wages of all *Kenworth Electrical* employees are summarised in the frequency table below.

Monthly wage, £x	Frequency
$1800 \leqslant x < 2000$	64
$2000 \leqslant x < 2100$	50
$2100 \leqslant x < 2400$	2
$2400 \leqslant x < 5800$	0
$5800 \leqslant x < 7800$	4

(i) How many people does *Kenworth Electrical* employ? [1]
Circle your answer.

5 6 50 100 120

.....

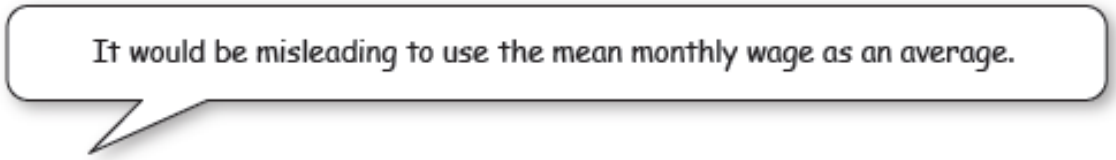
(ii) In which group does the median monthly wage lie? [1]
Circle your answer.

$1800 \leqslant x < 2000$ $2000 \leqslant x < 2100$ $2100 \leqslant x < 2400$
$2400 \leqslant x < 5800$ $5800 \leqslant x < 7800$

.....

(iii) Alysia is an accountant working for *Kenworth Electrical*.
She knows the exact wage of each employee.

Alysia says,



Explain why Alysia has reached this conclusion. [1]

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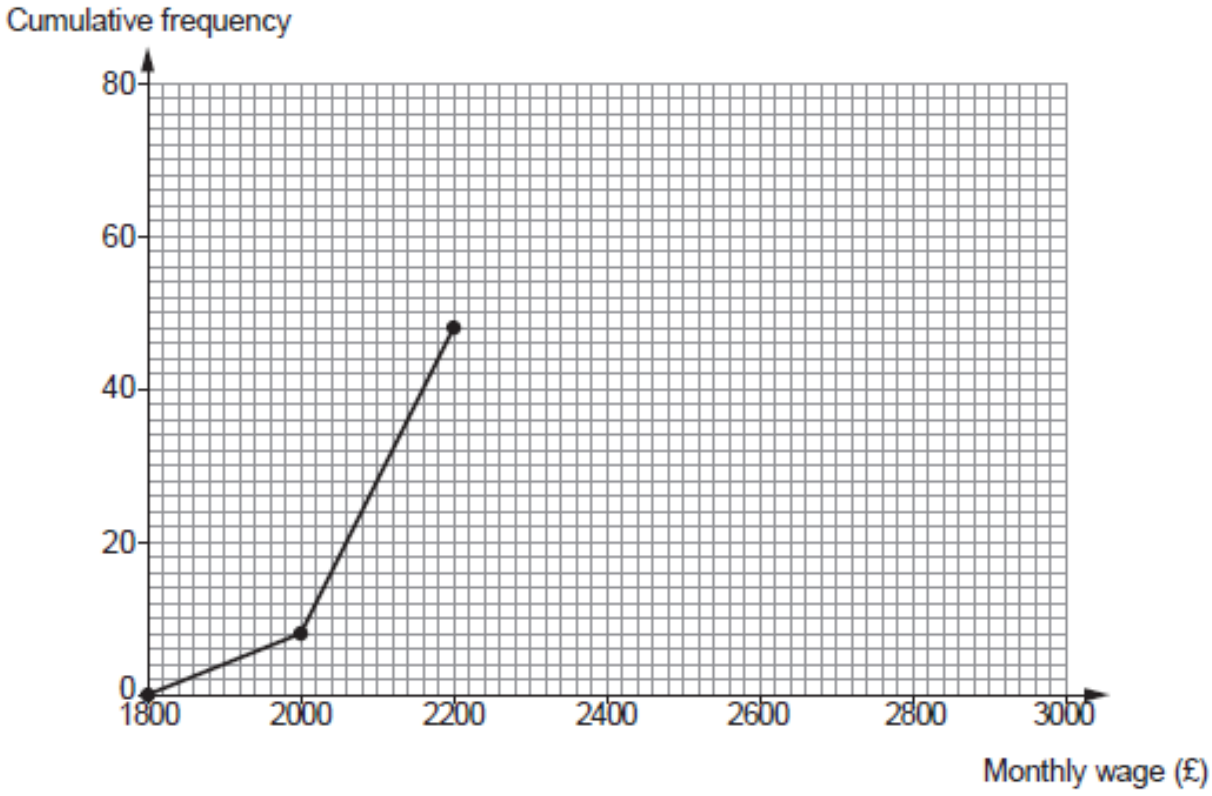
(b) *Maesteg Electrical* also specialises in wiring new houses.
The monthly wages of all *Maesteg Electrical* employees are summarised in the frequency table below.

Monthly wage, £x	Frequency
$1800 \leqslant x < 2000$	8
$2000 \leqslant x < 2200$	40
$2200 \leqslant x < 2400$	24
$2400 \leqslant x < 3000$	8

(i) Use the frequency table to complete the following cumulative frequency diagram to display the monthly wages of all *Maesteg Electrical* employees. [2]



Use the cumulative frequency diagram to answer each of the following questions.

(ii) Which of the following is the best estimate for the median monthly wage of *Maesteg Electrical* employees?
Circle your answer. [1]

£2100 £2160 £2200 £2360 £3000

.....

.....

Five pupils attended a dance class every Thursday.

For these five pupils:

- the median of their ages is 17 years,
- the mode is 18 years,
- the range of their ages is 8 years,
- one pupil is 2 years older than the youngest pupil.

Coleen now joins this class.
She is two years younger than the mean age of the other 5 pupils.

How old is Coleen?
You must show all your working. [4]

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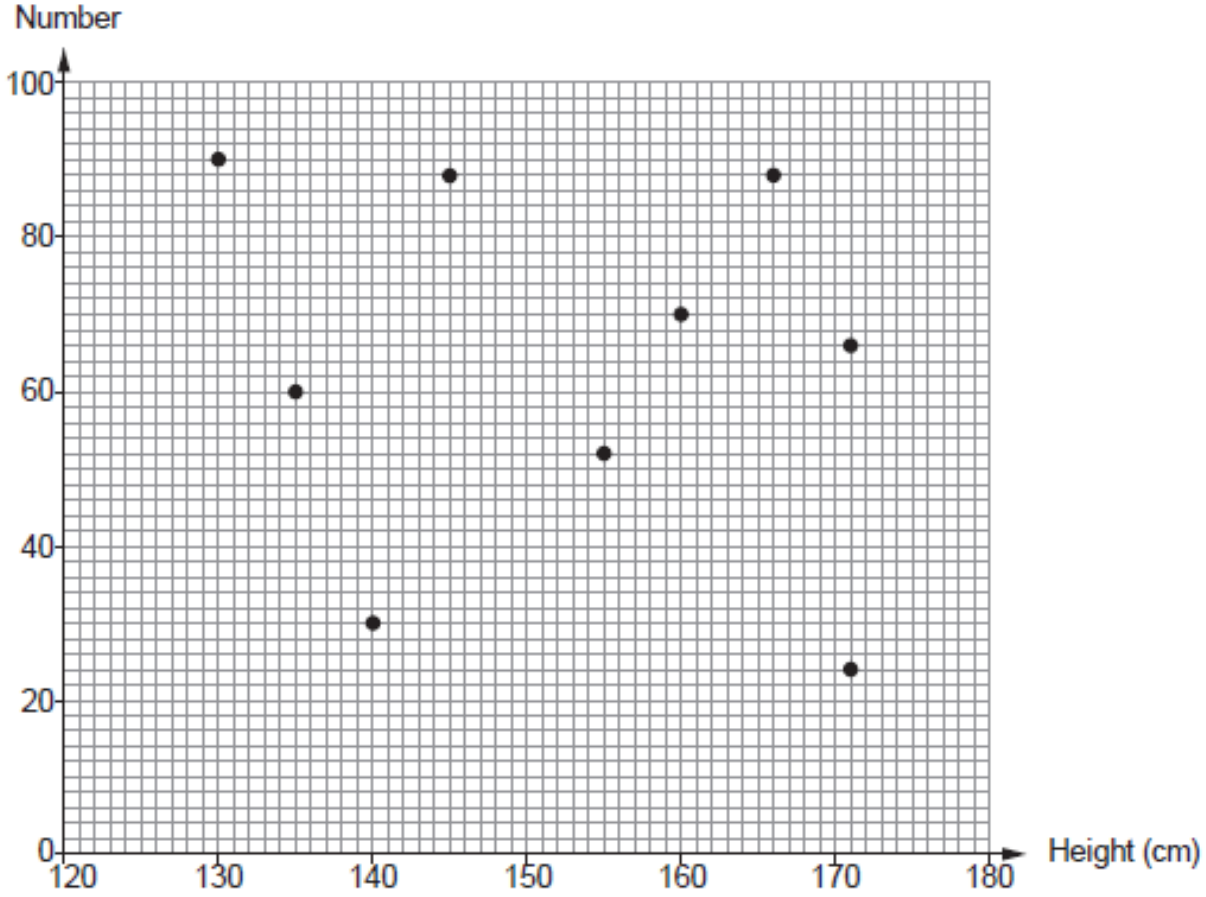
Some students were asked to select an even number between 0 and 100.
The heights of these students and the number they each selected are shown in the scatter diagram below.



(a) Describe the correlation shown by the scatter diagram. [1]

.....

(b) Gwenda and Daniel selected the same number.
Gwenda is shorter than Daniel.
Lotte is the shortest student.
Iona and Steffan are both the same height.
Iona selected a number greater than 40.

Complete the table. [4]

Name	Height (cm)	Number
Gwenda		
Daniel		
Lotte		
Iona		
Steffan		

(a) 40 people were asked how many mugs they have in their cupboards.
The results are shown below.

Number of mugs	Frequency
1 to 5	3
6 to 10	7
11 to 15	12
16 to 20	18

(i) From this data, which group contains the **median** number of mugs?
Circle your answer. [1]

Can't tell 1 to 5 6 to 10 11 to 15 16 to 20

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(ii) Calculate an estimate of the mean number of mugs these people have in their cupboards. [4]

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(a) 36 000 people took part in a survey to find out their favourite type of TV programme.
The pie chart shows the results.

(i) How many people chose *Drama* as their favourite type of TV programme?
You must show your working. [3]

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(ii) How many more people chose *Sport* rather than *News* as their favourite type of TV programme?
You must show your working. [3]

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(iii) Twice as many women as men chose *Talent shows* as their favourite type of TV programme.
Calculate how many women chose *Talent shows*.
You must show your working. [3]

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(b) 1000 people were asked,

'Should news programmes include details of the weather?
Yes or No?'

70% of the people answered 'yes'.
A pie chart is to be drawn to represent the answers to this question.
What size would the angle be to represent the answer 'yes'? [2]

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Angle representing 'yes' is ..... °

Rhodri has carried out an experiment to measure the diameters of 20 spherical dust particles, in microns.

Here are his results.

Diameter, d (microns)	Frequency
$1 \leqslant d < 2$	2
$2 \leqslant d < 4$	6
$4 \leqslant d < 5$	8
$5 \leqslant d < 9$	4

(a) (i) Calculate an estimate of the mean diameter of a dust particle. [4]

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(ii) Rhodri measures the diameters of another 25 dust particles.

Rhodri is told,

> 'The ratio of dust particles with diameters less than 4 microns to those with diameters greater than or equal to 4 microns is 7 : 8.'

He finds this fact is true when he considers all 45 dust particles.

How many of the extra 25 dust particles have a diameter of less than 4 microns?
You must show your working. [3]

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