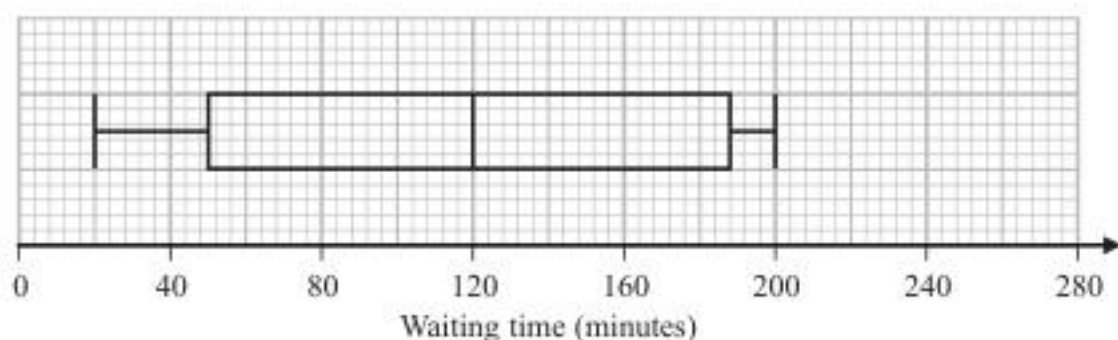


- 9 The box plot shows information about the length of time, in minutes, some people waited to see a doctor at a hospital on Monday.



- (a) Work out the interquartile range of the information in the box plot.

..... minutes
(2)

Becky says,
"50% of the people waited for at least 2 hours."

- (b) Is Becky correct?
Explain why.

.....
(1)



20 In a village,

if it rains on one day, the probability that it will rain on the next day is 0.8

if it does **not** rain on one day, the probability that it will rain on the next day is 0.6

A weather forecaster says,

“There is a 70% chance that it will rain in the village on Monday.”

Work out an estimate for the probability that it will rain in the village on Wednesday.

You must show all your working.

(Total for Question 20 is 4 marks)



P 6 4 6 3 2 A 0 2 1 2 4

- 6 In a bag there are only red counters, blue counters, green counters and pink counters. A counter is going to be taken at random from the bag.

The table shows the probabilities of taking a red counter or a blue counter.

Colour	red	blue	green	pink
Probability	0.05	0.15

The probability of taking a green counter is 0.2 more than the probability of taking a pink counter.

- (a) Complete the table.

(2)

There are 18 blue counters in the bag.

- (b) Work out the total number of counters in the bag.

(2)

(Total for Question 6 is 4 marks)



19 At the start of year n , the number of animals in a population is P_n

At the start of the following year, the number of animals in the population is P_{n+1} where

$$P_{n+1} = kP_n$$

At the start of 2017 the number of animals in the population was 4000

At the start of 2019 the number of animals in the population was 3610

Find the value of the constant k .

(Total for Question 19 is 3 marks)

20 Pat throws a fair coin n times.

Find an expression, in terms of n , for the probability that Pat gets at least 1 head and at least 1 tail.

(Total for Question 20 is 2 marks)



- 11 Cormac has some sweets in a bag.

The sweets are lime flavoured or strawberry flavoured or orange flavoured.

In the bag

$$\begin{array}{l} \text{number of lime} \\ \text{flavoured sweets} \end{array} : \begin{array}{l} \text{number of strawberry} \\ \text{flavoured sweets} \end{array} : \begin{array}{l} \text{number of orange} \\ \text{flavoured sweets} \end{array} = 9 : 4 : x$$

Cormac is going to take at random a sweet from the bag.

The probability that he takes a lime flavoured sweet is $\frac{3}{7}$

Work out the value of x .

$x = \dots\dots\dots$

(Total for Question 11 is 3 marks)

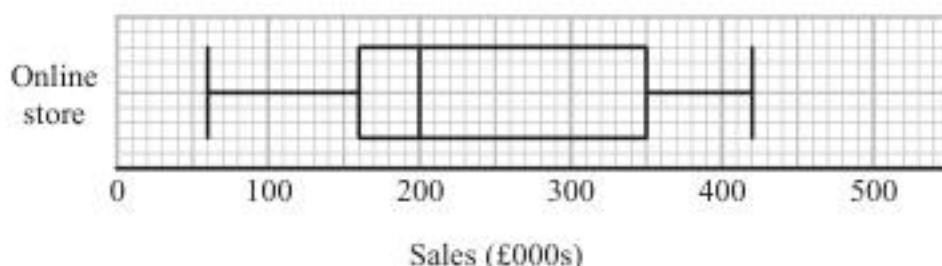


- 16 A first aid test has two parts, a theory test and a practical test.
The probability of passing the theory test is 0.75
The probability of passing only one of the two parts is 0.36
The two events are independent.
Work out the probability of passing the practical test.

(Total for Question 16 is 4 marks)



- 10 The box plot shows information about the sales, in thousands of pounds (£000s), of an online store each month.



Andrew says,

“Three quarters of the given data lies between 160 000 and 350 000 because these are the values of the lower quartile and the upper quartile.”

Andrew is wrong.

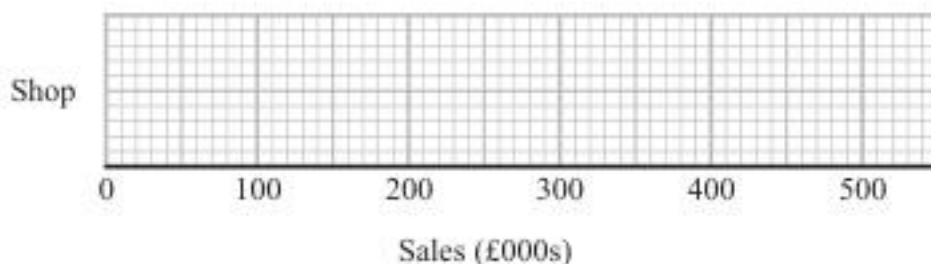
- (a) Explain why.

(1)

The table shows information about the sales, in £000s, in a shop each month.

	Sales (£000s)
least value	30
lower quartile	80
median	170
upper quartile	260
greatest value	350

- (b) On the grid below, draw a box plot for this information.



(2)

16 A shop manager wants to advertise special offers on social media platforms.

The manager asks 100 customers which of type A , type B or type C they use.

Of these customers,

4 use all three types

16 do not use any of type A , type B or type C

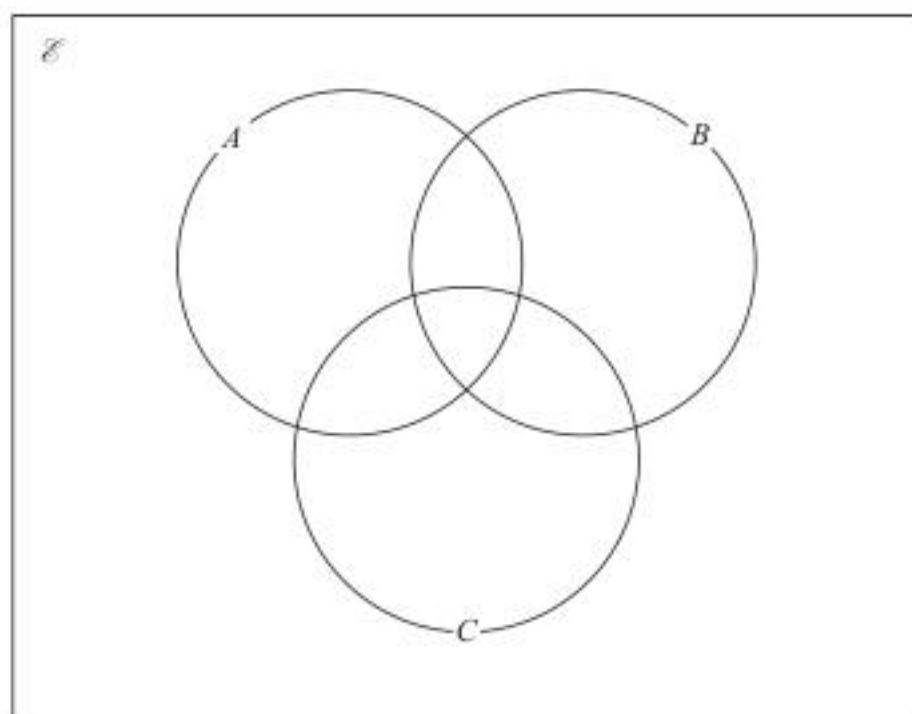
8 use both type A and type B , but not type C

14 use both type B and type C

62 in total use type A

all 20 who use type C also use at least one of type A and type B .

(a) Complete the Venn diagram for this information.



(4)

One of the customers is chosen at random.

Given that this customer uses type A ,

(b) find the probability that this customer also uses type B .

(2)

(Total for Question 16 is 6 marks)



- 14 Sally plays two games against Martin.
In each game, Sally could win, draw or lose.

In each game they play,
the probability that Sally will win against Martin is 0.3
the probability that Sally will draw against Martin is 0.1

Work out the probability that Sally will win **exactly** one of the two games against Martin.

(Total for Question 14 is 3 marks)

- 15 The straight line L_1 has equation $y = 3x - 4$
The straight line L_2 is perpendicular to L_1 and passes through the point (9, 5)
Find an equation of line L_2

(Total for Question 15 is 3 marks)

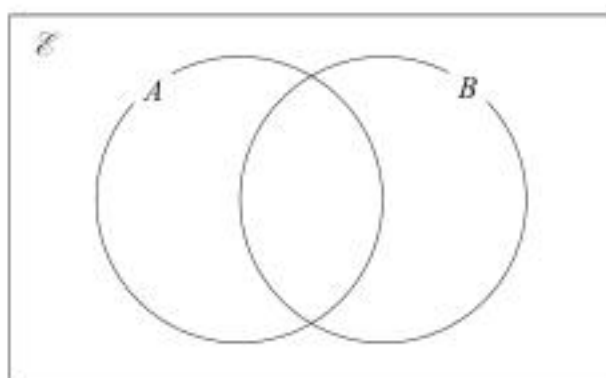


2 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{\text{even numbers}\}$

$B = \{\text{factors of } 10\}$

(a) Complete the Venn diagram for this information.



(3)

A number is chosen at random from the universal set, \mathcal{E}

(b) Find the probability that this number is in the set $A \cap B$

(2)

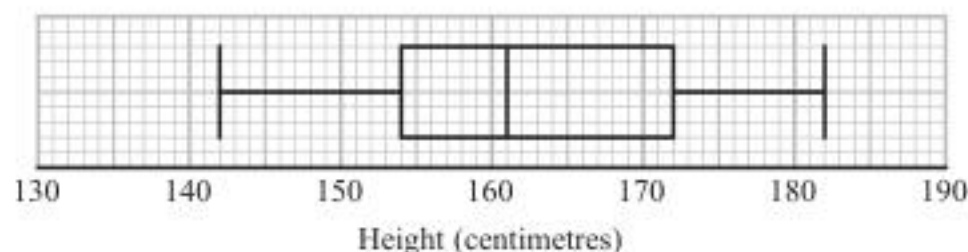
(Total for Question 2 is 5 marks)



- 9 Aisha recorded the heights, in centimetres, of some girls.
She used her results to work out the information in this table.

Least height	142 cm
Lower quartile	154 cm
Interquartile range	17 cm
Median	162 cm
Range	40 cm

Aisha drew this box plot for the information in the table.
The box plot is **not** fully correct.



Write down the two things Aisha should do to make the box plot fully correct.

1.....

.....

2.....

.....

.....

(Total for Question 9 is 2 marks)



20 There are only red sweets and yellow sweets in a bag.

There are n red sweets in the bag.

There are 8 yellow sweets in the bag.

Sajid is going to take at random a sweet from the bag and eat it.

He says that the probability that the sweet will be red is $\frac{7}{10}$

(a) Show why the probability cannot be $\frac{7}{10}$

(3)

After Sajid has taken the first sweet from the bag and eaten it, he is going to take at random a second sweet from the bag.

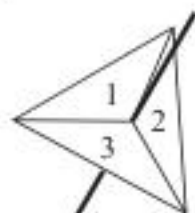
Given that the probability that both the sweets he takes will be red is $\frac{3}{5}$

(b) work out the number of red sweets in the bag.

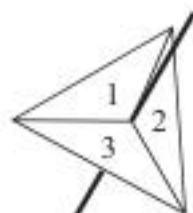
You must show all your working.



- 5 Amanda has two fair 3-sided spinners.



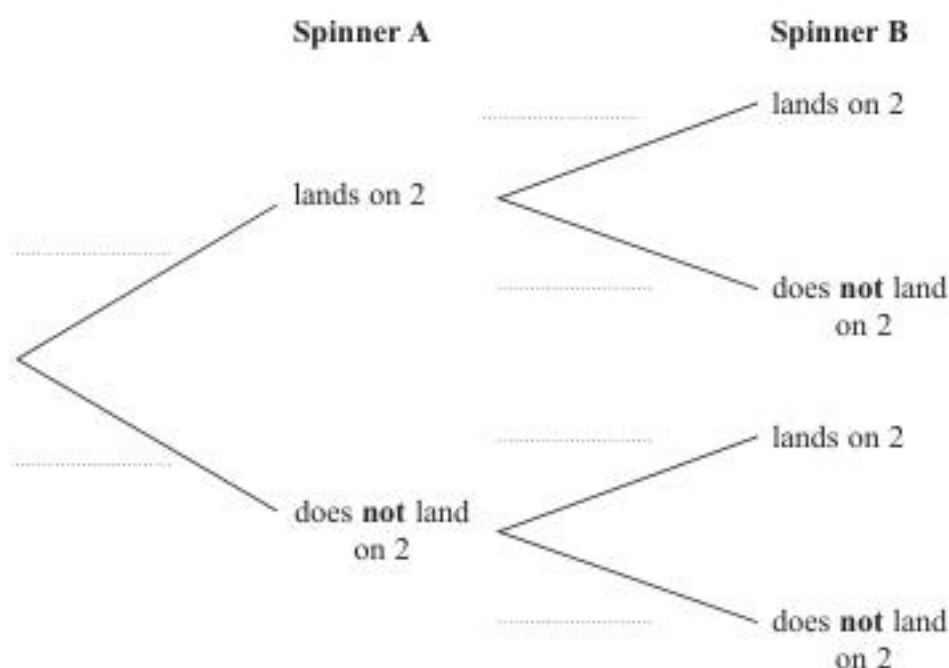
Spinner A



Spinner B

Amanda spins each spinner once.

- (a) Complete the probability tree diagram.



(2)

- (b) Work out the probability that Spinner A lands on 2 and Spinner B does **not** land on 2

(2)

(Total for Question 5 is 4 marks)



- 8 There are some counters in a bag.
The counters are blue or green or red or yellow.

The table shows the probabilities that a counter taken at random from the bag will be blue or will be green.

Colour	blue	green	red	yellow
Probability	0.32	0.20		

The probability that a counter taken at random from the bag will be red is five times the probability that the counter will be yellow.

There are 300 counters in the bag.

Work out the number of yellow counters in the bag.

(Total for Question 8 is 3 marks)



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 There are only blue cubes, red cubes and yellow cubes in a box.

The table shows the probability of taking at random a blue cube from the box.

Colour	blue	red	yellow
Probability	0.2		

The number of red cubes in the box is the same as the number of yellow cubes in the box.

- (a) Complete the table.

(2)

There are 12 blue cubes in the box.

- (b) Work out the total number of cubes in the box.

(2)

(Total for Question 1 is 4 marks)



22 There are only r red counters and g green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

red counters.....

green counters.....

(Total for Question 22 is 5 marks)

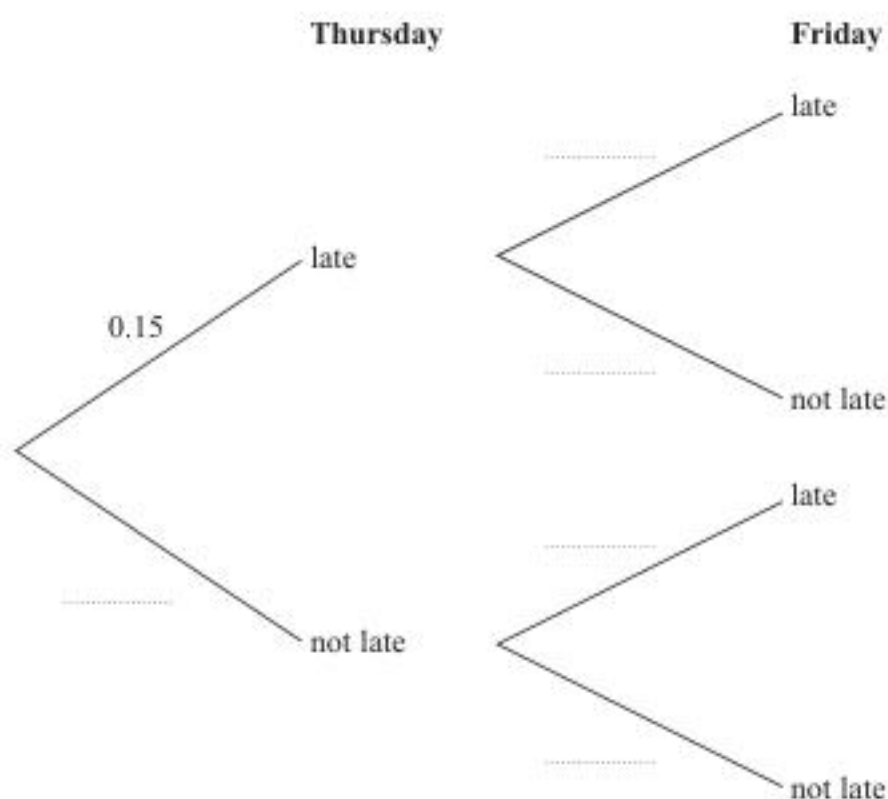
TOTAL FOR PAPER IS 80 MARKS



10 Mary travels to work by train every day.

The probability that her train will be late on any day is 0.15

(a) Complete the probability tree diagram for Thursday and Friday.



(2)

(b) Work out the probability that her train will be late on at least one of these two days.

(3)

(Total for Question 10 is 5 marks)



Answer ALL questions.

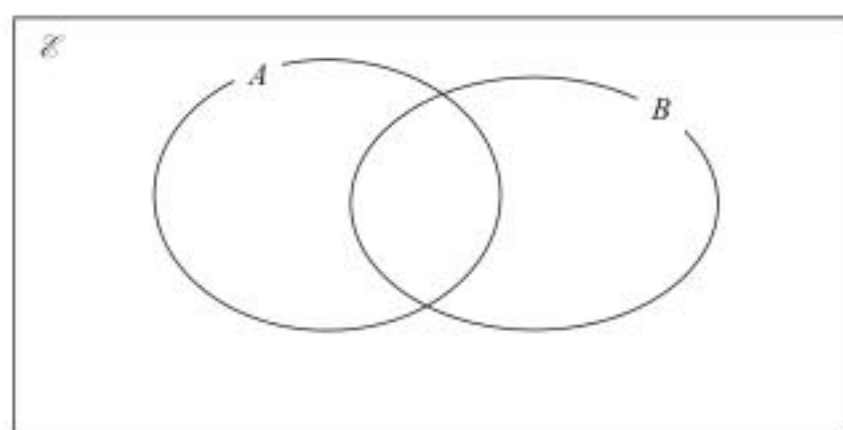
Write your answers in the spaces provided.

You must write down all the stages in your working.

1 $\mathcal{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$$A = \{1, 5, 6, 8, 9\}$$

$$B = \{2, 6, 9\}$$



(a) Complete the Venn diagram to represent this information.

(3)

A number is chosen at random from the universal set \mathcal{E} .

(b) Find the probability that the number is in the set $A \cap B$

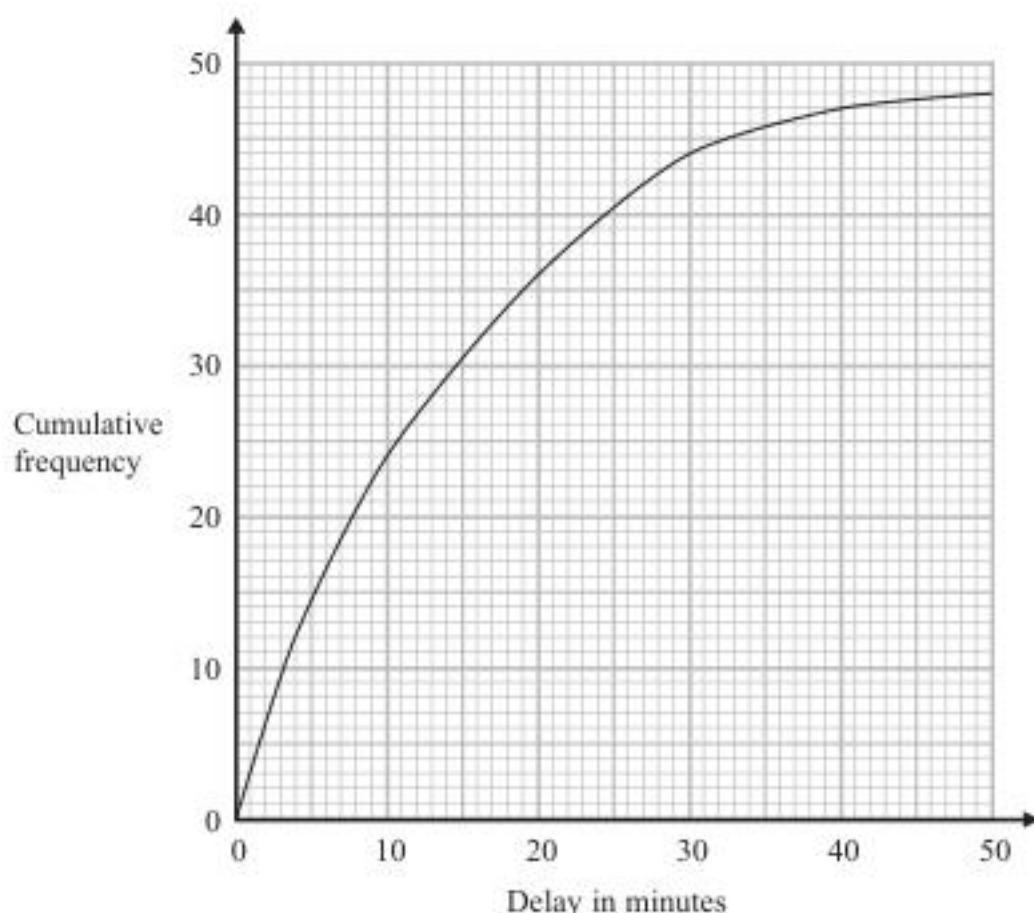
(2)

(Total for Question 1 is 5 marks)



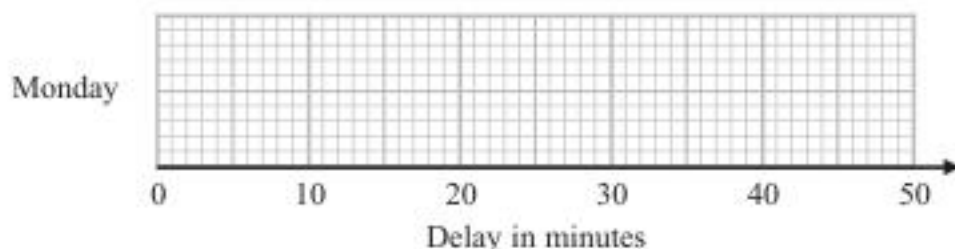
- 9 The times that 48 trains left a station on Monday were recorded.

The cumulative frequency graph gives information about the numbers of minutes the trains were delayed, correct to the nearest minute.



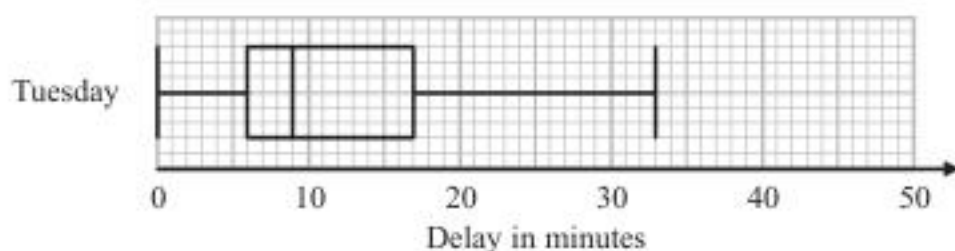
The shortest delay was 0 minutes.
The longest delay was 42 minutes.

- (a) On the grid below, draw a box plot for the information about the delays on Monday.



(3)

48 trains left the station on Tuesday.
The box plot below gives information about the delays on Tuesday.



22 There are only green pens and blue pens in a box.

There are three more blue pens than green pens in the box.

There are more than 12 pens in the box.

Simon is going to take at random two pens from the box.

The probability that Simon will take two pens of the same colour is $\frac{27}{55}$

Work out the number of green pens in the box.

(Total for Question 22 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

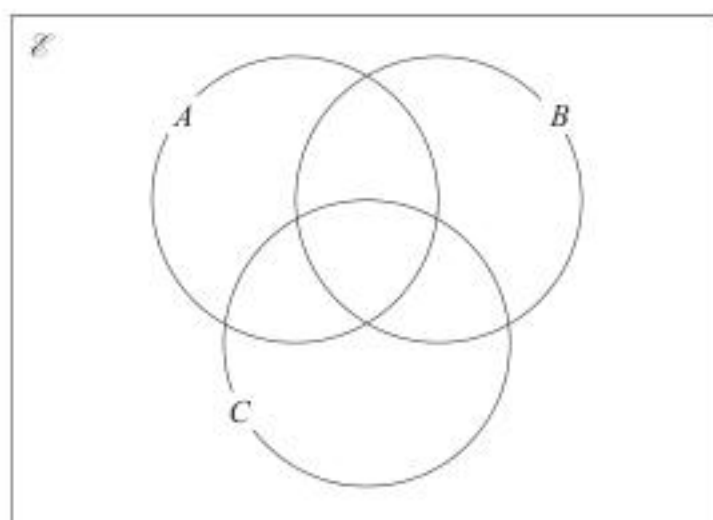
- 1 $\mathcal{E} = \{\text{even numbers between 1 and 25}\}$

$$A = \{2, 8, 10, 14\}$$

$$B = \{6, 8, 20\}$$

$$C = \{8, 18, 20, 22\}$$

- (a) Complete the Venn diagram for this information.



(4)

A number is chosen at random from \mathcal{E} .

- (b) Find the probability that the number is a member of $A \cap B$.

(2)

(Total for Question 1 is 6 marks)



- 15 The equation of a circle is $x^2 + y^2 = 42.25$

Find the radius of the circle.

(Total for Question 15 is 1 mark)

- 16 There are only red counters and blue counters in a bag.

Joe takes at random a counter from the bag.
The probability that the counter is red is 0.65
Joe puts the counter back into the bag.

Mary takes at random a counter from the bag.
She puts the counter back into the bag.

- (a) What is the probability that Joe and Mary take counters of different colours?

(2)

There are 78 red counters in the bag.

- (b) How many blue counters are there in the bag?

(2)

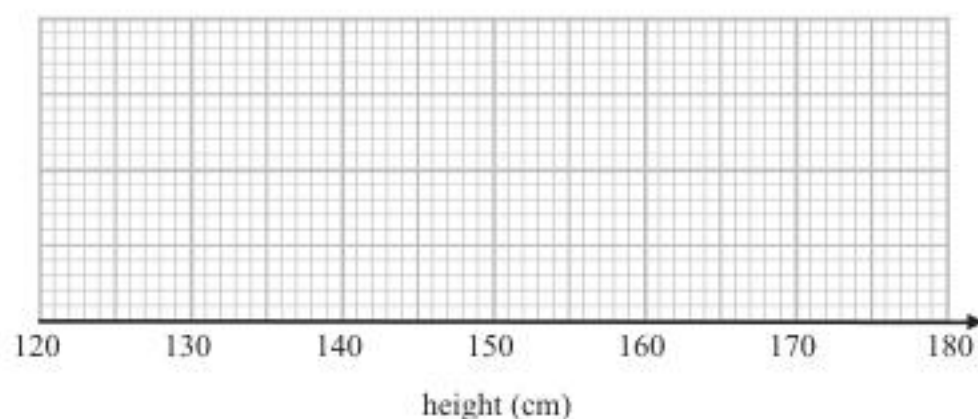
(Total for Question 16 is 4 marks)



10 The table gives some information about the heights of 80 girls.

Least height	133 cm
Greatest height	170 cm
Lower quartile	145 cm
Upper quartile	157 cm
Median	151 cm

(a) Draw a box plot to represent this information.



(3)

(b) Work out an estimate for the number of these girls with a height between 133 cm and 157 cm.

(2)

(Total for Question 10 is 5 marks)



15 (a) Factorise $a^2 - b^2$

(1)

(b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

(3)

(Total for Question 15 is 4 marks)

16 There are only red counters, blue counters and purple counters in a bag.
The ratio of the number of red counters to the number of blue counters is 3 : 17

Sam takes at random a counter from the bag.
The probability that the counter is purple is 0.2

Work out the probability that Sam takes a red counter.

(Total for Question 16 is 3 marks)



- 8 60 people were asked if they prefer to go on holiday in Britain or in Spain or in Italy.

38 of the people were male.

11 of the 32 people who said Britain were female.

8 males said Italy.

12 people said Spain.

One of the females is chosen at random.

What is the probability that this female said Spain?

(Total for Question 8 is 4 marks)



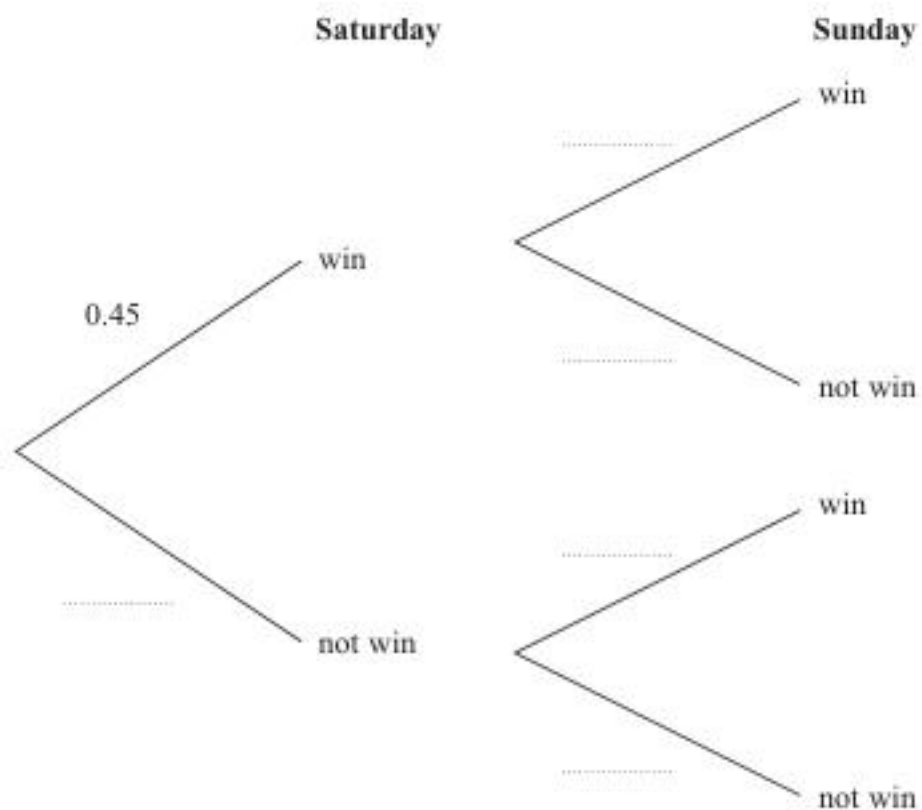
- 15 A darts team is going to play a match on Saturday and on Sunday.

The probability that the team will win on Saturday is 0.45

If they win on Saturday, the probability that they will win on Sunday is 0.67

If they do **not** win on Saturday, the probability that they will win on Sunday is 0.35

- (a) Complete the probability tree diagram.



(2)

- (b) Find the probability that the team will win exactly one of the two matches.

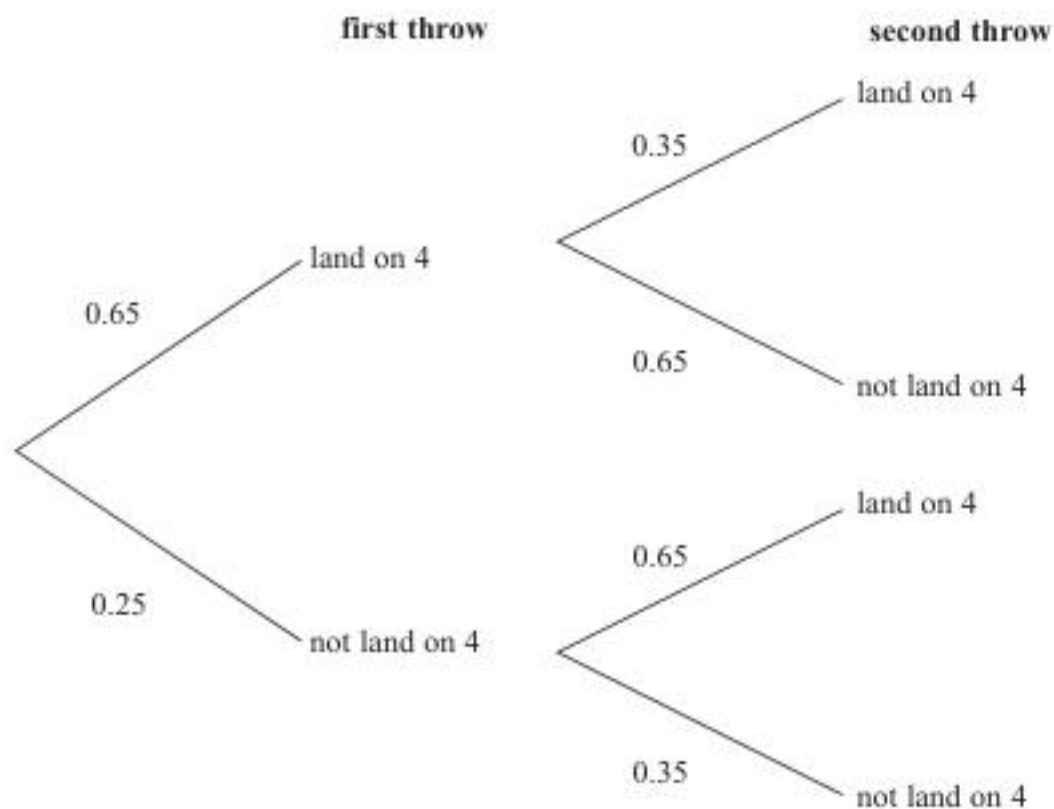
(3)

(Total for Question 15 is 5 marks)



- 4 When a biased 6-sided dice is thrown once, the probability that it will land on 4 is 0.65. The biased dice is thrown twice.

Amir draws this probability tree diagram.
The diagram is **not** correct.



Write down **two** things that are wrong with the probability tree diagram.

1

2

(Total for Question 4 is 2 marks)



- 6 There are some counters in a bag.
The counters are red or white or blue or yellow.

Bob is going to take at random a counter from the bag.

The table shows each of the probabilities that the counter will be blue or will be yellow.

Colour	red	white	blue	yellow
Probability			0.45	0.25

There are 18 blue counters in the bag.

The probability that the counter Bob takes will be red is twice the probability that the counter will be white.

- (a) Work out the number of red counters in the bag.

(4)

A marble is going to be taken at random from a box of marbles.

The probability that the marble will be silver is 0.5

There must be an even number of marbles in the box.

- (b) Explain why.

(1)

(Total for Question 6 is 5 marks)



20 50 people were asked if they speak French or German or Spanish.

Of these people,

31 speak French

2 speak French, German and Spanish

4 speak French and Spanish but not German

7 speak German and Spanish

8 do not speak any of the languages

all 10 people who speak German speak at least one other language

Two of the 50 people are chosen at random.

Work out the probability that they both only speak Spanish.

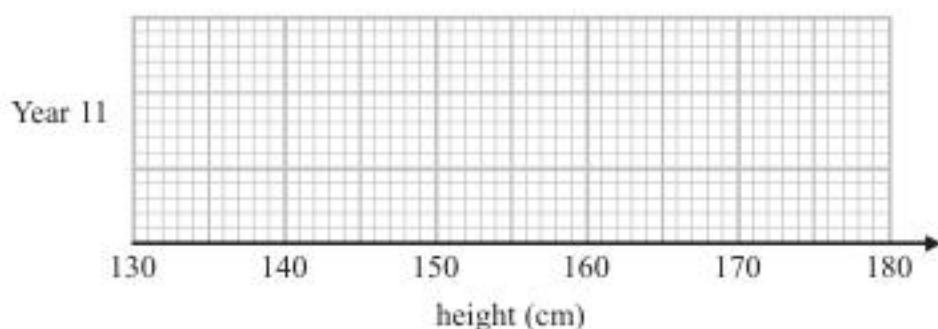
(Total for Question 20 is 5 marks)



12 The table shows information about the heights, in cm, of a group of Year 11 girls.

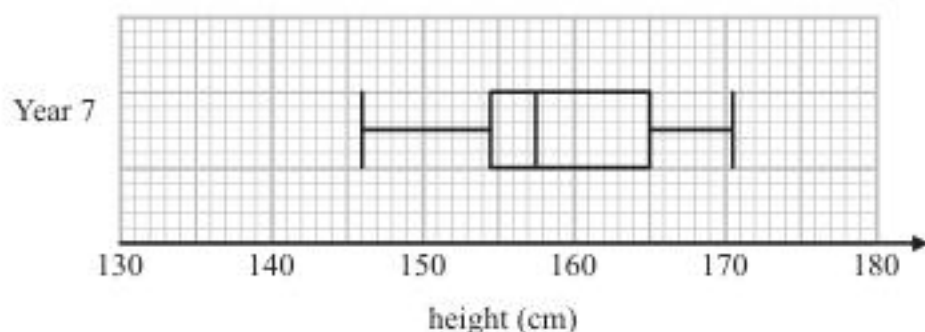
	height (cm)
least height	154
median	165
lower quartile	161
interquartile range	7
range	20

(a) Draw a box plot for this information.



(3)

The box plot below shows information about the heights, in cm, of a group of Year 7 girls.



(b) Compare the distribution of heights of the Year 7 girls with the distribution of heights of the Year 11 girls.

(2)

(Total for Question 12 is 5 marks)



- 13 A factory makes 450 pies every day.
The pies are chicken pies or steak pies.

Each day Milo takes a sample of 15 pies to check.

The proportion of the pies in his sample that are chicken is the same as the proportion of the pies made that day that are chicken.

On Monday Milo calculated that he needed exactly 4 chicken pies in his sample.

- (a) Work out the total number of chicken pies that were made on Monday.

(2)

On Tuesday, the number of steak pies Milo needs in his sample is 6 correct to the nearest whole number.

Milo takes at random a pie from the 450 pies made on Tuesday.

- (b) Work out the lower bound of the probability that the pie is a steak pie.

(2)

(Total for Question 13 is 4 marks)



- 8 When a drawing pin is dropped it can land point down or point up.

Lucy, Mel and Tom each dropped the drawing pin a number of times.

The table shows the number of times the drawing pin landed point down and the number of times the drawing pin landed point up for each person.

	Lucy	Mel	Tom
point down	31	53	16
point up	14	27	9

Rachael is going to drop the drawing pin once.

- (a) Whose results will give the best estimate for the probability that the drawing pin will land point up?
Give a reason for your answer.

(1)

Stuart is going to drop the drawing pin twice.

- (b) Use all the results in the table to work out an estimate for the probability that the drawing pin will land point up the first time and point down the second time.

(2)

(Total for Question 8 is 3 marks)



- 10 There are only blue counters, yellow counters, green counters and red counters in a bag. A counter is taken at random from the bag.

The table shows the probabilities of getting a blue counter or a yellow counter or a green counter.

Colour	blue	yellow	green	red
Probability	0.2	0.35	0.4	

- (a) Work out the probability of getting a red counter.

(1)

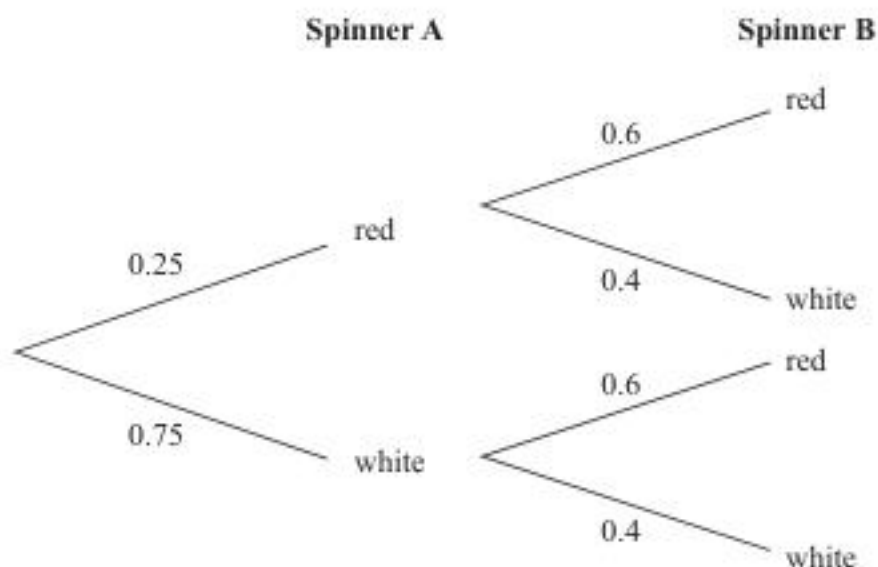
- (b) What is the least possible number of counters in the bag?
You must give a reason for your answer.

(2)

(Total for Question 10 is 3 marks)



- 12 Alan has two spinners, spinner **A** and spinner **B**.
Each spinner can land on only red or white.
- The probability that spinner **A** will land on red is 0.25
The probability that spinner **B** will land on red is 0.6
- The probability tree diagram shows this information.



Alan spins spinner **A** once and he spins spinner **B** once.
He does this a number of times.

The number of times **both** spinners land on red is 24

Work out an estimate for the number of times **both** spinners land on white.

(Total for Question 12 is 3 marks)



17 There are 9 counters in a bag.

7 of the counters are green.

2 of the counters are blue.

Ria takes at random two counters from the bag.

Work out the probability that Ria takes one counter of each colour.

You must show your working.

(Total for Question 17 is 4 marks)



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 The table shows the probabilities that a biased dice will land on 2, on 3, on 4, on 5 and on 6

Number on dice	1	2	3	4	5	6
Probability		0.17	0.18	0.09	0.15	0.1

Neymar rolls the biased dice 200 times.

Work out an estimate for the total number of times the dice will land on 1 or on 3

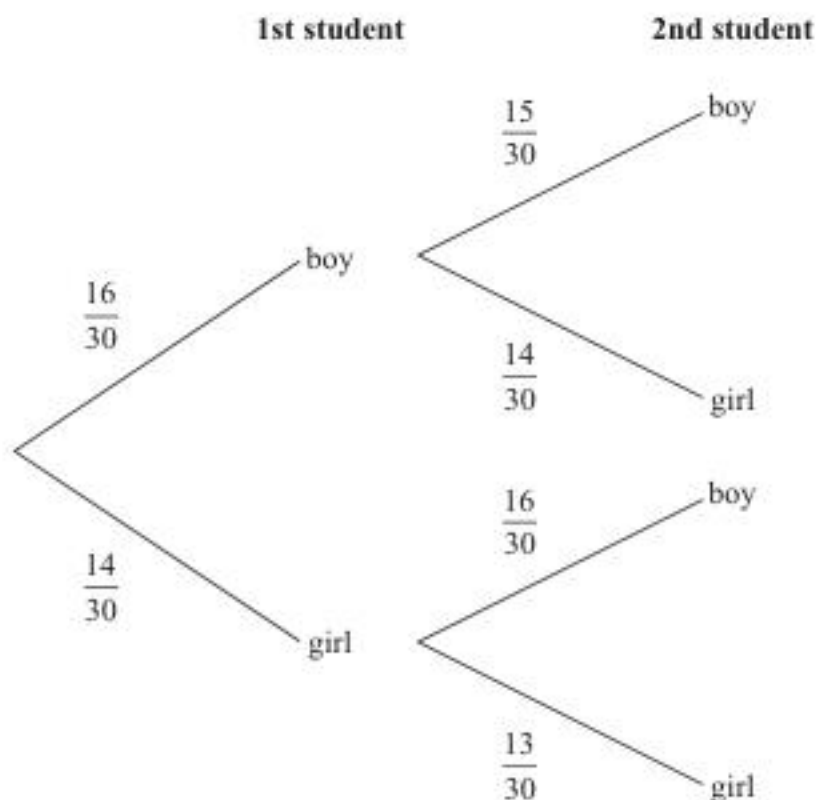
(Total for Question 1 is 3 marks)



- 12 There are 30 students in Mr Lear's class.
16 of the students are boys.

Two students from the class are chosen at random.

Mr Lear draws this probability tree diagram for this information.



- (a) Write down **one** thing that is wrong with the probabilities in the probability tree diagram.

(1)

Owen and Wasim play for the school football team.

The probability that Owen will score a goal in the next match is 0.4

The probability that Wasim will score a goal in the next match is 0.25

Mr Slater says,

“The probability that both boys will score a goal in the next match is $0.4 + 0.25$ ”

- (b) Is Mr Slater right?

Give a reason for your answer.

(1)

(Total for Question 12 is 2 marks)



Answer ALL questions.

Write your answers in the spaces provided.

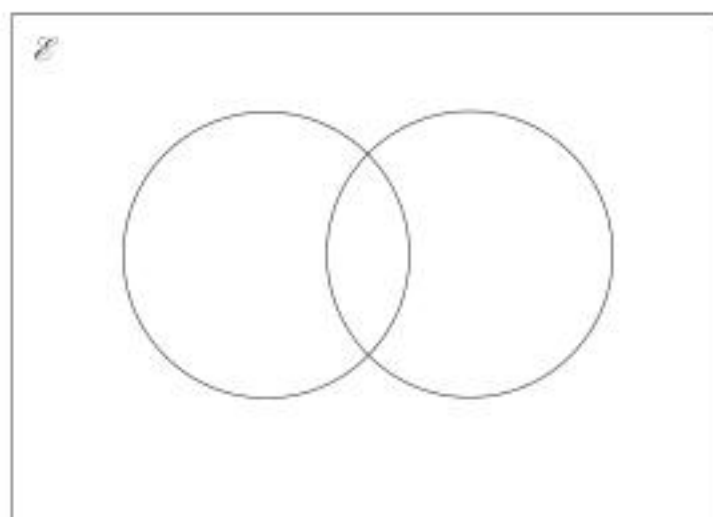
You must write down all the stages in your working.

1 $\mathcal{E} = \{\text{odd numbers less than } 30\}$

$A = \{3, 9, 15, 21, 27\}$

$B = \{5, 15, 25\}$

(a) Complete the Venn diagram to represent this information.



(4)

A number is chosen at random from the universal set, \mathcal{E} .

(b) What is the probability that the number is in the set $A \cup B$?

(2)

(Total for Question 1 is 6 marks)



- 3 The table shows some information about the dress sizes of 25 women.

Dress size	Number of women
8	2
10	9
12	8
14	6

- (a) Find the median dress size.

(1)

3 of the 25 women have a shoe size of 7

Zoe says that if you choose at random one of the 25 women, the probability that she has either a shoe size of 7 or a dress size of 14 is $\frac{9}{25}$ because

$$\frac{3}{25} + \frac{6}{25} = \frac{9}{25}$$

- (b) Is Zoe correct?

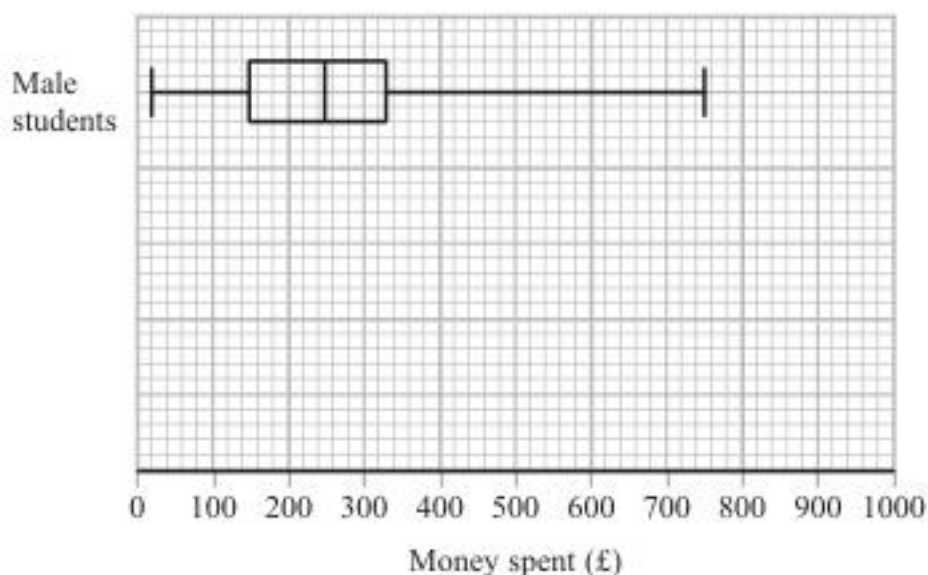
You must give a reason for your answer.

(1)

(Total for Question 3 is 2 marks)



- 9 The box plot shows information about the distribution of the amounts of money spent by some male students on their holidays.



- (a) Work out the interquartile range for the amounts of money spent by these male students.

£ (2)

The table below shows information about the distribution of the amounts of money spent by some female students on their holidays.

	Smallest	Lower quartile	Median	Upper quartile	Largest
Money spent (£)	60	180	300	350	650

- (b) On the grid above, draw a box plot for the information in the table.

(2)



Chris says,

"The box plots show that the female students spent more money than the male students."

(c) Is Chris correct?

Give a reason for your answer.

(1)

(Total for Question 9 is 5 marks)

10 Naoby invests £6000 for 5 years.

The investment gets compound interest of $x\%$ per annum.

At the end of 5 years the investment is worth £8029.35

Work out the value of x .

(Total for Question 10 is 3 marks)

