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Topical Worksheets for Cambridge IGCSE™

Mathematics (0580)

Probability (II)

1st edition, for examination until 2025

1 A bag contains blue, red, yellow and green balls only.
A ball is taken from the bag at random.
The table shows some information about the probabilities.

Colour	Blue	Red	Yellow	Green
Probability	0.15	0.2		0.43

(a) Complete the table.

[2]

(b) Abdul takes a ball at random and replaces it in the bag.
He does this 200 times.

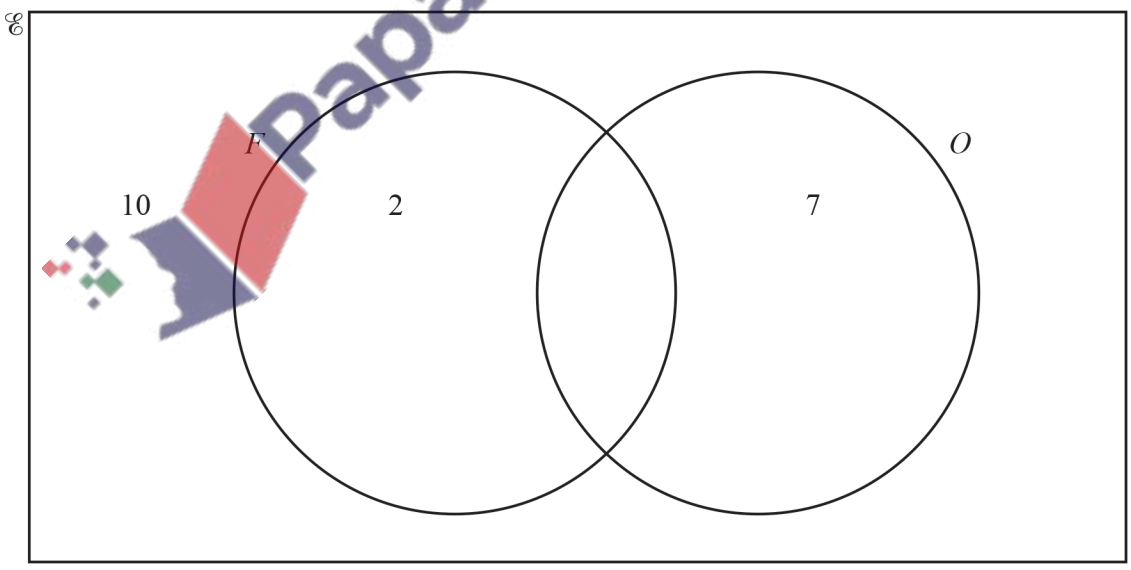
Find how many times he expects to take a red ball.

..... [1]

[Total: 3]

2 $\mathscr{E} = \{x : x \text{ is a natural number} \leqslant 15\}$
$F = \{x : x \text{ is a factor of } 12\}$
$O = \{x : x \text{ is an odd number}\}$

(a) Complete the Venn diagram to show the elements of these sets.



[2]

(b) Write down one number that is in set O, but not in set F.

..... [1]

(c) Find $\text{n}(F \cup O)$.

..... [1]

(d) A number is chosen at random from $\mathscr{E}$.

Work out the probability that this number is in set O.

..... [1]

[Total: 5]

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

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

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

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

(ii) Calculate an estimate of the mean height.

..... m [4]

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

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

..... [1]

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

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

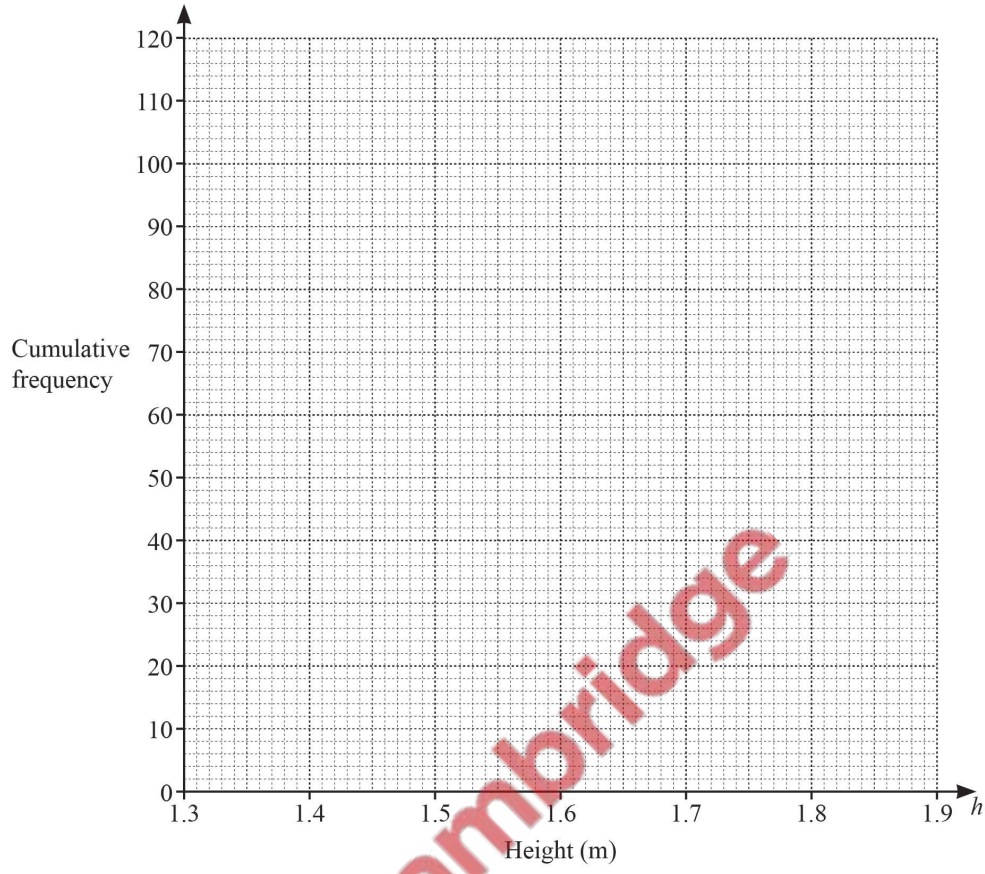
..... [4]

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

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

[2]

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



[3]

(d) Use your diagram to find an estimate for

(i) the median height,

..... m [1]

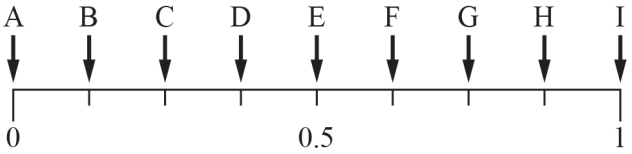
(ii) the 40th percentile.

..... m [2]

[Total: 18]

4 A bag contains 3 green balls, 4 red balls and 1 blue ball only.
Matt takes a ball from the bag at random.

Some probabilities are marked on the probability scale.



Write down the letter that shows the probability that

(a) Matt takes a red ball,

..... [1]

(b) Matt does not take a blue ball.

..... [1]

[Total: 2]

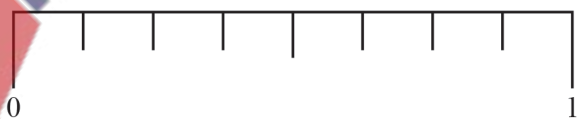
5 Rui has a bag containing 5 black pens, 8 red pens and 3 blue pens only.
He takes a pen out of the bag at random.

Draw an arrow (↓) on the probability scale to show the probability that Rui takes

(a) a red pen,

[1]

(b) a red pen or a blue pen.



[1]

[Total: 2]

6 The probability that the school bus is late is $\frac{9}{10}$.

If the school bus is late, the probability that Seb travels on the bus is $\frac{15}{16}$.

If the school bus is on time, the probability that Seb travels on the bus is $\frac{3}{4}$.

Find the probability that Seb travels on the bus.

..... [3]

[Total: 3]

7 Marco watches 25 boats enter a port, of which 9 have a mast.
There are a total of 200 boats in the port.

Calculate an estimate of the number of boats in the port that have a mast.

..... [2]

[Total: 2]

8 Marco has ropes of four different colours.
He takes a rope at random.

Colour	Brown	White	Red	Green
Probability	0.35		0.04	0.2

Complete the table.

[2]

[Total: 2]

9 Soraya makes 30 flags.
11 flags are pink, 7 are yellow, 5 are blue, 4 are silver and 3 are green.
Soraya takes a flag at random.

Find the probability that the flag she takes is

(a) pink,

..... [1]

(b) not blue,

..... [1]

(c) red.

..... [1]

[Total: 3]

10 A bag contains green balls and red balls only.
A ball is taken at random from the bag.
The probability of taking a green ball is 0.38 .

Write down the probability of taking

(a) a red ball,

..... [1]

(b) a blue ball.

..... [1]

[Total: 2]

11 The probability that Alex wins a prize is 0.27 .

Find the probability that Alex does not win a prize.

..... [1]

[Total: 1]

12 The probability that Tommy has his calculator for his mathematics lesson is 0.4 .
There are 120 mathematics lessons in one year.

Work out an estimate of the number of mathematics lessons in one year that Tommy has his calculator.

..... [1]

[Total: 1]

13 A box contains 22 coloured pencils.
6 pencils are pink, 9 pencils are blue and 7 pencils are yellow.

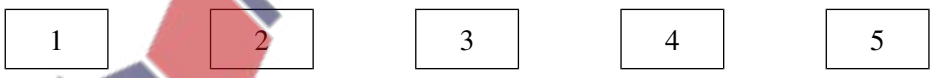
A pencil is taken at random from the box.

Write down the probability that this pencil is green.

..... [1]

[Total: 1]

14



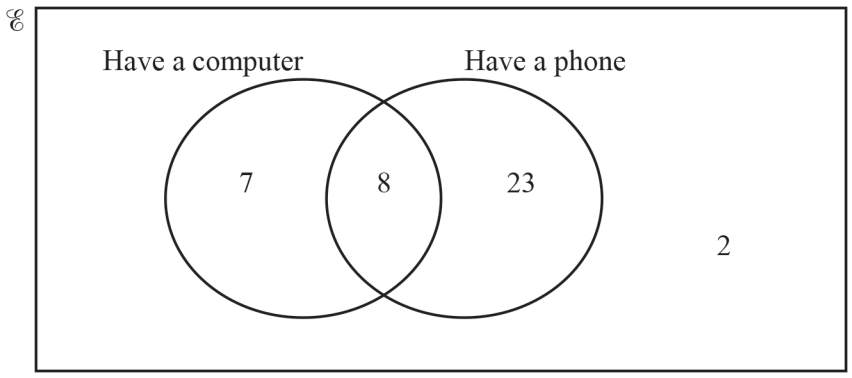
The diagram shows five cards.
Two of the cards are taken at random, without replacement.

Find the probability that both cards show an even number.

..... [2]

[Total: 2]

15 40 children were asked if they have a computer or a phone or both.
The Venn diagram shows the results.

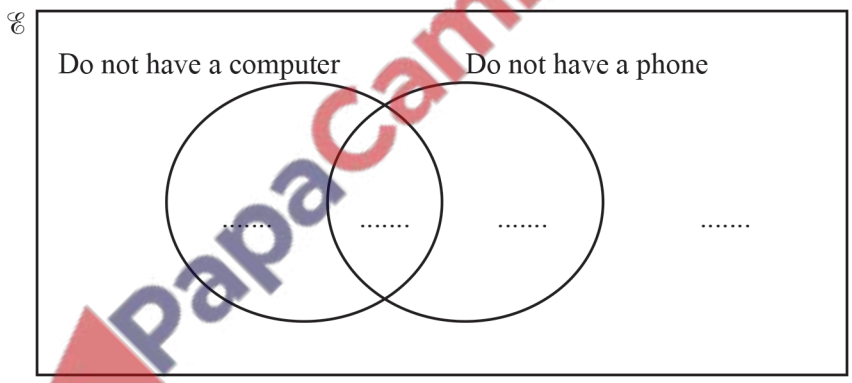


(a) A child is chosen at random from the children who have a computer.

Write down the probability that this child also has a phone.

..... [1]

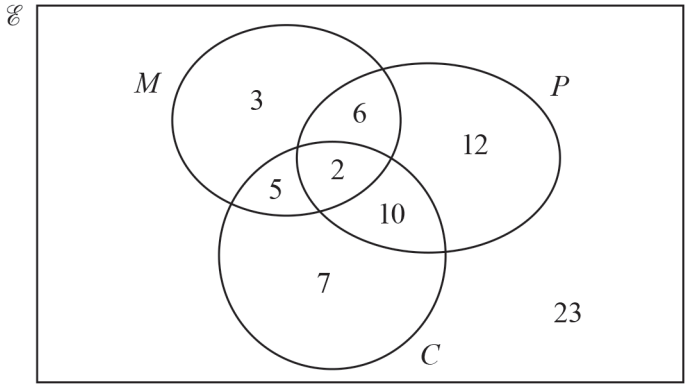
(b) Complete the Venn diagram.



[2]

[Total: 3]

16 The Venn diagram below shows information about the number of gardeners who grow melons (M), potatoes (P) and carrots (C).



(a) A gardener is chosen at random from the gardeners who grow melons.

Find the probability that this gardener does not grow carrots.

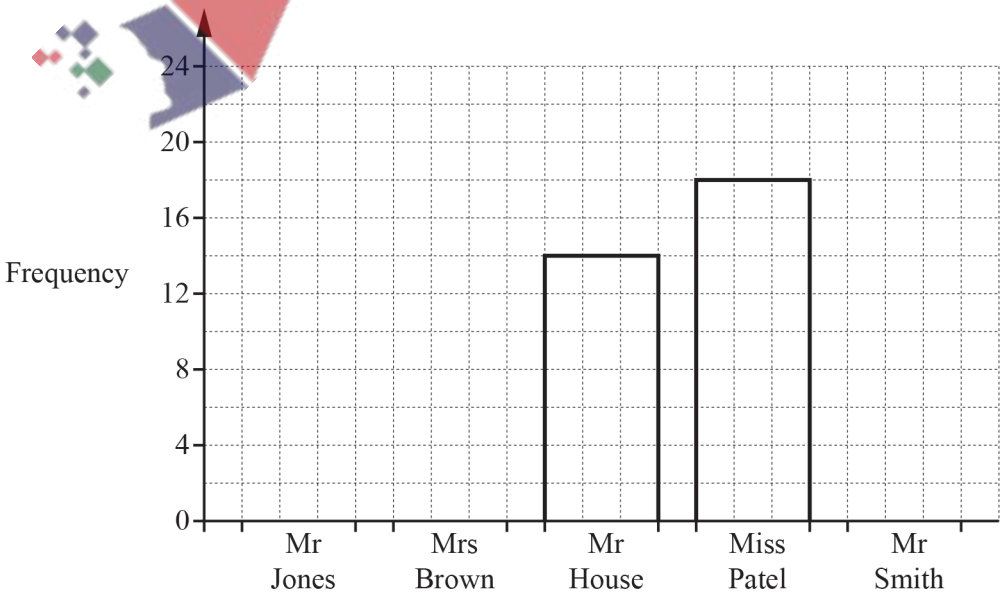
..... [2]

(b) Find n $((M \cap P) \cup C')$.

..... [1]

[Total: 3]

17 80 students each record the name of their mathematics teacher.
The number of these students taught by Mr House and by Miss Patel are shown in the bar chart.



(a) How many more students are taught by Miss Patel than by Mr House?

..... [1]

(b) 15 students are taught by Mr Smith.
Twice as many students are taught by Mrs Brown than by Mr Jones.

Use this information to complete the bar chart.

[4]

(c) Write down the mode.

..... [1]

(d) One of these students is chosen at random.

Work out the probability that this student

(i) is taught by Mr House,

..... [1]

(ii) is not taught by either Mr House or Miss Patel.

..... [2]

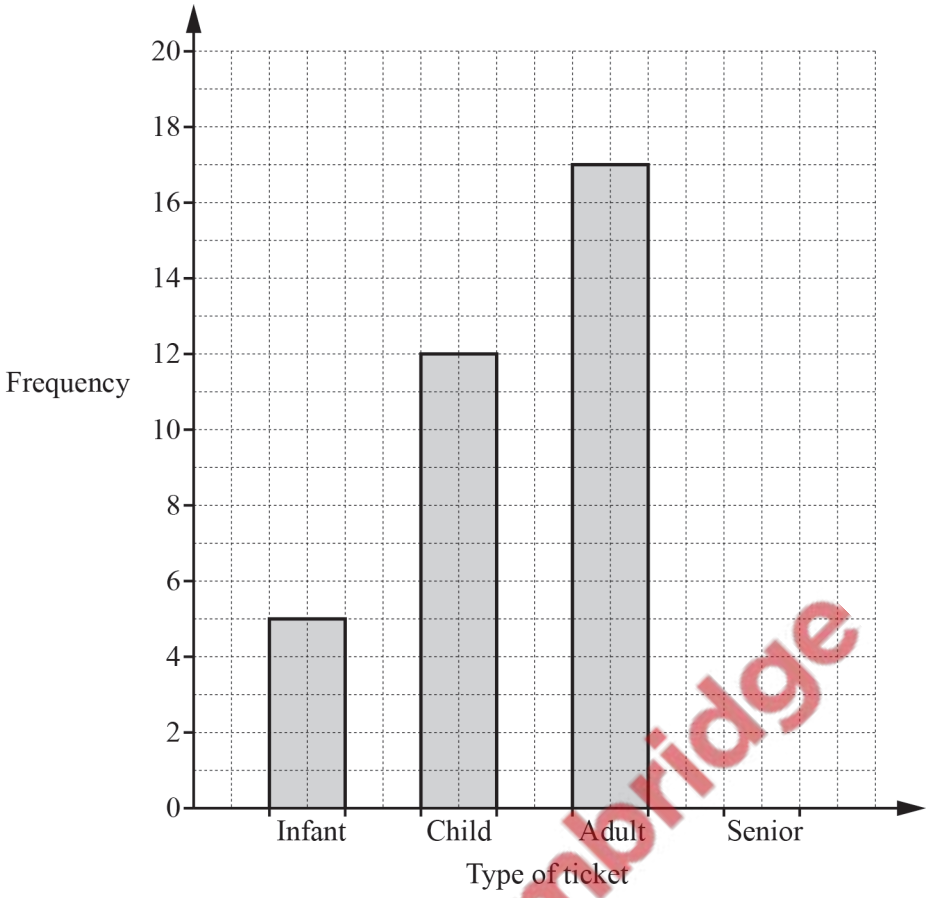
(e) This information is also to be shown in a pie chart.

Work out the sector angle for Miss Patel.

..... [2]

[Total: 11]

18 On Monday, Main Street station sells 40 tickets.
There are four types of ticket; infant, child, adult and senior.
The bar chart shows the number of infant, child and adult tickets sold.



(a) Complete the bar chart.

[3]

(b) Find how many more adult tickets were sold than child tickets.

..... [1]

(c) Write down the modal type of ticket.

..... [1]

(d) One of these 40 people is chosen at random.

Find the probability that this person is a child.

..... [1]

[Total: 6]

19 **(a)** Kyung records the number of people in each of 24 cars on Wednesday.
His results are shown below.

1 3 6 1 2 2 4 5

3	4	1	5	3	2	4	1
1	1	2	4	4	1	2	1

(i) Complete the frequency table.
You may use the tally column to help you.

Number in a car	Tally	Frequency
1		
2		
3		
4		
5		
6		

[2]

(ii) Write down the mode.

..... [1]

(iii) Work out the range.

..... [1]

(iv) Work out the median.

..... [1]

(v) Calculate the mean.

..... [3]

(vi) One of these cars is chosen at random.

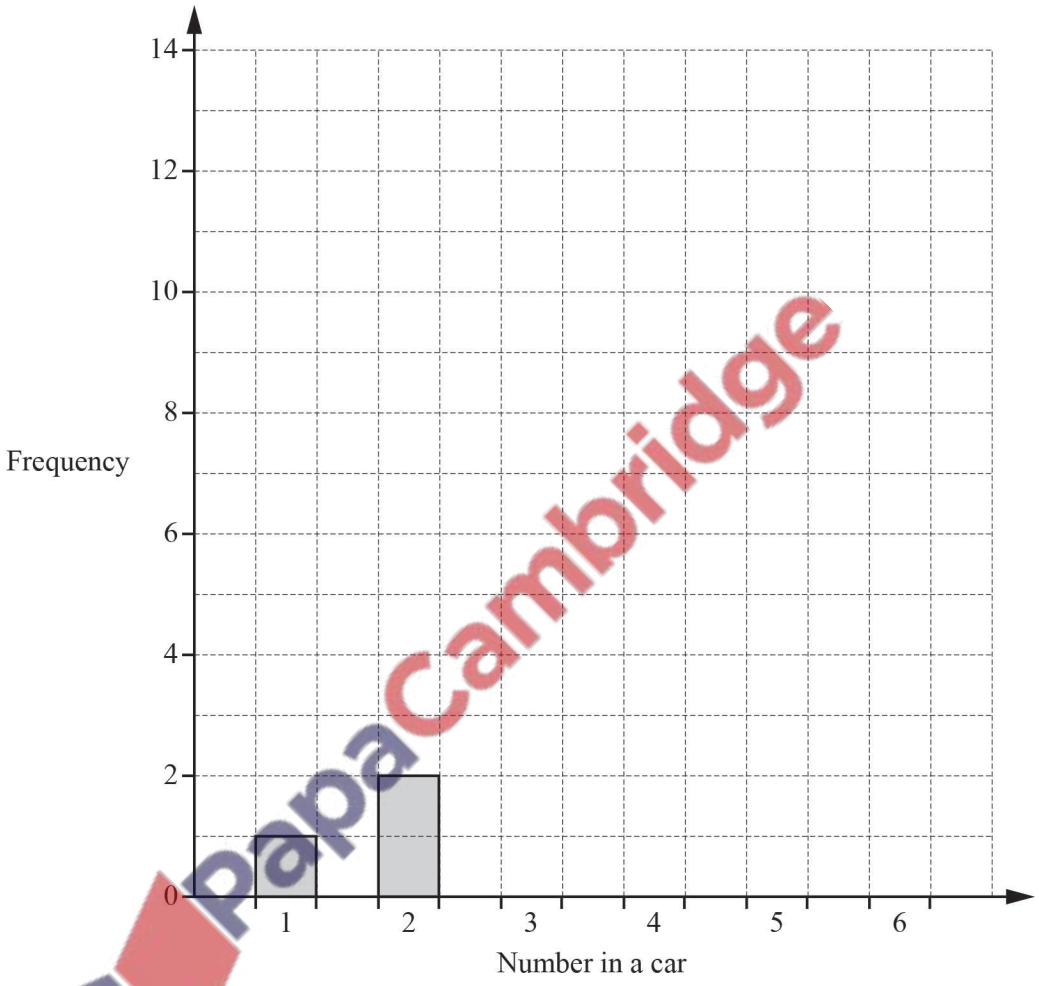
Find the probability that the number of people in this car is 4.

..... [1]

(b) Kyung also records the number of people in each of 24 cars on Saturday.
The table shows the results.

Number in a car	1	2	3	4	5	6
Frequency	1	2	5	13	2	1

On the grid, complete the bar chart to show these results.



[2]

(c) Write down one comparison between the frequency tables in **part(a)(i)** and **part(b)**.

.....

..... [1]

[Total: 12]

20 The probability that Andrei cycles to school is r.

(a) Write down, in terms of r, the probability that Andrei **does not** cycle to school.

..... [1]

(b) The probability that Benoit **does not** cycle to school is $1.3 - r$.
The probability that both Andrei and Benoit **do not** cycle to school is 0.4 .

(i) Complete the equation in terms of r.

(.....) × (.....) = 0.4 [1]

(ii) Show that this equation simplifies to $10r^2 - 23r + 9 = 0$.

[3]

(iii) Solve by factorisation $10r^2 - 23r + 9 = 0$.

r = ... or r = ... [3]

(iv) Find the probability that Benoit **does not** cycle to school.

..... [1]

[Total: 9]

21 The test scores of 14 students are shown below.

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

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

Range = ...

Mode = ...

Median = ...

Mean = ... [6]

(b) A student is chosen at random.

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

..... [1]

[Total: 7]

22 Esme has a bag with 5 green counters and 4 red counters.
She takes three counters at random from the bag without replacement.

Work out the probability that the three counters are all the same colour.

..... [4]

[Total: 4]

23 Angelo has a bag containing 3 white counters and x black counters.
He takes two counters at random from the bag, without replacement.

(a) Complete the following statement.

The probability that Angelo takes two black counters is

$$\frac{x}{x+3} \times \frac{\qquad}{\qquad}.$$

[2]

(b) The probability that Angelo takes two black counters is $\frac{7}{15}$.

(i) Show that $4x^2 - 25x - 21 = 0$.

[4]

(ii) Solve by factorisation.

$4x^2 - 25x - 21 = 0$

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

(iii) Write down the number of black counters in the bag.

..... [1]

[Total: 10]

24 The probability that it will be sunny tomorrow is 0.97 .

Work out the probability that it will not be sunny tomorrow.

..... [1]

[Total: 1]

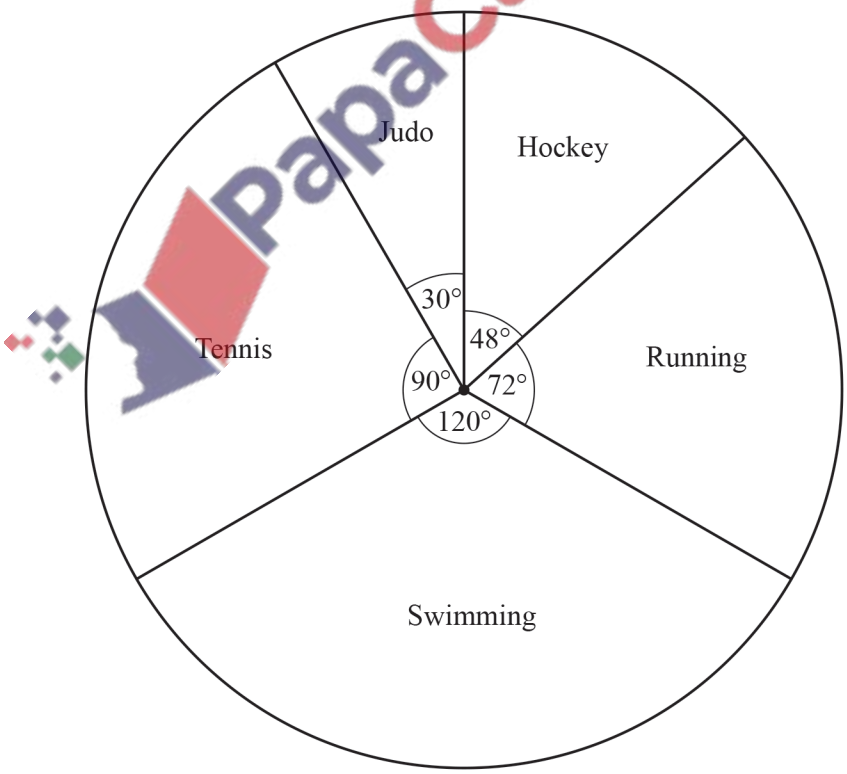
25 The probability that a sweet made in a factory is the wrong shape is 0.0028 .
One day, the factory makes 25 000 sweets.

Calculate the number of sweets that are expected to be the wrong shape.

..... [2]

[Total: 2]

26 **(a)** 60 boys are asked to name their favourite sport.
The results are shown in the pie chart.



(i) Write down the most popular sport.

..... [1]

(ii) Write down the fraction of boys who choose Running.

..... [1]

(iii) Work out how many boys choose Judo.

..... [2]

(iv) One of the boys is chosen at random.

Work out the probability that his favourite sport is **not** Judo.

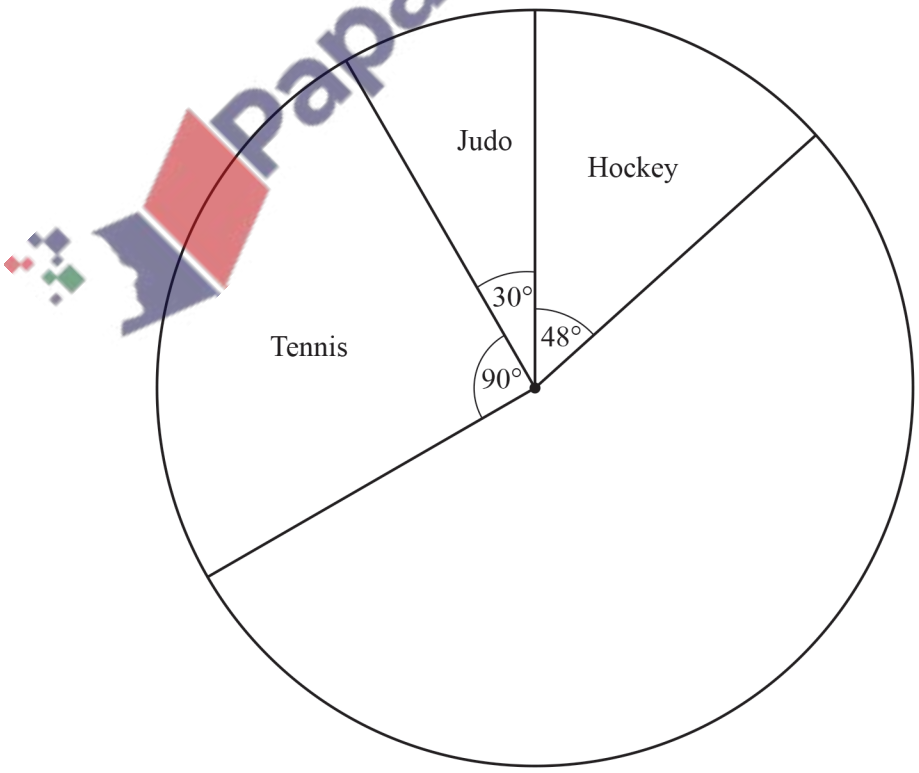
..... [1]

(v) Complete this statement.

Three times as many boys choose ..... than choose ..... [1]

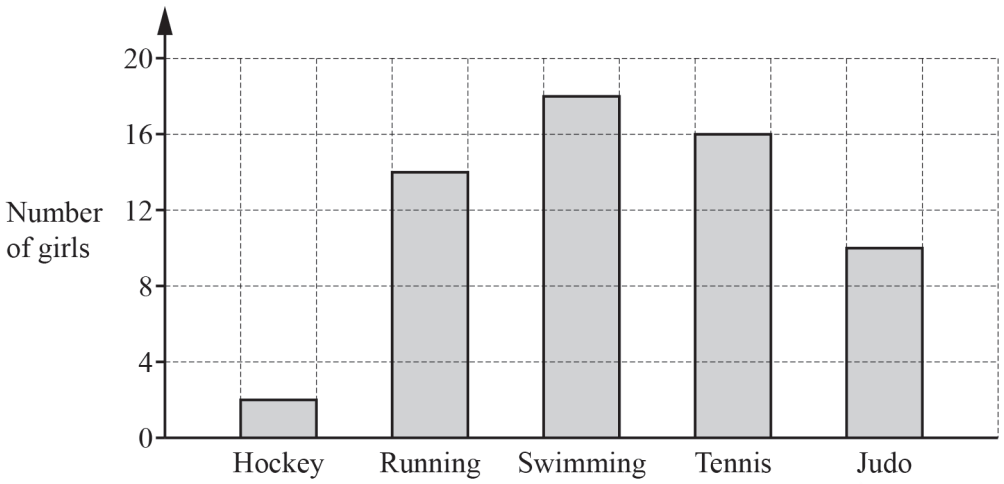
(b) Two of the boys in **part (a)** then change their choice from Running to Swimming.

Complete the pie chart after this change.
The Tennis, Judo and Hockey sectors have been drawn for you.



[2]

(c) 60 girls are asked to name their favourite sport.
Their results are shown in the bar chart below.



Using your pie chart in **part (b)** and the bar chart above, write down one similarity and one difference between the girls' results and the boys' results.

Similarity .....

Difference ..... [2]

[Total: 10]

27 Ravi has a bag that contains 10 red balls and 8 blue balls.
He takes two balls at random from the bag, without replacement.

Find the probability that one ball is red and one ball is blue.

..... [3]

[Total: 3]

28 Talika has a bag that contains 10 red balls and 8 blue balls.
She takes three balls at random from the bag, without replacement.

Calculate the probability that the three balls are the same colour.

..... [4]

[Total: 4]

29 Sushila has a bag that contains 10 red balls and 8 blue balls.
She takes one ball at random from the bag.

Find the probability that she takes a red ball.

..... [1]

[Total: 1]

30 20 students each record the mass, p grams, of their pencil case.
The table below shows the results.

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

(a) Calculate an estimate of the mean mass.

..... g [4]

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

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

[2]

(c) A student is chosen at random.

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

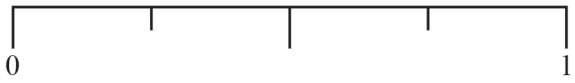
..... [1]

[Total: 7]

31 A bag contains 6 blue counters and 2 red counters only.
A counter is taken from the bag at random.

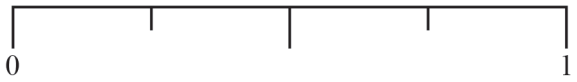
Draw an arrow (↓) on the probability scale to show the probability of taking

(a) a blue counter,



[1]

(b) a yellow counter.

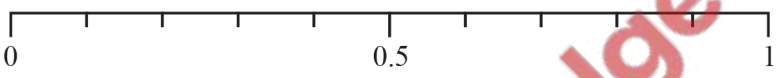


[1]

[Total: 2]

32 A bag contains 50 counters.
10 of the counters are red.
One of the counters is taken from the bag at random.

(a) Draw an arrow (↓) on the scale to show the probability that this counter is red.



[1]

(b) Find the probability that the counter is **not** red.

..... [1]

[Total: 2]

33 A bag contains green counters and black counters only.
A counter is taken from the bag at random.
The probability of taking a green counter is 0.64 .

Work out the probability of taking a black counter.

..... [1]

[Total: 1]

34 Ethan has a box of toys.
He takes a toy at random.

Toy	Car	Train	Bus	Other
Probability	0.2	0.45		0.08

Complete the table.

[2]

[Total: 2]

35 A group of 200 people were asked which city they would like to visit next.
The table shows the results.

City	London	Paris	New York	Tokyo
Number of people	50	48	56	46

(a) A person from the group is chosen at random.

Write down the probability that this person would like to visit either Paris or Tokyo next.

..... [2]

(b) Two people are chosen at random from the group of 200.

Find the probability that one person would like to visit London next and the other person would like to visit New York next.
Give your answer as a percentage.

..... % [3]

[Total: 5]

36 In a survey of 50 visitors to a leisure centre, 18 used the gym.
One day, 1500 people visited the leisure centre.

Calculate an estimate for the number of people who used the gym on this day.

..... [2]

[Total: 2]

37 The table gives some information about the numbers of visitors at a leisure centre one day.

	Adult	Child	Total
Male		144	240
Female	129		260
Total	225	275	500

(a) Complete the table.

[1]

(b) Work out how many more child visitors than adult visitors there are.

..... [1]

(c) Write down the fraction of visitors that are adults.
Give your answer in its lowest terms.

..... [2]

(d) Write the ratio number of males : number of females.
Give your answer in its simplest form.

..... : ..... [2]

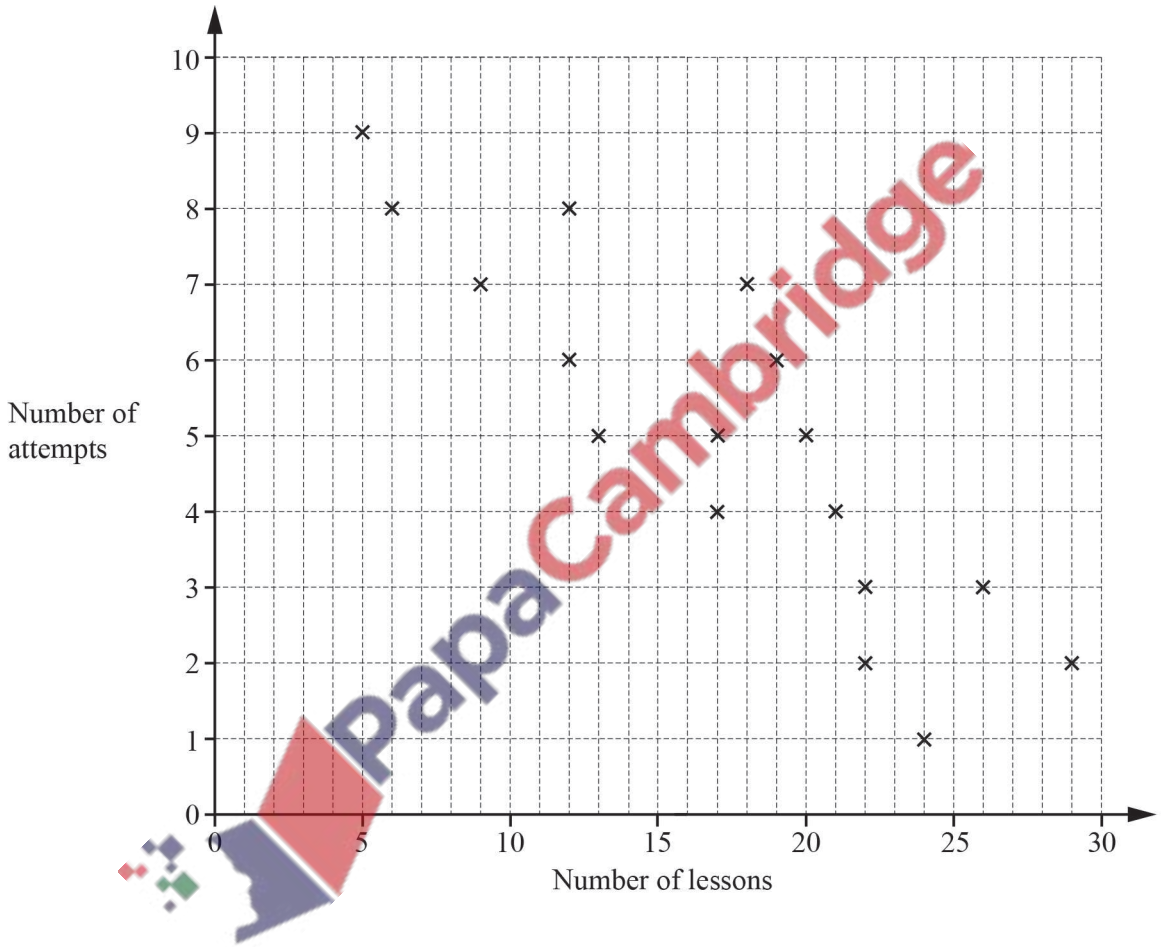
(e) One of these visitors is selected at random.

Find the probability that this visitor is a male child.

..... [1]

[Total: 7]

38 The number of attempts at a driving test and the number of driving lessons for each of 17 people are shown in the scatter diagram.



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

..... [1]

(b) One of these people is picked at random.

Work out the probability that this person had 5 or more attempts.

..... [1]

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

[1]

(d) Another person had 15 lessons.

Estimate their number of attempts.

..... [1]

[Total: 4]

39 A bag contains 20 bulbs.
8 are yellow, 5 are red, 4 are white and 3 are pink.
Sam takes one bulb at random.

Find the probability that the bulb he takes is

(a) white,

..... [1]

(b) blue,

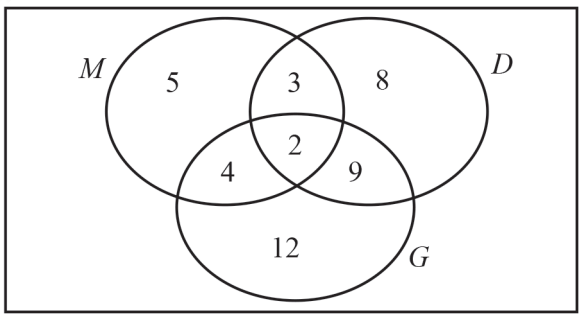
..... [1]

(c) not pink.

..... [1]

[Total: 3]

40



The Venn diagram above shows information about the number of students who study Music (M), Drama (D) and Geography (G).

(a) How many students study Music?

..... [1]

(b) How many students study exactly two subjects?

..... [1]

(c) Two students are chosen at random from those who study Drama.

Calculate the probability that they both also study Music.

..... [3]

(d) In the Venn diagram above, shade $M \cap D'$. [1]

[Total: 6]