



St. Patrick's High School, Keady
Mathematics Department

GCSE Mathematics Practice Booklet

M7

Topic 7 – Handling Data 1 - Probability

Calculating Probabilities

Relative Frequency

Tree Diagrams

Section A – Non Calculator Questions / Mark Scheme Pages 1-51

Section B – Calculator Questions / Mark Scheme Pages 52-86

Questions taken from CCEA Past Papers

Q1 A three-sided spinner has the numbers 2, 4 and 6 written on it. The probability of getting each number is the same.

A fair dice has the numbers 1, 3, 5, 7, 9 and 11 written on it.

In a game the spinner is spun and the dice is rolled. The two scores are added together.

(a) Use the two-way table to show all the outcomes for the sum of the two scores.

+	1	3	5	7	9	11
2						
4						
6						

[2]

(b) What is the probability that the sum of the two scores is greater than 12?

Answer _____ [2]

Q2

A bag contains five counters, each one a different colour.

The colours are red (R), green (G), blue (B), white (W) and yellow (Y).

Daniel takes a counter at random from the bag.

Daniel now tosses a fair coin.

One possible outcome is (red, heads), which can be written as (R, H).

(a) List all the possible outcomes for this experiment in this way in the two-way table below.

One has already been done for you.

		Counter (colour)				
		R	G	B	W	Y
Coin	H	(R, H)				
	T					

[2]

(b) What is the probability that the outcome is (B, H)?

Answer _____ [1]

(c) What is the probability that the outcome of this experiment contains a green (G) or a tail (T) or both of these?

Answer _____ [2]

Q3

Kendra flips a coin and rolls a dice.

(a) List all the possible outcomes in the table below.

Two have already been filled in for you.

		Dice					
		1	2	3	4	5	6
Coin	Heads (H)	H1					
	Tails (T)					T5	

[2]

Given that each outcome is equally likely, find the probability that

(b) Kendra gets a 5,

Answer _____ [1]

(c) Kendra gets a Tail and an odd number.

Answer _____ [1]

Q4 Cathy can buy either a 16GB memory stick or a 64GB memory stick.

The memory sticks are coloured black, red, yellow or green.

(a) Write down the size and colour of all the different memory sticks that Cathy can buy.

[2]

(b) Cathy bought one of each type of memory stick.

She gives one to her friend Jill.

What is the probability that this is a yellow 16GB memory stick?

Answer _____ [1]

Q5 Michael tosses a fair coin and rolls a fair 6-sided dice.

Work out the probability that the outcome is a head and a three.

You must show how you found your answer.

Answer _____ [2]

Q6 Two fair dice are rolled.

Make a list of all the ways it is possible to get a total score of 7 on the two dice.

Answer _____ [2]

- Q7** The probability for the number of goals scored in a league match during the season is given in the table below.

Number of goals	0	1	2	3	4	5 or more
Probability	0.15	0.23	0.13	0.28	0.12	0.09

What is the probability of at least 3 goals being scored in a league match?

Answer _____ [2]

Q8 A box containing 14 pencils has 3 pencils with broken leads.

A pencil is taken at random from the box.

(a) What is the probability that it does not have a broken lead?

Answer _____ [2]

The pencil taken does not have a broken lead and is not replaced.

(b) What is the probability that the next pencil taken has a broken lead?

Answer _____ [1]

Q9

A bag contains a number of counters.

They are either red, green, black or white.

In the bag the number of black counters is the same as the number of white counters.

The table shows some of the probabilities of taking a counter at random from the bag.

Colour	red	green	black	white
Probability	0.3	0.4		

Teresa takes a counter at random from the bag.

What is the probability that Teresa takes a white counter?

Answer _____ [2]

Q10

There are 32 pupils in a class and all were present on Monday.

On Monday the teacher asked each pupil their favourite colour.

She recorded the results for green, blue and yellow accurately in a table.

	Green	Blue	Yellow	Total
Girls	3	5	4	12
Boys	4	7	2	13
Total	7	12	6	25

(a) Give a reason why the total number of boys and girls in the table is not 32

_____ [1]

(b) There are 18 girls in the class.

What is the probability that a girl said the colour blue?

Answer _____ [1]

(c) What is the probability that a pupil in the class **did not** say green?

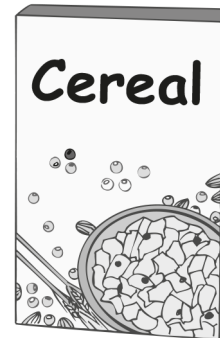
Answer _____ [1]

Q11

A machine fills boxes of breakfast cereal.

Each box should weigh 375 g.

Jason takes 100 boxes and tests the accuracy of the machine by weighing them.



Weight (g)	Less than 375	Exactly 375	More than 375
Number of boxes	9	58	33

- (a) What is the probability that one of the boxes taken by Jason weighs less than 375 g?

Answer _____ [1]

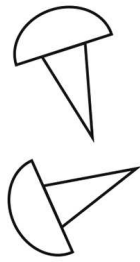
- (b) The machine fills 5000 boxes.

Calculate the number of boxes you would expect to weigh less than 375 g.

Answer _____ [2]

Q12 Marcus wants to investigate the likelihood of a drawing pin landing point up or point down when dropped.
He drops a drawing pin a number of times. His results are shown in the table.

up
up
down
up
up
down
up
down



(a) What is the relative frequency of the drawing pin landing point up?

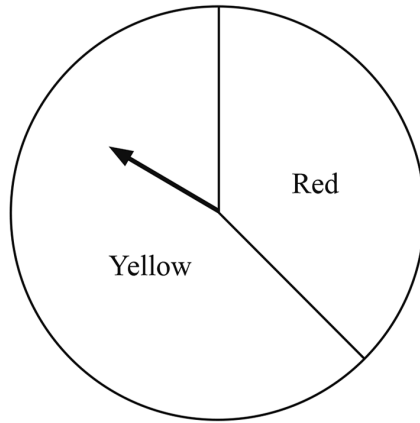
Answer _____ [1]

(b) Marcus concludes that a drawing pin is more likely to land point up.
Comment on his conclusion.

_____ [1]

Q13

A spinner has a red sector and a yellow sector as shown.



The arrow is spun 1000 times.

The table shows the relative frequency of the arrow landing on red after different numbers of spins.

Number of spins	Relative frequency of red
50	0.44
100	0.37
200	0.34
500	0.31
1000	0.32

(a) In the first 200 spins, how many times had the arrow landed on red?

Answer _____ [2]

(b) Which relative frequency gives the best estimate of the probability of obtaining a red?

Explain your answer.

Answer _____ because _____
 _____ [2]

Q14

A six-sided dice is rolled 800 times.

The table below shows the relative frequency of scoring a six after different numbers of rolls.

Number of rolls	Relative frequency of a six
100	0.3
200	0.26
300	0.27
500	0.23
800	0.25

(a) How many times was a six scored after 300 rolls?

Show how you obtained your answer.

Answer _____ [2]

(b) Which relative frequency from the table gives the best estimate of the probability of scoring a six when this dice is rolled?

Explain your answer.

Answer _____

Reason _____ [2]

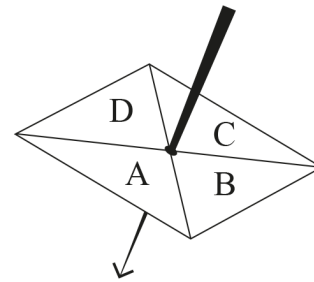
(c) How many sixes would you expect to get if a **fair** six-sided dice was rolled 300 times?

Answer _____ [2]

Q15

A spinner has sections labelled A, B, C and D.

The spinner is spun, and the relative frequency of landing on D is recorded after every 10 spins.



Some of the results are recorded in the table below.

Number of spins	Relative frequency of D
10	0.5
20	0.3
30	0.4
40	0.35
50	
60	0.45

(a) After 50 spins the spinner had landed on D 19 times.

Fill in the missing relative frequency in the table above.

[1]

(b) How many times had the spinner landed on D after 60 spins?

Answer _____ [1]

(c) Do you think that the spinner is biased? Give a reason for your answer.

Answer _____ because _____

_____ [2]

(d) If the spinner is spun 400 times how many times would you expect it to land on D?

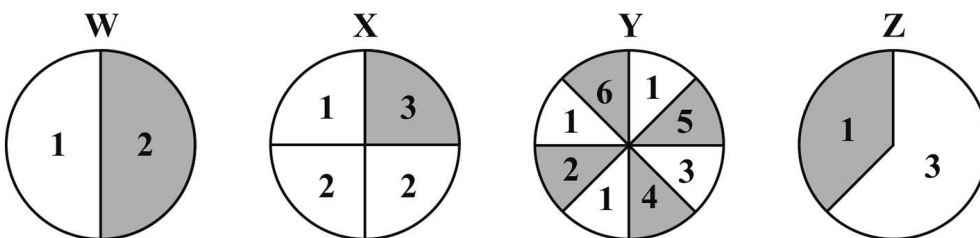
Answer _____ [2]

Q16

Aidan, Ben and Caitlin all spin a spinner 20 times each. They keep track of their scores of 1, 2 and 3 using a tally chart.

	1	2	3
Aidan			
Ben	/		
Caitlin			

They all used the **same** one of the following four spinners.



Which spinner do you think they used?

Explain clearly why you have made this choice.

Answer Spinner _____ because _____

_____ [3]

Q17

A six-sided dice is biased.

The table shows the probability of each score from 1 to 6

1	2	3	4	5	6
0.09	0.13	0.14	0.15	0.21	0.28

Mary rolls the dice once.

Work out the probability that at least 3 will be scored.

Answer _____ [2]

Q18 Helen says that the probability of getting exactly one head when two coins are tossed is the same as the probability of getting exactly two heads when four coins are tossed. Is Helen right?
Show clearly all your working.

[4]

Q19 The heights of patients attending a medical centre are recorded in a frequency table.

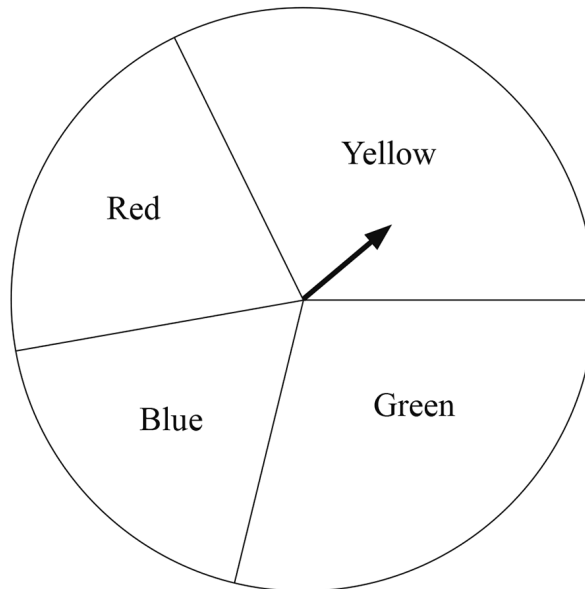
Height (cm)	$110 \leq h < 130$	$130 \leq h < 150$	$150 \leq h < 170$	$170 \leq h < 190$
Frequency	47	168	236	29

What is the probability that the next patient who enters the centre has a height between 130 cm and 150 cm?

Answer _____ [2]

Q20

The diagram shows a pointer which spins about the centre of a circular disc.



The disc is divided into sectors which are coloured Yellow, Green, Red and Blue.

When the pointer is spun, it stops on one of the colours.

The probability that it will stop on Red, Blue or Green is given in the table.

Red	Blue	Green	Yellow
0.19	0.22	0.27	

Jonathan is going to spin the pointer once.

(a) Work out the probability that the pointer will stop on Yellow.

Answer _____ [2]

(b) Work out the probability that the pointer will stop on Red or Green.

Answer _____ [2]

Q21

Mark has 16 blue and 12 green marbles in a bag.

What is the smallest number of blue and green marbles he must take out of the bag to make the probability of getting a blue marble at random equal to $\frac{3}{5}$?

Answer _____ blue and _____ green [2]

Q22 While in a newsagents the probability that Ed buys a newspaper is 0.8
In the same newsagents the probability that Ed independently buys a magazine is 0.3
Work out the probability that Ed buys at least a newspaper or a magazine in this same newsagents.

Answer _____ [3]

Q23

In a game at a school fair, a card is bought for 20p.
It will have either 3, 2, 1 or 0 stars.

The probability and prizes for some of these outcomes are shown.

number of stars	3	2	1	0
probability	0.05		0.2	0.65
prize	£1	50p	10p	nothing

300 cards were bought.

How much profit did this game make?

Answer £ _____ [6]

Q24

A golf shop sells gloves in three different sizes: small, medium and large.

The gloves come in 2 colours, black and white.

	SMALL	MEDIUM	LARGE
BLACK	10	22	15
WHITE	9	20	12

The table shows how many of each size and colour they have in stock.

The gloves are for either a right hand or for a left hand.

The ratio of right-handed gloves to left-handed gloves is 7:4

(a) How many right-handed gloves are there?

Answer _____ [2]

(b) The gloves are all kept together in a box and a glove is taken at random.

What is the probability that it is a large glove?

Answer _____ [2]

(c) The glove is replaced in the box. One glove is taken at random. It is black.

What is the probability that it is medium?

Answer _____ [2]

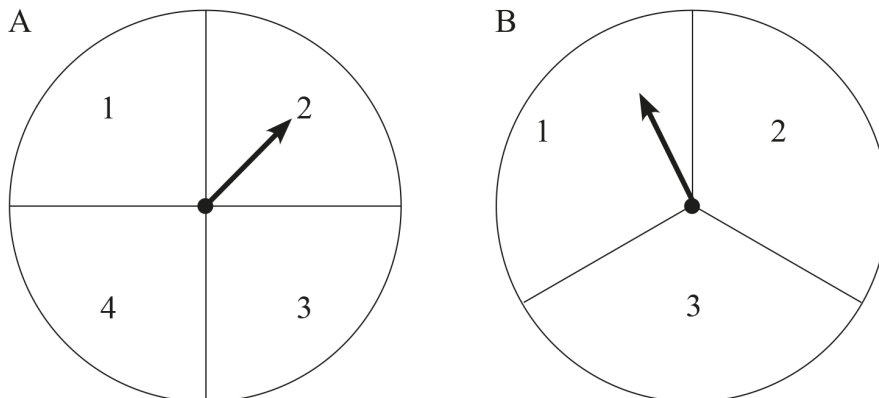
(d) Jack picks another glove at random from the box and it is white.

He says there is a 50% chance that it is small or large.

Is he correct? Explain why.

[2]

Q25



Spinners A and B are each spun once.

(a) Complete the table to show all the possible outcomes.

		Spinner B		
		1	2	3
Spinner A	1	1, 1	1, 2	1, 3
	2	2, 1	2, 2	
	3	3, 1		
	4			

[1]

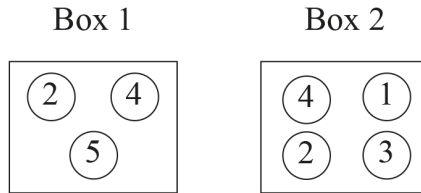
(b) What is the probability of getting the same number on each spinner?

Answer _____ [1]

(c) What is the probability of getting a bigger number on A than B?

Answer _____ [1]

Q26



There are two boxes of counters.

Each counter has a number on it as shown.

Mike takes one counter at random from Box 1 and then one counter at random from Box 2

(a) Complete the table to show all possible outcomes of counters taken.

		Box 2			
		1	2	3	4
Box 1	2	(2, 1)	(2, 2)		
	4	(4, 1)			
	5				

[2]

(b) What is the probability that Mike takes a counter with the same number on it from each box?

Answer _____ [1]

- (c) The numbers on the counters taken are **multiplied**.

What is the probability of this multiplication giving an **even** number?

Answer _____ [1]

- (d) On another day, Laura takes one counter from each box and **multiplies** the numbers together.

She replaces the counters and does the same thing again for a total of 30 times.

How many times would you expect her to get an **odd** number answer?

Answer _____ [3]

Q27

In a Year 12 class, the following information was recorded.

	Boys	Girls
Wears glasses	3	5
Does not wear glasses	10	6

(a) What fraction of the pupils in the class wear glasses?

Answer _____ [2]

(b) A pupil was chosen at random from the class.

What is the probability that the pupil was a boy who does not wear glasses?

Answer _____ [1]

(c) The next week a new boy joins the class.

He wears glasses.

Will this change the probability of now choosing at random a girl who wears glasses?

Explain your answer clearly.

Answer _____ because _____ [2]

Q28

There are three main routes from Belleek to Enniskillen by car.

There are five main routes from Enniskillen to Fintona by car.

- (a) How many different ways can James travel from Belleek to Enniskillen to Fintona by car using only main routes?

Answer _____ [1]

- (b) On a particular day, two of the main routes from Enniskillen to Fintona were closed.

By what percentage has the number of different ways for James to travel from Belleek to Enniskillen to Fintona by car using only main routes been reduced?

Answer _____% [2]

Q29

John has six shirts, eight ties and five cravats.

John is going out to dinner and he must choose a shirt **and** either a tie or a cravat to wear.

How many different combinations has John got to choose from?

Answer _____ [3]

Q30

Rob plans to travel to Australia by air.

His choice of destinations in Australia are Adelaide, Brisbane, Melbourne, Perth and Sydney.

He plans to make just one stop on his journey to Australia.

For each of these, he can choose to stop in Singapore, Hong Kong, Bangkok or Dubai.

How many different choices does he have for flying to Australia?

Answer _____ [2]

Q31

Special Menu
Two Courses (starter and main
or main and dessert) £15.95

Starters
Soup of the Day
Caesar Salad
Baked Brie
Bruschetta

Mains
Fish of the Day
Chicken Kiev
Pork Medallions
Ribeye Steak (£3 supplement)
Spaghetti Bolognese

Desserts
Cheesecake
Apple Pie
Ice Cream

A restaurant has the above Special Menu available.

How many different ways are there of choosing two courses (starter and main **or** main and dessert)?

Answer _____ [3]

Q32 For his morning run, Tony goes to the park by one of three different routes.
In the park he chooses one of eight different circuits to run.
In how many ways can he go to the park and complete a circuit?

Answer _____ [2]

Q33

A book club offers 26 **different** books for sale.

Five of the books cost £3 each

Six of the books cost £4 each

Seven of the books cost £6 each

Eight of the books cost £7 each.

Abi wants to buy two books for exactly £10

How many combinations of books can she choose from?

Answer _____ [2]

Q34 90 pupils audition for a part in the school play. 60 are girls.

The probability that a girl gets a part is 0.35 and the probability that a boy gets a part is 0.6

How many pupils are in the school play?

Answer _____ [4]

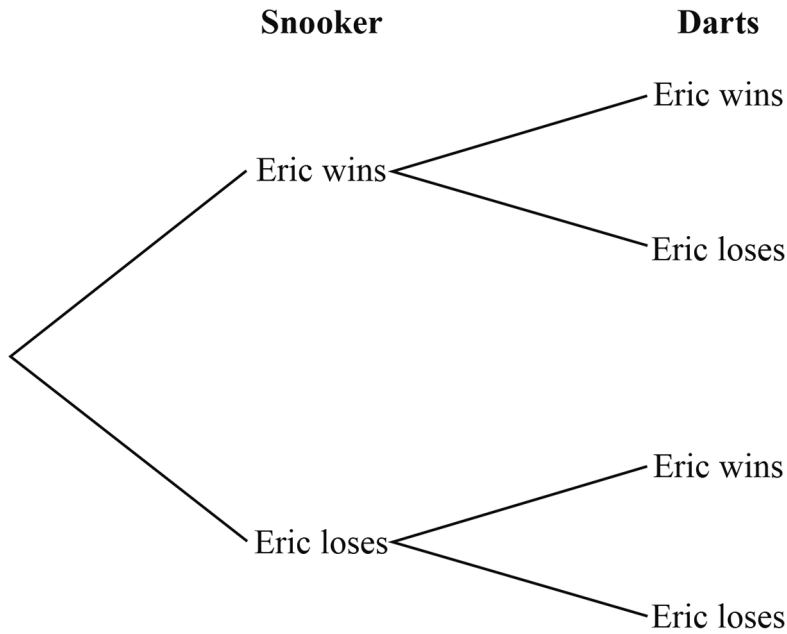
Q35

Eric is going to play one game of snooker and one game of darts.

He has a 30% chance of winning the game of snooker.

He has a 60% chance of losing the game of darts.

(a) Complete the probability tree diagram below.



[3]

(b) Work out the probability that Eric wins just one of the games that he plays.

Answer _____ [2]

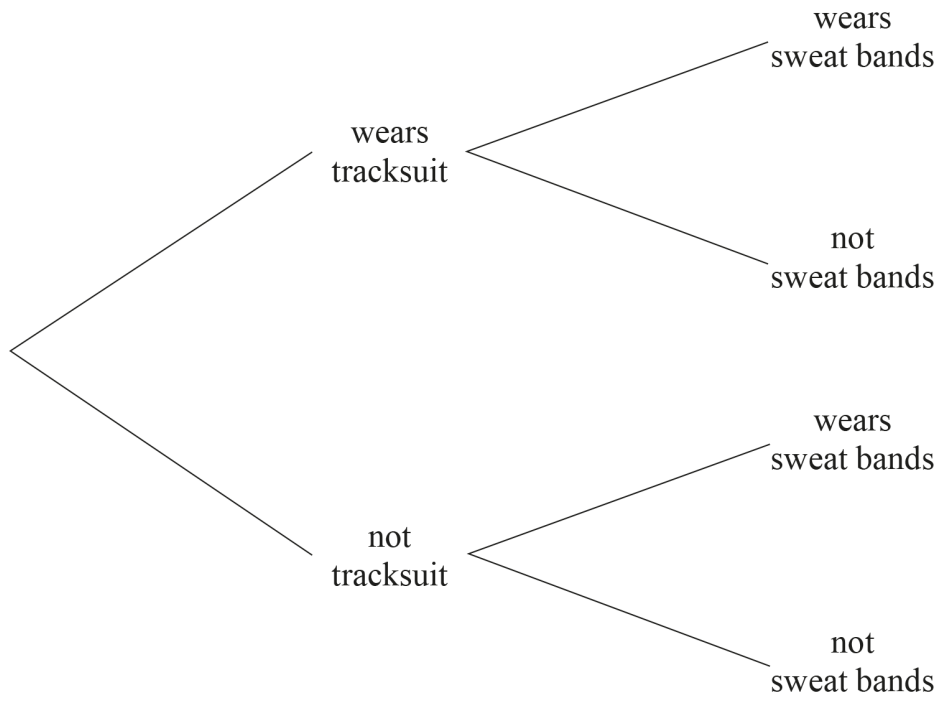
Q36

When Jan goes to the gym, the probability that she wears a tracksuit is $\frac{3}{4}$

When she wears a tracksuit, the probability that she wears sweat bands is $\frac{4}{5}$

When she does not wear a tracksuit, the probability that she wears sweat bands is $\frac{3}{5}$

(a) Complete the tree diagram.



(b) Calculate the probability that Jan does not wear sweat bands.

Answer _____ [2]

1.

(a)

3	5	7	9	11	13
5	7	9	11	13	15
7	9	11	13	15	17

A2

(b) $\frac{6}{18}$ or $\frac{1}{3}$

M1 A1

2.

(a) (G, H) (B, H) (W, H) (Y, H)
(R, T) (G, T) (B, T) (W, T) (Y, T)

M1 A1

(b) $\frac{1}{10}$

A1

(c) $\frac{6}{10}$

M1 A1

3.

(a) 10 correct missing pairs added to table
(at least 6 correct A1)

	H2	H3	H4	H5	H6
T1	T2	T3	T4		T6

A2

(b) $\frac{2}{12}$ or $\frac{1}{6}$

A1

(c) $\frac{3}{12}$ or $\frac{1}{4}$

A1

4.

(a) 16 black, 16 red, 16 yellow, 16 green
 64 black, 64 red, 64 yellow, 64 green

A2 (A1 for 5 correct)

(b) $\frac{1}{8}$

A1

5.

	1	2	3	4	5	6
H	H1	H2	H3	H4	H5	H6
T	T1	T2	T3	T4	T5	T6

M1

$\frac{1}{12}$

A1

6.

1 + 6, 2 + 5, 3 + 4, 4 + 3, 5 + 2, 6 + 1

A2
 (A1 for 3 correct)

7.

0.28 + 0.12 + 0.09
 0.49

M1
 A1

8. (a) $\frac{11}{14}$ A1 A1
(b) $\frac{3}{13}$ A1
-

9. $1 - (0.3 + 0.4) = 0.3$ MA1
 $0.3 \div 2 = 0.15$ A1
-

10. (a) 7 pupils picked different colours
(or some don't have favourite colour) A1
(b) $\frac{5}{18}$ A1
(c) $\frac{25}{32}$ A1
-

11. (a) $\frac{9}{100}$ (0.09) A1
(b) $\frac{9}{100} \times 5000 = 450$ M1 A1
-

12. (a) $\frac{5}{8}$ A1
 (b) Not a valid conclusion as he has not made enough trials to support this A1
-

13. (a) 0.34×200 M1
 68 A1
 (b) 0.32 A1
 Because more spins means that it is more reliable A1
-

14. (a) 300×0.27 M1
 81 A1
 (b) 0.25 A1
 The bigger the sample size the more reliable is the estimate A1
 (c) $300 \times \frac{1}{6}$ M1
 50 A1
-

15. (a) 0.38 A1
- (b) 27 A1
- (c) YES you expect D about 15 times or
rel freq should be 0.25 A1 A1
- (d) $400 \times 0.45 = 180$ M1 A1
-

16. It cannot be spinner W or Z because W doesn't have a 3 and Z doesn't have a 2.
It can't be spinner X because the tallies would have to add to give 20.
Therefore it must be spinner Y. A1 C2
(Not all the above points are needed for a full answer)
-

17. $0.14 + 0.15 + 0.21 + 0.28$ or $1 - (0.09 + 0.13)$ M1
- 0.78 A1
-

18. One head from two HT or TH = $\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{1}{2}$ or $\frac{2}{4}$ C1
 Two heads from four
 HHTT or HTHT or HTTH or THHT or THTH or TTHH C1
 $= 6 \times \left(\frac{1}{2}\right)^4 = \frac{6}{16}$ C1
 Conclusion: Helen is not correct as $\frac{1}{2} \neq \frac{6}{16}$ C1
-

19. $47 + 168 + 236 + 29 = 480$ A1
 Probability = $\frac{168}{480}$ (0.35) A1
-

20. (a) $1 - (0.19 + 0.22 + 0.27)$ M1
 0.32 A1
 (b) $0.19 + 0.27$ M1
 0.46 A1
-

21. 1 blue and 2 green A2
 (A1 for working out 15 blue and 10 green)
-

22.	Either	$0.2 \times 0.7 = 0.14$	MA1
		$1 - 0.14$	M1
		0.86	A1
	Or	$(0.8 \times 0.7) + (0.2 \times 0.3) + (0.8 \times 0.3)$	M1
		$0.56 + 0.06 + 0.24$	A1
		0.86	A1

23.	$1 - (0.05 + 0.2 + 0.65) = 0.1$	C2
	$300 \times 20p = \text{£}60$	C1
	$0.05 \times 300 \times \text{£}1 = \text{£}15$	
	$0.1 \times 300 \times 50p = \text{£}15$	
	$0.2 \times 300 \times 10p = \text{£}6$	
	Profit = $\text{£}60 - \text{£}36 = \text{£}24$	3 correct C2 (2 correct C1) C1

24. (a) 56
(Total = 88 gets A1) A2
- (b) $\frac{27}{88}$
(27 gets A1) A2
- (c) $\frac{22}{47}$
(22 gets A1) A2
- (d) explaining that of the white gloves, 20 are medium and 21 are either small or large so it is not a 50% chance A2
- or**
- probability of a small or large from the white gloves is $\frac{21}{41}$ which is not $\frac{1}{2}$ so it is not a 50% chance A2
-

25. (a) 2, 3
3, 2 3, 3
4, 1 4, 2 4, 3 A1
- (b) $\frac{3}{12}$ $\left(\frac{1}{4}\right)$ (0.25) A1
- (c) $\frac{6}{12}$ $\left(\frac{1}{2}\right)$ (0.5) A1
-

26.

(a)		Box 2			
		1	2	3	4
	2	(2, 1)	(2, 2)	(2, 3)	(2, 4)
Box 1	4	(4, 1)	(4, 2)	(4, 3)	(4, 4)
	5	(5, 1)	(5, 2)	(5, 3)	(5, 4)

Allow A1 for 8 correct

A2

(b) $\frac{2}{12} \left(\frac{1}{6} \right)$

A1

(c) $\frac{10}{12} \left(\frac{5}{6} \right)$

A1

(d) using $\frac{1}{6}$

A1

$\frac{1}{6} \times 30 = 5$

M1 A1

27.

(a) $\frac{8}{24}$ A1 A1

separate marks for numerator, denominator correct

(b) $\frac{10}{24}$ A1

(c) Yes because it was $\frac{5}{24}$ and is now $\frac{5}{25}$ MA1 MA1

or total number of pupils has changed but number of girls wearing glasses
has not (following YES) MA1 MA1

28.

(a) $(3 \times 5 =) 15$ A1

(b) Reduction of $\frac{2}{5}$ giving 40% M1 A1

Alternative

$3 \times 3 = 9$, so reduced by $\frac{6}{15}$ giving 40% M1 A1

29. $6 \times 8 + 6 \times 5$ MA1
 $48 + 30$ A1
 78 A1
(or $6 \times 13 = 78$ M1 A1 A1)

30. 4×5 M1
 20 A1

31. Starter + Main: $4 \times 5 = 20$ A1
Main + Dessert: $5 \times 3 = 15$ A1
Total is $20 + 15 = 35$ A1

32. $3 \times 8 = 24$ M1 A1

33.

$$5 \times 8 + 6 \times 7 = 82$$

M1 A1

34.

$$90 - 60 = 30$$

MA1

$$60 \times 0.35 = 21$$

MA1

$$30 \times 0.6 = 18$$

MA1

$$21 + 18 = 39$$

MA1

35.

(a) 0.3 and 0.7

A1

0.4 and 0.6

A1

0.4 and 0.6

A1

(b) $(0.3 \times 0.6) + (0.7 \times 0.4)$

M1

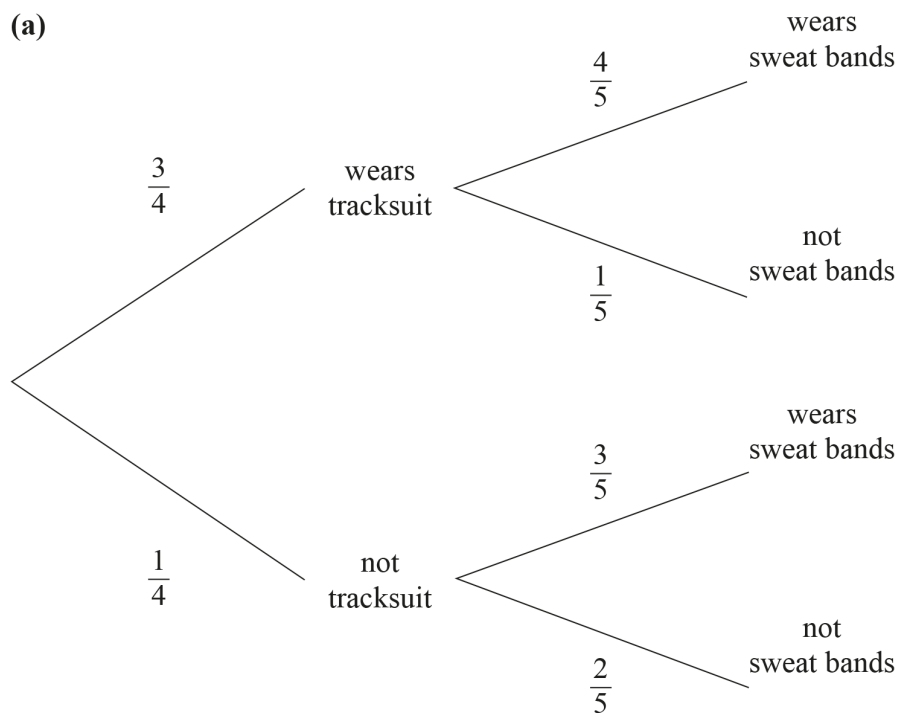
0.18 + 0.28

0.46

A1

36.

(a)

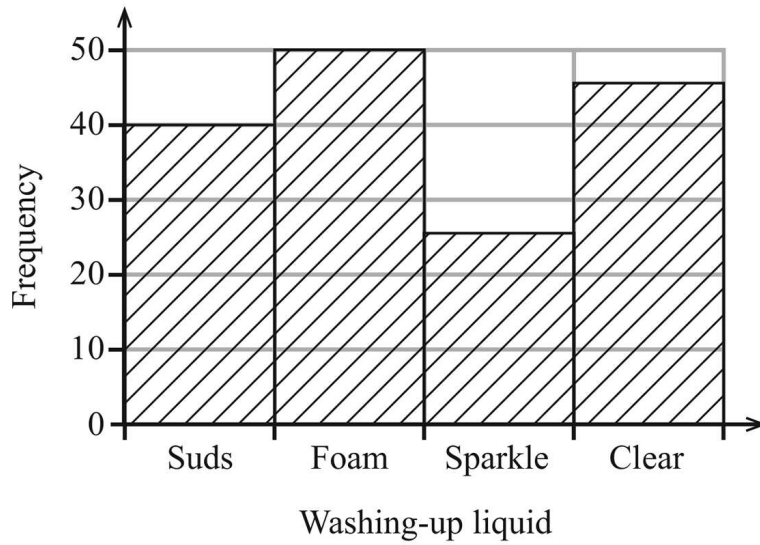


A3

(b) $\frac{3}{4} \times \frac{1}{5} + \frac{1}{4} \times \frac{2}{5} = \frac{3}{20} + \frac{2}{20} = \frac{5}{20} \left(\frac{1}{4} \right)$

M1 A1

Q1 A survey was carried out in a supermarket to find which washing-up liquid people buy.



(a) A customer is chosen at random. What is the probability that they buy either Foam or Sparkle?

Answer _____ [2]

(b) The supermarket is ordering new stock. They are going to order 8000 bottles in total. Based on the results of this survey, how many bottles of Clear should they order?

Answer _____ [2]

Q2

Bobby the builder has nails of five different lengths in a jar.

The probability of a nail being a certain length is given in the table.

Length (mm)	20	24	30	36	44
Probability	0.15		0.2	0.25	0.35

(a) What is the probability of a nail being 24 mm long?

Answer _____ [2]

There are 60 nails in the jar.

(b) How many nails are longer than 30 mm?

Answer _____ [3]

Q3

A bag contains only red, blue, yellow and white counters.

The table shows the probability of taking some of these colours from the bag at random.

Colour	red	blue	yellow	white
Probability	0.2	0.35		0.3

(a) Work out the probability of taking a yellow counter from the bag.

Answer _____ [2]

(b) The bag contains a total of 1500 counters.

How many blue counters would you expect the bag to contain?

Answer _____ [2]

Q4

There are four possible results from a music examination.

Result	Fail	Pass	Credit	Distinction
Probability		$\frac{1}{2}$	$\frac{3}{10}$	$\frac{1}{20}$

The probabilities of some results are recorded in the table.

(a) What is the probability of fail?

Answer _____ [2]

(b) What is the probability of credit or distinction?

Answer _____ [2]

Q5

A box contains sweets.

The sweets are strawberry, lime, orange or blackcurrant flavour.

A sweet is taken at random from the box.

The table below shows some of the probabilities.

Flavour	strawberry	lime	orange	blackcurrant
Probability	0.45			0.25

(a) The box has an equal number of lime and orange sweets.

Work out the probability that an orange sweet will be taken.

Answer _____ [2]

(b) The box contains a total of 120 sweets.

How many strawberry sweets should it contain?

Answer _____ [2]

Q6

In a herd of 40 goats there are

8 brown 9 white 13 without horns

A goat is taken at random from the herd.

What is the probability that this goat



(a) has horns,

Answer _____ [1]

(b) is brown or white,

Answer _____ [1]

(c) is not brown or white?

Answer _____ [1]

Q7 Visitors to Northern Ireland were asked to name their favourite tourist attraction.

The table of probabilities is based on their responses.

Tourist attraction	Giant's Causeway	Ulster Museum	Titanic Belfast	Mussenden Temple	Derry City Walls	Other
Probability	0.3	0.1	0.14			0.2

The probability of Mussenden Temple is the same as the probability of Derry City Walls.

(a) Complete the table. [3]

(b) What is the probability a visitor named Ulster Museum or Titanic Belfast?

Answer _____ [1]

(c) Last week 1800 visitors were asked to name their favourite tourist attraction.

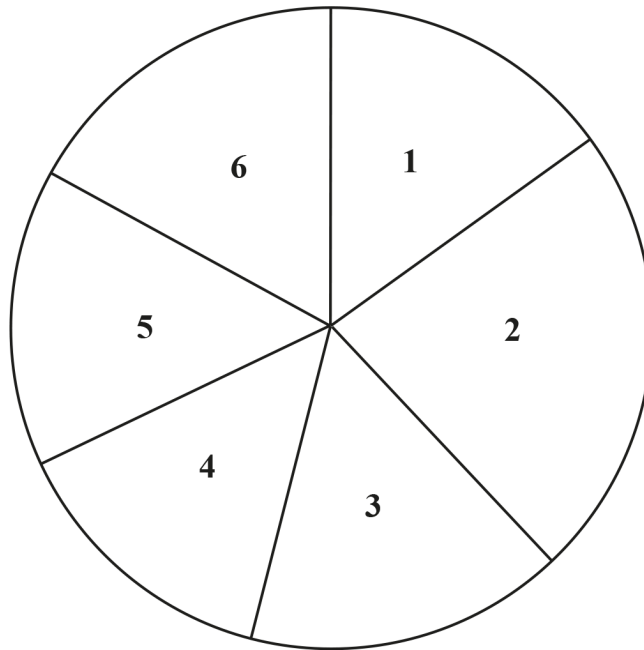
Estimate how many named Giant's Causeway.

Answer _____ [2]

Q8

Georgia rolls a dice a number of times and records the outcome each time.

She displays her results in this pie chart.



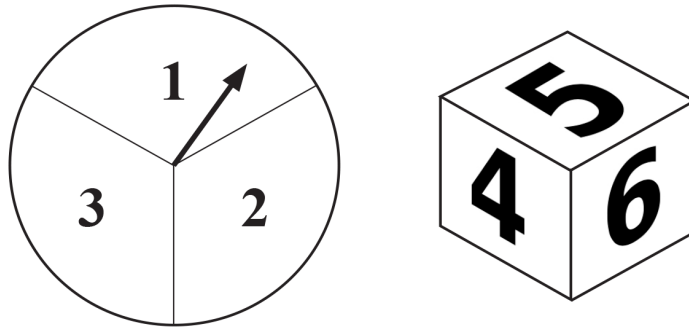
Alice thinks Georgia's dice is biased.

Bob disagrees.

What information is needed to decide who is correct?

Answer _____ [1]

Q9



The fair spinner shown is spun and a fair dice is thrown.

The number the spinner lands on is added to the number on the dice to give a total score.

Complete the table of total scores.

		Dice					
		1	2	3	4	5	6
Spinner	1	2	3	4	5		
	2	3	4	5			
	3	4	5				

[2]

What is the probability of a total score of 4?

Answer _____ [1]

What is the probability of a total score **greater than or equal to 5**?

Answer _____ [1]

Q10



© Getty Images

When Susan goes to the cinema, she always buys only one item.

She buys a drink or popcorn or crisps or ice cream.

Some of the probabilities are shown.

Item	Probability
A drink	0.4
Popcorn	0.15
Crisps	
Ice cream	0.2

Work out the probability that Susan buys crisps.

Answer _____ [2]

Susan goes to the cinema 20 times.

Calculate how many times you would expect her to buy a drink.

Answer _____ [2]

Q11

Data is recorded about the age and treatment received by patients who visit a dentist on a Monday.

	Patients aged 30 or under	Patients aged over 30
Filling	9	6
Extraction	5	13

- (a) What is the probability that one of these patients selected at random is over 30 and has an extraction?

Answer _____ [1]

- (b) One of the patients aged 30 or under is selected at random.

What is the probability that this patient has a filling?

Answer _____ [1]

Q12

Ben observes whether cars turn right or left at a T junction. He records the number of cars that come to the junction and the number that turn left.

Number of cars observed	10	20	50	100
Number of cars that turn left	4	13	33	72

(a) What is the relative frequency of cars turning left after 50 observations?

Answer _____ [1]

(b) What is the best estimate for the probability that a car will turn left at this junction?

Answer _____ [1]

(c) In one week 580 cars come to this junction.

Estimate how many turn **right**.

Answer _____ [2]

Q13

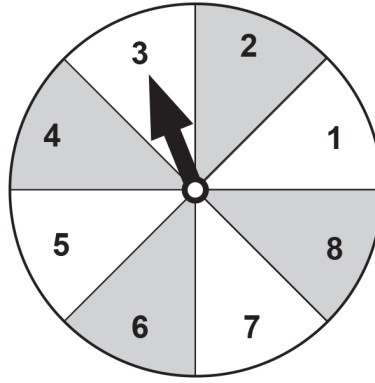
The probability that a pupil in Meadowcroft School wears glasses is 0.15
Seventy-two pupils in the school wear glasses.
How many pupils are in Meadowcroft School?

Answer _____ [2]

Q14 A company makes memory chips.
The probability that one of these memory chips is faulty is 0.025
The company makes 1800 memory chips each hour.
Work out an estimate for the number of memory chips made per hour that will **not** be faulty.

Answer _____ [3]

Q15



The spinner is spun 1000 times.

The table shows some of the number of times it landed on the number 3 and some of the calculated relative frequency values.

Number of spins	Number of threes	Relative frequency
20	2	0.1
200	26	0.13
500	64	
1000		0.122

Calculate the missing relative frequency value.

Answer _____ [1]

Calculate the number of times it landed on a 3 for the 1000 spins.

Answer _____ [1]

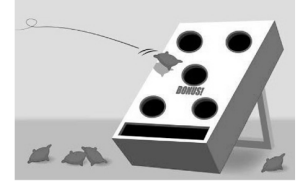
Use the best relative frequency value from the table to calculate the number of threes you would expect to get in 2500 spins.

Answer _____ [2]

Q16

Kate plays the game “throw the bean bag”.

She records the number of times she gets the bean bag in the bonus hole.



Total number of throws	10	30	100	200
Total number of times in the bonus hole	2	8	49	104

- (a) Write down the best estimate of the probability that Kate gets the bean bag in the bonus hole if she continues throwing.

Give a reason for your answer.

Answer _____

because _____

_____ [2]

- (b) Kate continues with her game and throws it a total of 300 times.

Calculate the number of times you would expect her to get the bean bag in the bonus hole.

Answer _____ [2]

Q17

A survey is carried out to find out the number of electric cars on the road.

One hundred cars are surveyed each day for four days.

The results are recorded in the following table along with the relative frequencies so far.

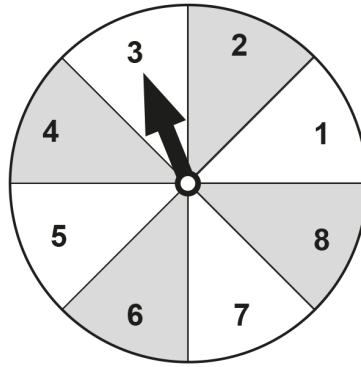
Day	Number of cars surveyed	Number of electric cars	Relative frequency
1	100	11	0.11
2	100	12	0.115
3	100	16	0.13
4	100	9	

(a) Work out the missing relative frequency and record it in the table. [1]

(b) What would be the best estimate for the probability that a car chosen at random is electric?

Answer _____ [1]

Q18



The spinner is spun 1000 times.

The table shows some of the number of times it landed on the number 3 and some of the calculated relative frequency values.

Number of spins	Number of threes	Relative frequency
20	2	0.1
200	26	0.13
500	64	
1000		0.122

(a) Calculate the missing relative frequency value.

Answer _____ [1]

(b) Calculate the number of times it landed on a 3 for the 1000 spins.

Answer _____ [1]

(c) Use the best relative frequency value from the table to calculate the number of threes you would expect to get in 2500 spins.

Answer _____ [2]

Q19

- (a) When a spinner was spun 50 times, it landed on red 12 times.
When spun another 50 times, it landed on red another 9 times.

Calculate the relative frequency for red

- (i) after the first 50 spins,

Answer _____ [1]

- (ii) after the 100 spins.

Answer _____ [1]

- (b) When spun another 50 times the spinner landed on red another 9 times.

What value of the relative frequency gives the best estimate of the probability of this spinner landing on red?

Explain your answer.

Answer _____ because _____
_____ [2]

- (c) The spinner landed on yellow 40 times in the first 100 spins.

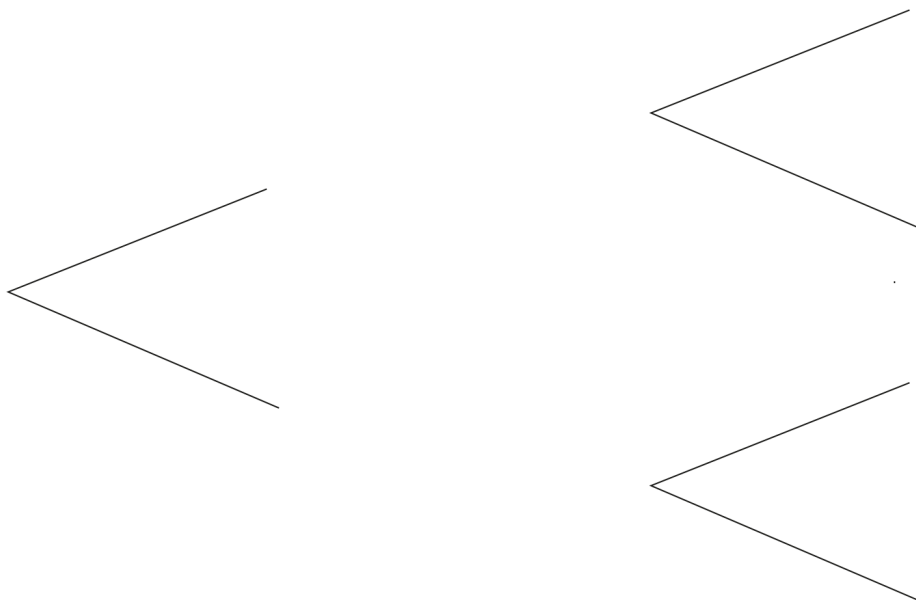
- (i) Estimate the probability for this spinner landing on yellow.

Answer _____ [1]

- (ii) Estimate how many times the spinner will land on yellow in 300 spins.

Answer _____ [1]

Q20 The probability of Fran's team playing their weekly game on a Friday is 0.1
The probability of Fran's team scoring first in a game is 0.75
Show this information on the tree diagram.

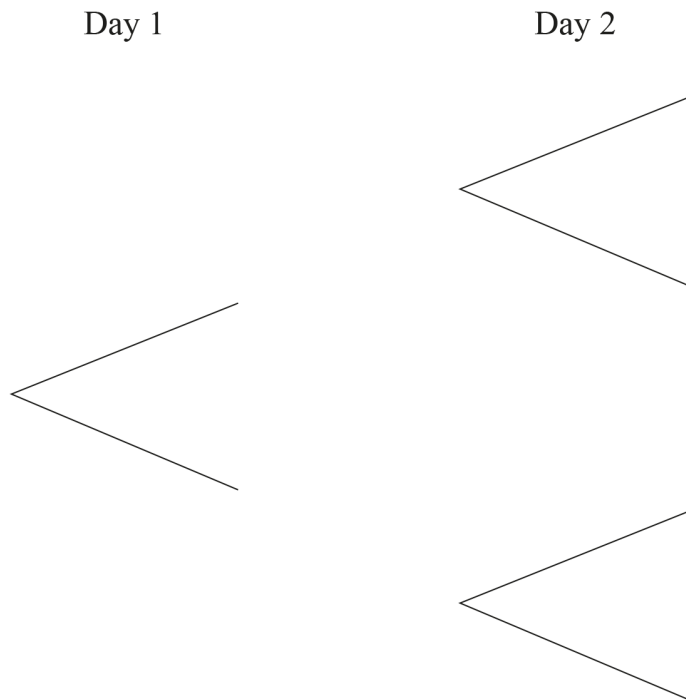


[3]

Q21

The probability that Jack takes a packed lunch to school on any given day is $\frac{3}{8}$

(a) Complete the tree diagram to show this information for two days.



[2]

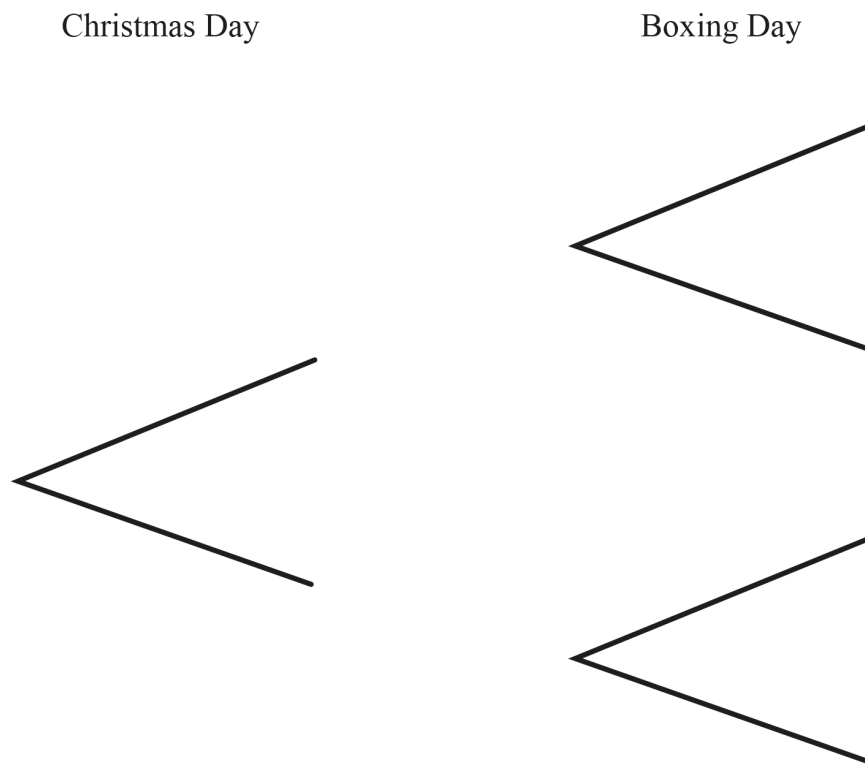
(b) What is the probability that Jack takes a packed lunch to school on only one of the two days?

Answer _____ [2]

Q22

The probability that it rains in Ireland on any given day in December is 0.62

- (a) Complete the tree diagram to show this information for Christmas Day and Boxing Day.



[2]

- (b) What is the probability that it rains on exactly one of these days?

Answer _____ [2]

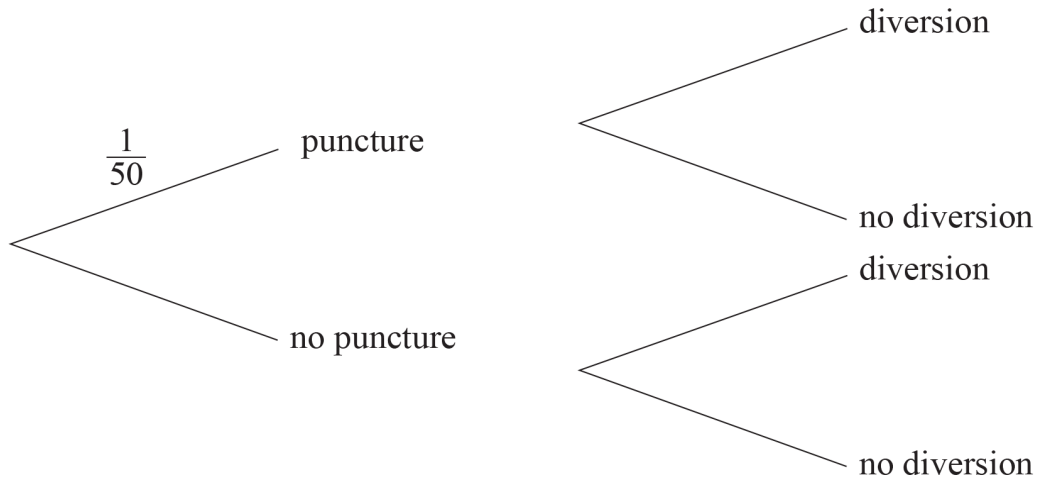
Q23

The probability that Orla has a puncture on her cycle ride to school is $\frac{1}{50}$

The probability that there is a traffic diversion is $\frac{1}{20}$

Complete the tree diagram to show this information.

[2]



What is the probability there will be no puncture and no diversion for Orla?

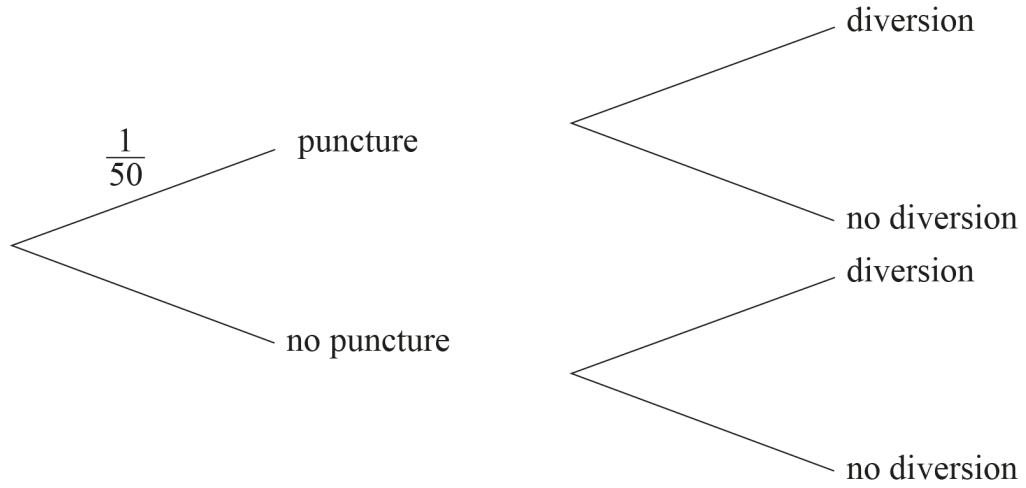
Answer _____ [1]

Q24

The probability that Orla has a puncture on her cycle ride to school is $\frac{1}{50}$

The probability that there is a traffic diversion is $\frac{1}{20}$

(a) Complete the tree diagram to show this information. [2]



(b) What is the probability that Orla will be delayed by **at least one** of these two causes?

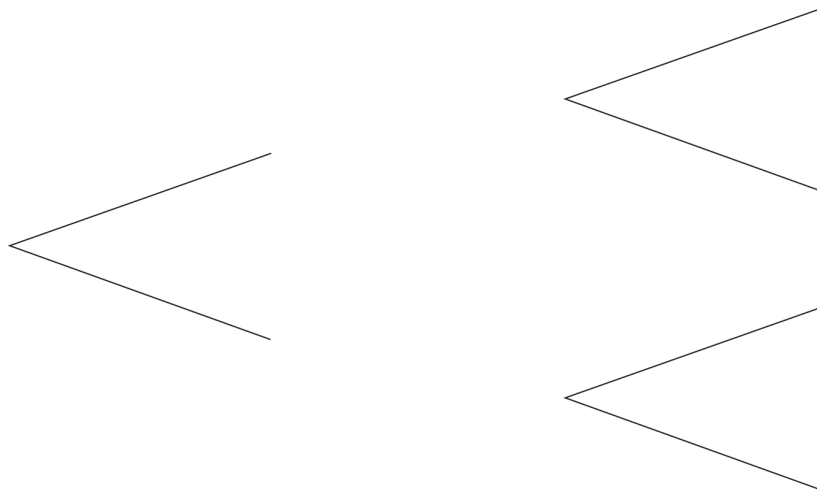
Answer _____ [3]

Q25

The probability that the first person to cross a footbridge in the morning is a child is 0.05

The probability that the first vehicle to pass under the footbridge is a tractor is 0.12

(a) Complete the tree diagram to show this information.



[3]

(b) What is the probability that the first person to cross is a child and the first vehicle to pass under is **not** a tractor.

Answer _____ [1]

1. (a) Total of 75 or 76 MA1
 $\frac{75}{160}$ (or $\frac{15}{32}$) or $\frac{76}{162}$ (or $\frac{38}{81}$) or $\frac{75}{161}$ or $\frac{76}{161}$ MA1
- (b) $\frac{45}{160} \times 8000$ or $\frac{46}{162} \times 8000$ or $\frac{45}{161} \times 8000$ or $\frac{46}{161} \times 8000$ M1
 $= 2250$ or 2272 or 2236 or 2285 or 2286 or 2271 A1
-

2. (a) $1 - (0.15 + 0.2 + 0.25 + 0.35) = 0.05$ M1, A1
- (b) $0.6 \times 60 = 36$ A1, M1, A1
-

3. (a) $1 - (0.2 + 0.35 + 0.3)$ M1
 0.15 A1
- (b) 1500×0.35 M1
 525 A1
-

4.

$$(a) 1 - \left(\frac{1}{2} + \frac{3}{10} + \frac{1}{20} \right) = \frac{3}{20}$$

M1 A1

$$(b) \frac{3}{10} + \frac{1}{20} = \frac{7}{20}$$

M1 A1

5.

$$(a) 1 - 0.45 - 0.25 = 0.3$$

$$0.3 \div 2 = 0.15$$

MA1

A1

$$(b) \frac{120 \times 0.45}{54}$$

M1

A1

6.

$$(a) \frac{27}{40}$$

A1

$$(b) \frac{17}{40}$$

A1

$$(c) \frac{23}{40}$$

A1

7. (a) $0.3 + 0.1 + 0.14 + 0.2 = 0.74$ MA1
 $1 - 0.74 = 0.26$ MA1
 $0.26 \div 2 = 0.13$; 0.13 and 0.13 MA1
- (b) 0.24 A1
- (c) $0.3 \times 1800 = 540$ M1A1
-

8. number of trials A1
-

9. (a)

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9

 A2
- 6 correct for [1] 9 correct for [2]
- (b) $\frac{3}{18} \left(\frac{1}{6} \right)$ A1
- (c) $\frac{12}{18} \left(\frac{2}{3} \right)$ A1
-

10. (a) $1 - 0.75$ M1
 $= 0.25$ A1
- (b) $20 \times 0.4 = 8$ M1 A1
-

11. (a) $\frac{13}{33}$ A1
- (b) $\frac{9}{14}$ A1
-

12. (a) $\frac{33}{50}$ (0.66) A1
- (b) $\frac{72}{100}$ (0.72) A1
- (c) $580 \times 0.28 = 162.4 = 162$ cars M1 A1
-

13. $72/0.15$ or $\frac{72}{15} \times 100$ or 4.8×100 or $72 \times \frac{1}{0.15}$ or $72 \times 6\frac{2}{3}$ M1
480 A1
-

14. $1 - 0.025 = 0.975$ or $1800 \times 0.025 = 45$ MA1
 1800×0.975 or $1800 - 45$ M1
 1755 1755 A1
-

15. (a) $\frac{64}{500} = 0.128$ MA1
 (b) $1000 \times 0.122 = 122$ MA1
 (c) 2500×0.122 M1
 $= 305$ A1
-

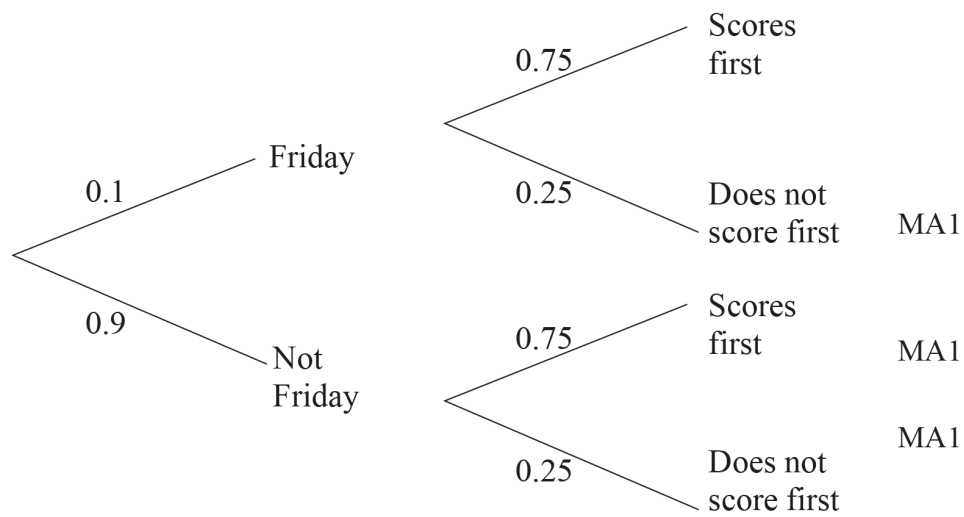
16. (a) $\frac{104}{200} \left(\frac{13}{25}\right) (0.52)$ A1
 The more throws the better the probability estimate A1
 (b) $\frac{104}{200} \times 300 = 156$ M1 A1
-

17. (a) 0.12 A1
 (b) 0.12 A1
-

18. (a) $\frac{64}{500} = 0.128$ MA1
- (b) $1000 \times 0.122 = 122$ MA1
- (c) 2500×0.122 M1
 $= 305$ A1
-

19. (a) (i) $\frac{12}{50}$ or equivalent A1
- (ii) $\frac{21}{100}$ or equivalent A1
- (b) $\frac{30}{150}$ or equivalent A1
- The bigger the sample size the more reliable the estimate A1
- (c) (i) $\frac{40}{100}$ or equivalent A1
- (ii) 120 A1
-

20.



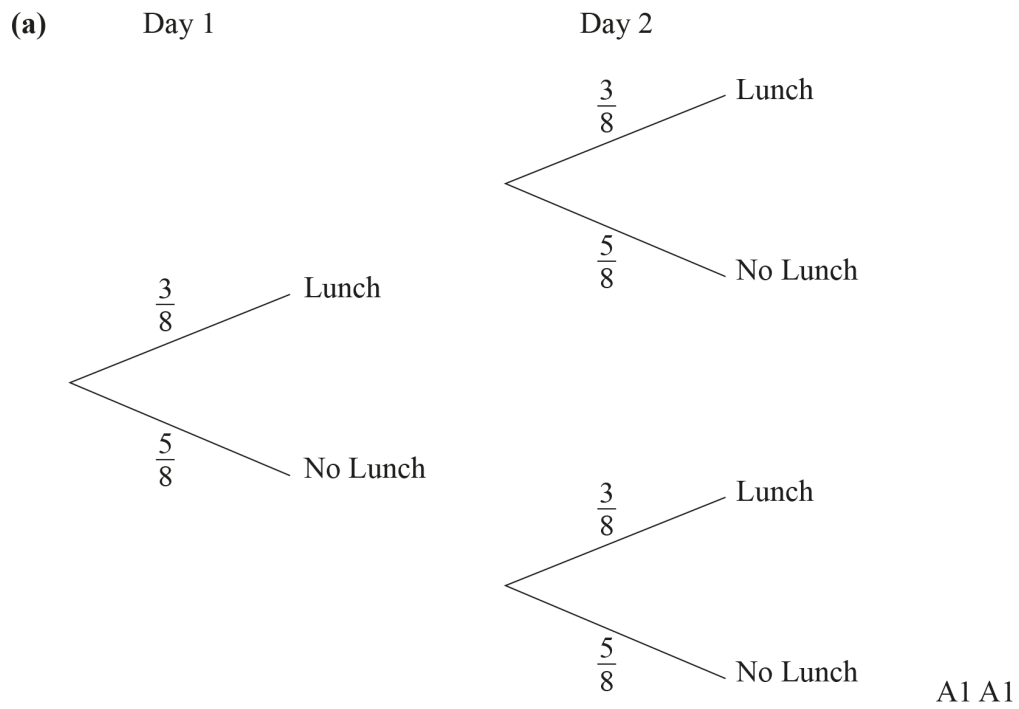
1 mark for 0.1, 0.9 and Friday labels in correct positions

1 mark for top 0.75, 0.25 and scores labels in correct positions

1 mark for bottom 0.75, 0.25 and scores labels in correct positions

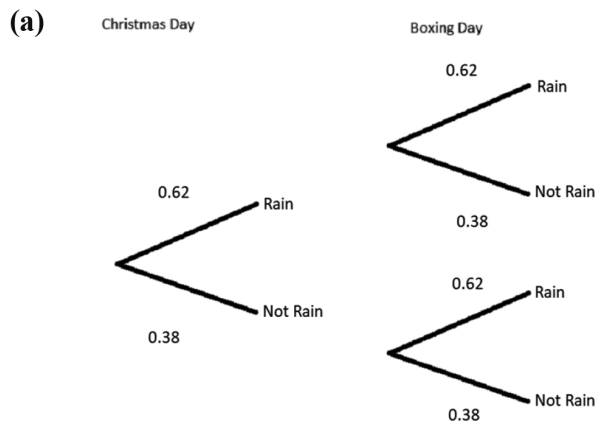
accept understandable abbreviations, e.g. F, notF, also equivalent fractions

21.



(b) $\frac{3}{8} \times \frac{5}{8} + \frac{3}{8} \times \frac{5}{8} = \frac{15}{64} + \frac{15}{64} = \frac{30}{64} = \left(\frac{15}{32}\right)$ M1 A1

22.



MA2

(b) $0.62 \times 0.38 + 0.38 \times 0.62 = 0.4712$ or $\frac{589}{1250}$

M1A1

23.

(a) $\frac{49}{50}$ on branch

A1

$\frac{1}{20}$ and $\frac{19}{20}$ in appropriate positions

A1

(b) $\frac{49}{50} \times \frac{19}{20} = \frac{931}{1000}$

A1

24. (a) $\frac{49}{50}$ on branch A1
 $\frac{1}{20}$ and $\frac{19}{20}$ in appropriate positions A1
- (b) $\frac{1}{50} \times \frac{1}{20} + \frac{1}{50} \times \frac{19}{20} + \frac{49}{50} \times \frac{1}{20}$ or $\frac{1}{50} + \frac{49}{50} \times \frac{1}{20}$ M1A1
 $\frac{69}{1000}$ or 0.069 A1
 Alternative method $1 - \frac{49}{50} \times \frac{19}{20} = \frac{69}{1000}$ 0.069 M1 A1 A1
-

25. (a)
-
- Labels A1 child branches A1 tractor branches A1
- (b) $0.05 \times 0.88 = 0.044$ A1
-