



St. Patrick's High School, Keady
Mathematics Department

GCSE Mathematics Practice Booklet

M6

Topic 7 – Handling Data 1 - Probability

Listing Outcomes

Probability Scale

Calculating Probabilities

Expectation

Relative Frequency

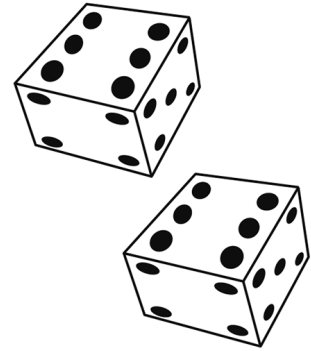
Section A – Non Calculator Questions / Mark Scheme Pages 1-52

Section B – Calculator Questions / Mark Scheme Pages 53-80

Questions taken from CCEA Past Papers

Q1

To start a game, Darragh must score a **total** of either 2 or 5 or 7 from throwing two fair dice.



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

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

[2]

(b) What is the probability of Darragh getting started straight away?

Answer _____ [2]

Q2 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.

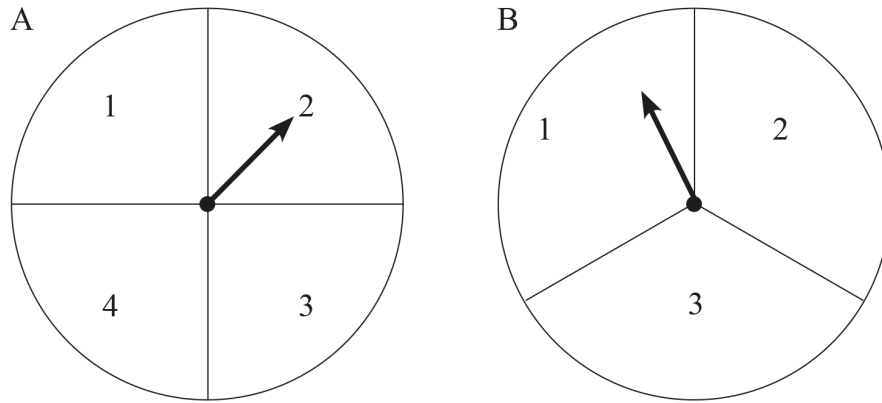
+	1	3	5	7	9	11
2						
4						
6						

[2]

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

Answer _____ [2]

Q3



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]

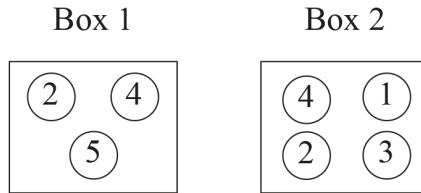
(b) What is the probability of getting the same number on each spinner?

Answer _____ [1]

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

Answer _____ [1]

Q4



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]

Q5

(a) The probability that Matt eats breakfast is marked on the scale with a B.

What is the probability?



Answer _____ [1]

(b) Matt has a three-digit combination lock for his bike.



He has forgotten the code.

He knows the first digit is 2

The second digit is either 3 or 4

The third digit is 5, 6 or 7

List all the possible combinations of Matt's code.

[2]

Q6

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)?

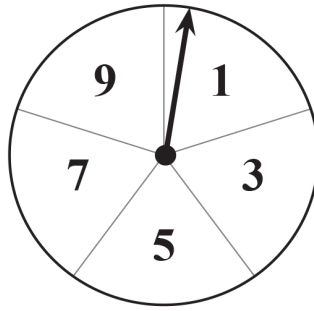
Answer _____ [1]

(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]

Q7

A fair spinner has outcomes of 1, 3, 5, 7 and 9



The spinner is spun twice.

The two outcomes are **added** together to give a score.

(a) Complete the table below to show all possible scores.

		First spin				
		1	3	5	7	9
Second spin	1	2				
	3		6			
	5			10		
	7	8			14	
	9			14		18

[2]

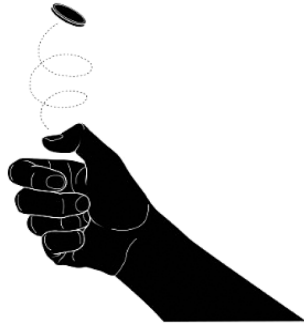
(b) What is the probability of getting the “most likely” score?

Answer _____ [1]

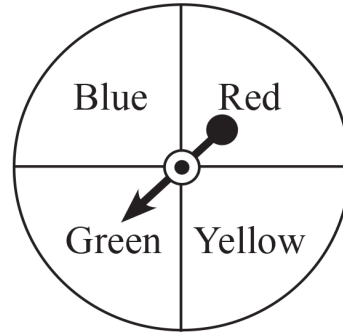
Q8

Bill flips a fair coin with outcomes head and tail once.

He spins the spinner with outcomes blue, red, yellow and green once.



© Getty Images



(a) List all the possible outcomes that Bill can get.

[2]

(b) The probability of getting an outcome of a tail and yellow is $\frac{1}{8}$

Explain **clearly** why this is the case.

[1]

Q9

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]

Q10

Below is a menu from Dillies Diner.

A two-course lunch is made up of one Starter and one Main course.

DILLIES DINER LUNCH MENU

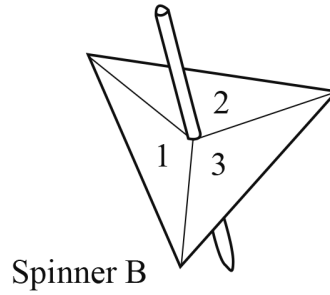
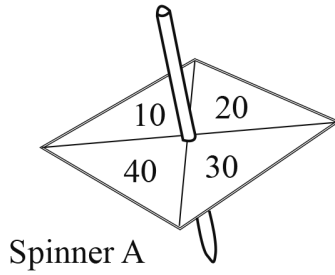
Starter	Main Course
Soup Mushrooms Ribbs	Plaice Beef Chicken Quiche

Work out the number of different two-course lunches that can be ordered from this menu.

Answer _____ lunches [2]

Q11

Two fair spinners are each spun once.



The scores on each spinner are multiplied together.

(a) Complete the table of outcomes.

		Spinner A			
		10	20	30	40
Spinner B	1				
	2				
	3				

[2]

(b) What is the probability that the outcome is 60?

Answer _____ [1]

(c) What is the probability that the outcome is less than 40?

Answer _____ [2]

- Q12** 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]

Q13 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]

Q14 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]

Q15

A fair six-sided dice is rolled once.

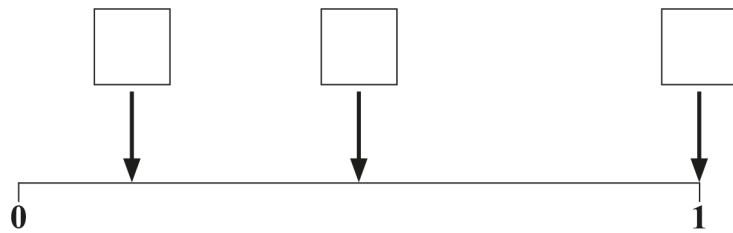


A: An even number is rolled.

B: A number greater than 0 is rolled.

C: A number less than 2 is rolled.

Label the boxes with the correct letter to show the probability of **A**, **B** and **C**.



[3]

Q16

Ben has five flags from Asia.

They are from Malaysia, Mongolia, Myanmar, Taiwan, and Vietnam.

Ben takes one of these flags at random.

- (a) Mark on the probability scale with a **V** the probability that the flag taken is Vietnam.



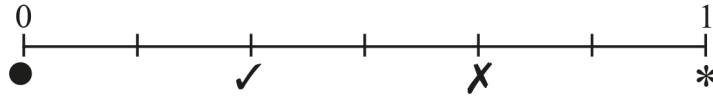
[1]

- (b) Mark on the probability scale with an **M** the probability that the flag taken is from a country beginning with the letter M.



[1]

Q17



One letter is taken at random from the word COMMON.

Which of ●, ✓, X, * shows the probability that the letter is

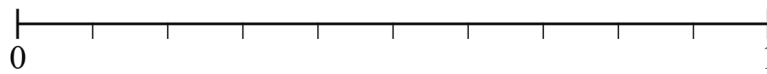
(a) M, Answer _____ [1]

(b) T, Answer _____ [1]

(c) a letter that appears twice in COMMON, Answer _____ [1]

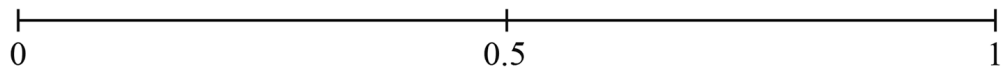
(d) a letter in the word MONOCLE? Answer _____ [1]

- Q18** There are **twenty** balls in a bag.
4 are blue, 6 are green and the rest are white.
A ball is taken at random from the bag.
Mark the probability of each of the following events happening on the probability scale below using the capital letters.
- B The ball taken is blue
 - W The ball taken is white
 - R The ball taken is red



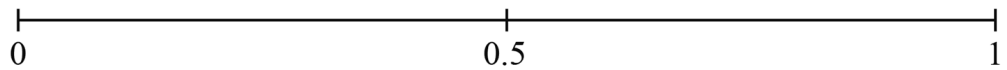
[3]

- Q19** (a) On the probability scale mark with a cross (**X**) the probability that it will snow in Belfast in July.



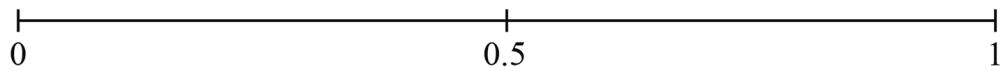
[1]

- (b) On the probability scale mark with a cross (**X**) the probability that it will rain in Belfast next year.



[1]

- (c) On the probability scale mark with a cross (**X**) the probability that you will get a tail when you toss a fair coin.



[1]

- (d) The weather forecaster says that there is a 70% chance of rain tomorrow.

What is the probability that it will not rain tomorrow?

Answer _____ [1]

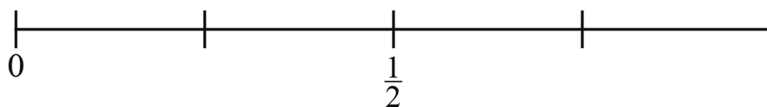
Q20

- (a) A probability scale goes from 0 to 1

What does the number 1 tell you about the chance of an event happening?

_____ [1]

- (b) Mark with an arrow and the letter P, the probability of having a birthday on 32nd January.



[1]

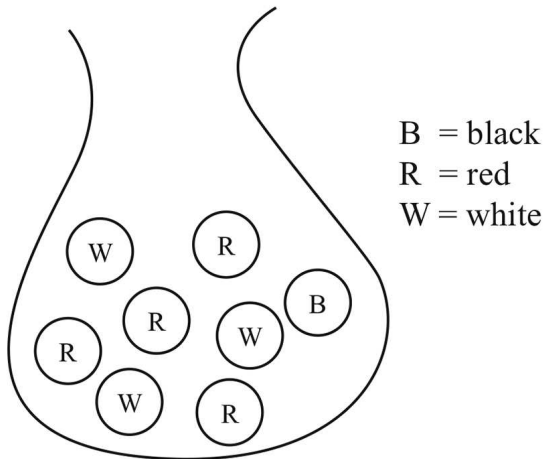
- (c) 300 tickets are sold in a school raffle.

Only boys and girls buy tickets.

Explain why the probability of a boy winning may not be $\frac{1}{2}$

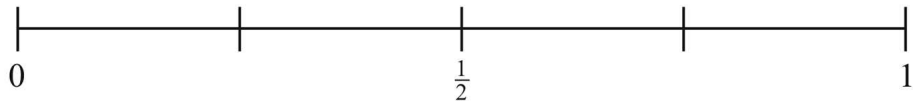
[1]

Q21 A bag contains 1 black, 4 red and 3 white counters.



(a) Emma takes a counter at random from the bag.
On the scale below:

- (i) mark with an arrow and the letter G, the probability that the counter taken is green, [1]
- (ii) mark with an arrow and the letter T, the probability that the counter taken is red or white. [2]



(b) Emma replaces the counter in the bag. A number of pink counters are added to the bag. A counter is now taken at random from the bag. The probability that it is red is now $\frac{1}{5}$.
How many pink counters were added to the bag?

Answer _____ [2]

- Q22** (a) Lucy says that the probability of her getting a car for her 18th birthday is $\frac{3}{2}$
 Explain what is wrong with Lucy's statement.

[1]

- (b) Lucy phones Tom. The probability that the phone line is busy is 0.26
 What is the probability that it is not busy?

Answer _____ [1]

- Q23** The 8 cards shown below are shuffled and placed with the pictures face down on a table.



Megan knows there are two cards with circles and two cards with triangles. She says, "There are an equal number of cards with circles and cards with triangles, so the probability of me taking a card with a triangle is 0.5".

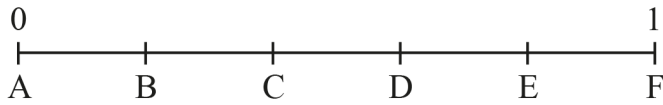
Is Megan correct? Explain your reasoning clearly.

_____ because _____

 _____ [2]

Q24 There are 2 ham sandwiches, 3 chicken sandwiches, 4 cheese sandwiches and 1 egg sandwich on a plate.

Benny takes a sandwich at random from the plate.



Which point (A, B, C, D, E or F) on the probability scale best matches the probability of Benny taking

(a) a prawn sandwich, Answer _____ [1]

(b) a cheese sandwich? Answer _____ [1]

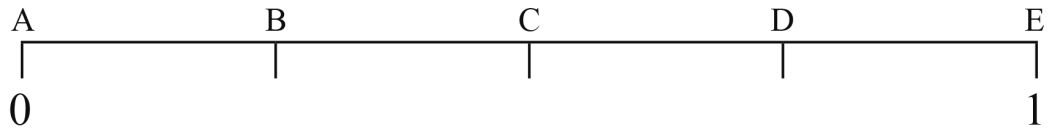
Q25

There are 80 packets of crisps in a school tuck shop.

The number of packets of each flavour is shown in the table.

Cheese & Onion	Pickled Onion	Prawn Cocktail	Ready Salted	Salt & Vinegar
20	7	8	5	40

A packet of crisps is chosen at random.



Which **letter** on the scale shows the probability that the flavour is

(a) Salt & Vinegar,

Answer _____ [1]

(b) Cheese & Onion,

Answer _____ [1]

(c) Roast Chicken?

Answer _____ [1]

Q26

A bag contains 21 pieces of fudge.

6 pieces are vanilla and 8 pieces are walnut. The rest are raisin.

Josh takes a piece of fudge at random from the bag.

What is the probability that it is

(a) not vanilla,

Answer _____ [1]

(b) raisin?

Answer _____ [1]

Q27

The table shows information about all pupils in a Year 12 class.

	Boys	Girls
Blue Eyes	4	6
Brown Eyes	10	8

(a) How many pupils are there in the class?

Answer _____ [1]

(b) A pupil is to be chosen at random.

What is the probability that the pupil will have blue eyes?

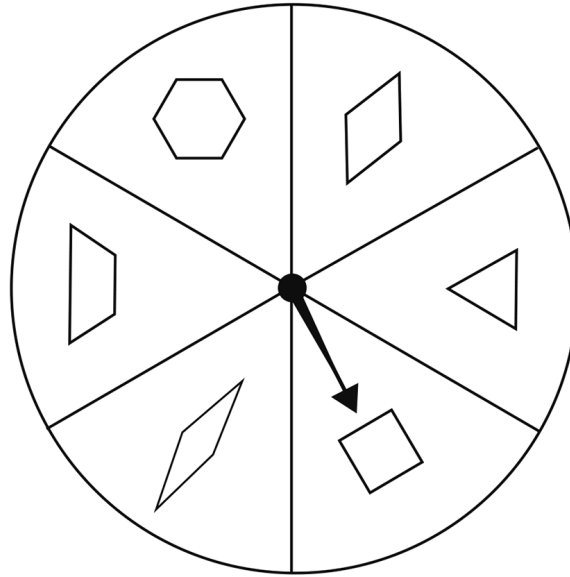
Answer _____ [1]

(c) A pupil was chosen. It was a boy.

What is the probability that he had brown eyes?

Answer _____ [2]

Q28



Sara spins a fair spinner with some shapes drawn on it.

What is the probability of Sara getting a shape which

(a) has 4 sides,

Answer _____ [1]

(b) has less than 3 sides,

Answer _____ [1]

(c) has less than 4 sides?

Answer _____ [1]

- Q29** In a raffle all 400 tickets were sold.
The tickets were numbered from 1 to 400
One ticket is to be drawn at random to win the prize.
What is the probability that the winning ticket will be numbered greater than 275?

Answer _____ [2]

- Q30** 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]

Q31 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]

Q32

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]

Q33

Tickets numbered from 1 to 81 are placed in a hat.
One winning ticket is taken at random.

(a) What is the probability that the winning ticket is the number 70?

Answer _____ [1]

(b) What is the probability that the winning ticket is a number bigger than 70?

Answer _____ [2]

(c) Explain why the probability of the winning ticket having an even number is not $\frac{1}{2}$

_____ [1]

Q34

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?

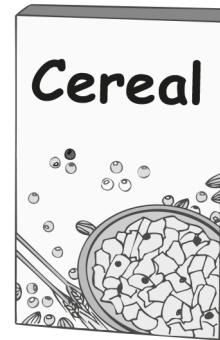
Answer _____ [1]

Q35

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]

Q36

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.

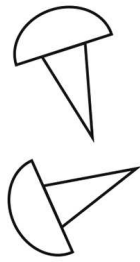
Will this change the probability of now choosing at random a girl who wears glasses?

Explain your answer clearly.

Answer _____ because _____ [2]

- Q37** 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?

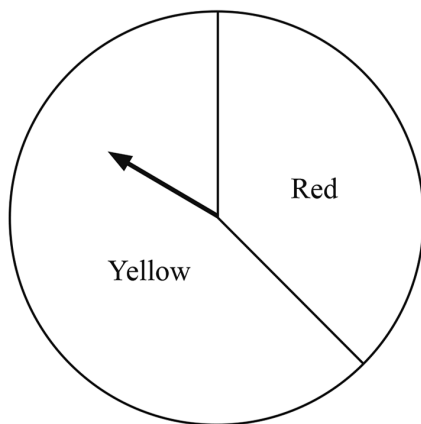
Answer _____ [1]

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

_____ [1]

Q38

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]

Q39

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]

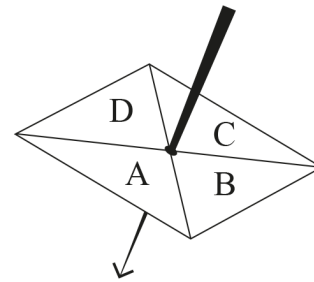
- (c) How many sixes would you expect to get if a **fair** six-sided dice was rolled 300 times?

Answer _____ [2]

Q40

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]

Q41 Tony tests a six-sided dice which he thinks is biased towards the even numbers. He carries out an experiment by rolling the dice. He records the results as E (even) or O (odd).

E O E O E E O E E O E O

(a) What is the relative frequency of an even number?

Answer _____ [1]

(b) How could Tony improve the experiment?

Answer _____ [1]

1. (a) All 16 scores correct A2 (A1 for 12 correct)
 (b) $\frac{11}{36}$ A1 (for identifying 11), A1 (for correct answer)
-

2. (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
-

3. (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
-

4.

(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

5.

(a) 0.8 (or $\frac{4}{5}$)

A1

(b) 235, 236, 237, 245, 246, 247

MA2

6.

(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

7.

(a)

	1	3	5	7	9
1	2	4	6	8	10
3	4	6	8	10	12
5	6	8	10	12	14
7	8	10	12	14	16
9	10	12	14	16	18

18 correct A2 At least 12 correct A1

(b) $\frac{5}{25} \left(\frac{1}{5}\right)$

A1

8.

- (a) Head Blue, Head Red, Head Yellow, Head Green
Tail Blue, Tail Red, Tail Yellow, Tail Green

8 correct A2 At least 6 correct A1

- (b) There are 8 outcomes

One outcome is Tail Yellow

A1

$$\left(P(\text{Tail Yellow}) = \frac{1}{8} \right)$$

9.

- (a) 10 correct missing pairs added to table

H2	H3	H4	H5	H6	
T1	T2	T3	T4	T6	

A2

(at least 6 correct A1)

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

A1

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

A1

10.

SP, SB, SC, SQ
MP, MB, MC, MQ
RP, RB, RC, RQ

M1

12

A1

11. (a) 10, 20, 30, 40
 20, 40, 60, 80
 30, 60, 90, 120
 (allow A1 for at least 6 correct) MA2
- (b) $\frac{2}{12}$ or equivalent A1
- (c) $\frac{5}{12}$ M1 A1
-

12. (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
-

- 13.
- | | | | | | | |
|---|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| H | H1 | H2 | H3 | H4 | H5 | H6 |
| T | T1 | T2 | T3 | T4 | T5 | T6 |
- $\frac{1}{12}$ M1
 A1
-

14.

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

A2
(A1 for 3 correct)

15.

C A B

A1 A1 A1

16.

(a) V indicated at 0.2

A1

(b) M indicated at 0.6

A1

17.

(a) ✓

A1

(b) ●

A1

(c) ✗

A1

(d) *

A1

18. B at 0.2 W at 0.5 R at 0 A1 A1 A1

19. (a) X at or very near to zero A1
 (b) X at 1 A1
 (c) X at 0.5 A1
 (d) 30% (or equivalent) A1

20. (a) It is certain to happen A1
 (b) An arrow marked at 0 A1
 (c) Half of the tickets may not be bought by boys A1

21. (a) (i) G at zero A1
 (ii) $\frac{7}{8}$ written MA1
 T correctly positioned at $\frac{7}{8}$ on scale A1
 (b) 4 reds = $\frac{1}{5}$, so 20 counters MA1
 12 pink counters MA1

22. (a) It is not possible to have a probability greater than 1 A1
(b) 0.74 A1
-

23. No because although there are an equal number of circles and triangles, both of them still have less chance than the squares which have a probability of $\frac{1}{2}$ (or no; the probability of choosing a triangle is 0.25 as there are only 2 out of a total of 8) (or equivalent) C2
-

24. (a) A A1
(b) C A1
-

25. (a) C A1
(b) B A1
(a) A A1
-

26. (a) $\frac{15}{21} \left(\frac{5}{7}\right)$ A1
(b) $\frac{7}{21} \left(\frac{1}{3}\right)$ A1
-

27. (a) 28 A1
(b) $\frac{10}{28} \left(\frac{5}{14}\right)$ A1
(c) $\frac{10}{14} \left(\frac{5}{7}\right)$ M1 A1
-

28. (a) $\frac{4}{6} \left(\frac{2}{3}\right)$ (b) 0 (c) $\frac{1}{6}$ A1 for each
-

29. $400 - 275 = 125$ MA1
 $\frac{125}{400}$ A1
-

30. $0.28 + 0.12 + 0.09$ M1
 0.49 A1

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

32. $1 - (0.3 + 0.4) = 0.3$ MA1
 $0.3 \div 2 = 0.15$ A1

33. (a) $\frac{1}{81}$ A1
(b) $\frac{11}{81}$ M1 A1
(c) not an equal number of odd and even A1

34.

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

35.

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

36.

- (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
-

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

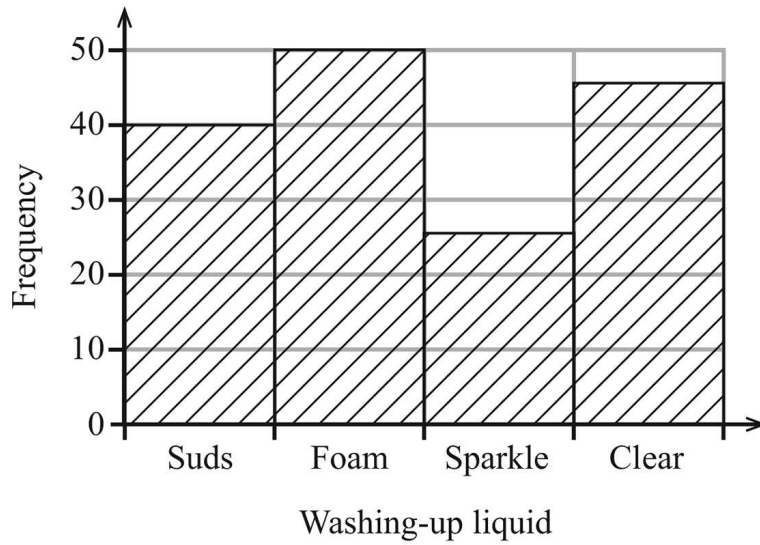
38. (a) 0.34×200 M1
 68 A1
 (b) 0.32 A1
 Because more spins means that it is more reliable A1
-

39. (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
-

- 40.
- (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
-

- 41.
- (a) $\frac{7}{12}$ A1
 - (b) By increasing the number of trials. 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.

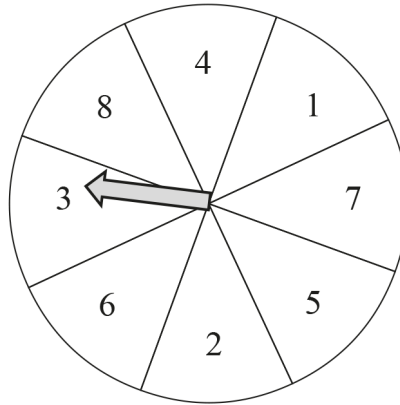
Answer _____ [2]

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

How many strawberry sweets should it contain?

Answer _____ [2]

Q6



A spinner consists of a circular wheel which is divided into eight sectors numbered 1 to 8 as in the diagram.

When spun, the arrow will point to one of the sectors.

(a) What is meant if the spinner is described as a **fair** spinner?

Answer _____
 _____ [1]

(b) The spinner is **not** fair.

The probability of the arrow pointing to the sector numbered 7 is 0.15

Work out the probability of the arrow not pointing to the sector numbered 7

Answer _____ [2]

Q7

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]

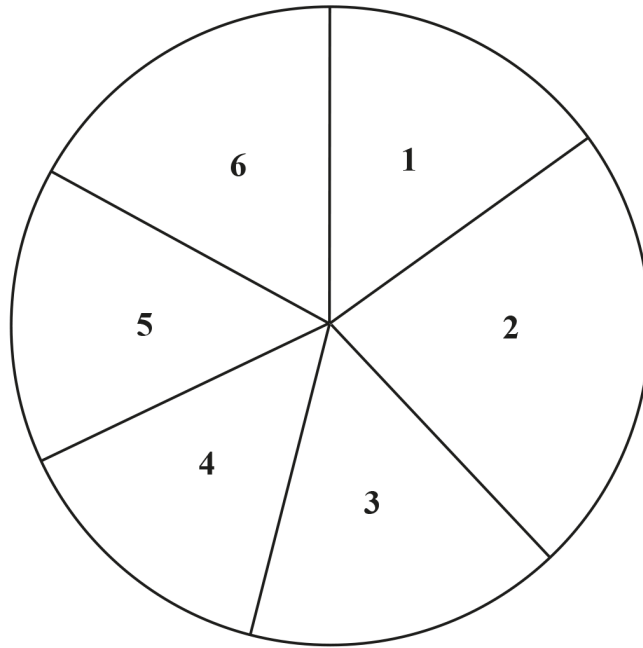
(c) is not brown or white?

Answer _____ [1]

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

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?

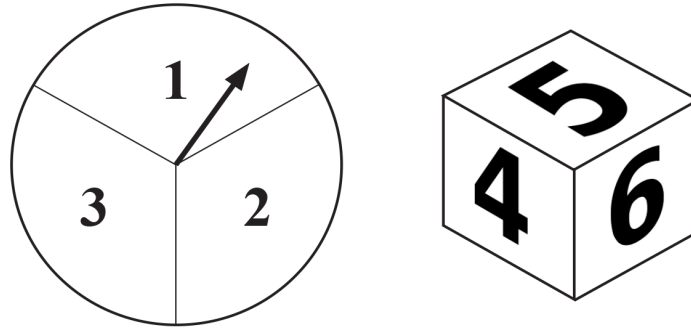
Answer _____ [1]

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

Estimate how many named Giant's Causeway.

Answer _____ [2]

Q10



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]

Q11



© 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]

- Q12** In a group, the number of boys and girls with a certain eye colour is recorded as shown below.

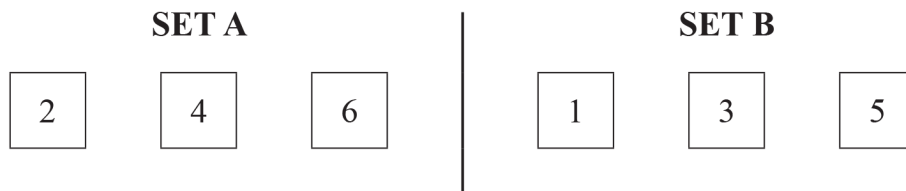
	Boys	Girls
Brown eyes	10	8
Blue eyes	4	7
Green eyes	6	5

A child is chosen at random from this group of boys and girls.

What is the probability that the child is a girl with blue eyes?

Answer _____ [2]

Q13



A card is taken at random from Set A.

A card is then taken at random from Set B.

The cards are used to make a two-digit number in the order AB.

Write down the 9 possible two-digit numbers.

_____, _____, _____, _____, _____, _____, _____, _____, _____

[2]

What is the probability that the two-digit number

(i) is even,

Answer _____ [1]

Complete

1 kg is approximately equal to _____ lbs

[1]

- Q14** 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]

Q15

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]

Q16 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.

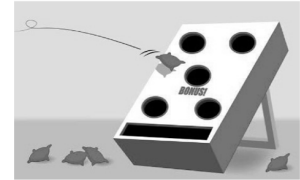
Work out an estimate for the number of memory chips made per hour that will **not** be faulty.

Answer _____ [3]

Q17

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]

Q18

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.

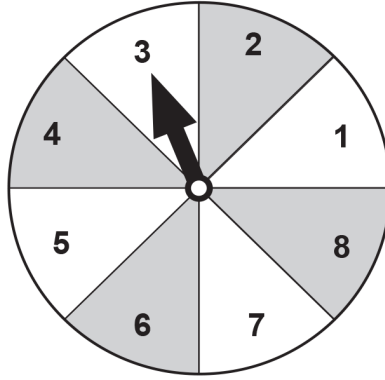
Day	Number of cars surveyed	Number of electric cars	Relative frequency
1	100	11	0.11
2	100	12	0.115
3	100	16	0.13
4	100	9	

(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]

Q19



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]

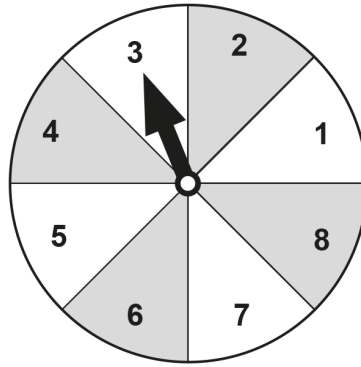
Calculate the number of times it landed on a 3 for the 1000 spins.

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]

Q20



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]

Q21

- (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) The spinner landed on yellow 40 times in the 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]

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) Each number has an equal chance / each sector is the same size

A1

$$(b) 1 - 0.15$$

M1

$$0.85$$

A1

- 7.
- | | | |
|-----|-----------------|----|
| (a) | $\frac{27}{40}$ | A1 |
| (b) | $\frac{17}{40}$ | A1 |
| (c) | $\frac{23}{40}$ | A1 |
-

- 8.
- | | |
|------------------|----|
| number of trials | A1 |
|------------------|----|
-

- 9.
- | | | |
|-----|--------------------------------------|------|
| (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 |
-

10.

(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

11.

(a) $1 - 0.75$

M1

$= 0.25$

A1

(b) $20 \times 0.4 = 8$

M1 A1

12.

40

MA1

$\frac{7}{40}$

A1

13.

(a) $\begin{matrix} 21 & 23 & 25 \\ 41 & 43 & 45 \\ 61 & 63 & 65 \end{matrix}$

M1 A1

(i) 0 or impossible

A1

(ii) $\frac{3}{9} \left(\frac{1}{3} \right)$

A1

14.

(a) $\frac{13}{33}$

A1

(b) $\frac{9}{14}$

A1

15.

(a) $\frac{33}{50} (0.66)$

A1

(b) $\frac{72}{100} (0.72)$

A1

(c) $580 \times 0.28 = 162.4 = 162 \text{ cars}$

M1 A1

16.

$1 - 0.025 = 0.975$ or $1800 \times 0.025 = 45$

MA1

1800×0.975 or $1800 - 45$

M1

1755 1755

A1

17.

$$(a) \frac{104}{200} \left(\frac{13}{25} \right) (0.52) \quad A1$$

The more throws the better the probability estimate A1

$$(b) \frac{104}{200} \times 300 = 156 \quad M1 A1$$

18.

$$(a) 0.12 \quad A1$$

$$(b) 0.12 \quad A1$$

19.

$$(a) \frac{64}{500} = 0.128 \quad MA1$$

$$(b) 1000 \times 0.122 = 122 \quad MA1$$

$$(c) 2500 \times 0.122 \\ = 305 \quad A1$$

20.

(a) $\frac{64}{500} = 0.128$ MA1

(b) $1000 \times 0.122 = 122$ MA1

(c) 2500×0.122 M1

$= 305$ A1

21.

(a) (i) $\frac{12}{50}$ or equivalent A1

(ii) $\frac{21}{100}$ or equivalent A1

(b) (i) $\frac{40}{100}$ or equivalent A1

(ii) 120 A1
