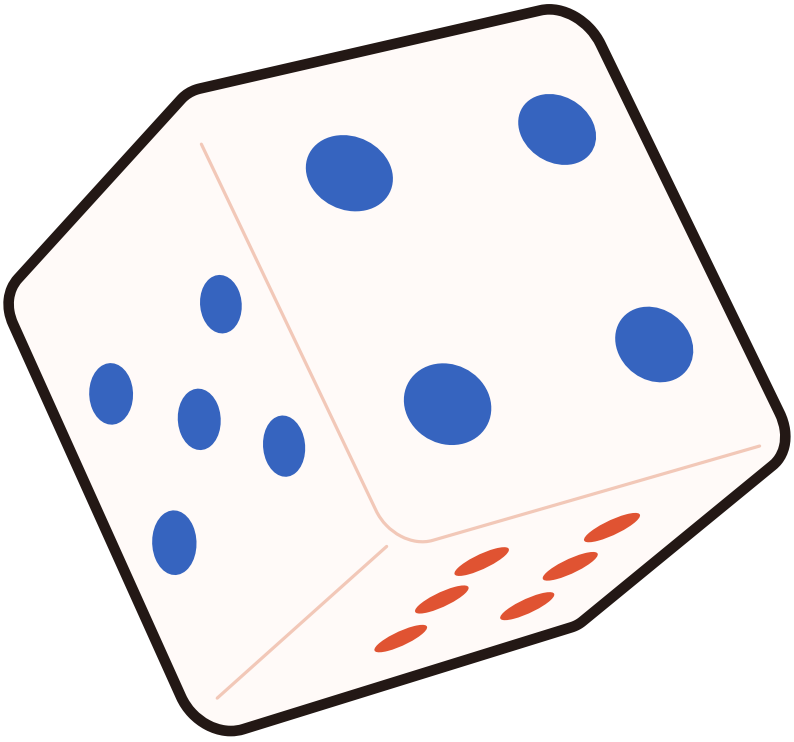
EDEXCEL IGCSE MATHEMATICS

PAPER 1H & 1HR (LINEAR)

PROBABILITY

QP & MS (2018 - 2025)



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by Sir Muhammad Abdullah Shah

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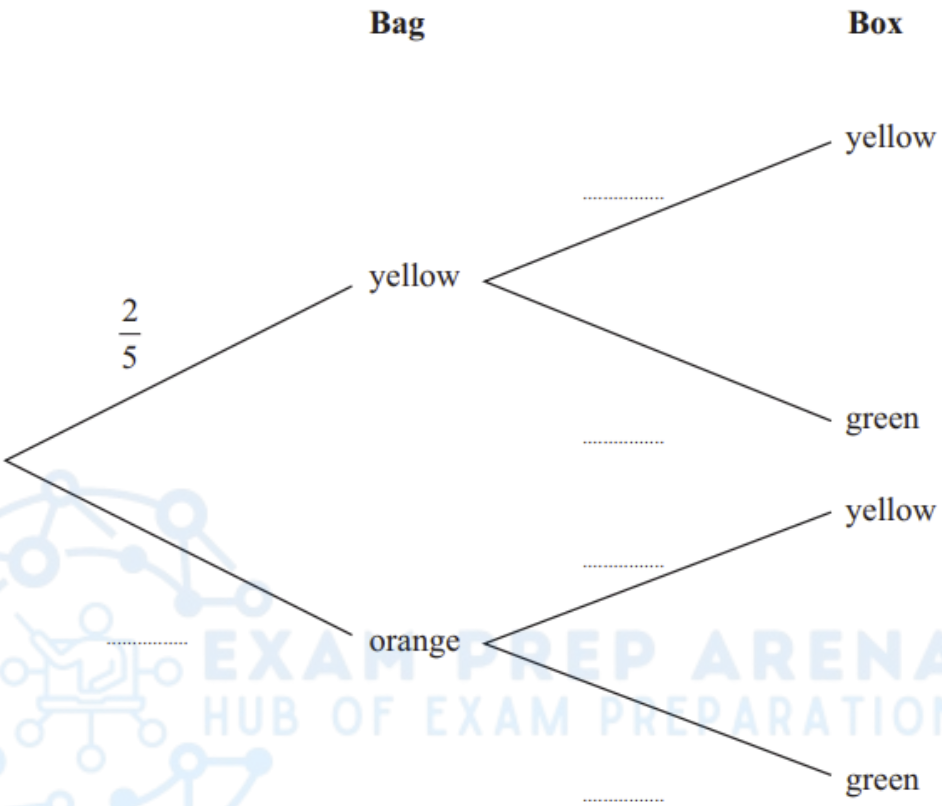
1. Nov 2025 1H/Q13

In a bag, there are only 2 yellow beads and 3 orange beads.
In a box, there are only 3 yellow beads and 5 green beads.

Chi takes at random a bead from the bag and a bead from the box.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Chi takes two beads of different colours.

.....

(3)

(Total for Question 13 is 5 marks)

2. Nov 2025 1H/Q22

There are 15 buttons in a box.

3 of the buttons are red
2 of the buttons are pink
10 of the buttons are blue

Pete takes at random three buttons from the box.

Work out the probability that there is still at least one pink button in the box.

.....

(Total for Question 22 is 3 marks)

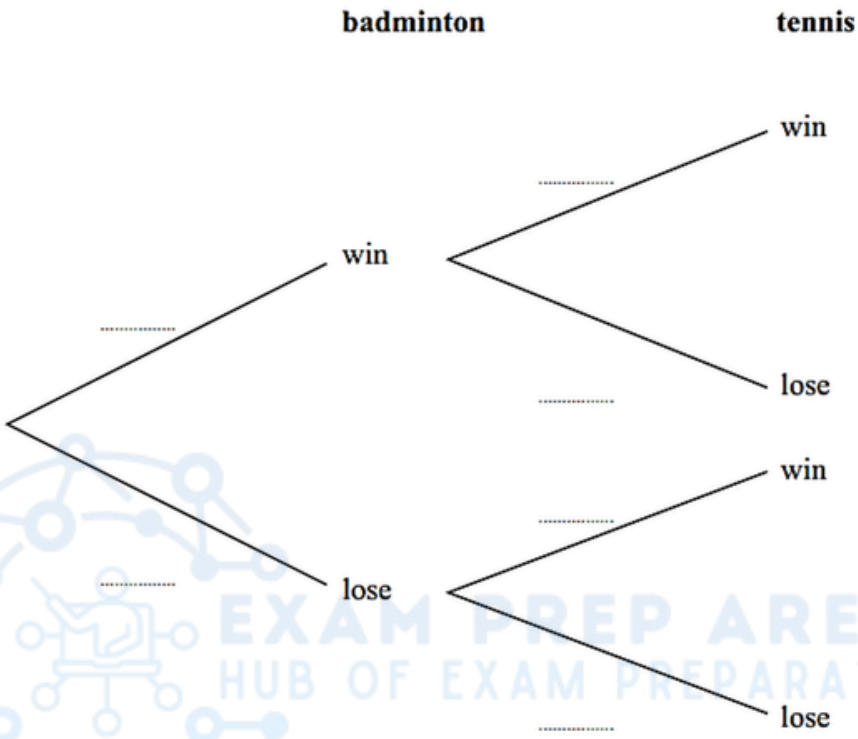
3. June 2025 1H/Q14

Ricardo is going to play one game of badminton and one game of tennis.

He can either win or lose each game.

The probability that he will win the game of badminton is 0.7
The probability that he will win the game of tennis is 0.4

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Ricardo loses both games.

.....

(2)

(Total for Question 14 is 4 marks)

4. June 2025 1H/Q21

A box contains 20 counters.

9 of the counters are red
7 of the counters are yellow
4 of the counters are green

Alex takes at random three counters from the box.

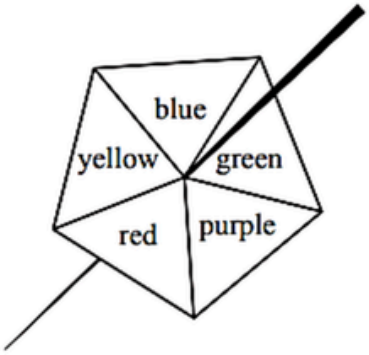
Work out the probability that exactly two of the three counters are the same colour.

.....

(Total for Question 21 is 3 marks)

5. June 2025 1HR/Q4

Here is a biased 5-sided spinner.
When the spinner is spun, it can land on blue or on green or on purple or on red or on yellow.



The table gives information about the probability of the spinner landing on each colour.

Colour	blue	green	purple	red	yellow
Probability	0.12	0.20	0.38	$4x$	x

Sophie spins the spinner once.

(a) Work out the probability that the spinner lands on blue or on green or on purple.

.....

(1)

Max spins the spinner 350 times.

(b) Work out an estimate for the number of times the spinner lands on red.

.....

(4)

(Total for Question 4 is 5 marks)

6. June 2025 1HR/Q19

Kannika has 9 counters.
There is a number on each counter.

Kannika puts the 9 counters in a bag.
She takes at random a counter from the bag and does not replace the counter.
She then takes at random a second counter from the bag.

Work out the probability that the sum of the numbers on the two counters is less than 5

.....

(Total for Question 19 is 3 marks)

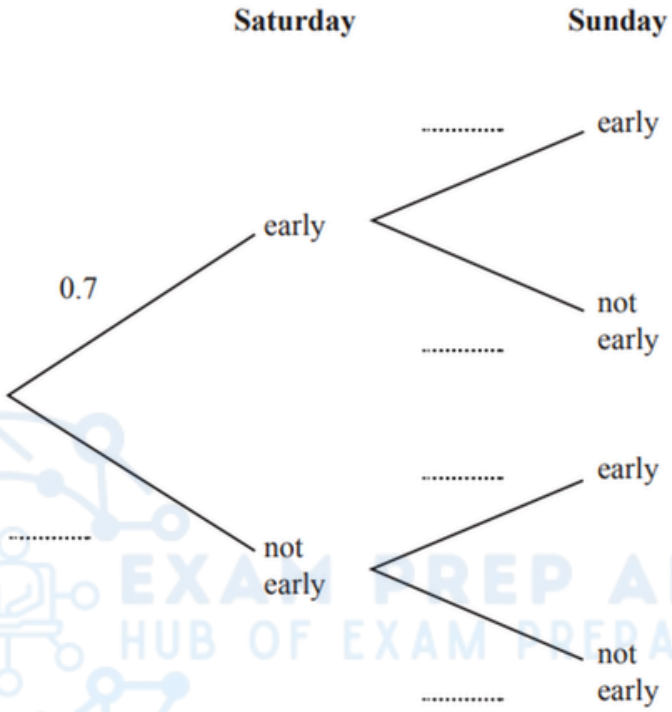
7. Nov 2024 1H/Q13

The probability that Thomas gets to work early on Saturday is 0.7

If Thomas gets to work early on Saturday, the probability that he will get to work early on Sunday is 0.9

If Thomas does **not** get to work early on Saturday, the probability that he will get to work early on Sunday is 0.6

(a) Use this information to complete the probability tree diagram.



(2)

(b) Work out the probability that Thomas gets to work early on both Saturday and Sunday.

.....

(2)

(Total for Question 13 is 4 marks)

8. June 2024 1H/Q2

450 students were asked how they travelled to school on Monday.
Each student walked or travelled by bus or travelled by car or travelled by bicycle.
Each student used just one method of travel.

One of these students is chosen at random.
The table shows information about the probability of each method of travel.

Method of travel	walk	bus	car	bicycle
Probability	0.20	x	$2x$	0.26

Work out how many of the 450 students travelled by car.

.....

(Total for Question 2 is 4 marks)

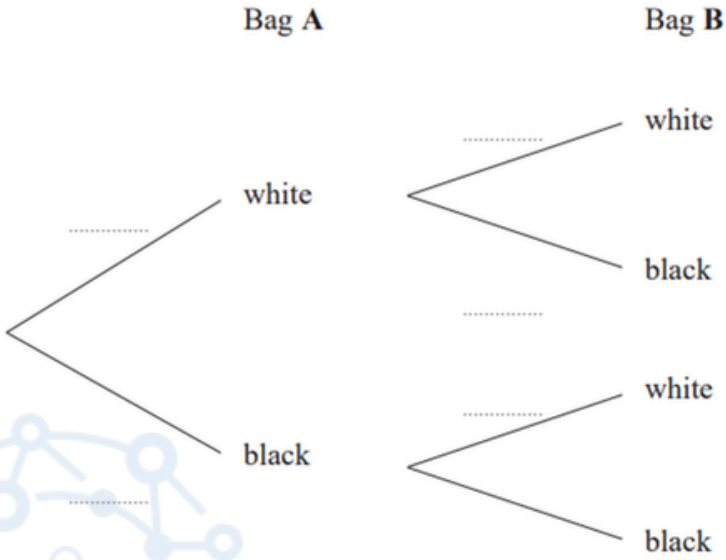
9. June 2024 1H/Q13

Harman has two bags of beads.

In bag **A**, there are 3 white beads and 7 black beads.
In bag **B**, there are 5 white beads and 4 black beads.

Harman takes at random a bead from bag **A** and a bead from bag **B**

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Harman takes two beads of the same colour.

.....

(3)

(Total for Question 13 is 5 marks)

10. June 2024 1H/Q16

There are 20 sweets in a box.

15 of the sweets are red
5 of the sweets are yellow

Fred takes at random 3 sweets from the box.

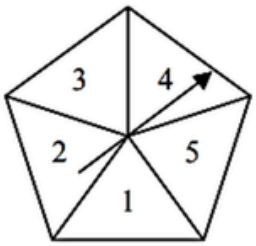
Work out the probability that Fred takes at least one sweet of each colour from the box.

.....

(Total for Question 16 is 4 marks)

11. June 2024 1HR/Q2

Here is a biased spinner.



The table gives information about the probability that, when the spinner is spun once, it will land on each number.

Number	1	2	3	4	5
Probability	$2x$	0.27	0.04	x	0.12

Alexis is going to spin the spinner 400 times.

Work out an estimate for the number of times the spinner will land on an odd number.

.....

(Total for Question 2 is 4 marks)

12. June 2024 1HR/Q21

There are 25 counters in a bag such that

6 counters are blue
x counters are orange, where $x > 9$
the rest of the counters are pink

Maalam takes at random two of the counters from the bag.

The probability that Maalam takes one orange counter and one pink counter is $\frac{22}{75}$

Calculate the probability that Maalam takes 2 pink counters from the bag.
Show clear algebraic working.

(Total for Question 21 is 5 marks)

13. Nov 2023 1H/Q4

A biased spinner has three sections each of a different colour.

The table shows the probability that, when the spinner is spun once, it will land on blue or on orange or on white.

Colour	blue	orange	white
Probability	0.58	$2x$	x

(a) Work out the value of x

$x =$ .....

(2)

The spinner is spun 250 times.

(b) Work out an estimate for the number of times the spinner will land on blue.

.....

(2)

(Total for Question 4 is 4 marks)

14. Nov 2023 1H/Q20

A bag contains only 10 cent coins and 20 cent coins.

Josip takes at random a coin from the bag, records its value and replaces it in the bag. He then takes at random a second coin from the bag, records its value and replaces it in the bag.

Josip finds the mean value of the two coins.

The probability that the two coins have a mean value of 10 cents is $\frac{49}{121}$

Work out the probability that the two coins have a mean value of 15 cents.

.....

(Total for Question 20 is 4 marks)

15. June 2023 1HR/Q5

Each time Evie plays a game against her computer, she will win or lose.

For each game, the probability that Evie will win is 0.74
Evie is going to play 300 games against her computer.

Work out an estimate for the number of games that Evie will lose.

.....

(Total for Question 5 is 2 marks)

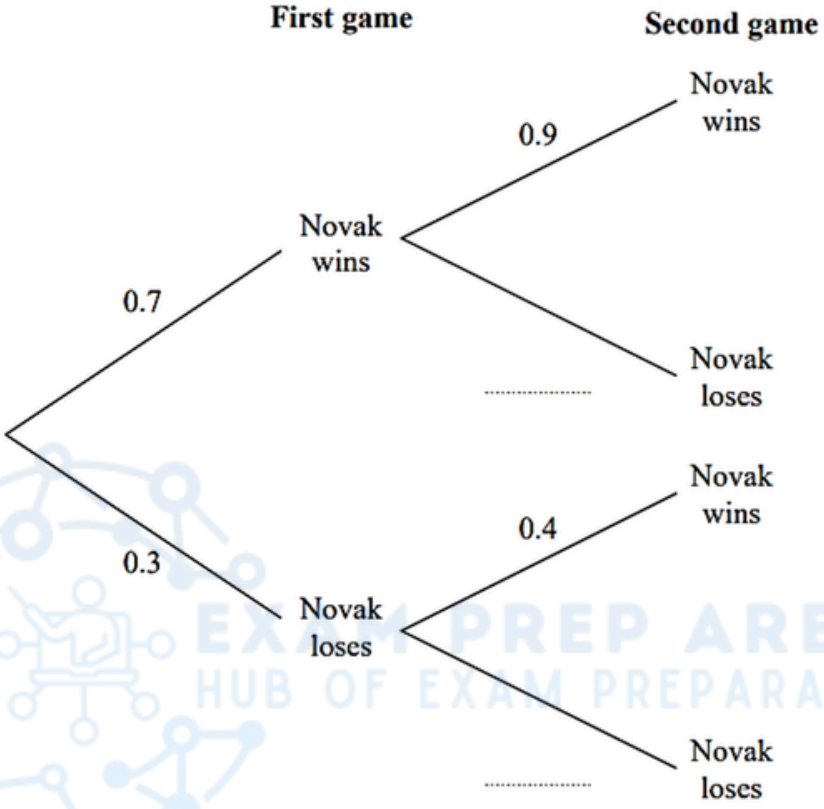
16. June 2023 1HR/Q13

Novak is going to play two games of tennis.

The probability that he wins the first game is 0.7

If he wins the first game, the probability that he wins the second game is 0.9
If he loses the first game, the probability that he wins the second game is 0.4

(a) Complete the probability tree diagram.



(1)

(b) Work out the probability that Novak wins both games of tennis.

.....

(2)

(Total for Question 13 is 3 marks)

17. Jan 2023 1H/Q7

Some members of a library were asked to name the type of book that they each liked to read the best.

One of the members is chosen at random.
The table shows information about the probability of the type of book that this member answered.

Type of book	comedy	romance	mystery	thriller
Probability	0.24	0.40	$3x$	x

48 members answered comedy books.

Work out how many of the members answered mystery books.

.....

(Total for Question 7 is 4 marks)

18. Jan 2023 1H/Q15

Here are 9 cards. Each card has either a number on it or a letter on it.

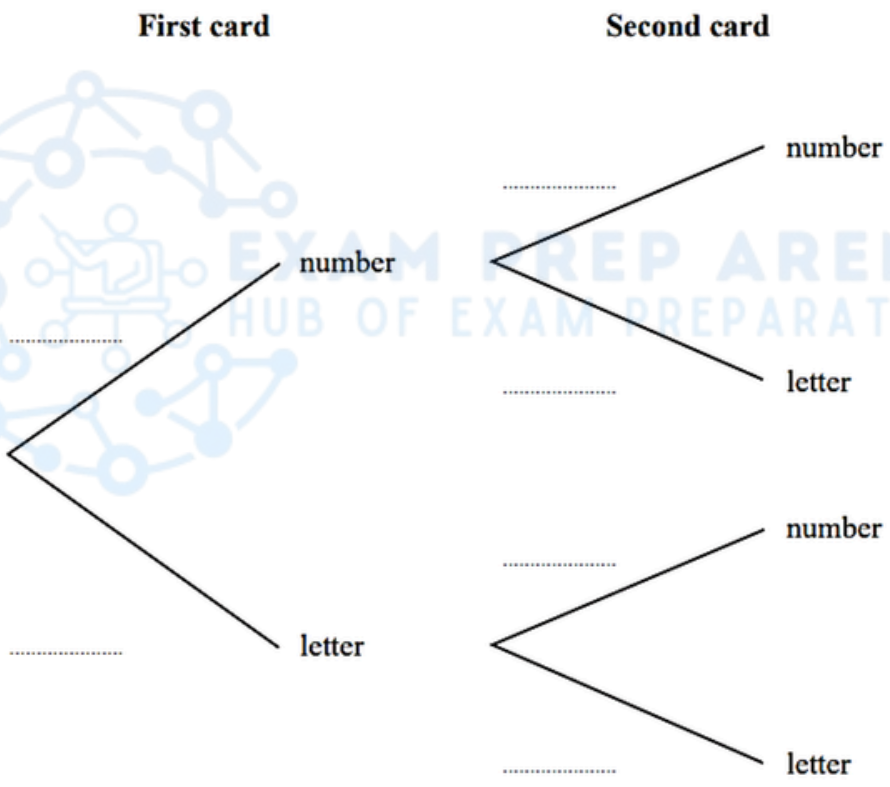
A	7	H	F	E	D	G	5	C

Tomas is playing a game.

Tomas takes at random one of the cards and keeps it.

Tomas then takes at random another card and keeps it.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that each of the two cards has a number on it.

(2)

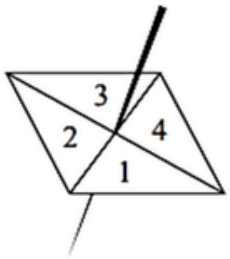
(c) Work out the probability that there will be one card with a number on it and one card with a letter on it.

(3)

(Total for Question 15 is 7 marks)

19. June 2022 1H/Q2

Here is a biased 4-sided spinner.



The table gives the probabilities that, when the spinner is spun once, it will land on 1 or it will land on 3

Number	1	2	3	4
Probability	0.26		0.18	

The probability that the spinner will land on 2 is equal to the probability that the spinner will land on 4

Ravina is going to spin the spinner a number of times.

Ravina works out that an estimate for the number of times the spinner will land on 3 is 45

Work out an estimate for the number of times the spinner will land on 4

.....

(Total for Question 2 is 4 marks)

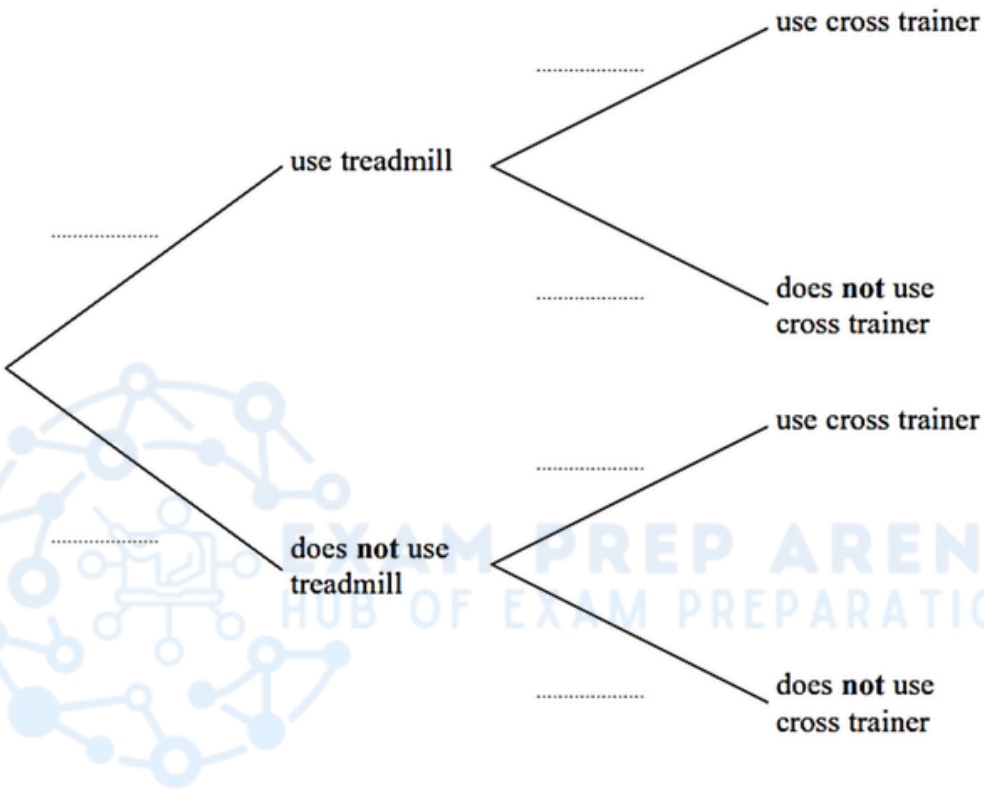
20. June 2022 1H/Q12

Rudolf goes to the gym.

The probability that he will use the treadmill is 0.8

When he uses the treadmill, the probability that he will use the cross trainer is 0.3
When he does **not** use the treadmill, the probability that he will use the cross trainer is 0.6

(a) Complete the probability tree diagram for this information.



(2)

(b) Work out the probability that Rudolf uses both the treadmill and the cross trainer.

.....

(2)

(Total for Question 12 is 4 marks)

21. June 2022 1H/Q15

Abraham is going to play a computer game.
Abraham can win the game, draw the game or lose the game.

For any game that Abraham plays

the probability that he wins the game is 0.3
the probability that he draws the game is 0.5
the probability that he loses the game is 0.2

When Abraham wins a game, he scores +10 points.
When Abraham draws a game, he scores 0 points.
When Abraham loses a game, he scores −5 points.

Abraham plays 3 games and the points he scores in each of the 3 games are added together to get his total score.

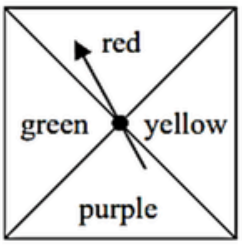
Work out the probability that when he has played 3 games his total score is 0 points.

.....

(Total for Question 15 is 4 marks)

22. June 2022 1HR/Q1

Here is a biased spinner.



When the spinner is spun once, the probabilities that it lands on red or on yellow or on green are given in the table.

Colour	red	yellow	purple	green
Probability	0.25	0.2		0.2

(a) Work out the probability that the spinner lands on red or on yellow.

.....

(1)

Yang is going to spin the spinner 300 times.

(b) Work out an estimate for the number of times the spinner will land on purple.

.....

(3)

(Total for Question 1 is 4 marks)

23. June 2022 1HR/Q24

Elliot has x counters.

Each counter has one red face and one green face.

Elliot spreads all the counters out on a table and sees that the number of counters showing a red face is 5

Elliot then picks at random one of the counters and turns the counter over.
He then picks at random a second counter and turns the counter over.

The probability that there are still 5 counters showing a red face is $\frac{19}{32}$

Work out the value of x
Show clear algebraic working.

$x =$ .....

(Total for Question 24 is 5 marks)

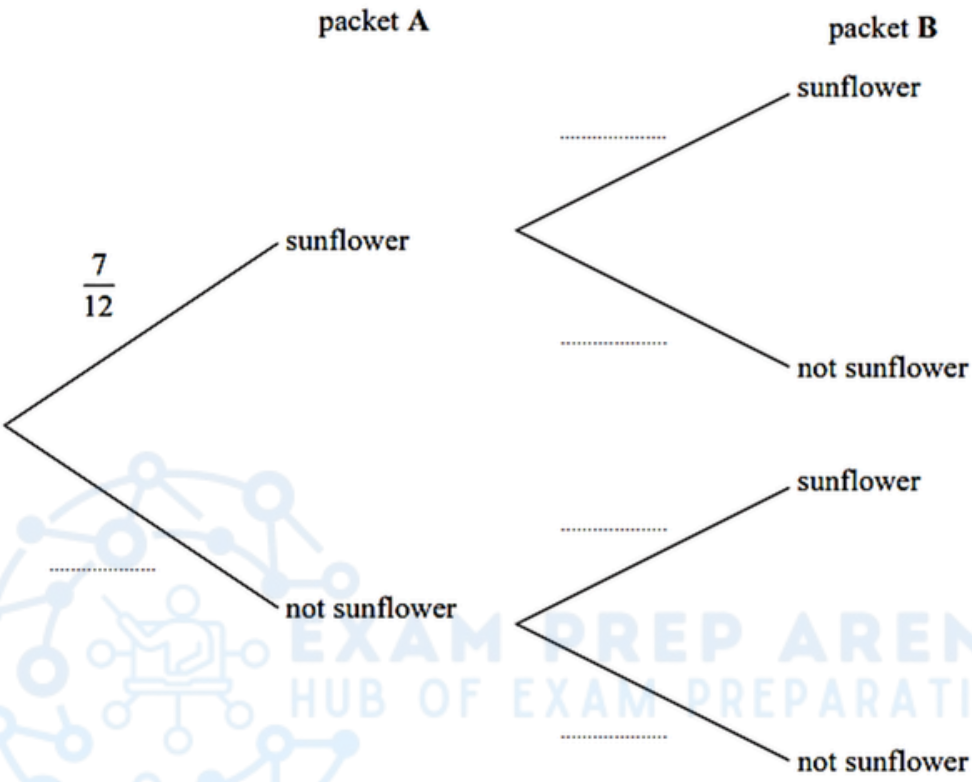
24. Jan 2022 1H/Q14

Aika has 2 packets of seeds, packet **A** and packet **B**

There are 12 seeds in packet **A** and 7 of these are sunflower seeds.
There are 15 seeds in packet **B** and 8 of these are sunflower seeds.

Aika is going to take at random a seed from packet **A** and a seed from packet **B**

(a) Complete the probability tree diagram.



(2)

(b) Calculate the probability that Aika will take two sunflower seeds.

.....

(2)

(Total for Question 14 is 4 marks)

25. Jan 2022 1HR/Q2

Each time John plays a game, the probability that he wins the game is 0.65

John is going to play the game 300 times.

Work out an estimate for the number of games that John wins.

.....

(Total for Question 2 is 2 marks)

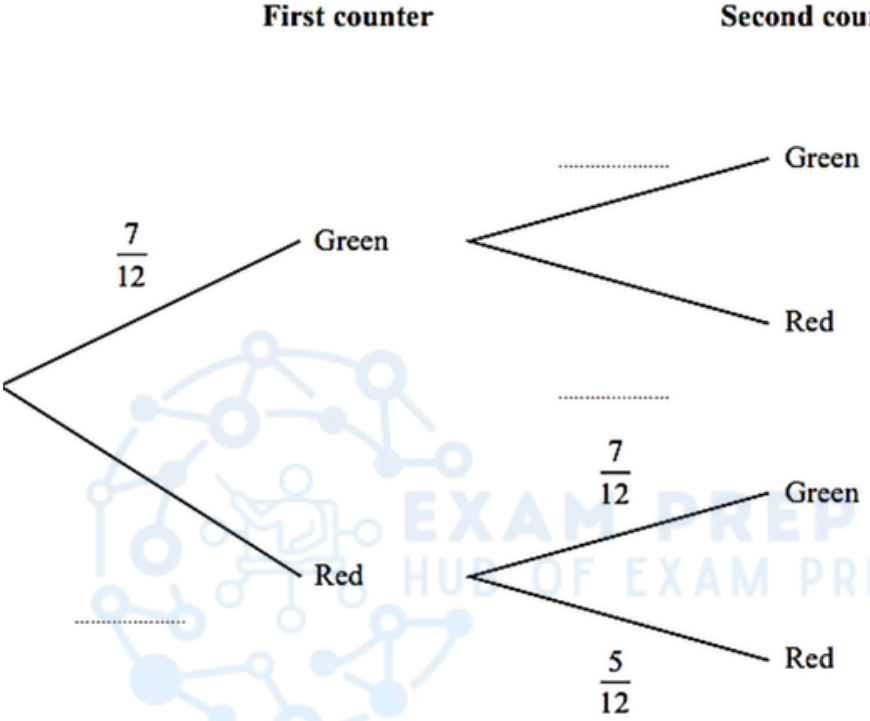
26. Jan 2022 1HR/Q13

Hector has a bag that contains 12 counters.
There are 7 green counters and 5 red counters in the bag.

Hector takes at random a counter from the bag.
He looks at the counter and puts the counter back into the bag.

Hector then takes at random a second counter from the bag.
He looks at the counter and puts the counter back into the bag.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that both counters are red.

.....

(2)

Meghan has a jar containing 15 counters.
There are only blue counters, green counters and red counters in the jar.

Hector is going to take at random one of the counters from his bag of 12 counters.
He will look at the counter and put the counter back into the bag.

Hector is then going to take at random a second counter from his bag.
He will look at the counter and put the counter back into the bag.

Meghan is then going to take at random one of the counters from her jar of counters.
She will look at the counter and put the counter back into the jar.

The probability that the 3 counters each have a different colour is $\frac{7}{24}$

(c) Work out how many blue counters there are in the jar.

.....

(3)

(Total for Question 13 is 7 marks)

27. Nov 2021 1H/Q3

There are 54 fish in a tank.
Some of the fish are white and the rest of the fish are red.

Jeevan takes at random a fish from the tank.
The probability that he takes a white fish is $\frac{4}{9}$

(a) Work out the number of white fish originally in the tank.

.....

(2)

Jeevan puts the fish he took out, back into the tank.
He puts some more white fish into the tank.

Jeevan takes at random a fish from the tank.
The probability that he takes a white fish is now $\frac{1}{2}$

(b) Work out the number of white fish Jeevan put into the tank.

.....

(2)

(Total for Question 3 is 4 marks)

28. Nov 2021 1H/Q15

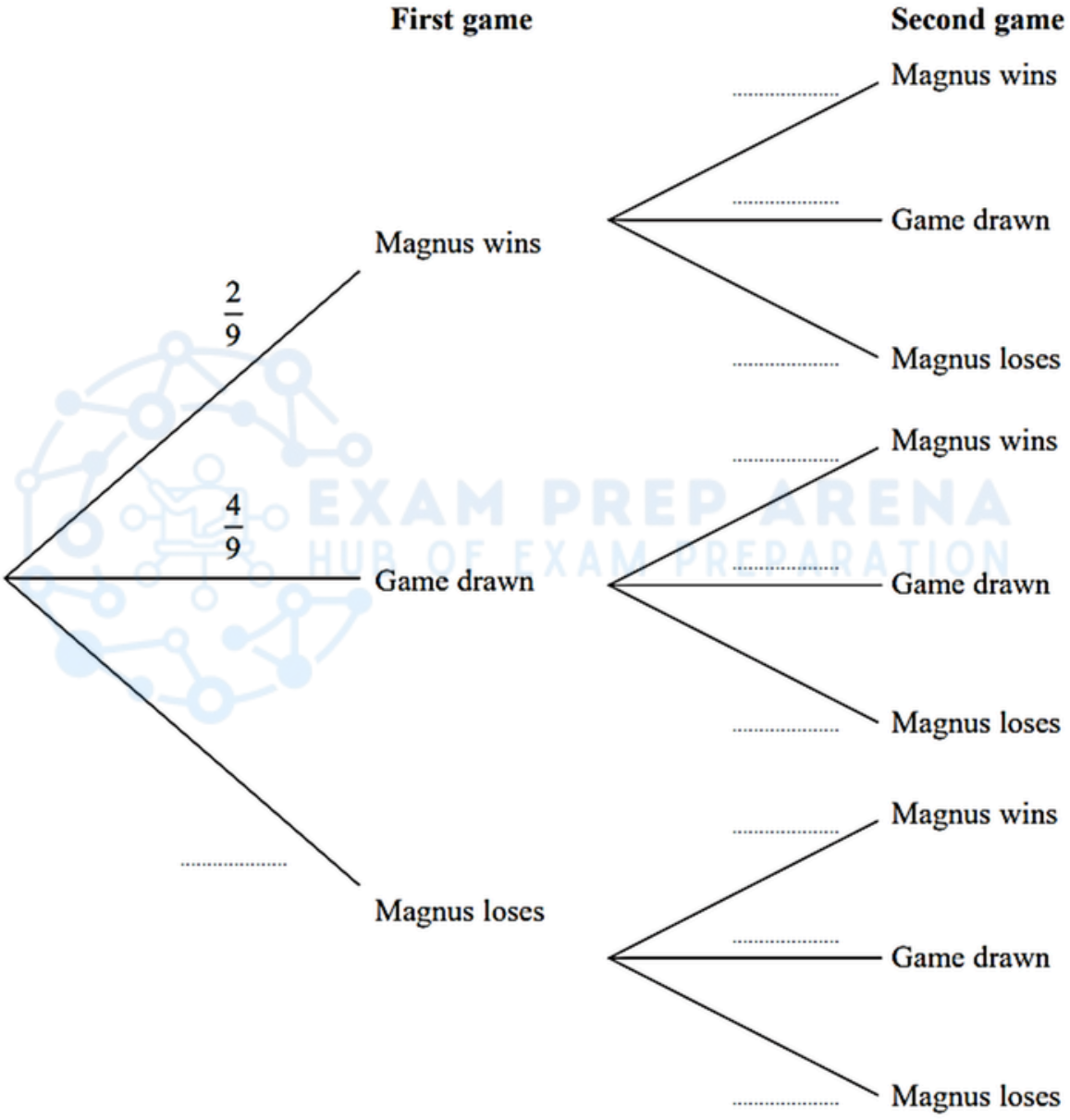
Magnus and Garry play 2 games of chess against each other.

The probability that Magnus beats Garry in any game is $\frac{2}{9}$

The probability that any game between Magnus and Garry is drawn is $\frac{4}{9}$

The result of any game is independent of the result of any other game.

(a) Complete the probability tree diagram.



(2)

For each game of chess,

the winner gets 2 points and the loser gets 0 points,
when the game is drawn, each player gets 1 point.

(b) Work out the probability that, after 2 games, Magnus and Garry have the same number of points.

.....

(3)

Magnus and Garry now play a third game of chess.

(c) Work out the probability that, after 3 games, Magnus and Garry have the same number of points.

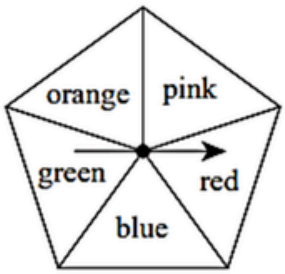
.....

(3)

(Total for Question 15 is 8 marks)

29. May 2021 1H/Q6

Grace has a biased 5-sided spinner.



Grace is going to spin the arrow on the spinner once.

The table below gives the probabilities that the spinner will land on red or on blue or on green.

Colour	Red	Blue	Green	Orange	Pink
Probability	0.20	0.12	0.08		

The probability that the spinner will land on orange is 3 times the probability that the spinner will land on pink.

(a) Work out the probability that the spinner will land on orange.

.....

(3)

Grace spins the arrow on the spinner 150 times.

(b) Work out an estimate for the number of times the spinner lands on blue.

.....

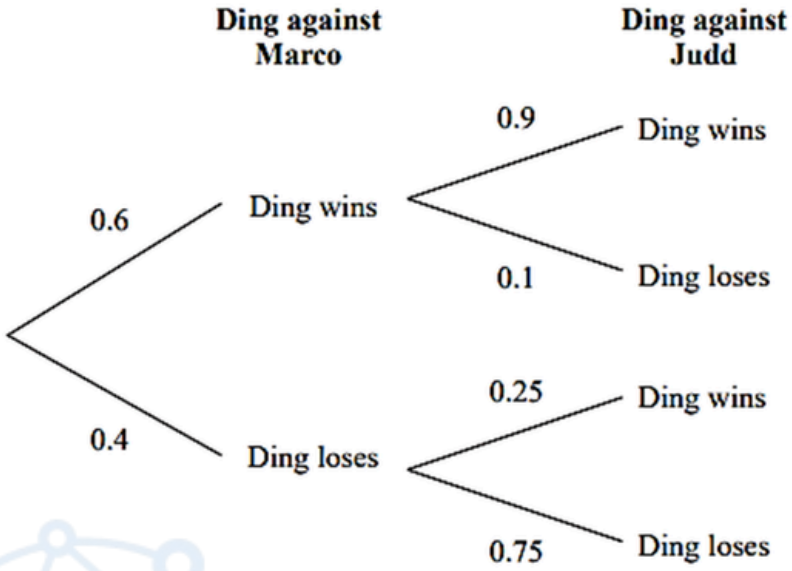
(2)

(Total for Question 6 is 5 marks)

30. Jan 2021 1H/Q14

Ding is going to play one game of snooker against each of two of his friends, Marco and Judd.

The probability tree diagram gives information about the probabilities that Ding will win or lose each of these two games.



(a) Work out the probability that Ding will win both games.

.....

(2)

(b) Work out the probability that Ding will win exactly one of the games.

.....

(3)

(Total for Question 14 is 5 marks)

31. Nov 2020 1H/Q2

Toy cars are made in a factory.
The toy cars are made for 15 hours each day.
5 toy cars are made every 12 seconds.

For the toy cars made each day, the probability of a toy car being faulty is 0.002

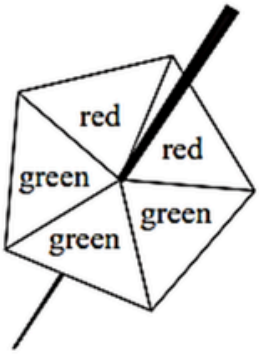
Work out an estimate of the number of faulty toy cars that are made each day.

.....

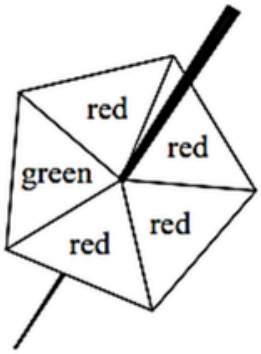
(Total for Question 2 is 4 marks)

32. Nov 2020 1H/Q15

Harry has two fair 5-sided spinners.



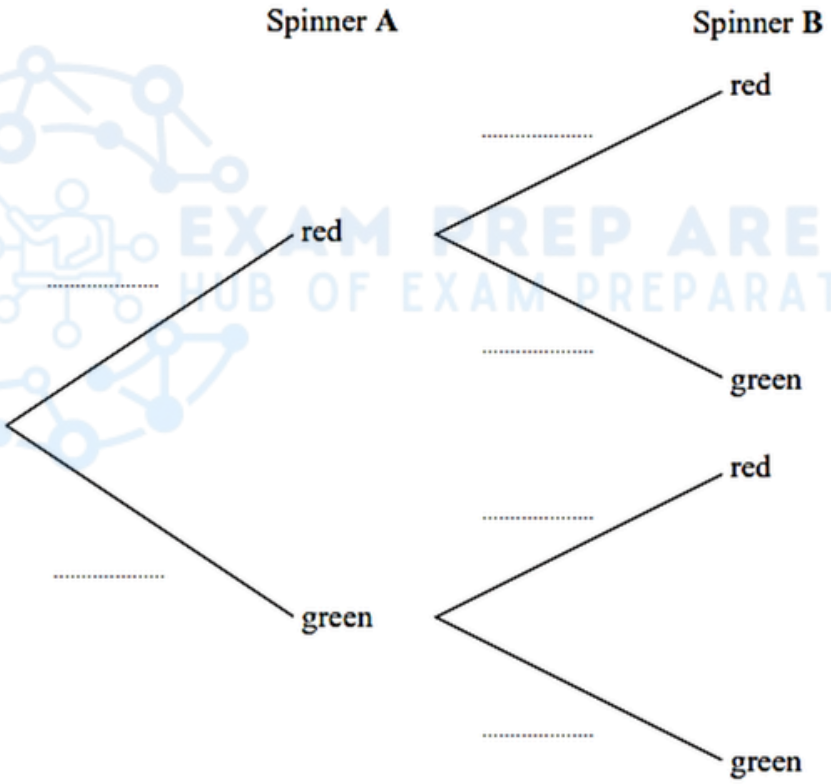
Spinner **A**



Spinner **B**

Harry is going to spin each spinner once.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that at least one of the spinners will land on green.

.....

(3)

(Total for Question 15 is 5 marks)

33. Nov 2020 1HR/Q23

In a bag, there are only

3 blue beads
4 white beads
and x orange beads.

Jean is going to take at random two beads from the bag.

The probability that Jean will take two beads of the same colour is $\frac{3}{8}$

Find the total number of beads in the bag.
Show clear algebraic working.

.....

(Total for Question 23 is 4 marks)

34. Jan 2020 1H/Q18

There are 16 sweets in a bowl.

4 of the sweets are blackcurrant.
5 of the sweets are lemon.
7 of the sweets are orange.

Anna, Ravi and Sam each take at random one sweet from the bowl.

Work out the probability that the 5 lemon sweets are still in the bowl.

.....

(Total for Question 18 is 4 marks)

35. June 2019 1H/Q5

Becky has a biased 6-sided dice.

The table gives information about the probability that, when the dice is thrown, it will land on each number.

Number	1	2	3	4	5	6
Probability	$2x$	0.18	$2x$	$3x$	0.26	x

Becky is going to throw the dice 200 times.

Work out an estimate for the number of times that the dice will land on an even number.

.....

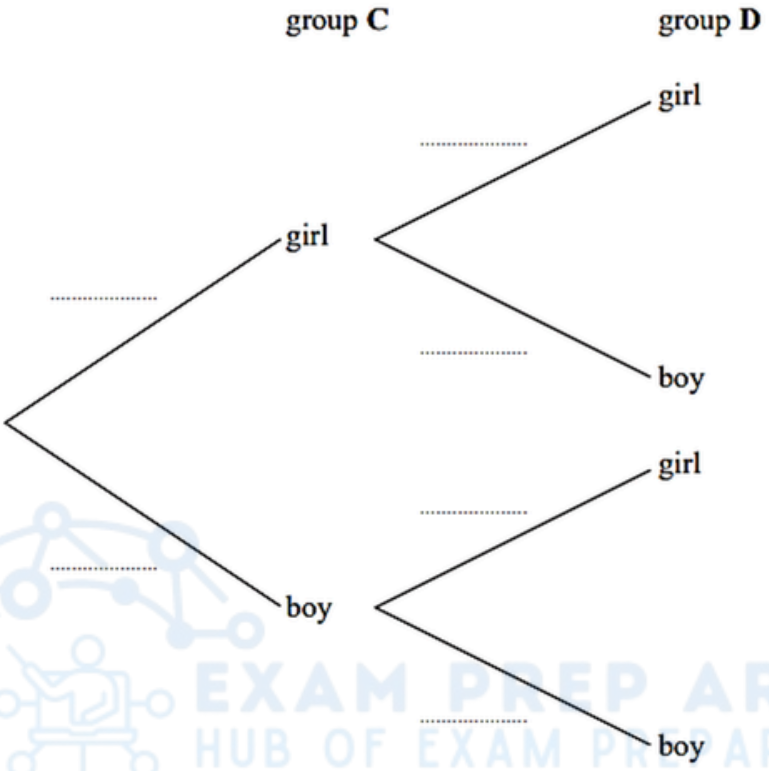
(Total for Question 5 is 4 marks)

36. June 2019 1H/Q13

In group **C**, there are 6 girls and 8 boys.
In group **D**, there are 3 girls and 7 boys.

A team is made by picking at random one child from group **C** and one child from group **D**.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that there are two boys in the team.

.....

(2)

After the first team has been picked, a second team is picked.
One child is picked at random from the children left in group **C** and one child is picked at random from the children left in group **D**.

(c) Work out the probability that there are two boys in each of the two teams.

.....

(3)

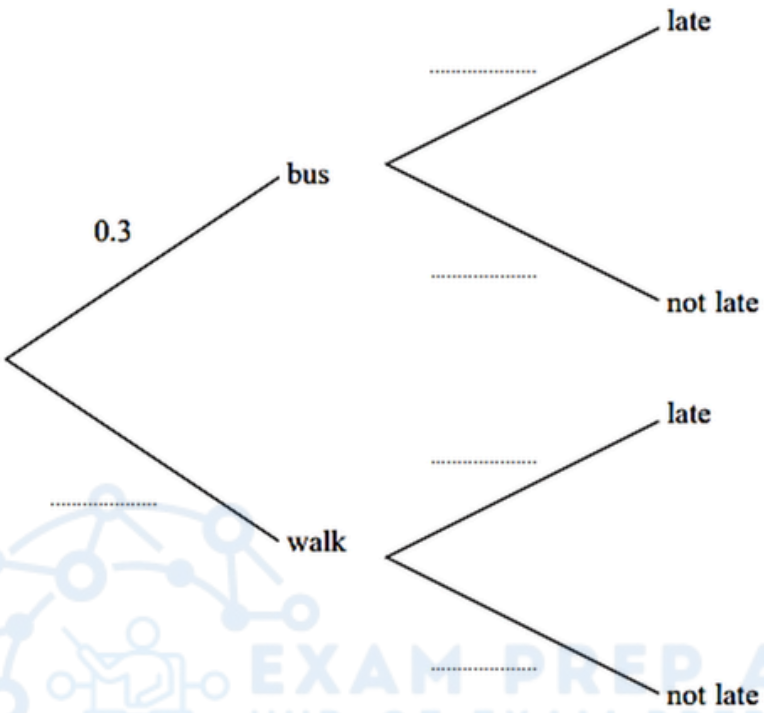
(Total for Question 13 is 7 marks)

37. June 2019 1HR/Q14

Each day that Barney goes to college, he either goes by bus or he walks.
The probability that Barney will go to college by bus on any day is 0.3

When Barney goes to college by bus, the probability that he will be late is 0.2
When Barney walks to college, the probability that he will be late is 0.1

(a) Complete the probability tree diagram.



(2)

Barney will go to college on 200 days next year.

(b) Work out an estimate for the number of days Barney will be late for college next year.

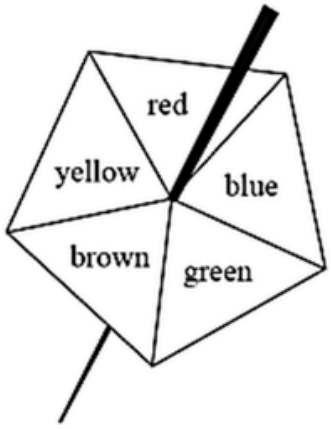
.....

(4)

(Total for Question 14 is 6 marks)

38. Jan 2019 1H/Q3

Here is a biased 5-sided spinner.



When the spinner is spun, it can land on red, blue, green, brown or yellow.

The table gives the probabilities that the spinner lands on red or on blue or on green.

Colour	red	blue	green	brown	yellow
Probability	0.15	0.26	0.33		

When the spinner is spun once, the probability that the spinner lands on brown is 0.06 more than the probability that the spinner lands on yellow.

Jenine spins the spinner 150 times.

Work out an estimate for the number of times the spinner lands on yellow.

(Total for Question 3 is 4 marks)

39. Jan 2019 1H/Q20

A bowl contains n pieces of fruit.
Of these, 4 are oranges and the rest are apples.

Two pieces of fruit are going to be taken at random from the bowl.

The probability that the bowl will then contain $(n - 6)$ apples is $\frac{1}{3}$

Work out the value of n
Show your working clearly.

(Total for Question 20 is 6 marks)

40. Jan 2019 1HR/Q16

There are 12 beads in a bag.

7 of the beads are red.
3 of the beads are green.
2 of the beads are yellow.

Lucy takes at random a bead from the bag and keeps it.
Then Julian takes at random a bead from the bag.

(a) Work out the probability that they each take a yellow bead.

.....

(2)

(b) Work out the probability that the beads they take are **not** the same colour.

.....

(3)

(Total for Question 16 is 5 marks)

41. June 2018 1H/Q19

Jack plays a game with two fair spinners, **A** and **B**.

Spinner **A** can land on the number 2 or 3 or 5 or 7
Spinner **B** can land on the number 2 or 3 or 4 or 5 or 6

Jack spins both spinners.
He wins the game if one spinner lands on an odd number **and** the other spinner lands on an even number.

Jack plays the game twice.
Work out the probability that Jack wins the game both times.

.....

(Total for Question 19 is 4 marks)

42. June 2018 1HR/Q15

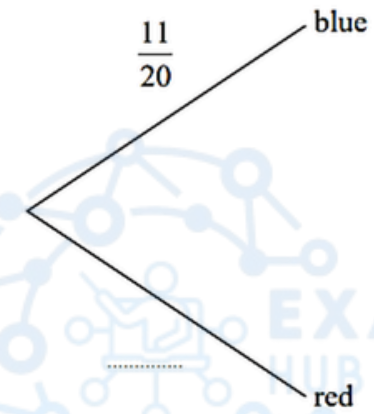
There are two bags of counters, bag **X** and bag **Y**.

There are 20 counters in bag **X**.
11 of the counters are blue and the rest are red.

There are 16 counters in bag **Y**.
9 of the counters are blue and the rest are red.

Arkady takes at random a counter from bag **X** and takes at random a counter from bag **Y**.

(a) Complete the probability tree diagram.



(3)

(b) Work out the probability that the two counters are both red.

.....

(2)

(c) Work out the probability that the two counters are both red or are both blue.

.....

(3)

(Total for Question 15 is 8 marks)

43. Specimen 1H/Q22

There are 7 red counters in a bag.
The rest of the counters in the bag are blue.

There are more blue counters than red counters in the bag.

Two counters are to be taken at random from the bag.
The probability that there will be one counter of each colour is $\frac{7}{15}$

Work out the total number of counters in the bag before any counters are taken from the bag.

.....

(Total for Question 22 is 5 marks)

MARKING SCHEME

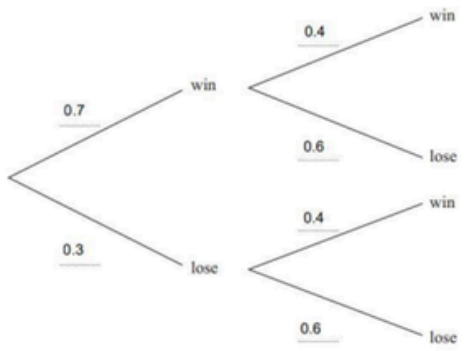
1. Nov 2025 1H/Q13

13	(a)			2	B1	for $\frac{3}{5}$ on bottom left oe (0.6)
					B1	for $\frac{3}{8},\frac{5}{8},\frac{3}{8},\frac{5}{8}$ oe (0.375, 0.625, 0.375, 0.625)
	(b)	$\frac{2}{5}\times"\frac{3}{8}"\left(=\frac{6}{40}\right)$ oe **or** $\frac{2}{5}\times"\frac{5}{8}"\left(=\frac{10}{40}\right)$ oe **or** $"\frac{3}{5}"\times"\frac{3}{8}"\left(=\frac{9}{40}\right)$ oe **or** $"\frac{3}{5}"\times"\frac{5}{8}"\left(=\frac{15}{40}\right)$ oe		3	M1	ft their tree diagram if probabilities less than 1 Allow equivalent fractions or decimals ie 0.4 or 0.37(5)
		$1-\frac{2}{5}\times"\frac{3}{8}"$ oe **or** $\frac{2}{5}\times"\frac{5}{8}"+"\frac{3}{5}"\times"\frac{3}{8}"+"\frac{3}{5}"\times"\frac{5}{8}"$ oe **or** $\frac{2}{5}\times"\frac{5}{8}"+"\frac{3}{5}"$			M1	ft a correct calculation for the required probability Allow equivalent fractions or decimals ie 0.4 or 0.37(5)
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{17}{20}$		A1 ft	ft oe eg $\frac{34}{40}$ **or** 0.85 **or** 85% Allow equivalent fractions or decimals to 2dp truncated or rounded or equivalent percentage (with % sign) to 2sf truncated or rounded
						Total 5 marks

2. Nov 2025 1H/Q22

22	$\frac{3}{15}\times\frac{2}{14}\times\frac{1}{13}\left(=\frac{6}{2730}=\frac{1}{455}\right)$ oe **or** $\frac{3}{15}\times\frac{2}{14}\times\frac{10}{13}\left(=\frac{60}{2730}=\frac{2}{91}\right)$ oe **or** $\frac{3}{15}\times\frac{10}{14}\times\frac{9}{13}\left(=\frac{270}{2730}=\frac{9}{91}\right)$ oe **or** $\frac{3}{15}\times\frac{2}{14}\times\frac{2}{13}\left(=\frac{12}{2730}=\frac{2}{455}\right)$ oe **or** $\frac{10}{15}\times\frac{9}{14}\times\frac{8}{13}\left(=\frac{720}{2730}=\frac{24}{91}\right)$ oe **or** $\frac{10}{15}\times\frac{9}{14}\times\frac{2}{13}\left(=\frac{180}{2730}=\frac{6}{91}\right)$ oe **or** $\frac{10}{15}\times\frac{3}{14}\times\frac{2}{13}\left(=\frac{60}{2730}=\frac{2}{91}\right)$ oe **OR** $\frac{2}{15}\times\frac{1}{14}\times\frac{3}{13}\left(=\frac{6}{2730}=\frac{1}{455}\right)$ oe **or** $\frac{2}{15}\times\frac{1}{14}\times\frac{10}{13}\left(=\frac{20}{2730}=\frac{2}{273}\right)$ oe **or** $\frac{2}{15}\times\frac{1}{14}\times\frac{13}{13}\left(=\frac{26}{2730}=\frac{1}{105}\right)$ oe **OR** $\frac{13}{15}\times\frac{12}{14}\times\frac{11}{13}\left(=\frac{1716}{2730}=\frac{22}{35}\right)$ oe **or** $\frac{13}{15}\times\frac{12}{14}\times\frac{2}{13}\left(=\frac{312}{2730}=\frac{4}{35}\right)$ oe		3	M1	one of **numerical** probabilities for RRR **or** RRB **or** RBB **or** RRP **or** BBB **or** BBP **or** BRP **OR** PPR **or** PPB **or** PPP′ **OR** P′ P′ P′ **or** P′ P′P [where P = probability of pink, R = probability of red, B = probability of blue, P′ = probability of not pink] For $\left(\frac{2}{15}\times\frac{1}{14}\times\frac{13}{13}\right)\left(=\frac{26}{2730}=\frac{1}{105}\right)$ accept $\left(\frac{2}{15}\times\frac{1}{14}\right)\left(=\frac{1}{105}\right)$
	$\left(\frac{3}{15}\times\frac{2}{14}\times\frac{1}{13}\right)+3\left(\frac{3}{15}\times\frac{2}{14}\times\frac{10}{13}\right)+3\left(\frac{3}{15}\times\frac{10}{14}\times\frac{9}{13}\right)+3\left(\frac{3}{15}\times\frac{2}{14}\times\frac{2}{13}\right)+$ $\left(\frac{10}{15}\times\frac{9}{14}\times\frac{8}{13}\right)+3\left(\frac{10}{15}\times\frac{9}{14}\times\frac{2}{13}\right)+6\left(\frac{10}{15}\times\frac{3}{14}\times\frac{2}{13}\right)$ **OR** $1-3\times\left(\frac{2}{15}\times\frac{1}{14}\times\frac{3}{13}\right)-3\times\left(\frac{2}{15}\times\frac{1}{14}\times\frac{10}{13}\right)$ **OR** $1-3\times\frac{2}{15}\times\frac{1}{14}\times\frac{13}{13}$ oe **OR** $\left(\frac{13}{15}\times\frac{12}{14}\times\frac{11}{13}\right)+3\left(\frac{13}{15}\times\frac{12}{14}\times\frac{2}{13}\right)$			M1	for adding at least one of each probability for RRR, RRB, RBB, RRP, BBB, BBP and BRP **OR** for subtracting at least one of the probabilities of PPR and PPB from 1 **OR** subtracting at least one of the probabilities for PPP′ from 1 **OR** for adding 3PPR and 3PPB **OR** for 3 PPP′ **OR** for adding at least one of the probabilities for P′ P′ P′ and P′ P′P for $\frac{2}{15}\times\frac{1}{14}\times\frac{13}{13}$ accept $\frac{2}{15}\times\frac{1}{14}$
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{34}{35}$		A1	oe eg $\frac{2652}{2730}$ or 0.97(14…) or 97.(14)%
					Total 3 marks

3. June 2025 1H/Q14

14	(a)		Correct probabilities	2	B2 (B1	for all 3 correct pairs of probabilities on the correct branches for 1 or 2 correct pairs of probabilities on the correct branches) Allow equivalent fractions or percentages
	(b)	"0.3" × "0.6"		2	M1ft	(Both probabilities must be less than 1)
		Correct answer scores full marks (unless from obvious incorrect working)	0.18		A1ft	oe eg $\frac{18}{100}$ or $\frac{9}{50}$ or $\frac{0.18}{1}$ or 18%
						Total 3 marks

4. June 2025 1H/Q21

21	eg (P(RRY) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\left(=\frac{504}{6840}=\frac{7}{95}\right)$ oe **or** (P(RRG) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{4}{18}\left(=\frac{288}{6840}=\frac{4}{95}\right)$ oe **or** (P(RRR) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\left(=\frac{504}{6840}=\frac{7}{95}\right)$ oe **or** (P(RRR′) =) $\frac{9}{20}\times\frac{8}{19}\times\frac{11}{18}\left(=\frac{792}{6840}=\frac{11}{95}\right)$ oe **or** (P(YYR) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{9}{18}\left(=\frac{378}{6840}=\frac{21}{380}\right)$ oe **or** (P(YYG) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{4}{18}\left(=\frac{168}{6840}=\frac{7}{285}\right)$ oe **or** (P(YYY) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{5}{18}\left(=\frac{210}{6840}=\frac{7}{228}\right)$ oe **or** (P(YYY′) =) $\frac{7}{20}\times\frac{6}{19}\times\frac{13}{18}\left(=\frac{546}{6840}=\frac{91}{1140}\right)$ oe **or** (P(GGR) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{9}{18}\left(=\frac{108}{6840}=\frac{3}{190}\right)$ oe **or** (P(GGY) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{7}{18}\left(=\frac{84}{6840}=\frac{7}{570}\right)$ oe **or** (P(GGG) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{2}{18}\left(=\frac{24}{6840}=\frac{1}{285}\right)$ oe **or** (P(GGG′) =) $\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\left(=\frac{192}{6840}=\frac{8}{285}\right)$ oe **or** (P(RGY) =) $\frac{9}{20}\times\frac{7}{19}\times\frac{4}{18}\left(=\frac{252}{6840}=\frac{7}{190}\right)$ oe		3	M1 for finding one correct product, does not need to be labelled **or** for an answer of $\frac{17}{76}$ oe eg 0.22(3…) **or** 22(.3…)% **or** $\frac{65}{76}$ oe eg 0.85(5…) **or** 85(.5…)%
	(P(RRR′ or YYY′ or GGG′) =) $\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{11}{18}\right)+\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{13}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{16}{18}\right)$ oe **or** (P(RRY or RRG or YYR or YYG or GGR or GGY) =) $\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\right)+\left(3\times\frac{9}{20}\times\frac{8}{19}\times\frac{4}{18}\right)+\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{9}{18}\right)+$ $\left(3\times\frac{7}{20}\times\frac{6}{19}\times\frac{4}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{9}{18}\right)+\left(3\times\frac{4}{20}\times\frac{3}{19}\times\frac{7}{18}\right)$ oe **or** (1 – P(RRR or YYY or GGG or RGY) =) $1-\left(\left(\frac{9}{20}\times\frac{8}{19}\times\frac{7}{18}\right)+\left(\frac{7}{20}\times\frac{6}{19}\times\frac{5}{18}\right)+\left(\frac{4}{20}\times\frac{3}{19}\times\frac{2}{18}\right)+\left(6\times\frac{9}{20}\times\frac{7}{19}\times\frac{4}{18}\right)\right)$ oe			M1 for a complete calculation
	Correct answer scores full marks (unless from obvious incorrect working) SCB1 for an answer of $\frac{669}{1000}$ oe eg 0.66(9) or 66(.9)%	$\frac{51}{76}$		A1 oe eg 0.67(1…) or 67(.1…)%
				Total 3 marks

5. June 2025 1HR/Q4

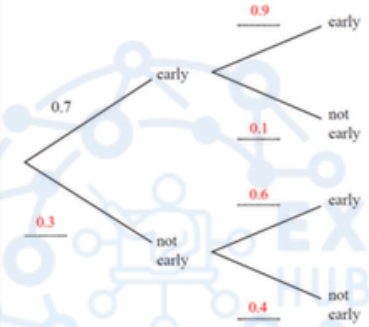
4	(a)		0.7	1	B1	oe eg $\frac{7}{10}$ oe or 70% or $\frac{0.7}{1}$ If probabilities are given as percentages then % sign must be seen
	(b)	eg 1 – (0.12 + 0.2 + 0.38) (= 0.3) oe **or** 1 – "0.7" (= 0.3) oe **or** 0.12 + 0.20 + 0.38 + 4x + x = 1 oe **or** "0.7" × 350 (= 245) oe **or** 0.12 × 350 (= 42) **or** 0.38 × 350 (= 133)		4	M1	ft their "0.7" If probabilities are given as percentages then % sign must be seen
		eg "0.3" ÷ 5 (= 0.06) **or** "0.3" ÷ 5 × 4 (= 0.24) **or** 0.24 **or** (x =) 0.06 **or** (4x =) 0.24 **or** "0.3" × 350 (= 105) oe **or** 350 – "245" (= 105) oe **or** 350 – "42" – 0.2 × 350 – "133" (=105) oe			M1	
		eg "0.06" × 350 (= 21) oe **or** "105" ÷ 5 (= 21) oe **or** "0.06" × 4 × 350 oe **or** "0.24" × 350			M1	or for $\frac{21}{350}$ or $\frac{84}{350}$
		Correct answer scores full marks (unless from obvious incorrect working)	84		A1	cao
						Total 5 marks

6. June 2025 1HR/Q19

19	$\frac{2}{9}\times\frac{1}{8}\left(=\frac{2}{72}\right)$ oe **or** $\frac{1}{9}\times\frac{2}{8}\left(=\frac{2}{72}\right)$ oe **or** $\frac{2}{9}\times\frac{3}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{3}{9}\times\frac{2}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{2}{9}\times\frac{5}{8}\left(=\frac{10}{72}\right)$ oe **or** $\frac{5}{9}\times\frac{2}{8}\left(=\frac{10}{72}\right)$ oe or ${}^{9}C_{2}$ or $\frac{9!}{2!7!}$ or $\frac{9\times8}{2}$ or 36 **or** 1 + 2 + 6 (= 9)		3	M1	for finding one correct product or for the correct number of total outcomes or for the correct number of outcomes when the sum < 5 NB if using decimals allow 2 decimal places truncated or rounded
	$3\times"\frac{2}{72}"+2\times"\frac{6}{72}"$ oe **or** $"\frac{2}{72}"+"\frac{6}{72}"+"\frac{10}{72}"$ oe or ${}^{9}C_{2}$ or $\frac{9!}{2!7!}$ or $\frac{9\times8}{2}$ or 36 **and** 1 + 2 + 6 (= 9)			M1	for a complete **correct** method or for the correct number of total outcomes **and** for the correct number of outcomes when the sum < 5
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{18}{72}$		A1	oe eg $\frac{9}{36}$ or 0.25 or 25% SCB1 for $\frac{21}{81}$ oe eg $\frac{7}{27}$ or 0.259(25…) or 25.9(25…)% truncated or rounded
	SEE NEXT PAGE FOR ALT METHOD				**Total 3 marks**

19 ALT	$\frac{2}{9}\times\frac{1}{8}\left(=\frac{2}{72}\right)$ oe **or** $\frac{1}{9}\times\frac{2}{8}\left(=\frac{2}{72}\right)$ **or** $\frac{1}{9}\times\frac{1}{8}\left(=\frac{1}{72}\right)$ oe **or** $\frac{2}{9}\times\frac{2}{8}\left(=\frac{4}{72}\right)$ **or** $\frac{3}{9}\times\frac{1}{8}\left(=\frac{3}{72}\right)$ oe **or** $\frac{1}{9}\times\frac{3}{8}\left(=\frac{3}{72}\right)$ oe **or** $\frac{2}{9}\times\frac{3}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{3}{9}\times\frac{2}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{1}{9}\times\frac{6}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{6}{9}\times\frac{1}{8}\left(=\frac{6}{72}\right)$ oe **or** $\frac{3}{9}\times\frac{6}{8}\left(=\frac{18}{72}\right)$ oe **or** $\frac{6}{9}\times\frac{3}{8}\left(=\frac{18}{72}\right)$ oe **or** $\frac{1}{9}\times\frac{8}{8}\left(=\frac{8}{72}\right)$ oe **or** $\frac{8}{9}\times\frac{1}{8}\left(=\frac{8}{72}\right)$ **or** $\frac{2}{9}\times\frac{8}{8}\left(=\frac{16}{72}\right)$ oe **or** $\frac{8}{9}\times\frac{2}{8}\left(=\frac{16}{72}\right)$ oe		3	M1 for finding one correct product NB if using decimals allow 2 decimal places truncated or rounded
	$1-\left(2\times"\frac{1}{72}"+7\times"\frac{2}{72}"+4\times"\frac{3}{72}"+2\times"\frac{4}{72}"+3\times"\frac{6}{72}"\right)$ **or** $1-\left("\frac{6}{72}"+"\frac{6}{72}"+"\frac{18}{72}"+"\frac{8}{72}"+"\frac{16}{72}"\right)$ **or** $1-\frac{54}{72}$ oe			M1 for a complete **correct** method
	Correct answer scores full marks (unless from obvious incorrect working) Do not allow $\frac{6}{9}\times\frac{3}{8}=\frac{18}{72}$ or $\frac{3}{9}\times\frac{6}{8}=\frac{18}{72}$ as this an incorrect method (M1M0A0)	$\frac{18}{72}$		A1 oe eg $\frac{9}{36}$ or 0.25 or 25% SCB1 for $\frac{21}{81}$ oe eg $\frac{7}{27}$ or 0.259(25…) or 25.9(25…)% truncated or rounded
				Total 3 marks

7. Nov 2024 1H/Q13

13 (a)		Correct probabilities	2	B2 for all 3 correct pairs of probabilities on the correct branches If not B2 then award B1 for one correct pair of probabilities on a correct branch Allow equivalent fractions 0.7 and 0.3 counts as a pair
(b)	0.7 × "0.9" oe		2	M1ft (probabilities < 1) for a complete method involving one product
	Correct answer scores full marks (unless from obvious incorrect working)	0.63		A1 ft oe eg $\frac{63}{100}$ or 63%
				Total 4 marks

8. June 2024 1H/Q2

2	$1-(0.20+0.26)$ oe or 0.54 oe or $x+2x+0.26+0.20=1$ oe or $x+2x=0.54$ oe or		4	M1 showing clear understanding that the total of probabilities is 1 If probabilities are given as percentages then % sign must be seen
	$\frac{"0.54"}{3}(=0.18)$ or $\frac{2}{3}\times"0.54"(=0.36)$ oe or "0.54" × 450 (= 243)			M1 for a correct method to find x or $2x$
	(2 ×) "0.18" × 450 oe or 81 or "0.36" × 450 oe			M1 or for $\frac{81}{450}$ or $\frac{162}{450}$
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	162		A1
				Total 4 marks

2 ALT	(0.2 × 450) + (0.26 × 450) (= 207) oe or 90 + 117 (= 207) or 0.46 × 450 (= 207)		4	M1
	450 – "207" (= 243)			M1
	$\frac{1}{3}\times"243"$ or 81 or $\frac{2}{3}\times"243"$			M1 or for $\frac{81}{450}$ or $\frac{162}{450}$
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	162		A1
				Total 4 marks

9. June 2024 1H/Q13

13 (a)		$\frac{3}{10}, \frac{7}{10}$ $\frac{5}{9}, \frac{4}{9}$ $\frac{5}{9}, \frac{4}{9}$	2	B2 for all 3 correct pairs of probabilities on the correct branches If not B2 then award B1 for 1 correct pair of probabilities on a correct branch Allow equivalent fractions/decimals (to 2 dp truncated or rounded ie 0.55(…) and/or 0.44(…))
(b)	$"\frac{3}{10}"\times"\frac{5}{9}"$ oe or $"\frac{7}{10}"\times"\frac{4}{9}"$ oe or $"\frac{3}{10}"\times"\frac{4}{9}"$ oe or $"\frac{7}{10}"\times"\frac{5}{9}"$ oe or		3	M1ft (probabilities < 1) Allow equivalent fractions/decimals (to 2 dp truncated or rounded ie 0.55(…) and/or 0.44(…))
	$"\frac{3}{10}"\times"\frac{5}{9}"+"\frac{7}{10}"\times"\frac{4}{9}"$ oe or $1-\left("\frac{3}{10}"\times"\frac{4}{9}"+"\frac{7}{10}"\times"\frac{5}{9}"\right)$ oe			M1 ft Allow equivalent fractions/decimals (to 2 dp truncated or rounded ie 0.55(…) and/or 0.44(…))
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{43}{90}$		A1ft oe 0.47(77..) to 2 dp truncated or rounded or 47.(77)% to 2 sf truncated or rounded
				Total 5 marks

10. June 2024 1H/Q16

10. June 2024 1H/Q16

16	$\frac{15}{20}\times\frac{14}{19}\times\frac{5}{18}\left(=\frac{35}{228}\right)$ oe or $\frac{5}{20}\times\frac{4}{19}\times\frac{15}{18}\left(=\frac{5}{114}\right)$ oe **or** $\frac{15}{20}\times\frac{14}{19}\times\frac{13}{18}\left(=\frac{91}{228}\right)$ oe or $\frac{5}{20}\times\frac{4}{19}\times\frac{3}{18}\left(=\frac{1}{114}\right)$ oe		4	M1 for *RRY* or *YYR* in any order **or** *RRR* or *YYY* Allow equivalent decimals to 2 dp truncated or rounded Products must be correct (may not be evaluated)	M2 for *RY* **and** *YR* $\frac{15}{20}\times\frac{5}{19}\left(=\frac{15}{76}\right)$ oe **and** $\frac{5}{20}\times\frac{15}{19}\left(=\frac{15}{76}\right)$ oe
	$3\times\frac{15}{20}\times\frac{14}{19}\times\frac{5}{18}$ oe or $3\times\frac{5}{20}\times\frac{4}{19}\times\frac{15}{18}$ oe **or** $\frac{15}{20}\times\frac{14}{19}\times\frac{13}{18}$ oe **and** $\frac{5}{20}\times\frac{4}{19}\times\frac{3}{18}$ oe			M1 for ($3\times$ *RRY*) or ($3\times$ *YYR*) **or** *RRY* **and** *YYR* (any order) **or** *RRR* **and** *YYY*	
	$3\times\frac{15}{20}\times\frac{14}{19}\times\frac{5}{18}+3\times\frac{5}{20}\times\frac{4}{19}\times\frac{15}{18}$ oe **or** $\left(\frac{15}{20}\times\frac{14}{19}\times\frac{5}{18}\right)+\left(\frac{5}{20}\times\frac{4}{19}\times\frac{15}{18}\right)+\left(\frac{15}{20}\times\frac{5}{19}\right)+\left(\frac{5}{20}\times\frac{15}{19}\right)$ oe **or** $1-\left(\frac{15}{20}\times\frac{14}{19}\times\frac{13}{18}+\frac{5}{20}\times\frac{4}{19}\times\frac{3}{18}\right)$ oe			M1 for a complete method using **correct** products	
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{45}{76}$		A1 oe 0.59(21..) to 2 dp truncated or rounded or 59.(21..)% to 2 sf truncated or rounded	
					Total 4 marks

11. June 2024 1HR/Q2

2	$1-(0.27+0.04+0.12)$ $(=0.57)$ oe **or** $2x+0.27+0.04+x+0.12=1$ oe **or** 0.27×400 $(=108)$ and 0.04×400 $(=16)$ and 0.12×400 $(=48)$		4	M1	for showing a clear understanding that the total of probabilities is 1 **or** for finding estimates for the number of times the spinner will land on 2 and 3 and 5
	($x=$) "0.57" ÷ 3 (= 0.19) **or** ($2x=$) "0.57" ÷ 3 × 2 (= 0.38) **or** $\frac{400-\text{"108"}-\text{"16"}-48}{3}$ $(=76)$ oe **or** $\frac{400-\text{"108"}-\text{"16"}-48}{3}\times2(=152)$ oe			M1	for a method to find the value of x **or** $2x$ **or** an estimate for the number of times the spinner will land on 4 **or** 1
	$(2\times\text{"0.19"}+0.04+0.12)\times400$ **or** $2\times\text{"76"}+\text{"16"}+\text{"48"}$			M1	for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	216		A1	for an answer of 216 answer of $\frac{216}{400}$ oe scores M3A0
					Total 4 marks

12. June 2024 1HR/Q21

21	eg $\frac{x}{25}\times\frac{25-(x+6)}{24}$ **or** $\frac{x}{25}\times\frac{19-x}{24}$ oe		5	M1 for a correct product for P(orange , pink)
	eg $2\times\left(\frac{x}{25}\times\frac{19-x}{24}\right)=\frac{22}{75}$ oe			M1 for setting up a correct equation in x
	eg $2x^2-38x+176(=0)$ oe eg $x^2-19x+88(=0)$			M1 for dealing with the fractions to set up a correct quadratic equation
	$x = 11$ or pink = 25 – 6 – 11 (= 8)			M1 (dep on M1) for $x = 11$ or pink = 25 – 6 – 11 (= 8)
	Working required	$\frac{7}{75}$		A1 (dep on M2) oe eg 0.093... or 9.3...%
				Total 5 marks

13. Nov 2023 1H/Q4

4 (a)	1 – 0.58 (= 0.42) or 100 – 58 (= 42) 0.58 + 2x + x = 1 oe		2	M1
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	0.14		A1 oe eg 14% (must have % sign) or $\frac{7}{50}$ etc SCB1 for an answer of 14 if no other marks are awarded
(b)	250 × 0.58 oe or 58 + 58 + (58 ÷ 2) oe		2	M1 or for $\frac{145}{250}$
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	145		A1 cao
				Total 4 marks

14. Nov 2023 1H/Q20

20	$\sqrt{\frac{49}{121}}\left(=\frac{7}{11}=0.63(63...)\right)$		4	M1 Accept 0.63(63…) or 63(.6363…)% rounded or truncated
	$1-"\frac{7}{11}"\left(=\frac{4}{11}=0.36(36...)\right)$			M1 Accept 0.36(36…) or 36(.3636…)% rounded or truncated
	$2\times\frac{7}{11}\times"\frac{4}{11}"$ or $1-\left(\frac{49}{121}+"\left(\frac{4}{11}\right)^2"\right)$ or 2 × "0.63" × "0.36" or 1 – (0.40(49…) + ("0.36")^2)			M1 for a complete method
	Working not required, so correct answer scores full marks (unless from obvious incorrect working)	$\frac{56}{121}$		A1 oe Allow 0.46(280…) or 46(.280)%
				Total 4 marks

15. June 2023 1HR/Q5

5	eg 0.74 × 300 (= 222) **or** 1 – 0.74 (= 0.26) seen **or** $\frac{78}{300}$		2	M1 for a method to work out an estimate for the number of games Evie will win **or** the probability that Evie will lose **or** an answer of $\frac{78}{300}$
	Correct answer scores full marks (unless from obvious incorrect working)	78		A1 cao
				Total 2 marks

16. June 2023 1HR/Q13

13 (a)		0.1 and 0.6	1	B1	oe
(b)	0.7×0.9 or $1 - (0.7 \times$ "0.1" $+ 0.3 \times 0.4 + 0.3 \times$ "0.6")		2	M1	must be considering one correct product only or 1 – (all 3 correct products only) allow ft if using 1 – P(WL or LW or LL)
	Correct answer scores full marks (unless from obvious incorrect working)	0.63		A1	oe eg 63% or $\frac{63}{100}$ allow ft if using 1 – P(WL or LW or LL)
					Total 3 marks

17. Jan 2023 1H/Q7

7	$1 - (0.24 + 0.4)$ (= 0.36) oe or $3x + x = 1 - (0.24 + 0.4)$ oe		4	M1
	$48 \div 0.24$ (= 200) or "0.36" $\div 4$ (= 0.09) or "0.36" $\div 4 \times 3$ (= 0.27)			M1
	"0.27" $\times$ "200" or "200" $\times$ "0.36" $\div 4 \times 3$ ("200" – 48 – "80") $\div 4 \times 3$			M1 for a complete method
		54		A1
				Total 4 marks

7 ALT	$1 - (0.24 + 0.4)$ (= 0.36) oe or $3x + x = 1 - (0.24 + 0.4)$ oe		4	M1
	$48 \div 24$ (= 2) oe or $\left(\frac{"0.36"}{4} \times 3\right) \div 0.24 \left(= \frac{9}{8} = 1.125\right)$ oe or $\left(\frac{"36"}{4} \times 3\right) \div 24 \left(= \frac{9}{8} = 1.125\right)$ oe			M1
	$"2" \times \left(\frac{"36"}{4} \times 3\right)$ oe or $"\frac{9}{8}" \times 48$ oe or $("27" \div 24) \times 48$ oe			M1 for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	54		A1
				Total 4 marks

18. Jan 2023 1H/Q15

15 (a)		$\frac{2}{9}, \frac{7}{9}$	2	B1 for correct probabilities for the first card Allow equivalent probabilities e.g 0.2
		$\frac{1}{8}, \frac{7}{8}, \frac{2}{8}, \frac{6}{8}$		B1 for correct probabilities for the second card Allow equivalent probabilities
(b)	$"\frac{2}{9}" \times "\frac{1}{8}"$ or $1 - "\frac{2}{9}" \times "\frac{7}{8}" - "\frac{7}{9}" \times "\frac{2}{8}" - "\frac{7}{9}" \times "\frac{6}{8}"$		2	M1ft (All probabilities must be less than 1)
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{1}{36}$		A1ft oe probability must be less than 1 Allow equivalent decimal to at least 2 sf (truncated or rounded) for $\frac{1}{36}$ (= 0.027(77..))

19. June 2022 1H/Q2

2	$1-(0.26+0.18)\ (=0.56)$ oe or 0.28 oe or $x+x=1-(0.26+0.18)$ oe		4	M1 0.28 oe may be seen in the table
	$45\div 0.18\ (=250)$ oe or $\frac{45}{18}\ (=2.5)$ oe $\frac{"0.56"}{2}\div 0.18\left(=\frac{14}{9}=1.55...\right)$ oe or $\frac{"56"}{2}\div 18\left(=\frac{14}{9}=1.55...\right)$			M1
	$"250"\times\frac{"0.56"}{2}$ oe or $2.5\times\frac{"56"}{2}$ oe or $"250"\times"0.28"$ oe or $"0.28"\div 0.18\times 45$ oe or $"\frac{14}{9}"\times 45$ oe or "28" ÷ 18 × 45 oe or $\frac{45}{18}\times"28"$ oe			M1
		70		A1 ($\frac{70}{250}$ scores M3A0)
				Total 4 marks

20. June 2022 1H/Q12

12	(a)		0.8 and 0.2 0.3 and 0.7 0.6 and 0.4	2	B2 for all 3 correct pairs of probabilities on the correct branches (B1 for 2 correct pairs of probabilities on the correct branches) Allow equivalent fractions
	(b)	"0.8" × "0.3"		2	M1ft (Both probabilities must be less than 1)
			0.24		A1ft oe
					Total 4 marks

21. June 2022 1H/Q15

15	0.5^3 or $\frac{1}{8}$ or 0.125 oe		4	M1 for finding *DDD*
	0.3×0.2^2 or $\frac{3}{250}$ or 0.012 oe			M1 for finding *WLL* in any order
	$0.5^3+3\times 0.3\times 0.2^2$ or $"\frac{1}{8}"+"\frac{9}{250}"$ or "0.125" + 3 × "0.012" oe			M1 for a complete method
		0.161		A1 oe
				Total 4 marks

15 ALT	0.3^3 or 0.027 or 0.2^3 or 0.008 oe		4	M1 for finding *WWW* or *LLL*
	$0.3^2\times 0.5$ or 0.045 or $0.3^2\times 0.2$ or 0.018 or $0.5^2\times 0.3$ or 0.075 or $0.5^2\times 0.2$ or 0.05 or $0.2^2\times 0.5$ or 0.02 or $0.3\times 0.5\times 0.2$ or 0.03 **or** $0.3^2\times 0.7$ or 0.063 or $0.5^2\times 0.5$ or 0.125 or $0.2^2\times 0.5$ or 0.02 or $0.3\times 0.5\times 0.2$ or 0.03			M1 for finding *WWD* or *WWL* or *WDD* or *DDL* or *DLL* or *WDL* in any order **or** for finding *WWW'* or *DDD'* or *DLL* or *WDL* in any order
	$1-(3\times 0.3^2\times 0.5+3\times 0.3^2\times 0.2+3\times 0.5^2\times 0.3+3\times 0.5^2\times 0.2+3\times 0.2^2\times 0.5+6\times 0.3\times 0.5\times 0.2)$ **or** $1-(3\times 0.3^2\times 0.7+3\times 0.5^2\times 0.5+3\times 0.2^2\times 0.5+6\times 0.3\times 0.5\times 0.2)$			M1 for a complete method
		0.161		A1 oe
				Total 4 marks

22. June 2022 1HR/Q1

1	(a)		0.45	1	B1 oe eg $\frac{9}{20}, \frac{45}{100}, 45\%$
	(b)	eg $1-(0.25+0.2+0.2)\ (=0.35)$ **or** $1-("0.45"+0.2)\ (=0.35)$ **or** $300\times(0.25+0.2+0.2)(=195)$		3	M1 allow use of their "0.45" from part (a), check the table
		eg $300\times"0.35"$ **or** $300-"195"$			M1 for a complete method
			105		A1 cao (award $\frac{105}{300}$ M2 only)
					Total 4 marks

23. June 2022 1HR/Q24

24	$\frac{5}{x}\times\frac{(x-4)}{x}$ oe **or** $\frac{(x-5)}{x}\times\frac{6}{x}$ oe		5	M1 for a correct expression for P(R,G) or P(G,R)
	$\frac{5}{x}\times\frac{(x-4)}{x}+\frac{(x-5)}{x}\times\frac{6}{x}$ oe			M1 for a correct expression for P(R,G) + P(G,R)
	$19x^2-352x+1600\ (=0)$ oe **or** $19x^2-352x=-1600$ oe			M1 for a correct equation in the form $ax^2+bx+c\ (=0)$ oe **or** $ax^2+bx=-c$ oe
	$(x-8)(19x-200)\ (=0)$ **or** $(x=)\frac{--352\pm\sqrt{(-352)^2-(4\times19\times1600)}}{2\times19}$ **or** $19\left[\left(x-\frac{176}{19}\right)^2-\left(\frac{176}{19}\right)^2\right]+1600(=0)$			M1 for solving their 3-term quadratic equation using any correct method - if factorising, allow brackets which expanded give 2 out of 3 terms correct (if using formula or completing the square allow one sign error and some simplification – allow as far as $\frac{352\pm\sqrt{123904-121600}}{38}$ oe **or** $19\left(x-\frac{176}{19}\right)^2-\frac{576}{19}(=0)$ oe)
		8		A1 cao, dep on M2. Do not award if non–integer solution also given. 8 must come from correct working.
				Total 5 marks

24. Jan 2022 1H/Q14

14 (a)		$\frac{5}{12}\ \frac{8}{15}\ \frac{7}{15}\ \frac{8}{15}\ \frac{7}{15}$	2	B2 for all correct probabilities (B1 for $\frac{5}{12}, \frac{8}{15}, \frac{7}{15}, \frac{8}{15}, \frac{7}{15}$ or $\frac{5}{12}$ or $\frac{8}{15}, \frac{7}{15}, \frac{8}{15}, \frac{7}{15}$) oe eg for $\frac{5}{12}$ accept 0.41(666…) or 0.42, for $\frac{8}{15}$ accept 0.53(333…) or 0.53, for $\frac{7}{15}$ accept 0.46(666…) or 0.47
(b)	$\frac{7}{12}\times\frac{8}{15}$		2	M1 ft their tree diagram
		$\frac{14}{45}$		A1 oe eg $\frac{56}{180}$ or 0.31(111...) or 31(.111…)%
				Total 4 marks

25. Jan 2022 1HR/Q2

2	0.65×300 oe			M1
		195		A1 (SCB1 for 105)
				Total 2 marks

26. Jan 2022 1HR/Q13

13 (a)		$\frac{5}{12}$	2	B1 for first choice correct 0.41(666…) to 2 dp truncated or rounded
		$\frac{7}{12}, \frac{5}{12}$		B1 for second choice correct 0.58(333…) to 2 dp truncated or rounded 0.41(666…) to 2 dp truncated or rounded
(b)	"$\frac{5}{12}$"$\times\frac{5}{12}$ oe		2	M1 ft from their tree diagram 0.58(333…) to 2 dp truncated or rounded
		$\frac{25}{144}$		A1 oe 0.17(361111…) to 2 dp truncated or rounded or 17.(361111)% to 2 sf truncated or rounded
(c)	$\frac{7}{12}\times\frac{5}{12}\times\frac{x}{15}$ oe **or** $\frac{7}{12}\times\frac{5}{12}\times y$ **or** $2\times\frac{7}{12}\times\frac{5}{12}$ oe		3	M1 for *GRB* or *RGB* or $2\times GR$ or $2\times RG$
	$2\times\frac{7}{12}\times\frac{5}{12}\times\frac{x}{15}=\frac{7}{24}$ oe **or** $2\times\frac{7}{12}\times\frac{5}{12}\times y=\frac{7}{24}$ oe **or** $\frac{\frac{7}{24}}{2\times\frac{7}{12}\times\frac{5}{12}}\left(=\frac{3}{5}\right)$ oe			M1 (ft their tree diagram) for a complete method 0.29(166…) to 2 dp truncated or rounded
		9		A1
				Total 7 marks

27. Nov 2021 1H/Q3

3	(a)	$54 \div 9 \times 4$ oe or $\frac{4}{9} \times 54$ oe		2	M1 Allow $0.44(44\ldots) \times 54$ or $\frac{24}{54}$
		Correct answer scores full marks (unless from obvious incorrect working	24		A1
	(b)	$\frac{"24"+n}{54+n} = \frac{1}{2}$ or $\frac{30}{60}$ or $54 - "24"$ (= 30) and "30" – "24" or $2 \times "30" - 54$		2	M1 ft if "24" < 27 or $\frac{6}{60}$
		Correct answer scores full marks (unless from obvious incorrect working)	6		A1
					Total 4 marks

28. Nov 2021 1H/Q15

15	(a)		$\frac{3}{9}$ $\frac{2}{9}, \frac{4}{9}, \frac{3}{9}$	2	B1 for lower 1st game branch probability B1ft for all values correct on 2nd game branches
	(b)	$\left(\frac{2}{9}\times\frac{3}{9}\right)$ or $\left(\frac{3}{9}\times\frac{2}{9}\right)$ or $\left(\frac{4}{9}\times\frac{4}{9}\right)$ oe or		3	M1 ft from their tree diagram for one correct product from *WL* or *L W* or *DD* (allow probabilities to 2 dp truncated or rounded)
		$\left(\frac{2}{9}\times\frac{3}{9}\right) + \left(\frac{3}{9}\times\frac{2}{9}\right) + \left(\frac{4}{9}\times\frac{4}{9}\right)$ oe			M1 ft for a fully correct method
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{28}{81}$		A1 Allow 0.345 ... (2 dp truncated or rounded) or 34.5% (2 sf truncated or rounded)
	(c)	$\left(\frac{2}{9}\times\frac{4}{9}\times\frac{3}{9}\right)$ or $\left(\frac{4}{9}\times\frac{4}{9}\times\frac{4}{9}\right)$		3	M1ft from their tree diagram for any combination of *WLD* or *DDD* (allow probabilities to 2 dp truncated or rounded)
		$6\times\left(\frac{2}{9}\times\frac{4}{9}\times\frac{3}{9}\right) + \left(\frac{4}{9}\times\frac{4}{9}\times\frac{4}{9}\right)$			M1ft for a fully correct method
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{208}{729}$		A1 Allow 0.285 ... (2 dp truncated or rounded) or 28.5% (2 sf truncated or rounded)
					Total 8 marks

15 ALT	(a)		$\frac{3}{9}$ $\frac{2}{9}, \frac{4}{9}, \frac{3}{9}$	2	B1 for lower 1st game branch probability B1ft for all values correct on 2nd game branches
	(b)	1 and $\left(\frac{2}{9}\times\frac{2}{9}\right)$ or $\left(\frac{4}{9}\times\frac{2}{9}\right)$ or $\left(\frac{4}{9}\times\frac{3}{9}\right)$ or $\left(\frac{3}{9}\times\frac{3}{9}\right)$ oe		3	M1ft from their tree diagram for 1 and one correct product from *WW*, *DW*, *DL* or *LL* (allow probabilities to 2 dp truncated or rounded)
		$1-\left[\left(\frac{2}{9}\times\frac{2}{9}\right)+2\left(\frac{4}{9}\times\frac{2}{9}\right)+2\left(\frac{4}{9}\times\frac{3}{9}\right)+\left(\frac{3}{9}\times\frac{3}{9}\right)\right]$ oe			M1ft for a fully correct method
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{28}{81}$		A1 Allow 0.345 ... (2 dp truncated or rounded) or 34.5% (2 sf truncated or rounded)
	(c)	1 and $\left(\frac{2}{9}\times\frac{2}{9}\times\frac{2}{9}\right)$ or $\left(\frac{2}{9}\times\frac{2}{9}\times\frac{4}{9}\right)$ or $\left(\frac{2}{9}\times\frac{2}{9}\times\frac{3}{9}\right)$ or $\left(\frac{2}{9}\times\frac{4}{9}\times\frac{4}{9}\right)$ or $\left(\frac{2}{9}\times\frac{3}{9}\times\frac{3}{9}\right)$ or $\left(\frac{4}{9}\times\frac{4}{9}\times\frac{3}{9}\right)$ or $\left(\frac{4}{9}\times\frac{3}{9}\times\frac{3}{9}\right)$ or $\left(\frac{3}{9}\times\frac{3}{9}\times\frac{3}{9}\right)$ oe		3	M1ft from their tree diagram for 1 and one correct product from *WWW* or *WWD* or *WWL* or *WDD* or *WLL* or *DDL* or *DLL* or *LLL* (allow probabilities to 2 dp truncated or rounded)
		$1-\left[\begin{array}{l}\left(\frac{2}{9}\times\frac{2}{9}\times\frac{2}{9}\right)+3\left(\frac{2}{9}\times\frac{2}{9}\times\frac{4}{9}\right)+3\left(\frac{2}{9}\times\frac{2}{9}\times\frac{3}{9}\right)+3\left(\frac{2}{9}\times\frac{4}{9}\times\frac{4}{9}\right)\\+3\left(\frac{2}{9}\times\frac{3}{9}\times\frac{3}{9}\right)+3\left(\frac{4}{9}\times\frac{4}{9}\times\frac{3}{9}\right)+3\left(\frac{4}{9}\times\frac{3}{9}\times\frac{3}{9}\right)+\left(\frac{3}{9}\times\frac{3}{9}\times\frac{3}{9}\right)\end{array}\right]$ oe			M1ft for a fully correct method
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{208}{729}$		A1 Allow 0.285 ... (2 dp truncated or rounded) or 28.5% (2 sf truncated or rounded)
					Total 8 marks

29. May 2021 1H/Q6

6	(a)	eg $1-(0.2+0.12+0.08)$ (= 0.6) $1-\left(\frac{20}{100}+\frac{12}{100}+\frac{8}{100}\right)\left(=\frac{60}{100}\right)$oe **or** 100(%) – (20(%) + 12(%) + 8(%)) (= 60(%)) **or** $0.2+0.12+0.08+3x+x=1$ oe		3	M1	For a correct calculation for the remaining probability **or** a correct equation for the remaining probability
		"0.6" ÷ 4 (= 0.15) oe **or** "0.6" ÷ 4 × 3 **or** "0.6" × 0.75 oe (Sight of 0.15 in the table for Orange or Pink or 0.45 for Pink gains M2)			M1	For dividing the remaining probability by 4 or finding ¼ of the remaining probability NB "0.6" means 0.6 must come from correct working
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	0.45		A1	**or** $\frac{9}{20}$ oe **or** 45% (if working in % final answer must have % sign). Allow $\frac{0.45}{1}$ If no answer on answer line, check in the correct space in table above. Value on the answer line takes precedence over the table.
	(b)	0.12×150 oe eg 12 + 6		2	M1	For a correct calculation to find the number of times the spinner lands on blue
		Working not required, so correct answer scores full marks (unless from obvious incorrect working)	18		A1	(an answer of $\frac{18}{150}$ scores M1A0 as this is a probability not a number of times)
						Total 5 marks

30. Jan 2021 1H/Q14

14	(a)	0.6×0.9		2	M1	oe
			0.54		A1	oe e.g. $\frac{27}{50}, \frac{54}{100}$, 54%
	(b)	0.6×0.1 (= 0.06) **or** 0.4×0.25 (= 0.1) **or** 0.4×0.75 (= 0.3)		3	M1	oe
		$0.6 \times 0.1 + 0.4 \times 0.25$ **or** $1-(0.4 \times 0.75)$ – "0.54"			M1	oe, ft their answer from (a)
			0.16		A1	oe e.g. $\frac{4}{25}, \frac{8}{50}, \frac{16}{100}$, 16%
						Total 5 marks

31. Nov 2020 1H/Q2

2	$15 \times 60 \times 60$ (= 54 000) oe **or** $\frac{60}{12} \times 60 \times 15$ (= 4500) oe **or** $5 \times \frac{60}{12} \times 60$ (= 1500) oe		4	M1	M2 for $\frac{15 \times 60 \times 60 \times 5}{12}$ (= 22 500)
	'54000' ÷ 12 × 5 (= 22 500) oe **or** '4500' × 5 (= 22 500) oe **or** '1500' × 15 (=22 500) oe			M1	
	'22 500' × 0.002 oe			M1	dep on M2 for a complete method
		45		A1	
					Total 4 marks

32. Nov 2020 1H/Q15

15	(a)		$\frac{2}{5}, \frac{3}{5}$ oe	2	B1	correct probabilities for spinner **A**
			$\frac{4}{5}, \frac{1}{5}, \frac{4}{5}, \frac{1}{5}$ oe		B1	correct probabilities for spinner **B**
	(b)	$'\frac{2}{5}' \times '\frac{4}{5}' \left(=\frac{8}{25}\right)$ **or** $'\frac{2}{5}' \times '\frac{1}{5}' \left(=\frac{2}{25}\right)$ **or** $'\frac{3}{5}' \times '\frac{4}{5}' \left(=\frac{12}{25}\right)$ **or** $'\frac{3}{5}' \times '\frac{1}{5}' \left(=\frac{3}{25}\right)$ oe		3	M1	ft from (a) provided 0 < probability <1
		$1-'\frac{8}{25}'$ **or** $'\frac{2}{25}'+'\frac{12}{25}'+'\frac{3}{25}'$ **or** $'\frac{2}{25}'+'\frac{3}{5}'$ oe			M1	ft from (a) for a complete method
			$\frac{17}{25}$		A1	oe
						Total 5 marks

33. Nov 2020 1HR/Q23

23	e.g. $\frac{3}{x+7}\times\frac{2}{x+6}+\frac{4}{x+7}\times\frac{3}{x+6}+\frac{x}{x+7}\times\frac{x-1}{x+6}(=\frac{3}{8})$ **or** e.g. $\frac{3}{N}\times\frac{2}{N-1}+\frac{4}{N}\times\frac{3}{N-1}+\frac{N-7}{N}\times\frac{N-8}{N-1}(=\frac{3}{8})$ oe		4	M2	for all correct products and intention to add (M1 for one correct product)
	$5x^2-47x+18=0$ oe $(x=9)$ **or** $5N^2-117N+592=0$			M1	Correct quadratic equation
		16		A1	dep on M3
					Total 4 marks

34. Jan 2020 1H/Q18

18	$\frac{4}{16}\times\frac{3}{15}\times\frac{2}{14}\left(=\frac{24}{3360}=\frac{1}{140}\right)$ oe **or** $\frac{7}{16}\times\frac{6}{15}\times\frac{5}{14}\left(=\frac{210}{3360}=\frac{1}{16}\right)$ oe **or** $\frac{5}{16}\times\frac{4}{15}\times\frac{3}{14}\left(=\frac{60}{3360}=\frac{1}{56}\right)$ oe		4	M1 for finding *BBB* **or** *OOO* **or** *LLL*	M3 for $\frac{11}{16}\times\frac{10}{15}\times\frac{9}{14}$ oe
	$\frac{4}{16}\times\frac{7}{15}\times\frac{6}{14}\left(=\frac{168}{3360}=\frac{1}{20}\right)$ oe **or** $\frac{4}{16}\times\frac{3}{15}\times\frac{7}{14}\left(=\frac{84}{3360}=\frac{1}{40}\right)$ oe **or** $\frac{5}{16}\times\frac{4}{15}\times\frac{4}{14}\left(=\frac{80}{3360}=\frac{1}{42}\right)$ oe **or** $\frac{5}{16}\times\frac{4}{15}\times\frac{7}{14}\left(=\frac{140}{3360}=\frac{1}{24}\right)$ oe **or** $\frac{5}{16}\times\frac{4}{15}\times\frac{3}{14}\left(=\frac{60}{3360}=\frac{1}{56}\right)$ oe **or** $\frac{5}{16}\times\frac{7}{15}\times\frac{6}{14}\left(=\frac{210}{3360}=\frac{1}{16}\right)$ oe **or** $\frac{5}{16}\times\frac{7}{15}\times\frac{4}{14}\left(=\frac{140}{3360}=\frac{1}{24}\right)$ oe **or** $\frac{5}{16}\times\frac{4}{15}\times\frac{11}{14}\left(=\frac{220}{3360}=\frac{11}{168}\right)$ oe or $\frac{5}{16}\times\frac{11}{15}\times\frac{10}{14}\left(=\frac{550}{3360}=\frac{55}{336}\right)$ oe			M1 for finding the following in any order *BOO* **or** *BBO* **or** *LLB* **or** *LLO* **or** *LBB* **or** *LOO* **or** *LOB* **or** *LLX* **or** *LXX* (*X* = not *L*)	
	$'\frac{24}{3360}'+3\times'\frac{84}{3360}'+'\frac{210}{3360}'+3\times'\frac{168}{3360}'$ oe **or** $1-\left('\frac{60}{3360}'+3\times'\frac{80}{3360}'+3\times'\frac{140}{3360}'+3\times'\frac{60}{3360}'3\times'\frac{210}{3360}'6\times'\frac{140}{3360}'\right)$ oe **or** $1-\left('\frac{60}{3360}'+3\times'\frac{220}{3360}'+3\times'\frac{550}{3360}'\right)$ oe			M1 for a complete method	
		$\frac{990}{3360}$		A1 for $\frac{990}{3360}$ oe e.g. $\frac{33}{112}$ or 0.29(464...)	
					Total 4 marks

35. June 2019 1H/Q5

5		$2x+0.18+2x+3x+0.26+x=1$ **or** $1-(0.18+0.26)$ (= 0.56)		4	M1
		$x=(1-0.18-0.26)\div(2+2+3+1)$ (=0.07)			M1
		eg $(0.18+4\times$"0.07"$)\times 200$ **or** 0.46×200 **or** $36+42+14$ oe			M1 dep on M2 and probabilities between 0 and 1 **or** $\frac{92}{200}$, oe with 92 seen
			92		A1
					Total 4 marks

36. June 2019 1H/Q13

13	(a)		$\frac{6}{14}, \frac{8}{14}$	2	B1	for $\frac{6}{14}\left(\frac{3}{7}\right), \frac{8}{14}\left(\frac{4}{7}\right)$ in correct positions. Allow decimals of 2dp or better (0.43, 0.57)
			$\frac{3}{10}, \frac{7}{10}, \frac{3}{10}, \frac{7}{10}$		B1oe	for $\frac{3}{10}, \frac{7}{10}, \frac{3}{10}, \frac{7}{10}$ in correct positions.
	(b)	$\frac{8}{14} \times \frac{7}{10}$		2	M1	ft from (a)
			$\frac{2}{5}$ oe		A1	
	(c)	$\frac{7}{13} \times \frac{6}{9}\left(= \frac{42}{117} = \frac{14}{39} = 0.35(897...)\right)$ **or** $\frac{8}{14} \times \frac{7}{13}\left(= \frac{56}{182} \text{ oe}\right)$ **or** $\frac{7}{10} \times \frac{6}{9}\left(= \frac{42}{90}\right)$		3	M1	ft from (a) ($\frac{7}{13} = 0.54$ to 2dp $\frac{6}{9} = 0.67$ to 2dp)
		"$\frac{42}{117}$" × "$\frac{2}{5}$" or $\left(\frac{8}{14} \times \frac{7}{13}\right) \times \left(\frac{7}{10} \times \frac{6}{9}\right)$			M1	ft from (b)
			$\frac{28}{195}$ oe		A1	for $\frac{28}{195}$ oe, e.g. 0.14(3589...) from accurate working
						Total 7 marks

37. June 2019 1HR/Q14

14	(a)		0.7, 0.2, 0.8, 0.1, 0.9	2	B2	oe, all correct
					(B1)	2 or 3 or 4 correct probabilities
	(b)	0.3 × "0.2" (= 0.06) **or** 0.7 × "0.1" (= 0.07) oe		4	M1	ft from (a) dep on probabilities being between 0 and 1, **OR** 0.3 × "0.8" (= 0.24) **or** 0.7 × "0.9" (= 0.63) oe
		0.3 × "0.2" + 0.7 × "0.1" (= 0.13) oe **or** "0.06" × 200 (= 12) **or** "0.07" × 200 (= 14)			M1	ft from (a), **OR** 0.3 × "0.8" + 0.7 × "0.9" (= 0.87) oe **or** "0.24" × 200 (= 48) **or** "0.63" × 200 (= 126)
		"0.13" × 200 oe **or** "12" + "14"			M1	ft from (a), 200 – "0.87" × 200 oe **or** (1 – "0.87") × 200 **or** 200 – "48" – "126"
			26		A1	cao
						Total 6 marks

38. Jan 2019 1H/Q3

Question	Working	Answer	Mark	Notes	
3	$1-(0.15+0.26+0.33)$ **or** $1-0.74$ $(=0.26)$			M1	can be implied by two values where P(brown) + P(yellow) = 0.26 (may be seen in table)
	$(\text{P(yellow)}=)\frac{"0.26"-0.06}{2}$ **or** 0.1			M1	for a complete method to find P(yellow)
	$150 \times "0.1"$			M1	independent mark Award for $150 \times p$ where $0 < p < 1$
		15	4	A1	NB: An answer of $\frac{15}{150}$ scores M3 A0

39. Jan 2019 1H/Q20

Question	Working	Answer	Mark	Notes
20	$\frac{n-4}{n}$ or $\frac{n-5}{n-1}$			M1 $\frac{n-4}{n}$ or $\frac{n-5}{n-1}$
	$\frac{n-4}{n}\times\frac{n-5}{n-1}=\frac{1}{3}$			M1 for the correct equation
	Eg $3(n^2-9n+20)=n(n-1)$ **or** $3n^2-27n+60=n^2-n$			M1 for a correct quadratic equation with fractions removed
	Eg $2n^2-26n+60=0$ **or** $n^2-13n+30=0$			M1 for a correct quadratic equation equal to 0
	Eg $(n-10)(n-3)=0$ **or** $\frac{--13\pm\sqrt{(-13)^2-4\times1\times30}}{2\times1}$			M1 dep on M2 ft for method to solve 3 term quadratic
		10	6	A1 for correct answer from correct working NB. Award M5A1 for an 8answer of 10 with justification e.g. $\frac{6}{10}\times\frac{5}{9}=\frac{1}{3}$ Award M0A0 for an answer of 10 with no working and no justificastion

40. Jan 2019 1HR/Q16

Question	Working	Answer	Mark	Notes
16 (a)	$\frac{2}{12}\times\frac{1}{11}$	$\frac{1}{66}$	2	M1 A1
(b)	Any two of $\frac{7}{12}\times\frac{3}{11}\left(=\frac{21}{132}\right)$ **or** $\frac{7}{12}\times\frac{2}{11}\left(=\frac{14}{132}\right)$ **or** $\frac{3}{12}\times\frac{2}{11}\left(=\frac{6}{132}\right)$	$\frac{41}{66}$	3	M1 for any two correct
	$2\times\frac{7}{12}\times\frac{3}{11}+2\times\frac{7}{12}\times\frac{2}{11}+2\times\frac{3}{12}\times\frac{2}{11}$			M1 for a complete method A1 oe
	Alternative method $\frac{7}{12}\times\frac{6}{11}\left(=\frac{42}{132}\right)$ **and** $\frac{3}{12}\times\frac{2}{11}\left(=\frac{6}{132}\right)$	$\frac{41}{66}$		M1 both correct
	$1-\left(\frac{2}{12}\times\frac{1}{11}\right)-\frac{7}{12}\times\frac{6}{11}-\frac{3}{12}\times\frac{2}{11}$			M1 for a complete method A1 **SC** B2 for an answer of $\frac{41}{72}$ oe

41. June 2018 1H/Q19

Question	Working	Answer	Mark	Notes
19	$\frac{1}{4}\times\frac{2}{5}\left(=\frac{2}{20}\right)$ **or** $\frac{3}{4}\times\frac{3}{5}\left(=\frac{9}{20}\right)$ **or** $\frac{1}{4}\times\frac{3}{5}\left(=\frac{3}{20}\right)$ **or** $\frac{3}{4}\times\frac{2}{5}\left(=\frac{6}{20}\right)$	$\frac{121}{400}$ oe	4	M1 for any one correct probability
	$\frac{1}{4}\times\frac{2}{5}+\frac{3}{4}\times\frac{3}{5}\left(=\frac{11}{20}\right)$ **or** $1-\left(\frac{1}{4}\times\frac{3}{5}+\frac{3}{4}\times\frac{2}{5}\right)\left(=\frac{11}{20}\right)$			M1 for a complete method
	$"\frac{11}{20}"\times"\frac{11}{20}"$ **or** $\left("\frac{2}{20}"+"\frac{9}{20}"\right)^2$			M1
				A1 for $\frac{121}{400}$ oe **or** 0.3025 **or** 30.25%

42. June 2018 1HR/Q15

15 (a)		$\frac{9}{20}$ on first red branch	3	B1	
		Correct binary structure		B1	
	$\frac{9}{16},\frac{7}{16},\frac{9}{16},\frac{7}{16}$	Labels and correct probabilities on all second branches		B1	
(b)	$\frac{'9'}{20}\times\frac{'7'}{16}$	$\frac{63}{320}$ or 0.196(875)	2	M1	
				A1	oe ft diagram Accept 0.20 or better
(c)	$\frac{'9'}{20}\times\frac{'7'}{16}+\frac{11}{20}\times\frac{9}{16}$	$\frac{162}{320}$ or 0.506(25)	3	M1	for $\frac{11}{20}\times\frac{9}{16}$
				M1	for $\frac{'9'}{20}\times\frac{'7'}{16}+\frac{11}{20}\times\frac{9}{16}$
				A1	oe Accept 0.51 or better
					Total 8 marks

43. Specimen 1H/Q22

22	$\frac{7}{x}$ **or** $\frac{x-7}{x-1}$			M1	for a correct expression for one probability
	$2\times\frac{7}{x}\times\frac{x-7}{x-1}=\frac{7}{15}$			M1	for equation formed
	e.g. $x^2-31x+210=0$ **or** $7x^2-217x+1470=0$			M1	correct quadratic ready to solve
	e.g. $(x-21)(x-10)=0$ **or** $\frac{--31\pm\sqrt{(-31)^2-4\times210}}{2}$			M1	method to solve quadratic equation
		21	5	A1	21 must be selected as final answer
					Total 5 marks