

GCSE MATHS • GRADE 5

MATHS



MODEL ANSWERS

PROBABILITY TREES

SCORE

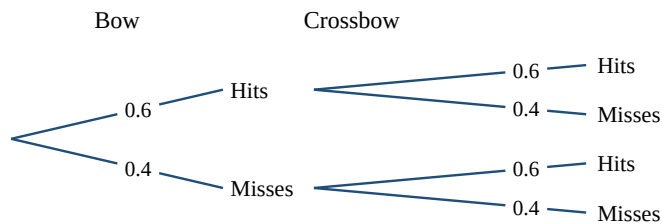
/92

PERCENTAGE

%

STEM UP

- 1 Maya shoots at a target with a bow and then with a crossbow. The probability tree diagram shows the probabilities. Work out the probability that Maya hits the target both times.



$$0.6 \times 0.6 = 0.36$$

0.36

1 / 1

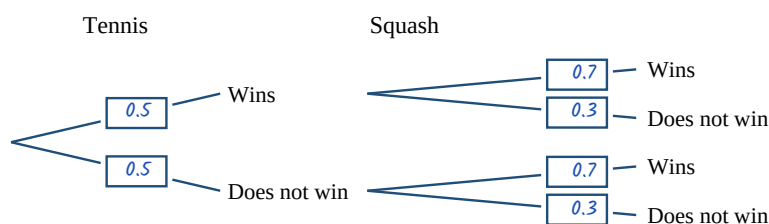
- 2 Omar has two bags. The first bag has 7 blue counters and 5 yellow counters. The second bag has 4 blue counters and 2 yellow counters. Omar takes at random one counter from the first bag and then one counter from the second bag. Work out the probability that Omar takes two yellow counters.

$$\frac{5}{12} \times \frac{2}{6} = \frac{5}{36}$$

$\frac{5}{36}$

1 / 1

- 3 Leigh-Anne is going to play one tennis match and one squash match. The probability that Leigh-Anne wins the tennis match is 0.5. The probability that Leigh-Anne wins the squash match is 0.7. (a) Complete the probability tree diagram. (b) Work out the probability that Leigh-Anne wins both matches.



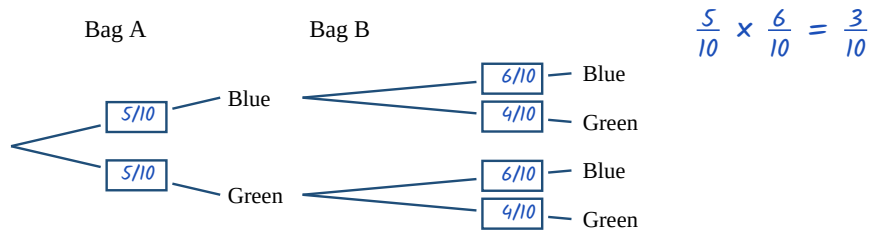
$$1 - 0.5 = 0.5, 1 - 0.7 = 0.3$$

$$0.5 \times 0.7 = 0.35$$

(b) 0.35

1 / 1

- 4 Perrie has two bags of counters. Bag A has 5 blue and 5 green counters, bag B has 6 blue and 4 green counters.
Perrie takes at random one counter from each bag.
(a) Complete the probability tree diagram.
(b) Work out the probability that Perrie takes two blue counters.



$$\frac{5}{10} \times \frac{6}{10} = \frac{3}{10}$$

(b) $\frac{3}{10}$

1 / 1

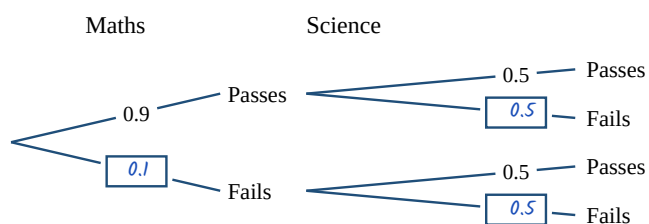
- 5 Michael plays a game where he can win, draw or lose.
The probability he wins any game is 0.4.
The probability he draws any game is 0.4.
Michael plays two games. Work out the probability that he wins exactly one game.

$$0.4 \times 0.6 + 0.6 \times 0.4 = 0.48$$

0.48

1 / 1

- 6 Michael sits a maths exam and a science exam.
The probability that Michael passes the maths exam is 0.9.
The probability that Michael passes the science exam is 0.5.
(a) Complete the probability tree diagram.
(b) Work out the probability that Michael passes both exams.



$$1 - 0.9 = 0.1, 1 - 0.5 = 0.5$$

$$0.9 \times 0.5 = 0.45$$

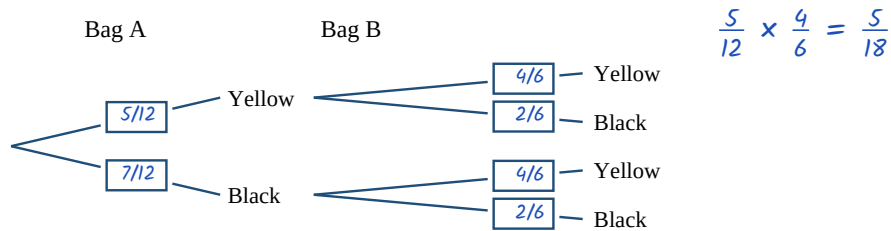
(b) 0.45

1 / 1

- 7 Charles has two bags of counters. Bag A has 5 yellow and 7 black counters, bag B has 4 yellow and 2 black counters.

Charles takes at random one counter from each bag.

- (a) Complete the probability tree diagram.
(b) Work out the probability that Charles takes two yellow counters.



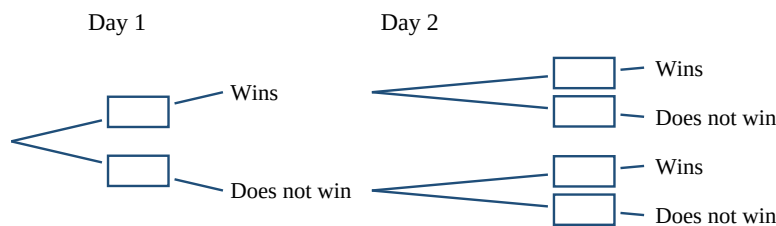
$$\frac{5}{12} \times \frac{4}{6} = \frac{5}{18}$$

(b) $\frac{5}{18}$

$\frac{1}{1}$

- 8 Priya plays a game on two days.
The probability that Priya wins each time is 0.9.

- (a) Complete the probability tree diagram.
(b) Work out the probability that Priya does not win on either day.



$$1 - 0.9 = 0.1$$

$$0.1 \times 0.1 = 0.01$$

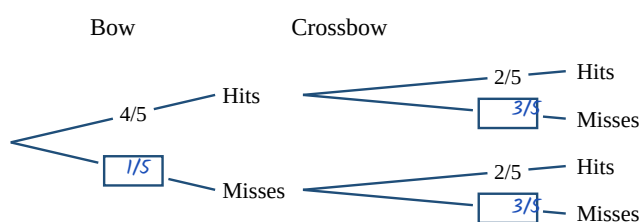
(a) every first branch pair 0.9, 0.1 and every second branch pair 0.9, 0.1 (b) 0.01

$\frac{1}{1}$

- 9 Frank shoots at a target with a bow and then with a crossbow.

The probability of "Hits" is $\frac{4}{5}$ for bow and $\frac{2}{5}$ for crossbow.

- (a) Complete the probability tree diagram.
(b) Work out the probability that Frank hits the target both times.



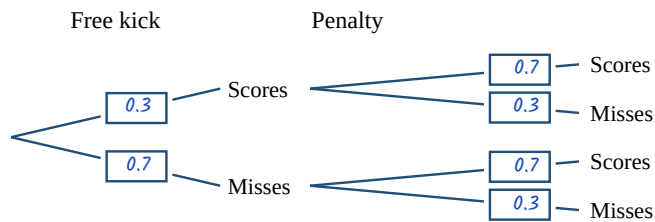
$$1 - \frac{4}{5} = \frac{1}{5}, 1 - \frac{2}{5} = \frac{3}{5}$$

$$\frac{4}{5} \times \frac{2}{5} = \frac{8}{25}$$

(b) $\frac{8}{25}$

$\frac{1}{1}$

- 10** Zara takes one free kick and one penalty.
 The probability that Zara scores the free kick is 0.3.
 The probability that Zara scores the penalty is 0.7.
 (a) Complete the probability tree diagram.
 (b) Work out the probability that Zara scores exactly one of them.



$$1 - 0.3 = 0.7, 1 - 0.7 = 0.3$$

$$0.3 \times 0.3 = 0.09$$

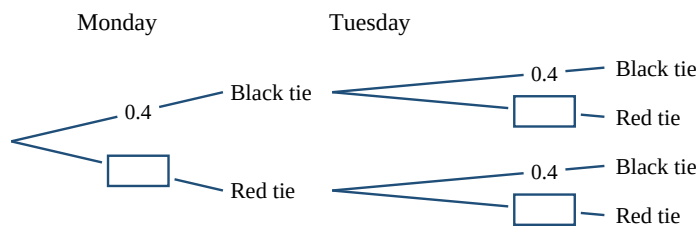
$$0.7 \times 0.7 = 0.49$$

$$0.09 + 0.49 = 0.58$$

(b) 0.58

 / 1

- 11** Each day Ethan wears either a black tie or a red tie to work.
 On any day the probability that Ethan wears a black tie is 0.4.
 (a) Complete the probability tree diagram for Monday and Tuesday.
 (b) Work out the probability that Ethan wears a red tie on both days.



$$1 - 0.4 = 0.6$$

$$0.6 \times 0.6 = 0.36$$

(a) every first branch pair 0.4, 0.6 and every second branch pair 0.4, 0.6 (b) 0.36

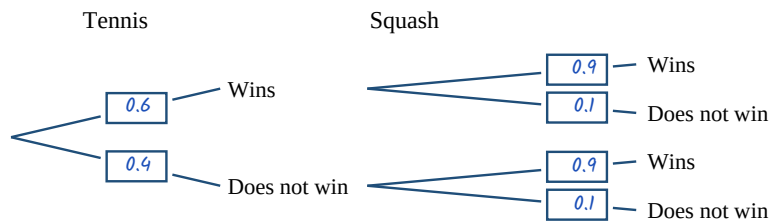
 / 1

- 12** Matt has two bags.
 The first bag has 8 black counters and 5 green counters. The second bag has 7 black counters and 2 green counters.
 Matt takes at random one counter from the first bag and then one counter from the second bag.
 Work out the probability that Matt takes two counters of the same colour.

$$\frac{8}{13} \times \frac{7}{9} + \frac{5}{13} \times \frac{2}{9} = \frac{22}{39}$$

 $\frac{22}{39}$ / 1

- 13 Tia is going to play one tennis match and one squash match.
The probability that Tia wins the tennis match is 0.6.
The probability that Tia wins the squash match is 0.9.
(a) Complete the probability tree diagram.
(b) Work out the probability that Tia wins at least one of the matches.



$$1 - 0.6 = 0.4, 1 - 0.9 = 0.1$$

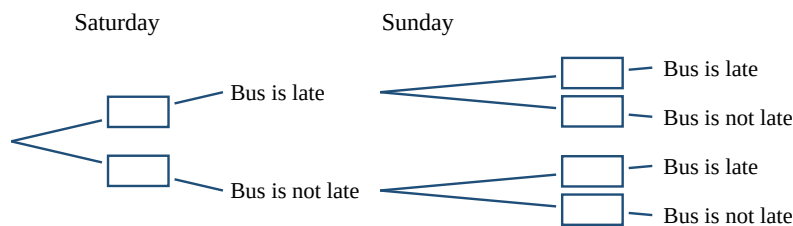
$$1 - 0.4 \times 0.1 = 1 - 0.04 = 0.96$$

(b) 0.96

1

 / 1

- 14 Alice gets the bus on Saturday and Sunday.
On any day the probability that the bus is late is 0.1.
(a) Complete the probability tree diagram.
(b) Work out the probability that the bus is late on both days.



$$1 - 0.1 = 0.9$$

$$0.1 \times 0.1 = 0.01$$

(a) every first branch pair 0.1, 0.9 and every second branch pair 0.1, 0.9 (b) 0.01

1

 / 1

- 15 Annie takes one free kick and one penalty.
The probability that Annie scores the free kick is 0.6.
The probability that Annie scores the penalty is 0.9.
Work out the probability that Annie scores exactly one of them.

$$0.6 \times 0.1 = 0.06$$

$$0.4 \times 0.9 = 0.36$$

$$0.06 + 0.36 = 0.42$$

0.42

1

 / 1

- 16** Albert has two bags.

The first bag has 6 red counters and 6 yellow counters. The second bag has 2 red counters and 8 yellow counters.

Albert takes at random one counter from the first bag and then one counter from the second bag.

Work out the probability that Albert takes at least one red counter.

$$1 - \frac{6}{12} \times \frac{8}{10} = \frac{3}{5}$$

$$\frac{3}{5}$$

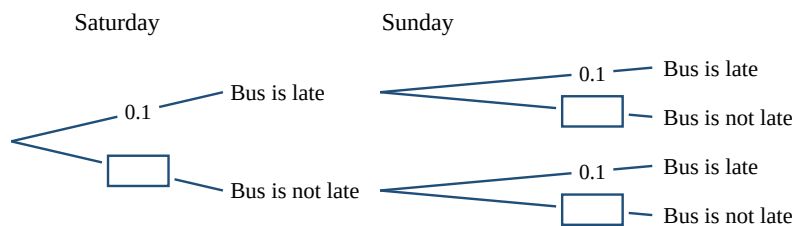
/ 1

- 17** Hannah gets the bus on Saturday and Sunday.

On any day the probability that the bus is late is 0.1.

(a) Complete the probability tree diagram.

(b) Work out the probability that the bus is not late on either day.



$$1 - 0.1 = 0.9$$

$$0.9 \times 0.9 = 0.81$$

(a) every first branch pair 0.1, 0.9 and every second branch pair 0.1, 0.9 (b) 0.81

/ 1

- 18** Alice is going to play one tennis match and one squash match.

The probability that Alice wins the tennis match is 0.9.

The probability that Alice wins the squash match is 0.9.

Work out the probability that Alice wins exactly one of the matches.

$$0.9 \times 0.1 = 0.09$$

$$0.1 \times 0.9 = 0.09$$

$$0.09 + 0.09 = 0.18$$

$$0.18$$

/ 1

19 Albert has two bags.

The first bag has 5 white counters and 6 yellow counters. The second bag has 8 white counters and 6 yellow counters.

Albert takes at random one counter from the first bag and then one counter from the second bag.

Work out the probability that Albert takes two counters of different colours.

$$\frac{5}{11} \times \frac{6}{14} + \frac{6}{11} \times \frac{8}{14} = \frac{39}{77}$$

$$\frac{39}{77}$$

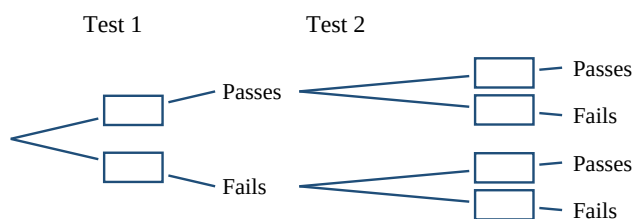
1 / 1

20 Leo takes a driving test and a theory test.

The probability that Leo passes a test each time is $\frac{2}{3}$.

(a) Complete the probability tree diagram.

(b) Work out the probability that Leo fails both tests.



$$1 - \frac{2}{3} = \frac{1}{3}$$

$$\frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$$

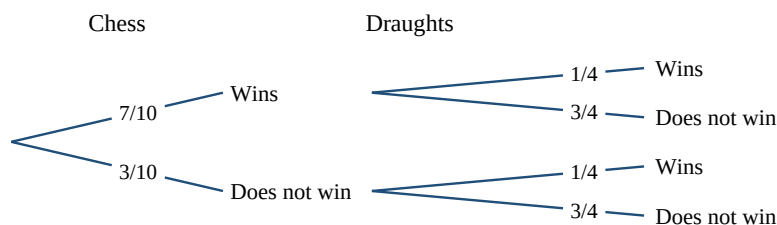
(a) every first branch pair $\frac{2}{3}, \frac{1}{3}$ and every second branch pair $\frac{2}{3}, \frac{1}{3}$ (b) $\frac{1}{9}$

1 / 1

21 Chloe is going to play one game of chess and one game of draughts.

The probability tree diagram shows the probabilities.

Work out the probability that Chloe wins at least one of the games.



$$1 - \frac{3}{10} \times \frac{3}{4} = 1 - \frac{9}{40} = \frac{31}{40}$$

$$\frac{31}{40}$$

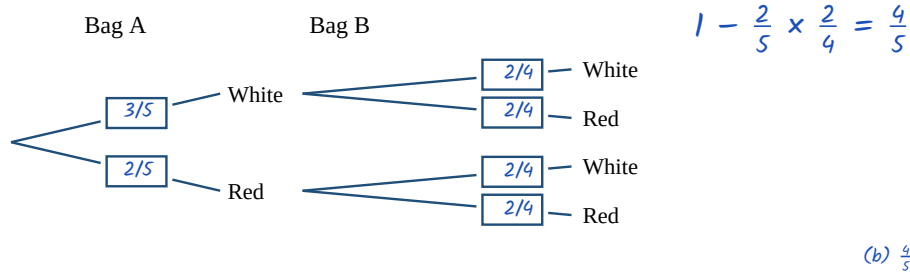
2 / 2

- 22 Leigh-Anne has two bags of counters. Bag A has 3 white and 2 red counters, bag B has 2 white and 2 red counters.

Leigh-Anne takes at random one counter from each bag.

(a) Complete the probability tree diagram.

(b) Work out the probability that Leigh-Anne takes at least one white counter.



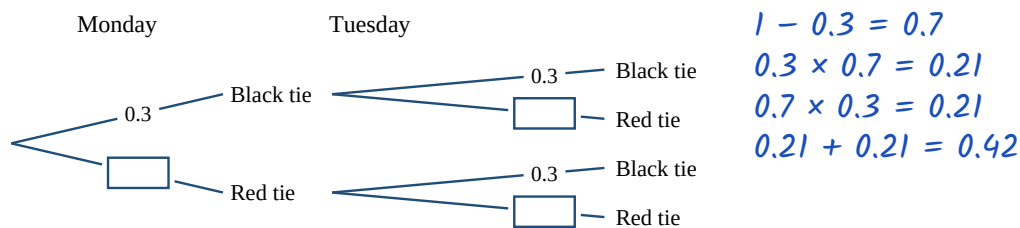
2 / 2

- 23 Each day Alex wears either a black tie or a red tie to work.

On any day the probability that Alex wears a black tie is 0.3.

(a) Complete the probability tree diagram for Monday and Tuesday.

(b) Work out the probability that Alex wears different coloured ties on Monday and Tuesday.



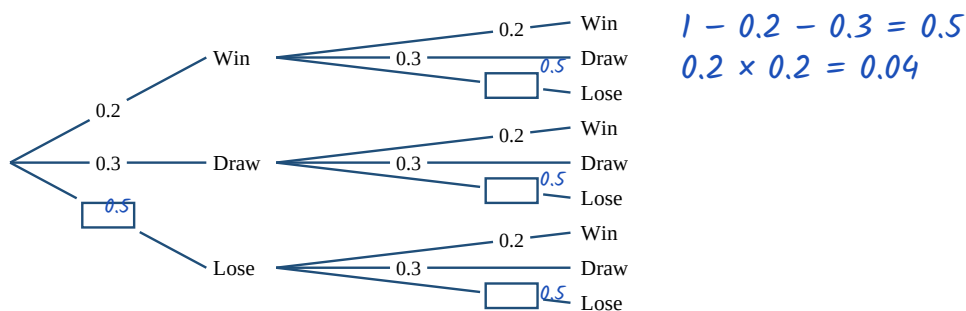
(a) every first branch pair 0.3, 0.7 and every second branch pair 0.3, 0.7 (b) 0.42

2 / 2

- 24 Tia plays two games. Each time, the probability of a win is 0.2 and of a draw is 0.3.

(a) Complete the probability tree diagram.

(b) Work out the probability that Tia wins both games.



(b) 0.04

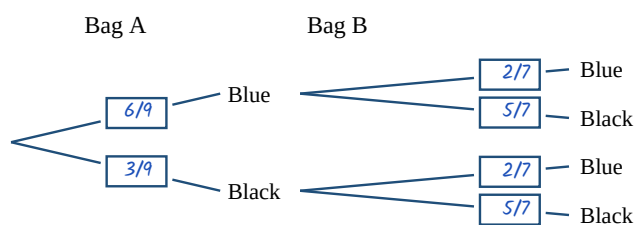
2 / 2

- 25 Mason has two bags of counters. Bag A has 6 blue and 3 black counters, bag B has 2 blue and 5 black counters.

Mason takes at random one counter from each bag.

(a) Complete the probability tree diagram.

(b) Work out the probability that Mason takes one counter of each colour.



$$\frac{6}{9} \times \frac{5}{7} + \frac{3}{9} \times \frac{2}{7} = \frac{4}{7}$$

(b) $\frac{4}{7}$

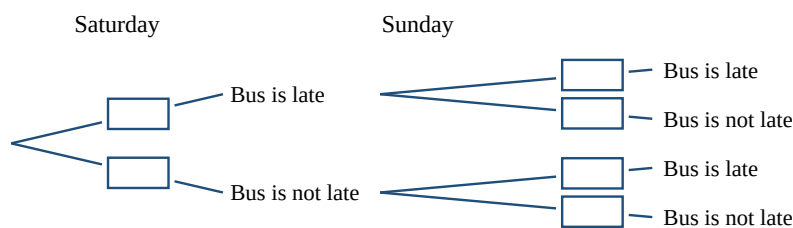
2 / 2

- 26 Leo gets the bus on Saturday and Sunday.

On any day the probability that the bus is late is 0.9.

(a) Complete the probability tree diagram.

(b) Work out the probability that the bus is late on exactly one of these days.



$$1 - 0.9 = 0.1$$

$$0.9 \times 0.1 = 0.09$$

$$0.1 \times 0.9 = 0.09$$

$$0.09 + 0.09 = 0.18$$

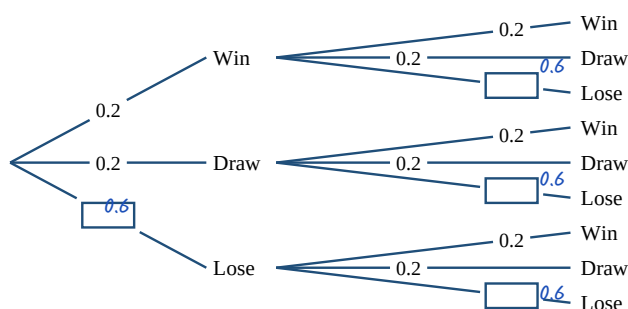
(a) every first branch pair 0.9, 0.1 and every second branch pair 0.9, 0.1 (b) 0.18

2 / 2

- 27 Fearne plays two games. Each time, the probability of a win is 0.2 and of a draw is 0.2.

(a) Complete the probability tree diagram.

(b) Work out the probability that Fearne wins both games.



$$1 - 0.2 - 0.2 = 0.6$$

$$0.2 \times 0.2 = 0.04$$

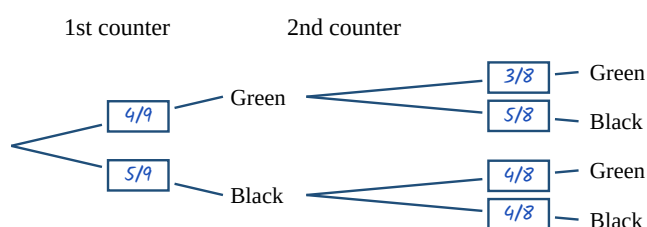
(b) 0.04

2 / 2

- 28 A bag has 4 green counters and 5 black counters. Priya takes two counters at random without replacement.

(a) Complete the probability tree diagram.

(b) Work out the probability that Priya takes two green counters.



$$\frac{4}{9} \times \frac{3}{8} = \frac{1}{6}$$

(b) $\frac{1}{6}$

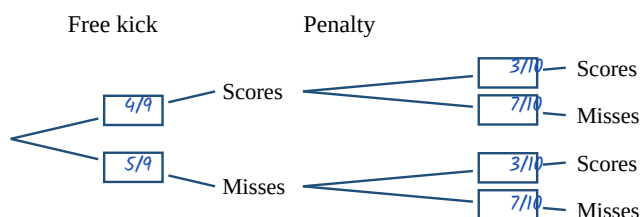
2 / 2

- 29 Charles takes one free kick and one penalty.

The probability of "Scores" is $\frac{4}{9}$ for free kick and $\frac{3}{10}$ for penalty.

(a) Complete the probability tree diagram.

(b) Work out the probability that Charles scores exactly one of them.



$$1 - \frac{4}{9} = \frac{5}{9}, 1 - \frac{3}{10} = \frac{7}{10}$$

$$\frac{4}{9} \times \frac{7}{10} = \frac{14}{45}$$

$$\frac{5}{9} \times \frac{3}{10} = \frac{1}{6}$$

$$\frac{14}{45} + \frac{1}{6} = \frac{43}{90}$$

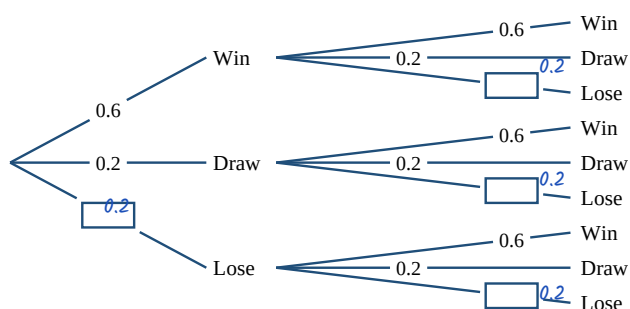
(b) $\frac{43}{90}$

2 / 2

- 30 Tia plays two games. Each time, the probability of a win is 0.6 and of a draw is 0.2.

(a) Complete the probability tree diagram.

(b) Work out the probability that Tia wins both games.



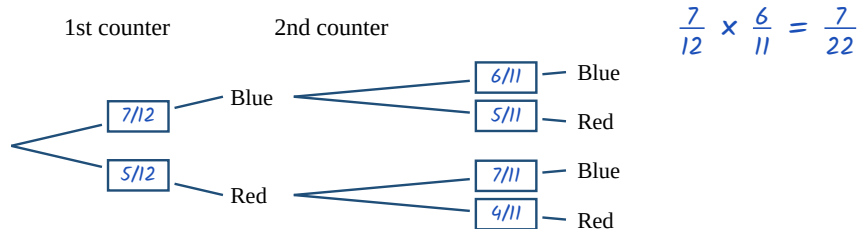
$$1 - 0.6 - 0.2 = 0.2$$

$$0.6 \times 0.6 = 0.36$$

(b) 0.36

2 / 2

- 31 A bag has 7 blue counters and 5 red counters. Alan takes two counters at random without replacement.
- (a) Complete the probability tree diagram.
- (b) Work out the probability that Alan takes two blue counters.



$$\frac{7}{12} \times \frac{6}{11} = \frac{7}{22}$$

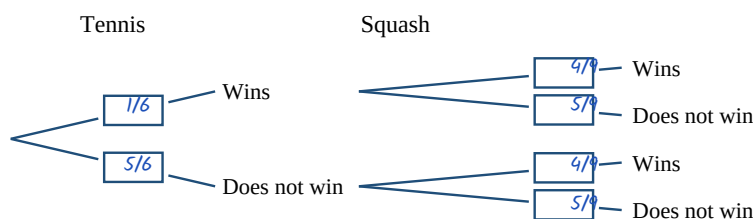
$$(b) \frac{7}{22}$$

2 / 2

- 32 Perrie is going to play one tennis match and one squash match.

The probability of "Wins" is $\frac{1}{6}$ for tennis and $\frac{4}{9}$ for squash.

- (a) Complete the probability tree diagram.
- (b) Work out the probability that Perrie wins exactly one of the matches.



$$1 - \frac{1}{6} = \frac{5}{6}, 1 - \frac{4}{9} = \frac{5}{9}$$

$$\frac{1}{6} \times \frac{5}{9} = \frac{5}{54}$$

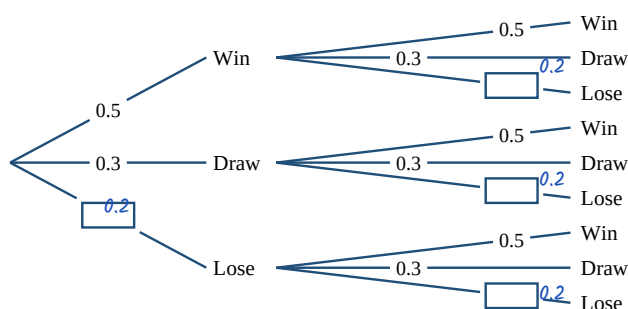
$$\frac{5}{6} \times \frac{4}{9} = \frac{10}{27}$$

$$\frac{5}{54} + \frac{10}{27} = \frac{25}{54}$$

$$(b) \frac{25}{54}$$

2 / 2

- 33 Annie plays two matches. Each time, the probability of a win is 0.5 and of a draw is 0.3.
- (a) Complete the probability tree diagram.
- (b) Work out the probability that Annie wins one match and draws the other.



$$1 - 0.5 - 0.3 = 0.2$$

$$0.5 \times 0.3 + 0.3 \times 0.5 = 0.3$$

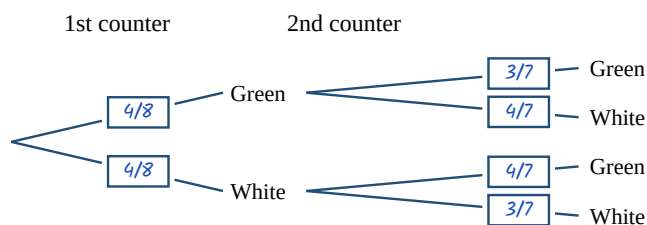
$$(b) 0.3$$

2 / 2

- 34 A bag has 4 green counters and 4 white counters. Annie takes two counters at random without replacement.

(a) Complete the probability tree diagram.

(b) Work out the probability that Annie takes two green counters.



$$\frac{4}{8} \times \frac{3}{7} = \frac{3}{14}$$

$$(b) \frac{3}{14}$$

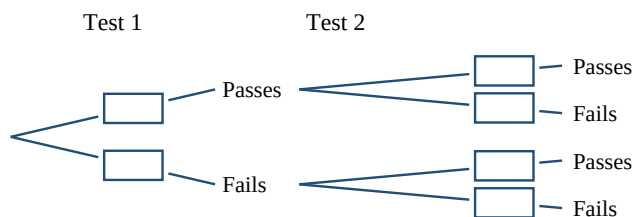
2 / 2

- 35 Isla takes a driving test and a theory test.

The probability that Isla passes a test each time is $\frac{7}{8}$.

(a) Complete the probability tree diagram.

(b) Work out the probability that Isla passes exactly one test.



$$1 - \frac{7}{8} = \frac{1}{8}$$

$$\frac{7}{8} \times \frac{1}{8} = \frac{7}{64}$$

$$\frac{1}{8} \times \frac{7}{8} = \frac{7}{64}$$

$$\frac{7}{64} + \frac{7}{64} = \frac{7}{32}$$

(a) every first branch pair $\frac{7}{8}, \frac{1}{8}$ and every second branch pair $\frac{7}{8}, \frac{1}{8}$ (b) $\frac{7}{32}$

2 / 2

- 36 Leo plays a game where he can win, draw or lose.

The probability he wins any game is 0.4.

The probability he draws any game is 0.5.

Leo plays two games. Work out the probability that he wins one game and loses the other.

You must show your working.

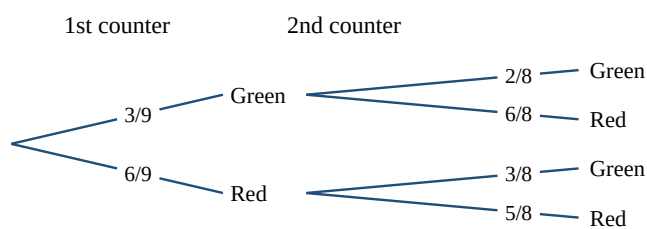
$$\text{lose} = 0.1$$

$$0.4 \times 0.1 + 0.1 \times 0.4 = 0.08$$

$$0.08$$

2 / 2

- 37 A bag has 3 green counters and 6 red counters. Two counters are taken at random without replacement.
The probability tree diagram shows the probabilities.
Work out the probability that the two counters are the same colour.



$$\frac{3}{9} \times \frac{2}{8} + \frac{6}{9} \times \frac{5}{8} = \frac{1}{2}$$

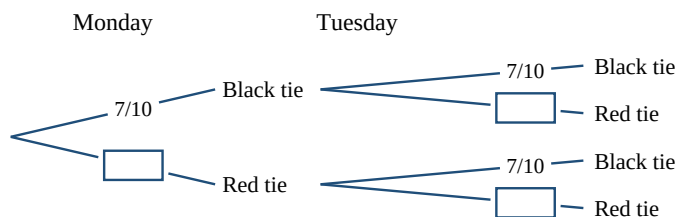
$$\frac{1}{2}$$

2 / 2

- 38 Each day Ethan wears either a black tie or a red tie to work.

On any day the probability that Ethan wears a black tie is $\frac{7}{10}$.

- (a) Complete the probability tree diagram for Monday and Tuesday.
(b) Work out the probability that Ethan wears different coloured ties on Monday and Tuesday.



$$1 - \frac{7}{10} = \frac{3}{10}$$

$$\frac{7}{10} \times \frac{3}{10} = \frac{21}{100}$$

$$\frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$$

$$\frac{21}{100} + \frac{21}{100} = \frac{21}{50}$$

(a) every first branch pair $\frac{7}{10}, \frac{3}{10}$ and every second branch pair $\frac{7}{10}, \frac{3}{10}$ (b) $\frac{21}{50}$

2 / 2

- 39 Ruby plays a game where she can win, draw or lose.
The probability she wins any game is 0.4.
The probability she draws any game is 0.2.
Ruby plays two games. Work out the probability that she wins one game and loses the other.
You must show your working.

$$\text{lose} = 0.4$$

$$0.4 \times 0.4 + 0.4 \times 0.4 = 0.32$$

$$0.32$$

3 / 3

- 40 Frank is going to play one game of chess and one game of draughts.
 The probability that Frank wins the game of chess is 0.2. The probability that Frank wins the game of draughts is 0.4.
 Frank does this 100 times.
 Work out an estimate for the number of times that Frank wins both games.

$$0.2 \times 0.4 = 0.08$$

$$0.08 \times 100 = 8$$

8

3 / 3

- 41 There are 6 yellow sweets and 5 blue sweets in a bag.
 Alan takes two sweets at random without replacement.
 Work out the probability that the two sweets are different colours.
 You must show your working.

$$\frac{6}{11} \times \frac{5}{10} + \frac{5}{11} \times \frac{6}{10} = \frac{6}{11}$$

 $\frac{6}{11}$

3 / 3

- 42 The probability that a bus is on time is 0.4.
 Leo catches the bus on three days.
 Work out the probability that all three succeed.
 You must show your working.

$$0.4 \times 0.4 \times 0.4 = 0.064$$

0.064

3 / 3

- 43 Frank is going to play one game of chess and one game of draughts.
 The probability that Frank wins the game of chess is 0.6. The probability that Frank wins the game of draughts is 0.9.
 Frank does this 100 times.
 Work out an estimate for the number of times that Frank wins both games.

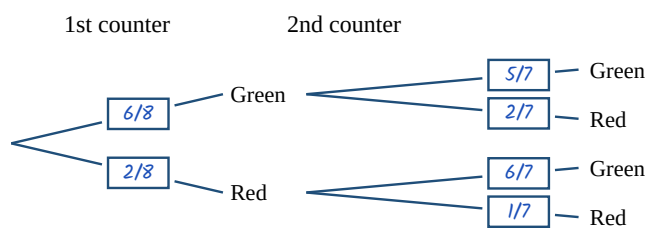
$$0.6 \times 0.9 = 0.54$$

$$0.54 \times 100 = 54$$

54

3 / 3

- 44 A bag has 6 green counters and 2 red counters. Annie takes two counters at random without replacement.
 (a) Complete the probability tree diagram.
 (b) Work out the probability that Annie takes two counters of the same colour.



$$\frac{6}{8} \times \frac{5}{7} + \frac{2}{8} \times \frac{1}{7} = \frac{4}{7}$$

(b) $\frac{4}{7}$

3 / 3

- 45 A bag has 3 blue counters, 2 red counters and 2 yellow counters.
 Perrie takes two counters at random without replacement.
 Work out the probability that Perrie takes two counters of the same colour.
 You must show your working.

$$\frac{3}{7} \times \frac{2}{6} + \frac{2}{7} \times \frac{1}{6} + \frac{2}{7} \times \frac{1}{6} = \frac{5}{21}$$

$\frac{5}{21}$

3 / 3

- 46 Ava takes the bus to school on Monday and on Tuesday.
 The probability that Ava's bus is late on Monday is 0.2. The probability that Ava's bus is late on Tuesday is 0.3.
 Ava does this 500 times.
 Work out an estimate for the number of times that Ava is late on at least one of the days.

$$1 - 0.2 \times 0.3 = 1 - 0.06 = 0.94$$

$$0.94 \times 500 = 470$$

470

3 / 3

- 47 The probability that a seed grows is 0.3.
 Mia plants three seeds.
 Work out the probability that at least one of the three succeeds.
 You must show your working.

$$1 - 0.7 \times 0.7 \times 0.7 = 1 - 0.343 = 0.657$$

0.657

3 / 3

- 48 A bag has 4 red counters, 2 green counters and 5 yellow counters.
 Matt takes two counters at random without replacement.
 Work out the probability that Matt takes two counters of the same colour.
 You must show your working.

$$\frac{4}{11} \times \frac{3}{10} + \frac{2}{11} \times \frac{1}{10} + \frac{5}{11} \times \frac{4}{10} = \frac{17}{55}$$

$\frac{17}{55}$

3 / 3

- 49 A bag has 3 black counters, 5 red counters and 2 blue counters.
Alan takes two counters at random without replacement.
Work out the probability that Alan takes two counters of the same colour.
You must show your working.

$$\frac{3}{10} \times \frac{2}{9} + \frac{5}{10} \times \frac{4}{9} + \frac{2}{10} \times \frac{1}{9} = \frac{14}{45}$$

$$\frac{14}{45}$$

3

 / 3

- 50 The probability that Zara hits the target with an arrow is 0.8.
Zara fires three arrows.
Work out the probability that at least one of the three succeeds.
You must show your working.

$$1 - 0.2 \times 0.2 \times 0.2 = 1 - 0.008 = 0.992$$

$$0.992$$

3

 / 3