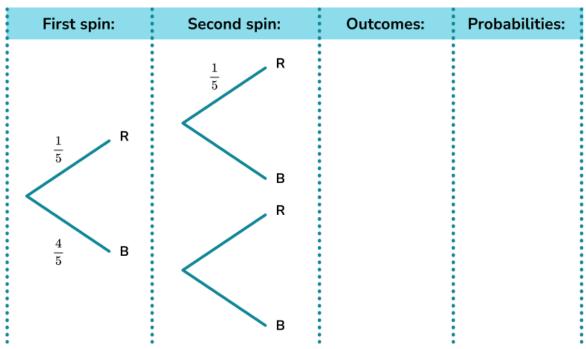


Skill

Group A - Repeated event

Complete the probability tree diagrams, including the outcomes and their probabilities:

1) A spinner has 5 sections, 1 red and 4 blue. The spinner is spun twice.



2) A spinner has 5 sections, 2 red and 3 blue. The spinner is spun twice.

First spin:	Second spin:	Outcomes:	Probabilities:
$\frac{2}{5}$ R $\frac{3}{5}$ B	$\frac{2}{5}$ R B R		



3) A spinner has 7 sections, 1 red and 6 blue. The spinner is spun twice.

First spin:	Second spin:	Outcomes:	Probabilities:
$\frac{1}{7}$ Red $\frac{6}{7}$ Blue	Red Blue Red		
	Blue		

4) A spinner has 7 sections, 2 red and 5 blue. The spinner is spun twice.

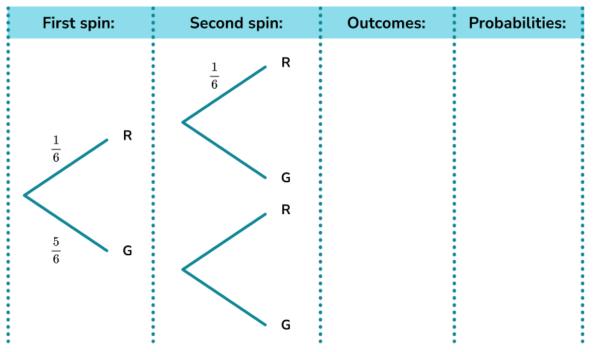
First spin:	Second spin:	Outcomes:	Probabilities:
$\frac{2}{7}$ R $\frac{5}{7}$ B	2 R B R		



Group B - With replacement

Complete the probability tree diagrams, including the outcomes and their probabilities:

1) A bag has 6 balls, 1 red and 5 green. A ball is picked and replaced. A second ball is picked.



2) A bag has 8 balls, 1 red and 7 green. A ball is picked and replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{1}{8}$ R $\frac{7}{8}$ G	$\frac{1}{8}$ R G R		



3) A bag has 8 balls, 3 red and 5 green. A ball is picked and replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{3}{8}$ R G	$\frac{3}{8}$ R G		

4) A bag has 9 balls, 2 red and 7 green. A ball is picked and replaced. A second ball is picked.

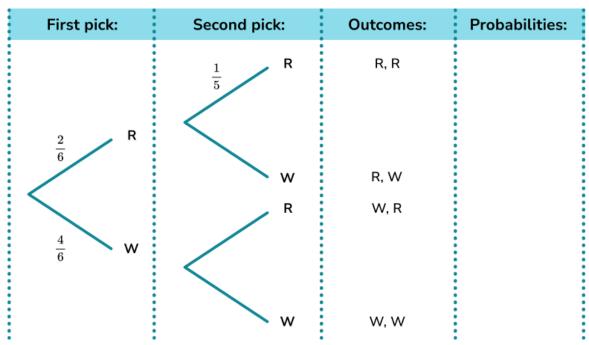
First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{2}{9}$ R $\frac{7}{9}$ G	2 R G R	Outcomes.	
	G		



Group C - Without replacement

Complete the probability tree diagrams, including the outcomes and their probabilities: (There is no need to simplify the fractions).

1) A bag has 6 balls, 2 red and 4 white. A ball is picked and **not** replaced. A second ball is picked.

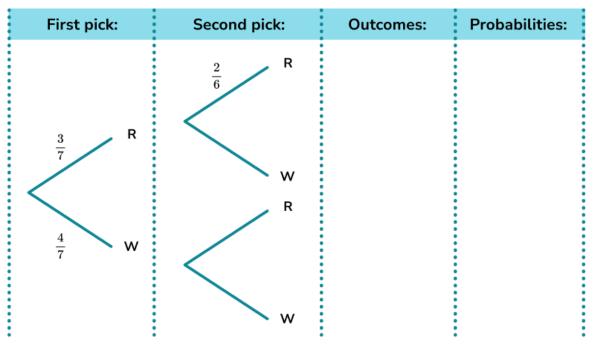


2) A bag has 7 balls, 2 red and 5 white. A ball is picked and **not** replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{2}{7}$ R $\frac{5}{7}$ W	1/6 R W R		



3) A bag has 7 balls, 3 red and 4 white. A ball is picked and **not** replaced. A second ball is picked.



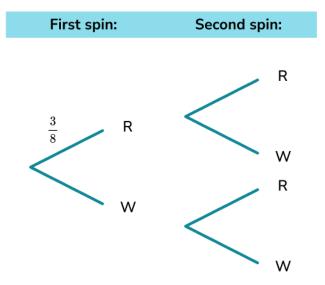
4) A bag has 8 balls, 3 red and 5 white. A ball is picked and **not** replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{3}{8}$ R $\frac{5}{8}$ W	$\frac{2}{7}$ R W R		

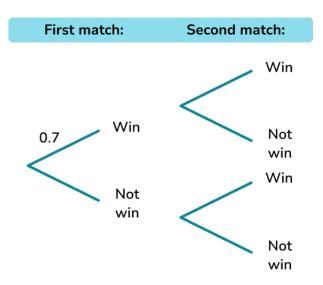


Applied

1) (a) A spinner has 8 sections. 3 sections are red and the remaining sections are white. The spinner is spun twice. Fill in the missing probabilities on the tree diagram.



- **(b)** Work out the probability that the spinner lands on red twice.
- **2)** (a) Maria plays tennis. The probability that she wins a match is 0. 7. Maria plays 2 matches. Fill in the missing probabilities on the tree diagram.

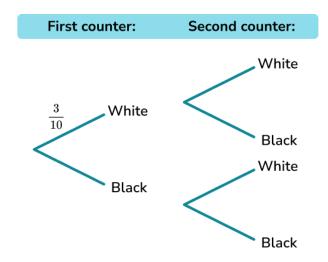


(b) Work out the probability that Maria wins at least one match.

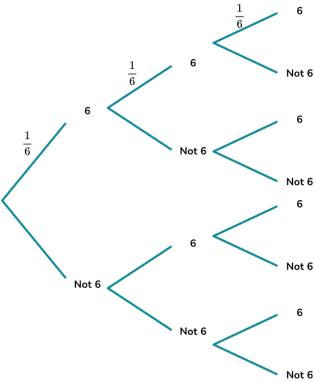


3) (a) 10 counters are in a bag. There are 3 white counters and the remaining counters are black. A counter is picked out at random. It is **not** replaced. A second counter is picked out at random.

Fill in the missing probabilities on the tree diagram.



- **(b)** Work out the probability that one of each colour counter is picked.
- **4) (a)** Three unbiased dice are rolled. Fill in the missing probabilities.



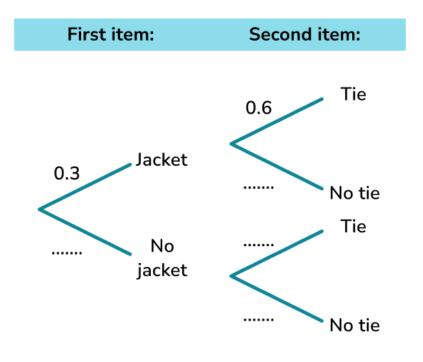
(b) Work out the probability that only one '6' is rolled.



Probability tree diagrams - Exam Questions

1) (a) Mr Jamal gets ready in the morning. The probability he wears a jacket is 0. 3. The probability that he wears a tie is 0. 6.

Complete the tree diagram.



(b) Work out the probability that Mr Jamal wears a jacket and a tie.

(2) (4 marks)

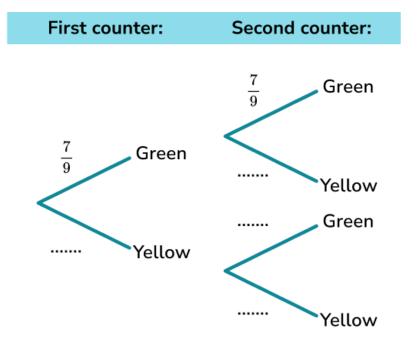
(2)



Probability tree diagrams - Exam Questions

2) (a) A bag contains only green and yellow counters. Sophie picks a counter at random and then replaces it. Sophie then picks a second counter.

Complete the tree diagram.



(2)

(b) Work out the probability that Sophie picks 2 green counters.

(2)

(c) Work out the probability that Sophie picks at least one green counter.

(2)

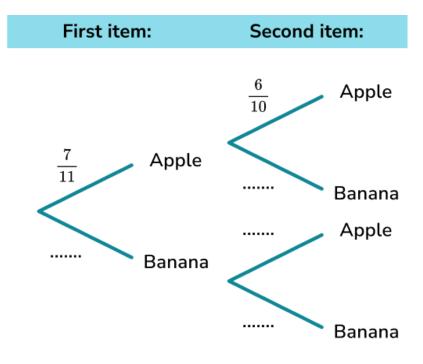
(6 marks)



Probability tree diagrams - Exam Questions

3) (a) There are 7 apples and 4 bananas in a fruit bowl. A piece of fruit is selected at random. It is eaten. A second piece of fruit is selected at random and is also eaten.

Complete the tree diagram.



(2)

(b) Work out the probability that one of each type of fruit is eaten.

(3)

(5 marks)



	Question	Answer			
	Skill Questions				
Group A	Complete the probability tree diagrams, including the outcomes and their probabilities: 1) A spinner has 5 sections, 1 red and 4 blue. The spinner is spun twice.	1) First spin:	Second spin:	Outcomes:	Probabilities:
	First spin: Second spin: Outcomes: Probabilities: 1/5	1 5 R B B	$ \frac{1}{5} $ R $ \frac{4}{5} $ B $ \frac{1}{5} $ R	R, R R, B B, R B, B	$\frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$ $\frac{1}{5} \times \frac{4}{5} = \frac{4}{25}$ $\frac{4}{5} \times \frac{1}{5} = \frac{4}{25}$ $\frac{4}{5} \times \frac{4}{5} = \frac{16}{25}$
	2) A spinner has 5 sections, 2 red and	2)			
	3 blue. The spinner is spun twice. First spin: Second spin: Outcomes: Probabilities:	First spin:	Second spin:	Outcomes: R, R	Probabilities: $\frac{2}{5} \times \frac{2}{5} = \frac{5}{25}$
	$ \begin{array}{c c} \hline 2 \\ \hline 5 \end{array} $ R $ \begin{array}{c} 2 \\ \hline 5 \end{array} $ B $ \begin{array}{c} R\\ R\\ \end{array} $ B	$\frac{2}{5}$ R $\frac{3}{5}$ B	$\frac{3}{5}$ B R $\frac{2}{5}$ B	R, B B, R B, B	$\frac{2}{5} \times \frac{3}{5} = \frac{6}{25}$ $\frac{3}{5} \times \frac{2}{5} = \frac{6}{25}$ $\frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$
	3) A spinner has 7 sections, 1 red and	3)			
	6 blue. The spinner is spun twice. First spin: Second spin: Outcomes: Probabilities:	First spin:	Second spin:	Outcomes: R, R	Probabilities: $\frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$
	Red $\frac{1}{7}$ Red $\frac{1}{7}$ Red $\frac{1}{7}$ Blue Red $\frac{6}{7}$ Blue Blue	$\frac{1}{7}$ Red $\frac{6}{7}$ Blue	$\frac{6}{7}$ Blue $\frac{1}{7}$ Red $\frac{6}{7}$ Blue	R, B B, R B, B	$\frac{1}{7} \times \frac{6}{7} = \frac{6}{49}$ $\frac{6}{7} \times \frac{1}{7} = \frac{6}{49}$ $\frac{6}{7} \times \frac{6}{7} = \frac{36}{49}$



Group A	4) A spinner has 7 sections, 2 red and 5	4)			
contd	blue. The spinner is spun twice.	First spin:	Second spin:	Outcomes:	Probabilities:
	First spin: Second spin: Outcomes: Probabilities: 2 7 R B R 5 7 B	$\frac{2}{7}$ R $\frac{5}{7}$ B	$\frac{2}{7}$ R $\frac{5}{7}$ R R $\frac{5}{7}$ R	R, R R, B B, R B, B	$\frac{2}{7} \times \frac{2}{7} = \frac{4}{49}$ $\frac{2}{7} \times \frac{5}{7} = \frac{10}{49}$ $\frac{5}{7} \times \frac{2}{7} = \frac{10}{49}$ $\frac{5}{7} \times \frac{5}{7} = \frac{25}{49}$
Group B	Complete the probability tree				
	diagrams, including the outcomes and				
	their probabilities:				
	1) A bag has 6 balls, 1 red and 5 green.	1)			
	A ball is picked and replaced. A second	First spin:	Second spin:	Outcomes:	Probabilities:
	ball is picked		$\frac{1}{6}$ Red	R, R	$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$
	First spin: Second spin: Outcomes: Probabilities: $\frac{1}{6} \qquad \qquad R$ $\frac{1}{6} \qquad \qquad R$ R	$\frac{1}{6}$ Red $\frac{5}{6}$ Green	$\frac{5}{6} \qquad \text{Green}$ $\frac{1}{6} \qquad \text{Red}$ $\frac{5}{6} \qquad \text{Green}$	R, G G, R G, G	$\frac{1}{6} \times \frac{5}{6} = \frac{5}{36}$ $\frac{5}{6} \times \frac{1}{6} = \frac{5}{36}$ $\frac{5}{6} \times \frac{5}{6} = \frac{25}{36}$
	2) A bag has 8 balls, 1 red and 7 green. A ball is picked and replaced. A second ball is picked First pick: Second pick: Outcomes: Probabilities: 1/8	2) First pick: 1/8 R	Second pick: $ \frac{1}{8} $ $ \frac{7}{8} $ $ \frac{1}{8} $ $ \frac{7}{8} $	Outcomes: R, R R, G G, R G, G	$\begin{array}{c} \text{Probabilities:} \\ \frac{1}{8} \times \frac{1}{8} = \frac{1}{64} \\ \\ \frac{1}{8} \times \frac{7}{8} = \frac{7}{64} \\ \\ \frac{7}{8} \times \frac{1}{8} = \frac{7}{64} \\ \\ \\ \frac{7}{8} \times \frac{7}{8} = \frac{49}{64} \end{array}$



Group B contd

3) A bag has 8 balls, 3 red and 5 green. 3) A ball is picked and replaced. A second ball is picked.

$\frac{3}{8}$ R $\frac{3}{8}$ R $\frac{3}{8}$ R	First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{5}{8}$ G	$\frac{3}{8}$ R	$\frac{3}{8}$ R		

First pick:	Second pick:	Outcomes:	Probabilities:
a R	$\frac{3}{8}$ R	R, R	$\frac{3}{8}\times\frac{3}{8}=\frac{9}{64}$
$\frac{3}{8}$ R $\frac{5}{8}$ G	$\frac{5}{8}$ G R	R, G G, R	$\frac{3}{8} \times \frac{5}{8} = \frac{15}{64}$ $\frac{5}{8} \times \frac{3}{8} = \frac{15}{64}$
	$\frac{5}{8}$ G	G, G	$\frac{5}{8}\times\frac{5}{8}=\frac{25}{64}$

4) A bag has 9 balls, 2 red and 7 green. 4) A ball is picked and replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{2}{9}$ R	$\frac{2}{9}$ R		
$\frac{7}{9}$ G	R		

First pick:	Second pick:	Outcomes:	Probabilities:
	$\frac{2}{9}$ R	R, R	$\frac{2}{9}\times\frac{2}{9}=\frac{4}{81}$
$\frac{2}{9}$ R	G R	R, G G, R	$\frac{2}{9} \times \frac{7}{9} = \frac{14}{81}$ $\frac{7}{9} \times \frac{2}{9} = \frac{14}{81}$
$\frac{7}{9}$ G			9 ^ 9 ¯ 81
	G	G, G	$\frac{7}{9}\times\frac{7}{9}=\frac{49}{81}$

Group C

Complete the probability tree diagrams, including the outcomes and their probabilities: (There is no need to simplify the fractions).

1) A bag has 6 balls, 2 red and 4 white. 1) A ball is picked and not replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
2 R	$\frac{1}{5}$ R	R, R	
$\frac{2}{6}$ R $\frac{4}{6}$ W	W R	R, W W, R	
v	w	w, w	

First pick:	Second pick:	Outcomes:	Probabilities:
	$\frac{1}{5}$ R	R, R	$\frac{2}{6} \times \frac{1}{5} = \frac{2}{30}$
$\frac{2}{6}$ R $\frac{4}{6}$ W	$\frac{4}{5}$ W R	R, W W, R	$\frac{2}{6} \times \frac{4}{5} = \frac{8}{30}$ $\frac{4}{6} \times \frac{2}{5} = \frac{8}{30}$
	$\frac{3}{5}$ W	w, w	$\frac{4}{6}\times\frac{3}{5}=\frac{12}{30}$



Group C contd

2) A bag has 7 balls, 2 red and 5 white. A ball is picked and **not** replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
2 . R	$\frac{1}{6}$ R		
$\frac{2}{7}$ R	w		
$\frac{5}{7}$ W	R		
	w		

3) A bag has 7 balls, 3 red and 4 white. A ball is picked and **not** replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
3 R	$\frac{2}{6}$ R		
	w		
$\frac{4}{7}$ W	R		
'			
	w		

4) A bag has 8 balls, 3 red and 5 white. A ball is picked and **not** replaced. A second ball is picked.

First pick:	Second pick:	Outcomes:	Probabilities:
$\frac{3}{8}$ R $\frac{5}{8}$ W	$\frac{2}{7}$ R W R		

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First pick:	Second pick:	Outcomes:	Probabilities:
	$\frac{1}{6}$ R	R, R	$\frac{2}{7}\times\frac{1}{6}=\frac{2}{42}$
$\frac{2}{7}$ R $\frac{5}{7}$ W	$\frac{5}{6}$ W R	R, W W, R	$\frac{2}{7} \times \frac{5}{6} = \frac{10}{42}$ $\frac{5}{7} \times \frac{2}{6} = \frac{10}{42}$
	$\frac{4}{6}$ W	w, w	$\frac{5}{7}\times\frac{4}{6}=\frac{20}{42}$

3)

First pick:	Second pick:	Outcomes:	Probabilities:
3 R	$\frac{2}{6}$ R	R, R	$\frac{3}{7}\times\frac{2}{6}=\frac{6}{42}$
$\frac{3}{7}$ R $\frac{4}{7}$ W	$\frac{4}{6}$ W R	R, W W. R	$\frac{3}{7} \times \frac{4}{6} = \frac{12}{42}$ $\frac{4}{7} \times \frac{3}{6} = \frac{12}{42}$
	$\frac{3}{6}$ W	W, W	$\frac{4}{7}\times\frac{3}{6}=\frac{12}{42}$

4)

First pick:	Second pick:	Outcomes:	Probabilities:
3 R	$\frac{2}{7}$ R	R, R	$\frac{3}{8}\times\frac{2}{7}=\frac{6}{56}$
$\frac{3}{8}$ W	$\frac{5}{7}$ W R	R, W W, R	$\frac{3}{8} \times \frac{5}{7} = \frac{15}{56}$ $\frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$
	$\frac{4}{7}$ W	w, w	$\frac{5}{8}\times\frac{4}{7}=\frac{20}{56}$



	Question	Answer
	Applied Questions	
1)	a) A spinner has 8 sections. 3 sections are red and the remaining sections are white. The spinner is spun twice. Fill in the missing probabilities on the tree diagram. First spin: Second spin:	a) First spin: Second spin: $ \frac{3}{8} \qquad R $ $ \frac{3}{8} \qquad W $ $ \frac{5}{8} \qquad W $ $ \frac{5}{8} \qquad W $ $ \frac{5}{8} \qquad W $
	b) Work out the probability that the spinner lands on red twice.	b) $\frac{3}{8} \times \frac{3}{8} = \frac{9}{64}$
2)	a) Maria plays tennis. The probability that she wins a match is 0. 7. Maria plays 2 matches. Fill in the missing probabilities on the tree diagram. First match: Second match: Win Not win Not win Not win	a) First match: Second match: 0.3 Win 0.7 Not win 0.3 Win 0.7 Not win 0.7 Not win 0.7 Not win
	b) Work out the probability that Maria wins at least one match.	b) $0.7 \times 0.7 = 0.49$ $0.7 \times 0.3 = 0.21$ $0.3 \times 0.7 = 0.21$ 0.49 + 0.21 + 0.21 = 0.91



a) 10 counters are in a bag.

There are 3 white counters and the remaining counters are black.

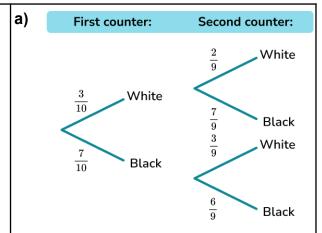
A counter is picked out at random. It is **not** replaced.

A second counter is picked out at random.

Fill in the missing probabilities on the tree diagram.

First counter:	Second counter:
$\frac{3}{10}$ White	White
	Black
Black	White
	Black

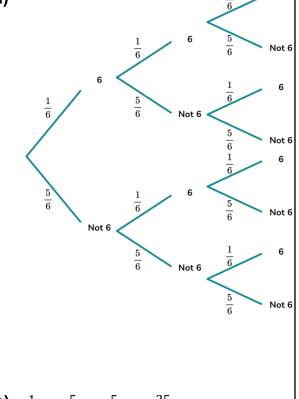
b) Work out the probability that one of each colour counter is picked.



b)
$$\frac{3}{10} \times \frac{7}{9} = \frac{21}{90}$$
 $\frac{7}{10} \times \frac{3}{9} = \frac{21}{90}$ $\frac{21}{90} + \frac{21}{90} = \frac{42}{90} = \frac{7}{15}$



4) a) Three unbiased dice are rolled. a) Fill in the missing probabilities. Not 6 Not 6 Not 6 Not 6 Not 6 **b)** Work out the probability that only one '6' is rolled.



b)
$$\frac{1}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{25}{216}$$

 $\frac{5}{6} \times \frac{1}{6} \times \frac{5}{6} = \frac{25}{216}$
 $\frac{5}{6} \times \frac{5}{6} \times \frac{1}{6} = \frac{25}{216}$
 $\frac{25}{216} + \frac{25}{216} + \frac{25}{216} = \frac{75}{216} = \frac{25}{72}$



Probability tree diagrams - Mark Scheme

		Question	Answer	
		Exam Questions		
1)	(a)	Mr Jamal gets ready in the morning.	(a) First item: Second item:	
		The probability he wears a jacket is 0.3.	0.6 Tie	
		The probability that he wears a tie is 0.6.	0.3 Jacket 0.4 No tie	
		Complete the tree diagram.	0.7 No 0.6	
		First item: Second item: 0.6 Tie	0.4 No tie 0.7 on the first set on branches	(1)
		No tie No tie Tie jacket No tie	0.4, 0.6, 0.4 on the second set of branches	(1)
	(b)	Work out the probability that Mr Jamal wears a jacket and a tie.	(b) 0.3 × 0.6 = 0.18	(1) (1)
2)	(a)	A bag contains only green and yellow counters. Sophie picks a counter at random and then replaces it. Sophie then picks a second counter. Complete the tree diagram. First counter: Second counter: $\frac{7}{9}$ Green $\frac{7}{9}$ Green Yellow		
		Green	$\frac{2}{9}$ on the first set on branches	(1)
		Yellow	$\frac{2}{9}$, $\frac{7}{9}$, $\frac{2}{9}$ on the second set of branches	(1)



Probability tree diagrams - Mark Scheme

	(b)	Work out the probability that Sophie picks 2 green counters.	$(\mathbf{b}) \frac{7}{9} \times \frac{7}{9}$ $= \frac{49}{81}$	(1) (1)
	(c)	Work out the probability that Sophie picks at least one green counter.	(c) $\left(\frac{7}{9} \times \frac{7}{9}\right) + \left(\frac{7}{9} \times \frac{2}{9}\right) + \left(\frac{2}{9} \times \frac{7}{9}\right)$ = $\frac{49}{81} + \frac{14}{81} + \frac{14}{81} = \frac{77}{81}$	(1) (1)
3)	(a)	There are 7 apples and 4 bananas in a fruit bowl. A piece of fruit is selected at random. It is eaten. A second piece of fruit is selected at random and is also eaten. Complete the tree diagram. First item: Second item: Apple Apple Banana Apple Banana Banana	(a) First item: Second item: $ \frac{6}{10} $ Apple $ \frac{7}{11} $ Apple $ \frac{4}{10} $ Banana $ \frac{7}{10} $ Apple $ \frac{3}{10} $ Banana $ \frac{4}{11} $ on the first set on branches $ \frac{4}{10}, \frac{7}{10}, \frac{3}{10} $ on the second set of branches	(1)(1)
	(b)	Work out the probability that one of each type of fruit is eaten.	(b) $\frac{7}{11} \times \frac{4}{10} = \frac{28}{110}$ or $\frac{4}{11} \times \frac{7}{10} = \frac{28}{110}$ $\frac{28}{110} + \frac{28}{110}$	(1)
			$=\frac{56}{110}\mathbf{oe}$	(1)

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