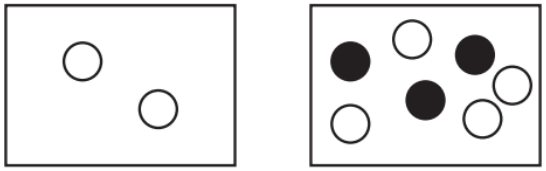
1. 4024/11/M/J/16 Q26



Box 1 Box 2

Box 1 contains 2 white balls. Box 2 contains 4 white balls and 3 black balls.

(a) Ann chooses, at random, one ball from each box.

(i) Find the probability that these balls are both black.

Answer ..... [1]

(ii) Find the probability that these balls have different colours.

Answer ..... [1]

(b) From the original contents of **Box 2**, Belle chooses, at random, two balls without replacement.

Find the probability that these balls are both white.

Answer ..... [1]

(c) Carla chooses one of the boxes at random.
With the original box contents, she then chooses, at random, one ball from this box.

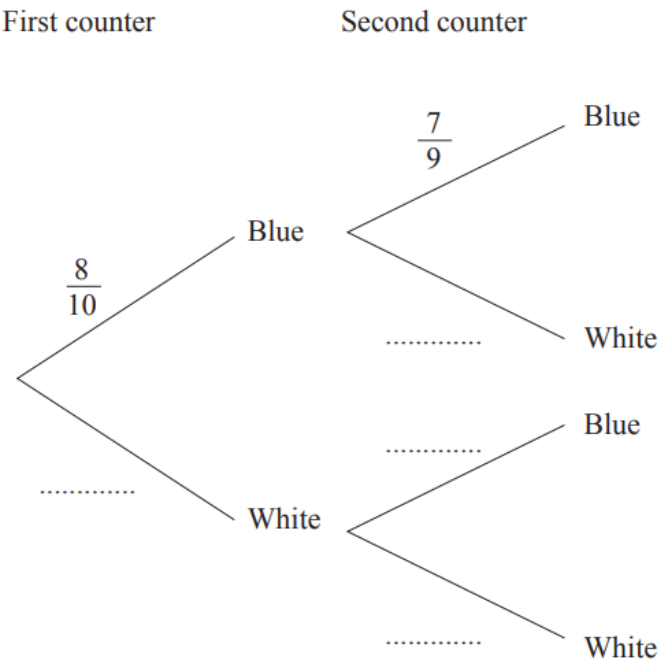
Find the probability that the ball is white.

Answer ..... [2]

2. 4024/12/M/J/16 Q20

A bag contains 10 counters of which 8 are blue and 2 are white.
Two counters are taken from the bag at random without replacement.

(a) Complete the tree diagram to show the possible outcomes and their probabilities.



[1]

(b) Find, as a fraction, the probability that

(i) both counters are blue,

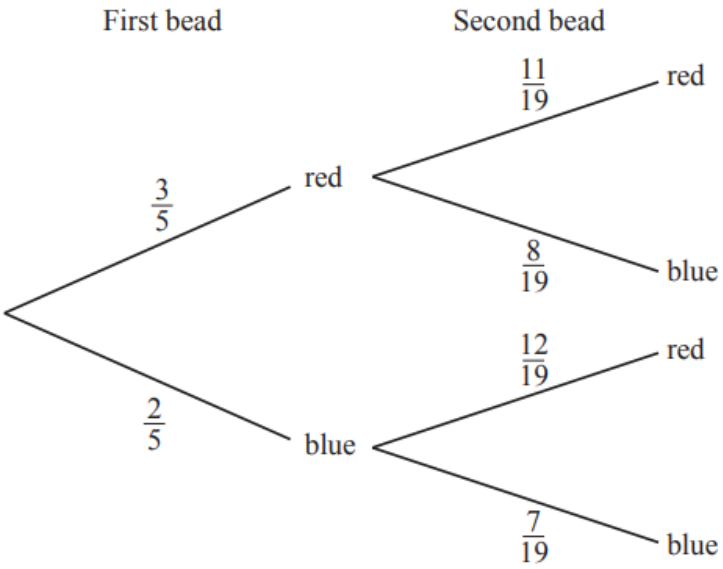
Answer ..... [1]

(ii) one counter is blue and the other is white.

Answer ..... [2]

3. 4024/21/O/N/16 Q10 (b)

(b) A bag contains R red beads and B blue beads.
Two beads are chosen, at random, without replacement.
The tree diagram shows the possible outcomes and their probabilities.



(i) Calculate the probability that both beads are red.

Answer ..... [1]

(ii) Calculate the probability that the two beads are different colours.

Answer ..... [2]

(iii) What is the value of R?

Answer ..... [1]

(iv) Of the red beads, half have a yellow spot.

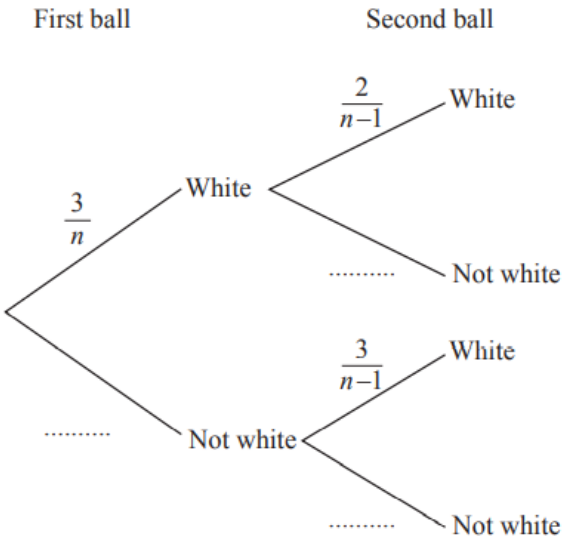
Calculate the probability that, of the two chosen beads, **neither** has a yellow spot.

Answer ..... [2]

4. 4024/12/M/J/17 Q24

A bag contains n balls.
3 of the balls are white.
Two balls are taken from the bag, at random, without replacement.

(a) Complete the tree diagram.



[2]

(b) The probability that both balls are white is $\frac{1}{15}$.

Show that $n^2 - n - 90 = 0$.

[2]

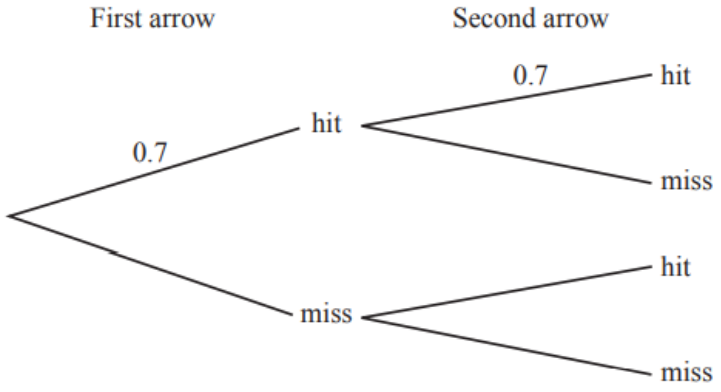
(c) Find the value of n.

Answer ..... [2]

5. 4024/12/O/N/17 Q19

Each time an archer fires an arrow, the probability that she hits the target is 0.7 .
She fires two arrows.

(a) Complete the tree diagram.



[1]

(b) Find the probability that

(i) she hits the target twice,

Answer ..... [1]

(ii) she hits the target exactly once.

Answer ..... [1]

6. 4024/21/O/N/17 Q4

Adam has a bag containing 9 balls, numbered from 1 to 9.

(a) Adam takes a ball at random from the bag and replaces it.

Find the probability that the ball has an odd number.

Answer ..... [1]

(b) Adam takes a ball from the 9 balls in the bag, notes the number and replaces it.
He then takes a second ball from the bag, notes the number and replaces it.

(i) Work out the probability that both numbers are odd.

Answer ..... [1]

(ii) Work out the probability that one number is odd and the other is even.

Answer ..... [2]

(c) Adam now takes two balls from the 9 balls in the bag, **without replacement**.

Work out the probability that the two numbers are either both odd or both even.

Answer ..... [3]

7. 4024/21/M/J/18 Q4

T	R	I	G	O	N	O	M	E	T	R	Y

Twelve lettered tiles spelling the word TRIGONOMETRY are placed inside a bag.

(a) A tile is taken at random from the bag.

Find the probability that the tile shows a letter R.
Give your answer as a fraction in its simplest form.

Answer ..... [1]

(b) All the tiles are placed back in the bag, a tile is then taken at random and placed on the table.
A second tile is taken at random and placed to the right of the first tile.
A third tile is taken at random and placed to the right of the second tile.

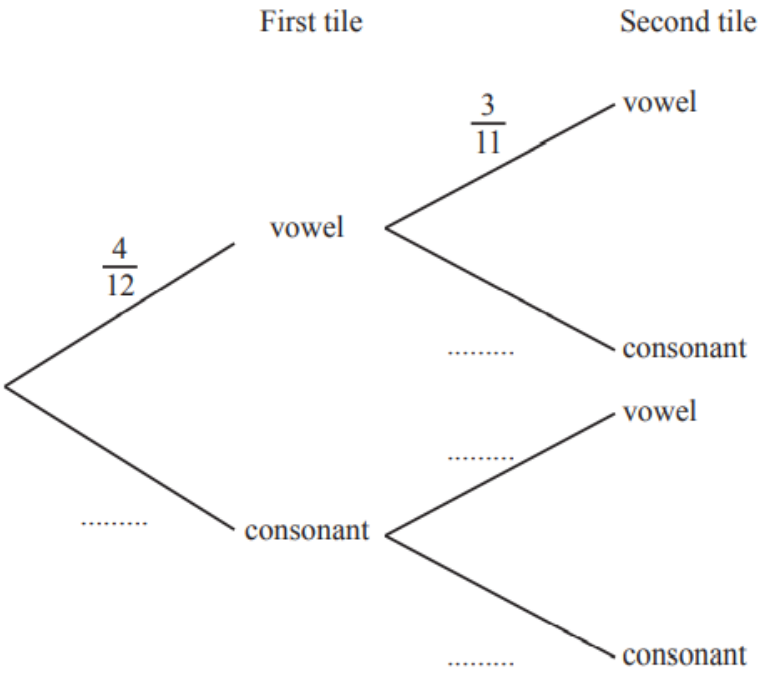
1st	2nd	3rd

Find the probability that, in the order the tiles were placed on the table, they spell GET.

Answer ..... [2]

(c) Vowels are the letters A, E, I, O and U.
All other letters are consonants.
All the twelve tiles are placed back in the bag and two tiles are taken at random, without replacement.

(i) Complete the tree diagram.



[2]

(ii) Find the probability that the tiles both show vowels.

Answer ..... [1]

(iii) Find the probability that one tile shows a vowel and one tile shows a consonant.

Answer ..... [2]

8. 4024/12/O/N/18 Q17

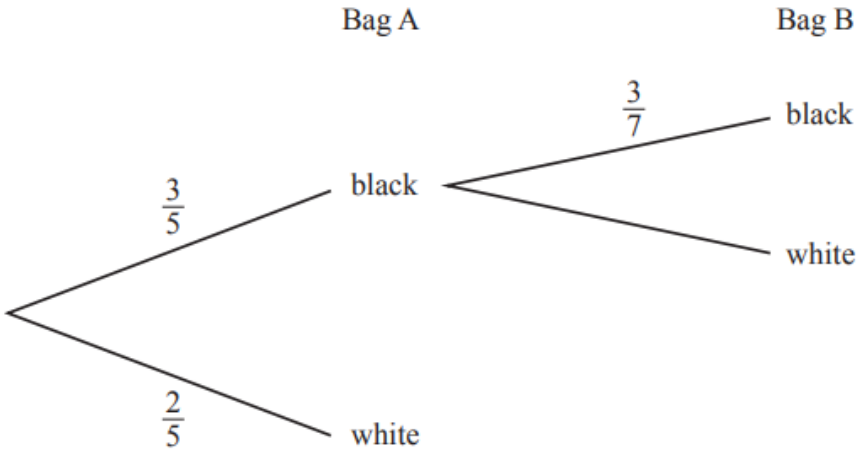
Bag A

Bag B

Bag A contains 3 black and 2 white beads.
Bag B contains 2 black and 4 white beads.

A bead is chosen, at random, from Bag A and placed in Bag B.
A bead is then chosen, at random, from Bag B.

(a) Complete the tree diagram.



[2]

(b) Find the probability that a black bead is taken from Bag B.

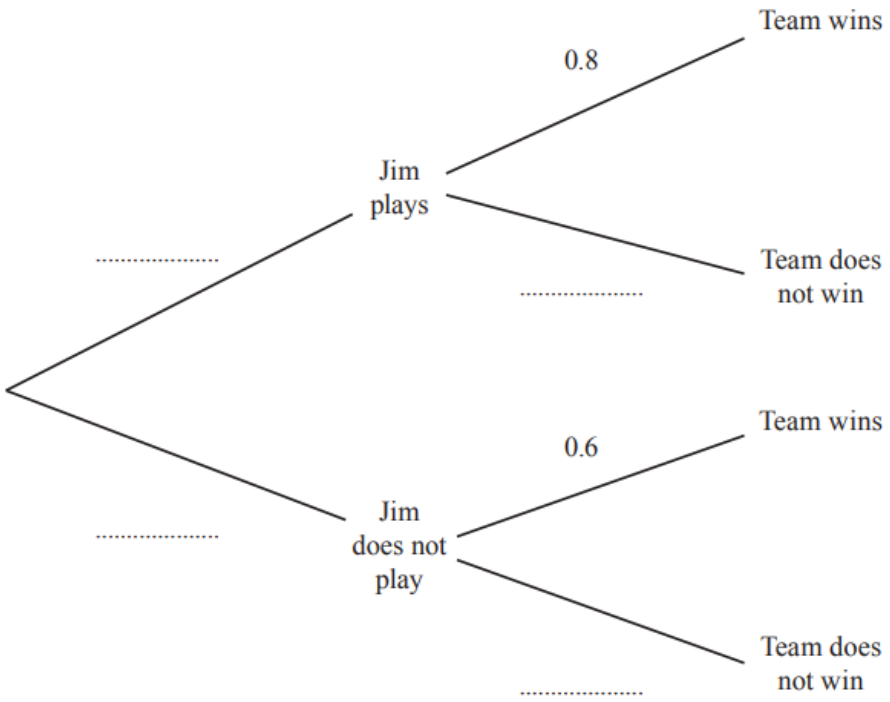
Answer ..... [2]

9. 4024/11/M/J/19 Q18

Jim plays for his local football team.
The probability that Jim plays in the next match is 0.7.

If Jim plays in the match, the probability of his team winning is 0.8.
If Jim does not play in the match, the probability of his team winning is 0.6.

(a) Complete the tree diagram.

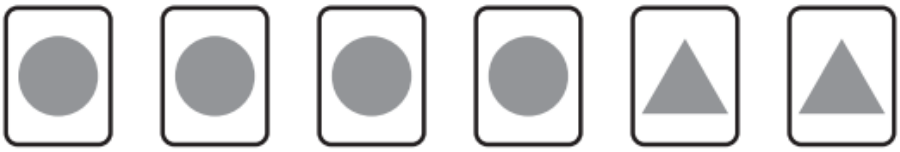


[2]

(b) Calculate the probability that Jim's team wins their next match.

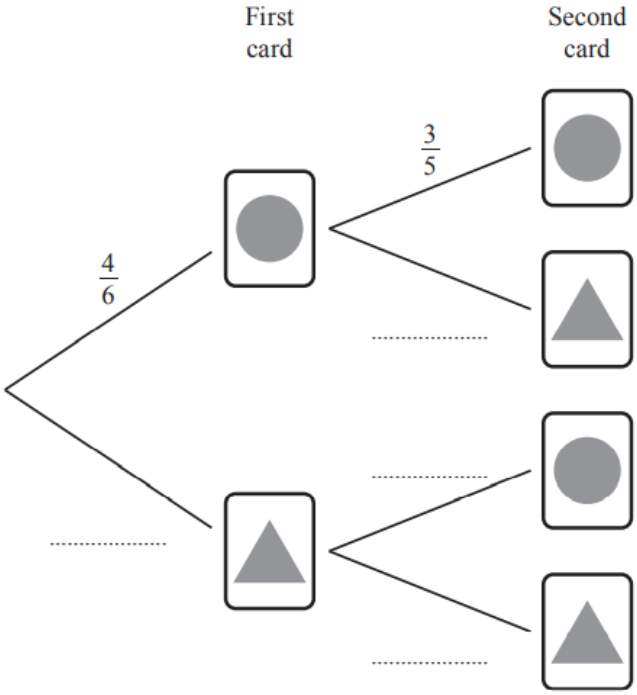
..... [2]

10. 4024/12/M/J/19 Q17



Nima has these six cards. Each card has a shape on it.
She takes two cards at random without replacement.

(a) Complete the tree diagram.



[2]

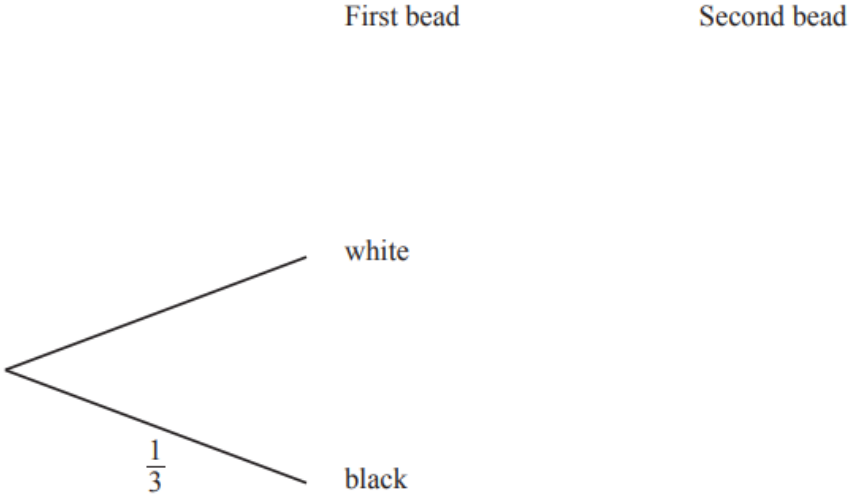
(b) Find the probability that the shapes on Nima's two cards are the same.
Give your answer as a fraction.

..... [2]

11. 4024/12/O/N/19 Q17

A bag contains two white beads and one black bead only.
Two beads are taken, at random, without replacement from the bag.

(a) Complete the tree diagram.



[2]

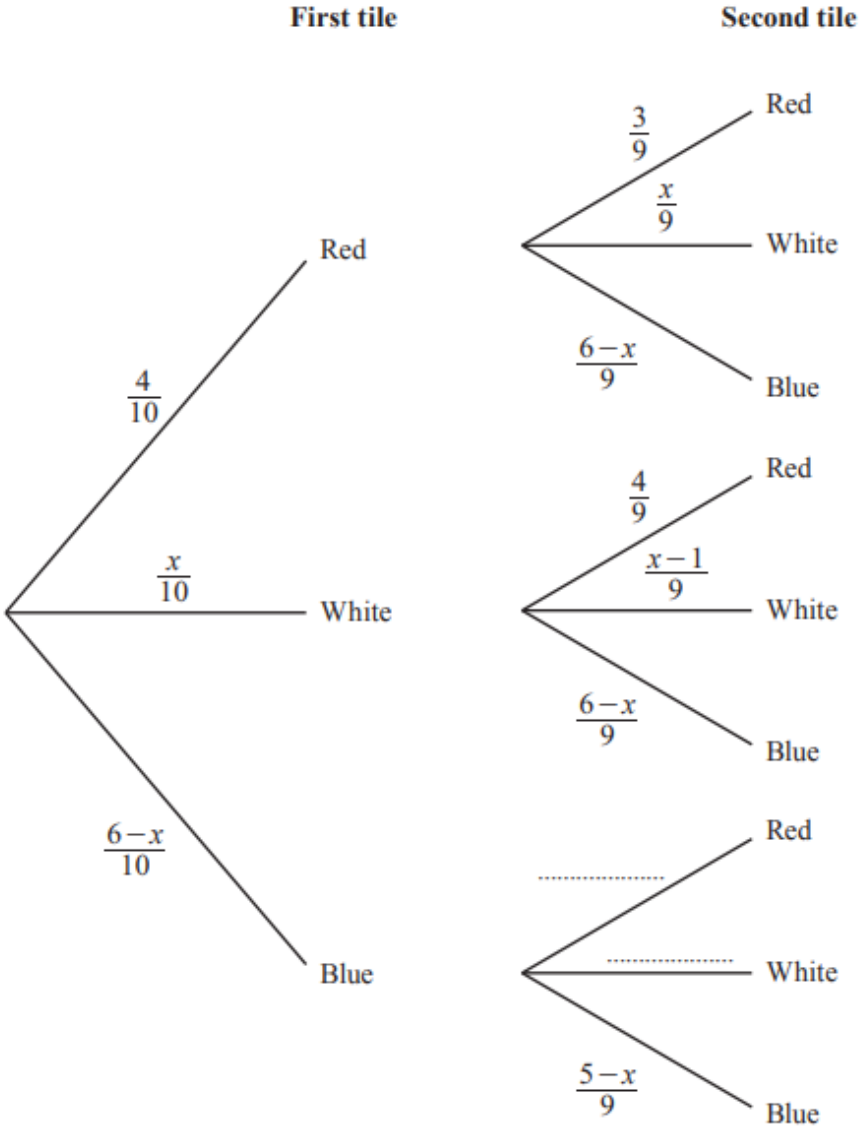
(b) Write down the probability that two black beads are taken.

..... [1]

12. 4024/21/M/J/20 Q9

A bag contains 10 tiles.
There are 4 red tiles, x white tiles and the rest are blue.
Two tiles are taken at random, without replacement, from the bag.

(a) Complete the tree diagram.



[2]

(b) Calculate the probability that both the tiles are red.

..... [1]

(c) **(i)** Show that the probability that the tiles are both the same colour is $\frac{x^2-6x+21}{45}$.

[4]

(ii) The probability the tiles are both the same colour is $\frac{16}{45}$.

Show that $x^2-6x+5=0$.

[1]

(iii) Solve $x^2-6x+5=0$.

$x =$ ..... or $x =$ ..... [2]

(iv) There are more red tiles than white tiles in the bag.

Find the probability that the first tile taken from the bag is blue.

..... [2]

13. 4024/22/M/J/20 Q6

(ii) (a)

Two of these cards are chosen at random.
They are placed next to each other to give a two-digit number.

(i) Find the probability that the two-digit number is less than 30.

..... [1]

(ii) List all the possible two-digit numbers that are prime.

..... [2]

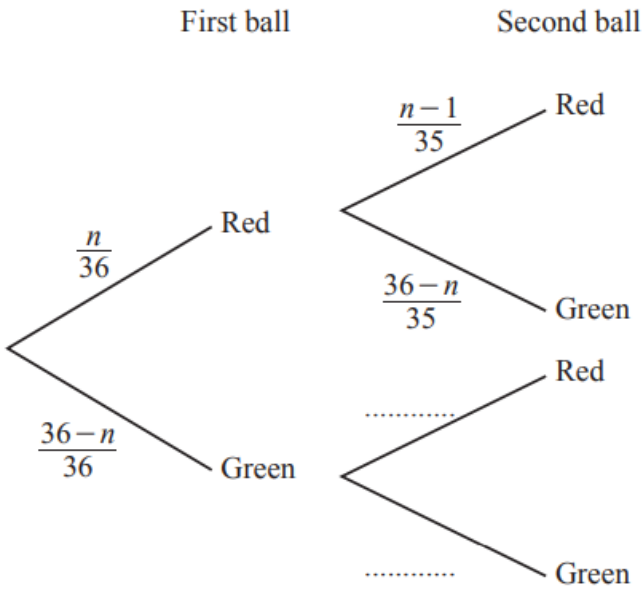
(iii) Find the probability that the two-digit number is a multiple of 4.

..... [2]

14. 4024/21/O/N/20 Q8

A bag contains 36 balls.
There are n red balls in the bag.
The rest of the balls are green.
Esther takes two balls from the bag, at random, without replacement.

(a) Complete the tree diagram.



[2]

(b) Write an expression, in terms of n, for the probability that Esther's first ball is red and her second ball is green.

..... [1]

(c) The probability that Esther's first ball is red and her second ball is green is $\frac{1}{7}$.

Show that $n^2 - 36n + 180 = 0$.

[2]

(d) Solve the equation $n^2 - 36n + 180 = 0$.
Show your working.

$n =$ ..... or $n =$ ..... [2]

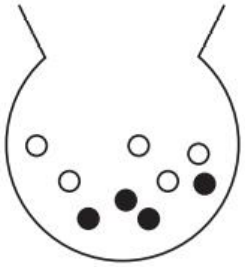
(e) There are more green balls than red balls in the bag.

Find the probability that Esther takes two green balls.
Give your answer as a fraction in its lowest terms.

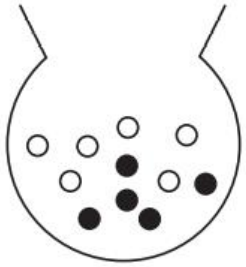
..... [3]

15. 4024/21/O/N/22 Q5

(a)



Bag 1



Bag 2

George has two bags each containing black balls and white balls.

(i) George says:

I am more likely to take a black ball from bag 2 than from bag 1.

Show that George is correct.

[2]

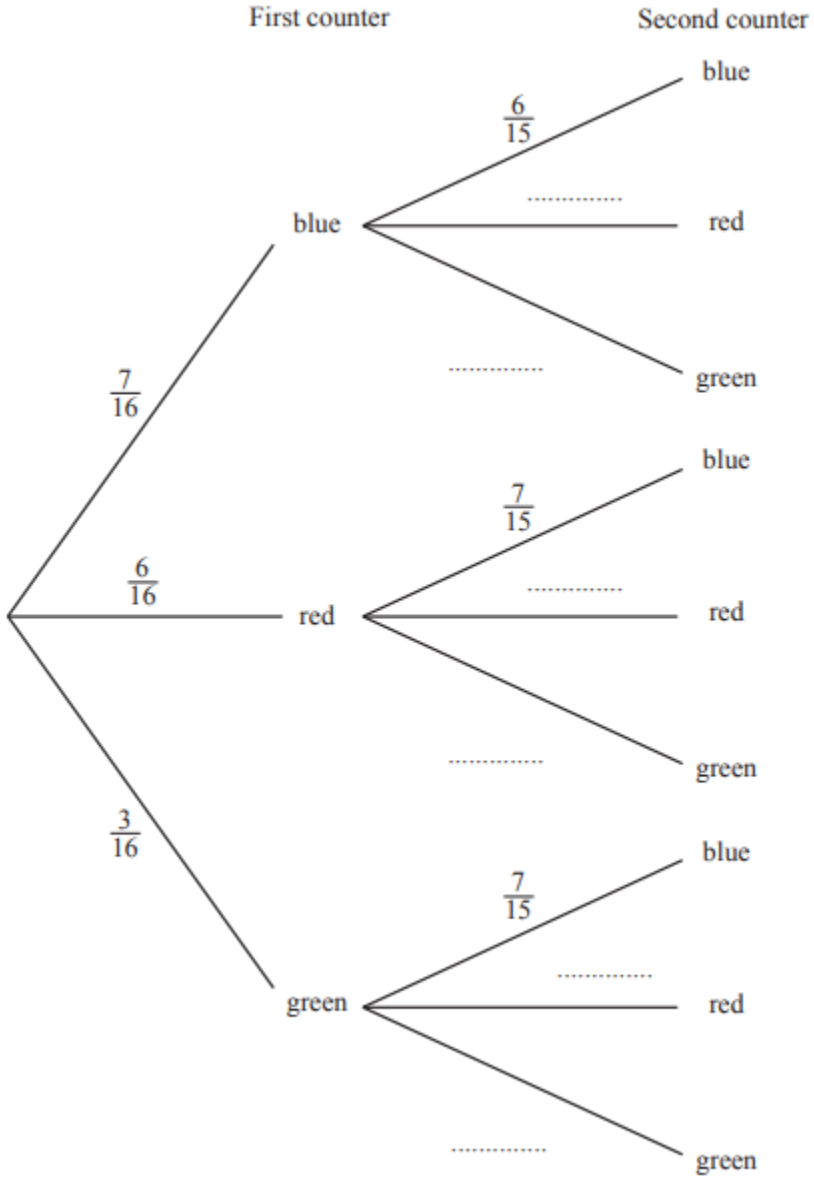
(ii) George takes a ball at random from Bag 2, notes its colour and replaces it.
He repeats this 220 times.

How many times would he expect to take a white ball?

..... [2]

(b) A bag contains 7 blue counters, 6 red counters and 3 green counters.
Yasmin takes two counters from the bag at random without replacement.

(i) Complete the tree diagram.



[2]

(ii) Find the probability that at least one of the counters is red.

..... [3]