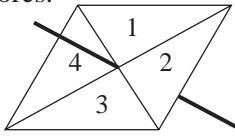


# UNIT 5 Probability

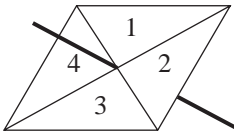
## Revision Test 5.1

40 minutes are allowed

1. Express the probability of the following events as  
*Certain*  
*Probable*  
*Possible*  
*Unlikely*  
*Impossible*
  - (a) Tomorrow is a Saturday.
  - (b) The first day of each year is a Sunday.
  - (c) There are 24 hours in each day.
  - (d) It will snow next week.
  - (e) You will live for more than 50 years. (5 marks)
  
2. If I throw a fair die 90 times, how many times should I expect to get
  - (a) an odd number,
  - (b) a '2'? (3 marks)
  
3. With a biased coin, the probability of obtaining HEADS is  $\frac{2}{3}$ .  
 What is the probability of obtaining TAILS? (1 mark)
  
4. Gary spins two spinners A and B.  
 List all possible combinations of scores.
 



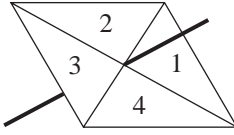
A



B

(2 marks)  
(LON)
  
5. A spinner, with its edges numbered one to four, is biased.  
 For one spin, the probability of scoring 1 is 0.2, the probability of scoring 3 is 0.15 and the probability of scoring 4 is 0.3.
 

- (a) Calculate the probability of scoring 2 with one spin. (1 mark)
  - (b)
    - (i) Explain why the spinner is described as biased.
    - (ii) If the spinner were fair, what could you say about the probabilities of each of the four possible scores? (2 marks)



### Revision Test 5.1

(c) The spinner is spun twice.

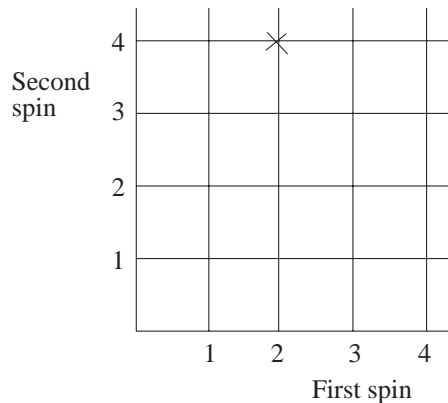
(i) Represent all the possible outcomes by crosses on the diagram below.

The outcome

First spin 2

Second spin 4

has been marked for you.



(ii) Copy the diagram and draw a ring round those crosses for which the total of the two spins is 6.

(3 marks)

(MEG)

6. A bag contains 40 marbles, 25 green ones and 15 red ones. A marble is picked at random from the bag.

What is the probability of picking a red marble?

(2 marks)

7. Sangita is playing 'heads or tails' with her friend. She spins a fair coin four times and gets four heads.

(a) What is the probability that she gets a tail with her next spin of the coin?

(1 mark)

(b) If Sangita spins the coin 600 times in succession, approximately how many times should she expect to get a tail?

(1 mark)

(NEAB)

8. In a raffle 100 tickets are sold. Only one prize can be won.

(a) Nicola buys one ticket.

What is the probability that she wins the prize?

(1 mark)

(b) Dee buys five tickets.

What is the probability that she wins the prize?

(1 mark)

(c) Keith buys some tickets. The probability that he wins the prize is  $\frac{3}{20}$ .

(i) What is the probability that he does not win the prize?

(ii) How many tickets did he buy?

(3 marks)

(SEG)

### Revision Test 5.1

9. A bag contains a number of counters.

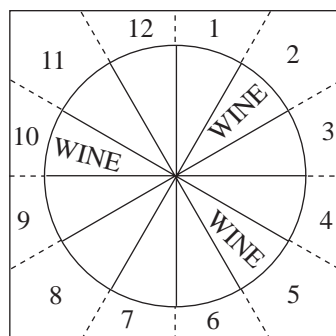
Each counter is coloured red, blue, yellow or green.

Each counter is numbered 1, 2 or 3.

The table shows the probability of colour and number for these counters.

Number of counter	Colour of Counter			
	Red	Blue	Yellow	Green
1	0.2	0	0.1	0
2	0.2	0.1	0.1	0
3	0.1	0.1	0	0.1

- (a) There are two green counters in the bag.  
How many counters are in the bag altogether? (2 marks)
- (b) A counter is taken from the bag at random
- What is the probability that it is red *and* numbered 2?
  - What is the probability that it is green *or* numbered 2?
  - What is the probability that it is red *or* numbered 2? (5 marks)  
(SEG)
10. Peter and Jennifer go to their school's Autumn Fair. Peter has a go on the 'Spinning Wheel'. After every spin, three numbers are exactly next to the words 'WINE'.



**WIN A BOTTLE OF WINE**  
Choose a number on the board  
If your number is next to  
'WINE' you will win a bottle!

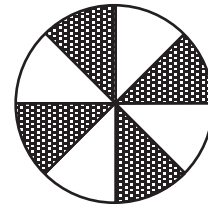
- (a) Peter says "I'll have one go. I have a good chance of winning."  
Is Peter right? Give a reason for your answer. (2 marks)
- (b) Peter chooses the number 8,
- What is the probability that he will win a bottle of wine?  
Give your answer as a fraction in its simplest form.
  - What is the probability that he does not win a bottle of wine? (2 marks)

**Revision Test 5.1**

- (c) The next stall they visit is a dart stall.

The probability that Jennifer hits the shaded area is 0.45 and the probability that she hits the unshaded area is 0.35.

What is the probability that she misses the dartboard altogether?



(2 marks)  
(NEAB)

11. A coin is tossed three times. Find the probability of 'heads' coming up

- (a) at all three throws,      (b) not even once,      (c) at least once.

(4 marks)

12. Leroy is taking two exams, Biology and Chinese.

The probabilities of passing these are as follows:

Biology:  $\frac{3}{4}$

Chinese:  $\frac{4}{5}$

- (a) Construct a tree diagram, showing all the probabilities.

(2 marks)

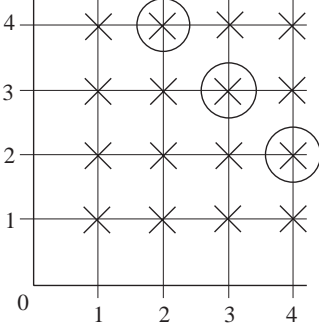
- (b) Calculate the probability that

- (i) he passes both subjects,  
(ii) he passes one subject and fails one.

(5 marks)  
(SEG)

## Revision Test 5.1

## Answers

1. (b) Impossible (c) Certain B1 B1 B1 B1 B1 (5 marks)  
(Responses to (a), (d), and (e) will vary.)
2. (a) About 45 times. (b) About 15 times. B1 M1 A1 (3 marks)
3.  $\frac{1}{3}$  B1 (1 mark)
4. (1, 1), (1, 2) (also (2, 1) but not need to list both), (1, 3), B2 (2 marks)  
(1, 4), (2, 2), (2, 3), (2, 4), (3, 3), (3, 4), (4, 4)  
(for completely correct answer)
5. (a) 0.35 B1  
(b) (i) Probabilities are not equal (ii) each = 0.25 B1 B1
- (c)  B2 B1 (6 marks)
6.  $\frac{15}{40} = \frac{3}{8}$  M1 A1 (2 marks)
7. (a)  $\frac{1}{2}$  (b) About 300 B1 B1 (2 marks)
8. (a)  $\frac{1}{100}$  (b)  $\frac{5}{100} = \frac{1}{20}$  (c) (i)  $\frac{17}{20}$  (ii) 15 B1 B1 B1 M1 A1 (5 marks)
9. (a) 20 (b) (i) 0.2 (ii) 0.5 (iii) 0.7 M1 A1 B1 B2 B2 (7 marks)
10. (a) No. Whichever number is chosen, the probability of winning is less than  $\frac{1}{2}$ . B1 B1  
(b) (i)  $\frac{1}{4}$  (ii)  $\frac{3}{4}$  (c) 0.2 B1 B1 M1 A1 (6 marks)
11. (a)  $\frac{1}{8}$  (b)  $\frac{1}{8}$  (c)  $\frac{7}{8}$  B1 B1 B2 (4 marks)
12. (a) tree diagram B2  
(b) (i)  $\frac{3}{5}$  (ii)  $\left(\frac{3}{4} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{4}{5}\right) = \frac{7}{20}$  M1 A1 M2 A1 (7 marks)

**(TOTAL MARKS****50)**

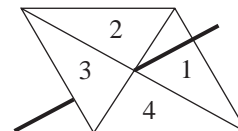
# UNIT 5 Probability

## Revision Test 5.2

40 minutes are allowed

1. A spinner, with its edges numbered one to four, is biased.

For one spin, the probability of scoring 1 is 0.2, the probability of scoring 3 is 0.15 and the probability of scoring 4 is 0.3.



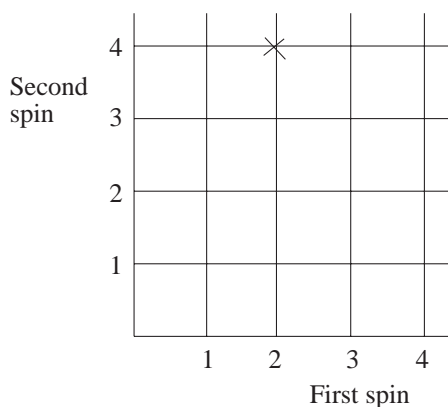
- (a) Calculate the probability of scoring 2 with one spin. (1 mark)
- (b) (i) Explain why the spinner is described as biased.  
 (ii) If the spinner were fair, what could you say about the probabilities of each of the four possible scores? (2 marks)
- (c) The spinner is spun twice.  
 (i) Represent all the possible outcomes by crosses on the diagram below.

The outcome

First spin 2

Second spin 4

has been marked for you.



- (ii) Copy the diagram and draw a ring round those crosses for which the total of the two spins is 6. (3 marks)  
 (MEG)

2. A bag contains 40 marbles, 25 green ones and 15 red ones. A marble is picked at random from the bag. What is the probability of picking a red marble? (2 marks)

3. Sangita is playing 'heads or tails' with her friend.  
 She spins a fair coin four times and gets four heads.

- (a) What is the probability that she gets a tail with her next spin of the coin? (1 mark)
- (b) If Sangita spins the coin 600 times in succession, approximately how many times should she expect to get a tail? (1 mark)  
 (NEAB)

## Revision Test 5.2

4. In a raffle 100 tickets are sold. Only one prize can be won.
- (a) Nicola buys one ticket.  
What is the probability that she wins the prize? (1 mark)
- (b) Dee buys five tickets.  
What is the probability that she wins the prize? (1 mark)
- (c) Keith buys some tickets. The probability that he wins the prize is  $\frac{3}{20}$ .
- (i) What is the probability that he does not win the prize?
- (ii) How many tickets did he buy? (3 marks)  
(SEG)

5. A bag contains a number of counters.  
Each counter is coloured red, blue, yellow or green.  
Each counter is numbered 1, 2 or 3.  
The table shows the probability of colour and number for these counters.

Number of counter	Colour of Counter			
	Red	Blue	Yellow	Green
1	0.2	0	0.1	0
2	0.2	0.1	0.1	0
3	0.1	0.1	0	0.1

- (a) There are two green counters in the bag.  
How many counters are in the bag altogether? (2 marks)
- (b) A counter is taken from the bag at random
- (i) What is the probability that it is red *and* numbered 2?
- (ii) What is the probability that it is green *or* numbered 2?
- (iii) What is the probability that it is red *or* numbered 2? (5 marks)  
(SEG)
6. Leroy is taking two exams, Biology and Chinese.  
The probabilities of passing these are as follows:
- Biology:  $\frac{3}{4}$
- Chinese:  $\frac{4}{5}$
- (a) Construct a tree diagram, showing all the probabilities. (2 marks)
- (b) Calculate the probability that
- (i) he passes both subjects,
- (ii) he passes one subject and fails one. (5 marks)  
(SEG)

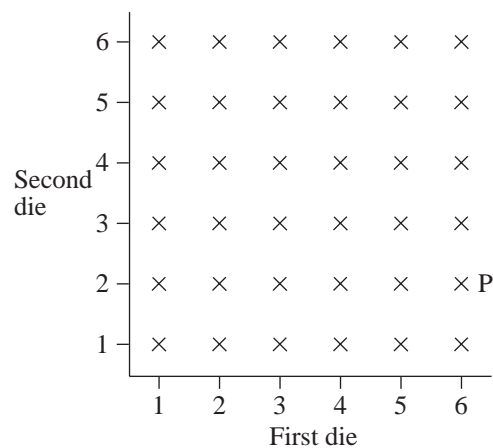
**Revision Test 5.2**

7. A dice is biased as follows:

The probability of scoring a 6 is 0.4.

The probability of scoring a 5 is 0.2.

- (a) Julia throws a dice once. Calculate the probability that the score will be 5 or 6. (2 marks)
- (b) Jeff throws the dice twice. Calculate the probability that both scores will be 6s. (2 marks)  
(SEG)
8. (a) Jim owns a car. On any morning, the probability that the car will start is 0.9. Calculate the probability that the car will not start on a particular morning. (1 mark)
- (b) June and Jeff own a van and a motorbike. The probability that the van will start is 0.8. The probability that the motorbike will start is 0.75.
- (i) Calculate the probability that both the van and the motorbike will start on a particular morning. (2 marks)
- (ii) Calculate the probability that, on another morning, only one of these two will start. (2 marks)  
(SEG)
9. The diagram shows all the possible outcomes when two fair dice are thrown.

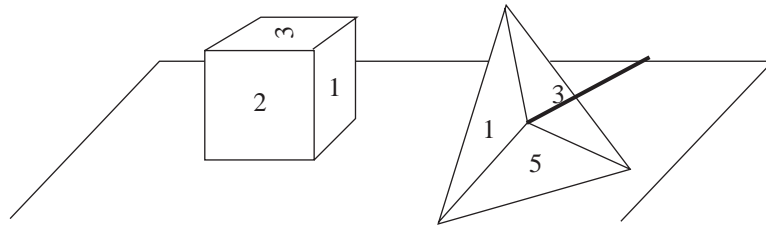


- (a) Explain clearly what outcome is represented by the cross P. (2 marks)
- (b) On the diagram ring each of the crosses representing those outcomes with a total score on the two dice 8. (1 mark)
- (c) Find the probability, as a fraction in its lowest terms, that
- (i) the two dice will show a total score of 8,
- (ii) the two dice will show the same score as each other,
- (iii) the two dice will not show the same score as each other. (4 marks)  
(MEG)



**Revision Test 5.2**

10. The diagram represents a fair die and a fair spinner.  
The die is a cube with faces labelled 1, 2, 3, 4, 5 and 6.  
The triangular spinner is labelled 1, 3 and 5.  
The score on the die is 3.  
The score on the spinner is 5.

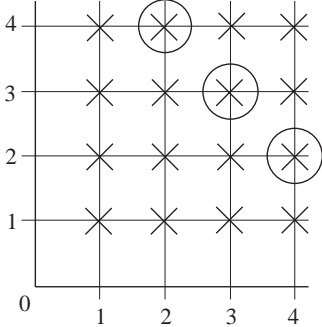


The die is thrown and the spinner is spun.  
The two scores are added together.

- (a) Calculate the probability that the total score will be 2. (2 marks)  
(b) Calculate the probability that the total score will be 6. (3 marks)

## Revision Test 5.2

## Answers

1. (a) 0.35 B1  
 (b) (i) Probabilities are not equal (ii) each = 0.25 B1 B1  
 (c)  B2 B1 (6 marks)
2.  $\frac{15}{40} = \frac{3}{8}$  M1 A1 (2 marks)
3. (a)  $\frac{1}{2}$  (b) About 300 B1 B1 (2 marks)
4. (a)  $\frac{1}{100}$  (b)  $\frac{5}{100} = \frac{1}{20}$  (c) (i)  $\frac{17}{20}$  (ii) 15 B1 B1 B1 M1 A1 (5 marks)
5. (a) 20 (b) (i) 0.2 (ii) 0.5 (iii) 0.7 M1 A1 B1 B2 B2 (7 marks)
6. (a) Tree diagram B2  
 (b) (i)  $\frac{3}{5}$  (ii)  $\left(\frac{3}{4} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{4}{5}\right) = \frac{7}{20}$  M1 A1 M2 A1 (7 marks)
7. (a) 0.6 (b) 0.16 M1 A1 M1 A1 (4 marks)
8. (a) 0.1 (b) (i) 0.6 (ii) 0.35 B1 M1 A1 M1 A1 (5 marks)
9. (a) 1st die - 6, 2nd die - 2 (b) cross on diagram B2 B1  
 (c) (i)  $\frac{5}{36}$  (ii)  $\frac{1}{6}$  (iii)  $\frac{5}{6}$  B1 B2 B1 (7 marks)
10. (a)  $\frac{1}{18}$  (b)  $\frac{1}{6}$  M1 A1 M2 A1 (5 marks)

**(TOTAL MARKS 50)**

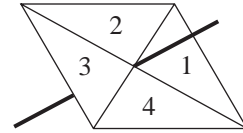
# UNIT 5 Probability

## Revision Test 5.3

40 minutes are allowed

1. A spinner, with its edges numbered one to four, is biased.

For one spin, the probability of scoring 1 is 0.2, the probability of scoring 3 is 0.15 and the probability of scoring 4 is 0.3.



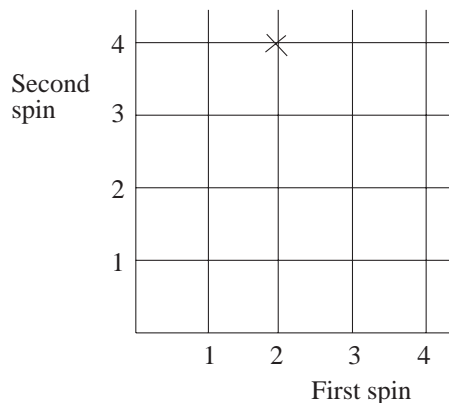
- (a) Calculate the probability of scoring 2 with one spin. (1 mark)
- (b) (i) Explain why the spinner is described as biased.  
(ii) If the spinner were fair, what could you say about the probabilities of each of the four possible scores? (2 marks)
- (c) The spinner is spun twice.  
(i) Represent all the possible outcomes by crosses on the diagram below.

The outcome

First spin 2

Second spin 4

has been marked for you.



- (ii) Copy the diagram and draw a ring round those crosses for which the total of the two spins is 6. (3 marks)  
(MEG)

2. A bag contains 40 marbles, 25 green ones and 15 red ones. A marble is picked at random from the bag. What is the probability of picking a red marble? (2 marks)

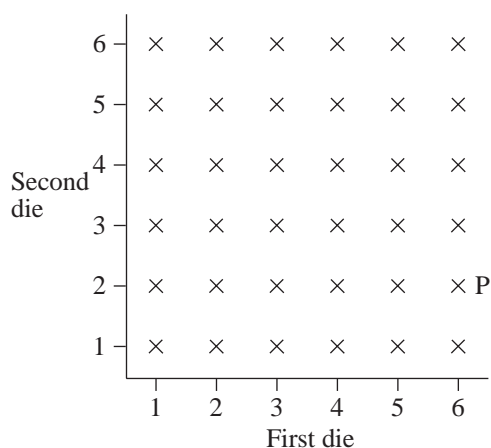
3. Sangita is playing 'heads or tails' with her friend.

She spins a fair coin four times and gets four heads.

- (a) What is the probability that she gets a tail with her next spin of the coin? (1 mark)
- (b) If Sangita spins the coin 600 times in succession, approximately how many times should she expect to get a tail? (1 mark)  
(NEAB)

**Revision Test 5.3**

4. In a raffle 100 tickets are sold. Only one prize can be won.
- Nicola buys one ticket.  
What is the probability that she wins the prize? (1 mark)
  - Dee buys five tickets.  
What is the probability that she wins the prize? (1 mark)
  - Keith buys some tickets. The probability that he wins the prize is  $\frac{3}{20}$ .
    - What is the probability that he does not win the prize?
    - How many tickets did he buy? (3 marks)  
(SEG)
5. Leroy is taking two exams, Biology and Chinese.  
The probabilities of passing these are as follows:
- Biology:  $\frac{3}{4}$   
Chinese:  $\frac{4}{5}$
- Construct a tree diagram, showing all the probabilities. (2 marks)
  - Calculate the probability that
    - he passes both subjects,
    - he passes one subject and fails one. (5 marks)  
(SEG)
6. The diagram shows all the possible outcomes when two fair dice are thrown.



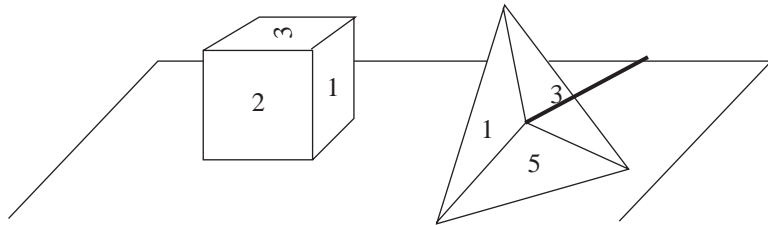
- Explain clearly what outcome is represented by the cross P. (2 marks)
- On the diagram ring each of the crosses representing those outcomes with a total score on the two dice 8. (1 mark)

**Revision Test 5.3**

- (c) Find the probability, as a fraction in its lowest terms, that
- (i) the two dice will show a total score of 8,
  - (ii) the two dice will show the same score as each other,
  - (iii) the two dice will not show the same score as each other.

(4 marks)  
(MEG)

7. The diagram represents a fair die and a fair spinner.  
The die is a cube with faces labelled 1, 2, 3, 4, 5 and 6.  
The triangular spinner is labelled 1, 3 and 5.  
The score on the die is 3.  
The score on the spinner is 5.



The die is thrown and the spinner is spun.  
The two scores are added together.

- (a) Calculate the probability that the total score will be 2.
- (b) Calculate the probability that the total score will be 6.

(2 marks)

(3 marks)

8. A coin is biased.  
The probability that it lands showing heads is 0.7.  
To play a game, the coin is tossed 3 times.

- (a) Find the probability that more heads than tails are obtained.
- (b) You pay £2 to play the game.

(5 marks)

When more heads than tails are obtained you win £1 and you get your £2 back.

Are you likely to win money when playing the game?

Show working to explain how you arrive at your answer.

(3 marks)  
(SEG)

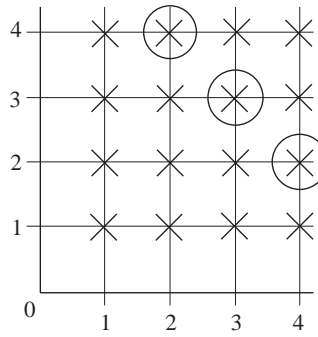
9. A bag contains 4 RED and 6 BLUE balls. One ball is chosen and its colour noted.  
It is *not* put back into the bag.  
A second ball is chosen and its colour noted.

- (a) Draw a tree diagram to represent this situation.
- (b) (i) Find the probability of obtaining *two* RED balls.
- (ii) Find the probability of obtaining one ball of each colour.

(8 marks)  
(SEG)

## Revision Test 5.3

## Answers

1. (a) 0.35 B1  
 (b) (i) Probabilities are not equal (ii) each = 0.25 B1 B1  
 (c)  B2 B1 (6 marks)
2.  $\frac{15}{40} = \frac{3}{8}$  M1 A1 (2 marks)
3. (a)  $\frac{1}{2}$  (b) About 300 B1 B1 (2 marks)
4. (a)  $\frac{1}{100}$  (b)  $\frac{5}{100} = \frac{1}{20}$  (c) (i)  $\frac{17}{20}$  (ii) 15 B1 B1 B1 M1 A1 (5 marks)
5. (a) Tree diagram B2  
 (b) (i)  $\frac{3}{5}$  (ii)  $\left(\frac{3}{4} \times \frac{1}{5}\right) + \left(\frac{1}{4} \times \frac{4}{5}\right) = \frac{7}{20}$  M1 A1 M2 A1 (7 marks)
6. (a) 1st die - 6, 2nd die - 2 (b) cross on diagram B2 B1  
 (c) (i)  $\frac{5}{36}$  (ii)  $\frac{1}{6}$  (iii)  $\frac{5}{6}$  B1 B2 B1 (7 marks)
7. (a)  $\frac{1}{18}$  (b)  $\frac{1}{6}$  M1 A1 M2 A1 (5 marks)
8. (a)  $p(3 \text{ heads}) = (0.7)^3 = 0.343$ , M1 A1  
 $p(2 \text{ heads}) = 3 \times 0.3 \times (0.7)^2 = 0.441$  M1 A1  
 $p(2 \text{ or more heads}) = 0.343 + 0.441 = 0.784$  B1  
 (b)  $1 \times 0.784 - 2 \times 0.216 > 0$  - Yes M2 A1 (8 marks)
9. (a) Tree diagram (b) (i)  $\frac{2}{15}$  (ii)  $\frac{8}{15}$  B3 M1 A1 M2 A1 (8 marks)

(TOTAL MARKS 50)