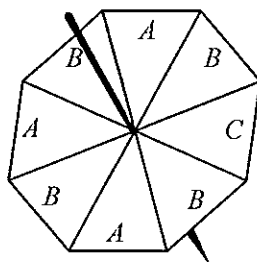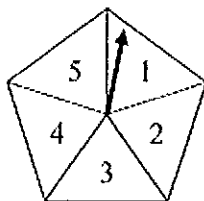**1.**

The diagram shows a fair spinner in the shape of a rectangular octagon.
The spinner can land on A or B or C.
Marc spins the spinner.

Write down the probability that the spinner will land on A.

.............$\frac{3}{8}$.............

(Total 2 marks)

2. Ishah spins a fair 5-sided spinner.
She then throws a fair coin.

(a) List all the possible outcomes she could get.
The first one has been done for you.

(1, head)....(2, head)...(3, head)...(4, head)...(5, head).............
(1, tail)..(2, tail)..(3, tail)...(4, tail)..(5, tail).................

....

(2)

Ishah spins the spinner once and throws the coin once.

(b) Work out the probability that she will get a 1 and a head.

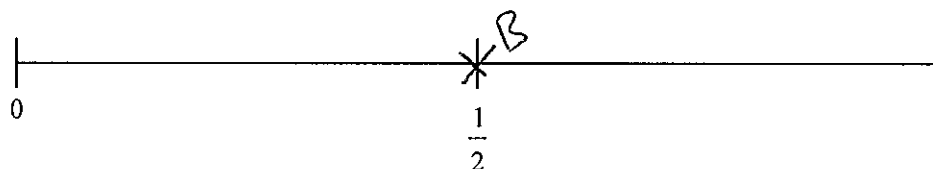.............$\frac{1}{10}$.............

(1)
(Total 3 marks)

3. There are eight marbles in a bag.

Four marbles are blue (B),
two marbles are red (R)
and two marbles are green (G).
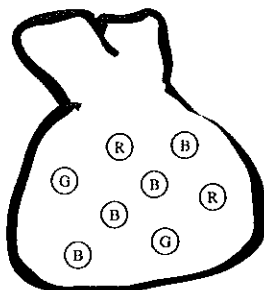
Steve takes a marble at random from the bag.
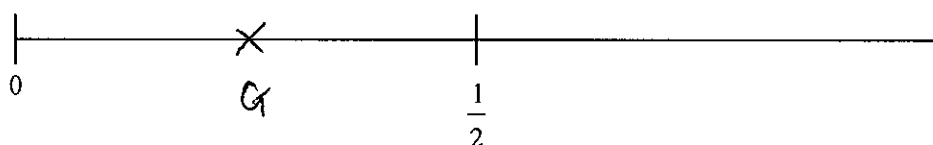
(a) On the probability scale, mark with the letter B, the probability that Steve will take a blue marble.
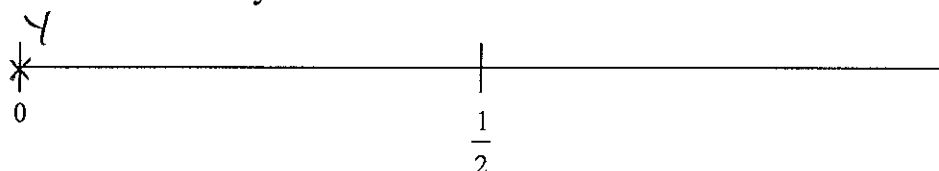

(1)

(b) On the probability scale, mark with the letter G, the probability that Steve will take a green marble.
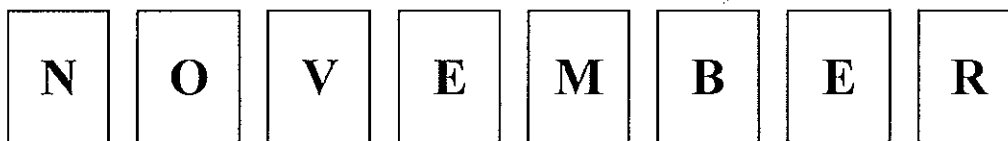

(1)

(c) On the probability scale, mark with the letter Y, the probability that Steve will take a yellow marble.

(1)
(Total 3 marks)

4. Lucy uses some letter cards to spell the word "NOVEMBER".

| N | O | V | E | M | B | E | R |

Lucy takes one of these cards at random.

Write down the probability that Lucy takes a card with a letter E.

$\frac{2}{8}$

....
(Total 2 marks)

5. Here are some statements.

Draw an arrow from each statement to the word which best describes its likelihood.

One has been done for you.

| A head is obtained when a fair coin is thrown once. |

| A number less than 7 will be scored when an ordinary six-sided dice is rolled once. |

| It will rain every day for a week next July in London. |

| A red disc is obtained when a disc is taken at random from a bag containing 9 red discs and 2 blue discs. |

Certain

Likely $\frac{9}{11}$

Even

Unlikely

Impossible
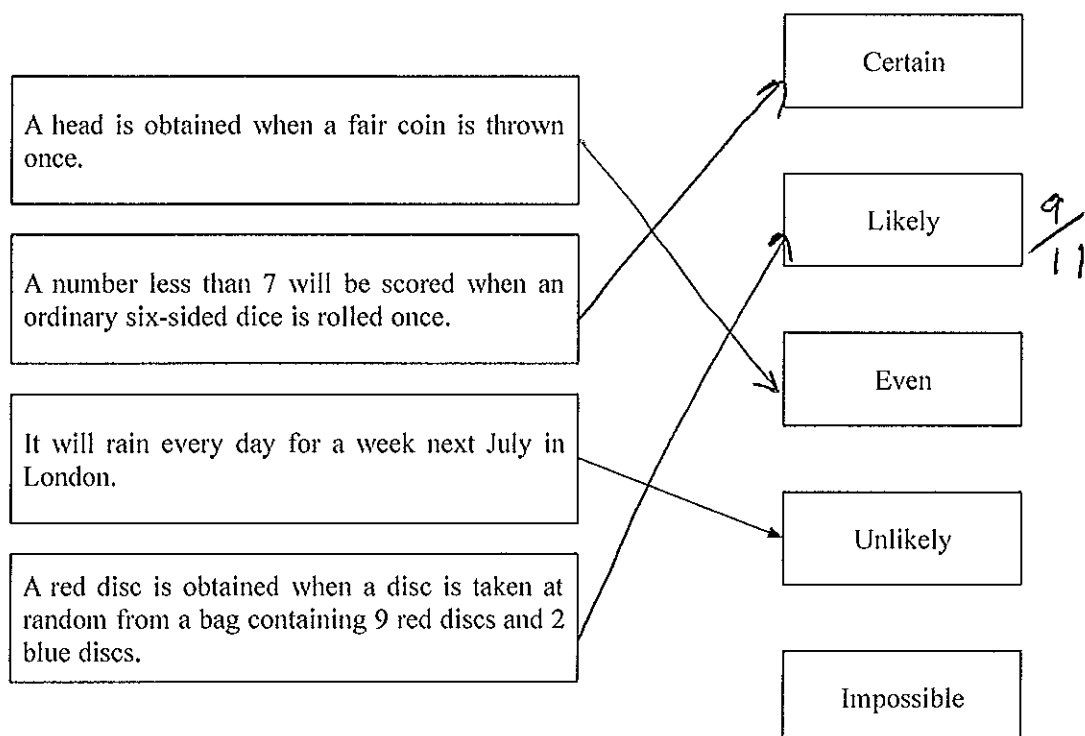
(Total 3 marks)

6. There are three beads in a bag.
    One bead is red, one bead is white and one bead is yellow.

    Sarah takes, at random, a bead from the bag.
    She looks at its colour and then puts the bead back in the bag.

    On the probability line,

    (i)   mark with the letter R the probability that Sarah takes a red bead.

    (ii) mark with the letter B the probability that Sarah takes a black bead.

                                                                    (2)
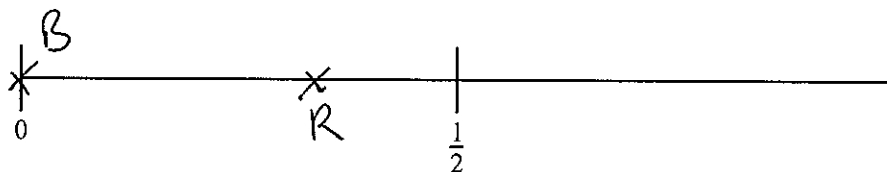   (Total 2 marks)

7. A bag contains some beads which are red or green or blue or yellow.

    The table shows the number of beads of each colour.

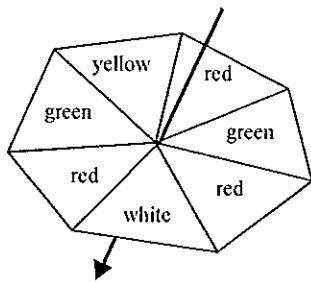 | Colour | Red | Green | Blue | Yellow |
    |-----------------|-----|-------|------|--------|
    | Number of beads | 3 | 2 | 5 | 2 |

    Samire takes a bead at random from the bag.
    Write down the probability that she takes a blue bead.

    $\dfrac{5}{12}$
    ....
                                                          (Total 2 marks)

8.

Here is a fair 7-sided spinner.
The spinner is to be spun once.
The spinner will land on one of the colours.

(a) On which colour is the spinner most likely to land?

$\left(\dfrac{3}{7}\right)$ RED

(1)

(b) Write down the probability that the spinner will land on green.
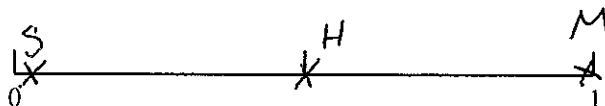
$\dfrac{2}{7}$

(1)

(Total 2 marks)

9. On the probability scale below, mark

(i) with the letter S, the probability that it will snow in London in June,

(ii) with the letter H, the probability that when a fair coin is thrown once it comes down heads,

(iii) with the letter M, the probability that it will rain in Manchester next year.

(Total 3 marks)

10. Joshua rolls an ordinary dice once.
It has faces marked 1, 2, 3, 4, 5 and 6.

(a) Write down the probability that he gets

(i) a 6,

.... 1/6 ....

(ii) an odd number,

.... 3/6 ....

(iii) a number less than 3,

.... 2/6 ....

(iv) an 8.

.... 0 ....

(4)

Ken rolls a different dice 60 times. This dice also has six faces.

The table gives information about Ken's scores.

Score on dice	Frequency
1	9
2	11
3	20
4	2
5	8
6	10

(b) Explain what you think is different about Ken's dice.

It does not look like the dice is fair.
There have been 20 3's, but only 2 fours.

(1)
(Total 5 marks)

11. Emily has a bag of 20 fruit flavour sweets.

7 of the sweets are strawberry flavour,
11 are lime flavour,
2 are lemon flavour.

Emily takes at random a sweet from the bag.

Write down the probability that Emily

(a)   takes a strawberry flavour sweet,

.............7/20.........(1)

(b)   does **not** take a lime flavour sweet,

.............9/20.......(1)

(c)   takes an orange flavour sweet.

.............0......(1)

(Total 3 marks)

12. (a)   On the probability scale below, mark with a cross (×)
the probability that it will rain on at least one day in London in 2008.

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

(1)
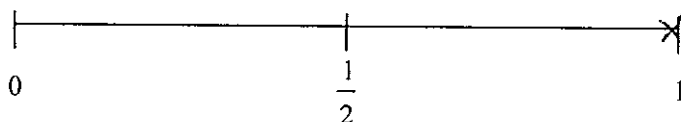
(b)   On the probability scale below, mark with a cross (×)
the probability that you will get a 10 when you roll an ordinary 6-sided
dice.

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

(1)
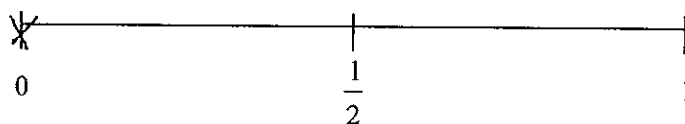
(c)   On the probability scale below, mark with a cross (×)
the probability that you will get a head when you throw a coin.

0          $\frac{1}{2}$ 1
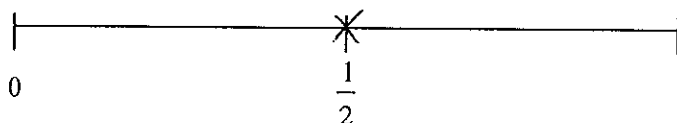
(1)
(Total 3 marks)

1. Hannah is going to play one badminton match and one tennis match.

The probability that she will win the badminton match is $\dfrac{9}{10}$

The probability that she will win the tennis match is $\dfrac{2}{5}$

(a) Complete the probability tree diagram.

(2)

badminton   **tennis**

$\dfrac{2}{5}$ — Hannah wins

Hannah wins

$\dfrac{9}{10}$

$\dfrac{3}{5}$ — Hannah does not win

$\dfrac{2}{5}$ — Hannah wins

$\dfrac{1}{10}$

Hannah does not win

$\dfrac{3}{5}$ — Hannah does not win
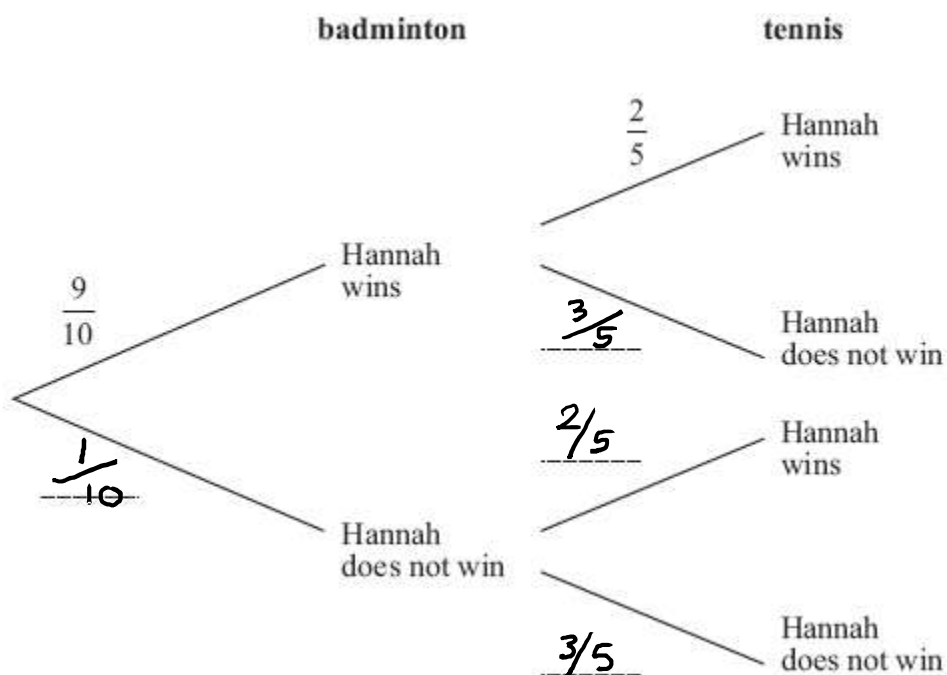
(b) Work out the probability that Hannah will win **both** matches.

(2)

$$\dfrac{9}{10} \times \dfrac{2}{5} = \dfrac{18}{50}$$

$\dfrac{18}{50}$

....

(4 marks)

2. There are only red marbles and green marbles in a bag.
There are 5 red marbles and 3 green marbles.

Dwayne takes at random a marble from the bag.
He does not put the marble back in the bag.

Dwayne takes at random a second marble from the bag.

(a) Complete the probability tree diagram.

1st Marble		2nd Marble

$\frac{5}{8}$ Red

$\frac{4}{7}$ Red

$\frac{3}{7}$ Green

$\frac{3}{8}$ Green

$\frac{5}{7}$ Red

$\frac{2}{7}$ Green

(2)
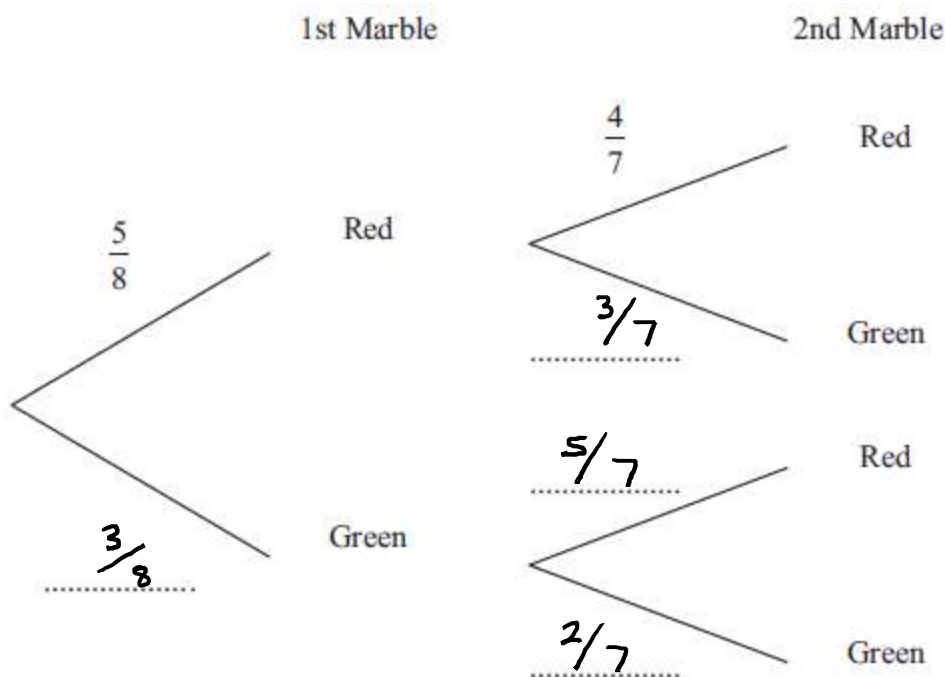
(b) Work out the probability that Dwayne takes marbles of different colours.

$$P(RG) = \frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$$

$$P(GR) = \frac{3}{8} \times \frac{5}{7} = \frac{15}{56}$$

.... $\frac{30}{56}$ ....

(3)

(5 marks)

3.   Wendy goes to a fun fair.
She has one go at Hoopla.
She has one go on the Coconut shy.

The probability that she wins at Hoopla is 0.4
The probability that she wins on the Coconut shy is 0.3

(a) Complete the probability tree diagram.

Hoopla   **Coconut shy**

0.4 Wendy wins
                    0.3 Wendy wins
                    0.7 Wendy does not win
0.6 Wendy does not win
                    0.3 Wendy wins
                    0.7 Wendy does not win

(2)
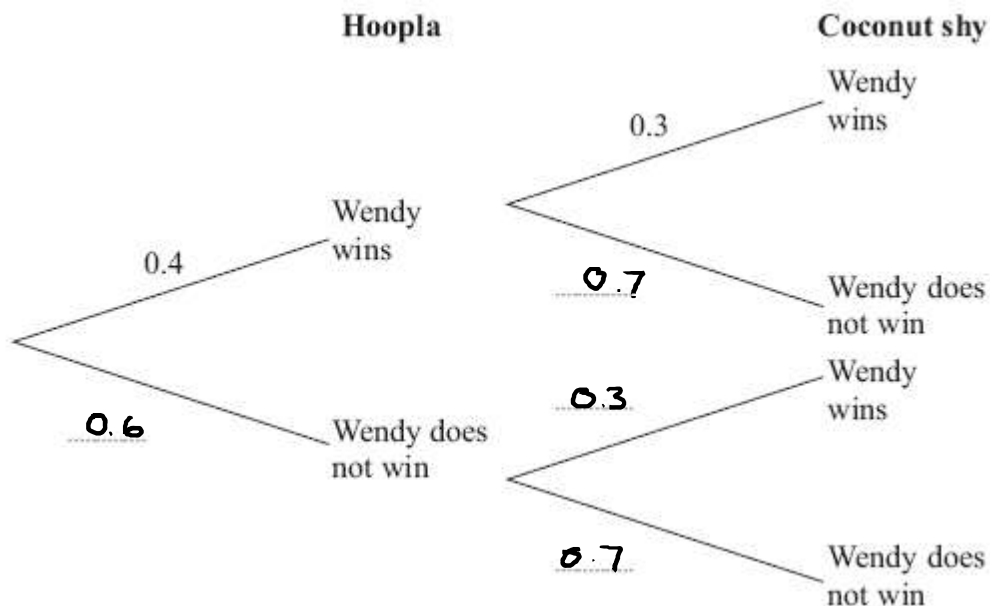
(b) Work out the probability that Wendy wins at Hoopla and also wins on the Coconut shy.

0.4×0.3

.... 0.12 ....

(2)

(4 marks)

4. There are 5 red pens, 3 blue pens and 2 green pens in a box.

Gary takes at random a pen from the box and gives the pen to his friend.
Gary then takes at random another pen from the box.

Work out the probability that both pens are the same colour.

$$P(RR) \quad \frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$$

$$P(BB) \quad \frac{3}{10} \times \frac{2}{9} = \frac{6}{90}$$

$$P(GG) \quad \frac{2}{10} \times \frac{1}{9} = \frac{2}{90}$$

$$\frac{28}{90}$$

(4 marks)

5. Carolyn has 20 biscuits in a tin.

She has

    12 plain biscuits
    5 chocolate biscuits
    3 ginger biscuits

Carolyn takes at random two biscuits from the tin.

Work out the probability that the two biscuits were **not** the same type.

$$P(\text{not same}) = 1 - P(\text{same})$$

$$P(PP) = \frac{12}{20} \times \frac{11}{19} = \frac{132}{380}$$

$$P(CC) = \frac{5}{20} \times \frac{4}{19} = \frac{20}{380}$$

$$P(GG) = \frac{3}{20} \times \frac{2}{19} = \frac{6}{380}$$

$$P(\text{same}) = \frac{158}{380}$$

$$1 - \frac{158}{380} = \frac{222}{380}$$

$$\frac{222}{380}$$

(4 marks)

6. Here are seven tiles.

| 1 | 1 | 2 | 2 | 2 | 3 | 3 |

Jim takes at random a tile.
He does **not** replace the tile.

Jim then takes at random a second tile.

(a) Calculate the probability that both the tiles Jim takes have the number 1 on them.

$$\frac{2}{7} \times \frac{1}{6} = \frac{2}{42}$$

$$\frac{2}{42}$$

(2)

(b) Calculate the probability that the number on the second tile Jim takes is greater than the number on the first tile he takes.

$$1, 2 \qquad 1, 3 \qquad 2, 3$$

$$P(1,2) = \frac{2}{7} \times \frac{3}{6} = \frac{6}{42}$$

$$P(1,3) = \frac{2}{7} \times \frac{2}{6} = \frac{4}{42}$$

$$P(2,3) = \frac{3}{7} \times \frac{2}{6} = \frac{6}{42}$$

$$\frac{16}{42}$$

(3)

(5 marks)

7. There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,
5 cheese sandwiches
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

$$P(2 \text{ different}) = 1 - P(2 \text{ same})$$

$$P(EE) = \frac{4}{11} \times \frac{3}{10} = \frac{12}{110}$$

$$P(CC) = \frac{5}{11} \times \frac{4}{10} = \frac{20}{110}$$

$$P(HH) = \frac{2}{11} \times \frac{1}{10} = \frac{2}{110}$$

$$P(2 \text{ same}) = \frac{34}{110}$$

$$1 - \frac{34}{110} = \frac{76}{110}$$

$$\frac{76}{110}$$

(5 marks)

1. The probability that a biased dice will land on a five is 0.3

   Megan is going to roll the dice 400 times.

   Work out an estimate for the number of times the dice will land on a five.

   0.3×400

   3×40

   ....120............................

   (2 marks)

2. Jack sows 300 wildflower seeds.
   The probability of a seed flowering is 0.7

   Work out an estimate for the number of these seeds that will flower.

   300×0.7

   30×7

   ....210............................

   (2 marks)

3. Angel Ltd manufacture components for washing machines. The probability that a component will be made within a tolerance of one tenth of a millimetre is 0.995.

   Angel Ltd. manufacture 10 000 components each day.

   Work out an estimate for the number of components that will not be within the tolerance of one tenth of a millimetre each day.

   0.005×10000

   $5 \times 10 = 50$

   ....50............................

   (2 marks)

4. Four teams, City, Rovers, Town and United play a competition to win a cup. Only one team can win the cup.

The table below shows the probabilities of City or Rovers or Town winning the cup.

City	Rovers	Town	United
0.38	0.27	0.15	x

Work out the value of x.

...........0.2..........

(2 marks)

5. Mia spins a spinner.
The spinner can land on red or green or blue or pink.

The table shows each of the probabilities that the spinner will land on red or green or blue.

Colour	Red	Green	Blue	Pink
Probability	0.4	0.1	0.2	

Work out the probability that the spinner will land on pink.

...........0.3...........

(2 marks)

6. A bag contains some sweets.
The flavours of the sweets are either strawberry or chocolate or mint or orange.
Sarah is going to take one sweet at random from the bag.

The table shows the probability that Sarah will take a strawberry sweet or a mint sweet or an orange sweet.

Flavour	Strawberry	Chocolate	Mint	Orange
Probability	0.32		0.17	0.2

Work out the probability that Sarah will take a chocolate sweet.

...........0.31...........

(2 marks)

7. A bag contains only red, green and blue counters.

The table shows the probability that a counter chosen at random from the bag will be red or will be green.

Colour	Red	Green	Blue
Probability	0.5	0.3	

Mary takes a counter at random from the bag.

(a) Work out the probability that Mary takes a blue counter.

0.2

(2)

The bag contains 50 counters.

(b) Work out how many green counters there are in the bag.

0.3 × 50   15

(2)

(4 marks)

8. A bag contains counters which are blue or red or green or yellow.
Mark takes a counter at random from the bag.

The table shows the probabilities he takes a blue counter or a red counter or a yellow counter.

Colour	Blue	red	green	yellow
Probability	0.3	0.2		0.1

(a) Work out the probability that Mark takes a green counter.

0.4

(2)

Mark puts the counter back into the bag.

Laura takes a counter at random from the bag.
She looks at its colour then puts the counter back into the bag.
She does this 50 times.

(b) Work out an estimate for the number of times Laura takes a red counter.

0.2 × 50

10

(2)

(4 marks)

9. Marco has a 4-sided spinner.
    The sides of the spinner are numbered 1, 2, 3 and 4
    The spinner is biased.

    The table shows the probability that the spinner will land on each of the numbers 1, 2 and 3

Number	1	2	3	4
Probability	0.20	0.35	0.20	

    (a) Work out the probability that the spinner will land on the number 4

    ....0.25.............

    (2)

    Marco spins the spinner 100 times.

    (b) Work out an estimate for the number of times the spinner will land on the number 2

    0.35 x 100

    ....35.............

    (2)

    (4 marks)

10. A box contains bricks which are orange or blue or brown or yellow.
    Duncan is going to choose one brick at random from the box.

    The table shows each of the probabilities that Duncan will choose an orange brick or a brown brick or a yellow brick.

Colour	Orange	Blue	Brown	Yellow
Probability	0.35		0.24	0.19

    Work out the probability that Duncan will choose a blue brick.

    ....0.22.............

    (2 marks)

11. Riki has a packet of flower seeds.

   The table shows each of the probabilities that a seed taken at random will grow into a flower that is pink or red or blue or yellow.

Colour	pink	red	blue	yellow	white
Probability	0.15	0.25	0.20	0.16	

   (a)   Work out the probability that a seed taken at random will grow into a white flower.

   ......0.24........
                                      (2)

   There are 300 seeds in the packet.

   All of the seeds grow into flowers.

   (b)   Work out an estimate for the number of red flowers.

   300×0.25 ......75........
                                      (2)

                                   (4 marks)

12.   There are only red counters, blue counters, white counters and black counters in a bag.

   The table shows the probability that a counter taken at random from the bag will be red or blue.

Colour	red	blue	white	black
Probability	0.2	0.5	0.15	0.15

   The number of white counters in the bag is the same as the number of black counters in the bag.

   Tania takes at random a counter from the bag.

   (a) Work out the probability that Tania takes a white counter.

   ......0.15........
                                      (2)

   There are 240 counters in the bag.

   (b) Work out the number of red counters in the bag.

   240×0.2 ......48........
                                      (2)

                                   (4 marks)

13. A bag contains some balls which are red or blue or green or black.
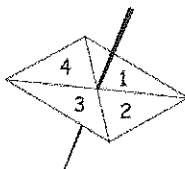   Yvonne is going to take one ball at random from the bag.

    The table shows each of the probabilities that Yvonne will take a red ball or a blue ball or a black ball.

Colour	Red	Blue	Green	Black
Probability	0.3	0.17		0.24

    Work out the probability that Yvonne will take a green ball.

    0.29

    (2 marks)

14. Here is a four-sided spinner. **The spinner is biased.**

    The table shows the probabilities that the spinner will land on 1 or on 3

Number	1	2	3	4
Probability	0.2	0.35	0.1	0.35

    The probability that the spinner will land on 2 is the same as the probability that the spinner will land on 4

    (a) Work out the probability that the spinner will land on 4

    0.35

    (3)

    Shunya is going to spin the spinner 200 times.

    (b) Work out an estimate for the number of times the spinner will land on 3

    0.1 × 200

    20

    (2)

    (5 marks)

15. Here is a 4-sided spinner.

The sides of the spinner are labelled 1, 2, 3 and 4.
The spinner is biased.
The probability that the spinner will land on each of the numbers 2 and 3 is given in the table.
The probability that the spinner will land on 1 is **equal** to the probability that it will land on 4.

Number	1	2	3	4
Probability	x	0.3	0.2	x

(a) Work out the value of x. $x = $ ......0.25......

(2)

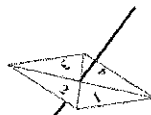Sarah is going to spin the spinner 200 times.

(b) Work out an estimate for the number of times it will land on 2

......60......

0.3×200

(2)

(4 marks)

16. Here is a 4-sided spinner.

The sides of the spinner are labelled 1, 2, 3 and 4.
The spinner is biased.
The probability that the spinner will land on each of the numbers 2 and 3 is given in the table.
The probability that the spinner will land on 1 is **equal** to the probability that it will land on 4.

Number	1	2	3	4
Probability	x	0.46	0.28	x

0.13   0.13

Sarah is going to spin the spinner 500 times.

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

500×0.13

......65......

(5 marks)