Solutions by
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GCSE (9-1) Grade 4 Probability & Relative Frequency

Instructions

Use **black** ink or ball-point pen.
Fill in the boxes at the top of this page with your name.
Answer **all** questions.
Answer the questions in the spaces provided
- there may be more space than you need.

Show all your working out

Information

The marks for **each** question are shown in brackets.
Use this as a guide as to how much time to spend on each question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed

Advice

Read each question carefully before you start to answer it
Attempt every question
Check your answers if you have time at the end

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.

$0.3 \times 400 = 120$

.....

(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.

$0.7 \times 300 = 210$

.....

(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.

$0.995 \times 10{,}000 = 9950$ (in tolerance)

$10{,}000 - 9950 = 50$

(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.

$0.38 + 0.27 + 0.15 = 0.8$

$1 - 0.8 = 0.2$

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	0.3

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

$0.4 + 0.1 + 0.2 = 0.7$

$1 - 0.7 = 0.3$

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	0.31	0.17	0.2

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

$0.32 + 0.17 + 0.2 = 0.69$

$1 - 0.69 = 0.31$

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	0·2

Mary takes a counter at random from the bag.

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

0·5 + 0·3 = 0·8 1 − 0·8 = 0·2

.....

(2)

The bag contains 50 counters.

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

30

.....

(2)

(4 marks)

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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	0·4	0.1

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

0·3 + 0·2 + 0·1 = 0·6 1 − 0·6 = 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

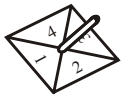
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(2)

(4 marks)

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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	0·25

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

0·20 + 0·35 + 0·20 = 0·75

1 − 0·75 = 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 × 100 = 35

(2)

(4 marks)

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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	0·12	0.24	0.19

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

0·35 + 0·24 + 0·19 = 0·88

1 − 0·88 = 0·12

(2 marks)

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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.

0·15
0·25
0·20
0·16
0·76

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.

1 − 0·76 = 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.

0·25 × 300 = 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.

0·2 + 0·5 = 0·7

1 − 0·7 = 0·3

0·3 ÷ 2 = 0·15 .....

(2)

There are 240 counters in the bag.

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

0·2 × 240 = 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	0·29	0.24

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

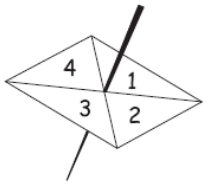
0·3 + 0·17 + 0·24 = 0·71

1 − 0·71 = 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

0·2 + 0·1 = 0·3

1 − 0·3 = 0·7

0·7 ÷ 2 = 0·35

0·35

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(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

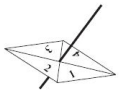
200 × 0·1 = 20

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(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.

0·3 + 0·2 = 0·5
1 − 0·5 = 0·5
0·5 ÷ 2 = 0·25

$x =$ 0·25 **(2)**

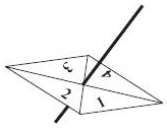
Sarah is going to spin the spinner 200 times.

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

0·3 × 200 = 60 **(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

Sarah is going to spin the spinner 500 times.

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

0·46 + 0·28 = 0·74
1 − 0·74 = 0·26
0·26 ÷ 2 = 0·13
0·13 × 500 = 65

(5 marks)