GCSE · Edexcel · Maths

1 hour 32 questions

Exam Questions

Introduction to Probability

Basic Probability / Sample Space Diagrams / Relative & Expected Frequency

Easy (12 questions)	/25
Medium (13 questions)	/30
Hard (7 questions)	/26
Total Marks	**/81**

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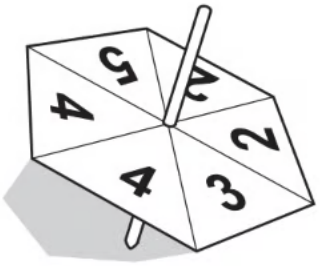
Easy Questions

1 Jian has a fair spinner in the shape of a regular hexagon. The spinner is numbered 2, 2, 3, 4, 4, 5.



Jian spins the spinner.
Find the probability that the spinner lands on

i) an even number,

[1]

ii) a number less than 6,

[1]

iii) the number 1.

[1]

(1 mark)

2 Paul has a set of 8 cards, each with a number written on it. The numbers on the cards are 1, 1, 2, 3, 3, 3, 4, 5. One card is taken at random.

Write down the probability that the number on the card is

i) 1,

[1]

ii) an odd number,

[1]

iii) a prime number,

[1]

iv) a number less than 6.

[1]

(4 marks)

3 Joel spins a fair five-sided spinner numbered 2, 3, 4, 5 and 6.

Write down the probability that the spinner lands on

i) an odd number,

[1]

ii) a prime number,

[1]

iii) the number 7.

[1]

(3 marks)

4 Soraya makes 30 flags. 11 flags are pink, 7 are yellow, 5 are blue, 4 are silver and 3 are green.
Soraya takes a flag at random.

Find the probability that the flag she takes is

i) pink,

[1]

ii) not blue,

[1]

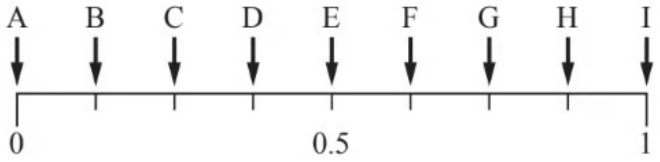
iii) red.

[1]

(3 marks)

5 (a) A bag contains 3 green balls, 4 red balls and 1 blue ball only.
Matt takes a ball from the bag at random.

Some probabilities are marked on the probability scale.



Write down the letter that shows the probability that Matt takes a red ball.

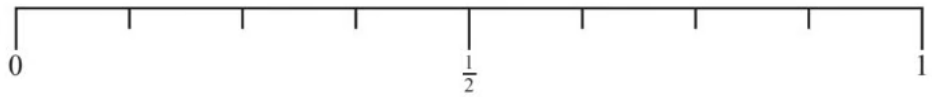
(1 mark)

(b) Write down the letter that shows the probability that Matt does **not** take a blue ball.

(1 mark)

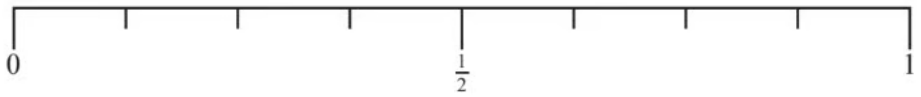
6 (a) A bag contains 6 red balls and 10 blue balls only.

On the probability scale, draw an arrow (↓) to show the probability that a ball taken at random is blue.



(1 mark)

(b) On the probability scale, draw an arrow (↓) to show the probability that a ball taken at random is red or blue.



(1 mark)

7 (a) A bag contains green balls and red balls only.
A ball is taken at random from the bag.
The probability of taking a green ball is 0.38.

Write down the probability of taking a red ball.

(1 mark)

(b) Write down the probability of taking a blue ball.

(1 mark)

8 A box contains 22 coloured pencils.
6 pencils are pink, 9 pencils are blue and 7 pencils are yellow.

A pencil is taken at random from the box.

Write down the probability that this pencil is green.

(1 mark)

9 The probability that Alex wins a prize is 0.27 .

Find the probability that Alex does not win a prize.

(1 mark)

10 The probability that it will be sunny tomorrow is 0.97.

Work out the probability that it will not be sunny tomorrow.

(1 mark)

11 The probability that it rains tomorrow is 0.35 .

Work out the probability that it does not rain tomorrow.

(1 mark)

12 (a) Mano has a box containing 55 shapes.

25 of the shapes are squares.

20 of the shapes are triangles.

The rest are circles.

Mano takes at random a shape from the bag.

Write down the probability that Mano

(i) takes a square

(ii) does **not** take a triangle

(iii) takes an octagon

(3 marks)

(b) Mano adds 8 more triangles to the bag.

Explain what will happen to the probability of picking a circle.

(1 mark)

Medium Questions

1 Sarah throws a biased dice 10 times.
She gets 8 sixes.

Diljit throws the same dice 50 times.
He gets 41 sixes.

Jonah is going to thrown the dice once.

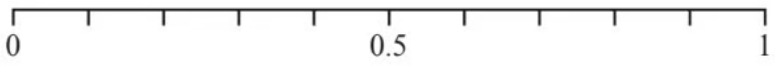
i) Whose results will give the better estimate for the probability that Jonah will throw a six, Sarah's or Diljit's?
You must give a reason for your answer.

ii) Use Sarah's and Diljit's results to work out an estimate for the probability that Jonah will throw a six.

(2 marks)

2 A bag contains 20 balls.
5 of these balls are red.
A ball is picked at random from the bag.

On the probability scale, draw an arrow (↓) to show the probability that this ball is red.



(1 mark)

3 (a) COMMONWEALTH

Lindon picks a letter at random from this word.

Explain why the probability that he picks a letter **M** is not $\frac{1}{10}$.

(1 mark)

(b) Tickets for athletics or swimming or hockey or diving are placed in a box.
A ticket is picked at random from the box.

Sport	Athletics	Swimming	Hockey	Diving
Probability	0.12		0.09	0.4

Complete the table.

(2 marks)

4 (a) On any day, the probability that Marcus will get a seat on the school bus is 0.93 .

Write down the probability that he will **not** get a seat on the school bus today.

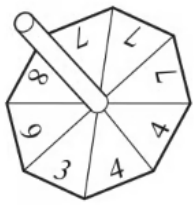
(1 mark)

(b) There are 200 school days in a year.

Work out the expected number of days in a year that Marcus will **not** get a seat.

(1 mark)

5 (a) The diagram shows a fair 8-sided spinner.



The numbers on the spinner are 3, 4, 4, 7, 7, 7, 8 and 9.

The spinner is spun once.

Write down the probability that the spinner lands on

i) the number 7,

[1]

ii) a number greater than 2.

[1]

(2 marks)

(b) The spinner is spun 160 times.

Work out the expected number of times the spinner lands on the number 7.

.....

(1 mark)

6 (a) Dan either walks or cycles to school.

The probability that he cycles to school is $\frac{1}{5}$.

Write down the probability that Dan walks to school.

(1 mark)

(b) There are 200 days in a school year.

Work out the expected number of days that Dan cycles to school in a school year.

[1]

(1 mark)

7 Marco has ropes of four different colours.
He takes a rope at random.

Colour	Brown	White	Red	Green
Probability	0.35		0.04	0.2

Complete the table.

(2 marks)

8 The probability that a sweet made in a factory is the wrong shape is 0.0028 .
One day, the factory makes 25000 sweets.

Calculate the number of sweets that are expected to be the wrong shape.

(2 marks)

9 Records show that $\frac{3}{14}$ of all mullet caught are underweight.

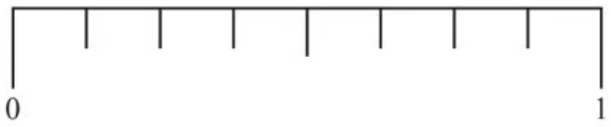
In one day, 168 mullet are caught.

Work out the expected number of mullet that are underweight.

(1 mark)

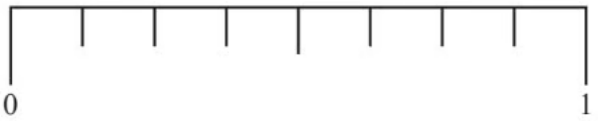
10 (a) Rui has a bag containing 5 black pens, 8 red pens and 3 blue pens only.
He takes a pen out of the bag at random.

Draw an arrow (↓) on the probability scale to show the probability that Rui takes a red pen.



(1 mark)

(b) Draw an arrow (↓) on the probability scale to show the probability that Rui takes a red pen or a blue pen.



(1 mark)

11 The probability that Tommy has his calculator for his mathematics lesson is 0.4 .
There are 120 mathematics lessons in one year.

Work out an estimate of the number of mathematics lessons in one year that Tommy has his calculator.

(1 mark)

12 (a) A company is organising training sessions for 260 employees.

The manager asks a sample of 40 employees which training topic they would prefer.

Each employee chooses one topic.

The table shows the results of the survey.

Training Topic	**Number of Employees**
Communication Skills	12
Leadership	9
Time Management	11
Customer Service	8

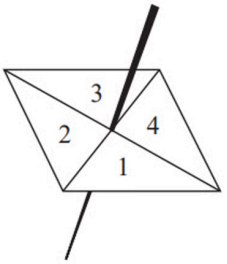
Work out an estimate for the number of the 260 employees who choose the Communication Skills training.

(2 marks)

(b) State an assumption you made in part (a) and explain how this may affect your answer.

(1 mark)

13 (a) Here is a four-sided spinner.



The table shows the probabilities that when the spinner is spun it will land on 1 and on 4.

Number	1	2	3	4
Probability	0.23			0.308

The probability that the spinner will land on 2 is 1.2 times the probability that the spinner will land on 3.

Work out the probability that the spinner will land on 3.

(3 marks)

(b) Which number is the spinner least likely to land on?

(1 mark)

(c) Brinda is going to spin the spinner 300 times.

Work out an estimate for the number of times the spinner will land on 1.

(2 marks)

Hard Questions

1 (a) Jen, Geoff and Alesha play a game with a toy that has an arrow painted on it.
When the toy is thrown it can land with the arrow pointing up or the arrow pointing down.
The toy is thrown a number of times.

The table below shows the number of times that the toy landed with the arrow pointing up and the arrow pointing down for each person.

	Jen	Geoff	Alesha
Arrow pointing up	10	7	13
Arrow pointing down	27	18	45

Priti is going to throw the toy once.

Whose results will give the best estimate for the probability that the toy will land with the arrow pointing down?
Give a reason for your answer.

(1 mark)

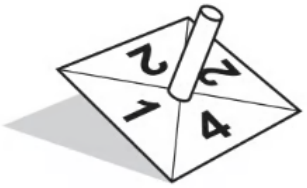
(b) Bryce is going to throw the toy two times.

Use all the results in the table to work out an estimate for the probability that the toy lands with the arrow pointing up on both throws.

(2 marks)

2 Mei has two fair square spinners, A and B.

Spinner A is numbered 1, 2, 2, 4 and spinner B is numbered 3, 3, 4, 5.



Spinner A

Spinner B

She spins both spinners and adds the two numbers.

i) Complete the table to show all the possible outcomes.

A \ B	3	3	4	5
1	4	4		
2	5	5	6	7
2	5	5	6	7
4	7	7		

Use the table to write down the probability that the total is

iia) 5.

[1]

iib) more than 5.

[1]

(4 marks)

3 A bag contains 7 red discs, 5 green discs and 2 pink discs.

Helen takes one disc at random, records the colour and replaces it in the bag.
She does this 140 times.

Find how many times she expects to take a green disc.

(2 marks)

4 (a) A bag contains 6 green balls, 5 red balls and 3 blue balls only.
A ball is taken from the bag at random.

Find the probability that the ball is

i) green,

[1]

ii) green or red,

[1]

iii) yellow.

[1]

(3 marks)

(b) Another bag contains brown balls, white balls, black balls and purple balls only.
A ball is taken from this bag at random.

Colour	Brown	White	Black	Purple
Probability	0.46	0.22	0.14	

i) Complete the table.

[2]

ii) Which colour is the most likely to be taken?

[1]

iii) There are 50 balls in this bag.
Work out the number of black balls.

[1]

(4 marks)

5 (a) A box contains 3 blue pens, 4 red pens and 8 green pens only.
A pen is chosen at random from the box.

Find the probability that this pen is green.

(1 mark)

(b) A cube has only one of its six faces painted yellow.
This cube is rolled 240 times.

Work out the expected number of times that it lands on the yellow face.

[1]

(1 mark)

6 The probability that Zoe feeds the ducks when she visits the lake is 0.82.
Zoe visits the lake 200 times in one year.

Work out an estimate of the number of times that Zoe does not feed the ducks when she visits the lake.

(3 marks)

7 (a) Four biased spinners are spun. The spinners can either land on purple or green.

The probability that each spinner will land on purple is shown in the table.

Spinner	Probability of Purple
A	0.26
B	0.57
C	0.668
D	0.043

(i) Which spinner is least likely to land on purple?

(ii) Which spinner is most likely to land on purple?

(2 marks)

(b) Garrett says,

"The probability that Spinner B will land on purple is the same as the probability that Spinner D will land on green."

Is Garrett correct?

You must show how you get your answer.

(1 mark)

(c) Spinner A is going to be spun 2000 times.

Work out an estimate for the number of times Spinner A will land on green.

(2 marks)