



### Examination Practice Questions

**You should have:**

A ruler, protractor, compasses, a pen, pencil, eraser, calculator.  
For some questions, you may need tracing paper.

### Instructions

- Use **black** ink or ball-point pen.
- Answer the questions in the spaces provided – *there may be more space than you need*.
- **Calculators may be used.**

### Information

- The marks for each question are shown in brackets.
- If the number of marks for two similar questions isn't the same, this is likely due to them being modelled on different specifications. In this case, it is worth considering both mark schemes.
- Use the number of marks for each question as a guide as to how much time to spend on each question. As a rough guide, you can multiply the number of marks by 1.2 to see how many minutes you should spend on a question.
- Questions will generally get more challenging as the document progresses. Some of the latter questions will go beyond the core grade level for this topic.

### Advice

- Read each question carefully before you start to answer it.
- Don't forget to have fun.
- Check your answers at the end.

Q1.

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Tony tests a six-sided dice which he thinks is biased towards the even numbers.

He carries out an experiment by rolling the dice.

He records the results as E (even) or O (odd).

E O E O E E O E E O E O

How could Tony improve the experiment?

INCREASE THE NUMBER OF TRIALS.

(1 mark)

Q2.

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Egor rolled a dice 24 times. Here are his results.

2 3 5 4 6 2  
1 3 3 5 1 3  
3 5 5 6 2 5  
4 3 4 3 3 4

This is the frequency table for Egor's results.

| Number on dice | Frequency |
|----------------|-----------|
| 1              | 2         |
| 2              | 3         |
| 3              | 8         |
| 4              | 4         |
| 5              | 5         |
| 6              | 2         |

Egor thinks the dice he rolled is biased.

Which two of the the following statements are valid reasons as to why the dice *could* be biased?

TOO MANY 3s. VERY FEW 1s OR 6s.

(1 mark)

Ling throws a six-sided dice 300 times.  
The table shows the frequencies of their results.

This is the table to show the relative frequencies.

|                    |      |      |      |     |      |      |
|--------------------|------|------|------|-----|------|------|
| Number on Dice     | 1    | 2    | 3    | 4   | 5    | 6    |
| Frequency          | 42   | 27   | 57   | 60  | 39   | 75   |
| Relative Frequency | 0.14 | 0.09 | 0.19 | 0.2 | 0.13 | 0.25 |

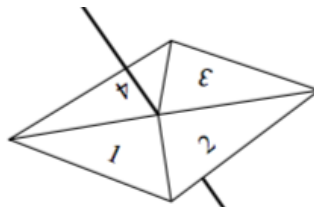
Ling thinks that the dice may be biased.

Explain why the dice may, in fact, not be biased.

CURRENT SAMPLE SIZE  
NEEDS TO BE LARGER TO  
KNOW.

(1 mark)

Here is a 4-sided spinner.



The sides of the spinner are labelled 1, 2, 3 and 4.  
Hanif spins the spinner 100 times. His results are shown in the table.

| Score | Frequency |
|-------|-----------|
| 1     | 26        |
| 2     | 26        |
| 3     | 23        |
| 4     | 25        |

Is the spinner fair? Give a reason for your answer.

YES. FREQUENCIES ARE  
NEARLY EQUAL.

(1 mark)

Q5.

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Tony tests a six-sided dice which he thinks is biased towards the even numbers.

He carries out an experiment by rolling the dice.

He records the results as E (even) or O (odd).

E O E O E E O E E O E O

What is the relative frequency of an even number?

$\frac{7}{12}$

(1 mark)

Q6.

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The Anglesey Show is a two-day event held every August.

On the first day, a random sample of 2000 visitors at the show were asked:

Do you live on Anglesey?

640 of them answered 'Yes'.

What was the relative frequency of those who answered 'Yes'?

Give your answer as a decimal.

$$\frac{640}{2000} =$$

$\frac{m}{n}$

$\frac{A}{n}$

0.32

(2 marks)

Q7.

AtoZrevision.com

A six sided dice is rolled 800 times.

A table below shows the relative frequency of scoring a six after different numbers of rolls.

| Number of rolls | Relative frequency of a six |
|-----------------|-----------------------------|
| 100             | 0.3                         |
| 200             | 0.26                        |
| 300             | 0.27                        |
| 500             | 0.23                        |
| 800             | 0.25                        |

Which relative frequency from the table gives the best estimate of the probability of scoring a six when **this** dice is rolled?

800  
1 (1 marks)

Q8.

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Karen has a spinner. When the spinner is spun once, the probability that it will land on yellow is  $\frac{2}{5}$ .

Karen spins the spinner 30 times.

Work out an estimate for the number of times the spinner lands on yellow.

$\frac{2}{5} \times 30 = 12$   
m1  
(2 marks)

Q9.

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James rolled a fair 6-sided dice 24 times.

How many times would you expect James to roll a six?

$\frac{1}{6} \times 24 = 4$   
(1 mark)

Each time John plays a game, the probability that he wins the game is 0.65

John is going to play the game 300 times.

Work out an estimate for the number of games that John wins.

$$\underbrace{0.65 \times 300}_{m_1} =$$

$$\begin{array}{c} A_1 \\ 195 \end{array}$$

(2 marks)

A company delivers parcels to people's homes.

The probability of a parcel arriving damaged is 0.023.

In one month, the company delivered 700 parcels, of which 15 were damaged.

Determine if this is more or less than expected.

$$\underbrace{700 \times 0.023}_{m_1} = 16.1$$

$$\begin{array}{c} A_1 \\ \text{LESS} \end{array}$$

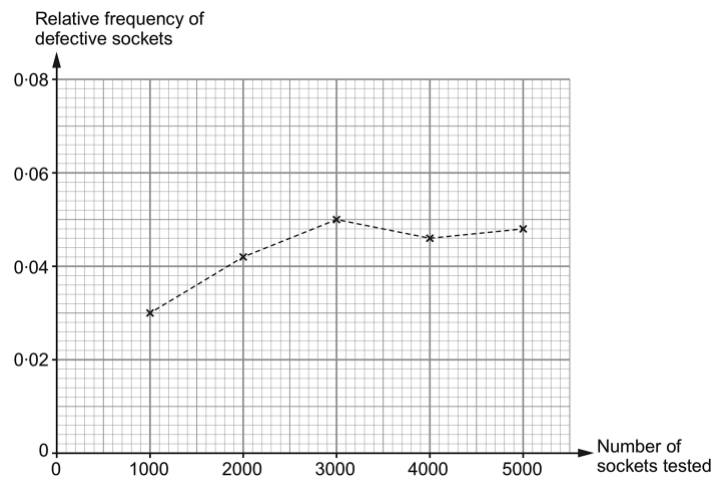
(2 marks)

A factory uses a machine to produce electrical sockets.

The manager carries out a survey to investigate the probability of the machine producing a defective socket.

The relative frequency of defective sockets produced was calculated after testing a total of 1000, 2000, 3000, 4000 and 5000 sockets.

The results are plotted on the graph below.



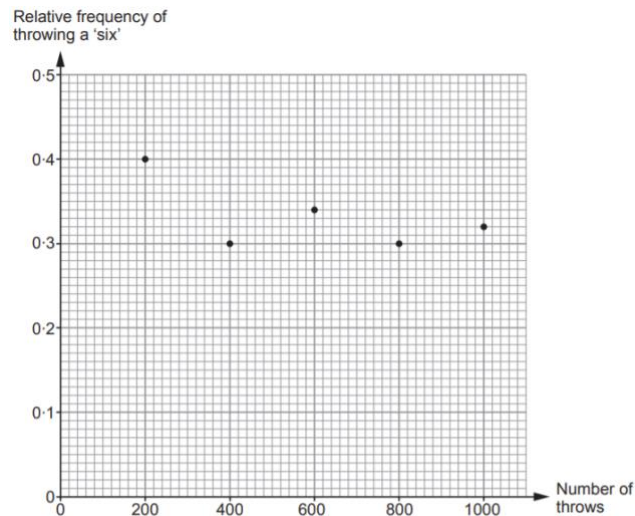
Write down the best estimate for the probability that one socket, selected at random, will be defective.

$$\frac{240}{5000} = 0.048$$

*(Handwritten notes: 'A' circled in red above the equals sign, and 'm1' circled in red below the fraction bar)*

.....  
(2 marks)

A biased six-sided dice is thrown a total of 1000 times.  
The graph shows the relative frequency of throwing a 'six' after 200, 400, 600, 800 and 1000 throws.



It has been calculated that 204 'sixes' were thrown in the first 600 throws of the dice.

How many **more** 'sixes' were recorded for these 600 throws than you would expect when a **fair** six-sided dice is thrown 600 times?

$$204 - \left( \frac{600}{6} \right) =$$

M1

104

A1

(2 marks)

One morning Kai records the colour of the cars passing his house.  
He then works out the relative frequency of each colour. Some of his results are shown in this table.

| Colour             | Silver | Red  | Green | Black | Other |
|--------------------|--------|------|-------|-------|-------|
| Relative frequency |        | 0.16 | 0.10  | 0.24  | 0.32  |

The following morning, Kai is going to record the colour of the first 200 cars to pass his house.

Work out an estimate for the total number of cars, coloured silver or red, that he should expect to see.

$$1 - (0.16 + 0.10 + 0.24 + 0.32) = 0.18 \text{ (silver)}$$

$$0.18 \times 200 = 36 \quad (m_1)$$

$$0.16 \times 200 = 32 \quad (m_1)$$

$$\underline{\quad 68 \quad}$$

(4 marks)

*Handwritten notes: A1, B1, 68*

Becky has a biased 6-sided dice. The table gives information about the probability that, when the dice is thrown, it will land on each number.

| Number      | 1    | 2    | 3    | 4    | 5    | 6   |
|-------------|------|------|------|------|------|-----|
| Probability | $2x$ | 0.18 | $2x$ | $3x$ | 0.26 | $x$ |

Becky is going to throw the dice 200 times.

Work out an estimate for the number of times that the dice will land on an even number.

$$1 = 0.44 + 8x \quad (m_1)$$

$$8x = 0.56$$

$$x = 0.07 \quad (A_1)$$

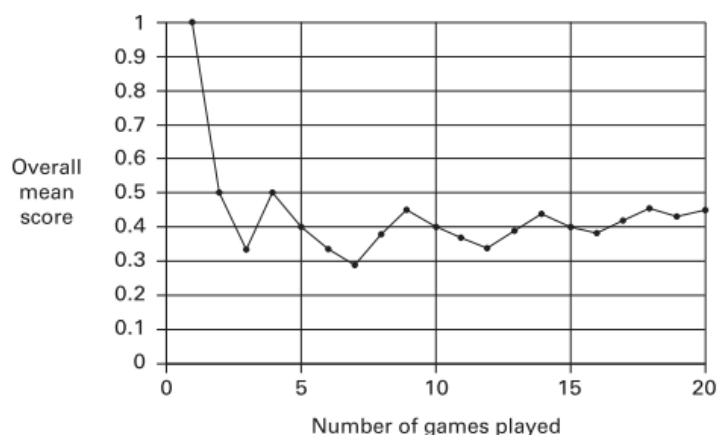
$$(0.18 + 0.21 + 0.07) \times 200 = 92 \quad (A_1)$$

(4 marks)

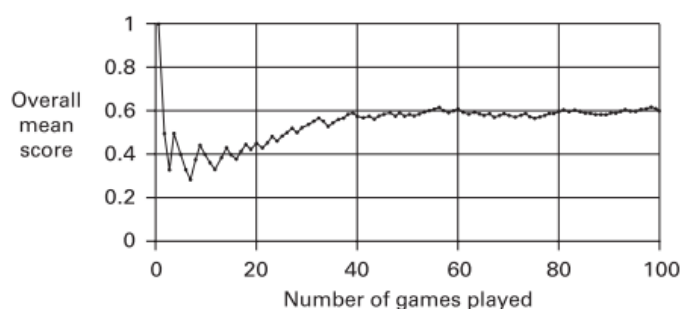
*Handwritten notes: m1, A1, 92*

A girl plays the same computer game lots of times. The computer scores each game using 1 for win, 0 for lose. After each game, the computer calculates her overall mean score.

The graph shows the results for the first 20 games.



The graph below shows the girl's results for the first 100 games.



She is going to play the game again. Estimate the probability that she will win.

M1 ATTEMPT TO  
READ THE GRAPH

A1  
0.6

(2 marks)

Sue played the same computer game. She won 12 of the games she played, and so she estimated the probability of winning each game to be 0.4

How many games did Sue play?

$$12 = 40\% \quad \text{M1}$$

$$\frac{12}{40\%} = 30$$

30

(2 marks)

Dan believes he knows what his brother Ethan is thinking.  
He carries out an experiment to test this.

Dan and Ethan sit back-to-back.

Ethan rolls an ordinary fair dice.

Ethan then thinks about the number on the dice while Dan tries to predict this number.

In 300 attempts, how many correct predictions would you expect Dan to make if he was just guessing?

$$\frac{1}{6} \times 300 = 50$$

A,  
50

(2 marks)

Karl wants to raise money for charity.  
He designs a game for people to play.

Karl uses a fair 10-sided dice for the game.  
The dice is numbered from 1 to 10.

Each person will roll the dice once.  
A person wins the game if the dice lands on a multiple of 4.

Each person pays 30p to play the game once.

The prize for a win is £1.

Karl thinks that the game will be played 100 times.

Work out an estimate for how much money Karl will raise for charity.

$$\frac{2}{10} \times 200 = 20$$

$$30p \times 100 = £30$$

$$30 - (£1 \times 20) = £10$$

A,  
£10

(3 marks)

# QUESTIONS FROM MATHEMATICAL COMPETITIONS

Q1.

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A fair die has just been rolled five times – giving scores of 1, 2, 3, 4, 5 in that order. How likely is it that the score on the next roll will be a 6? Tick the correct answer.

$\frac{1}{6}$  CHANCE OF ANY  
NUMBER.

- ☒ No chance
- ☐ Less than evens
- ☐ Evens
- ☐ Better than evens
- ☐ Certain