

# Probability 1 (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

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Total Marks:	

1. The village of Sumston is organising a Spring Fayre to raise money for the local community centre.

Prize	Toy	Pen	Pencil
Probability	$x$	$3x$	$16x$

(a) In the 'lucky dip', everyone wins either a toy or a pen or a pencil.

The probabilities of winning the different prizes are given in the following table.

Prize Toy Pen Pencil

Probability  $x$   $3x$   $16x$

Find the value of  $x$ .

$$x + 3x + 16x = 1$$

$$20x = 1$$

$$x = \frac{1}{20} (= 0.05)$$

[2]

(b) In the raffle, a free second ticket is given with every ticket bought.



Stephen thinks this offer will double his chance of winning a prize.

Is Stephen correct?

You must explain your answer.

Stephen is not correct as everyone gets a 2nd ticket & so the probability will stay the same.

[1]

2. 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.

(a) 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]

(b) The results of the first 15 attempts are shown in the table.

Ethan's number	2	6	5	3	2	1	5	1	3	4	4	6	1	6	5
Dan's prediction	2	4	3	1	2	6	1	6	4	3	2	6	5	2	3
Matching pair	✓				✓							✓			

Estimate the probability of getting a matching pair using the results of

(i) the first five attempts,

(b)(i) .....  $\frac{2}{5}$  ..... [1]

(ii) all 15 attempts.

(ii) .....  $\frac{3}{15} = \frac{1}{5}$  ..... [1]

(c) Use answers from (a) and (b) to comment on Dan's belief that he knows what Ethan is thinking.

The probability of guessing correctly is  $\frac{1}{6}$ , which is very close to  $\frac{1}{6}$  theoretical probability, so no evidence to back up Dan's belief. [2]

3. A coin is rolled onto a grid of squares.

It lands randomly on the grid.

To win, the coin must land completely within one of the squares.

Meera and John each roll the coin a number of times and record their results.

	Number of wins	Number of losses
Meera	6	44
John	28	72

(a) Work out two different estimates for the probability of winning.

Answer  $\frac{6}{50}$  and  $\frac{28}{100}$  [2]

(b) Which of your estimates is the better estimate for the probability of winning?

Give a reason for your answer.

Answer:  $\frac{28}{100}$

Reason: There have been more trials so probability is more reliable.

[1]

4. Abi, Ben and Carl each drop a number of identical drawing pins, and count how many land with the pin upwards. The table shows some of their results.

	Number of pins dropped	Number landing 'pin up'
Abi	10	4
Ben	30	9
Carl	100	35

(a) Abi says

*As a drawing pin can only land with its pin up or with its pin down, the probability of a drawing pin landing 'pin up' is  $\frac{1}{2}$*

Criticise her statement.

Probability of  $\frac{1}{2}$  is for equally likely events and the results shown pin up or down are not equally likely.

[1]

(b) Carl's results give the best estimate of the probability of a drawing pin landing 'pin up'.

Explain why.

He has carried out more trials, so has more reliable results.

[1]

(c) Two pins are dropped.

Estimate the probability that both pins land 'pin up'.

using all results

$$\frac{48}{140} \times \frac{48}{140} = \frac{2304}{19600}$$

(a) ..... 0.12 (2dp) ..... [2]

5. There are only red counters, blue counters, green counters and yellow counters in a bag.

The table shows the probabilities of picking at random a red counter and picking a random a yellow counter.

<b>Colour</b>	red	blue	green	yellow
<b>Probability</b>	0.24	0.22	0.22	0.32

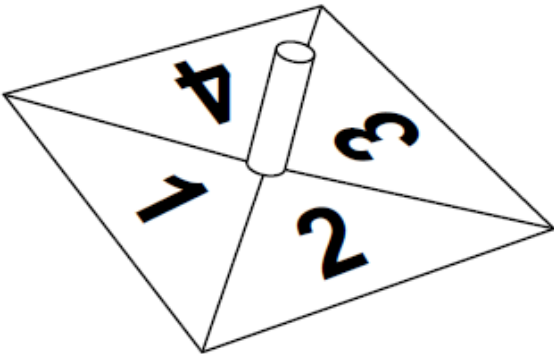
The probability of picking a blue counter is the same as the probability of picking a green counter.

Complete the table.

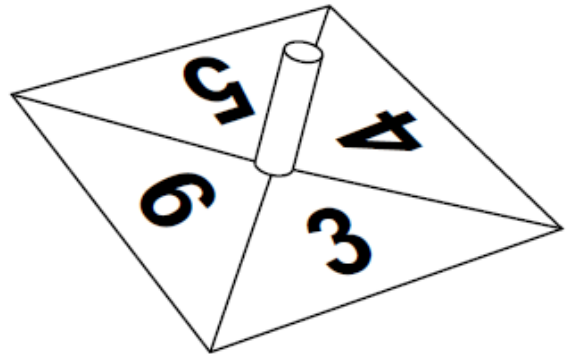
$$\begin{array}{r} 0.24 \\ 0.32 \\ \hline 0.56 \end{array} \quad \begin{array}{l} 1 - 0.56 = 0.44 \\ \frac{0.44}{2} = 0.22 \end{array}$$

[2]

6. Andrea has these two fair spinners.



Spinner A



Spinner B

a) Andrea spins spinner A.

Calculate the probability that Andrea gets 2 with one spin.

a) .....  $\frac{1}{4}$  ..... [1]

b) Andrea now spins both spinners once.

She adds the number she gets on spinner A to the number she gets on spinner B.

i) Andrea works out the probability that the two numbers she gets add to 4.

Here is her working.

$$1 + 3 = 4$$

$$3 + 1 = 4$$

There are 4 outcomes on each spinner making 8 outcomes in total.

The probability of the two numbers adding to 4 is  $\frac{2}{8} = \frac{1}{4}$ .

Andrea has made some errors.

Describe these errors.

- 1) Only 1 possible way to make 4 A B  
1 + 3
- 2) There are 16 outcomes (4x4, not 4+4) [2]

ii) Find the probability that the two numbers she gets add to 6.

	3	4	5	6
1	4	5	6	7
2	5	6	7	8
3	6	7	8	9
4	7	8	9	10

b)(ii)  $\frac{3}{16}$  ..... [3]

7. The probability that a biased coin lands on heads is  $\frac{2}{3}$

The coin is spun twice.

Circle the probability of two heads.

$$\frac{2}{9}$$

$$\frac{4}{6}$$

$$\frac{4}{9}$$

$$\frac{4}{3}$$

[1]

8. Here is an ordinary dice.



(a) Ali is going to throw the dice six times.

He says, "I will get one of each number."

Give a reason why he could be wrong.

Not rolled enough times for theoretical probability

[1]

(b) Lucy throws the dice 50 times.

Her results are shown.

<b>Number thrown</b>	1	2	3	4	5	6
<b>Frequency</b>	7	4	12	5	9	13

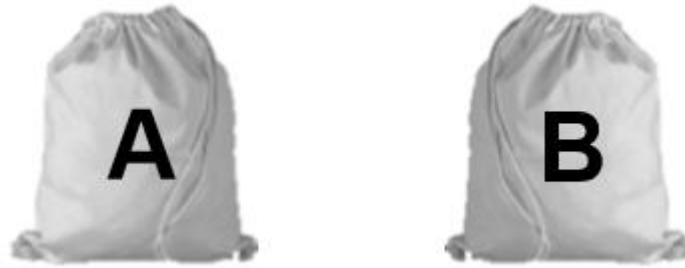
Work out the relative frequency of throwing an odd number.

$$\frac{28}{50}$$

[2]

9. Bag A contains 10 blue balls and 20 red balls.

Bag B contains 8 blue balls and 12 red balls.



A ball is chosen at random from each bag.

Jo says,

*"It is more likely that a blue ball is chosen from Bag A than Bag B because there are more blue balls in Bag A."*

Is she correct? You must show your working.

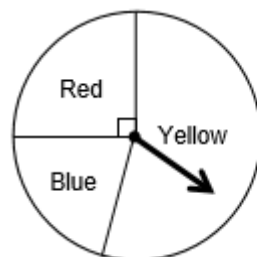
$$A: p(\text{blue}) = \frac{10}{30} = \frac{1}{3} = 33.3\%$$

$$B: p(\text{blue}) = \frac{8}{20} = \frac{2}{5} = 40\%$$

*She is wrong as there is a bigger probability she will get blue from bag B.*

[3]

10. In a game, a fair spinner has three sections.



Not drawn accurately

a) Joe uses this method to work out the probability of getting two reds from two spins.

He writes: "There are three colours, so the probability of the spinner landing on red is  $\frac{1}{3}$

$$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}, \text{ so the probability is } \frac{2}{3}$$

Make two criticisms of Joe's method.

Criticism 1 *The colours aren't evenly split so red is  $\frac{1}{4}$  of spinner, not  $\frac{1}{3}$ .*

Criticism 2 *you need to multiply probabilities for the two events happening, not add.* [2]

b) The probability of getting two blues from two spins is  $\frac{1}{25}$

Work out the angle of the blue sector.

$$\sqrt{\frac{1}{25}} = \frac{1}{5} \text{ so blue} = \frac{1}{5} \text{ of } 360^\circ = 72^\circ$$
 [3]

11. A doctor claims that the probability of having regular illness is doubled if you have poor sleep rather than good sleep.

In a survey, 16% of people with poor sleep had regular illness.

Here are the results for people with good sleep.

**Good Sleep**

	Number of people
Regular illness	24
Not regular illness	276

300

Comment on the doctor's claim. You must show your working.

*Probability of regular illness for bad sleep is  $\frac{24}{300} = \frac{8}{100} = 8\%$ . which is double the good sleep, so doctors claims are correct for these results.*

[3]

12. John chooses a number at random from the digits 1 to 4

Matt also chooses a number at random from the digits 1 to 4

a) Write down the probability that the sum of the two numbers chosen is a two-digit number.

0

[1]

b) Work out the probability that the product of the two numbers chosen is a two-digit number.

	1	2	3	4
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16

$\frac{3}{16}$

[3]



## CREDITS AND NOTES

Question	Awarding Body	Question	Awarding Body
1	WJEC Eduqas	9	AQA
2	OCR	10	AQA
3	AQA	11	AQA
4	OCR	12	AQA
5	Pearson Edexcel		
6	OCR		
7	AQA		
8	AQA		

### **Notes:**

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.

### **Links:**

AQA <http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300>

OCR <http://ocr.org.uk/gcsemaths>

Pearson Edexcel <http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html>

WJEC Eduqas <http://www.eduqas.co.uk/qualifications/mathematics/gcse/>

### **Contents:**

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material

