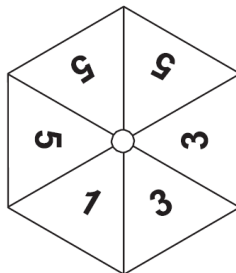# Probability 1 (F)

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

Name:	*Nikki @mathszest*
Total Marks:	

1. An unbiased spinner is shown below.

(a) Write a number to make each sentence true.

   (i) It is evens that the spinner will land on number ....**5**.... .

[1]

   (ii) There is a probability of $\frac{1}{6}$ that the spinner will land on number ....**1**.... .

[1]

   (iii) It is impossible that the spinner will land on number ....**4**.... .

[1]

(b) The spinner **shown** has the following properties.

   • There are eight equal sections, each showing one number.

   • There are three different numbers on the spinner.

   • The probability of the spinner landing on an even number is greater than the probability of it landing on an odd number.

   • It is more likely that the spinner will land on a 6 than either of the other numbers.

for example
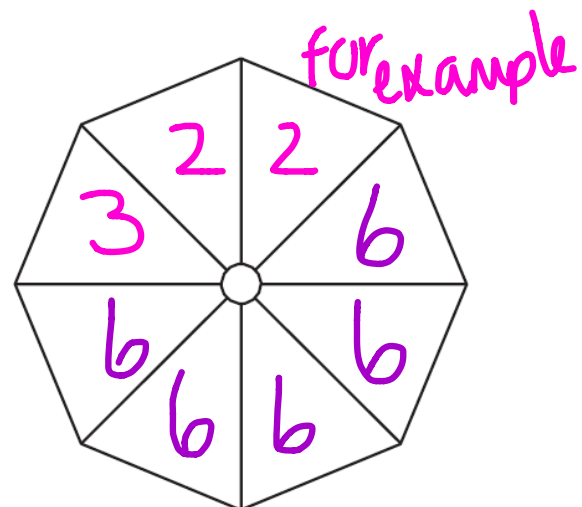
Complete the spinner to show one possible arrangement of numbers.

[3]

2. A tin contains four different types of sweet.

A sweet is taken from the tin at random.

The table below shows some of the probabilities of taking each type of sweet.

Sweet	Toffee	Fudge	Jelly	Mint
Probability	0.4	0.2	0.1	0.3

(a) Complete the table.

$0.4 + 0.2 + 0.3 = 0.9$

$1 - 0.9 = 0.1$

[2]

(b) What is the probability that a toffee or a mint is taken from the tin?

$0.4 + 0.3 =$

(b) .... 0.7 .... [2]

3. 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
	140	48

(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 ½

Criticise her statement.

Probability of ½ is when the two outcomes are equally likely, whereas the results show landing pin up is less likely.

[1]

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

Explain why. The best estimate is when the experiment has been repeated the most.

[1]

(c) Two pins are dropped.

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

using all trials

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

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

could also use Carl's trial.

4. Three friends, Ann (A), Bob (B) and Carol (C), go on holiday together.

(a) They book a row of three seats on the plane.

When they arrive at the plane they sit in a random order.

(i) List all the different orders they could sit on the three seats.

The first one has been done for you.

Seat 1	Seat 2	Seat 3
A	B	C
A	C	B
B	A	C
B	C	A
C	A	B
C	B	A

[2]

(ii) What is the probability that Ann and Carol sit next to each other? **4/6**

(ii) .... [1]

(iii) What is the probability that Bob sits in seat 1 with Ann next to him? **1/6**

(iii) .... [1]

5. This frequency diagram summarises the number of minutes Astrid's train was late over the last 50 days.
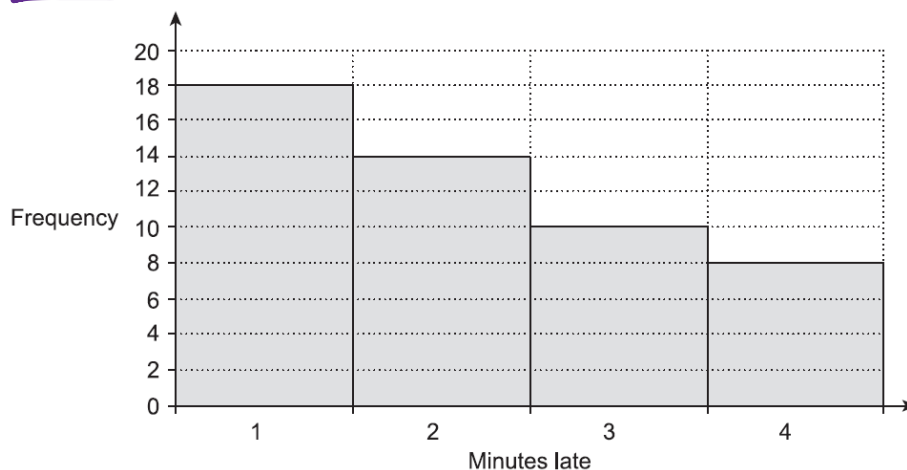
(a)   Use information from this diagram to estimate the probability that her train will be 4 minutes late tomorrow.

(a) ...... 8/50 ...... [2]

(b)   Explain whether your answer to part (a) gives a reliable probability.

Probability becomes more reliable the more trials are used, so only having 50 trials is not very reliable.

[1]

6. Jason is playing a game.

He has two sets of cards.

One set has three red cards, numbered 1, 2 and 3.

The other set has four green cards, numbered 4, 5, 6 and 8.

Jason chooses a red card and a green card at random.

He works out his score by adding the numbers on the two cards together.

(a) Complete the table to show all the possible scores.

3	7	8	9	11
Red card **2**	6	7	8	10
1	5	6	7	9
	4	5	6	8

Green card

[2]

(b) Work out the probability that Jason gets

(i) a score of 10,

(i) ...... 1/12 ...... [1]

(ii) a score of 9 or more.

(ii) ...... 4/12 ...... [1]

7. (a) Ken has a bag containing counters.

2 are white, 3 are black and 4 are red.

He takes one of these counters at random.

What is the probability that the counter is white?

.... [2]

(b) Abi has a bag containing black counters and white counters.

The ratio of black to white counters is 1 : 2.

Abi takes one of these counters at random.

What is the probability that it is black?

$\frac{1}{3}$
.... [1]

(c) Jemma has a bag containing 24 balls.

(i) The probability that a ball taken from the bag at random is green is $\frac{1}{3}$

How many of the 24 balls are green?

$\frac{1}{3}$ of 24 =

(i) ....8............... [2]

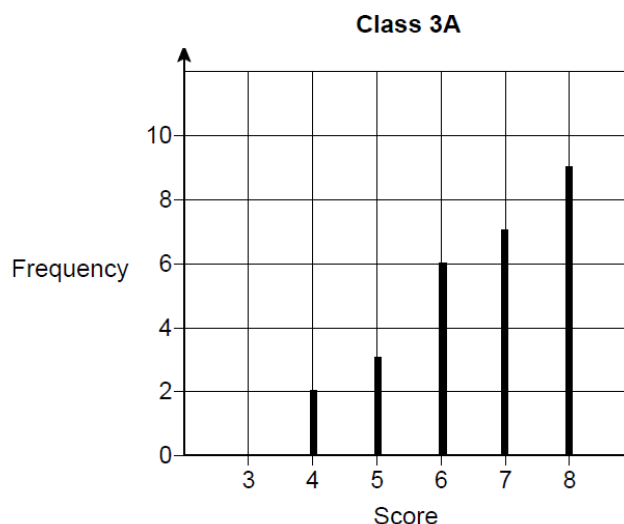(ii) 12 of the 24 balls are blue.

Jemma takes a ball from the bag at random and then puts it back.

She then takes a ball again at random.

What is the probability that both balls are blue?

$\frac{12}{24} = \frac{1}{2}$ $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

(ii) ....$\frac{1}{4}$............. [2]

8. The diagram shows information about the scores of Class 3A in a spelling test.
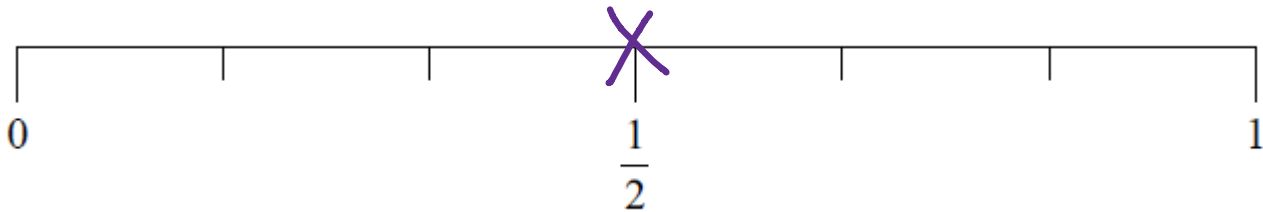

Class 3A

A student is chosen at random from Class 3A.

Work out the probability that the student's score was the mode for the class.

Mode = 8   2 + 3 + 6 + 7 + 9 = 27

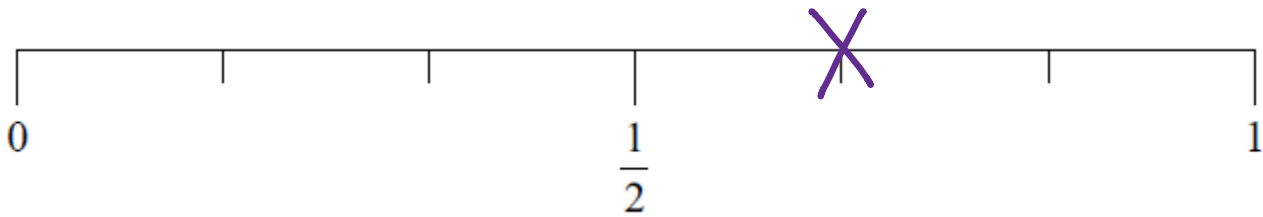prob of 8 = $\frac{9}{27}$ $\left(= \frac{1}{3} \right)$

[3]

9. Greg rolls a fair ordinary dice once.

(i) On the probability scale, mark with a cross (×) the probability that the dice will land on an odd number.

0 — 1/2 — 1

(ii) On the probability scale, mark with a cross (×) the probability that the dice will land on a number less than 5

0 — 1/2 — 1

[2]

10. There are 3 red beads and 1 blue bead in a jar.

A bead is taken at random from the jar.

What is the probability that the bead is blue?

.... 1/4 .... [1]

11. There are some boys and girls in a classroom.

The probability of picking at random a boy is $\frac{1}{3}$

What is the probability of picking a girl?

.... 2/3 .... [1]

12. There are 25 boys and 32 girls in a club.

2/5 of the boys and = 10

1/2 of the girls walk to the club. = 16

} total who walk = 26

The club leader picks at random a child from the children who walk to the club.

Work out the probability that this child is a boy.

.... 10/26 .... [3]

13. In a box there are three types of chocolates.
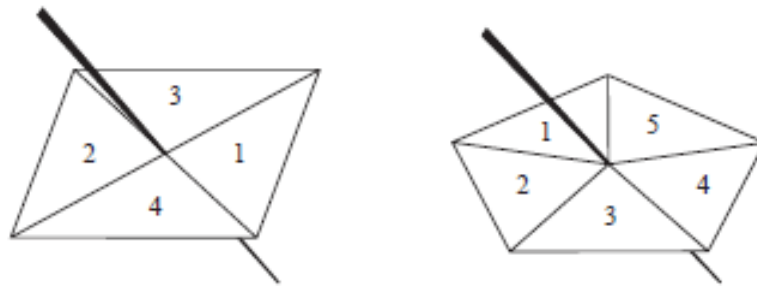
There are 6 plain chocolates,

8 milk chocolates

and 10 white chocolates.

Ben takes at random a chocolate from the box.

Write down the probability that Ben takes a plain chocolate.

$^6/_{24}$ $(= ^1/_4)$ .... [2]

14. The spinners are fair.

Jeff is going to spin each spinner once.

Each spinner will land on a number.

Jeff will get his score by adding these two numbers together.

(a) Complete the possibility space diagram for each possible score.

		5-sided spinner				
		1	2	3	4	5
4-sided spinner	1	2	3	4	5	6
	2	3	4	5	6	7
	3	4	5	6	7	8
	4	5	6	7	8	9

[2]

Jeff spins each spinner once.

(b) Find the probability that Jeff gets

(i) a score of 3 $2/20$ $(=^1/_{10})$

(ii) a score of 5 or more. $^{14}/_{20}$ $(= ^7/_{10})$

[2]

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

George is going to take at random a counter from the bag.

The table shows each of the probabilities that George will take a blue counter or a green counter or a yellow counter.

Colour	blue	green	red	yellow
Probability	0.5	0.2		0.25

(a) Work out the probability that George will take a red counter.

$0.5 + 0.2 + 0.25 = 0.95$ $1 - 0.95 =$ ....0.05.... [1]

There are 120 counters in the bag.

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

$0.2 \times 120 =$ ....24.... [2]

16. 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 ____6/50____ and ____28/100____

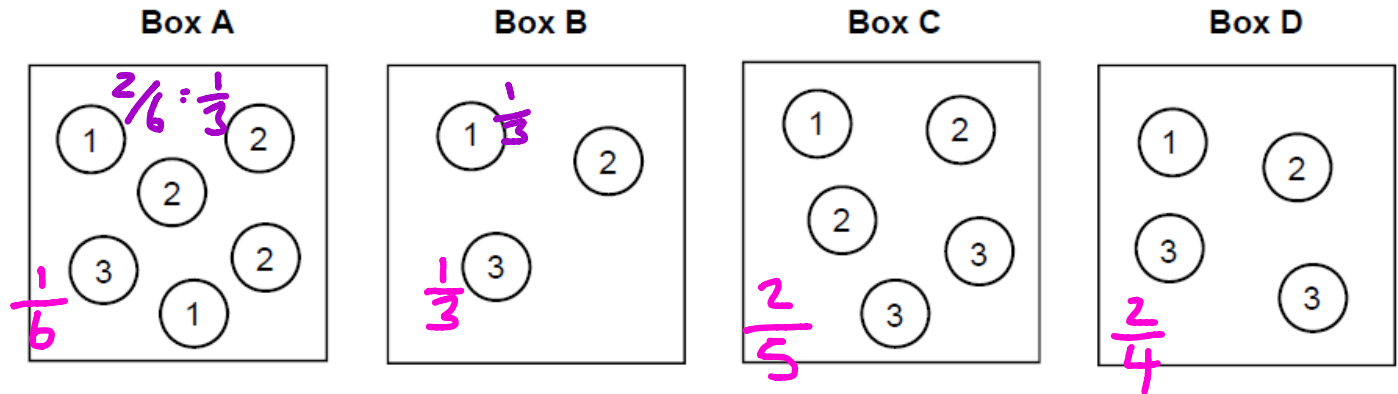(b) Which of your estimates is the better estimate for the probability of winning?

Give a reason for your answer.

Answer: 28/100

Reason: The experiment has been repeated more times

[1]

17. Boxes A, B, C and D contain balls with numbers on them.

Box A	Box B	Box C	Box D

Box A (balls): 1, 2, 2, 3, 2, 1 — handwritten: $2/6 : \frac{1}{3}$, $\frac{1}{6}$

Box B (balls): 1, 2, 3 — handwritten: $\frac{1}{3}$, $\frac{1}{3}$

Box C (balls): 1, 2, 2, 3, 3 — handwritten: $\frac{2}{5}$

Box D (balls): 1, 2, 3, 3 — handwritten: $\frac{2}{4}$

A ball is picked at random from each box.

(a) Which box gives the greatest chance of picking a 3?

You must show your working.

Box ____D____ [2]

(b) Which two boxes give the same chance of picking a 1?

Box ____A____ and Box ____B____ [1]
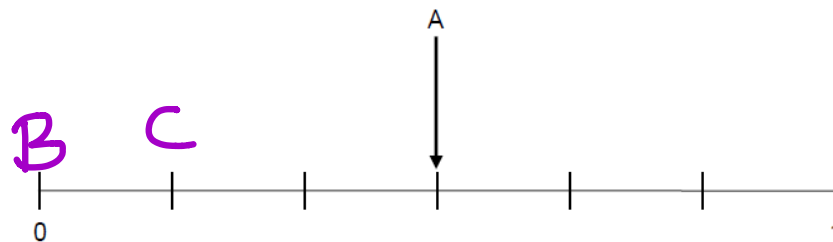
18. Here are three events for an ordinary fair dice.

　　　　A Roll an odd number

　　　　B Roll a number greater than 6

　　　　C Roll an even number less than 3

Draw and label arrows to show the probabilities of events B and C on the probability scale.

[2]

19. There are 25 counters in a bag.
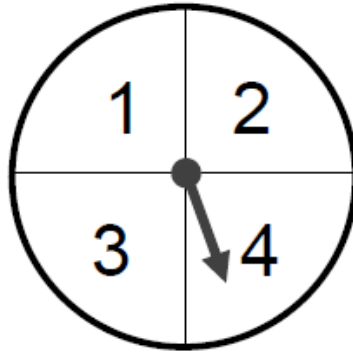
12 are red, 5 are green and the rest are white.

A counter is chosen at random.

Work out the probability that it is white.　　$\frac{8}{25}$

[2]

20. A game is played with a fair spinner.

The player spins the spinner twice.

The score is the difference between the two numbers.

(a) Complete the table to show the scores.

	First spin			
	1	2	3	4
Second spin 1	0	1	2	3
2	1	0	1	2
3	2	1	0	1
4	3	2	1	0

[2]

(b) The player loses if the score is 0 or 1 $\frac{10}{16}$

The player wins if the score is 2 or 3 $\frac{6}{16}$

Amy says,

   "Two scores win and two scores lose, so the chance of winning is evens."

Is Amy correct?

Yes [ ]   No [X]

Give a reason for your answer.

The two different scores are not equally likely. It is more likely that a player loses ($\frac{10}{16}$)

[2]

21. 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.

The sample size is too small for the theoretical probability to be accurate [1]

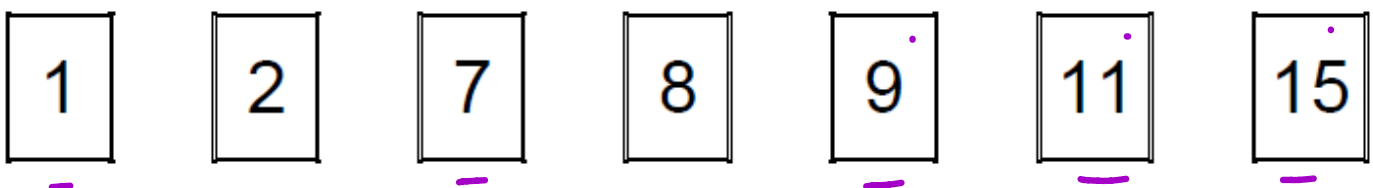(b) Lucy throws the dice 50 times.

Her results are shown.

Number thrown	1	2	3	4	5	6
Frequency	7	4	12	5	9	13

Work out the relative frequency of throwing an odd number.

$\dfrac{28}{50} \left(= \dfrac{14}{25} \right)$

[2]

22. Seven numbered cards are placed face down.

| 1 | 2 | 7 | 8 | 9 | 11 | 15 |

One card is chosen at random.

What is the probability that the card chosen will have:

(a) an odd number? $\dfrac{5}{7}$

[1]

(b) a number greater than 8? $\dfrac{3}{7}$

[1]

23. Kyle and Ethan play a game using a spinner.

A player wins when the spinner stops on their chosen colour.
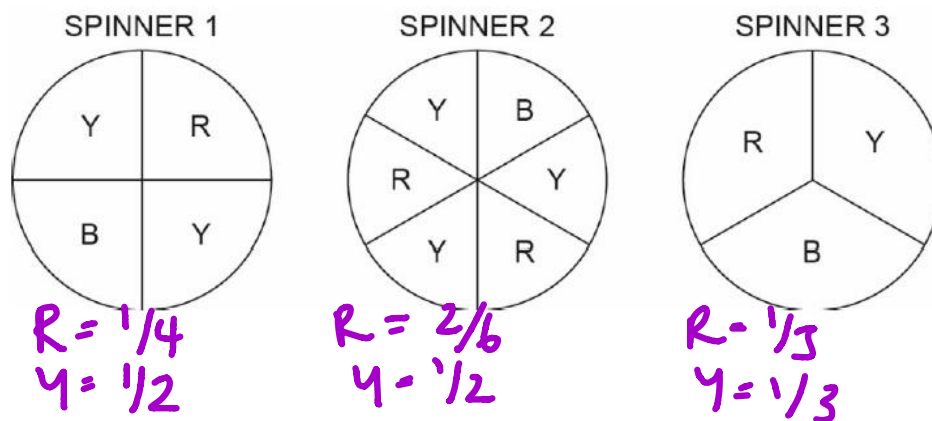
A player can choose from the colours Yellow (Y), Black (B) or Red (R).

Kyle always chooses Red.

Ethan always chooses Yellow.

Which of the following spinners should Ethan choose so that he has the greatest chance of beating Kyle?

Give a reason for your answer.

SPINNER 1   SPINNER 2   SPINNER 3

R = 1/4   R = 2/6   R - 1/3
Y = 1/2   Y - 1/2   Y = 1/3

Ethan should choose spinner 1 as there is the biggest difference in the probabilities [2]

24. Nancy makes two statements about the probability of events based on throwing fair dice.

Decide whether or not Nancy is correct.

You must explain your decision using probabilities.

The probability of throwing a three on a dice is half the probability of throwing a six.
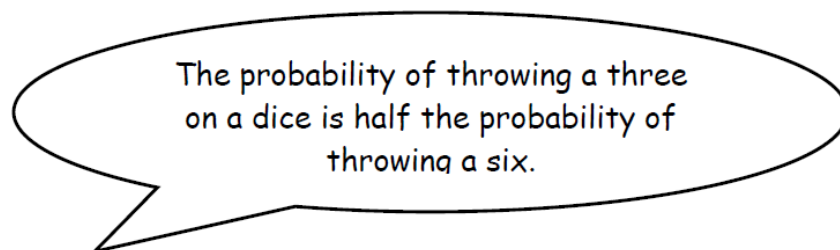
Is Nancy correct? ....NO............

Explanation:

They both have the same probability of 1/6 as there is 1 of each number out of 6 different possible outcomes. [1]

25. 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.

Colour	red	blue	green	yellow
Probability	0.24	0·22	0·22	0.32

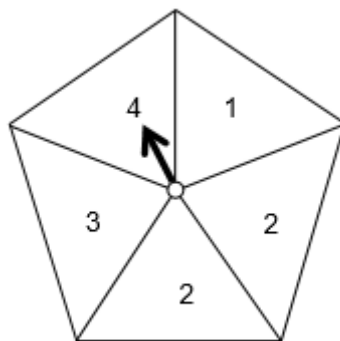The probability of picking a blue counter is the same as the probability of picking a green counter.

Complete the table.

0.24
0.32
$\overline{0.56}$

$1 - 0.56 = 0.44$

$\dfrac{0.44}{2} = 0.22$

[2]

26. Joanne has a fair five-sided spinner.

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

a) Write down the probability of scoring a 4 with one spin.

$\frac{1}{5}$

[1]

b) Work out the probability of scoring a total of 4 with two spins.

$\dfrac{6}{25}$

[3]

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

Bag B contains 8 blue balls and 12 red balls.

$B = {}^{10}/_{30}$　　　　$B = {}^{8}/_{20}$　　

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.

Bag A = 1/3 chance of blue ball = 33.3%
Bag B = 2/5 chance of blue ball = 40%.
Therefore Jo is wrong as 2/5 is a greater probability than 1/3.

[3]

28. What is the probability of rolling a 5 on an ordinary fair dice? Circle your answer.
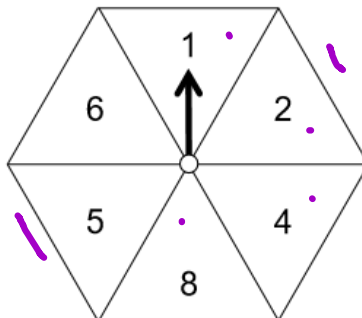
$\frac{1}{6}$　　　　　$\frac{1}{5}$　　　　　$\frac{5}{6}$　　　　　$\frac{1}{2}$

[1]

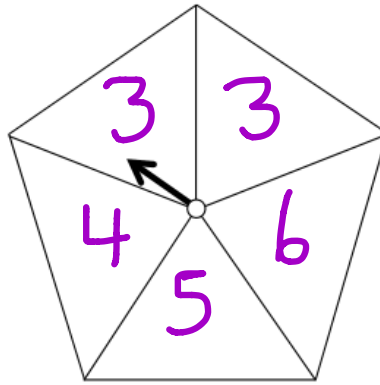29. a) A fair spinner has 6 equal sections.

The arrow on the spinner is spun.

Complete each of the following sentences with the correct probability.

The probability that the arrow will land on a factor of 8 is __4/6 (= 2/3)__

The probability that the arrow will land on a prime number is __2/6 (= 1/3)__ [2]

b) This fair spinner has five equal sections.

Write a number on each section so that

the probability that the arrow lands on 3 is $\frac{2}{5}$

the range of the numbers is 3

the sum of the numbers is 21 $21-6=15$

[2]

30. 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

$\dfrac{3}{16}$

[3]

31. 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

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

$$\frac{24}{300} = \frac{8}{100} = 8\%$$

The results from this sample supports the doctors claim as there is double the chance of having a regular illness from bad sleep (16%) as there is from good sleep (8%).

[3]

CREDITS AND NOTES

Q	Awarding Body	Q	Awarding Body	Q	Awarding Body
1	OCR	14	Pearson Edexcel	27	AQA
2	OCR	15	Pearson Edexcel	28	AQA
3	OCR	16	AQA	29	AQA
4	OCR	17	AQA	30	AQA
5	OCR	18	AQA	31	AQA
6	OCR	19	AQA		
7	OCR	20	AQA		
8	AQA	21	AQA		
9	Pearson Edexcel	22	WJEC Eduqas		
10	Pearson Edexcel	23	WJEC Eduqas		
11	Pearson Edexcel	24	WJEC Eduqas		
12	Pearson Edexcel	25	Pearson Edexcel		
13	Pearson Edexcel	26	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