

Probability

GCSE MATHS

Name: _____

Teacher: _____

Learning objectives

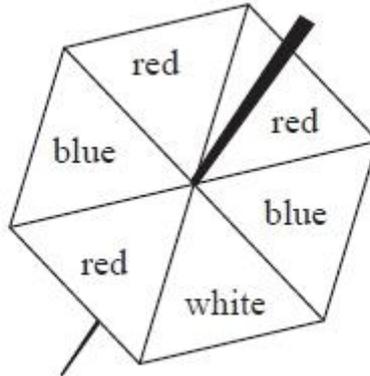
By the end this pack you will be able to:

- 1. Find probabilities on probability scales**
- 2. Calculate theoretical probability and relative frequency**
- 3. Find the probability of an event not happening**
- 4. Construct a tree diagram**

Probability Scales

Q1.

Here is a fair 6-sided spinner.



Ryan is going to spin the spinner once.

(a) Which colour is the spinner most likely to land on?

.....
(1)

(b) Choose the word that best describes the probability that the spinner will land on white.

impossible unlikely evens likely certain

.....
(1)

(c) Choose the word that best describes the probability that the spinner will land on green.

impossible unlikely evens likely certain

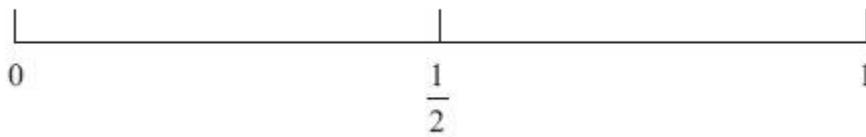
.....
(1)

(Total for Question is 3 marks)

Q2.

Liam throws a fair coin once.

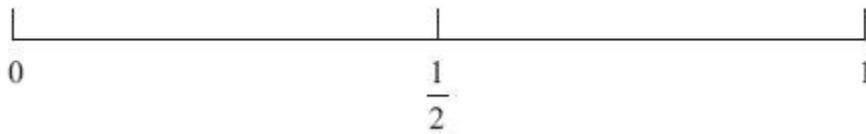
(a) On the probability scale below, mark with a cross (×) the probability that he gets a head.



(1)

Ann rolls a fair dice once.

(b) On the probability scale below, mark with a cross (×) the probability that she gets a 7



(1)

Fred throws a fair coin and rolls a fair dice.

(c) (i) List all the possible combinations.

The first one has been done for you.

.....
.....
.....

(ii) Write down the probability that Fred gets a head and an even number.

.....

(4)

(Total for Question is 6 marks)

Q3.

likely impossible certain evens unlikely
--

(a) Use a word from the box which best describes the probability of each of the following events.

(i) When you throw an ordinary coin you get a tail.

.....

(ii) When you throw an ordinary dice you get a number less than 7

.....

(2)

Bill has some counters in a bag.

3 of the counters are red.

7 of the counters are blue.

The rest of the counters are yellow.

Bill takes at random a counter from the bag.

The probability that he takes a yellow counter is $\frac{2}{7}$

(b) How many yellow counters are in the bag before Bill takes a counter?

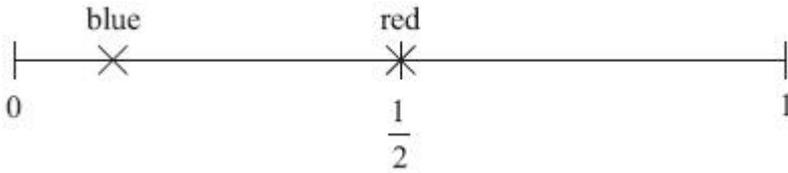
.....

(2)

(Total for Question is 4 marks)

Q4.

(a) The probability scale shows the probability that a spinner will land on red. It also shows the probability that the spinner will land on blue.



Tony says the spinner is more likely to land on blue than on red.

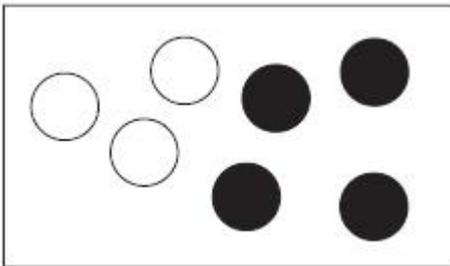
Is he right?

Explain your answer.

.....
.....

(1)

(b) There are 3 white counters and 4 black counters in a box.



Jenny is going to take at random a counter from the box.

(i) Write down the probability that Jenny will take a black counter.

.....

(ii) Write down the probability that Jenny will take a yellow counter.

.....

(2)

(Total for Question is 3 marks)

Q5.

Sue has a bag of 18 sweets.

5 of the sweets are blue

7 of the sweets are red

6 of the sweets are green

Sue takes at random a sweet from the bag.

Write down the probability that Sue

(i) takes a red sweet,

.....

(ii) does **not** take a green sweet,

.....

(iii) takes a yellow sweet.

.....

(Total for Question is 3 marks)

Q6.

Margaret is going to have a meal.
She can choose one starter and one main course.

Menu	
Starter	Main course
Pate	Beef
Melon	Salmon
Ham	Lasagne

Write down all the possible combinations Margaret can choose.

.....

.....

.....

.....

.....

.....

.....

(Total for Question is 2 marks)

Q7.

Valentina is going to have a meal.
She can choose one starter and one main course from the menu.

Menu	
Starter	Main course
Soup	Beef
Prawns	Tuna
Mushrooms	Vegetarian

Write down all the possible combinations Valentina can choose.

.....

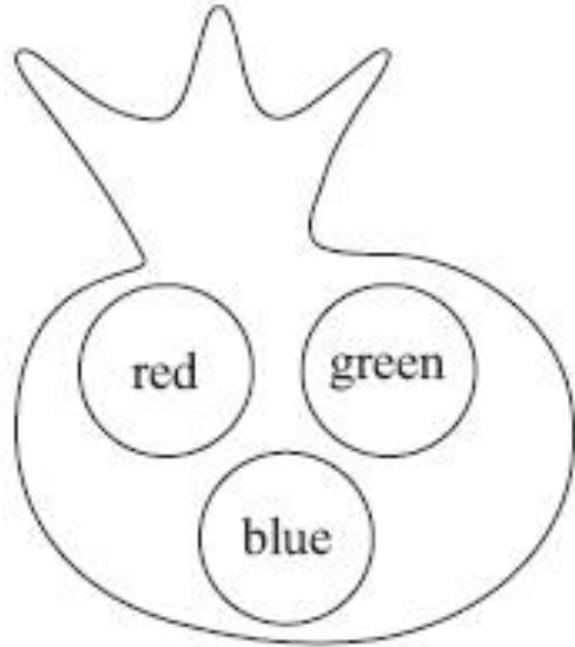
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.....

(Total for Question is 2 marks)

Q8.

There are 3 counters in a bag. One counter is red.
One counter is green.
One counter is blue. Mike takes at random a counter from the bag.
He puts the counter back in the bag. Then Ellie takes at random a counter from the bag. (a) Is Ellie more likely to take a blue counter from the bag than Mike?
You must explain your answer.



.....
.....

(1)

(b) Write a list of all the possible combinations of the two counters that Mike and Ellie can take.

.....
.....

(2)

(c) Find the probability that Mike takes a blue counter and then Ellie takes a green counter.

.....

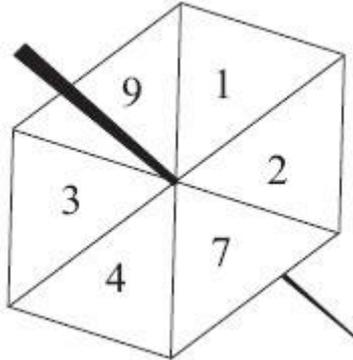
(1)

(Total for Question is 4 marks)

Theoretical Probability

Q1.

Here is a fair 6-sided spinner.



Jake is going to spin the spinner once.

(a) Write down the probability that the spinner will land
(i) on 4

.....

(ii) on a number greater than 10

.....

(2)

Liz is going to spin the spinner 120 times.

(b) Work out an estimate for the number of times the spinner will land on 7

.....

(2)

(Total for Question is 4 mark)

Q2.

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.

.....

(Total for Question is 2 marks)

Q3.

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		

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.

.....

(2)

There are 240 counters in the bag.

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

.....

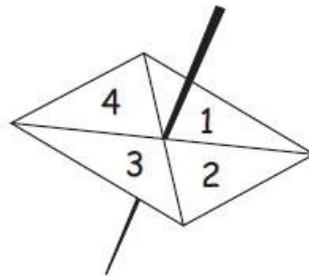
(2)

(Total for Question is 4 marks)

Q4.

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		0.1	

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

.....

(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

.....

(2)

(Total for Question is 5 marks)

Q5.

Jane has a packet of seeds.

The probability that a seed will grow is 0.75

(a) What is the probability that a seed will **not** grow?

.....
(1)

Jane plants 200 of these seeds.

(b) Estimate the number of the seeds that will grow.

.....
(2)

(Total for Question is 3 marks)

Q6.

Lorna carries out a survey about the number of times customers go to a shop.
She asks at random 100 customers how many times they went to the shop last month.
The table shows Lorna's results.

Number of times	0	1	2	3	4	5	6	more than 6
Frequency	4	12	13	17	25	13	11	5

One of the 100 customers is chosen at random.

(a) What is the probability that this customer went to the shop 5 or more times?

.....
(2)

Last month the shop had a total of 1500 customers.

(b) Work out an estimate for the number of customers who went to the shop exactly 2 times last month.

.....
(2)

The owner of a different shop is carrying out a survey on the ages of his customers.
He records the ages of the first 10 customers in his shop after 9 am one morning.

(c) This may **not** be a suitable sample.
Give **two** reasons why.

1
.....
.....

2
.....
.....

(2)

(Total for Question is 6 marks)

Q7.

Hannah has a biased coin.

She is going to throw the coin once.

The probability of getting heads is 0.7

(a) Work out the probability of getting tails.

.....

(2)

Jamal is going to throw this coin 200 times.

(b) Work out an estimate for the number of heads Jamal will get.

.....

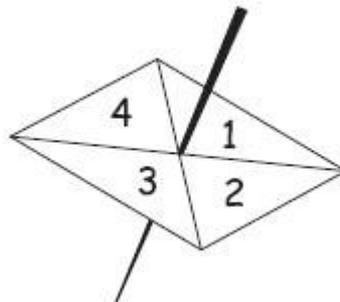
(2)

(Total for Question is 4 marks)

Q8.

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		0.1	

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

.....

(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

.....

(2)

(Total for Question is 5 marks)

Tree Diagrams

1. The probability that Mark gets to work on time is $\frac{7}{8}$ and the probability he leaves work on time is $\frac{3}{5}$



Multiply along branches to find the these probabilities

Getting to work

Leaving work

$\frac{7}{8}$

$\frac{3}{5}$

on time

on time

$P(T,T) =$

late

$P(T,L) =$

on time

$P(L,T) =$

late

late

$P(L,L) =$

Total =

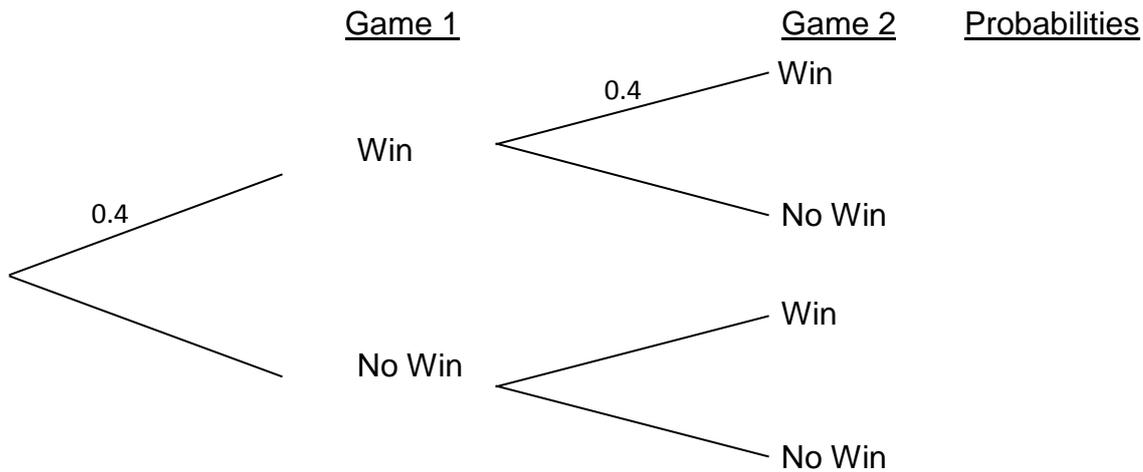
T means on time

L means late

P(T,L) means the probability that he arrives on time but leaves late



1. The probability that Neil wins a game of chance is 0.4. He plays 2 games.
Complete the tree diagram below.



Find the probability that:

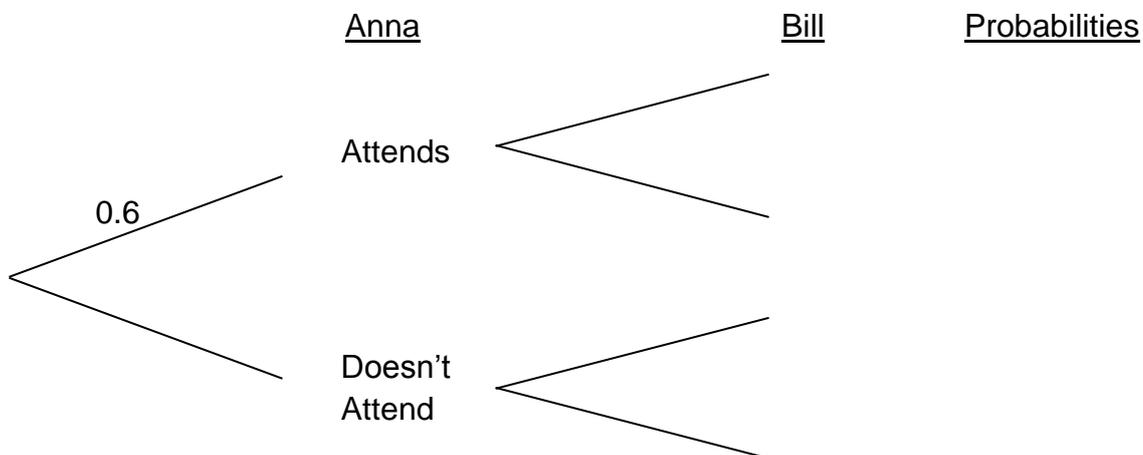
- a. He wins both games b. He wins only one game

2. Anna and Bill are set to fail their maths exam because they are not good attenders at school. On a particular day:

$P(\text{Anna attends school}) = 0.6$

$P(\text{Bill attends school}) = 0.7$

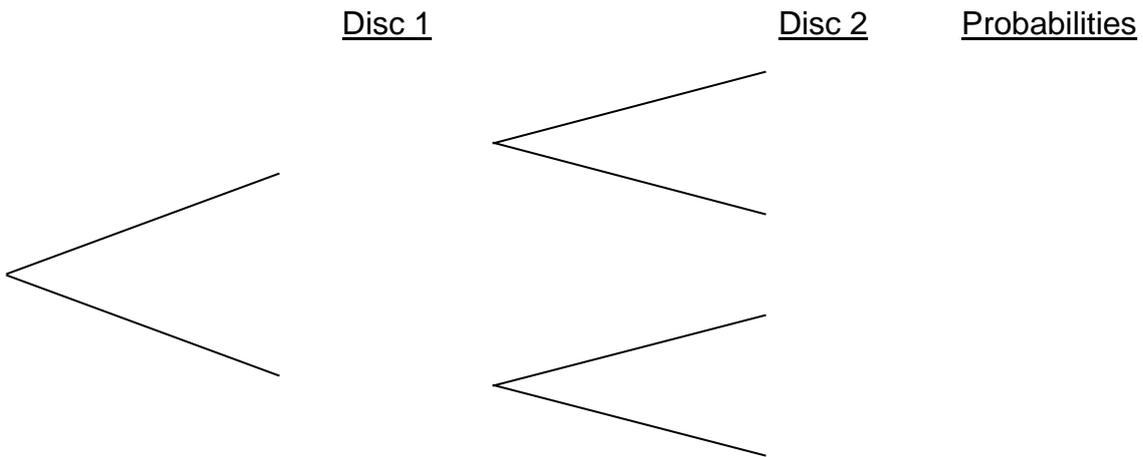
Complete the tree diagram below.



Find the probability that:

- a. Neither is at school b. At least one of them is at school

3. There are 6 red and 3 white discs in a bag. A disc is drawn, then replaced and another disc is drawn.



Find the probability that:

- a. Both discs are the same colour. At least one of the discs was red

4. Melanie is a sixth form student who has 2 classes with homework due on a Tuesday.

The probability that she has her Maths homework is $\frac{2}{5}$

The probability that she has her English homework is $\frac{7}{10}$

Draw a probability tree diagram in the space below.

<u>Maths</u>	<u>English</u>	<u>Probabilities</u>
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Use your diagram to find, P(No homework) and P(only one piece of homework)

Q5.

*Shabeen has a biased coin.

The probability that the coin will land on heads is 0.6

Shabeen is going to throw the coin 3 times.

She says the probability that the coin will land on tails 3 times is less than 0.1

Is Shabeen correct?

You must show all your working.

(Total for Question is 3 marks)

Q6.

Wendy goes to a fun fair.

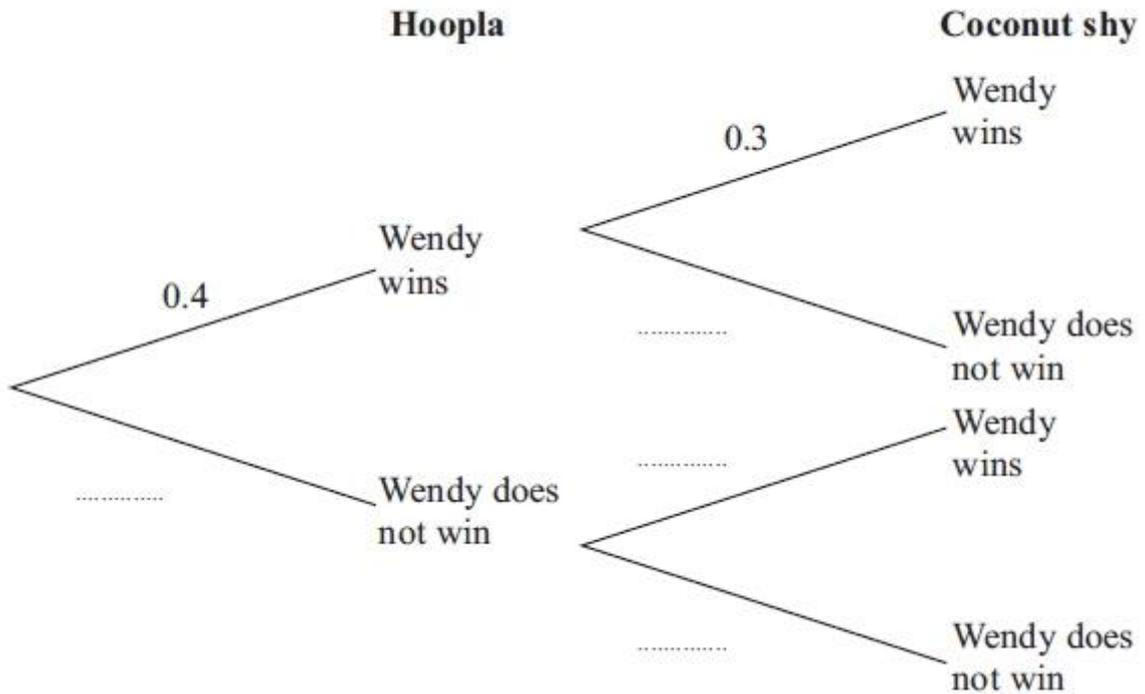
She has one go at Hoopla.

She has one go on the Coconut shy.

The probability that she wins at Hoopla is 0.4

The probability that she wins on the Coconut shy is 0.3

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Wendy wins at Hoopla and also wins on the Coconut shy.

.....
(2)

(Total for Question is 4 marks)

Q7.

In a supermarket, the probability that John buys fruit is 0.7

In the same supermarket, the probability that John independently buys vegetables is 0.4

Work out the probability that John buys fruit or buys vegetables or buys both.

.....
(Total for Question is 3 marks)

Q8.

Yvonne has 10 tulip bulbs in a bag.

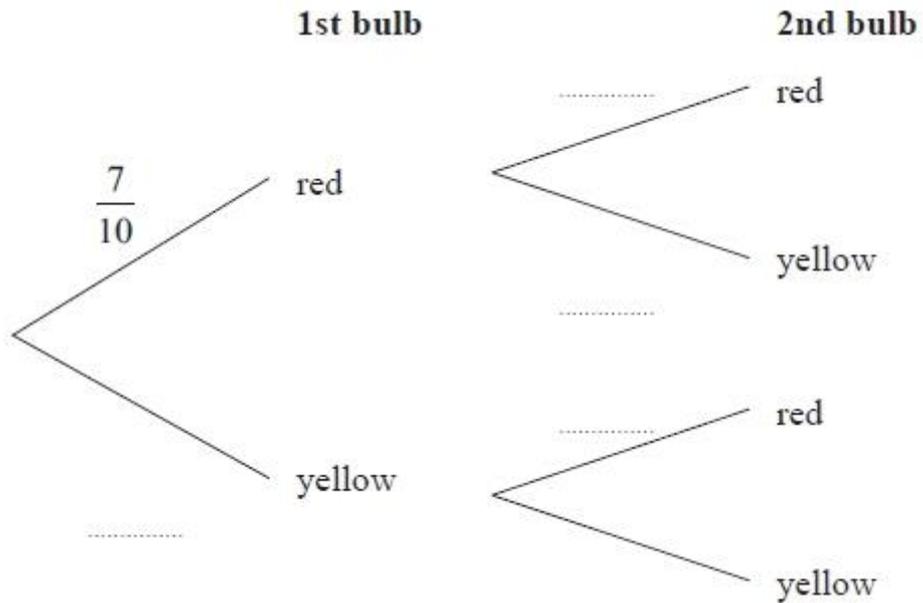
7 of the tulip bulbs will grow into red tulips.

3 of the tulip bulbs will grow into yellow tulips.

Yvonne takes at random two tulip bulbs from the bag.

She plants the bulbs.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that at least one of the bulbs will grow into a yellow tulip.

.....
(3)

(Total for Question is 5 marks)

Q9.

There are three different types of sandwiches on a shelf.

There are

- 4 egg sandwiches,
- 5 cheese sandwiches
- and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

(Total for Question is 5 marks)

Q10.

Carolyn has 20 biscuits in a tin.

She has

- 12 plain biscuits
- 5 chocolate biscuits
- 3 ginger biscuits

Carolyn takes at random two biscuits from the tin.

Work out the probability that the two biscuits were **not** the same type.

.....
(Total for Question is 4 marks)

Q11.

Fiza has 10 coins in a bag.

There are three £1 coins and seven 50 pence coins.

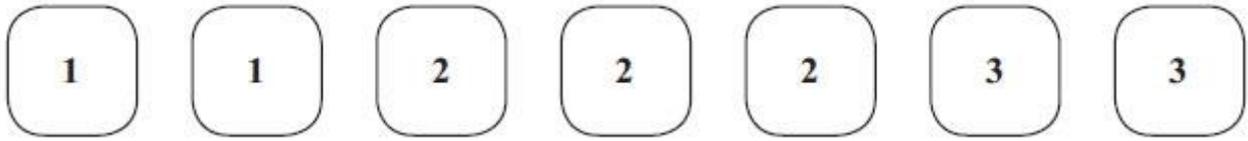
Fiza takes at random, 3 coins from the bag.

Work out the probability that she takes exactly £2.50

.....
(Total for Question is 4 marks)

Q12.

Here are seven tiles.



Jim takes at random a tile.

He does **not** replace the tile.

Jim then takes at random a second tile.

(a) Calculate the probability that both the tiles Jim takes have the number 1 on them.

.....

(2)

(b) Calculate the probability that the number on the second tile Jim takes is greater than the number on the first tile he takes.

.....

(3)

(Total for Question is 5 marks)