

GCSE Mathematics
Probability

PROBABILITY



Heads or Tails ?

Lesson 1

GCSE Mathematics Probability

1.1 Twelve Faced Die

Here is a picture of a die[†] with twelve *sides*.

(A mathematician would say this solid is a dodecahedron and has twelve *faces*)



This die is going to be rolled once.

What is :	(i)	$p (8)$	[1 mark]
	(ii)	$p (\text{multiple of } 4)$	[1 mark]
	(iii)	$p (\text{factor of } 12)$	[1 mark]
	(iv)	$p (\text{prime})$	[1 mark]
	(v)	$p (15)$	[1 mark]
	(vi)	$p (> 10)$	[1 mark]

If the die were rolled 144 times, how often would you expect a 5 to be rolled ?

[1 mark]

[†] Technically it is “one die” and “many dice”. However, it has become acceptable to talk of “one dice”.

1.2 Some useful information

Positive integers :	The counting numbers 1, 2, 3, 4, 5, 6, ...
Multiples of x :	The positive integers in the x times table
Factors of x :	The positive integers that divide x exactly
Primes :	The positive integers with exactly two factors 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, ...
$>$	More than
$<$	Less than
Square numbers :	1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...
Triangular numbers :	1, 3, 6, 10, 15, 21, ...
Vulgar fraction :	A fraction in the form $\frac{p}{q}$, for integer p and q and $q \neq 0$

1.3 Exercise

Marks Available : 36

Question 1

A twenty sided unbiased die is thrown

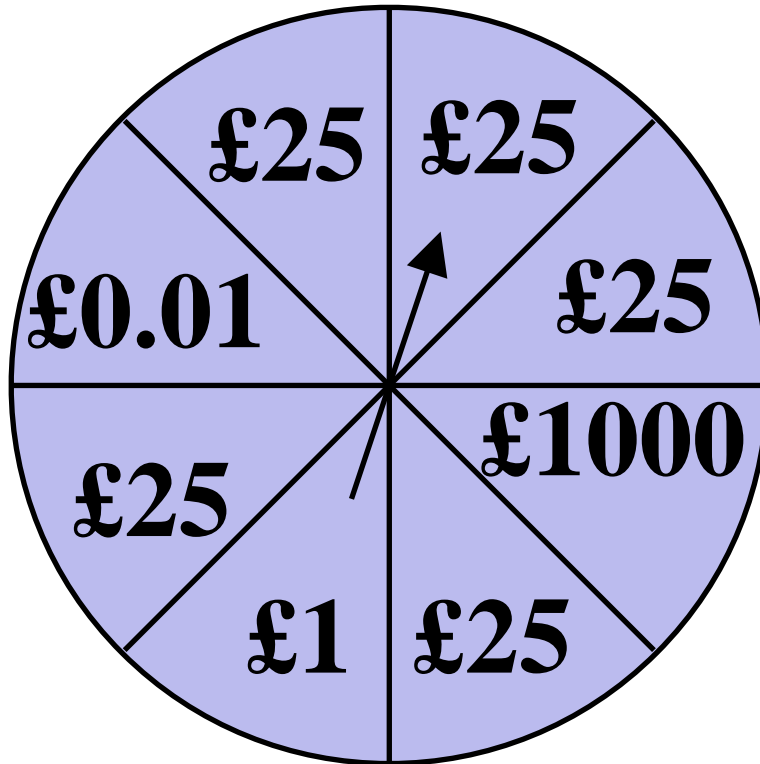
What is	(i)	$p (5)$	[1 mark]
	(ii)	$p (\text{multiple of } 5)$	[1 mark]
	(iii)	$p (\text{factor of } 20)$	[1 mark]
	(iv)	$p (\text{prime})$	[1 mark]
	(v)	$p (\text{square})$	[1 mark]
	(vi)	$p (> 17)$	[1 mark]

If the die were rolled 144 times, how often would you expect an EVEN number to be rolled ?

[1 mark]

Question 2

Tim's dad has decided to give him some money for doing well in a probability test. He spins the *wheel of fortune* shown below.



Each of the eight possible outcomes is equally likely.

What is; (i) $p(\text{£25})$

[1 mark]

(ii) $p(\text{£1000})$

[1 mark]

(iii) $p(>\text{£1})$

[1 mark]

Question 3

A drawer contains eight red T-shirts, six white T-shirts, and one blue T-shirt. One T-shirt is taken out at random.

What is; (i) $p(\text{white})$

[1 mark]

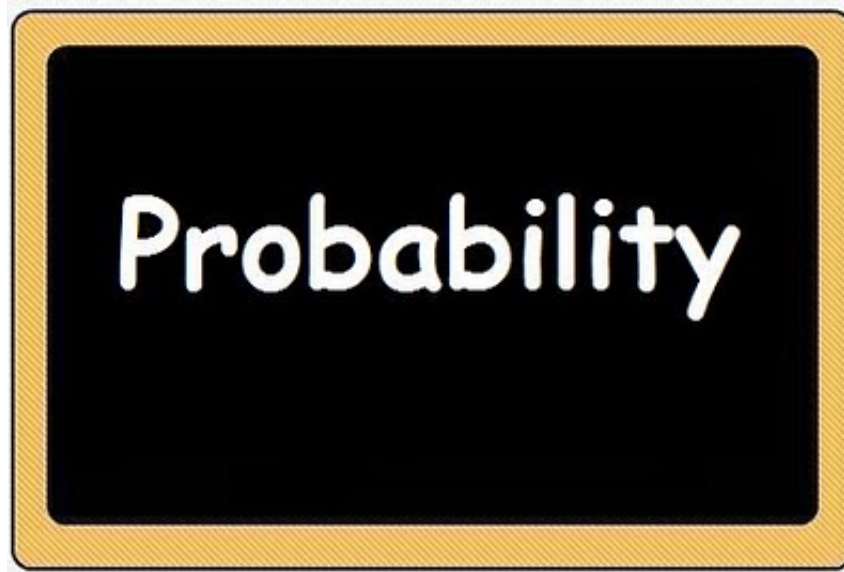
(ii) $p(\text{not blue})$

[1 mark]

(iii) $p(\text{not purple})$

[1 mark]

Question 4



A letter is chosen at random from the word "P r o b a b i l i t y".

What is; (i) $p (y)$

[1 mark]

(ii) $p (b)$

[1 mark]

(iii) $p (\text{vowel})$

[1 mark]

(iv) $p (\text{lower case})$

[1 mark]

Question 5

In a field are fourteen black sheep and thirty-five white sheep.

A sheep from the field is chosen at random.

What is the probability that it is white ?

Give your answer as a vulgar fraction that has been cancelled down.

[2 marks]

Question 6



In a field is estimated to be 10 000 000 clovers.

Of these, 400 are estimated to have four leaves, rather than the usual three.

If a clover is picked at random, what is the probability that it has four leaves ?

Give your answer as a vulgar fraction that has been cancelled down.

[2 marks]

Question 7

An ordinary die with six faces is thrown.

What is; (i) $p(4)$

[1 mark]

(ii) $p(\text{ODD})$

[1 mark]

(iii) $p(0.5)$

[1 mark]

(iv) $p(\leq 2)$

[1 mark]

(v) $p(> 2)$

[1 mark]

(vi) $p(\leq 6)$

[1 mark]

(vii) $p(\text{triangular number})$

[1 mark]

Question 8

A letter is chosen at random from the word "ORIENTEERING".

What is; (i) $p(G)$

[1 mark]

(ii) $p(N)$

[1 mark]

(iii) $p(E)$

[1 mark]

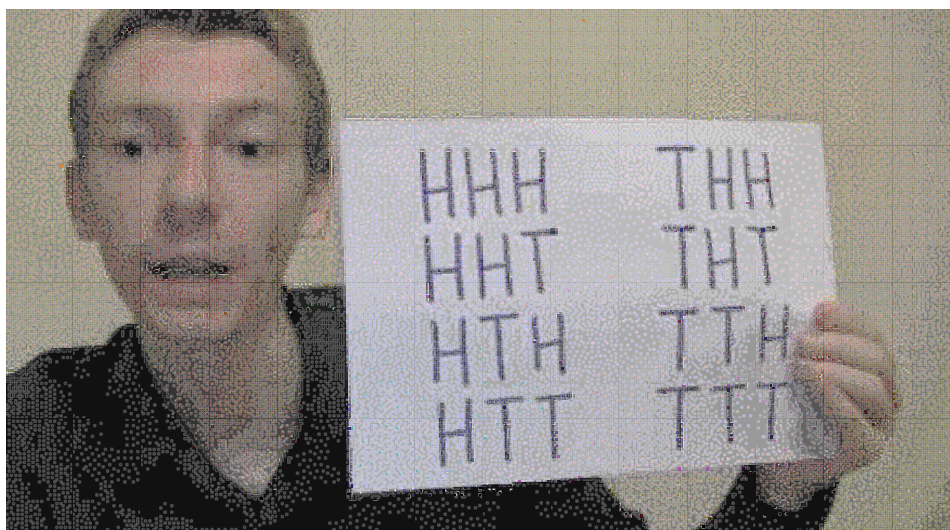
(iv) $p(\text{vowel})$

[1 mark]

(v) $p(\text{it's also found in "CUNNING RUNNING"})$

[1 mark]

Question 9



A coin is to be spun three times and it will be recorded if it lands 'heads' or 'tails'. On YouTube, Jack is talking about what can happen.

Explain why the probability of the coin landing heads once and tails twice is $\frac{3}{8}$.

[3 marks]

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Teachers may obtain detailed worked solutions to the exercises by email from MHHShrewsbury@Gmail.com