

GCSE Maths – Probability

Exhaustive and Mutually Exclusive Events

Worksheet

NOTES



SOLUTIONS



This worksheet will show you how to work out questions relating to exhaustive and mutually exclusive events. Each section contains a **worked example**, a **question with hints** and then **questions for you to work through** on your own.

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Section A

Worked Example

There are yellow and green counters in a bag. Lucy picks out counters at random, and then returns them. The probability that she will pick a yellow counter is 0.4. What is the probability that she will pick out a green counter?

Step 1: Identify all the exhaustive events in this scenario.

The only possible counters that Lucy can draw from the bag are yellow or green, so we know all exhaustive events (green or yellow). There are no other possibilities.

Step 2: Subtract the known probabilities from 1 to find the missing probability.

We know that the probability of drawing a yellow counter is 0.4. To find the probability of drawing a green counter, we perform the operation:

$$P(\text{Green counter selected}) = 1 - 0.4 = 0.6$$

The probability of picking out a green counter is 0.6.

Guided Example

The table below shows the probabilities of obtaining each number on a biased dice:

Value	1	2	3	4	5	6
Probability	0.15	0.15	0.3	0.24	0.06	

What is the probability of obtaining a 6 on this dice?

Step 1: Identify all the exhaustive events in this scenario.

Step 2: Subtract the known probabilities from 1 to find the missing probability.



Now it's your turn!

If you get stuck, look back at the worked and guided examples.

1. The probability that a football player is going to score in the next game is 0.8. What is the probability that they will not score?

2. In a raffle, 40 tickets were sold. Jack and Owen have 10 tickets each.

- a) Identify all exhaustive events in this scenario.

- b) What is the probability that Owen wins the raffle prize?



3. A letter is picked out at random from the word MISSISSIPPI.
- Identify all the exhaustive events from this scenario.
 - What is the probability of picking the letter 'S'?
4. In a lottery, there are 30 balls numbered 1-30 inclusive. One ball is drawn at random.
- How many exhaustive events are there?
 - Calculate the probability of picking a number larger than 20.



Section B

Worked Example

Steven rolls a fair die.

- Are the events of rolling an odd number and rolling a prime number mutually exclusive?
- What is the probability of rolling an odd number?

Step 1: For part a), consider whether the events are mutually exclusive.

*'Mutually exclusive' means the events **cannot** happen at the same time. To check whether these are mutually exclusive, we can look at each possible outcome:*

- 1 – odd, not a prime number
- 2 – even, a prime number
- 3 – odd, a prime number
- 4 – even, not a prime number
- 5 – odd, a prime number
- 6 – even, not a prime number.

*As 3 and 5 are both odd **and** prime numbers, this means that the events are **not** mutually exclusive, as they can both occur at the same time.*

Step 2: Calculate the probability for part b).

There are six possible numbers and amongst these six there are three odd numbers: 1, 3 and 5.

$$\text{Probability(Rolling an odd number)} = \frac{3}{6} = \frac{1}{2} = 0.5$$

The probability of rolling an odd number is 0.5.

Guided Example

Ryan picks out letters at random from the word LUXEMBOURG.

- Are the events of picking out a vowel and picking out a consonant mutually exclusive?
- What is the probability of picking out a vowel?

Step 1: For part a), consider whether the events are mutually exclusive.

Step 2: Calculate the probability for part b).



Now it's your turn!

If you get stuck, look back at the worked and guided examples.

5. In a bag of marbles, there are 20 orange and 30 blue marbles. Vanessa picks out 2 marbles at a time.
- Are the events of picking out an orange marble and blue marble mutually exclusive?
 - What is the probability of picking out an orange marble?
6. Louis picks out letters at random from the word LIGHTHOUSE.
- Are the events of picking a vowel and picking a letter in the first half of the word mutually exclusive?
 - Find the probability of picking a consonant.



7. A basketball team has a 0.7 chance of winning its next game.
- Explain why winning the next game and losing the next game are mutually exclusive events.

 - If the probabilities of losing the game or drawing the game are equal, what is the probability that they lose the next game?
8. A bag contains blue and red marbles, which come in sizes small and large. 80% of the marbles in the bag are blue. 60% of the marbles are large. Explain why picking a large marble and a blue marble are not mutually exclusive events.

