

2.3 Lesson 3 Mutually exclusive and exhaustive outcomes

Mutually exclusive outcomes cannot happen at the same time.

A **list of exhaustive outcomes** includes all possible outcomes.

If a set of outcomes are all mutually exclusive and the list is exhaustive, then the probabilities of these events add up to 1, because it is **certain** that exactly one of them will happen.

If $P(A)$ is the probability of event A happening, then the probability if A **not** happening is :

$$P(\bar{A}) = 1 - P(A)$$

■ **Example 2.1** A spinner used in a game shows the numbers 1 – 5. The table shows the probability of it landing on each number. The chance of it landing on the number 4 is double the chance of it landing on 1. Complete the table :

$$P(1) = P(4) \div 2 = 0.3 \div 2 = 0.15$$

$$P(3) = 1 - 0.15 - 0.2 - 0.3 - 0.1 = 0.25$$

ω	1	2	3	4	5	Total
$P(\omega)$		0.2		0.3	0.1	

Exercise 8 Answer the questions. Write a sentence and show your workings

1) In a game, you can either win or lose. The probability of winning is $\frac{3}{7}$. Work out the probability of losing.

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2) In a game, you can either win, lose or draw. The probability of losing is 35% and the probability of drawing is 20%. Work out the probability of winning.

.....

3) The probability of a token in a bag being particular color is shown in the table.

It is equally likely that a counter will be blue or

black. Complete the table.

ω	Red	Blue	Black	Other
$P(\omega)$	$\frac{3}{10}$			0.45

4) The probability that a train will be running late is 3%. Work out the probability that the train will be running on time.

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5) The probability that Jackie will win the first prize in a raffle is 0.05. Work out the probability that Jackie will **not** win the first prize in the raffle.

.....

6) Each table shows the probabilities of winning, drawing and losing in a particular game. Work out the missing values.

Win	Draw	Lose
	0.05	$\frac{6}{10}$

Win	Draw	Lose
	$\frac{2}{5}$	$\frac{1}{2}$

Win	Draw	Lose
22%		78%

Win	Draw	Lose
0.12		$\frac{1}{2}$

- 7) The table shows the probability of picking a red, blue, green or yellow token from a bag.
Are there any other colored token in the bag ?

Color	Red	Blue	Green	Yellow
Probability	0.2	0.18	0.02	0.5

Explain your answer.

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- 8) The list below shows a set of events that can occur when a normal six sided fair die is rolled.

A = Rolling an even number

B = Rolling a prime number

C = Rolling a square number

D = Rolling a number greater than 4

E = Rolling an odd number

Which pair of events are mutually exclusive.

.....

Which pair of events are exhaustive.

.....

- 9) The table shows the probabilities of some countries winning an Olympic event.

Country	UK	USA	Japan	Other
Probability	$\frac{1}{2}$			$\frac{1}{6}$

USA are twice as likely to win as Japan. Complete the table.

- 10) Here are some events that can happen when a card is picked from a normal pack of 52 playing cards.

Event A	Event B	Event C	Event D	Event E
The card is red	The card is a club	The card is an even number	The card is black	The card is a diamond

Decide whether these statements are true or false :

	True	False
1/ Events A and B are mutually exclusive.	<input type="checkbox"/>	<input type="checkbox"/>
2/ Events A and D are mutually exclusive.	<input type="checkbox"/>	<input type="checkbox"/>
3/ Events B and E are exhaustive.	<input type="checkbox"/>	<input type="checkbox"/>
4/ Events C and D are exhaustive.	<input type="checkbox"/>	<input type="checkbox"/>
5/ Events A and B are exhaustive.	<input type="checkbox"/>	<input type="checkbox"/>