

Student Name

Mathematics Stage 5 Core

PROBABILITY A

Book 1 Describe multistage chance experiments
involving independent and dependent events

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OVERVIEW

SYLLABUS CONTENT

MA5-PRO-C-01 solves problems involving probabilities in multistage chance experiments and simulations

Describe multistage chance experiments involving independent and dependent events

- Explain the difference between dependent and independent events in experiments involving 2 stages
- Explain how the probability of independent and dependent events differs in relation to replacement

MULTI-STEP EXPERIMENTS

- A **two-step experiment** consists of two steps.
- For example:
 - tossing two coins
 - rolling two dice
 - flipping a coin then rolling a die.

INDEPENDENT AND DEPENDENT EVENTS

- An **independent event** doesn't change based on previous results.
Example: Flipping a coin twice - the second flip doesn't depend on the first.
- A **dependent event** changes based on previous results.
Example: Taking two marbles from a bag - the second pick depends on the first.

Example Distinguish between independent and dependent events.

Determine whether these events are independent or dependent.	
Tossing a coin then tossing another coin.	Rolling a die then rolling another die.
Tossing a coin then rolling a die.	Choosing a marble from a jar then tossing a coin.
Choosing a card from a deck, replacing it, then choosing another card after shuffling.	Choosing a card from a deck, then choosing another one without replacing it.
Choosing a marble from a jar, replacing it, shaking the jar, then choosing another marble.	Choosing a marble from a jar then choosing another marble.
When an experiment is conducted with replacement , is it independent or dependent?	
.....	
When an experiment is conducted without replacement , is it independent or dependent?	
.....	

Key ideas

1. A experiment involves performing two or more actions in sequence.
2. An event is one that is not affected by the previous outcome, such as flipping a coin twice.
3. For multi-step experiments with replacement, successive events are
4. A event is one that is influenced by the previous outcome, such as drawing marbles from a bag without replacement
5. For multi-step experiments without replacement, successive events are

1	Identify these events as independent or dependent.	
a	You roll a six-sided die and then flip a fair coin.	 I
b	You have a bag with red marbles and blue marbles. You draw a marble, note its color, and then draw another marble without replacement.	 D
c	You draw a card from a standard deck and record its suit. You replace the card and shuffle the deck, then draw a second card from the deck.	 I
d	You have a drawer with black socks and white socks. You select a sock, record its color, and then select another sock without replacement.	 D
e	You check the weather forecast in the morning, and based on that information, you decide whether to bring an umbrella.	 D

2 A fair coin is tossed 10 times. It comes up heads 9 times.
What is the probability it will be heads on the 10th toss? Why?

.....

$\frac{1}{2}$, as coin tosses are independent events.

3 A bag contains a red jellybean and a blue jellybean.

Scenario 1: A jellybean is drawn randomly, the colour recorded, and then returned to the bag. Afterwards, a second jellybean is drawn.

Scenario 2: A jellybean is drawn randomly, the colour recorded, and it is then eaten. Afterwards, a second jellybean is drawn.

a Out of the two scenarios, which one represents a series of independent events, and which one represents a series of dependent events?

Scenario 1 is independent, Scenario 2 is dependent

b In scenario 1, explain why the probability that the second jellybean is red is $\frac{1}{2}$, regardless of the colour of the first jellybean.

Jellybean draws are independent events

c In scenario 2, explain why the probability of the second jellybean being red will not be $\frac{1}{2}$.

If a red jellybean was taken first, the probability of the second being red will be 0
If a blue jellybean was taken first, the probability of the second being red will be 1