S3 Topic 3

Probability – Mutually exclusive events

Level: Key Stage 3

Dimension: Data Handling
Module: Probability
Unit: Simple Idea of Probability

Student ability: Average

Content Objectives:

After completing the activity, students should understand the concept of mutually exclusive events and be able to calculate the probability of mutually exclusive events.

Language Objectives:

After completing the activity, students should be able to:

- understand the English terms related to mutually exclusive events (e.g., mutually exclusive events, probability)
- understand the English expressions for explaining the key concepts related to this topic, e.g.,
  - *In everyday life, there are events that cannot happen at the same time. We called these mutually exclusive events.*
  - *Because mutually exclusive events cannot happen together, the probability that both events will happen together is equal to zero.*
  - *If A and B are mutually exclusive events, then P (A or B) = P(A) + P(B).*
  - *Because two mutually exclusive events cannot occur at the same time, they have no outcome in common, the probability that either event may happen is the sum of the probabilities of the events A and B.*
- follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite knowledge:

Students should have learned, through the medium of Chinese, how to calculate the probability of simple and single events.

Time: 2 lessons (80 minutes)

Procedure:

1. The teacher should first ask the students to study the events in Activity 1 and determine whether both events in each case can occur at the same time or not. The teacher should check the answers with the students. Teacher may assign Activity 1 for group discussion.

2. The teacher should discuss the findings of Activity 1 and introduce the concept of mutually exclusive events. The teacher should then lead the students to find the probability of the four cases in Activity 2. The teacher should invite the students to present their answers. The teacher should also lead the class to draw the conclusion: For two mutually exclusive events A and B, P(A or B) = P(A) + P(B).

Explanatory Notes for Teachers:

1. After the demonstration of the simple experiments in activities 1, 2 and 3, students should be able to understand how to find the probabilities of different events.

2. The suggested answers are provided on the last page of the worksheet.

Name: _____ Class: _____ ( )

Probability - Mutually Exclusive Events

Activity 1:

Could the two events A and B in the following situations happen at the same time? If yes, put a tick (✓) in the box. If no, put a cross (✗).

1) Event A: toss a coin and get "heads".
   Event B: toss a coin and get "tails". ☐

2) Event A: roll a dice and get a "1".
   Event B: roll a dice and get a "6". ☐

3) Event A: roll a dice and get a "2".
   Event B: roll a dice and get an even number. ☐

4) A bag contains 2 yellow balls and 3 blue balls. A ball is drawn from it.
   Event A: You get a yellow ball.
   Event B: You get a blue ball. ☐

5) One student is selected as the class monitor.
   Event A: John is selected as the monitor.
   Event B: Peter is selected as the monitor. ☐

6) A card is drawn from a deck of standard playing cards.
   Event A: A spade is drawn.
   Event B: A heart is drawn. ☐

7) A card is drawn from a deck of standard playing cards.
   Event A: A heart is drawn.
   Event B: A king is drawn. ☐

In everyday life, there are events that cannot happen at the same time. We called these Mutually Exclusive Events (互斥事件).

Can you write down two mutually exclusive events?

_____

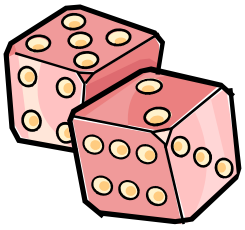
_____

Since mutually exclusive events cannot happen together, the probability that both events will happen together is equal to _____.

How about the probability that either one event will happen?

Activity 2:

Complete the following.



1) Roll a dice:

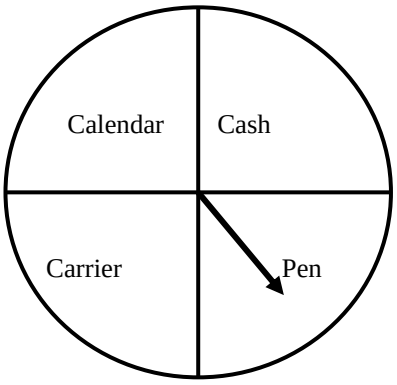
Event A: Roll a dice and get a "1".

Event B: Roll a dice, and get a "4".

The probability that you get a "1", P(A), is _____.

The probability that you get a "4" , P(B) , is _____.

The probability of getting a "1" or a "4", P(A or B), is _____.



1. Spin to win a prize:

You spin the wheel which has four equal sectors.

Event A: You get a calendar.

Event B: You get a cash coupon.

P(A) = _____.

P(B) = _____.

The probability of getting a calendar or cash coupon, P(A or B), is _____.

2. Draw a coloured ball from the bag

There are five balls of different colours (orange, yellow, red, blue and white) inside a bag.

Event A: Draw a white ball.

Event B: Draw an orange ball.

P(A) = _____.

P(B) = _____.

The probability of getting a white or an orange ball, P(A or B), is _____.

4) Draw a card

There are 52 cards in a deck of standard playing cards.

Event A: You draw the King of Spades.

Event B: You draw an ace.

P(A) = _____.

P(B) = _____.

The probability of getting the King of Spades or an ace, P(A or B), is

_____.

Discussion:

In the above cases, events A and B are

_____.

State the relationship between P(A), P(B) and P(A or B)

Then P (A or B) = _____ + _____.

Why?

_____

_____

Exercises:

1. Form 3C is looking for a new monitor. The probability of John becoming the monitor is 0.2 and the probability of Jenny becoming the monitor is 0.4. What is the probability of either John or Jenny becoming the monitor?

2. A bag contains 2 yellow balls, 3 green balls, 5 red balls and 6 black balls. What is the probability of either a yellow ball or a red ball being drawn if only one ball is drawn?

3. A card is drawn from a deck of playing cards. What is the probability of drawing a heart or the King of Spades?

Suggested answers:

Activity 1:

1, 2, 4, 5 and 6 ✘

3 and 7 ✓

Zero / 0

Activity 2:

1) $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{3}$

2) $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{2}$

3) $\frac{1}{5}$ $\frac{1}{5}$ $\frac{2}{5}$

4) $\frac{1}{52}$ $\frac{4}{52}$ $\frac{5}{52}$

Discussion:

mutually exclusive events

P(A) + P(B)

Two events cannot occur at the same time, so that they have no outcome in common. Therefore the probability that either event may happen is the sum of the probabilities of the events A and B.

Exercises:

1) 0.6 2) $\frac{7}{16}$ 3) $\frac{7}{26}$