S3 Topic 2

Probability – Simple 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 have gained a better understand of the meaning of probability and be able to calculate the probability of simple events.

Language Objectives:

After completing the activity, students should be able to:

- understand the English terms related to probability (e.g., *certain events, uncertain events, probability, likely to happen, compare the likelihood of events, favourable outcomes, possible outcomes*);
- understand the English expressions for explaining the key concepts related to probability, e.g.,
  - *Probability is the measure of how likely an event is.*
  - *For some events in everyday life, we are certain about the outcomes, whereas for other events we are not so certain about the outcomes.*
  - *For uncertain events, some events are more likely to happen and some events are less likely to happen. We may use a number to represent the likelihood of an event happening. This number is called the probability of the event.*
- understand the English expressions for explaining how to calculate the probability of an event, e.g.,
  - *The probability of an event is the number of favourable outcomes divided by the number of possible outcomes.*
  - *The formula of probability of an event G:*

$$P(G) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

  - *The number of favourable outcomes must be greater than or equal to 0 and less than or equal to the number of possible outcomes*
- follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite knowledge: nil

Materials: balls and dice for activity 3

Time: 2 lessons (80 minutes)

Procedure:

1. The teacher should lead the class to discuss the events in activity 1, and check the answers with the students to see whether they can identify the certain and uncertain events. The teacher may assign Activity 1 for group discussion.

2. The teacher should assign Activity 2 to the class and asks the students to decide the event which is more likely to happen. The teacher may assign this activity for group discussion.

3. The teacher should show the class the ball and dice before the students work on the cases. The teacher should then guide the students to find out the probability, possible outcomes and favourite outcomes for each event in activity 3. The teacher should check the answers with the students. Similarly, the teacher may assign the case studies to the class for discussion.

4. The teacher should explain the definition of probability which may help students to memorize what they have learned. Besides, the last discussion can help students to gain a better insight into the topic.

Explanatory Notes for Teachers:

1. After the demonstration of the simple experiments in activities 1, 2 and 3, students should be able to grasp the idea of how to calculate the chance of occurrence of the different events.

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

Name: _____ Class: _____ ( )

Title: Probability

Activity 1:

Certain and uncertain events (事件)

Study the following events and put a tick (✓) next to the ones for which you are certain about the result and put a cross (✗) next to the ones for which you are not certain about the result.

1. The sun will rise in the east tomorrow.

   _____

2. There is no snowfall in Hong Kong in August.

   _____

3. China cannot become the champion of the European Cup Football competition.

   _____

4. You will lose you wallet this week.

   _____

5. John will be sick tomorrow.

   _____

For some events in everyday life, we are certain about the outcomes and for other events we are not so certain about the outcomes.

Activity 2:

Compare the likelihood (可能性) of following pairs of events and put a tick against the event that is more likely to happen.

1. Event A: You will get 98 marks or above in the coming math examination. ( )
   Event B: You will pass the coming math examination. ( )

2. Event A: You will throw a dice and get an odd number. ( )
   Event B: You will throw a dice and get a number 3. ( )

3. Event A: There will be a typhoon signal hoisted in August in Hong Kong. ( )
   Event B: There will be a typhoon signal hoisted in February in Hong Kong. ( )

4. Event A: You will draw a king from a deck of playing cards. ( )
   Event B: You will get a "Head" when you toss a five-dollar coin. ( )

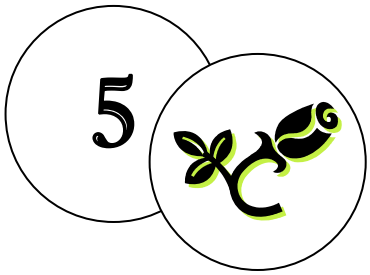
For uncertain events, some events are more likely to happen and some events are less likely to happen. We may use a number to represent the likelihood of an event happening. This number is called the probability (概率) of the event.

Activity 3:

Consider the following events and list all possible outcomes (可能結果).

Example:

On a coin, we may have a picture of a head or a flower on one side and a number or words on the other side. When we toss a coin to decide something, we call the side with the head or flower "Heads", and the side with numbers or words "Tails".



Event C: Toss a coin and get "Heads".

When we toss the coin, we may get "Heads" or "Tails".

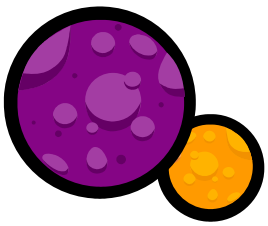
They are two possible outcomes (可能結果).

For event E, getting Heads (a flower) is the ***favourable outcome*** (有利結果).

The number of favourable outcomes is one.

The probability of the getting "Heads", P(C), is _____.

Case 1:



Draw a ball from the bag

There are four different colours (orange, yellow, blue and white) of balls inside the bag.

Event D: Draw a white ball from the bag.

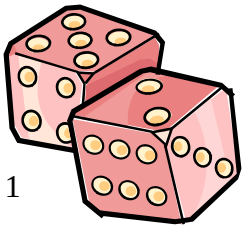
The possible outcomes: _____

There are _____ possible outcomes.

Favourable outcomes: _____

Probability of the event A, P(D): _____

Case 2:



Throw a dice

If the dice is a fair dice, you have an equal chance of getting any number from 1 to 6.

Event E: Throw the dice and get an odd number.

The possible outcomes: _____

There are _____ possible outcomes.

Favourable outcomes: _____

P(E): _____

Case 3:

Draw a ball from the bag

There are 3 red balls and 2 green balls inside the bag.

Event F: Draw a red ball from the bag.

The possible outcomes: _____

There are _____ possible outcomes.

Favourable outcomes: _____

P(F): _____

From the above cases:

We observe that the probability (概率) of an event is the number of favourable outcomes divided by the number of possible outcomes.

The formula of probability of an event G:

P (G) = _____

Discussion:

1) If the coin is biased or unfair, what happens to the probability of getting “Heads”?

2) What are the smallest and greatest values of the probability, P(H), of an event H? Why?

Suggested answers:

Activity 1:

1. ✓ 2. ✓ 3. ✓ 4. × 5. ×

Activity 2:

1. Event B 2. Event A 3. Event A 4. Event B

Activity 3:

Toss a coin: P(C) = $\frac{1}{2}$

Case 1:

orange, yellow, blue, white

4 possible outcomes

white ball

P(D) = $\frac{1}{4}$

Case 2:

1, 2, 3, 4, 5, and 6 6 possible outcomes

1, 3, 5 P(E) = $\frac{1}{2}$

Case 3:

Red 1, Red 2, Red 3, Green 1, Green 2

5 3 P(F) = $\frac{3}{5}$

$$P(G) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$

Discussion:

(Any other possible answers)

1. If the coin is not balanced, the probability of getting "Heads" may be affected and not equal to $\frac{1}{2}$.
2. Since the number of favourable outcomes must be greater than or equal to 0 and less than or equal to the number of possible outcomes, we can conclude that:
   For any event E, $0 \le P(H) \le 1$.)