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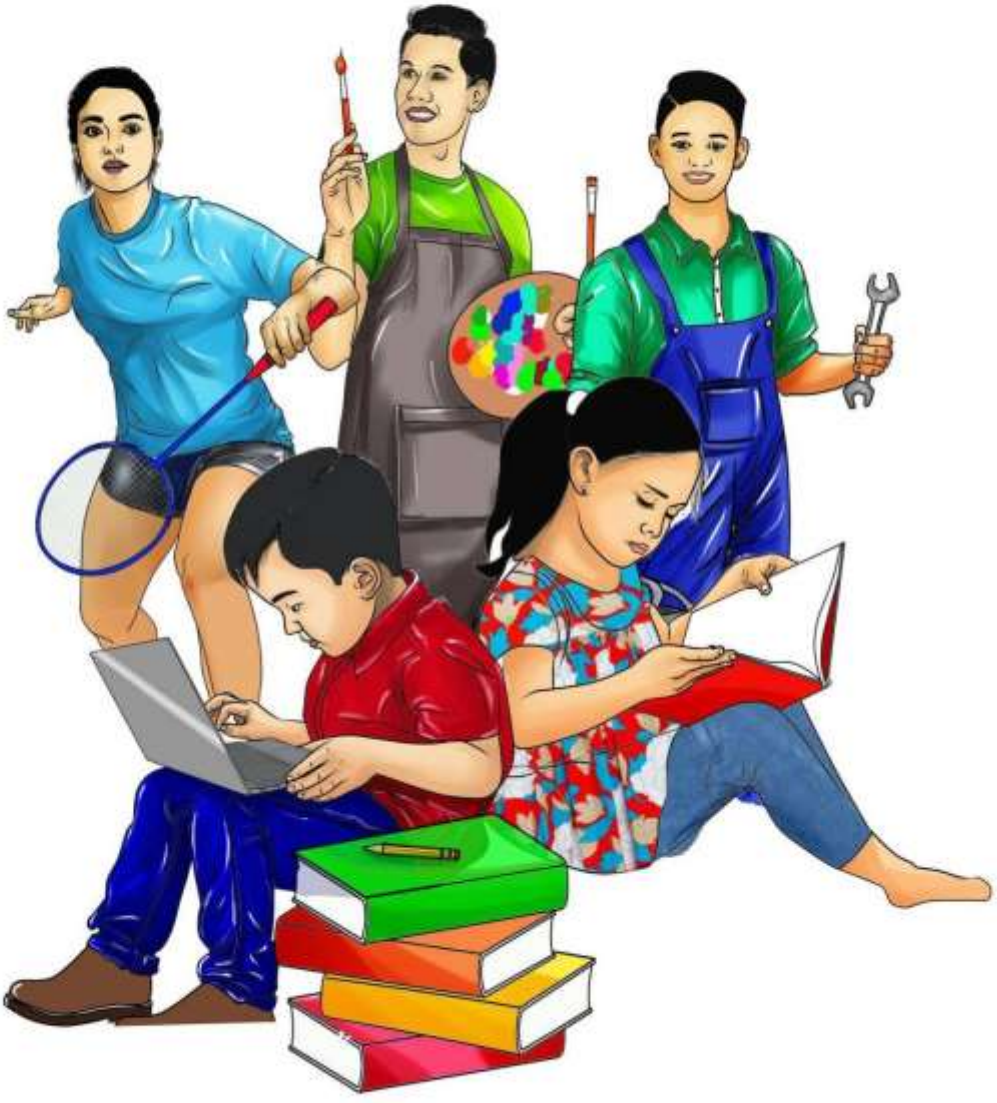
Mathematics

Quarter 4- Week 8
Module 8: Solving Problems Involving Probability of Simple Event



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Mathematics 8
Quarter 4- Week 8 Module 8: Solving Problems Involving Probability of Simple Event
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La Union Schools Division
Region I

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Target

Probability is the likelihood of a particular outcome or event happening. Statisticians and actuaries use probability to make predictions about events. An actuary that works for a car insurance company would, for example, be interested in how likely a 17 year old male would be to get in a car accident. They would use data from past events to make predictions about future events using the characteristics of probabilities, then use this information to calculate an insurance rate.

Before we start, let us consider first this learning competency.

1. Solves problems involving probabilities of simple events. **(M8GE-IVi-j-1)**

After going through this module, you are expected to:

1. define probability of simple event,
2. determine the sample space and favorable outcome, and
3. solve problems involving probability of simple event.

Before going on, check how much you know about this topic. Answer the pretest in a separate sheet of paper.

Pre-Assessment

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. Which of the following does not belong to the group?
   A. chance B. interpretation
   C. possibilities D. uncertainly
2. Suppose you roll a die, how many possible outcomes are there?
   A. 2 B. 4 C. 6 D. 8
3. Which of the following is true?
   A. Answering a true/false-type question has one possible answer.
   B. Flipping a coin thrice has 3 possible outcomes.
   C. The probability of getting a head when a coin is tossed can be expressed as ½.
   D. The probability of rolling 7 in a die is $\frac{1}{7}$.
4. The local weather forecaster said that there is a 20% chance of rain tomorrow. What is the probability that it will not rain tomorrow?
   A. 0.2 B. 0.8 C. 20 D. 80
5. A balanced die is rolled. What is the probability of rolling a number that is not 3?
   A. 0 B. $\frac{1}{6}$ C. $\frac{5}{6}$ D. 1
6. In a 500-ticket draw for an educational prize. Ana's name was written on 41 tickets. What is the probability that she would win?
   A. 0.082 B. 0.122 C. 0.41 D. 0.82
7. If you choose from the following M&M colors, what is the probability that you choose blue? 5 green 8 blue 6 yellow 7 brown

   A. $\frac{8}{26}$ B. $\frac{8}{25}$ C. $\frac{4}{13}$ D. $\frac{1}{3}$
8. A bag contains 5 pieces of one-peso coin, 2 pieces of five-peso coin and 4 pieces of ten-peso coin. What is the probability of picking a one – peso coin?
   A. $\frac{5}{11}$ B. $\frac{1}{3}$ C. $\frac{5}{6}$ D. 5
9. A bag has 3 red marbles, 2 blue and 4 yellow. What is the probability of pulling a red?
   A. $\frac{1}{9}$ B. $\frac{3}{10}$ C. $\frac{1}{3}$ D. 3
10. There are 6 blue marbles, 3 red marbles, and 5 yellow marbles in a bag. What is the probability of selecting a blue on the first draw?
    A. $\frac{1}{3}$ B. $\frac{3}{7}$ C. $\frac{3}{14}$ D. $\frac{5}{14}$
11. Which of these numbers cannot be a probability?
    A. ½ B. 0.75 C. 89% D. 1.01

12. If you roll a die numbered from 1 to 6, what is the probability that will not roll an even number?

A. $\frac{1}{3}$ B. $\frac{1}{6}$ C. $\frac{1}{2}$ D. $\frac{3}{4}$

13. There are 8 marbles in a bag. 3 are striped. What is the probability of getting a not striped?

A. $\frac{3}{8}$ B. $\frac{5}{8}$ C. $\frac{3}{5}$ D. $\frac{5}{3}$

14. Alison chooses a playing car at random from a standard deck. What is the probability of choosing a heart?

A. 25% B. 50% C. 75% D. 100%

15. Which is the best way to represent answering 25 multiple-choice questions with 4 choices for each answer?

A. spin a spinner with four sections 25 times
B. roll a die 25 times
C. flip a coin 25 times
D. roll a die 4 times

MODULE 8 Solving Problems Involving Probability of Simple Event

Let's start this module by assessing your knowledge of the different mathematics concepts previously studied. These knowledge will help you understand on how to solve problems involving probability of simple event. If you find difficulty in answering the activities, seek the assistance of your teacher.

Activity 1: How Likely Am I?

Directions: Which of the words; certain, likely, unlikely or impossible best describe how likely the events below takes place?

1. It will rain tomorrow.
2. It will snow tomorrow.
3. It is your teacher's birthday tomorrow.
4. You will obtain a 7 when rolling a die.
5. You throw an unbiased die and get an even number.

Were you able to describe how likely of the events take place? In the next activity, you will determine the sample space of an experiment. You are done with this activity in your previous lesson so I am sure you can do it!

Jumpstart

For you to understand the lesson well, do the following activities. Have fun and good luck!

Activity 2: Show My Sample Space

Directions: Determine the possible outcomes in each experiment.

1. Rolling a die
2. Flipping two coins
3. Rolling a die and tossing a coin simultaneously
4. Drawing a card from a standard deck of cards
5. Rolling a pair of dice

Activity 3: List Me

Directions: List the favorable outcome in each event.

1. Getting a head in tossing two coins
2. Having an even number in rolling a die
3. Choosing a red card from a deck of cards
4. Choosing a face card from a deck of cards
5. Rolling a sum of 6 from a pair of dice

Discover

Probability is the science of how likely events are to happen. At its simplest, it's concerned with the roll of dice or the fall of the cards in a game. But probability is also vital to science and life more generally.
Probability is used for example, in such diverse areas as weather forecasting and to work out the cost of your insurance premiums.

Simple Event

A simple event is one that can only happen in one way – in other words, it has a single outcome.
Examples

1. Tossing a coin: we can get one outcome that is a head or tail
2. Getting an odd number in rolling a die: we can get one outcome that is 1 or 3 or 5
3. Drawing an ace from a standard deck of cards: we can get ace of heart or ace of diamond or ace of club or ace of spade

Probability of Simple Event

The probability of simple event is finding the probability of a single event occurring. The probability of an event E, written P(E), is defined as

$$P(event) = \frac{number\ of\ favorable\ outcomes}{number\ of\ all\ possible\ outcomes}$$

$$P(E) = \frac{n(E)}{n(S)}$$

Fraction must be simplified to its lowest term.

Reminders:
Probability Rules
1. The probability of any event is a number (either a fraction, a decimal, or a percent) from 0 to 1.
2. If an event will never happen, then its probability is 0.
3. If an event is sure to happen, then the probability is 1.
4. The sum of the probabilities of all the outcomes in the sample space is 1.

Example 1: Flipping a coin/ Tossing a coin

When a coin is tossed, there are two possible outcomes: head(H) or tail(T)

What is the probability of flipping a tail?

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

$$P(tail) = \frac{1}{2}$$

Also… the probability of flipping a head is $\frac{1}{2}$.

Example 2: Rolling a die/ Throwing a die

When a fair die is thrown, what is the probability of getting
a) the number 5
b) a number that is a multiple of 3
c) a number that is greater than 6
d) a number that is less than 7

Solution:
A fair die is an unbiased die where each of the six numbers is equally likely to turn up.
S = {1, 2, 3, 4, 5, 6}
a) Let A = event of getting the number 5 = {5}
Let n(A) = number of outcomes in event A = 1
n(S) = number of outcomes in S = 6

$$P(A) = \frac{1}{6}$$

b) Let B = event of getting a multiple of 3
Multiple of 3 = {3, 6}

$$P(B) = \frac{2}{6} = \frac{1}{3}$$

c) Let C = event of getting a number greater than 6
There is no number greater than 6 in the sample space S.
C ={}

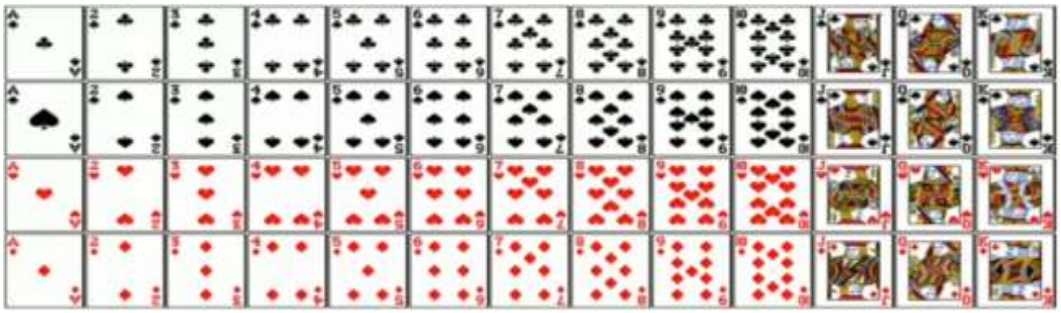
$$P(C) = \frac{0}{6} = 0$$

A probability of 0 means the event will never occur.
d) Let D = event of getting a number less than 7
Numbers less than 7 = {1, 2, 3, 4, 5, 6}

$$P(D) = \frac{6}{6} = 1$$

A probability of 1 means the event will always occur.

Example 3: Picking a card from a standard deck of cards



A standard deck of cards includes 13 ranks of each of the four suits: hearts, diamonds, spades and clubs. Each suit has 10 numbered cards and 3 figures or faces: jack, queen and king.

a. What is the probability of picking a heart?

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

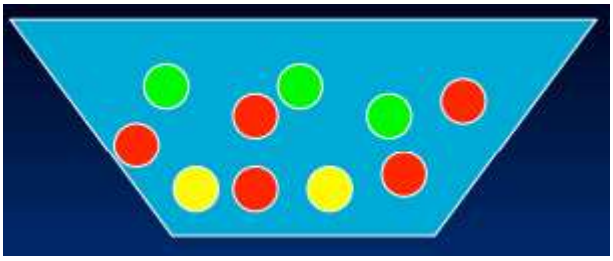
$$P(heart) = \frac{13}{52} = \frac{1}{2}$$

b. What is the probability of picking a face card?

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

$$P(heart) = \frac{12}{52} = \frac{3}{13}$$

Example 4: Choosing a ball from a box



A box contains 5 red balls, 3 green balls, and 2 yellow balls. What is the probability of choosing:

a. a green ball

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

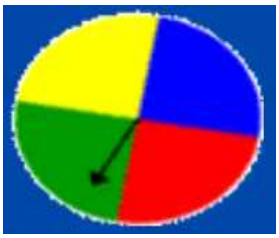
$$P(event) = \frac{3}{10}$$

b. a red ball

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

$$P(event) = \frac{5}{10} = \frac{1}{2}$$

Example 5: Spinner

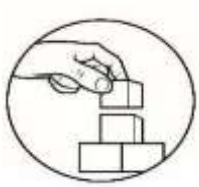


What is the probability of spinning green?

$$P(event) = \frac{\#\ of\ favorable\ outcomes}{\#\ of\ possible\ outcomes}$$

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

Now that you have learned about solving problems involving probability of simple event, so you can proceed to the next activities.



Explore

Here are some enrichment activities for you to work on to master and strengthen the basic concepts you have learned from this lesson.

Activity 4: Let's Toss and Enjoy...

Directions: A die is tossed once. Find the probability of tossing:

1. an odd number
2. a prime number
3. a number greater than 4
4. a number less than 2
5. a 7

Activity 5: Pick My Card

Directions: A card is picked from a standard deck of cards. Determine the probability of picking:

1. a numbered card
2. a red card
3. a black card
4. an ace
5. a king

Deepen

Activity 6: See My Prob-Ability

Directions: Solve the following carefully.

1. Earl Darenz is asked to choose a day from a week. What is the probability of choosing a day which start with S?
2. Choosing a month from a year, what is the probability of selecting a month with 31 days?
3. If a letter is chosen at random from the word PERSEVERANCE, what is the probability that the letter chosen is E?
4. If one letter is chosen at random from the word TRUSTWORTHY, what is the probability that the letter chosen is a consonant?
5. The sides of a cube are numbered 11 to 16. If Jan Renz rolled the cube once, what is the probability of rolling a composite number?

6. A box contains 7 red balls, 5 orange balls, 4 yellow balls, 6 green balls, and 3 blue balls. What is the probability of drawing out an orange ball?
7. Of the 45 students in a class. 25 are boys. If a student is selected at random for a fieldtrip, what is the probability of selecting a girl?
8. Two fair coins are tossed simultaneously. What is the probability of showing a tail (T) followed by a head (H)?
9. A spinner is divided equally and numbered as follows: 1,1,2,3,3,4,1,1,2,4,1, 2,3,4,1,2. What is the probability that the pointer will stop at an even prime?
10. What is the probability of getting an 8 from a deck of 52 cards?

Gauge

Assessment

Directions: Read carefully each item. Use separate sheet for your answers. Write only the letter of the best answer for each test item.

1. When a single die is rolled, what is the probability of getting an 8?
   A. 0 B. $\frac{1}{6}$ C. $\frac{5}{6}$ D. 1
2. When a die is rolled, what is the probability of getting a number less than 7?
   A. 0 B. $\frac{1}{6}$ C. $\frac{5}{6}$ D. 1
3. A balance die is rolled. What is the probability of rolling a number that is not 3?
   A. 0 B. $\frac{1}{6}$ C. $\frac{5}{6}$ D. 1
4. Suppose you toss two fair coins once, how many possible outcomes are there?
   A. 1 B. 2 C. 4 D. 8
5. Arlene Joy got coins from her pocket which accidentally rolled on the floor. If there were 8 possible outcomes, how many coins fell on the floor?
   A. 3 B. 4 C. 8 D. 16
6. If a card is drawn from a standard deck of cards, what is the probability of getting a jack?
   A. 0 B. $\frac{1}{13}$ C. $\frac{12}{13}$ D. 1
7. What is a probability of picking a card that is not ace from a standard deck of cards?
   A. 0 B. $\frac{1}{13}$ C. $\frac{12}{13}$ D. 1
8. There are 16 dogs at the dog park on a busy Saturday. 4 of them are golden retrievers. What is the probability that a randomly selected dog is a golden retriever?
   A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $\frac{3}{4}$ D. 1

9. There are 16 dogs at the dog park on a busy Saturday. 4 of them are golden retrievers. What is the probability that a randomly selected dog is not a golden retriever?
   A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $\frac{3}{4}$ D. 1

10. A box contains 7 red balls, 5 orange balls, 4 yellow balls, 6 green balls, and 3 blue balls. What is the probability of drawing out a yellow ball?

A. $\frac{3}{25}$ B. $\frac{4}{25}$ C. $\frac{6}{25}$ D. $\frac{7}{25}$

11. A box contains 7 red balls, 5 orange balls, 4 yellow balls, 6 green balls, and 3 blue balls. What is the probability of drawing out a green ball?

A. $\frac{3}{25}$ B. $\frac{4}{25}$ C. $\frac{6}{25}$ D. $\frac{7}{25}$

12. Of the 50 students in a class 30 are girls. If a student is selected at random for a fieldtrip, what is the probability of selecting a boy?

A. $\frac{1}{5}$ B. $\frac{2}{5}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$

13. A bowl contains 6 beads of which 3 are brown. What is the probability that a randomly selected bead will be brown?

A. $\frac{1}{6}$ B. $\frac{1}{3}$ C. $\frac{1}{2}$ D. $\frac{2}{3}$

14. On a sample tray, 2 out of 10 cake samples are strawberry. What is the probability that a randomly selected piece of cake will be strawberry?

A. $\frac{1}{5}$ B. $\frac{2}{5}$ C. $\frac{3}{5}$ D. $\frac{4}{5}$

15. Mandy is the costume manager for a large theatre company. She has 7 fezzes and 7 other hats. What is the probability that a randomly chosen hat from Mandy's inventory will be a fez?

A. $\frac{1}{7}$ B. $\frac{1}{2}$ C. $\frac{6}{7}$ D. 1

References

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