Experimental and Theoretical Probability

Relative frequency: the frequency of the outcome expressed as percentage of the total number of trials

Experimental Probability:

a probability based on an experiment written as a ratio compares the number of events that happen to the number of trials

$$P(E) = \frac{\text{number of events}}{\text{total number of trials}}$$

Theoretical Probability: a probability based on how the reality of an event will happen, written as the ratio of the number of ways the event can occur to the total number of possible outcomes in a sample space.

$$P(E) = \frac{\text{number of ways the event can happen}}{\text{total number of possible outcomes}}$$

If the number of trials becomes bigger, the theoretical probability is the value which the experimental probability approaches.

Practice Exercises

A. Determine whether experimental or theoretical probability is used in each of the following cases.

1. Cyril and Alyssa played a Pinoy game 20 times. Cyril won 12 times. The probability that Alyssa will lose the next game is 0.4.
2. The probability getting a sum of 8 in throwing a pair of dice is $\frac{5}{36}$.
3. Bernadette tossed a coin 150 times and got 81 heads and 69 tails. The probability of getting a head is 0.54.
4. Anita surveyed 200 families in the barangay and recorded the number of children in each family. The survey results showed that 110 families had 2 children and 90 families had more than 2 children. The probability that the number of families with 2 children is 0.55.
5. The probabilityof getting at least 3 heads in tossing a coin thrice is $\frac{1}{8}$.
6. The probability of drawing a red ball from a jar that contains 12 red balls, 15 blue balls and 7 white balls is 0.353.
7. The probability of choosing a senior from 25 seniors and 25 juniors is $\frac{1}{2}$.
8. If the probability that a 50-year old man will still live at 70 is 37%, then the probability that the man will die before the age of 70 years is 63%.

B. Solve each problem completely.

1. A coin was tossed 100 times. It fell on tails 43 times. What is the experimental probability that it falls:
   a. Heads
   b. Tails
2. A pair of coin is tossed 400 times and the results are:

Result	Two heads	Two tails	A head and a tail
Frequency	104	199	97

   What is the experimental probability of getting:
   a. Two heads
   b. A head and a tail
   c. Two tails
3. A 52-card pack is well shuffled and then one card is drawn from the top of the pack. Determine that it is:
   a. A jack
   b. A diamond
   c. A red card

Problem Set

Solve each problem completely.

1. A coin was tossed 120 times. It fell on tails 45 times. What is the experimental probability that it falls:
   a. Heads
   b. Tails
2. A pair of coin is tossed 300 times and the results are:

Result	Two heads	Two tails	A head and a tail
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   a. Two heads
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3. A 52-card pack is well shuffled and then one card is drawn from the top of the pack. Determine that it is:
   a. A red ace
   b. A black number card
   c. A red face card

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