Lesson 4.8.1: Experimental and Theoretical Probability

Experimental Probability: the probability of an outcome of an event based on an experiment. The more trials done in an experiment, the closer the experimental probability gets to the theoretical probability.

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

Theoretical Probability: the probability that a certain outcome will occur as determined through reasoning or calculation.

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

Practice Exercises 4.8.1

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:
   - 1.1 Heads
   - 1.2 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:
   - 2.1 Two heads
   - 2.2 A head and a tail
   - 2.3 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:
   - 3.1 A jack
   - 3.2 A diamond
   - 3.3 A red card
4. Three coins are tossed. What is the probability of getting:
   - 4.1 three heads
   - 4.2 at least two tails
   - 4.3 at most two tails

Activity 4.8.1

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:
   - 1.1 Heads
   - 1.2 Tails
2. A pair of coin is tossed 300 times and the results are:

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   - 3.1 A red ace
   - 3.2 A black number card
   - 3.3 A red face card
4. A pair of dice is rolled. What is the probability of getting:
   - 4.1 sum of seven
   - 4.2 sum is odd
   - 4.3 sum is less than 4
   - 4.4 a double

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