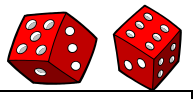
Volume 1 Issue 3

Math 78
Unit 3 Probability

Dear Parents,
Below is information regarding Unit 6, Probability.



Probability

By the end of this unit, students will be able to:

- Investigate chance processes and develop, use, and evaluate probability models
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation
- Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability

Vocabulary

- **Chance Process:** The repeated observations of random outcomes of a given event.
- **Compound Event:** Any event which consists of more than one outcome.
- **Empirical:** A probability model based upon observed data generated by the process. Also, referred to as the experimental probability.
- **Event:** Any possible outcome of an experiment in probability. Any collection of outcomes of an experiment. Formally, an event is any subset of the sample space.
- **Experimental Probability:** The ratio of the number of times an outcome occurs to the total amount of trials performed.

$$Experimental\ Probability = \frac{\text{The number of times an event occurs}}{\text{The total number of trials}}$$

- **Independent events:** Two events are independent if the occurrence of one of the events gives us no information about whether or not the other event will occur; that is, the events have no influence on each other.
- **Probability:** A measure of the likelihood of an event. It is the ratio of the number of ways a certain event can occur to the number of possible outcomes.
- **Probability Model:** It provides a probability for each possible non-overlapping outcome for a change process so that the total probability over all such outcomes is unity. This can be either theoretical or experimental.
- **Relative Frequency of Outcomes:** Also, Experimental Probability
- **Sample space:** All possible outcomes of a given experiment.
- **Simple Event:** Any event which consists of a single outcome in the sample space. A simple event can be represented by a single branch of a tree diagram.
- **Simulation:** A technique used for answering real-world questions or making decisions in complex situations where an element of chance is involved.
- **Theoretical Probability**: The mathematical calculation that an event will happen in theory. It is based on the structure of the processes and its outcomes.
- **Tree diagram:** A tree-shaped diagram that illustrates sequentially the possible outcomes of a given event.
  - http://intermath.coe.uga.edu/dictnary/homepg.asp

Textbook Connection

McGraw Hill Georgia Math Grade 7: Chapter 10
McGraw Hill Textbook Online: connected.mcgraw-hill.com

Web Resources

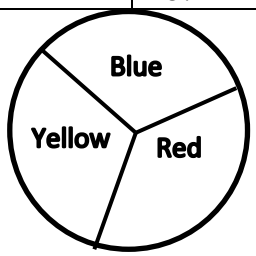
- Random Dice Simulator This simulator allows students to roll up to six dice at a time.
- Random Coin Flipper This site allows you to flip virtual coins
- Adjustable Spinner
- http://mathforum.org/dr.math/faq/faq.prob.intro.html
- http://mathforum.org/dr.math/faq/faq.prob.world.html
- https://www.mathgoodies.com/lessons/vol6/intro_probability

Practice Problems

1) The probability of snow is P(snow) =30% = 0.3. What is the probability that it will not snow?

2)You can estimate the probability of an event by using experimental methods. After 1000 spins of the spinner, the following information was recorded. Estimate the probability of the spinner landing on red.

Outcome	Blue	Red	Yellow
Spins	448	267	285



3)You roll a pair of fair 6-sided dice. Create a table.

a. What is the probability that the sum of the numbers rolled will be 9?
b. What is the probability that the sum of the numbers will be less than 15?
c. What is the probability that the sum of the numbers will be odd?

Answers

1) The probabilities must add to 1, so the probability of no snow is P(no snow) = 1 – 0.3 = 0.7, or 70%.

2) Probability ≈ $\frac{\text{number of spins that land on red}}{\text{total number of spins}} = \frac{267}{1000} = 0.267$

3)a) There are 36 possible outcomes (sums) and 4 of them are equal to 9. So, the probability of rolling a sum of 9: P(sum of 9)= $\frac{4}{36} = \frac{1}{9}$.

b) Out of 36 possible outcomes (sums), all the sums are less than 15. So, the probability of rolling a sum less than 15: P(sum less than 15)= $\frac{36}{36}$ =1 or 100%.

c) Out of 36 possible outcomes (sums), 18 sums are odd numbers. So, the probability of rolling an odd sum: P(odd number sum)= $\frac{18}{36} = \frac{1}{2}$ or 50%.