Name: _____   Date:_____

Basic Probability Concepts
Algebra 1

Probability is one of the most important concepts in all of mathematics. At its core, probability is a measurement of how likely an event, E, is to happen. In this lesson, we will review some of the most basic probability concepts that you have seen before.

Exercise #1: Given that a *standard* die is rolled *once*, find the probability for each of the following events.

(a) $P(\text{rolling a } 4)$

(b) $P(\text{rolling less than a } 5)$

(c) $P(\text{rolling a } 10)$

Fundamental Probability Definition

$$P(E) = \frac{\text{number of successful outcomes}}{\text{total number of outcomes}}$$

Exercise #2: Consider an event, E.

(a) If $P(E) = 0$, how do we interpret this probability?

(b) If $P(E) = 1$, how do we interpret this probability?

(c) Which of the following represents all possible probabilities for an event E?

(1) $0 \le P(E) \le 100$

(2) $0 < P(E) < 1$

(3) $0 \le P(E) \le 1$

(4) $-1 \le P(E) \le 1$

Exercise #3: A bag contains eight geometric shapes: two squares, one rhombus, two scalene triangles, and three isosceles trapezoids. If one shape is pulled out at random, what is the probability all of its sides have equal lengths?

Card Problems: Some of the most common probability problems center on decks of cards. Here is a review of the cards in a standard deck.

Total Number of Cards = 52

4 Suits of Cards [Hearts (Red), Diamonds (Red), Clubs (Black), and Spades (Black)] – 13 cards in each suit

3 Face Cards in Each Suit (Jack, Queen, and King) – Hence there are 12 face cards.

There are 4 Aces that do not count as face cards (one in each suit).

Exercise #4: Answer each of the following probability problems based on the cards in a standard deck.

(a) Given a standard deck of cards, if one card is drawn at random what is the probability that it will be a red queen?

(b) Given a standard deck of cards, if one card is drawn at random, what is the probability that it will be a black face card?

In every experiment in which an event E occurs, all outcomes in the sample space that are **not** in E are contained within the **complement** of E. This is the same idea as the complement of a set that we encountered in the last unit.

Exercise #5: Consider rolling a standard die once.

(a) What is the probability that the number rolled is less than 3?

(b) What is the probability that the number rolled is *not* less than 3?

(c) In general what is the sum $P(E) + P(\text{not } E)$ equal to?

$$P(E) + P(\text{not } E) =$$

Exercise#6: If the chance of Jenna bringing a cheese sandwich to school for lunch is 55%, then what is the probability that she will not bring a cheese sandwich to school?

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Basic Probability Concepts
Algebra 1 Homework

Applications

In problems 1-8, a standard fair die is tossed. Find the probability that the number rolled is :

1. 4   2. even   3. less than 2   4. 9

5. not greater that 5   6. prime   7. odd   8. greater than 2

In problems 9-20, one card is chosen at random from a standard deck of cards. Find the probability of the following:

9. P(Red)   10. P(face card)   11. P(7)   12. P(a diamond)

13. P(not a heart)   14. P(not a red 2)   15. P(red 8)   16. P(king)

17. P(not a King)   18. P(a red diamond) 19. P(5)   20. P(red jack)

21. The probability that Mr. Ford is going to buy a new car is $\dfrac{3}{42}$. What is the probability that Mr. Ford will not buy a new car?

22. The local weather station predicts a 35% change of snow tomorrow. Which of the following represents the probability that it will not snow?

    (1) 85%   (3) 35%

    (2) 65%   (4) 55%

Reasoning

23. If a coin is tossed twice in a row, one outcome is getting two heads. Is getting two tails the complement of this event? Explain.