ALGEBRA 4

Day 54

Bell Work

In which of the following are $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{5}{8}$ arranged in ascending order?

F. $\frac{1}{2} < \frac{5}{8} < \frac{5}{6}$

G. $\frac{5}{6} < \frac{1}{2} < \frac{5}{8}$

H. $\frac{5}{6} < \frac{5}{8} < \frac{1}{2}$

J. $\frac{5}{8} < \frac{1}{2} < \frac{5}{6}$

K. $\frac{5}{8} < \frac{5}{6} < \frac{1}{2}$

Review from 11.1

- Fundamental Counting Principle:
  - Event 1: 8 ways Event 2: 12 ways Event 3: 10 ways

- Factorial:
  - 9! 0! 3! x 5!

- Permutation: order does matters
  - Example: phone number

$$ {}_nP_r = \frac{n!}{(n-r)!} $$

- Combinations: order does NOT matter
  - Example: order at mcdonalds

$$ {}_nC_r = \frac{n!}{(n-r)!\cdot r!} $$

Example

Find the number of permutations:

${}_{10}P_6$ ${}_{5}P_2$

Find the number of combinations:

${}_{10}C_6$ ${}_{9}C_3$

Permutation or Combination?

<u>Example:</u> You are considering 10 different colleges. Before you decide to apply to the colleges, you want to visit some of them. In how many ways can you visit,

6 of the colleges?

Multiple Events:

Event A and Event B → Multiply

Event A or Event B → Add

Example:

A restaurant serves omelets that can be ordered with any of the ingredients shown.

- *Vegetarian*
- *Green Pepper*
- *Red Pepper*
- *Onion*
- *Mushroom*
- *Tomato*
- *Cheese*

Meat

Ham

Bacon

Sausage

Steak

Answer the following:

- a) Suppose you want exactly 2 vegetarian ingredients and 1 meat ingredient in your omelet. How many different types of omelets can you order?
- b) Suppose you can afford at most 3 ingredients in your omelet. How many different omelets can you order?

For Next Time

- Page 678 #1-6, 9-11, 13-19 (odd), 20, 21-37 (odd), 38-41

11.2 Probability

- Objective: To find the probability of an event using theoretical, experimental, and simulation methods

Probability: the likelihood an event will occur indicated by a number between 0 and 1
(Can be written as a fraction, decimal, or percentage)

- 1 = will always occur
- 0 = will never occur

Experimental Probability:

The number of times an event occurs compared to the number of trials;

$$P(A) = \frac{number\ of\ times\ the\ event\ occurs}{number\ of\ trials}$$

Theoretical Probability:

The probability that an event will occur can be represented by;

$$P(A) = \frac{number\ of\ outcomes\ in\ A}{total\ number\ of\ outcomes}$$

Example: Experimental or Theoretical?

1.) Roll a die 30 times and record the amount of times each number shows up. What do you find? How does it compare to what you'd expect?

2.) *You roll a six-sided die whose sides are numbered from 1 through 6. Find the probability of:*

a.) Rolling a 4 b.) *Rolling an odd number*

Answer the following:

A jar contains 2 red marbles, 3 blue marbles, and 1 green marble. Find the probability of randomly drawing the given type of marble.

1) A red marble

2) A green marble

3) A yellow marble

4) A blue or a green marble

5) A red or a blue marble

6) A red or blue or green marble

Think Deeper…

You put a CD that has 8 songs in your CD player. You set the player to play the songs at random. The player plays all 8 songs without repeating any song.

1) What is the probability that the songs are played in the same order they are listed on the CD?

2) You have 4 favorite songs on the CD. What is the probability that 2 of your favorite songs are played first, in any order?

For Next Time

Page 685 #1-5, 7-9, 13-24, 29-33