

# Activity 12

## Probability

### TEACHER NOTES

**Topic Area: Data Analysis and Probability**

**NCTM Standard:** Understand and apply basic concepts of probability.

**Objective:** The student will be able to utilize the Casio fx-9750G Plus calculator to determine the basic concepts of probability in the various activities in this unit.

**Introduction:** This activity is designed to help the students to determine probability and odds of a situation. The students will also be able to determine the permutation or combination of an event.

The students should be familiar with the following vocabulary

Combination

Event

Odds

Permutation

Probability

## Calculator Notes for Activity 12

**Objective:** The student will be able to utilize the Casio fx-9750G Plus calculator to determine the basic concepts of probability in the various activities in this unit.

### Steps for Determining Probability, Odds, Factorials, Permutation and Combination

1. Probability. Probability is written as a fraction.

$$Probability = \frac{success}{total}$$

Successes are any outcomes that agree with what is being asked.  
Total is the total number of outcomes whether success or failure.

**Problem: It has rained 7 days out of the last 8 days.  
What is the probability that it will rain tomorrow?**

Since you are asked the probability that it will rain, rain is the success, no rain is the failure.

$$probability = \frac{7}{8}$$

2. Odds. Odds are also written as a fraction.

$$odds = \frac{success}{failure}$$

Successes are any outcomes that agree with what is being asked.  
Failures are any outcomes that do not agree with what is being asked.

**Problem: It has rained 7 days out of the last 8 days.  
What are the odds that it will rain tomorrow?**

Since you are asked the odds that it will rain, rain is the success, no rain is the failure.

$$\text{odds} = \frac{7}{1}$$

3. Factorials. An example of a factorial is 8! The exclamation point or factorial sign means that the number that is given is multiplied by a series of numbers that is one less than the one before it until you get to 1.

$$8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 40,320$$

This can be done on the calculator. To do this turn the calculator on, use the arrow keys to choose the **RUN** Menu and press **EXE**, and press **8**. Press **OPTN**, press **F6** to choose the other screen of options.



Choose **F1** (x!) and press **EXE**.



The answer is 40,320.

**Problem: How many different ways could I arrange the letters A, B, C, D, and E?**

This problem says that you have 5 choices for the first letter, 4 choices for the second letter, 3 choices for the third letter, 2 choices for the fourth letter, and 1 choice for the last letter. The basic counting principle says you multiply all choices.

$$5 \times 4 \times 3 \times 2 \times 1 = 5!$$

Fill 5! into the calculator.



The answer is that you have 120 different ways to arrange the 5 letters.

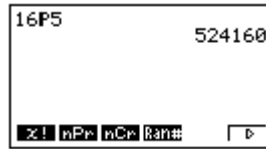
4. Permutation. Permutations are used when you have different choices but **THE ORDER YOU USE THE CHOICES MATTER**. The calculator can be used for permutations. Check to see if the order is important. If it is, use the following

$${}_n P_r$$

Where  $n$  = total number of choices and  $r$  = the number of choices you are using.

**Problem: There are 16 runners on the track team. The coach needs to pick 5 runners to run a relay. Remember, it does matter how he orders the runners. How many different relay teams could he organize?**

To let the calculator work this for you, turn the calculator on, use the arrow keys to choose the **Run Menu**, press **EXE**, press 16, press **OPTN**, press **F2** ( ${}_nP_r$ ), press 5 and press **EXE**.



The answer is 524,160 different relay teams the coach could choose.

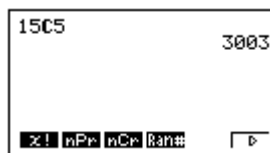
5. Combination. Combinations are used when you have different choices but **THE ORDER YOU USE THE CHOICES DOES NOT MATTER**. The calculator can be used for combinations. Check to see if the order is important. If it does NOT, use the following

$${}_nC_r$$

Where  $n$  = total number of choices and  $r$  = the number of choices you are using.

**Problem: Bob Heck orders a pizza. There are 15 different toppings he can choose from, but he can only choose 5 toppings. How many different pizzas could he pick?**

To let the calculator work this for you, turn the calculator on, use the arrow keys to choose the **Run Menu**, press **EXE**, press 15, press **OPTN**, press **F3** ( ${}_nC_r$ ), press 5 and press **EXE**.



Therefore, Bob Heck has 3,003 different pizzas to choose from.

Name \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

## Activity 12: Worksheet Probability

A bag contains 5 blue marbles, 3 red marbles, 6 white marbles.

1. What is the probability of choosing a blue marble?
2. What is the probability of not choosing a red marble?
3. What are the odds of choosing a red marble?
4. What are the odds of choosing red or blue marble?

Solve the following.

5.  $4!$

6.  $12!$

7.  ${}_8P_5$

8.  ${}_7P_3$

9.  ${}_{10}C_6$

10.  ${}_7C_5$

## Solutions to Activity 12 Worksheet

1.  $probability = \frac{5}{14}$

2.  $probability = \frac{11}{14}$

3.  $odds = \frac{3}{11}$

4.  $odds = \frac{8}{6}$

5. 24

6. 479,001,600

7. 6,720

8. 210

9. 210

10. 21