

Graphing Calculator Activity

For use with pages 708–715

GOAL To compare combinations to permutations**Activity**

- 1 If a math club has 5 people, there are $5 \cdot 4 \cdot 3 = 60$ ways to choose a president, vice president, and treasurer.

The answer to this problem can also be thought of as a permutation of 3 people selected from 5 choices. Use a graphing calculator to verify

$${}_5P_3 = \frac{5!}{(5-3)!} = \frac{5!}{2!} = 60.$$

- 2 Consider a new problem where 3 scholarship recipients will be chosen from the math club. Each recipient will win \$1000. Determine the number of ways to pick these recipients. List them all.
- 3 For Step 2, you should have come up with answers similar to: ABC, ABD, ABE, ACD, ACE, ADE, BCD, BCE, BDE, CDE.
- 4 In Step 3, we list ABC only once since the order of recipients doesn't matter. (The scholarships are all of equal value.) In Step 1, how many times would we see A, B, and C selected in some order?
- 5 The answer to Step 1 divided by the answer to Step 4 gives our answer to the problem in Step 2. Problems where the order of the answers does not matter, such as the one in Step 2, are combinations. The number of combinations of r objects taken from a group of n distinct objects is: ${}_nC_r = \frac{n!}{(n-r)!r!}$. Calculate ${}_5C_3$.

Exercises

1. Consider the following problem: With 8 students in a class, decide how many ways that 1st, 2nd, and 3rd place could be awarded in a spelling bee.

This would be a permutation problem since the order of the awards given makes a difference. Calculate the answer by evaluating ${}_8P_3$.

2. Consider the following problem: With 8 students in a class, decide how many ways that 3 A's can be awarded.

This would be a combination problem since the order of those chosen to receive A's doesn't matter. The student cares only if he or she gets an A or not. Calculate the answer by evaluating ${}_8C_3$.

3. From 10 different fruits, how many ways could one select a fruit salad that included 4 of the fruits? Decide if this is a permutation or a combination problem, and use a graphing calculator to calculate the answer.

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TI-82

Step 1

5 \times 4 \times 3 **ENTER**

5 **MATH** \leftarrow 2 3 **ENTER**

Step 4

3 **MATH** \leftarrow 4 **ENTER**

Step 5

Using the formula:

5 **MATH** \leftarrow 4 \div (2 **MATH** \leftarrow

4 \times 3 **MATH** \leftarrow 4) **ENTER**

Using shortcut:

5 **MATH** \leftarrow 3 3 **ENTER**

TI-83

Step 1

5 \times 4 \times 3 **ENTER**

5 **MATH** \leftarrow 2 3 **ENTER**

Step 4

3 **MATH** \leftarrow 4 **ENTER**

Step 5

Using the formula:

5 **MATH** \leftarrow 4 \div (2 **MATH** \leftarrow

4 \times 3 **MATH** \leftarrow 4) **ENTER**

Using shortcut:

5 **MATH** \leftarrow 3 3 **ENTER**

SHARP EL-9600c

Step 1

5 \times 4 \times 3 **ENTER**

5 **MATH** [C] 2 3 **ENTER**

Step 4

3 **MATH** [C] 4 **ENTER**

Step 5

Using the formula:

5 **MATH** [C] 4 \div (2 **MATH** [C] 4 \times 3

MATH [C] 4) **ENTER**

Using shortcut:

5 **MATH** [C] 3 3 **ENTER**

CASIO CFX-9850GA PLUS

From the main menu, choose RUN.

Step 1

5 \times 4 \times 3 **EXE**

5 **OPTN** **F6** **F3** **F2** 3 **EXE**

Step 4

3 **F1** **ENTER**

Step 5

Using the formula:

5 **F1** \div (2 **F1** \times 3 **F1**) **EXE**

Using shortcut:

5 **F3** 3 **EXE**