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Objectives

Solve problems involving the Fundamental Counting Principle.

Simplify problems involving factorials.

Feb 7-12:03 PM

You have previously used tree diagrams to find the number of possible combinations of a group of objects. In this lesson, you will learn to use the **Fundamental Counting Principle**.

What is the benefit of using the Fundamental Counting Principle over a tree diagram?

How many different ways can a musical director select a duet consisting from 3 violinists, and 2 pianists?

Tree Diagram...

Fundamental Counting Principle...

$3 \cdot 2 = 6$

Feb 7-12:08 PM

Fundamental Counting Principle

If there are n items and m_1 ways to choose a first item, m_2 ways to choose a second item after the first item has been chosen, and so on, then there are $m_1 \cdot m_2 \cdot \ldots \cdot m_n$ ways to choose n items.

Feb 2-10:32 AM

To make a yogurt parfait, you choose one flavor of yogurt, one fruit topping, and one nut topping. How many parfait choices are there?

Yogurt Parfait (choose 1 of each)		
Flavor	**Fruit**	**Nuts**
~~Plain~~	Peaches	Almonds
Vanilla	Strawberries	Peanuts
Chox.	Bananas	Walnuts
	Raspberries	
	Blueberries	

$2 \cdot 5 \cdot 3$

$10 \cdot 3$

30

Feb 7-12:09 PM

1. How many pizzas can you create with 2 crust choices, 4 toppings and 3 types of cheese?

$2 \cdot 4 \cdot 3 = 24$

2. How many different codes can you create with a letter, 2 digits, and a letter

CODE 0-9

a) if the numbers and letters can repeat?

$26 \cdot 10 \cdot 10 \cdot 26 = 67{,}600$

letter digit digit letter

b) if the numbers and letters cannot repeat?

no repeats $26 \cdot 10 \cdot 9 \cdot 25 = 58{,}500$

Feb 14-2:58 PM

$3!$

Wow!

$3 \cdot 2 \cdot 1 = 6$

Factorial

Jan 30-8:49 AM

2!

Jan 30-8:49 AM

n Factorial

For any whole number n,

WORDS	NUMBERS	ALGEBRA
The **factorial** of a number is the product of the natural numbers less than or equal to the number. 0! is defined as 1.	$6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$ $5^0 = 1$	$n! = n \cdot (n-1) \cdot (n-2) \cdot (n-3) \cdot \ldots \cdot 1$ $100^0 = 1$

Important enough to repeat... $0! = 1$

Feb 7-12:16 PM

Simplify the following:

$5!$

$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

$\frac{2!}{0!} = \frac{2 \cdot 1}{1} = 2$

$\frac{4!}{3!} = \frac{4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1} = 4$

Jan 30-9:15 AM

Simplify the following:

$\frac{6!}{2!4!} = \frac{3 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{30}{2} = 15$

$\frac{100!}{97!} = \frac{100 \cdot 99 \cdot 98 \cdot 97!}{97!} = 970{,}200$

$\frac{12!}{2!10!} = \frac{6 \cdot 12 \cdot 11 \cdot 10!}{2 \cdot 1 \cdot 10!} = \frac{132}{2} = 66$

$\frac{5!}{2!(5-2)!} = \frac{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{2 \cdot 1 \cdot 3 \cdot 2 \cdot 1} = \frac{20}{2} = 10$

Jan 30-9:17 AM

Assignment:

10-8 Intro worksheet

Feb 7-3:02 PM