

OBJ: 131, 132, 133

Evaluate Factorials

Simplify Factorial Expressions

Fundamental Counting Principle

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Factorial Examples

$$4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

$$6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$$

10! in calculator
10 Math → PRB # 4

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EX 1: $\frac{7!}{(5!2!)}$

$7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$
 $\frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 2 \cdot 1}$

$\frac{4 \cdot 2}{2} = [2]$

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EX 2: $\frac{(N+5)!}{(N+3)!}$

$\frac{(N+5)(N+4)(N+3)(N+2)\dots\dots}{(N+3)(N+2)\dots\dots}$

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EX 3:
$$\frac{(N-4)!}{(N-2)!}$$

$$\frac{\cancel{(N-4)(N-5)(N-6)\dots}}{\cancel{(N-2)(N-3)(N-4)(N-5)\dots}}$$

$$\frac{1}{(N-2)(N-3)}$$

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EX 4:
$$\frac{(N+2)!}{(N-1)!}$$

$$\frac{\cancel{(N+2)(N+1)(N+0)(N-1)(N-2)\dots}}{\cancel{(N-1)(N-2)\dots}}$$

$$(N+2)(N+1)(N)$$

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EX 5: A yogurt shop sells 4 flavors and 15 toppings. How many single cones with one topping are possible?

$$\frac{4}{\text{FLAVORS}} \cdot \frac{15}{\text{TOPPINGS}} = \boxed{60}$$

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EX 6: Account numbers for a business have 12 digits. The first digit cannot be a 0 or a 1. How many different account numbers are possible?

$$\underline{8} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10} \quad \underline{10}$$

$$800,000,000,000$$

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EX 7: If you flip a coin 10 times, how many different possibilities of heads and tails are possible?

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$$

$$2^{10} = \underline{1024}$$

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