TOPIC: REVIEW OF FACTORIALS

Factorials

◆ **Factorials** are just another operation, where you multiply all _____ numbers from a specific number down to 1.

- Sequences, series, combinatorics, & probability all use factorials, represented with __

$$4! = 4 \cdot \_\_ \cdot \_\_ \cdot 1$$

EXAMPLE Calculate the factorials in the table below.

Factorials	
Number	**Factorial**
0	$0! =$ ⟶ ____
1	$1! =$ ⟶ ____
2	$2! =$ ⟶ ___ · ___ = ____
3	$3! =$ ⟶ ___ · ___ · ___ = ____
4	$4! =$ ⟶ ___ · 3 · 2 · 1 = ____
5	$5! =$ ___ · 4 · 3 · 2 · 1 = ____
6	$6! =$ ___ · ⏟ = ____

◆ Each factorial = _____ factorial multiplied by new number:

New $n! = n \cdot (\_\_\_\_\_)!$

- This can be used to easily simplify factorial expressions.

EXAMPLE Evaluate the expression. Hint: *Use the formula above.*

(***A***) $4 \cdot 3!$

(***B***) $\dfrac{100!}{99!}$

(***C***) $(1-1)!$

PRACTICE Evaluate each expression.

(***A***) $\dfrac{12}{4!}$

(***B***) $\dfrac{9!}{7!}$

(***C***) $\dfrac{16!}{12! \cdot 4!}$

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PRACTICE Write the first 4 terms of the sequence $a_n = n^2 \cdot (n-1)!$