LESSON MAKER PRO

Factorial Moves

Evaluate factorials and use them to count arrangements.

HIGH SCHOOL · N.OA.A.1

N.OA.A.1 "Use the notation for the factorial of a non-negative integer, n!, to evaluate expressions."

NAME _____ DATE _____

THE FACTORIAL RULE

For a positive whole number n, n! means multiply every whole number from n down to 1. By definition, 0! = 1. When factorials appear in a fraction, you can cancel common factors before multiplying.

WORKED EXAMPLE

Evaluate 5!.

1. 5! = 5 × 4 × 3 × 2 × 1
2. 5 × 4 = 20 and 3 × 2 × 1 = 6
3. 20 × 6 = 120

Answer: 120

PRACTICE 6 problems

1 Evaluate 0!.

ANSWER _____

2 Evaluate 2!.

ANSWER _____

3 Evaluate 3! + 2!.

ANSWER _____

4 Evaluate 6!/3!.

ANSWER _____

5 Evaluate 7!/6!.

ANSWER _____

6 Evaluate 8!/(6! × 2!).

ANSWER _____

APPLY IT Show your work

1 Six friends in a video club stand in one row for a group photo. How many different orders can they stand in? Write a factorial expression and evaluate it.

WORK SPACE

ANSWER _____

2 Eight students volunteer to make a concert poster. One will draw the art, and a different student will write the title. How many ways can the two jobs be assigned? Write a factorial expression and evaluate it.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Evaluate (8! − 7!)/6!. Show how you can simplify without finding the value of 8!.

WORK SPACE AND ANSWER

ANSWER KEY # Factorial Moves

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate 0!.	**1**
2	Evaluate 2!.	**2**
3	Evaluate 3! + 2!.	**8**
4	Evaluate 6!/3!.	**120**
5	Evaluate 7!/6!.	**7**
6	Evaluate 8!/(6! × 2!).	**28**

PART 2 · APPLY IT

1. **6! = 720 orders** There are 6 choices for the first spot, then 5 for the next, and so on. Multiply to get 6! = 720.
2. **8!/6! = 56 ways** There are 8 choices for the artist and 7 remaining choices for the title writer. Thus, 8!/6! = 8 × 7 = 56.

CHALLENGE

(8! − 7!)/6! = (8 × 7! − 7!)/6! = 7 × 7!/6! = 7 × 7 = 49

Accept equivalent factorial expressions and correctly evaluated numerical answers. For the challenge, students may also write 8! − 7! = 7 × 7! before canceling.