LESSON MAKER PRO

Count the Choices

Does order matter? Can choices repeat?

HIGH SCHOOL · FM.AC.A.8

FM.AC.A.8 "Using application-based problems, develop formulas for permutations, combinations, and combinations with repetition and compare student-derived formulas to standard representations of the formulas. a..."

NAME _____ DATE _____

CHOOSE THE RIGHT COUNT

If order matters, use P(n,r) = n!/(n-r)!. If order does not matter, divide by the number of ways to arrange your picks: C(n,r) = n!/(r!(n-r)!). For unordered picks that may repeat, use C(n+r-1, r).

WORKED EXAMPLE

A studio selects 3 of 5 mural designs. Order does not matter. How many groups can it select?

CHOICES FOR ORDERED PICKS

Pick	Choices
First	5
Second	4
Third	3

1. Count ordered picks: 5 x 4 x 3 = 60.
2. Each group appears in 3 x 2 x 1 = 6 orders.
3. Divide: 60/6 = 10, matching C(5,3) = 5!/(3!2!).

Answer: 10 groups

PRACTICE 4 problems

1 Arrange all 6 finalists in a photo line. How many orders are possible?

ANSWER _____

2 Choose a captain and vice captain from 7 players. How many assignments are possible?

ANSWER _____

3 Pick 2 of 8 clubs to visit. How many pairs can you pick?

ANSWER _____

4 Choose 2 stickers from 4 designs. Designs may repeat, and order does not matter. How many selections are possible?

ANSWER _____

APPLY IT Show your work

1 A school streams a talent show. It chooses 4 of 8 acts to perform in a fixed sequence. How many lineups are possible?

WORK SPACE

ANSWER _____

2 At a game booth, you choose 6 prize tokens from 4 designs. Designs may repeat, and order does not matter. How many sets can you make?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A club picks 2 of 6 artists for a poster. One student counts 6 x 5; another uses C(6,2). Explain the difference and find the number of pairs.

WORK SPACE AND ANSWER

ANSWER KEY

Count the Choices

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Arrange all 6 finalists in a photo line. How many orders are possible?	**720**
2	Choose a captain and vice captain from 7 players. How many assignments are possible?	**42**
3	Pick 2 of 8 clubs to visit. How many pairs can you pick?	**28**
4	Choose 2 stickers from 4 designs. Designs may repeat, and order does not matter. How many selections are possible?	**10**

PART 2 · APPLY IT

1. **1,680 lineups** Order matters, so multiply 8 x 7 x 6 x 5 = 1,680.
2. **84 sets** Use combinations with repetition: C(4+6-1,6) = C(9,6) = C(9,3) = 84.

CHALLENGE

6 x 5 = 30 counts ordered picks. Each pair appears in 2 orders, so there are 30/2 = 15 pairs, matching C(6,2) = 15.

Accept equivalent factorial or product forms. In the challenge, the explanation must distinguish ordered picks from unordered pairs.