LESSON MAKER PRO

Count the Choices

Choose items when repeats are allowed and order does not matter.

HIGH SCHOOL · FM.AC.A.8.d

FM.AC.A.8.d "Using application-based problems, calculate the number of combinations with repetitions of r elements from a set of n elements as "(n + r – 1) choose r.""

NAME _____ DATE _____

COUNTING REPEATED CHOICES

When you choose r items from n types, the same type can be chosen more than once. If order does not matter, the number of groups is (n + r - 1) choose r.

WORKED EXAMPLE

A café offers 7 tea flavors. You buy 3 tea bags. Flavors can repeat, and order does not matter. How many flavor groups can you make?

1. There are n = 7 flavors and r = 3 tea bags.
2. (n + r - 1) choose r = (7 + 3 - 1) choose 3 = 9 choose 3.
3. 9 choose 3 = (9 × 8 × 7)/(3 × 2 × 1) = 84.

Answer: 84 flavor groups

PRACTICE 6 problems

1 Choose 2 beads from 4 colors. Colors can repeat, and order does not matter. How many color groups are possible?

ANSWER _____

2 Choose 4 pens from 5 ink colors. Colors can repeat, and order does not matter. How many color groups are possible?

ANSWER _____

3 Choose 2 scoops of ice cream from 6 flavors. Flavors can repeat, and order does not matter. How many flavor groups are possible?

ANSWER _____

4 Choose 5 decals from 4 designs. Designs can repeat, and order does not matter. How many design groups are possible?

ANSWER _____

5 Choose 2 buttons from 8 designs. Designs can repeat, and order does not matter. How many design groups are possible?

ANSWER _____

6 Choose 6 snack bars from 2 flavors. Flavors can repeat, and order does not matter. How many flavor groups are possible?

ANSWER _____

APPLY IT Show your work

1 For a team event, you buy 4 enamel pins from 6 designs. You may buy more than one of any design. How many different groups of pins can you buy?

WORK SPACE

ANSWER _____

2 A fan shop lets you fill a laptop pack with 6 stickers from 5 designs. Designs can repeat. How many different packs can you make?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A keyboard shop offers 5 keycap colors, including blue and red. You choose 8 keycaps, with at least 2 blue and at least 1 red. Colors can repeat, and order does not matter. How many color groups can you make? Show your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Count the Choices

HIGH SCHOOL · FM.AC.A.8.d

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Choose 2 beads from 4 colors. Colors can repeat, and order does not matter. How many color groups are possible?	**10**
2	Choose 4 pens from 5 ink colors. Colors can repeat, and order does not matter. How many color groups are possible?	**70**
3	Choose 2 scoops of ice cream from 6 flavors. Flavors can repeat, and order does not matter. How many flavor groups are possible?	**21**
4	Choose 5 decals from 4 designs. Designs can repeat, and order does not matter. How many design groups are possible?	**56**
5	Choose 2 buttons from 8 designs. Designs can repeat, and order does not matter. How many design groups are possible?	**36**
6	Choose 6 snack bars from 2 flavors. Flavors can repeat, and order does not matter. How many flavor groups are possible?	**7**

PART 2 · APPLY IT

1. **126 groups** Order does not matter, so use (6 + 4 - 1) choose 4 = 9 choose 4 = 126.
2. **210 packs** Order does not matter, so use (5 + 6 - 1) choose 6 = 10 choose 6 = 210.

CHALLENGE

126 groups. Set aside 2 blue keycaps and 1 red keycap. Choose the remaining 5 from all 5 colors: (5 + 5 - 1) choose 5 = 9 choose 5 = 126.

Accept an equivalent combination expression for each answer. For the challenge, the reasoning must account for the required blue and red keycaps before counting the remaining choices.