

Counting review in one lesson

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Practice problems

1. A club has 15 members. In how many ways can a vice-president and a secretary be chosen?
2. How many ways can you choose 4 colors from a palette of 12 to paint a room, where the order of selection does not matter?
3. A bakery sells 5 types of donuts. You want to buy a dozen (12) donuts. How many different combinations of donuts can you buy?

Solutions

1. A club has 15 members. In how many ways can a vice-president and a secretary be chosen?

- Identify if order matters. Since the roles are distinct (VP vs Secretary), order matters.
- Identify if repetition is allowed. One person cannot hold both roles, so no repetition.
- Use the permutation formula $P(15, 2)$.
- Calculate $15 \times 14 = 210$.

Answer: 210

2. How many ways can you choose 4 colors from a palette of 12 to paint a room, where the order of selection does not matter?

- Identify if order matters. The problem explicitly states it does not.
- Identify if repetition is allowed. You are choosing a set of 4 distinct colors, so no repetition.
- Use the combination formula $\binom{12}{4}$.
- Calculate $\frac{12 \times 11 \times 10 \times 9}{4 \times 3 \times 2 \times 1} = \frac{11880}{24} = 495$.

Answer: 495

3. A bakery sells 5 types of donuts. You want to buy a dozen (12) donuts. How many different combinations of donuts can you buy?

- Identify if order matters. The order in the box does not matter.
- Identify if repetition is allowed. You can buy multiple donuts of the same type, so yes.
- Use the stars and bars formula with $n = 5$ types and $k = 12$ items.
- Calculate $\binom{5+12-1}{12} = \binom{16}{12} = \binom{16}{4}$.
- Calculate $\frac{16 \times 15 \times 14 \times 13}{4 \times 3 \times 2 \times 1} = \frac{43680}{24} = 1820$.

Answer: 1820