LESSON MAKER PRO

Count the Chances

Count possible outcomes, then find their probabilities.

HIGH SCHOOL · A1.D.2.1

A1.D.2.1 "Apply simple counting procedures (factorials, permutations, combinations, and tree diagrams) to determine sample size, sample space, and calculate probabilities."

NAME _____ DATE _____

COUNT BEFORE YOU DIVIDE

When order matters, multiply the number of choices for each position. When order does not matter, divide the ordered count by the number of ways to arrange the selected items. To find a probability, divide the number of favorable outcomes by the number of equally likely outcomes.

WORKED EXAMPLE

A club has 9 members. How many different groups of 4 members can it form?

1. Count ordered selections: 9 × 8 × 7 × 6 = 3024.
2. Each group appears 4! = 24 times in that count.
3. Divide: 3024/24 = 126.

Answer: 126 groups

PRACTICE 6 problems

1 You have 5 different art prints. In how many orders can you hang all 5 in a row?

ANSWER _____

2 Six esports players are eligible to be captain or co-captain. One player cannot hold both roles. How many ways can you fill the roles?

ANSWER _____

3 A class will choose 2 of 10 poster designs to print. Order does not matter. How many pairs can it choose?

ANSWER _____

4 A shop sells red or blue hoodies and black or white caps. List the sample space of hoodie-cap pairs.

ANSWER _____

5 A teacher randomly selects 2 of 6 students for a committee. What is the probability that two particular students are both selected?

ANSWER _____

6 A two-digit access code uses different digits from 0 through 5. A code may start with 0. What is the probability that a randomly generated code starts with 0?

ANSWER _____

APPLY IT Show your work

1 A music app randomly picks 2 different tracks from a playlist of 12 for the first and second featured spots. How many ordered outcomes are possible? What is the probability that your two favorite tracks get the spots, in either order?

WORK SPACE

ANSWER _____

2 A movie club randomly chooses 2 of 11 films for a double feature. Five of the films are comedies. What is the probability that both chosen films are comedies? Order does not matter.

WORK SPACE

ANSWER _____

CHALLENGE One step up

Seven finalists are equally likely to finish in any order. What is the probability that Ava and Ben both finish in the top 3, with Ava ahead of Ben? Show how you counted the outcomes.

WORK SPACE AND ANSWER

ANSWER KEY

Count the Chances

HIGH SCHOOL · A1.D.2.1

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	You have 5 different art prints. In how many orders can you hang all 5 in a row?	**5! = 120 orders**
2	Six esports players are eligible to be captain or co-captain. One player cannot hold both roles. How many ways can you fill the roles?	**6 × 5 = 30 ways**
3	A class will choose 2 of 10 poster designs to print. Order does not matter. How many pairs can it choose?	**10 × 9/2 = 45 pairs**
4	A shop sells red or blue hoodies and black or white caps. List the sample space of hoodie-cap pairs.	**(red hoodie, black cap), (red hoodie, white cap), (blue hoodie, black cap), (blue hoodie, white cap)**
5	A teacher randomly selects 2 of 6 students for a committee. What is the probability that two particular students are both selected?	**1/15**
6	A two-digit access code uses different digits from 0 through 5. A code may start with 0. What is the probability that a randomly generated code starts with 0?	**1/6**

PART 2 · APPLY IT

1. **132 ordered outcomes; 1/66** There are 12 × 11 = 132 ordered outcomes. The two favorite tracks can fill the spots in 2 orders, so the probability is 2/132 = 1/66.
2. **2/11** There are 11 × 10/2 = 55 possible pairs and 5 × 4/2 = 10 comedy pairs. The probability is 10/55 = 2/11.

CHALLENGE

1/14. There are 7 × 6 × 5 = 210 ordered top-three finishes. Choose the third finalist in 5 ways, then arrange the three so Ava is ahead of Ben in 3 ways. The probability is 15/210 = 1/14.

Accept equivalent fractions and counting expressions. For the sample space, accept the four pairs in any order.