MATHEMATICS · GRADES 10-12

Permutations and combinations review

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you decide whether order matters before you count, like picking a committee where order does not matter versus awarding gold, silver, and bronze where it does. A committee of three is the same no matter who is named first, but a medal ceremony is completely different if the gold and bronze swap places. Counting the wrong way gives an answer that is far too big or far too small. Asking whether order matters first is the one question that keeps the counting honest.



Rule

If order matters, use a permutation.

If order does not matter, use a combination. Ask whether swapping two chosen items makes a different result: if it does, order matters.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Choose a president and vice-president from 5 people. Permutation or combination?

SOLUTION

Order matters: president is a different job from vice-president.

So use a permutation: 5×4.

So the answer is 20 ways.

EXAMPLE 2

Q Choose any 2 committee members from 5 people. Permutation or combination?

SOLUTION

Order does not matter: the same two people form the same committee.

So use a combination:

$$\frac{(5 \times 4)}{(2 \times 1)}$$

So the answer is 10 ways.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 **Choose 3 officers from 10, order matters: how many ways?**

Understand It with Pulse | Flag a mistake

2 **Choose any 3 from 10, order ignored: how many ways?**

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3

What question decides between permutation and combination?

A How many people are there?

B Does order matter?

C Are the objects different?

D Can an object be used twice?

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

4 A coach picks a captain and a goalie from 9 players. Permutation or combination?

- **A** Permutation, because order matters
- **B** Combination, because order does not matter
- **C** Permutation, because order does not matter
- **D** Combination, because order matters

Understand It with Pulse | Flag a mistake

5 Choosing 3 from 10 gives 720 permutations and 120 combinations. How many times bigger is the permutation count?

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

6 **Find P(6, 3).**

Understand It with Pulse | Flag a mistake

7 **Find C(6, 3).**

Understand It with Pulse | Flag a mistake

8 **A committee of 3 is chosen from 10 people. In how many ways can those 3 chosen people be arranged in a row?**

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 A committee of 2 is chosen from some number of people. There are 21 possible committees. How many people are there?

Understand It with Pulse | Flag a mistake

10 Why is the permutation count always at least as big as the combination count?

- **A** Because permutations count every ordering of each group separately
- **B** Because combinations count every ordering of each group separately
- **C** Because there are always more people to choose from in a permutation
- **D** Because combinations count each group more than once

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. 720

2. 120

3. Does order matter?

4. Permutation, because order matters

5. 6

6. 120

7. 20

8. 6

9. 7

10. Because permutations count every ordering of each group separately

© 2026 Brett Robbins. All Rights Reserved.