

Permutations and Combinations

Name: _____	Date: _____	Score: _____ / 18
-------------	-------------	-------------------

Quick Review and Helpful Hints

A *permutation* counts arrangements where order matters: ${}_n P_r = \frac{n!}{(n-r)!}$. A *combination* counts selections where order does *not* matter: ${}_n C_r = \frac{n!}{r!(n-r)!}$. Remember that $n!$ (factorial) means multiply every whole number from n down to 1.

▶ **Example:** In how many ways can you arrange 3 of 5 books on a shelf (order matters)? **Work:** Order matters, so use a permutation: ${}_5 P_3 = \frac{5!}{(5-3)!} = \frac{5!}{2!} = \frac{120}{2}$. ★ **Answer:** 60

◆ Practice Problems

Evaluate each expression.

- | | |
|---------------|----------------|
| 1. $4!$ | 8. ${}_6 C_2$ |
| _____ | _____ |
| 2. $5!$ | 9. ${}_7 C_3$ |
| _____ | _____ |
| 3. $3!$ | 10. ${}_4 C_1$ |
| _____ | _____ |
| 4. ${}_5 P_2$ | 11. ${}_6 P_2$ |
| _____ | _____ |
| 5. ${}_6 P_3$ | 12. ${}_5 C_5$ |
| _____ | _____ |
| 6. ${}_4 P_4$ | 13. ${}_8 C_2$ |
| _____ | _____ |
| 7. ${}_5 C_2$ | 14. ${}_7 P_2$ |
| _____ | _____ |

◆ Word Problems

15. In how many ways can a president and a vice-president be chosen from a club of 6 members (order matters)? _____
16. How many ways can you choose 2 toppings from 5 available toppings (order does not matter)? _____
17. How many different 3-letter arrangements can be made from the letters A, B, C, D with no repeats (order matters)? _____
18. A team of 3 is chosen from 8 players (order does not matter). How many different teams are possible? _____



Answer Keys

- | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|
| 1. <input type="text" value="24"/> | 7. <input type="text" value="10"/> | 13. <input type="text" value="28"/> |
| 2. <input type="text" value="120"/> | 8. <input type="text" value="15"/> | 14. <input type="text" value="42"/> |
| 3. <input type="text" value="6"/> | 9. <input type="text" value="35"/> | 15. <input type="text" value="30"/> |
| 4. <input type="text" value="20"/> | 10. <input type="text" value="4"/> | 16. <input type="text" value="10"/> |
| 5. <input type="text" value="120"/> | 11. <input type="text" value="30"/> | 17. <input type="text" value="24"/> |
| 6. <input type="text" value="24"/> | 12. <input type="text" value="1"/> | 18. <input type="text" value="56"/> |

Step-by-Step Explanations

1. Start by naming the process: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is A factorial multiplies down to 1: $4! = 4 \times 3 \times 2 \times 1 = 24$. So the final answer is 24.

2. A good way to think about this is: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$. So the final answer is 120.

3. Step by step: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is $3! = 3 \times 2 \times 1 = 6$. So the final answer is 6.

4. Take it one move at a time: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Permutations count ordered choices: ${}_5P_2 = 5 \times 4 = 20$. So the final answer is 20.

5. Start by naming the process: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_6P_3 = 6 \times 5 \times 4 = 120$. So the final answer is 120.

6. A good way to think about this is: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_4P_4 = 4! = 24$ – every arrangement of all four items. So the final answer is 24.

7. Step by step: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Combinations ignore order: ${}_5C_2 = \frac{5 \times 4}{2 \times 1} = 10$. So the final answer is 10.

8. Take it one move at a time: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_6C_2 = \frac{6 \times 5}{2} = 15$. So the final answer is 15.

9. Start by naming the process: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_7C_3 = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35$. So the final answer is 35.

10. A good way to think about this is: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Choosing 1 from 4 can be done in 4 ways. So the final answer is 4.

11. Step by step: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_6P_2 = 6 \times 5 = 30$. So the final answer is 30.

12. Take it one move at a time: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is There is exactly one way to choose all 5, so ${}_5C_5 = 1$. So the final answer is 1.

13. Start by naming the process: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_8C_2 = \frac{8 \times 7}{2} = 28$. So the final answer is 28.

14. A good way to think about this is: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is ${}_7P_2 = 7 \times 6 = 42$. So the final answer is 42.

15. Step by step: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Order matters (president vs. vice-president), so ${}_6P_2 = 6 \times 5 = 30$. So the final answer is 30.

16. Take it one move at a time: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Order doesn't matter for toppings, so ${}_5C_2 = \frac{5 \times 4}{2} = 10$. So the final answer is 10.

17. Start by naming the process: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is Arrangements care about order: ${}_4P_3 = 4 \times 3 \times 2 = 24$. So the final answer is 24.

18. A good way to think about this is: Decide whether order matters, then use the counting rule, permutation rule, or combination rule that fits. The setup/work is A team ignores order, so ${}_8C_3 = \frac{8 \times 7 \times 6}{3 \times 2 \times 1} = 56$. So the final answer is 56.



Keep Building CLEP College Mathematics Skills

Recommended Effortless Math resources



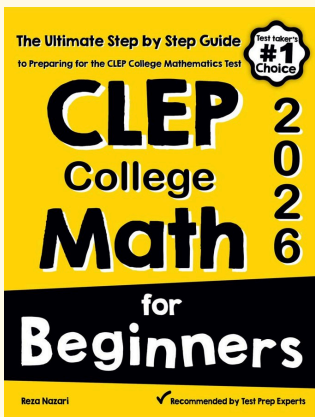
CLEP College Mathematics Test Prep Bundle

Use the complete CLEP College Mathematics resource for review, worked examples, extra practice, and test-style questions after each worksheet.



Scan Me
Download Instantly

STUDENT FAVORITE - CLEP College Mathematics for Beginners



CLEP College Mathematics for Beginners 2026

Step-by-step lessons, topic practice, and full review support for students who want a calm path through CLEP College Mathematics preparation.

A strong companion for self-study, tutoring, homework, and targeted review.

PDF Edition



Scan Me
Download Instantly