




**Evaluate the expression.**

- |              |                    |                 |
|--------------|--------------------|-----------------|
| 1. ${}_8C_4$ | 2. ${}_5C_5$       | 3. ${}_{12}C_0$ |
| 4. ${}_7C_1$ | 5. ${}_{15}C_{11}$ | 6. ${}_{10}C_3$ |
| 7. ${}_6C_5$ | 8. ${}_4C_2$       | 9. ${}_{16}C_8$ |

10. **Error Analysis** Describe and correct the error in evaluating  ${}_5C_2$ .

$${}_5C_2 = \frac{5!}{(5-2)!} = \frac{5!}{3!} = 20$$


**Complete the statement using >, <, or =.**

- |  |  |  |
|--|--|--|
| 11. ${}_{10}C_6$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_8C_5$    | 12. ${}_{22}C_3$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_{18}C_4$ | 13. ${}_9C_6$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_9C_3$ |
| 14. ${}_8C_2$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_{15}C_{14}$ | 15. ${}_7C_7$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_{14}C_{14}$ | 16. ${}_5C_3$ $\overset{?}{\rule{0.5cm}{0.4pt}}$ ${}_8C_3$ |

**In Exercises 17 and 18, tell whether the question can be answered using combinations or permutations. Explain your choice, then answer the question.**

17. Five students from the 90 students in your class not running for class president will be selected to count the ballots for the vote for class president. In how many ways can the 5 students be selected?
18. Twenty students are running for 3 different positions on student council. In how many ways can the 3 positions be filled?
19. **Sweaters** The buyer for a retail store must decide which sweaters to stock for the upcoming fall season. A sweater from one manufacturer comes in 5 different colors and 3 different textures. The buyer decides that the store will stock the sweater in 3 different colors and 2 different textures. How many different sweaters are possible?
20. **Greeting Cards** A greeting card company packages 4 different cards together that are randomly selected from 10 different cards with a different animal on each card. What is the probability that one of the cards in a package is the card that has a dog on it?
21. **Open-Mike Night** A coffee shop offers an open-mike night for poetry. Tonight, 15 people would like to read, but there is only enough time to have 7 people read.
- Seven of the 15 people who would like to read are randomly chosen. How many combinations of 7 readers from the group of people that would like to read are possible?
  - You and your friend are part of the group that would like to read. What is the probability that you and your friend are chosen? What is the probability that you are chosen first and your friend is chosen second? Which event is more likely to occur?



**Evaluate the expression.**

- |                 |                    |                    |
|-----------------|--------------------|--------------------|
| 1. ${}_9C_3$    | 2. ${}_6C_6$       | 3. ${}_{15}C_0$    |
| 4. ${}_{18}C_3$ | 5. ${}_{13}C_5$    | 6. ${}_8C_2$       |
| 7. ${}_{22}C_5$ | 8. ${}_{30}C_{20}$ | 9. ${}_{17}C_{10}$ |

**Complete the statement using  $>$ ,  $<$ , or  $=$ .**

- |   |  |  |
|---|--|--|
| 10. ${}_{14}C_2 \text{ ? } {}_9C_5$       | 11. ${}_{25}C_5 \text{ ? } {}_{20}C_7$ | 12. ${}_{12}C_4 \text{ ? } {}_{12}C_8$ |
| 13. ${}_{15}C_3 \text{ ? } {}_{24}C_{22}$ | 14. ${}_8C_0 \text{ ? } {}_8C_2$       | 15. ${}_{11}C_4 \text{ ? } {}_{15}C_4$ |

**In Exercises 16–18, tell whether the question can be answered using combinations or permutations. Explain your choice, then answer the question.**

16. Five students from the 90 students in your class will be selected to answer a questionnaire about participating in school sports. How many groups of 5 students are possible?
17. Eleven students are trying out for 5 different positions in the school band. In how many ways can the 5 positions be filled?
18. To complete a quiz, you must answer 4 questions from a list of 12 questions. In how many ways can you complete the quiz?
19. **Athletic Shoes** The buyer for a sporting goods store must decide which athletic shoes to stock for the upcoming selling season. A shoe from one manufacturer comes in 6 different styles and 4 different colors. The buyer decides that the store will stock the shoes in 4 different styles and 2 different colors. How many different shoe combinations are possible?
20. **Committee** You have been working on the prom planning committee with 5 other people. Your committee has decided to choose 2 committee members randomly to present the prom plan to the student body.
- How many combinations of 2 committee members are possible?
  - What is the probability that you are one of the 2 people?
21. **Volunteers** Your class is participating in the school fair and will run the refreshments table. Your teacher has asked for 4 volunteers to run the table. Fifteen of the students in the class volunteer, so your teacher will randomly choose 4 people from the group. You and your friend are part of the group that would like to volunteer. What is the probability that you and your friend are chosen? What is the probability that you are chosen first and your friend is chosen second? Which event is more likely to occur? *Explain* how you found your answer.