

# Combinations

## Liberal Arts Mathematics

### Assignment Text

Answer the following problems from Section 7.3 of the textbook: 1-2, 5-7, 17-18, 25-27.

For reference, the text of the problems are duplicated below.

For the following exercises, decide whether the situation describes a permutation or a combination.

1. You're packing for vacation, and you need to pick 5 shirts.
2. You and your friends are about to play a game, and you need to decide who will have the first turn, second turn, and so on.

For the following exercises, express your answers as whole numbers.

5.  ${}_5C_3$

6.  ${}_8C_2$

7.  ${}_8C_6$

17. In most variations of the card game poker, a hand consists of 5 cards, where the order doesn't matter. How many different poker hands are there?

18. A professor starts each class by choosing 3 students to present solutions to homework problems to the class. If there are 41 students in the class, in how many different ways can the professor make those selections?

You and 5 of your friends are at an amusement park, and are about to ride a roller coaster. The cars have room for 6 people arranged in 3 rows of 2, so you and your friends will perfectly fill one car.

25. How many ways are there to choose the 2 people in the front row?

26. Assuming the front row has been selected, how many ways are there to choose the 2 people in the middle row?

27. Assuming the first 2 rows have been selected, how many ways are there to choose the 2 people in the back row?

## Answer Key

	7. 28
1. Combination	17. 2,598,960
2. Permutation	18. 10,660
5. 10	25. 15
6. 28	26. 6
	27. 1

## Student Feedback Templates

#1 should be a combination (the order you pick the shirts does not matter)

#2 should be a permutation (the order you chose your teammates does matter)

#5 should be 10 ( ${}_{5}C_{3} = (5 \cdot 4 \cdot 3) / (3 \cdot 2 \cdot 1) = 5 \cdot 2 \cdot 1$  (after reducing) = 10)

#6 should be 28 ( ${}_{8}C_{2} = (8 \cdot 7) / (2 \cdot 1) = 4 \cdot 7$  (after reducing) = 28)

#7 should be 28 ( ${}_{8}C_{6} = (8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3) / (6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1) = 4 \cdot 7 \cdot 1 \cdot 1 \cdot 1 \cdot 1$  (after reducing) = 28)

#17 should be 2,598,960 ( ${}_{52}C_{5} = (52 \cdot 51 \cdot 50 \cdot 49 \cdot 48) / (5 \cdot 4 \cdot 3 \cdot 2 \cdot 1) = 26 \cdot 17 \cdot 10 \cdot 49 \cdot 12$  (after reducing) = 2,598,960)

#18 should be 10,660 ( ${}_{41}C_{3} = (41 \cdot 40 \cdot 39) / (3 \cdot 2 \cdot 1) = 41 \cdot 20 \cdot 13$  (after reducing) = 10,660)

#25 should be 15 ( ${}_{6}C_{2} = (6 \cdot 5) / (2 \cdot 1) = 15$ )

#26 should be 6 ( ${}_{4}C_{2} = (4 \cdot 3) / (2 \cdot 1) = 6$ )

#27 should be 1 ( ${}_{2}C_{2} = (2 \cdot 1) / (2 \cdot 1) = 1$ )