

More Counting Practice: Group Work
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We are given the following information: 100 tickets numbered $1, 2, 3, \dots, 100$ are sold to 100 different people. Four tickets will be drawn. The first three tickets drawn will get modest prizes, and the fourth ticket drawn will get a really snazzy prize.

More information is needed here before we can count the number of ways there are to award the prizes. Let's assume the grand prize is a weekend for two in Paris. Regarding the other prizes, there are two possible scenarios:

- **Scenario I:** The three modest prizes are tickets to the Metropolitan Opera, tickets to a Brooklyn Cyclones game, and tickets to the musical "Billy Elliot".
- **Scenario II:** The three modest prizes are the same – namely, a seat on a helicopter ride around New York City.

Make sure you understand why this distinction affects the number of ways the prizes can be awarded, then answer each of the following questions assuming Scenario I.

1. In how many ways can the prizes be awarded?
2. In how many ways can the prizes be awarded if it is known that the person holding ticket 47 wins the grand prize?
3. In how many ways can the prizes be awarded if it is known that the person holding ticket 47 wins one of the prizes?
4. In how many ways can the prizes be awarded if it is known that the person holding ticket 47 does not win a prize?
5. In how many ways can the prizes be awarded if it is known that the people holding tickets 47 and 19 both win prizes?
6. In how many ways can the prizes be awarded if it is known that the people holding tickets 47, 19 and 73 all win prizes?
7. In how many ways can the prizes be awarded if it is known that the people holding tickets 47, 19, 73 and 97 all win prizes?
8. In how many ways can the prizes be awarded if it is known that none of the people holding tickets 47, 19, 73 and 97 win prizes?
9. In how many ways can the prizes be awarded if it is known that the grand prize goes to the holders of tickets 47, 19, 73 or 97?
10. In how many ways can the prizes be awarded if it is known that 19 and 47 win prizes, but the holders of tickets 73 and 93 do not?
11. Now go back and answer them again assuming Scenario II.