

Section 9-3 Independent, Mutually Exclusive and Overlapping Events

Independent Events when the outcome of one event does NOT influence the outcome of a second event

Mutually Exclusive Events—either one event or the other occurs, but not both

1. If there are 4 different types of bagels and 3 different types of cream cheese, how many ways can you buy one bagel and one cream cheese?

Counting Principle $n(A \text{ and } B) = 4 * 3 = 12$

2. A pizza restaurant offers 12 vegetable toppings and 5 meat toppings. Find the number of different ways you could select:

- a) a meat topping and a vegetable topping

$$5 * 12 = 60$$

- b) a meat topping or a vegetable topping

Counting Principle $n(A \text{ or } B)$

$$5 + 12 = 17$$

3. Jared brought 2 country CDs and 5 rap CDs to play for his math class.

- a) How many different ways could he choose a country CD and then a rap CD?

$$2 * 5 = 10$$

- b) How many different ways could he choose a country CD or a rap CD?

$$2 + 5 = 7$$

- c) Mrs. Ancelet's CD player allows you to load four CDs at once. The CDs will play in the order you load them. How many different orderings of the four CDs are possible?

$$7 * 6 * 5 * 4$$

4. Suppose that you draw one card from a deck of 52 cards. In how many different ways can you draw a heart or a face card?

Overlapping Events $n(A \text{ or } B) = n(A) + n(B) - n(A \cap B)$

$$13 + 12 - 3$$

$$25 - 3 = 22$$

5. Lexi's DVD collection includes 37 classic films and 29 comedies. Of these, 21 are classic comedies. How many DVDs does Lexi have that are classics or comedies?

$$37 + 29 - 21$$
$$66 - 21 = \boxed{45}$$

6. The senior class has 367 girls and 425 students with brown hair. Of the girls, 296 have brown hair. In how many different ways could you select a girl or a brown-haired student from the senior class?

$$367 + 425 - 296$$
$$792 - 296 = 496$$

7. 9 people on a baseball team are trying to decide who will play each position.

- a) In how many different ways could they select a person to be pitcher? 9
- b) After someone has been selected as pitcher, in how many different ways could they select someone to be catcher? 8
- c) In how many different ways could they select a pitcher and a catcher? $9 \times 8 = 72$
- d) After the pitcher and catcher have been selected, in how many different ways could they select a first-baseman? 7
- e) In how many different ways could they select a pitcher, catcher and first-baseman?
- f) In how many different ways could all nine positions be filled? $9 \times 8 \times 7 = 504$

$$9! \quad 362,880$$