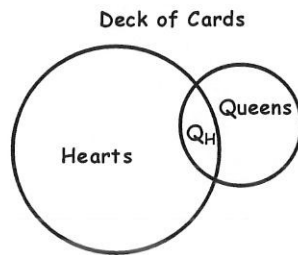


## Probability of Multiple Events $P(A)$ & $P(B)$

### A. Definitions

1. Independent Events -  $P(A)$  and  $P(B)$  do not affect each other.  
Example: Tossing a coin twice (the 1<sup>st</sup> toss does not affect the 2<sup>nd</sup>)
2. Dependent Events - The first event affects the chances of the second.  
Example: Pulling names out of a hat without replacing them
3. Mutually Exclusive Events - 2 events that cannot happen at the same time.  
Example: Rolling a die and getting a "2" and a "6"
4. Not Mutually Exclusive Events - Events that can happen at the same time.  
Example: Pulling a queen and getting hearts



### B. Formulas (In math, "or" indicates +, and "and" indicates $\times$ .)

1.  $P(A \text{ and } B) = P(A) \cdot P(B)$   
Example: What is the probability of rolling a die and getting a 6 and then a 1?

$$\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$$

2. Mutually Exclusive Events

$$P(A \text{ or } B) = P(A) + P(B)$$

Example: What is the probability of rolling a 3 or an even number?

$$\frac{1}{6} + \frac{3}{6} = \frac{2}{3}$$

3. Not Mutually Exclusive

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Example: What is the probability of rolling a 3 or an odd number:

$$\frac{1}{6} + \frac{3}{6} - \frac{1}{6} = \frac{1}{2}$$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

**Does the problem involve permutations or combinations? Do not solve.**

- 1) From 10 names on a ballot, a committee of 3 will be elected to attend a political national convention. How many different committees are possible? 1) \_\_\_\_\_
- 2) The matching section of an exam has 4 questions and 7 possible answers. In how many different ways can a student answer the 4 questions, if none of the answer choices can be repeated? 2) \_\_\_\_\_

**Find the probability.**

- 3) Give the probability that the roll of a die will show 5 or 3. 3) \_\_\_\_\_
- 4) Urn A has balls numbered 1 through 7. Urn B has balls numbered 1 through 3. What is the probability that a 4 is drawn from A followed by a 2 from B? 4) \_\_\_\_\_
- 5) A game spinner has regions that are numbered 1 through 9. If the spinner is used twice, what is the probability that the first number is a 3 and the second is a 5? 5) \_\_\_\_\_
- 6) A card is drawn from a deck of 52 cards. What is the probability that it is a 2 or a diamond? 6) \_\_\_\_\_
- 7) A bag contains 3 red marbles, 5 blue marbles, and 6 green marbles. What is the probability of choosing a blue marble when one marble is drawn? 7) \_\_\_\_\_

**Solve the problem.**

- 8) Lisa has 4 skirts, 8 blouses, and 4 jackets. How many 3-piece outfits can she put together assuming any piece goes with any other? 8) \_\_\_\_\_
- 9) A hamburger shop sells hamburgers with cheese, relish, lettuce, tomato, onion, mustard, or ketchup. How many different hamburgers can be concocted using any 5 of the extras? 9) \_\_\_\_\_

- 10) In how many ways can Susan arrange 10 books into 3 slots on her bookshelf? 10) \_\_\_\_\_
- 11) In how many ways can 6 volunteers be assigned to 6 booths for a charity bazaar? 11) \_\_\_\_\_
- 12) In how many ways can 7 players be assigned to 7 positions on a baseball team, assuming that any player can play any position? 12) \_\_\_\_\_
- 13) A restaurant offers a choice of 4 salads, 9 main courses, and 4 desserts. How many possible 3-course meals are there? 13) \_\_\_\_\_
- 14) Measurements of the height of a group of men entering a particular college produced the following table. What is the probability that a man entering the college is 68–69 inches tall? 14) \_\_\_\_\_

| Height (inches) | 60–61 | 62–63 | 64–65 | 66–67 | 68–69 | 70–71 | 72–73 | 74–75 | 76+ |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| Number          | 2     | 12    | 90    | 241   | 257   | 194   | 88    | 36    | 6   |

- 15) Ron finds 8 books at a bookstore that he would like to buy, but he can afford only 5 of them. In how many ways can he make his selection? How many ways can he make his selection if he decides that one of the books is a must? 15) \_\_\_\_\_
- 16) Each day, at a 3 day basketball camp, there are 2 choices for lunch. How many possibilities are there for lunch, considering all 3 days? 16) \_\_\_\_\_

**Solve the problem.**

- 17) How many 3-letter codes can be formed using the letters A, B, C, D, and E? No letter can be used more than once. 17) \_\_\_\_\_

**Use the formula for  ${}_nP_r$  to evaluate the expression.**

- 18)  $7P_3$  18) \_\_\_\_\_

**Use the formula for  ${}_nC_r$  to evaluate the expression.**

- 19)  $8C_3$  19) \_\_\_\_\_