

6.4

Mutually Exclusive and Mutually Inclusive Events



Objective:

- To determine the difference between a mutually exclusive and inclusive event.
- To find the probability of mutually exclusive and inclusive events.

Mutually Exclusive - when two events cannot happen at the same time.

** You will never have any outcomes in common.

Examples of mutually exclusive events:

- Turning left and turning right
heads/tails)

- Tossing a coin (getting

- In cards: kings and aces

+ or - **Formula for Mutually Exclusive**

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

Mutually Inclusive - when one event can happen at the same time. as another event

** You will have outcomes in common.

Examples of mutually inclusive events:

- Turning your head left and scratching your head
- In cards: kings and hearts → King of ♥'s

Formula for Mutually Inclusive

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

**When completing these problems, first ask yourself if the problems are mutually EXCLUSIVE or INCLUSIVE? This will help you determine how to set up and solve the problem.

A card is drawn randomly from nine cards labeled 1 through 9. What is the probability of picking a 5 or an even number.

We have two possible outcomes.

- a. Getting a 5
- b. Getting an even number

Mutually exclusive/inclusive? _____

1, 2, 3, 4, 5, 6, 7, 8, 9

$$P(5 \text{ or even}) = \frac{1}{9} + \frac{4}{9} = \frac{5}{9}$$

whole #
5 5 5 5 5
56%
←

$P(\text{number less than 4 or a 2}) =$

We have two possible outcomes.

- a. Getting a number less than 4
- b. Getting a 2

Mutually exclusive/inclusive? _____

1, 2, 3, 4, 5, 6, 7, 8, 9

$$P(\overset{\text{less than}}{< 4 \text{ or } 2}) = \frac{3}{9} + \frac{1}{9} - \frac{1}{9}$$
$$= \frac{1}{3} \text{ or } 33\%$$

Examples: A card is drawn randomly from nine cards labeled 1 through 9.

$P(\text{odd number or a number less than 3}) = \underline{\hspace{2cm}}$

ME or MI?

$$P(\text{odd}) + P(<3) - P(\text{odd and } <3)$$

$$\frac{5}{9} + \frac{2}{9} - \frac{1}{9} = \frac{6}{9} = \left(\frac{2}{3}\right)$$

1, 2, 3, 4, 5, 6, 7, 8, 9

67%

Examples: A card is drawn randomly from nine cards labeled 1 through 9.

$P(1 \text{ or a number greater than or equal to } 7) = \underline{\hspace{2cm}}$

exclusive

$$\frac{1}{9} + \frac{3}{9} = \frac{4}{9} \quad 44\%$$

1, 2, 3, 4, 5, 6, 7, 8, 9

Examples: A card is drawn randomly from nine cards labeled 1 through 9.

$P(3 \text{ or a number greater than } 9) = \underline{\hspace{2cm}}$

$$\frac{1}{9} + \frac{0}{9} = \frac{1}{9}$$

11%.

1, 2, 3, 4, 5, 6, 7, 8, 9

Examples: A card is drawn randomly from nine cards labeled 1 through 9.

$P(2 \text{ or an even number}) = \underline{\hspace{2cm}}$

1, 2, 3, 4, 5, 6, 7, 8, 9

$$P(2) + P(\text{even}) - P(2 \text{ and even})$$

$$\frac{1}{9} + \frac{4}{9} - \frac{1}{9} = \frac{4}{9} \quad 44\%$$