

Addition of Probabilities Principle

PROBABILITY OF COMPOUND EVENTS

If A and B are two events, then the probability of A or B is:

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

If A and B are mutually exclusive, then the probability of A or B is:

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

EXAMPLE 1

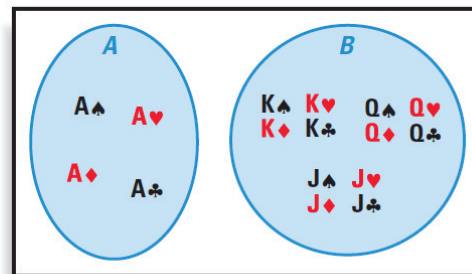
Probability of Mutually Exclusive Events

A card is randomly selected from a standard deck of 52 cards. What is the probability that it is an ace *or* a face card?

SOLUTION

Let event A be selecting an ace, and let event B be selecting a face card. Event A has 4 outcomes and event B has 12 outcomes. Because A and B are mutually exclusive, the probability is:

$$P(A \text{ or } B) = P(A) + P(B) = \frac{4}{52} + \frac{12}{52} = \frac{16}{52} = \frac{4}{13} \approx 0.308$$



EXAMPLE 2

Probability of a Compound Event

A card is randomly selected from a standard deck of 52 cards. What is the probability that the card is a heart *or* a face card?

SOLUTION

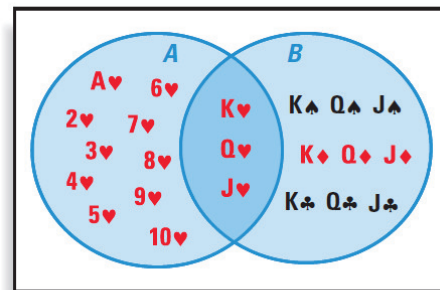
Let event A be selecting a heart, and let event B be selecting a face card. Event A has 13 outcomes and event B has 12 outcomes. Of these, three outcomes are common to A and B . So, the probability of selecting a heart *or* a face card is:

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

$$= \frac{13}{52} + \frac{12}{52} - \frac{3}{52}$$

$$= \frac{22}{52}$$

$$= \frac{11}{26}$$



Write general formula.

Substitute known probabilities.

Combine terms.

Simplify.

Try These

A standard six-sided number cube is rolled. Find the probability of the given in simplest fraction form.

1. $P(\text{even number or a } 1)$
2. $P(6 \text{ or a number less than } 3)$
3. $P(\text{even number or a number greater than } 5)$
4. $P(\text{odd number or a number divisible by } 3)$

A card is drawn from a standard deck of 52 playing cards. Find the probability of the given event in simplest fraction form.

5. $P(\text{red card or a king})$
6. $P(\text{face card or a club})$
7. $P(\text{spade or an ace})$
8. $P(\text{a black card or a } 5)$

Using the spinner, find the probability of the given event in simplest fraction form.

9. $P(\text{white or gray})$

10. $P(\text{vowel or black})$

11. $P(G \text{ or not gray})$

12. $P(\text{vowel or consonant})$

