Mutually Exclusive Events

Mutually Exclusive Events are 2 or more events that cannot happen at the same time.

Key Term That Defines Mutually Exclusive Events

Key Term That Defines Mutually Exclusive Events is 'or'.

Example Question (With Answer)

Mutually Exclusive Example

What is the probability of a dice showing a 2 or 5?

$$P(2) = \frac{1}{6} \qquad P(5) = \frac{1}{6}$$

$$P(2 \text{ or } 5) = P(2) + P(5)$$
$$= \frac{1}{6} + \frac{1}{6}$$
$$= \frac{2}{6} = \frac{1}{3}$$

The probability of a dice showing 2 or 5 is $\frac{1}{3}$

Independent Events

Independent events are events that can occur at the same time but do not affect each other.

Key Term That Defines Independent Events

The key term defining Independent events is "and".

Example Question (With Answer)

A purse contains four $5 bills, five $10 bills and three $20 bills. Two bills are selected without the first selection being replaced. Find P($5, then $5)

Solution:

There are four $5 bills.

There are a total of twelve bills.

$P(\$5) = \frac{4}{12}$

The result of the first draw affected the probability of the second draw.

There are three $5 bills left.

There are a total of eleven bills left.

$P(\$5 \text{ after } \$5) = \frac{3}{11}$

$P(\$5, \text{ then } \$5) = P(\$5) \cdot P(\$5 \text{ after } \$5) = \frac{4}{12} \times \frac{3}{11} = \frac{1}{11}$

The probability of drawing a $5 bill and then a $5 bill is $\frac{1}{11}$

Dependent Events

These are events that can occur at the same time but the can affect each other.

Key Term That Defines Dependent Events

The term that defines a dependent event is also 'and' but in that one object is not put back.

Example Question (With Answer)

Dependent Event Example

There are 6 black socks and 4 white socks in a drawer. If one sock is taken out without looking and then a second one is taken out, what is the probability that they both will be black?

$$P(\text{first sock is black}) = \frac{6}{10} = \frac{3}{5}$$

$$P(\text{second sock is black}) = \frac{5}{9}$$

$$P(\text{two black socks}) = \frac{3}{5} \cdot \frac{5}{9} = \frac{15}{45} = \frac{1}{3}$$

The probability of picking two black socks is $\frac{1}{3}$.