Warm Up

You are choosing a letter at random from the alphabet. Calculate each of the following probabilities.

P("B") $\frac{1}{26} = 3.8\%$

P(vowel) - no "Y"! $\frac{5}{26} = 19.2\%$

P(not vowel) $\frac{26-5}{26} = \frac{21}{26} = 80.8\%$

Compound Probability

Clear Learning Target

You will be able to calculate the probability of compound events.

Words Worth Knowing!

compound event - two or more simple events

independent events - when the outcome of one event does not affect the outcome of the other events (example: rolling a die and picking a card)

dependent events - when one event affects the outcome of another (example: "without replacement")

mutually exclusive events - events that cannot occur at the same time

Probability of Independent Events

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

"then"

"followed by"

Example #1: A bag contains 6 black marbles, 9 blue marbles, 4 yellow marbles, and 2 green marbles. A marble is selected, replaced, and a second marble is selected. Find the probability of selecting a black marble, then a yellow marble.

$P(\text{black and yellow}) = P(\text{black}) \cdot P(\text{yellow})$

TOTAL: 21

$= \frac{6}{21} \cdot \frac{4}{21} = \frac{8}{147} = 5.4\%$

Probability of Dependent Events

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ following } A)$$

assuming "A" happened

Example #2: Cynthia randomly draws three cards from a standard deck one at a time without replacement. Find the probability that the cards are drawn in the given order.

P(diamond, spade, diamond)

$$\frac{13}{52} \cdot \frac{13}{51} \cdot \frac{12}{50} = \frac{13}{850} = 1.5\%$$

Probability of Mutually Exclusive Events

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

Example #3: A die is being rolled. Find the probability.

P(3 or 5)

$\frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3} = 33.3\%$

P(at least 4)

P(4 or 5 or 6)

$\frac{3}{6} = \frac{1}{2} = 50\%$

Probability of Events that are Not Mutually Exclusive

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

delete duplicates

Example #4: A card is drawn from a standard deck. Find the probability.

P(2 or diamond)

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

$\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \boxed{\frac{4}{13}}$

$= \boxed{30.8\%}$