Section 11-6 Dependent Events and Conditional Probability

Objective: Find conditional Probabilities.

The probability of event B, Given Event A has happened (or will happen) is called _____

_____

Conditional Probability

The Conditional Probability of an event B, given event A denoted by $P(B|A)$, is given by $P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$, where $P(A) \neq 0$.

A box contains 5 purple marbles, 3 green marbles, and 2 orange marbles. Two consecutive draws are made from the box without replacement of the first draw. Find the probability of each event.

1. Purple first, orange second _____
2. Green first, purple second _____
3. green first, green second _____
4. Orange first, green second _____
5. orange first, purple second _____
6. Orange first, blue second _____
7. purple first, purple second _____
8. Purple first, blue second _____

Lest A and B represent events.

9. Given $P(A \text{ and } B) = \frac{1}{2}$ and $P(A) = \frac{2}{3}$, find $P(B|A)$. _____
10. Given $P(A \text{ and } B) = .12$ and $P(A) = 0.2$, find $P(B|A)$. _____
11. Given $P(A) = \frac{1}{4}$ and $P(B|A) = \frac{1}{3}$, find $P(A \text{ and } B)$. _____
12. Given $P(A) = 0.37$ and $P(B|A) = 0.42$, find $P(A \text{ and } B)$. _____
13. Given $P(B|A) = \frac{2}{3}$ and $P(A \text{ and } B) = \frac{1}{5}$, find $P(A)$. _____
14. Given $P(B|A) = 0.63$ and $P(A \text{ and } B) = 0.27$, find $P(A)$. _____

Two number cubes are rolled and the first shows a 3. Find the probability of each event.

15. Both numbers are 3s. _____
16. A sum of 7. _____
17. The numbers are both odd. _____
18. A sum 2. _____

For one roll of a number cube, let A be the event "multiple of 2" and let B be the event "factor of 12." Find each probability.

19. P(A) _____
20. P(A and B) _____
21. P(B|A) _____
22. P(A|B) _____

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} \qquad P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$$

5 purple, 3 green, 2 orange

4. Orange, green

$\frac{2}{10} \cdot \frac{3}{9} = \frac{6}{90} = \frac{1}{15}$

6. orange, blue

$\frac{2}{10} \cdot \frac{0}{9} = 0$

7. purple, purple

$\frac{5}{10} \cdot \frac{4}{9} = \frac{20}{90} = \frac{2}{9}$