Probability of Compound Events

	Two events A and B are dependent events if the occurrence of one affects the occurrence of the other. The probability that B will occur given that A has occurred is called conditional probability.	$P(A \text{ and } B)$ $= P(A) \cdot P(B, \text{after } A \text{ has happened})$
Probability of Dependent Events		

You randomly select two cards from a standard 52-card deck. What is the probability that the first card is not a face card (a king, queen, or jack) and the second card is a face card if (**a**) you replace the first card before selecting the second, and (**b**) you do *not* replace the first card?

SOLUTION

a. If you replace the first card before selecting the second card, then A and B are independent events. So, the probability is:

$$P(A \text{ and } B) = P(A) \cdot P(B) = \frac{40}{52} \cdot \frac{12}{52} = \frac{30}{169} \approx 0.178$$

b. If you do *not* replace the first card before selecting the second card, then A and B are dependent events. So, the probability is:

$$P(A \text{ and } B) = P(A) \cdot P(B \mid A) = \frac{40}{52} \cdot \frac{12}{51} = \frac{40}{221} \approx 0.181$$

Try These

A jar contains 12 red marbles, 16 blue marbles and 18 white marbles.

1. Two marbles are chosen from a jar without replacement. What is the probability that none are white?

2. Three marbles are chosen from the jar with replacement. What is the probability that all are white?

3. Three marbles are chosen from the jar without replacement. What is the probability that the first one is red, the second one is white and the third one is blue?

Find the probability of drawing the given cards from a standard deck of 52 playing cards WITH replacement.

    4. A heart, then a diamond

    5. A jack, then a king

    6. A face card, then a 2

    7. A heart, then a heart

Find the probability of drawing the given cards from a standard deck of 52 playing cards WITHOUT replacement.

    8. A heart, then a diamond

    9. A jack, then a king

    10. A face card, then a 2

    11. A heart, then a heart

The game of scrabble contains 12 tiles with the letter E, 9 tiles with A, 9 tiles with I, 8 tiles with O and 4 tiles with U. Find the probability of the following events WITHOUT replacement.

    12. E, then I

    13. A, then A, then A

    14. O, then U

    15. U, then U