

# 16-R Probability

## Review

Show all work on a separate sheet of paper. Leave all answers in simplest fractional form unless specified.

- One card is selected from a standard deck of card.
  - What is the probability that the card is a heart or a face card? (Ace has no face)  
 $13 + 12 - 3 = 22/52 = 11/26$
  - What is the probability that the card is a jack, given a black card?  $2/26 = 1/13$
  - What is the probability that the card is black, given a jack?  $2/4 = 1/2$
  - What is the probability that the card is a diamond and a face card? (Ace is not a face card)
  - What is the probability that the card is a 6 or less? (Ace is 1)  $6/13$   $3/52$

- A bag contains 3 red marbles, 4 yellow marbles, and 5 blue marbles. Two marbles are selected from the bag without replacement.

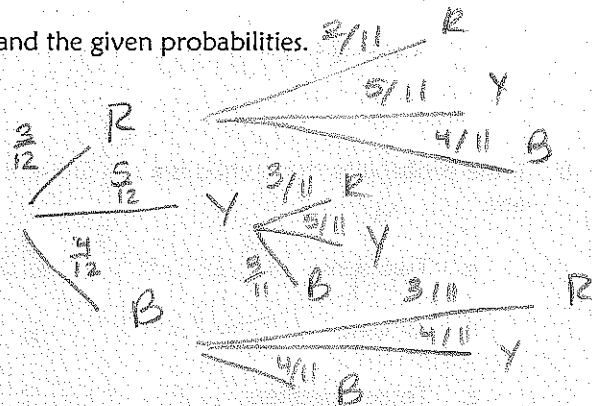
- Draw a tree diagram listing all possibilities and the given probabilities.

b.  $P(Y | R) = 5/11$

c.  $P(R | B) = 3/11$

d.  $P(YY) = \frac{5}{12} \cdot \frac{4}{11} = \frac{5}{33}$

e.  $P(BY) = \frac{4}{12} \cdot \frac{5}{11} = \frac{5}{33}$



- If four cards are drawn from two well shuffled standard decks with replacement, find the probability of drawing:

a. 4 diamonds  $\frac{26}{104} \cdot \frac{26}{104} \cdot \frac{26}{104} \cdot \frac{26}{104} = 0.0039 = 0.39\%$

b. 0 diamonds  $\frac{78}{104} \cdot \frac{78}{104} \cdot \frac{78}{104} \cdot \frac{78}{104} = 0.316 = 31.64\%$

- A quiz has 8 multiple-choice questions, each with 5 choices. If you randomly guess at every questions, what is the probability of getting:

a. At least 6 questions correct?  $8C_6 \left(\frac{1}{5}\right)^6 \left(\frac{4}{5}\right)^2 + 8C_7 \left(\frac{1}{5}\right)^7 \left(\frac{4}{5}\right)^1 + 8C_8 \left(\frac{1}{5}\right)^8 \left(\frac{4}{5}\right)^0$

b. All eight questions correct?  $8C_8 \left(\frac{1}{5}\right)^8 \left(\frac{4}{5}\right)^0$  or  $1 - 8C_0 \left(\frac{1}{5}\right)^0 \left(\frac{4}{5}\right)^8$

5. A bag contains 3 green marbles, 5 pink marbles, and 7 purple marbles. A marble is drawn at random from the bag. What is the probability that:

- a. It is purple?  $\frac{7}{15}$
- b. It is not pink?  $\frac{2}{3}$
- c. It is yellow?  $0$
- d. What are the odds of drawing a pink marble?  $1:2$
- e. What are the odds of not drawing a green marble?  $4:1$

6. A die is rolled and a coin is tossed. List the sample space.

$\{1H, 1T, 2H, 2T, 3H, 3T, 4H, 4T, 5H, 5T, 6H, 6T\}$

7. The probability of Mrs. Serafino waking up on time any one of the 5 school days is 65%.

a. What is the probability of waking up on time at least 3 days in a school week?

$${}^5C_3 (.65)^3 (.35)^2 + {}^5C_4 (.65)^4 (.35)^1 + {}^5C_5 (.65)^5 (.35)^0$$

b. What is the probability of waking up on time every day?

$${}^5C_5 (.65)^5 (.35)^0 = 11.6\%$$

$$= 76.4\%$$

8. If the probability that a child is a son is 0.4, find the probability that in a family of four children, there are:

- a. Two sons.  ${}^4C_2 (.4)^2 (.6)^2$
- b. All sons.  ${}^4C_4 (.4)^4 (.6)^0$
- c. Three daughters.  ${}^4C_3 (.6)^3 (.4)^1$
- d. Fewer than two daughters.  ${}^4C_0 (.6)^0 (.4)^4 + {}^4C_1 (.6)^1 (.4)^3$
- e. At least one son.  $1 - {}^4C_0 (.4)^0 (.6)^4$

9. If a coin is tossed 5 times, what is the probability:

- a. Of tossing exactly 3 heads?  ${}^5C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^2$
- b. Of tossing at least 4 tails?  ${}^5C_4 \left(\frac{1}{2}\right)^4 \left(\frac{1}{2}\right)^1 + {}^5C_5 \left(\frac{1}{2}\right)^5 \left(\frac{1}{2}\right)^0$