Name: ___*Key*___   Date: _____

Independent and Dependent Events

Multiplication Rule for Independent Events

$$\bullet \; P(A \text{ and } B) = P(A \cap B) = P(A) \bullet P(B)$$

The two spinners at the right are spun. Find each probability.

1. P(4 and C)

$$\frac{1}{8} \bullet \frac{1}{6} = \frac{1}{48}$$
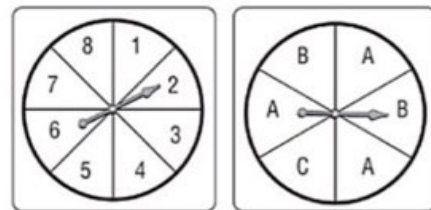
3. P(greater than 3 and B)

$$\frac{5}{8} \bullet \frac{2}{6} = \frac{5}{24}$$

2. P(odd and A)

$$\frac{4}{8} \bullet \frac{3}{6} = \frac{1}{4}$$

4. P(less than 5 and B)

$$\frac{4}{8} \bullet \frac{2}{6} = \frac{1}{6}$$

There are 10 yellow, 6 green, 9 orange, and 5 red cards in a stack of cards turned facedown. Once a card is selected, it is not replaced. Find each probability.

5. P(two yellow cards)

$$\frac{10}{30} \bullet \frac{9}{29} = \frac{3}{29}$$

7. P(two cards that are not orange)

$$\frac{21}{30} \bullet \frac{20}{29} = \frac{14}{29}$$

6. P(yellow and green)

$$\frac{10}{30} \bullet \frac{6}{29} = \frac{2}{29}$$

8. P(two cards that are neither red nor green)

$$\frac{16}{30} \bullet \frac{15}{29} = \frac{8}{29}$$

9. A coin is flipped, and a 6-sided die is rolled. What is the probability of landing on the tail side of the coin and rolling a 3 on the die?

$$\frac{1}{2} \bullet \frac{1}{6} = \frac{1}{12}$$

10. A jar contains 3 red, 5 green, 2 blue and 6 yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a green and a yellow marble?

$$\frac{5}{16} \bullet \frac{6}{16} = \frac{15}{128}$$

11. A jar contains 3 red, 5 green, 2 blue and 6 yellow marbles. If you pull two marbles from the jar at the same time, what is the probability of choosing a green and a yellow marble?

$$\frac{5}{16} \cdot \frac{6}{15} = \frac{1}{8}$$

12. An aquarium contains 6 male goldfish and 4 female goldfish. You randomly select a fish from the tank, do not replace it, and then randomly select a second fish. P(male and male)?

$$\frac{6}{10} \cdot \frac{5}{9} = \frac{1}{3}$$

13. A random sample of parts coming off a machine is done by an inspector. He found that 5 out of 100 parts are bad on average. If he were to do a new sample, what is the probability that he picks a bad part and then, picks another bad part if he doesn't replace the first?

$$\frac{5}{100} \cdot \frac{4}{99} = \frac{1}{495}$$

How to Determine If 2 Events Are Independent:
- **Plug in what you know into P(A ∩ B) = P(A) ● P(B) and test it!**

14. Let event M = taking a math class. Let event S = taking a science class. Then, M and S = taking a math class and a science class. Suppose P(M) = 0.6, P(S) = 0.5, and P(M and S) = 0.3. Are M and S independent?

$$0.3 \stackrel{?}{=} 0.6 \cdot 0.5$$
$$0.3 = 0.3 \checkmark$$
yes, independent

15. In a class, 60% of the students are female. 50% of all students in the class have long hair. 45% of the students are female and have long hair. Of the female students, 75% have long hair. Let F be the event that the student is female. Let L be the event that the student has long hair. One student is picked randomly.
Are the events of being female and having long hair independent?

$$P(F \cap L) = P(F) \cdot P(L)$$
$$.45 = .6 \cdot 0.5$$
$$.45 \neq .3$$

NO, dependent