Dependent and Independent Events

Vocabulary

dependent events: events where the outcome of the first event affects the outcome of the second event

** Be aware that numbers of outcomes or choices may decrease if an item is NOT replaced

Vocabulary

independent events: events where the outcome of one event does not affect the outcome of the other event (letters chosen to be on a license plate are independent)

written as *P(A and B)* or sometimes *P(A,* then *B)*

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

Ex 1

Classify as dependent or independent

- Spin a spinner. Then, select a marble from a bag that contains marbles of different colors.
- Select a marble from a bag that contains marbles of two colors. Put the marble aside, and select a second marble from the bag.
- What if we put the marble back???

Ex 1

Classify as dependent or independent

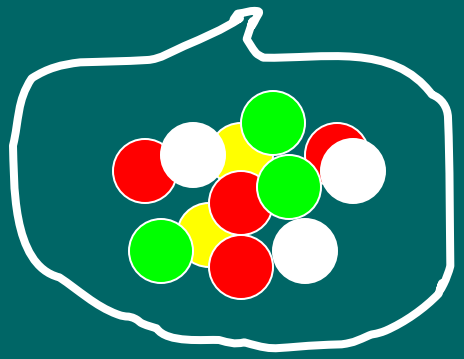
- Spin a spinner. Then, select a marble from a bag that contains marbles of different colors.

  (Independent – use theoretical probabilities)
- Select a marble from a bag that contains marbles of two colors. Put the marble aside, and select a second marble from the bag.

  (Dependent – cannot use theoretical probabilities)
- What if we put the marble back???

  (Independent – use theoretical probabilities)

Ex 2

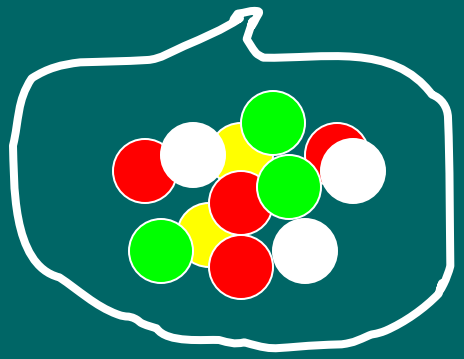


What is the probability of flipping a coin and rolling a three on a die?

P(A and B) = P(A) x P(B) for events that are independent.

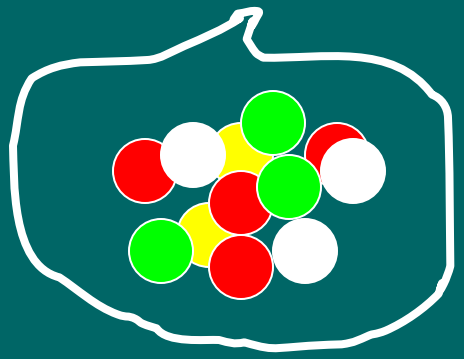
$$\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$$

Ex 3



A bag contains 3 white softballs, 2 yellow softballs, 3 green softballs, and 4 red softballs. You draw a ball without looking. You replace it and draw another ball. Find the probability that the first ball is red and the second ball is white.

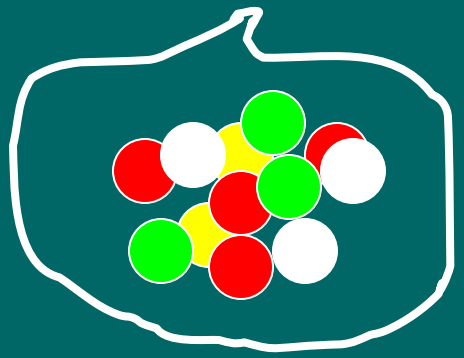
Ex 3



A bag contains 3 white softballs, 2 yellow softballs, 3 green softballs, and 4 red softballs. You draw a ball without looking. You replace it and draw another ball. Find the probability that the first ball is red and the second ball is white.

$$\frac{4}{12} \times \frac{3}{12} = \frac{1}{12}$$

Ex 4



In order to match up socks in a drawer, there are 4 black socks, 6 red socks and 2 blue socks. What is the probability that two black socks will be chosen out of the drawer?

P(A and B) = P(A) x P(B|A)

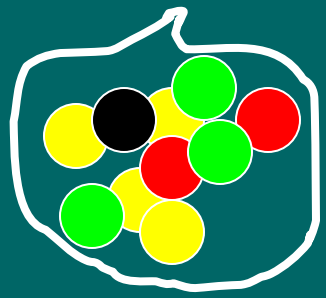
$$\frac{4}{12} \times \frac{3}{11} = \frac{1}{11}$$

Ex 5

A box contains 20 red marbles and 30 blue marbles. A second box contains 10 white marbles and 47 black marbles. If you choose one marble from each box without looking, what is the probability that you get a blue marble and a black marble?

$$\frac{30}{50} \times \frac{47}{57} = \frac{47}{95} \text{ or } 0.49$$

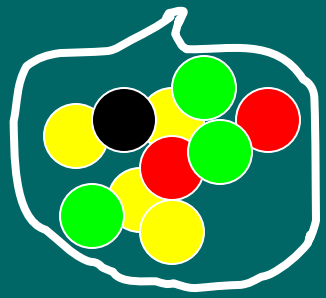
Ex 6



A bag contains 3 green marbles, 2 red marbles, 4 yellow marbles, and 1 black marble. Two are taken at random *without* replacement.

Find *P (green,* then *red).*

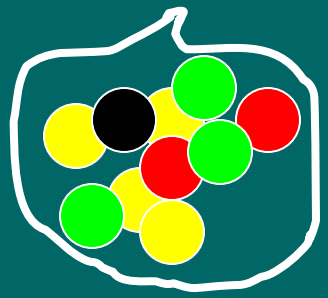
Ex 7



A bag contains 3 green marbles, 2 red marbles, 4 yellow marbles, and 1 black marble. Two are taken at random *without* replacement.

Find *P (green,* then *green).*

Ex 8

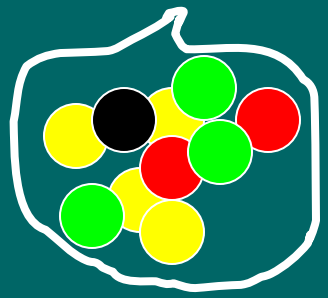


The probability that it is going to be sunny is 0.4 when walking to school. The probability of meeting up with your friend on the way to school is 0.3.

a) What is the probability of it being sunny and walking to school with your friend?

$$0.4 \times 0.3 = 0.12$$

Ex 8



b) What is the probability of it not being sunny and walking to school with your friend?

$$0.6 \times 0.3 = 0.18$$

c) What are the odds of it being sunny and walking to school without your friend?

$$\frac{0.4 \times 0.7}{1 - (0.4 \times 0.7)} = 7:18$$