Name: __KEY__ Hour: _____ Date: _____

NOTES: Section 10.3 – Define and Use Probability

Goals: #1 - I can find the probability of a given event.

#2 - I can find the odds (in favor or against) a given event.

#3 - I can find the geometric probability of an event.

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Homework: Lesson 10.3 Worksheet

Warm Up:

1. The manager of a chain of restaurants must choose 6 restaurants from 11 for a promotion. How many different selections can be made?

$$_{11}C_6 = \boxed{462 \text{ selections}}$$

2. A committee consists of 10 Republicans and 8 Democrats. In how many ways can a sub-committee be chosen if it has 5 Republicans and 4 Democrats?

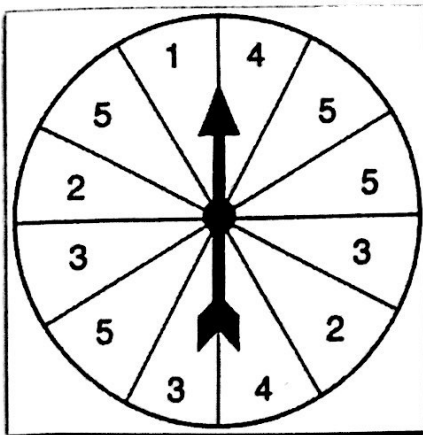$$_{10}C_5 \cdot {}_8C_4 = \boxed{17,640 \text{ ways}}$$

3. Use the binomial theorem to expand $(3 - x^2)^4$

$$1(3)^4(-x^2)^0 + 4(3)^3(-x^2)^1 + 6(3)^2(-x^2)^2 + 4(3)^1(-x^2)^3 + 1(3)^0(-x^2)^4$$

$$81 - 108x^2 + 54x^4 - 12x^6 + x^8$$

$$\boxed{x^8 - 12x^6 + 54x^4 - 108x^2 + 81}$$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

Exploration #1:

1. How many ways could you spin a 2?

$$\boxed{2 \text{ ways}}$$

2. How many ways could you spin a 5?

$$\boxed{4 \text{ ways}}$$

3. What is the total number of outcomes?

$$\boxed{12 \text{ outcomes}}$$
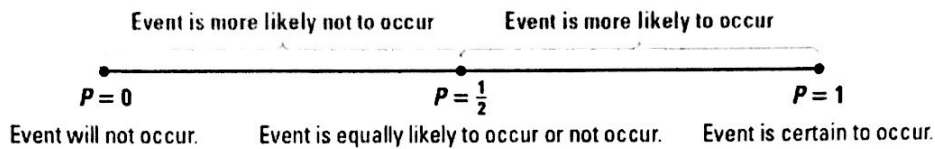
4. What is the *probability* that you will spin a 5?

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

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Notes:

The ___outcomes___ of an event is the possible results of the event.

The ___probability___ of an event is a number from __0__ to __1__ that indicates
the ___likelihood___ that the event will occur.

Event is more likely not to occur   Event is more likely to occur

$P = 0$ $P = \frac{1}{2}$ $P = 1$

Event will not occur.   Event is equally likely to occur or not occur.   Event is certain to occur.

When all outcomes are equally likely, the ___probability___ that an event *A* will occur is:

$$P(A) = \frac{\text{\# of outcomes in event A}}{\text{Total \# of outcomes}}$$

Example #1:

A card is randomly drawn from a standard deck of 52 cards. Find the probability of
drawing the given card. Write your answer as a simplified fraction.

    1. An eight $\frac{4}{52} = \boxed{\frac{1}{13}}$

    2. A red king $\frac{2}{52} = \boxed{\frac{1}{26}}$

You practice:

A marble is randomly drawn from a bag. The bag contains 3 red marbles, 2 green marbles,
5 yellow marbles, and 4 blue marbles. Find the probability of choosing the given marble.
Write your answer as a simplified fraction.

    1. A yellow marble $\boxed{\frac{5}{14}}$

    2. A blue or red marble

      $4 + 3$ $\frac{7}{14} = \boxed{\frac{1}{2}}$

Notes:

You can also use __odds__ to measure the ____likelihood____ that an event will occur.

Odds measure the changes in ____favor____ of an event occurring or the chances __against__ an event occurring:

odds in favor: # of outcomes in event A : # of outcomes NOT in event A

odds against: # of outcomes NOT in event A : # of outcomes in event A

Example #2:

A marble is randomly drawn from a bag. The bag contains 6 red marbles, 12 yellow marbles, and 9 blue marbles.

1. Find the odds in favor of drawing a red marble.

6 : 21

2 : 7

2. Find the odds against drawing a ~~black~~ blue marble.

18 : 9

2 : 1

You practice:

A card is drawn from a standard deck of 52 cards.

1. Find the odds in favor of drawing a 10.

4 : 48

1 : 12

2. Find the odds against drawing a club.

39 : 13

3 : 1

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Notes:

Some probabilites are found by calculating a ration of two lengths, areas, or volumes called

<u>geometric probabilities</u>

Example #3: You throw a dart at the square board shown. Your dart is equally likely to hit any point inside the board. Find the probability that a dart thrown at the square target will hit the given region. Round your answer to three decimal places.

Total area: 324 in^2

1. The center

$$\frac{\pi(3)^2}{324}$$

$$\approx \boxed{0.087}$$

2. The three rings (10, 5, and 2 points)

$$\frac{\pi(9)^2}{324}$$

$$\approx \boxed{0.785}$$

3. The 2 point or 5 point ring

$$\frac{\pi(9)^2 - \pi(3)^2}{324}$$

$$\frac{72\pi}{324}$$

$$\approx \boxed{0.698}$$

3 in.

10

5

2

0

18 in.