Unit 6-Lesson 1: Sample Spaces, Subsets, and Basic Probability

- There are a total of _____cards in a deck.
- There are _____ ranks of cards. These ranks include the numbers _____ through _____, _____, _____,_____, _____. This ordering of the rank is called "ace high."
- There are _____ suits: _____, _____, _____, _____.
- There are _____ hearts_____ diamonds, _____ spades and _____ clubs.

- The diamonds and hearts are printed in red. The spades and clubs are printed in black. So there are _____ red cards and _____ black cards.
- Each rank has four cards in it (one for each of the four suits). This means there are four nines, four tens and so on.
- The jacks, queens and kings are all considered _____ cards. Thus there are three face cards for each suit and a total of _____ face cards in the deck.
- The deck does not include any jokers.

Vocabulary:

_____ The **set** of all possible outcomes of an experiment.

Ex: List the sample space, S, for each of the following:

a. Tossing a coin:_____

b. Rolling a six-sided die:_____

c. Drawing a marble from a bag that contains two red, three blue and one white marble:_____

Vocabulary:

- The _____ of two sets (**A** $\cap$ **B**) is the set of all elements in both set A **AND** set B.
- The _____ of two sets (**A** $\cup$ **B**) is the set of all elements in set A **OR** set B.

Ex: Given the following sets, find A $\cap$ B and A $\cup$ B

A = {1,3,5,7,9,11,13,15} B = {0,3,6,9,12,15}

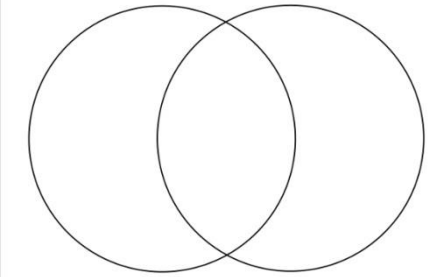
A $\cap$ B =_____ A $\cup$ B =_____

Sometimes drawing a diagram helps in finding intersections and unions of sets.

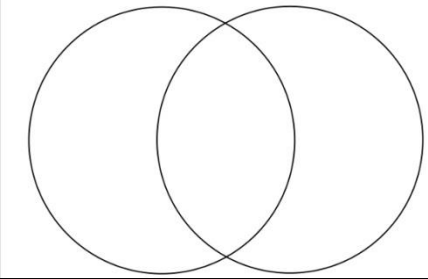
Vocabulary:

A _____ is a visual representation of sets and their relationships to each other using overlapping circles. Each circle represents a different set.

EX: Factors of 12 and factors of 16



EX: In a class of 60 students, 21 sign up for chorus, 29 sign up for band, and 5 take both. 15 students in the class are not enrolled in either band or chorus.



Vocabulary:

The _____ of a set is the set of all elements **NOT** in the set.

- The compliment of a set, A, is denoted as A^C

Ex: S = {…-3,-2,-1,0,1,2,3,4,…}

A = {…-2,0,2,4,…}

If A is a subset of S, what is A^C?

A^C=_____

Vocabulary:

Probability of an event occurring is: $P(E) = \frac{Number\ of\ Favorable\ Outcomes}{Total\ Number\ of\ Outcomes}$

We can use sample spaces, intersections, unions, and compliments of sets to help us find probabilities of events. *Note that **P(A^C)** is every outcome **except (or not)** A, so we can find P(A^C) by finding 1 – P(A)*

P(A) is always between 0 and 1

If P(A)=0, then _____(will never happen) If P(A) = 1, then _____(will always happen)

EX: An experiment consists of tossing three coins.

List the sample space for the outcomes of the experiment

Sample Space:_____

Find the following probabilities:

a. P(all heads) _____

b. P(two tails) _____

c. P(no heads) _____

d. P(at least one tail) _____

e. How could you use compliments to find d? _____

EX: A bag contains six red marbles, four blue marbles, two yellow marbles and 3 white marbles. One marble is drawn at random.

List the sample space for this experiment

Sample Space:_____

Find the following probabilities:

a. P(red) _____

b. P(blue or white) _____

c. P(not yellow) _____

EX: A card is drawn at random from a standard deck of cards. Find each of the following:

a. P(heart) _____

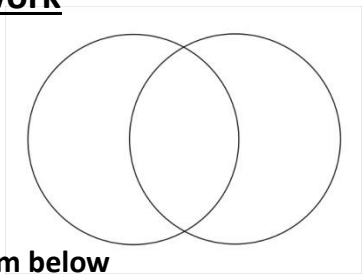
b. P(black card) _____

c. P(2 or jack) _____

d. P(not a heart) _____

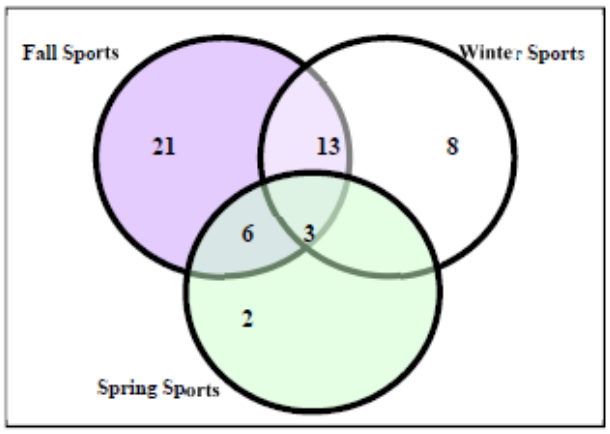
Unit 6-Lesson 1 Classwork/Homework

1. **Organize the data into the circles.**



Factors of 64: 1, 2, 4, 8, 16, 32, 64
Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

2. **Answer Questions about the diagram below**



a. How many students play sports year-round?
_____
b. How many students play sports in the spring and fall?
_____
c. How many students play sports in the winter and fall?
_____
d. How many students play sports in the winter and spring?
_____
e. How many students play only one sport?
_____
f. How many students play at least two sports?
_____
g. Find the probability a student plays a spring sport?
_____

3. **Suppose you have a standard deck of 52 cards. Let** A: draw a 7 B: draw a Diamond
   a. Describe $A \cup B$ for this experiment, and find the probability of $A \cup B$
   _____
   b. Describe $A \cap B$ for this experiment, and find the probability of $A \cap B$
   _____

4. **Suppose a box contains eight marbles, one red, five blue, and two white. One marble is selected, its color is observed, and then the marble is placed back in the box. The marbles are scrambled, and again, a marble is selected and its color is observed.**
   Sample Space:_____
   P(white marble):_____
   P(red and blue marble):_____

5. **Suppose you have a jar of candies: 4 red, 5 purple and 7 green. Find the following probabilities of the following events:**
   a. Selecting a red candy: P(red):_____
   b. Selecting a purple candy. P(purple):_____
   c. Selecting a green or red candy. P(green or red):_____
   d. Selecting a yellow candy. P(yellow):_____
   e. Selecting any color except a green candy. P(not green):_____

6. **Consider the throw of a die experiment. Assume we define the following events:**
   A: observe an even number B: observe a number less than or equal to 3
   a. Describe $A \cup B$ for this experiment:_____
   b. Describe $A \cap B$ for this experiment:_____