

NOTES: MATH 2 HONORS
Unit 7: Probability

An **EVENT** is an activity or experiment and is usually represented by a capital letter. A **SAMPLE SPACE** is a set of all possible outcomes for an activity or experiment. A smaller set of outcomes from the sample space is called a **SUBSET**.

EXAMPLE 1:

a. In the event of rolling a die, what is the sample space?

$$S = \{1, 2, 3, 4, 5, 6\}$$

b. In the event of rolling a die, what is the sample space for the subset of rolling an even?

$$E = \{2, 4, 6\}$$

The **COMPLEMENT** of a subset is all the outcomes in the sample space that are not part of the subset. A subset and its complement make up the entire sample space. If a subset is represented by A , the complement can be represented by *not* A , $\sim A$, or A^c .

EXAMPLE 2:

a. What is the complement of Example 1b above?

$$\sim E = \{1, 3, 5\}$$

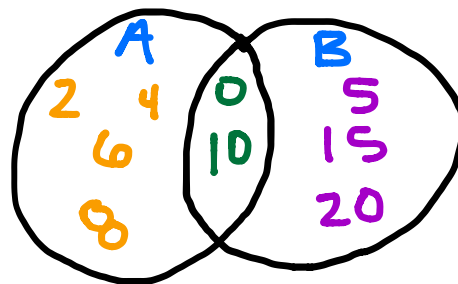
The **UNION** of two events includes all outcomes from each event. The union can be included by the word "or" or the symbol \cup . The **INTERSECTION** of two events includes only those outcomes that are in both events. The intersection can be indicated by the word "and" or the symbol \cap .

IT IS SOMETIMES EASIER TO FIND THE UNION AND INTERSECTION BY DRAWING A VENN DIAGRAM.

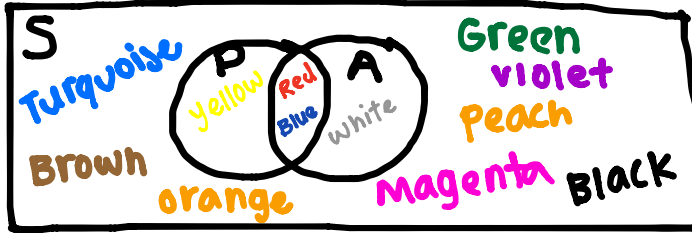
EXAMPLE 3: If $A = \{0, 2, 4, 6, 8, 10\}$ and $B = \{0, 5, 10, 15, 20\}$, find the following.

a. $A \cup B = \{0, 2, 4, 5, 6, 8, 10, 15, 20\}$

b. $A \cap B = \{0, 10\}$



EXAMPLE 4: A small box of Crayola Crayons has twelve crayons. The sample space for the different colors is $S = \{\text{Green, Violet, Turquoise, Yellow, Blue, Red, White, Brown, Peach, Black, Magenta, Orange}\}$.



a. What is the subset of primary colors, P ?

$$P = \{\text{Yellow, Red, Blue}\}$$

b. What is the subset of American Flag colors, A ?

$$A = \{\text{Red, White, Blue}\}$$

c. What is the union of P and A ?

$$P \cup A = \{\text{Yellow, Red, Blue, White}\}$$

d. What is the intersection of P and A ?

$$P \cap A = \{\text{Blue, Red}\}$$

e. What is the complement of P ?

$$\sim P = \{\text{Green, violet, Turquoise, white, Brown, Peach, Black, Magenta, orange}\}$$

f. What is the complement of P and A ?

$$\sim(P \cup A) = \{\text{Green, violet, Turquoise, Black, Brown, Peach, Magenta, orange}\}$$