Name___*Key*_____ Date_____ Hour_____

Adding Probabilities
Algebra 2 Trig G

If 2 events cannot occur at the same time, they are called __*mutually exclusive*__.

Probability of Mutually Exclusive Events:

$$\boxed{P(A \ or \ B) = P(A) + P(B)}$$

Example 1: Jenny has a stack of playing cards consisting of 10 hearts, 8 spades, 3 diamonds, and 7 clubs. If she selects a card at random from this stack, what is the probability that it is <u>a heart OR a club</u>?

$$P(heart) + P(club)$$

$$\frac{10}{28} + \frac{7}{28} = \boxed{\frac{17}{28}}$$

What is the probability that it is <u>a spade OR a diamond</u>?

$$\frac{8}{28} + \frac{3}{28} = \boxed{\frac{11}{28}}$$

What is the probability that it is <u>a spade OR a heart OR a club</u>?

$$\frac{8}{28} + \frac{10}{28} + \frac{7}{28} = \boxed{\frac{25}{28}}$$

What is the probability that it is <u>a diamond OR a spade OR a club</u>?

$$\frac{3}{28} + \frac{8}{28} + \frac{7}{28} = \frac{18}{28} = \boxed{\frac{9}{14}}$$

What is the probability that it is <u>a spade OR a club OR a diamond OR a heart</u>?

$$\frac{8}{28} + \frac{7}{28} + \frac{3}{28} + \frac{10}{28} = \frac{28}{28} = \boxed{1}$$

If it is possible for 2 events to occur at the same time, they are called **inclusive**.

Probability of Inclusive Events:

$$P(A \text{ or } B) = P(A) + P(B) - P(\text{both } A \text{ and } B)$$

52 cards → 13 of each suit

Example 2: Bobby has a standard deck of playing cards. He picks one card out of the deck. What is the probability that it is a spade OR a Queen?

$$P(spade) + P(Queen) - P(\text{both spade and Queen})$$

$$\frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = \boxed{\frac{4}{13}}$$

What is the probability that it is a 5 or a red card?

$$P(5) + P(red) - P(red\ 5)$$

$$\frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \boxed{\frac{7}{13}}$$

What is the probability that it is an Ace or a diamond?

$$P(Ace) + P(diamond) - P(Ace\ diamond)$$

$$\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \boxed{\frac{4}{13}}$$

What is the probability that it is a club or a black card?

$$P(club) + P(black) - P(black\ club)$$

$$\frac{13}{52} + \frac{26}{52} - \frac{13}{52} = \frac{26}{52} = \boxed{\frac{1}{2}}$$

Example 3: There are 200 students taking Calculus, 500 taking Spanish, and 100 taking both. There are 1000 students in the school. What is the probability that a student selected at random is taking Calculus OR Spanish?

$$P(Calc) + P(Span) - P(Calc + Span)$$

$$\frac{200}{1000} + \frac{500}{1000} - \frac{100}{1000} = \frac{600}{1000} = \boxed{\frac{3}{5}}$$