Math 2

Unit 7.5 – Adding Probabilities "OR"

Probability of Mutually Exclusive Events →

If two events, A and B, are mutually exclusive (two events cannot occur at the same time),

then the probability of one event or another event is $P(A \text{ or } B) = P(A) + P(B)$ *Adding Fractions*

Example 1: Complete each problem about finding the probability of mutually exclusive events.

a.) Keisha has a stack of 8 baseball cards, 5 basketball cards, and 6 soccer cards. If she selects a card at random from the stack, find the probability of the situations below. 19 total cards

i.) P (baseball or soccer)

P(BB) + P(Soc)

$= \frac{8}{19} + \frac{6}{19}$

$= \frac{14}{19} \approx 73.7\%$

ii.) P (football or basketball)

P(FB) or P(Bsk+B)

$= \frac{0}{19} + \frac{5}{19}$

$= \frac{5}{19} \approx 26.3\%$

b.) A card is drawn from a standard deck of cards. Determine the probability.

52 total cards

i.) P (6 or king)

P(6) + P(K)

$= \frac{4}{52} + \frac{4}{52}$

$= \frac{8}{52} \approx 15.4\%$

ii.) P (red or black)

P(R) + P(B)

$= \frac{26}{52} + \frac{26}{52}$

$= \frac{52}{52} = 100\%$

Probability of Inclusive Events →

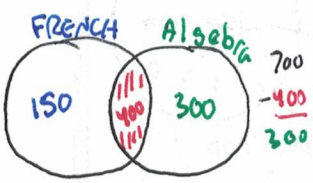
If two events, A and B, are inclusive (two events can occur at the same time),

then the probability one event or another event is $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Example 2: Complete each problem about finding the probability of inclusive events.

a.) The enrollment at South High School is 1400. Suppose 550 students take French, 700 take Algebra , and 400 take both French and Algebra.

i.) Draw a Venn Diagram to illustrate situation.



550 − 400 = 150

700 − 400 = 300

550 700

1250 but not all students take both classes.

ii.) P (French or Algebra)

P(F) + P(Alg) − P(F/Alg)

$\frac{550}{1400} + \frac{700}{1400} - \frac{400}{1400}$

$= \frac{850}{1400} \approx 60.7\%$

b.) A card is drawn from a standard deck of cards. Determine the probability.

i.) P (queen or diamond)

P(Q) + P(D) − P(QD)

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

$= \frac{16}{52} \approx 30.8\%$

ii.) P (black or ace)

P(B) + P(A) − P(BlkAce)

$= \frac{26}{52} + \frac{4}{52} - \frac{2}{52}$

$= \frac{28}{52} \approx 53.8\%$

Example 3: Determine whether the events are exclusive or inclusive. Then find the probability.

a.) There are 3 literature books, 4 algebra books, and 2 biology books on a shelf. * total 9 books
If a book is randomly selected, what is the probability of selecting a literature book or an algebra book?

(Exclusive) $P(Lit) + P(Alg)$

$\frac{3}{9} + \frac{4}{9} = \frac{7}{9} \approx 77.8\%$

b.) A die is rolled. What is the probability of rolling a 5 or a number greater than 3? 6 total #'s

(Inclusive) $P(5) + P(>3)$

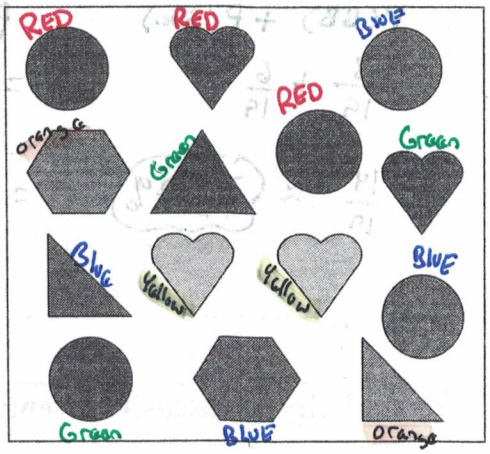
$\frac{1}{6} + \frac{3}{6} - \frac{1}{6} = \frac{3}{6} = 50\%$

c.) In the Math Club, 7 of the 20 girls are seniors, and 4 of the 14 boys are seniors. What is the probability of randomly selecting a boy or a senior to represent the club at a statewide math contest? 34 total

(Inclusive) $P(B) + P(Sn) - P(BSn)$

$\frac{14}{34} + \frac{11}{34} - \frac{4}{34} = \frac{21}{34} \approx 61.8\%$

d.) Jamie reaches into a dish and selects a token at random. Find the probability of each situation. 14 total tokens



i.) What is the probability of Jamie picking a circle or heart token?

(Exclusive) $P(circle) + P(heart)$

$\frac{5}{14} + \frac{4}{14} = \frac{9}{14} \approx 64.3\%$

ii.) What is the probability of Jamie picking a triangle or blue token?

(Inclusive) $P(\triangle) + P(Blue) - P(Blue\ \triangle)$

$\frac{3}{14} + \frac{4}{14} - \frac{1}{14} = \frac{6}{14} \approx 42.9\%$

iii.) What is the probability of Jamie picking an orange or hexagon token?

(Inclusive) $P(orange) + P(\hexagon) - P(org\ \hexagon)$

$2/14 + 3/14 - 1/14 = 3/14 \approx 21.4\%$

iv.) What is the probability of Jamie picking a blue heart or green triangle?

(Exclusive) $P(B\heartsuit) + P(G\triangle)$

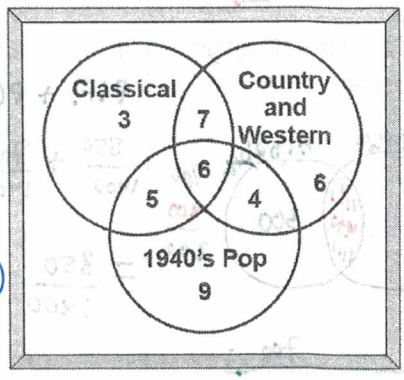
$\frac{0}{14} + \frac{1}{14} = \frac{1}{14} \approx 7.1\%$

e.) One tile with each letter of the alphabet is placed in a bag, and one is drawn at random.
What is the probability of selecting a vowel or a letter from the word EQUATION?

(Inclusive) $P(vowel) + P(Letter) - P(vowel)$

$\frac{5}{26} + \frac{8}{26} - \frac{5}{26} = \frac{8}{26} \approx 30.8\%$

f.) The Venn Diagram below represents senior citizens and their music preferences. total 60
The number of senior citizens surveyed was 60. Determine the probability of each situation.



a.) P (only Western or only Classical)

(Exclusive) $\frac{6}{60} + \frac{3}{60} = \frac{9}{60} = 15\%$

b.) P (Classical or 1940's Pop)

(Inclusive) $P(Class) + P(Pop) - P(Class\ and\ Pop)$

$\frac{(3+7+6+5)}{60} + \frac{(5+6+4+9)}{60} - \frac{(5+0)}{60} = \frac{34}{60} \approx 56.7\%$

c.) P (Classical and Western and 1940's Pop)

(Exclusive) $\frac{6}{60} = 10\%$