Name: _____ Date: _____

Compound Probability: Mutually Exclusive vs. Overlapping

Vocabulary:

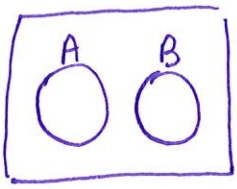
- ☆ Compound Event
  - combines 2 or more events, using "and" + "or"
- ☆ Mutually Exclusive
  - 2 or more events cannot occur at the same time
- ☆ Overlapping
  - have at least one event in common

"or" = add

Mutually Exclusive

The probability that one or the other of several events will occur is found by summing the individual probabilities of the events:

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



1. Find the probability that a girl's favorite department store is Macy's or Nordstrom.

   .25 + .20 = .45

   Find the probability that a girl's favorite store is $\boxed{\text{not}}$ JC Penny's.

   .25 + .20 + .20 + .25 = .90

Macy's	0.25
Saks Fifth Ave.	0.20
Nordstrom	0.20
JC Penny's	0.10
Bloomingdale's	0.25

+

= 1

2. When rolling two dice, what is probability that your sum will be 4 or 5?

   $= P(4) + P(5)$

   $= \frac{3}{36} + \frac{4}{36} = \frac{7}{36}$

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

3. What is the probability of picking a queen or an ace from a deck of cards?

   52 total

   $\frac{4}{52} + \frac{4}{52} = \frac{2}{13}$

   P(Q) + P(A)

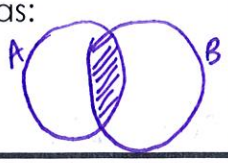
Standard Deck of 52 Playing Cards

Clubs	Spades	Hearts	Diamonds
A♣	A♠	A♥	A♦
2♣	2♠	2♥	2♦
3♣	3♠	3♥	3♦
4♣	4♠	4♥	4♦
5♣	5♠	5♥	5♦
6♣	6♠	6♥	6♦
7♣	7♠	7♥	7♦
8♣	8♠	8♥	8♦
9♣	9♠	9♥	9♦
10♣	10♠	10♥	10♦
Jack♣	Jack♠	Jack♥	Jack♦
Queen♣	Queen♠	Queen♥	Queen♦
King♣	King♠	King♥	King♦

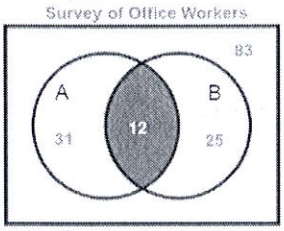
Overlapping Events

Probability that non-mutually exclusive events A and B or both will occur expressed as:
P(A or B)

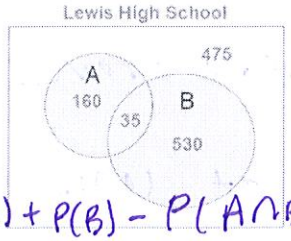
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$



4. Find the probability that a person will drink both.



$\boxed{\frac{12}{51}}$



5. Find the $P(A \cup B)$.

$P(A) + P(B) - P(A \cap B)$

$\frac{195}{1200} + \frac{565}{1200} - \frac{35}{1200}$

$= \boxed{\frac{29}{48}}$

Standard Deck of 52 Playing Cards

Clubs	Spades	Hearts	Diamonds
A♣	A♠	A♥	A♦
2♣	2♠	2♥	2♦
3♣	3♠	3♥	3♦
4♣	4♠	4♥	4♦
5♣	5♠	5♥	5♦
6♣	6♠	6♥	6♦
7♣	7♠	7♥	7♦
8♣	8♠	8♥	8♦
9♣	9♠	9♥	9♦
10♣	10♠	10♥	10♦
Jack♣	Jack♠	Jack♥	Jack♦
Queen♣	Queen♠	Queen♥	Queen♦
King♣	King♠	King♥	King♦

6. Find the probability of picking a king or a club in a deck of cards.

$P(K) + P(\text{club}) - P(K \cap \text{club})$

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

7. Find the probability of picking a female or a person from Florida out of the committee members. $P(F) + P(FL) - P(F \cap FL)$

$\frac{21}{31} + \frac{12}{31} - \frac{8}{31} = \boxed{\frac{25}{31}}$

	Female	Male
Florida	8	4
Alabama	6	3
Georgia	7	3

8. When rolling 2 dice, what is the probability of getting an even sum or a number greater than 10?

$P(\text{even}) + P(x>10) - P(\text{even} \cap x>10)$

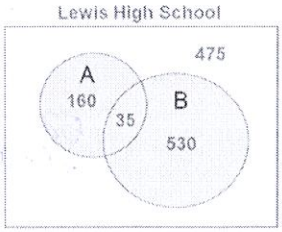
$\frac{18}{36} + \frac{3}{36} - \frac{1}{36} = \boxed{\frac{5}{9}}$

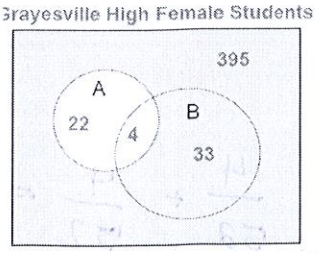
+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

9. Find the $P(\overline{A \cup B})$.

NOT

$\frac{475}{1200} = \boxed{\frac{19}{48}}$



10. Find the $P(A)'$.

$\frac{33+395}{454} = \boxed{\frac{214}{227}}$