#11. $\underbrace{16\,G,\ 7\,B}_{23 \text{ ppl.}}$ } 5-person committee
→ order matters NOT

$n(3G, 2B) = {}_{16}C_3 \cdot {}_7C_2 = 11760$

$n(\text{all possible}) = {}_{23}C_5 = 33649$

$n(3G, 2B') = 33649 - 11760 = 21889$

$O(3G, 2B) = 11760 : 21889$

$= 1680 : 3127$

#11. $n(\text{no tails}) = 1$

$n(\text{all}) = 2^4 = 16$

$P(\text{no tails}) = \frac{1}{16}$ $\therefore P(\text{at least one } T)$

$= 1 - \frac{1}{16}$

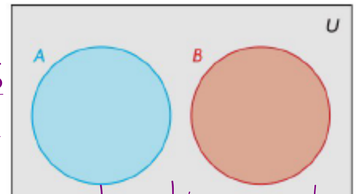
$= \frac{15}{16}$

## 5.4 Mutually Exclusive Events

Explore pg. 328 together

$8 = 2$ or $B = 24$, $2$

$P = \frac{28}{52}$




mutually exclusive

For mutually exclusive events

Does this work for NOT mutually exclusive events?

$$P(A \cup B) = \frac{n(A \cup B)}{n(U)}$$

$$P(A \cup B) = \frac{n(A) + n(B)}{n(U)}$$

$$P(A \cup B) = \frac{n(A)}{n(U)} + \frac{n(B)}{n(U)}$$

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

$$P(A \cup B) = \frac{n(A) + n(B) - n(A \cap B)}{n(U)}$$

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

**EXAMPLE 2** Determining the probability of events that are not mutually exclusive

Recall the board game that Janek and Violeta were playing. According to a different rule, if a player rolls a sum that is greater than 8 or a multiple of 5, the player gets a bonus of 100 points.

**a)** Determine the probability that Violeta will receive a bonus of 100 points on her next roll.

**b)** Write a formula you could use to calculate the probability of two non-mutually exclusive events. Answer part a) again to show that your formula works.

$$P(\text{Bonus}) = P(5) \text{ or } P(>8)$$

$$= \frac{7}{36} + \frac{10}{36} - \frac{3}{36}$$

$$= \frac{14}{36} = \frac{7}{18}$$

**Possible Sums When a Pair of Dice are Rolled**

| Die 1/ Die 2 | 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 |

$$P(A \overset{\cup}{\text{or}} B) = P(A) + P(B) - P(A \overset{\cap}{\text{and}} B)$$

November 4, 2019

## EXAMPLE 3 Using a Venn diagram to solve a probability problem that involves two events

A school newspaper published the results of a recent survey.

**a)** Are skipping breakfast and skipping lunch mutually exclusive events?

**b)** Determine the probability that a randomly selected student skips breakfast but not lunch.

**c)** Determine the probability that a randomly selected student skips at least one of breakfast or lunch.

**Eating Habits: Student Survey Results**

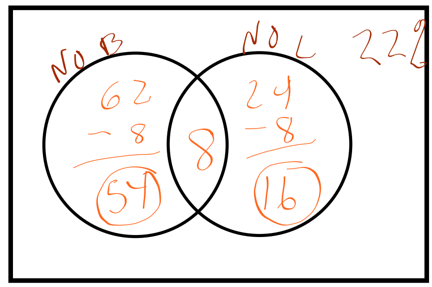
- 62% skip breakfast
- 24% skip lunch
- 22% eat both breakfast and lunch

total = 108%

a) NO – 8% skip both

b) $P(B \setminus L) = 54\%$

c) $P(B \cup L) = 100\% - 22\%$
$= 78\%$




Read example 4 together

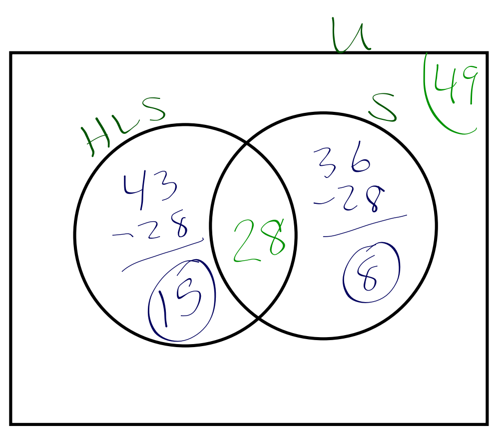
## EXAMPLE 5 Determining the probability of two events

A car manufacturer keeps a database of all the cars that are available for sale at all the dealerships in Western Canada. For model A, the database reports that 43% have heated leather seats, 36% have a sunroof, and 49% have neither. Determine the probability of a model A car at a dealership having both heated leather seats and a sunroof.

$\therefore 36\% + 43\% + 49\%$

$= 128\%$

$\therefore \boxed{28\% = P(HLS \cap S)}$




Homework: pg. 338 # 4, 5, 8, 9, 11-14, 16, 18