Name: ______________________________ Hour: _____ Date: ______

Lesson 10.2: Day 2: Which cookie has the most chips?

Is there a difference in the number of chocolate chips in Chips Ahoy cookies versus the number of chocolate chips in Meijer brand cookies? Each pair of students will count the number of chocolate chips in 1 Chips Ahoy cookie and 1 Meijer Chipsters cookie. Due to the factories processes, we can assume the population distributions of # of chips are approximately normal and that the samples are random.

1. Record the number of chocolate chips in each cookie. Write them on the board.

\# in Chips Ahoy = _______ # in Meijer Chipsters = _______

2. Find the mean number of chocolate chips for each type of cookie, the standard deviation and the difference.

Chips Ahoy: $\bar{x}_1 =$ Meijer Chipsters: $\bar{x}_2 =$ Difference: $\bar{x}_1 - \bar{x}_2 =$

$s_1 =$ $s_2 =$

3. If we repeated this process many times and created a dotplot, we would have the sampling distribution of $\bar{x}_1 - \bar{x}_2$. Describe the shape, center and spread of the sampling distribution.

Shape: Approx. Normal since the populations are approx. Normal

Center: $\mu_{\bar{x}_1-\bar{x}_2} = \mu_1 - \mu_2$

Spread: $\sigma_{\bar{x}_1-\bar{x}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

4. Have the conditions for constructing a confidence interval been met? Explain.

Random: "samples are random"

10%: $n_1 < \frac{1}{10}$ All ChipsAhoy
$n_2 < \frac{1}{10}$ All Chipsters

Normal: ✓

5. Construct a 95% confidence interval for the true difference in the mean number of chocolate chips in Chips Ahoy and Meijer Chipsters.

Pt. Est ± MOE → $(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

Conservative df = smaller $n-1$

6. Do we have evidence that there is a difference in the average number of chocolate chips in a Chips Ahoy and a Meijer Chipsters cookie?

(−, −) → Chipsters has more
(+, +) → Chips Ahoy has more
(−, +) → no difference

STATS MEDIC

Name: ______________________________ Hour: _____ Date: _____

Lesson 10.2 Day 2– Confidence Intervals for a Difference in Means

Important ideas:	
LT#1 Shape: Normal ← Pop. is Normal / $n \geq 30$ CLT / No strong skew or outliers Center: $\mu_{\bar{x}_1-\bar{x}_2} = \mu_1 - \mu_2$ Spread: $SE_{\bar{x}_1-\bar{x}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	LT#2 & 3: 2 sample t interval for $\mu_1 - \mu_2$ Conditions: Normal, Random, 10% Specific: $(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$ Conservative $df = n-1$

Check Your Understanding

Mr. Wilcox's class performed an experiment to investigate whether drinking a caffeinated beverage would increase pulse rates. Twenty students in the class volunteered to take part in the experiment. All of the students measured their initial pulse rates (in beats per minute). Then Mr. Wilcox randomly assigned the students into two groups of 10. Each student in the first group drank 12 ounces of cola with caffeine. Each student in the second group drank 12 ounces of caffeine-free cola. All students then measured their pulse rates again. The table displays the change in pulse rate for the students in both groups.

	Change in pulse rate (Final pulse rate − Initial pulse rate)										Mean change
Caffeine	8	3	5	1	4	0	6	1	4	0	3.2
No caffeine	3	−2	4	−1	5	5	1	2	−1	4	2.0

$s_1 = 2.70$
$s_2 = 2.62$

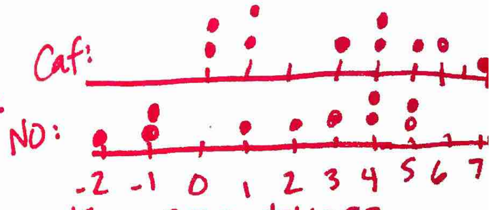
Construct and interpret a 95% confidence interval for the difference in true mean change in pulse rate for subjects like these who drink caffeine versus who drink no caffeine.

State: $\mu_1 - \mu_2 \rightarrow$ True difference in true mean change in pulse rate (caffeine − No caffeine)

Confidence level = 95%

Plan: Two sample t interval for $\mu_1 - \mu_2$

Random: "Randomly assigned" Normal:



No strong skew or outliers.

DO: Pt. Est ± m.o.E.

$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$

$1.2 \pm 2.26\sqrt{\frac{2.7^2}{10} + \frac{2.62^2}{10}} \rightarrow (-1.491, 3.891)$

Conclude: We are 95% confident that the interval from −1.491 to 3.891 captures the true difference in mean change in pulse rate (caffeine − No caffeine).