**Warm Up:**
What is the shape, mean and standard deviation for means?

**Learning Goals:** I will be able to describe the shape, center and variability of the sampling distribution of the difference of means.

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**Is one form of the AP exam harder?**

Last year, Burke High School had 30 students take the AP Statistics exam. We were informed later that the College Board gave two forms of the exam, which were randomly assigned to the students. Here are the results:

**Form A**
- 3 3 3 3 4 4 4 5 5 5 5

**Form B**
- 2 2 3 3 4 4 4 5 5 5 5

Mean Score Form A (x_A) = 4.2
Mean Score Form B (x_B) = 4

What is the difference in means x_A - x_B = 4.2 - 4 = 0.2

Assume the two forms are the same difficulty, so if Doug scored a 5 on Form A, he would also score a 5 on Form B. In other words, Doug is a 5 no matter which form he is randomly assigned.

1.) The 30 AP scores from the class are written on 30 cards. Randomly assign half of the students to get Form A and the other half to get Form B. What is the difference in mean scores for this random assignment?

x_A = x_B = x_A - x_B =
2.) Plot the difference on the board. Sketch the dotplot below.

3.) Burke High School had a difference of mean scores of $4.2 - 4.0 = 0.2$. Is this outcome surprising if we assume both forms are the same difficulty? Explain.

   **No**, assuming both forms are of the same difficulty there is a 50% probability of getting a difference of sample means of 0.2 or greater purely by chance.

4.) Based on the simulation, do we have convincing evidence that one form of the exam is harder? Explain.

   **No**, we do not have convincing evidence.

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**Coursework:**

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