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:

<table>
<thead>
<tr>
<th>Form A</th>
<th>3</th>
<th>3</th>
<th>3</th>
<th>3</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>4</th>
<th>5</th>
<th>5</th>
<th>5</th>
<th>5</th>
<th>5</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form B</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean score Form A ($\bar{x}_A$) ? ________ Mean score Form B ($\bar{x}_B$) ? ________

What is the difference in means $\bar{x}_A - \bar{x}_B$ ? ________

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?

   $\bar{x}_A = ________$ $\bar{x}_B = ________$ $\bar{x}_A - \bar{x}_B = ________$

2. Write the difference of mean scores on a sticker dot and take it to the poster at the front of the room. Sketch the dotplot below.

   ![](image)

   difference of mean scores ($\bar{x}_A - \bar{x}_B$)

3. Burke High School had a difference of mean scores of 4.20 – 4.0 = 0.2. Is this outcome surprising if we assume both forms are the same difficulty? Explain.

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

How tall? The heights of young men follow a Normal distribution with mean $m = 69.3$ inches and standard deviation $s_m = 2.8$ inches. The heights of young women follow a Normal distribution with mean $w = 64.5$ inches and standard deviation $s_w = 2.5$ inches. Suppose we select independent SRSs of 16 young men and 9 young women and calculate the sample mean heights $\bar{x}_m$ and $\bar{x}_w$.

(a) What is the shape of the sampling distribution of $\bar{x}_m - \bar{x}_w$? Why?

(b) Find the mean of the sampling distribution of $\bar{x}_m - \bar{x}_w$.

(c) Calculate and interpret the standard deviation of the sampling distribution of $\bar{x}_m - \bar{x}_w$. 