High or Low?

Based on Activity 14.2, p. 248 Expanded Lesson for Van De Walle Companion Website – Ch 14 p. 1

Standards:

- 3.NBT.1 Use place value understanding to round whole numbers to nearest 10 or 100.
- 3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

Mathematics Goals

- To develop an understanding that estimates are based on calculations of simpler related problems that can be computed mentally.
- To develop the idea that there are different estimates that can be made for a given computation and that some can be better estimates than others.

Thinking about the Students

Lessons based on this activity should address addition and/or subtraction or multiplication. The prerequisite knowledge required depends to a large degree on which operation(s) the lesson addresses. This particular lesson will focus on subtraction.

LESSON

Begin with a simpler version of the task:

Write 45- 29 on the board. "Suppose that you did not have time to compute the exact answer and so you decided on an estimate. How could you estimate the answer? Write examples on the board. "Would your estimate be higher or lower than the exact answer to 45-29?" Explain that they are not to compute either but only decide their estimate would be higher or lower than the original problem. Call on at least two students to get their reasoning.

The Task

On the worksheet ("High or Low?") is one difference to estimate (172 - 85) and three possible computations that could be used for estimates. For each estimation computation their task is to decide if that computation would be higher or lower than the exact answer.

Establish expectations:

Emphasize that they are not to do any computation. They must use words and numbers to explain why they chose higher or lower. There will be time when they will be asked to share their reasons so they should be well prepared to explain their choices.

DURING

- Simply monitor students to see that they are not computing and that they are writing adequate reasons. This is not a time to assist with explanations.
- If a student has circled a choice but is puzzled with what to write, ask, "How did you decide that it would be lower?" Listen to the students thinking and encourage him/her to put those ideas, regardless of correctness or sophistication, in writing. That is, be sure to value all student ideas.

AFTER

- Examine each estimation computation separately. First ask who thinks the estimate would be higher and who thinks lower.
- Call on students in each camp for their explanations. Do not evaluate! Rather, ask others if they understand the explanation; do they have questions about it; do they disagree with it and if so why.

ASSESSMENT NOTES

- When both numbers have been adjusted in the same direction—either both up or both down—the explanation should be easy and reflect an understanding of what subtraction means. Students who have difficulty with these explanations may not have a good grasp of the concept of subtraction.
- When the two numbers have been adjusted in opposite directions, the explanation is very difficult and students may have a lot of difficulty making their arguments without some assistance.

Name _____

You are given a number sentence and three computations that might be used to estimate it.
For each estimation, decide if the computation would be higher or lower than the actual answer. Explain why.

Do not do ANY computation.
172- 85

a) 170 - 80 higher lower
Explain:

b) 170 – 90 higher lower
Explain:

c) 180 – 80 higher lower
Explain: