

Brenda's Walk

Starting at home, Brenda walked 1 block north, 2 blocks east, 3 blocks south, 4 blocks west, and so on, each time turning 90° to her right and walking one block further. Assume each block is exactly 1 block unit in length.

1. After walking a total of 190 blocks, how many block units is Brenda from home? Express your answer in radical form.
2. Plot Brenda's walk on a coordinate grid locating Brenda's home at the origin. Describe the endpoints of the segments along the walk. Are there patterns? Find the rules, if possible.
3. Are there any endpoints for which the distance from home is an *integer* number of block units from home?

Extension Investigations:

4. What if each segment is *double* the distance of the previous segment? That is, Brenda walks 1 block north, 2 blocks east, 4 blocks south, 8 blocks west, and so on. Describe the patterns that emerge.
5. **The Golden Walk.** What if each segment is the *sum of the distances of the previous two* segments? That is, she walks 1 block north, 1 block east, 2 blocks south, 3 blocks west, 5 blocks north, 8 blocks east, and so on. Describe the patterns that emerge.
6. **Zeno's Walk.** What if each segment is *half* that of the previous block? She walks 1 block north, $\frac{1}{2}$ block east, $\frac{1}{4}$ block south, $\frac{1}{8}$ block west, and so on. Describe the patterns that emerge. What will Brenda's distance from home be if she continues this walk "infinitely?"
7. Design a new walk for Brenda. Describe the patterns that emerge.