4) Which method did you prefer? Why? Do you think one method works better than the other? (Consider what variables could change your answers.)

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3) With help from your partner, now measure the tree using the shadow method:

Your height: \_\_\_\_\_\_\_\_in

Your shadow length: \_\_\_\_\_\_in

Length of tree’s shadow: \_\_\_\_\_\_ in

Tree’s height: \_\_\_\_\_\_\_in

1. Ben wants to know the height of a tree in his yard. He is 68 inches tall and currently casts a shadow that is 17 inches. If the tree at that same time casts a shadow that is 31 inches long, how tall is the tree?
2. Use mathematical reasoning to explain why measuring the shadows and creating proportions works.

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1. Measure your height (x)
2. Measure the length of your shadow (y)
3. Measure the length of the tree’s shadow (n)
4. Plug into the equation: x/y = m/n where:

x= your height

y= your shadow length

m= tree’s height

n= length of tree’s shadow

1. Solve for m by cross multiplying.

**Method 2: Shadow Measurement**

**How tall is that tree?**

Diagram

Description automatically generated

Measure your own tree! Grab a partner and record the following information from a tree in the area.

Distance from eye to palm- \_\_\_\_\_\_\_\_in

Height of stick- \_\_\_\_\_\_\_\_\_in

Distance from eye to bottom of tree: \_\_\_\_\_\_\_in

Height of tree: \_\_\_\_\_\_\_\_\_in

1. Why should a and b be the same length? What should you do differently if they are not?

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1. Use mathematical concepts about geometry to explain why this method works.

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1. Find a ruler or a straight stick that has a length longer than your arm.
2. Measure the distance from your eye to your palm when you hold your arm straight out.
3. Vertically hold the stick, making sure that it is arm’s length and that the length of it above your hand equals the distance from your hand to your eye.
4. Take steps back away from the tree until the stick above your hand covers the tree exactly.
5. Measure the distance of the straight line from your eye to the bottom of the tree.
6. Plug into the formula (b/a) x c where:

a= the distance from your eye to your hand (bottom of the stick)

b= the height of your stick (from where you are holding it and up)

c= the distance from your eye to the bottom of the tree

**Method 1: Stick Measurement**

**How tall is that tree?**