

Name: _____

This work may be exhibited if my name is removed: Yes ☐ No ☐

Instructions. Always include explanations, so that other readers can tell what you did and why you did it. Never write outside the box.

Inches and Centimeters. Daniel measured several things in inches and in centimeters and he made the following table:

| Object | inches | centimeters | in./cm. |
|-------------------------|------------------|-------------|---------|
| Book (long dimension) | 9 | 22.8 | 0.3947 |
| Book (short dimension) | $5\frac{15}{16}$ | 15.2 | 0.3906 |
| Paper clip (long dim.) | $1\frac{5}{16}$ | 3.3 | 0.3977 |
| Paper clip (short dim.) | $\frac{5}{16}$ | 0.8 | 0.3906 |
| Pen (length) | $5\frac{6}{16}$ | 13.6 | 0.3952 |
| Phone | $3\frac{10}{16}$ | 9.1 | 0.3984 |

He conjectured that “inches over centimeters” is a constant, which is approximately equal to 0.39.

Liana said this is wrong, because the conversion table in her book says 1 inch = 2.54 centimeters. Therefore, dividing both sides by centimeters, we get:

$$\text{inch/centimeter} = 2.54. \quad (1)$$

She also said, “An inch is bigger than a centimeter, so when we take the ratio of an inch to a centimeter, we must get a number that is larger than 1.”

Daniel said that Liana is wrong. His table shows that the correct value of “inches/centimeters” is:

$$\text{inches/centimeters} = 0.39\dots \quad (2)$$

He also said that $1/(2.54) = 0.393701$, so if you invert both sides of (2), you get

$$\text{centimeter/inch} = 2.54. \quad (3)$$

He added, “2.54 is the number of centimeters per inch, so (3) is right, because

$$\text{centimeters per inch} = 2.54.$$

Liana said that Daniel is wrong, because the number of centimeters per inch is the number you get when you divide a centimeter into an inch, not what you get when you try to find out how many inches there are in a centimeter (which would be 0.39).

Please help Daniel and Liana figure out why they can't agree.