Algebra: Process Engineer
Zilog, Inc.
Job Description: Maintains, improves, and develops new processes for the microscopic printing process of computer chips. Must carry out experiments for testing possible improvements and use statistics, charts, graphs, and text to report findings.

Problem:

In the computer industry, the photo process involves printing the small features on the computer chips. One basic unit of length is the micron (μ). 1μ = 1/1,000,000 meter. Printing the small features is difficult to do and difficult to measure. How well a computer chip performs depends largely on the size of the features; measuring them accurately is very important. A Scanning Electronic Microscope (SEM) is used and magnifies the image around 50,000 times. The SEM may measure 5% high or 5% low.

How can the SEM measurements be calibrated?

These small measurements are called Critical Dimensions (CDs).

A 'Line' is a printed feature of material.

A 'Space' is where material was removed in between Lines.

The 'Pitch' is the sum of a Line and Space. The pitch is always constant whether the Line is bigger or smaller than normal.

From design drawings the actual Pitch (AP) is 1.5μ.
The SEM CD measured Pitch (MP) is 1.45μ.
The SEM CD measured Line (ML) is 0.85μ.

What is the actual Line (AL) width?

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Solution:
Proportional fractions

The ratio of Actual Pitch (AP) / Measured Pitch = Actual Line (AL) / Measured Line (ML)

1.5μ / 1.45 = AL / 0.85
AL = (0.85μ) x (1.5÷ 1.45) = 0.88μ