

A barometer is faulty. When the true barometer readings are 73 and 75 cm of Hg, the faulty barometer reads 69 cm and 70 cm respectively. What is the total length of barometer tube?

Answer: As you see, when true barometer readings are changing for 2 cm Hg ($75-73=2$), faulty barometer readings are changing for 1 cm Hg ($70-69=1$). The ratio between these differences is 2:1. Standard length of barometer tube is 83 cm; difference between standard tube length and maximal reading of the true barometer is 8 cm ($83-75=8$), and the difference between the tube length of faulty barometer and maximal reading of the faulty barometer should be two times smaller than for the true barometer: $8/2 = 4$ cm. Then, tube length of faulty barometer is $70+4 = 74$ cm.