1. A quantity is known to follow a linear relationship, \( y = a + bx \). If \( y = -1.5 \) when \( x = 0.2 \) and \( y = 111.7 \) when \( x = 8.9 \), what are the values of \( a \) and \( b \)?
   a. \( a = -2.5; b = 5.0 \)  
   b. \( a = -3.5; b = 10.0 \)  
   c. \( a = -4.0; b = 12.7 \)  
   d. \( a = -4.1; b = 13.0 \)  
   e. none of these

2. According to the accompanying calibration graph, if the true temperature is 20.0°C, what value does the thermistor read?
   a. -0.2°C  
   b. 0.2°C  
   c. 20.0°C  
   d. 19.8°C  
   e. 20.2°C

3. Refer to the accompanying figure of three connected Hg manometers. If atmospheric pressure is 754 torr, \( h_1 = 111 \) mm, \( h_2 = 83 \) mm, \( h_3 = 192 \) mm, and \( h_4 = 289 \) mm, what are the pressures \( P_1 \) and \( P_2 \) (in Torr)?
   a. 865 & 948  
   b. 948 & 659  
   c. 948 & 851  
   d. 560 & 849  
   e. \( P_1 = 948 \) Torr; \( P_2 \) cannot be determined.

4. A particular thermistor has a resistance of 5.0 kΩ at 0°C. Therefore, its resistance at 200 K must be
   a. higher  
   b. lower  
   c. This depends on whether \( \Delta E \) is positive or negative.

5. If barometers used water as the operating fluid, a weather barometer would need to be about how tall? [1.00 m = 39.37 in.]
   a. 5 ft  
   b. 15 ft  
   c. 40 ft  
   d. 100 ft  
   e. none of these

6. Besides the size problem, can you think of any other reason why water might be an unwise choice for a barometer?
   a. It is transparent.  
   b. It has significant vapor pressure.  
   c. Mosquitoes can breed in H₂O but not in Hg.  
   d. All of the above  
   e. None of the above