Name

Date

THE VAULT
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Intro 3

1. The ratio of $\frac{diameter\ of\ a\ nucleus}{diameter\ of\ an\ atom}$ is approximately equal to:

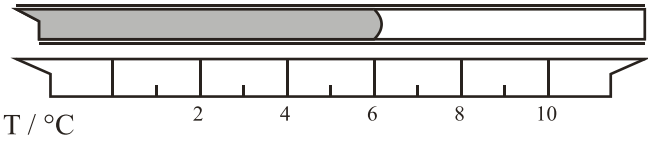
   A. 10^{-15}
   B. 10^{-8}
   C. 10^{-5}
   D. 10^{-2}

2. The reading of a constant potential difference is made four times by a student. The readings are:

   1.176 V
   1.178 V
   1.177 V
   1.176 V

   A. precise and accurate
   B. precise but not accurate
   C. accurate but not precise
   D. not accurate and not precise

3. The diagram below shows the position of the meniscus of the mercury in a mercury-in-glass thermometer.



   Which of the following best expresses the indicated temperature with its uncertainty?

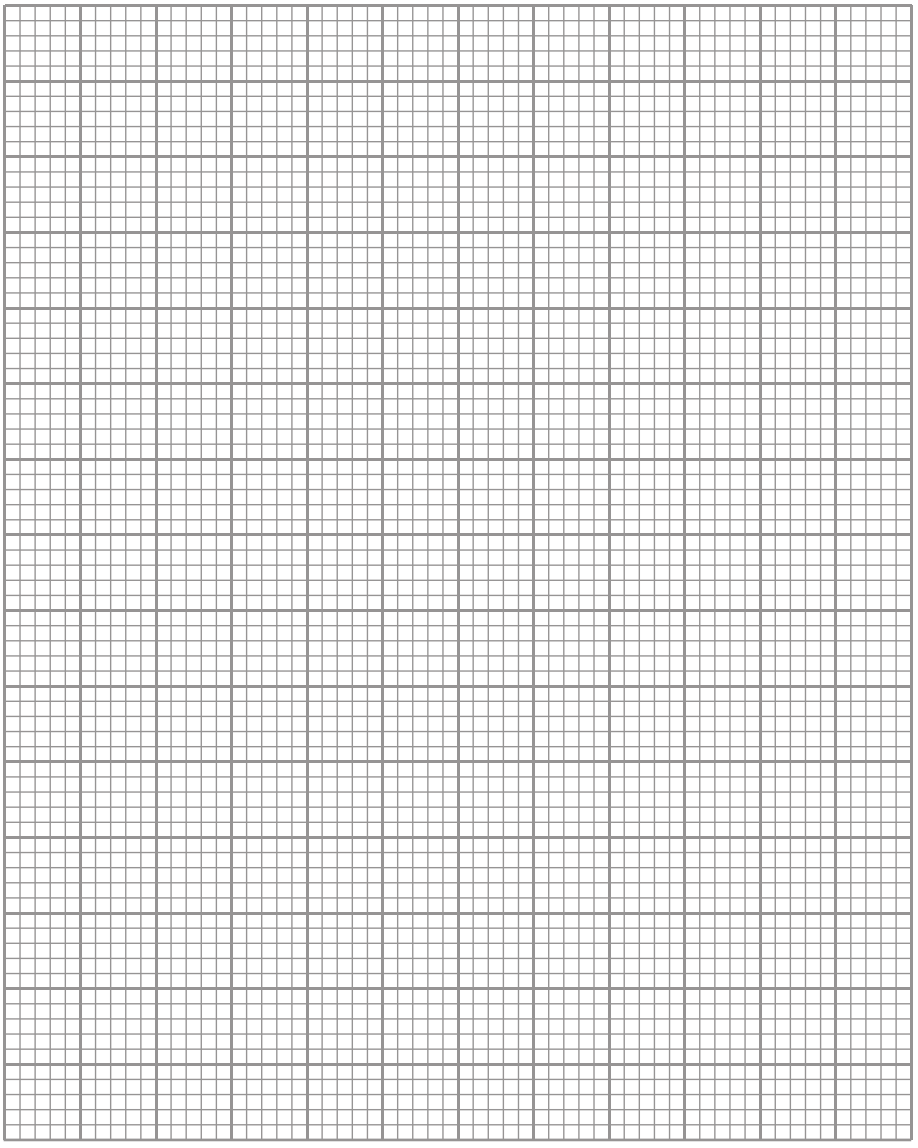
   A. $(6.0 \pm 0.5)°C$
   B. $(6.1 \pm 0.1)°C$
   C. $(6.2 \pm 0.2)°C$
   D. $(6.2 \pm 0.5)°C$

4. Data based question. This question is about change of electrical resistance with temperature.

The table below gives values of the resistance R of an electrical component for different values of its temperature T. (Uncertainties in measurement are not shown.)

T / °C	1.2	2.0	3.5	5.2	6.8	8.1	9.6
R / Ω	3590	3480	3250	3060	2880	2770	2650

A. On the grid below, plot a graph to show the variation with temperature T of the resistance R. Show values on the temperature axis from T = 0 C to T = 10 C.



B. i. Draw a curve that best fits the points you have plotted. Extend your curve to cover the temperature range from 0C to 10C.

ii. Use your graph to determine the resistance at 0C and at 10C.

Resistance at 0C = ... Ω

Resistance at 10C = ... Ω

C. On your graph, draw a straight-line between the resistance values at 0 C and at 10 C. This line shows the variation with temperature (between 0C and 10C) of the resistance, assuming a linear change.

D. i. Assuming a linear change of resistance with temperature, use your graph to determine the temperature at which the resistance is 3060 Ω.

Temperature = ... °C

ii. Use your answer in *D.i.* to calculate the percentage difference in the temperature for a resistance of 3060 that results from assuming a linear change rather than the non-linear change.

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