\[ n = 1 \text{ mol} \]
\[ \Delta E_{\text{th}} = 1.0 \text{ J} \]

For any substance:
\[ \Delta E_{\text{th}} = n C_v \Delta T \]

So
\[ \Delta T = \frac{\Delta E_{\text{th}}}{n C_v} \]

a.) Monatomic \text{ Ga}_2, \quad C_v = \frac{3}{2} R

\[ \Delta T = \frac{\Delta E_{\text{th}}}{n \frac{3}{2} R} = 0.08 \text{ K (or } ^\circ \text{C)} \]

b.) Diatomic \text{ Ga}_2, \quad C_v = \frac{5}{2} R

\[ \Delta T = \frac{\Delta E_{\text{th}}}{n \frac{5}{2} R} = 0.048 \text{ K (or } ^\circ \text{C)} \]

c.) Solid, \quad C_v = 3R

\[ \Delta T = \frac{\Delta E_{\text{th}}}{n 3R} = 0.04 \text{ K (or } ^\circ \text{C)} \]

Why the difference? For the diatomic \text{ Ga}_2 and solid, the thermal energy is "stored" in other modes (degree of freedom), but temperature is a measure of random translational KE.