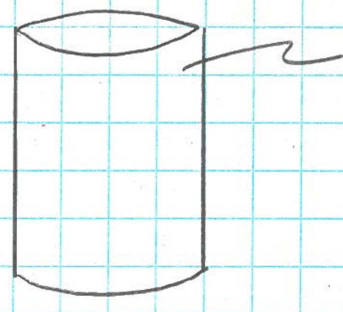

$n = 1$ mol

$\Delta E_{th} = 1.0$ J

for any substance:

$$\Delta E_{th} = n C_v \Delta T$$

so $$\Delta T = \frac{\Delta E_{th}}{n C_v}$$

a.) <u>Monatomic</u> <u>Gas</u>, $C_v = \frac{3}{2}R$

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

b.) <u>Diatomic</u> <u>Gas</u>, $C_v = \frac{5}{2}R$

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

c.) <u>Solid</u>, $C_v = 3R$

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

Why the difference? For the diatomic gas and solid, the thermal energy is "stored" in other modes (degrees of freedom), but temperature is a measure of random <u>translational</u> KE.