Thermal properties of Matter:

① Temperature scales: # $-40^\circ C = -40^\circ F$ # $574^\circ K = 574^\circ F$

$$\boxed{\frac{C}{5} = \frac{F-32}{9} = \frac{K-273.15}{5} = \frac{R}{4}}$$

③ Triple point of water is 273.16K at 4mm of Hg.

④ Expansion of solids:

i) Coefficient of linear expansion : $\boxed{\alpha = \frac{\Delta L}{L_0 \Delta t}}$ # final length of Rod.

$$\Rightarrow \boxed{\Delta L = \alpha L_0 \Delta t} \qquad \boxed{L_2 = L_1(1+\alpha \Delta T)}$$

ii) Coefficient of superficial expansion : $\boxed{\beta = \frac{\Delta A}{A_0 \Delta t}}$ # final area of Body

$$\Rightarrow \boxed{\Delta A = \beta A_0 \Delta t} \qquad \boxed{A_2 = A_1(1+\beta \Delta T)}$$

iii) Coefficient of Volume expansion: $\boxed{\gamma = \frac{\Delta V}{V_0 \Delta t}}$ # final Volume,

$$\Rightarrow \boxed{\Delta V = \gamma V_0 \Delta t} \qquad \boxed{V_2 = V_1(1+\gamma \Delta t)}$$

iv) $\beta = 2\alpha$; $\gamma = 3\alpha$

Percentage change in Volume: $\frac{\Delta V}{V} \times 100 = \gamma \Delta t \times 100$

Percentage change in length : $\frac{\Delta l}{l} \times 100 = \alpha \Delta t \times 100$

Percentage change in Area : $\frac{\Delta A}{A} \times 100 = \beta \Delta t \times 100$

Difference in temperature on faharenheit scale ΔF in terms on Celsius scale is given by, $\boxed{\Delta F = \frac{9}{5}\Delta C}$

Temperature gradient : $\boxed{T_g = \frac{\Delta T}{\Delta x}}$

YA2567

Rate of flow of Heat:

$$\boxed{H = \frac{Q}{t} = K A \frac{\Delta T}{\Delta x}}$$

Specific Heat (C) or s

$$\rightarrow \boxed{c = \frac{\Delta Q}{m \Delta T}}$$

$$\rightarrow \boxed{Q = m c \Delta T}$$

$$\text{Joules} = kg\,\frac{m^2}{s^2}$$

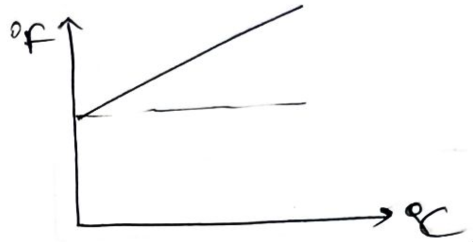
Latent Heat :

$$\boxed{L = \frac{Q}{m}}$$

m = mass of substance.

$$F = \frac{9}{5} T^\circ C + 32$$

$$y = m x + c$$



Coefficient of thermal conductivity:

$$\boxed{K = \frac{Q}{A \cdot t}\,\frac{\Delta x}{\Delta T}}$$

Temp Scales	I.P.	U.P.
(1) Celcius	0°C	100°C
(2) Kelvin	273.14K	373.14K
(3) Fahrenheit	32°F	212°F
(4) Reumer	0R	80R

$$\frac{\Delta T}{T} = \frac{\alpha \Delta \theta}{2}$$ = Time lost or gained by pendulum per second

$\Delta T \rightarrow$ change in time

$T \rightarrow$ original time

$\Delta \theta \rightarrow$ Change in tempertore

$$\frac{\alpha \Delta \theta}{2} \times 86400$$ = Time lost or gained by pendulum per day.

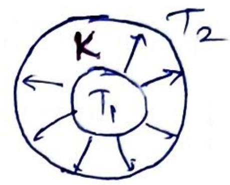
for Thermal strain, $\boxed{\frac{\Delta l}{L} = \alpha \Delta T = \frac{F}{AY}}$

$$H = \frac{dQ}{dt} = \frac{A \Delta T}{\frac{L_1}{K_1} + \frac{L_2}{K_2}}$$ (for Rods in Series)

$$H = \frac{dQ}{dt} = \frac{(K_1 + K_2) A \Delta T}{L}$$ (for Rods in parallel)

• Radial flow of Heat in a material of thermal conductivity K placed Between two concentric shells of radii r_1 & r_2 $(r_1 < r_2)$ which are maintained at temperature T_1 & T_2 $(T_1 > T_2)$.

$$\boxed{H = 4\pi K (T_1 - T_2) \frac{r_1 r_2}{r_2 - r_1}}$$



• Radial flow of Heat in a material of thermal Conductivity K placed Between two co-axial cylindrical shells of length L and radii r_1 & r_2, respectively $(r_1 < r_2)$, maintained at Temperatures T_1 & T_2, respectively $(T_1 > T_2)$

$$\boxed{H = \frac{2\pi L K (T_1 - T_2)}{\ln (r_2/r_1)}}$$