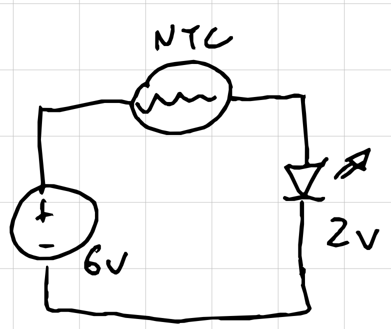
NTC - TYPE

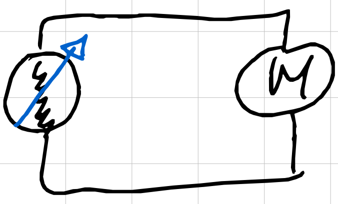


⇒ IF HOT, T↑ R↓ MAKING MORE CURRENT FLOW THROUGH IT AND THROUGH THE LED. THE BRIGHTNESS OF THE LED WILL GO UP.

⇒ IF COLD, T↓ R↑ DECREASING THE CURRENT FLOW THROUGH THE LED. THE BRIGHTNESS WILL DECREASE AS WELL.

⇒ HOT: HIGH BRIGTNESS, COLD LOW BRIGHTNESS
⇒ TEMPERATURE SENSOR

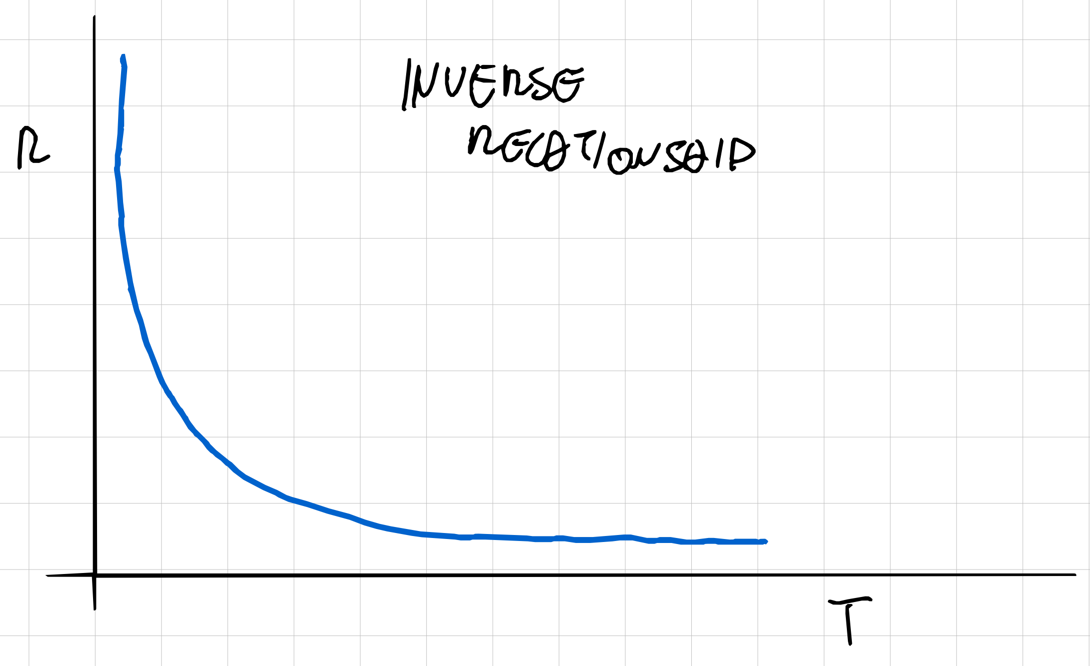
MATH - TOOLS



T	R
0°C	30kΩ
25°C	10kΩ
50°C	4kΩ
85°C	1kΩ

DEPENDS ON THE PARTIC. DEVICE

PLOT T-R GRAPH



FORMULA:

$$R = R_0\, e^{\beta\left(\frac{1}{T} - \frac{1}{T_0}\right)}$$

R_0 = RESISTANCE AT TEMPERATURE T_0 [K]

R = NEW RESISTANCE AT TEMPR. T [K]

$$T_{KELVIN} = T_{CELSIUS} + 273.15$$

CONSEQUENTLY

$$\beta = \ln\left(\frac{R_1}{R_2}\right)\left(\frac{1}{T_1} - \frac{1}{T_2}\right)^{-1}$$

EXERCISE

$R_1 = 10k\Omega$ $\quad T_1 = 25°C = 297.15$ K
$R_2 = 30k\Omega$ $\quad T_2 = 0°C = 273.15$ K

(a) CALCULATE β CONSTANT

$$\beta = \ln(R_1/R_2)\left(T_1^{-1} - T_2^{-1}\right)^{-1} = 3715$$

(b) CALCULATE R_3 WHEN $T_3 = 150°C = 423.15$ °K

$$R_3 = R_1\, e^{\beta\left(1/T_3 - 1/T_1\right)} = 291.68\ \Omega$$