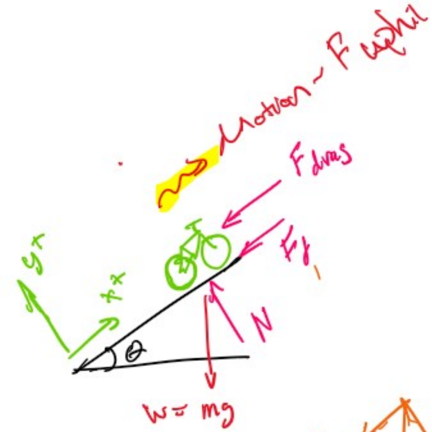
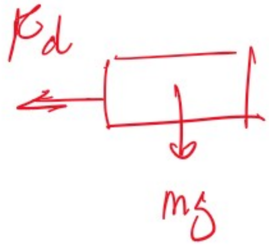




Soh cah toa

$\cos\theta = \frac{N = g_y}{mg}$

$N = mg\cos\theta$

$\sin\theta = \frac{g_x}{mg}$

$g_x = mg\sin\theta$

$\Sigma F_y = 0$

$N - W\cos\theta = 0$

$F_x = ma_x$ No acceleration

$\Sigma F_x = m a_x$ newton's 2nd law (with $a_x = 0$)

$\Sigma F_x = 0$

$-F_f - F_{drag} - F_{gx} + F_{uphill} = 0$

$F_{uphill} = F_f + f_{drag} + F_{gx}$

$P = F_p v$

Sanity check:

Assumption:

1D - going to treat 6 walls as one

$$R_{t,cond} = \frac{T_{s,1} - T_{s,2}}{q_x} = \frac{L}{kA} \qquad (3.6)$$

Similarly, for electrical conduction in the same system, Ohm's law provides an electrical resistance of the form

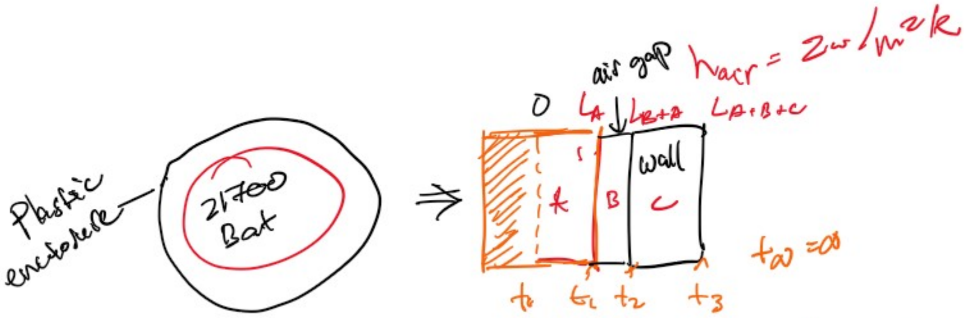
$$R_e = \frac{E_{s,1} - E_{s,2}}{I} = \frac{L}{\sigma A} \qquad (3.7)$$

The analogy between Equations 3.6 and 3.7 is obvious. A thermal resistance may also be associated with heat transfer by convection at a surface. From Newton's law of cooling,

$$q = hA(T_s - T_\infty) \qquad (3.8)$$

The *thermal resistance for convection* is then

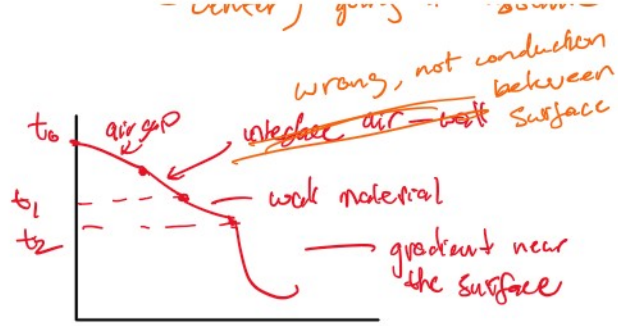
$$R_{t,conv} = \frac{T_s - T_\infty}{q} = \frac{1}{hA} \qquad (3.9)$$



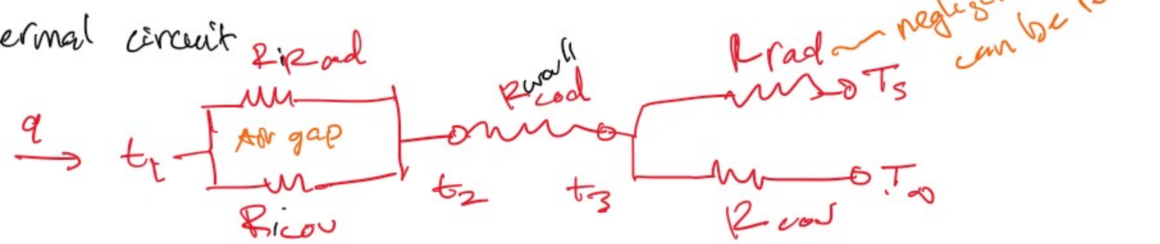
center, going to assume other half is insulated

wrong, not conduction between

insulated



thermal circuit



* Just going to treat all surface as one — less accurate each surface have different coefficient

convection to internal wall

$$R_i = \frac{1}{h_i A_i}$$

$q'' = h(T_3 - T_\infty)$ heat flux at the internal surface is the same as external so, balance eq can be done

$q L_A = q''$

At steady-state heat flux → wall must be equal to conv + rad out the wall

$$t_3 = T_\infty + \frac{q L_A}{h_{conv+rad}}$$

$$T_0 = \frac{q L_A^2}{2k_A} + T_1$$

$$q'' = \frac{\Delta T}{R''_{total}}$$ heat flux in form of ohm's Law

$$t_0 = \frac{q L_1^2}{2k_1} + T_1$$ $t_1 = ?$

IGNORE
Might go Back

air gap between battery and plastic

$q = q'' A = \bar{h} A (T_{Body} - T_\infty)$? air gap is small might not work ~ T_∞

$h_{eff} = h_{icod} + h_{irad}$

$$h_{Irad} = \frac{\sigma (T_1 + T_2)(T_1^2 + T_2^2)}{\frac{1}{\varepsilon} + \frac{1-\varepsilon}{\varepsilon}}$$

$$R_{Irad} = \frac{1}{h_{irad} \cdot A_i}$$

wall enclosure

$R_{cod} = \frac{L_c}{KA}$ K thermal cod of ABS

outside: rad + cov

$$R_{rad} = \frac{1}{h_{Erad} A_{total}} \Rightarrow R_{rad} \ldots$$

$$h_{ERad} = \varepsilon\sigma (T_3 + T_\infty)(T_3^2 + T_\infty^2)$$

$$R_{cov} = \frac{1}{h_{conv} A_{total}} \Rightarrow R_{cov} = \frac{\cancel{A_{total}}(T_3 - T_\infty)}{Q\ (\cancel{A_{total}})}$$

$$h_{conv} = \frac{Q}{A_{total}(T_3 - T_\infty)}$$

$$Q = \frac{\Delta T}{R_{total}} \Rightarrow Q R_{total} = T_3 - T_\infty =$$

Parallel

$$\frac{1}{R_{total}} = \frac{1}{R_1} + \frac{1}{R_2} \Rightarrow R_{total} = \frac{1}{\frac{1}{R_{cov}} + \frac{1}{rad}}$$

CANT GET THIS MODEL TO WORK,

THE EXT TEMP KEEP BEING SAME AS AMB