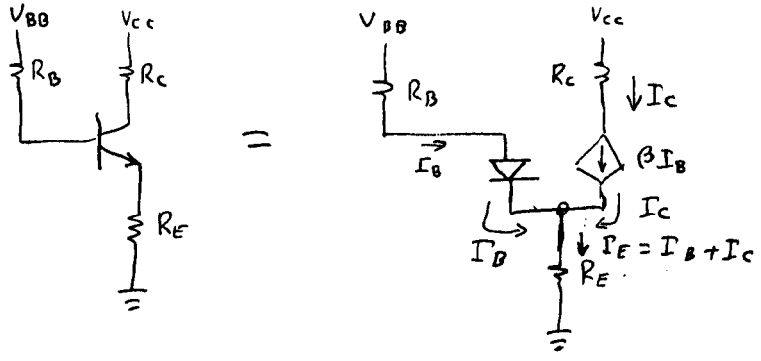
Analysis tricks ...

Moving components through nodes:

Consider this:

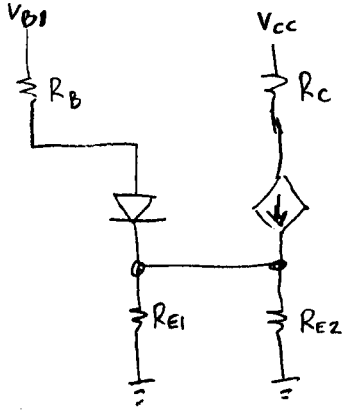



Split $R_E$ into 2 parts, in parallel:

Part ① has $I = I_B$ – Call it "$R_{E1}$"

Part ② has $I = I_C$ Call it "$R_{E2}$"

Put them in parallel!




$V_{RE} = I_E R_E$

So...

$R_{E1} = \frac{V_{RE}}{I_B}$

$R_{E2} = \frac{V_{RE}}{I_C}$



Ohm's law:

$V_{RE} = I_E R_E$

sub for $I_E$:

$V_{RE} = (I_B + I_C) R_E = (\beta+1) I_B R_E$

Value of $R_{E1}$, $R_{E2}$:

$R_{E1} = \frac{V_{RE}}{I_B} = \frac{(\beta+1) I_B R_E}{I_B}$

$R_{E1} = (\beta+1) R_E$

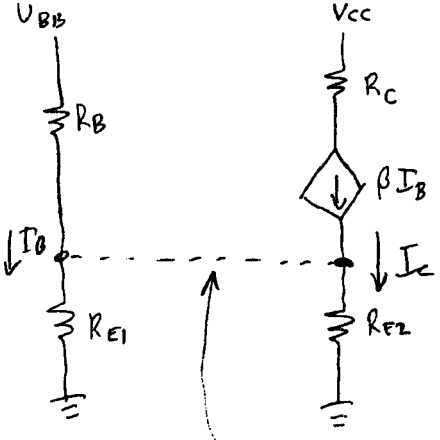
$\approx \beta R_E$

$R_{E2} = \frac{V_{RE}}{I_C} = \frac{V_{RE}}{\beta I_B} = \frac{(\beta+1) I_B R_E}{\beta I_B}$

$= \frac{\beta+1}{\beta} R_E = \frac{R_E}{\alpha}$

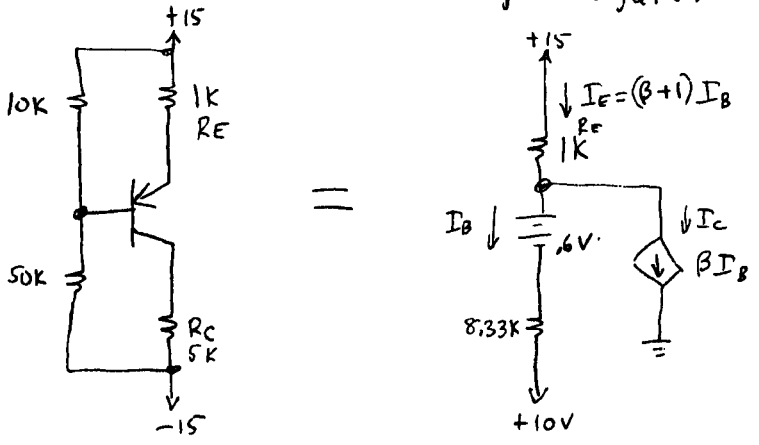
$\approx R_E$

$\approx$ is valid when $\beta >> 1$. It usually is.




Treat this as a "virtual short" – $V = 0$, $I = 0$.

Do last time's example again:

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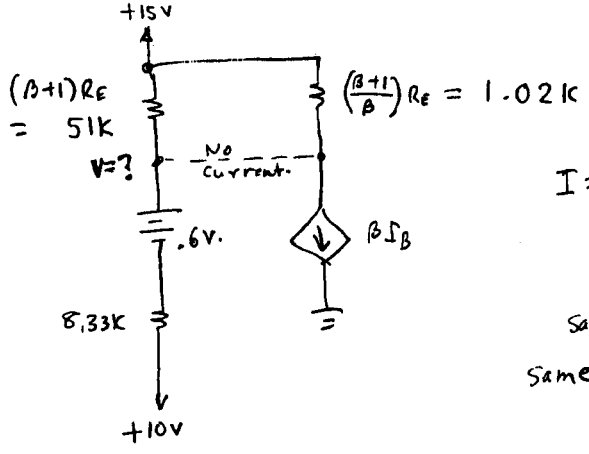
Split $R_E$:




$\left(\frac{\beta+1}{\beta}\right)R_E = 1.02K$

$$I = \frac{15-10-.6}{51K + 8.33K}$$

$$= 7.4 \times 10^{-5}$$

Same answer

Same equations, too.