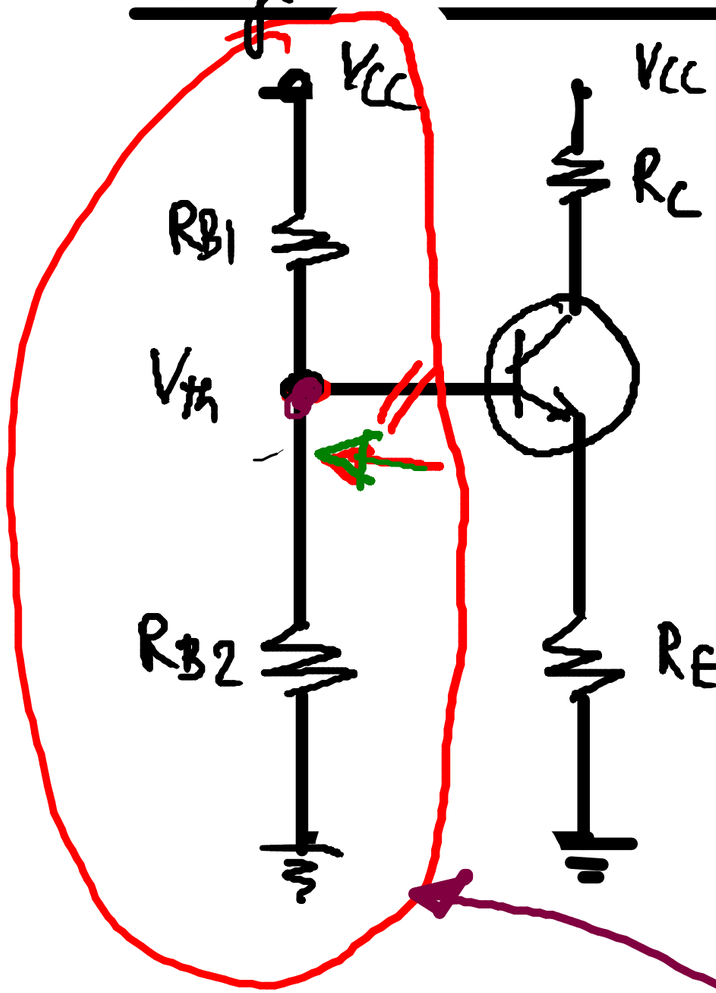
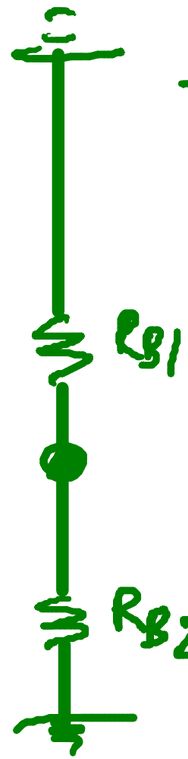
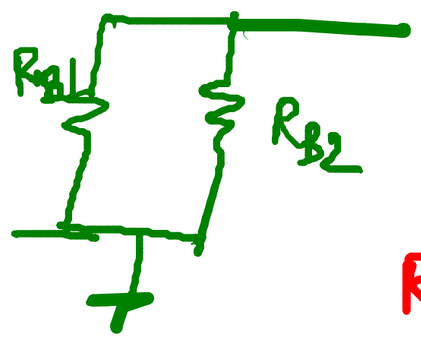
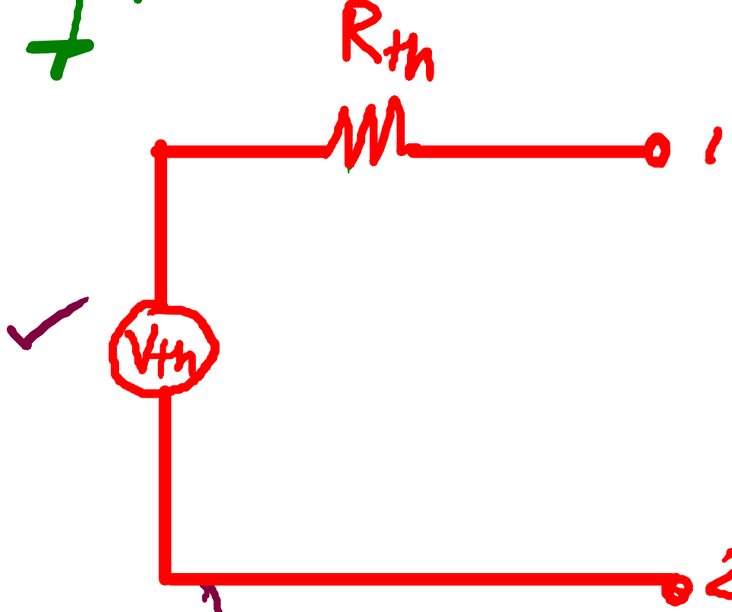
Voltage-divider bias configuration:

18 Sept 2017



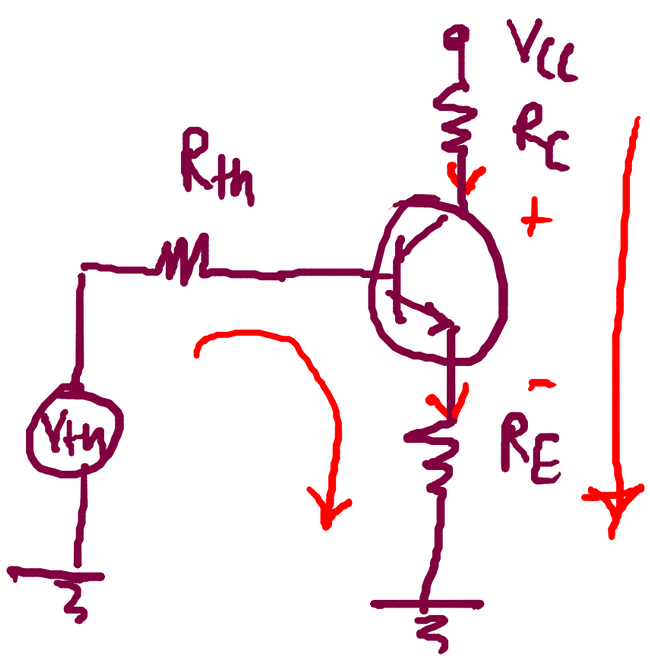






$$V_{th} = \frac{V_{CC}}{R_{B1} + R_{B2}} \times R_{B2}$$

$$R_{th} = R_{B1} \,||\, R_{B2}$$



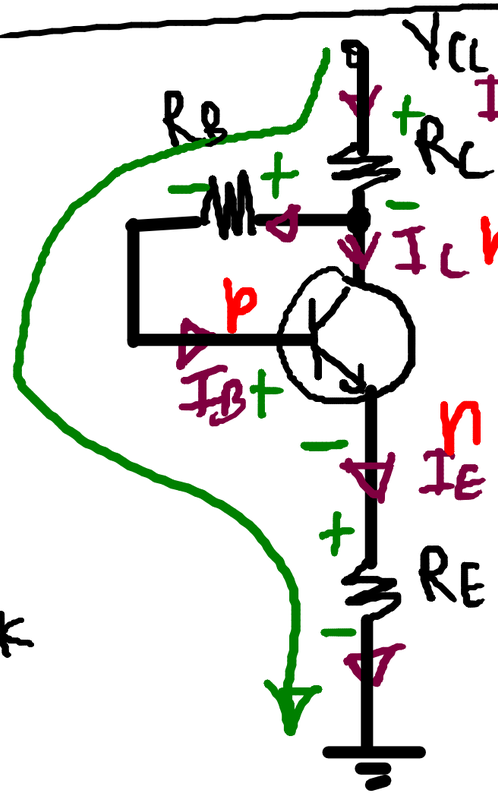
$$I_B = \frac{V_{th} - V_{BE}}{R_{th} + (1+\beta) R_E}$$

$$I_C = \beta I_B$$

$$V_{CE} = V_{CC} - (\beta R_C + (1+\beta) R_E) I_B$$

$$V_{CC} - I_C R_C - V_{CE} - I_E R_E$$

Collector to base Feedback bias



$R_E = 2K$

$R_B = 500K$

$R_C = 2K$

$\beta = 100$

$V_{CC} = 12$

$$I_B = \frac{V_{CC} - V_{BE}}{R_B + (1+\beta)(R_C + R_E)} \rightarrow \beta$$

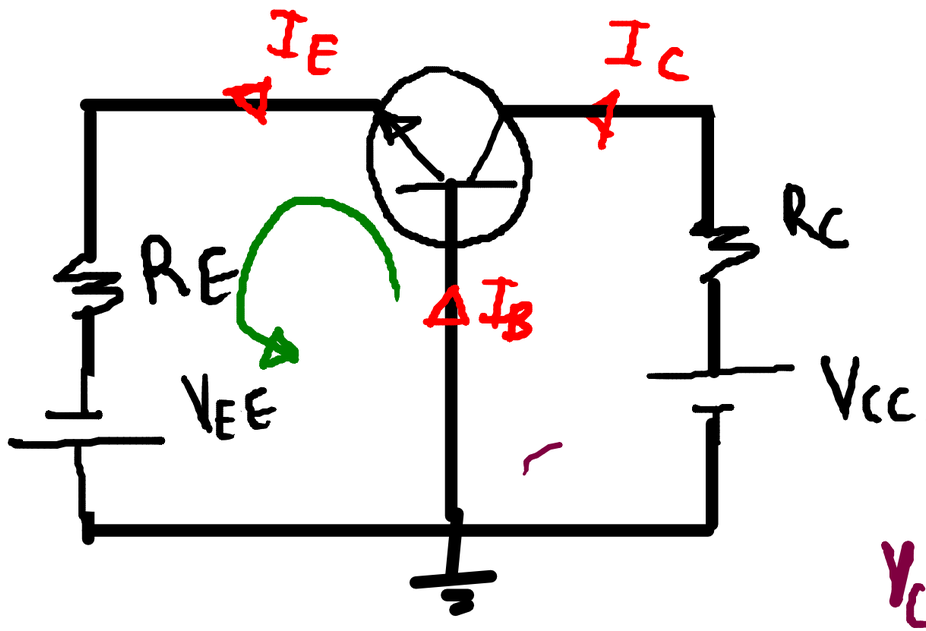
Step (1) Mark currents

Step (2) Apply KVL to BE loop in order to find I_B

$$V_{CC} - (I_B + I_C) R_C - I_B (R_B) - V_{BE} - I_E R_E = 0$$

Step (3) (I_C, V_{CE})

Common-Base Configuration



$I_B =$ $V_{EE} - V_{BE}$

$R_E = 1.2k$; $V_{EE} = 4\ V$; $V_{CC} = 10\ V$

$R_C = 2.4k$; $\beta = 60$

$I_B = 45.08\ \mu$

$I_C = 2.704\ m$

$V_{CB} = 3.5\ V$

$I_E = 2.75\ m$

$V_{CE} = 4.1\ V$