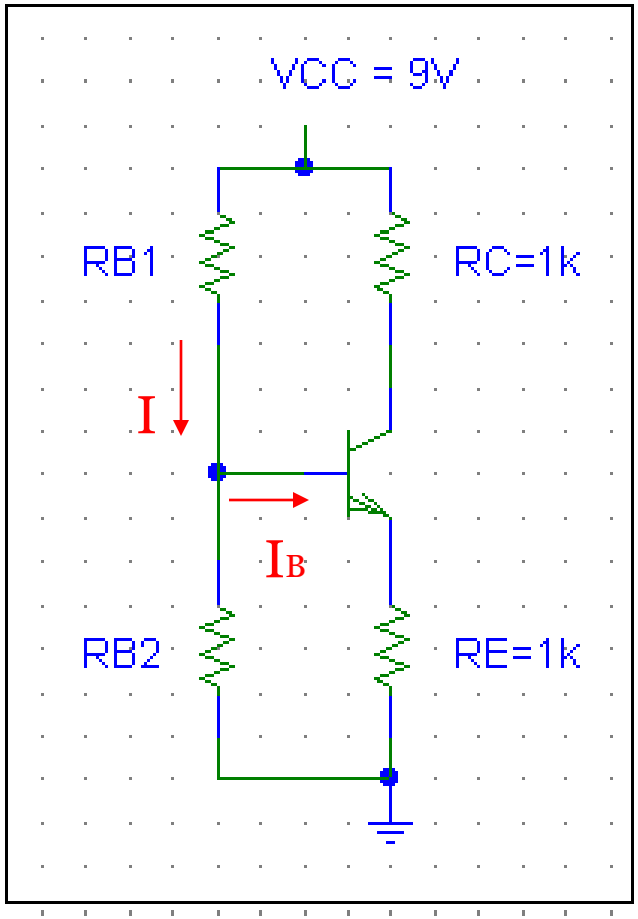
BJT transistors

Problem



- Use a voltage divider, R_{B1} and R_{B2} to bias V_B to avoid two power supplies.
- Make the current in the voltage divider about 10 times I_B to simplify the analysis. Use $V_B = 3V$ and $I = 0.2mA$.

(a) R_{B1} and R_{B2} form a voltage divider.

Assume $I >> I_B$ $I = V_{CC}/(R_{B1} + R_{B2})$

$.2mA = 9/(R_{B1} + R_{B2})$

AND

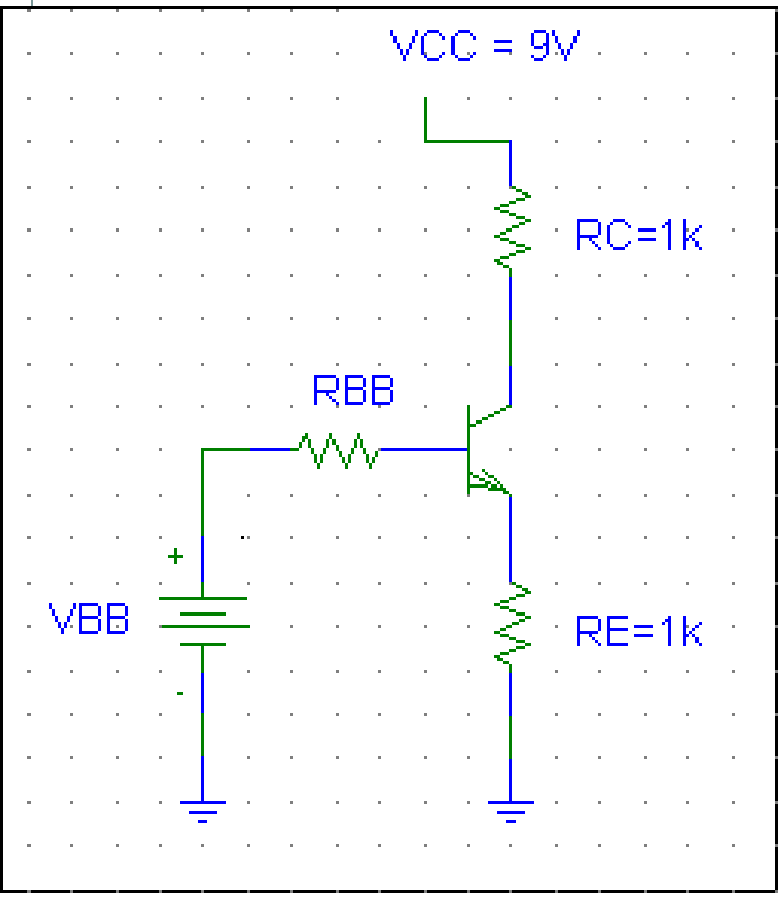
$V_B = V_{CC}[R_{B2}/(R_{B1} + R_{B2})]$

$3 = 9\,[R_{B2}/(R_{B1} + R_{B2})]$, Solve for R_{B1} and R_{B2}.

$R_{B1} = 30K\Omega$, and $R_{B2} = 15K\Omega$.

Problem

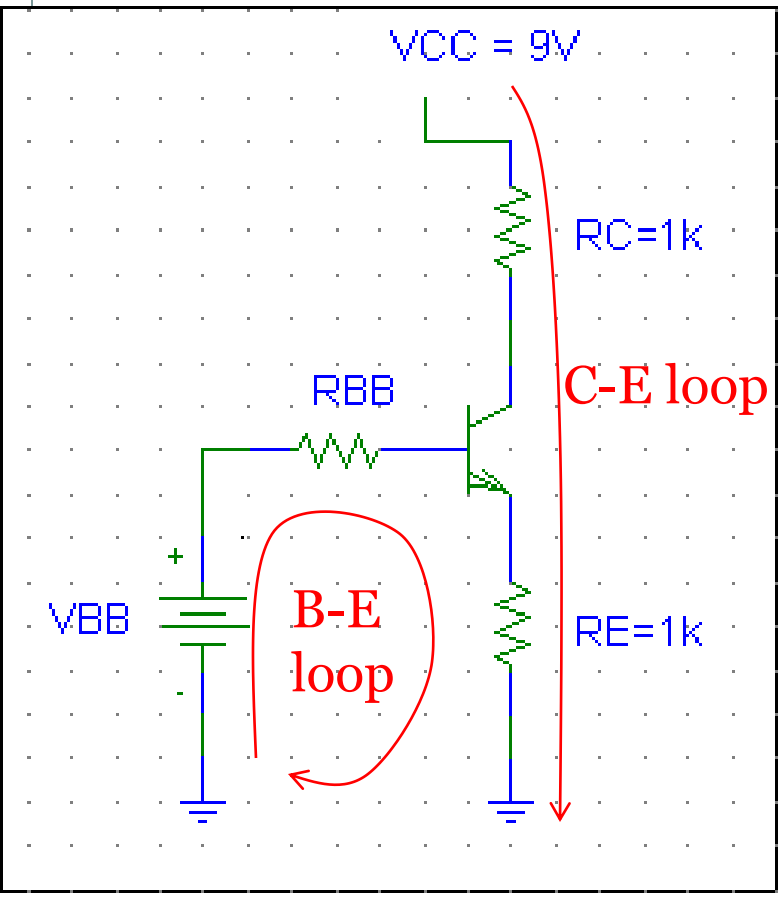
Find the operating point



- Use the Thevenin equivalent circuit for the base
- Makes the circuit simpler
- $V_{BB} = V_B = 3V$
- R_{BB} is measured with voltage sources grounde
- $R_{BB} = R_{B1} || R_{B2} = 30K\Omega \parallel 15K\Omega = .10K\Omega$

Problem

Write B-E loop and C-E loop



B-E loop

$V_{BB} = I_B R_{BB} + V_{BE} + I_E R_E$

$I_E = 2.09$ mA

C-E loop

$V_{CC} = I_C R_C + V_{CE} + I_E R_E$

$V_{CE} = 4.8$ V

This is how all DC circuits are analyzed and designed!