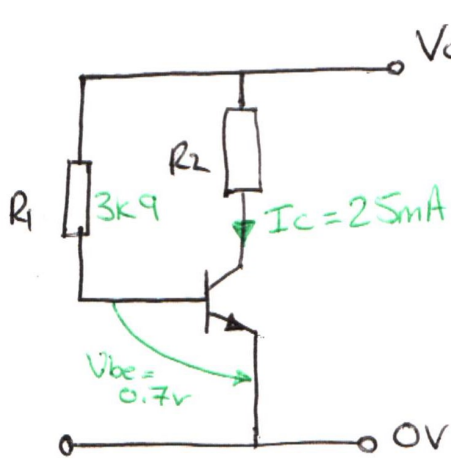


# Homework 1.7



a)(i)

$$V = 4.5 - 0.7$$

$$V = 3.8V$$

$$V = I \times R$$

$$I_b = \frac{3.8}{3900}$$

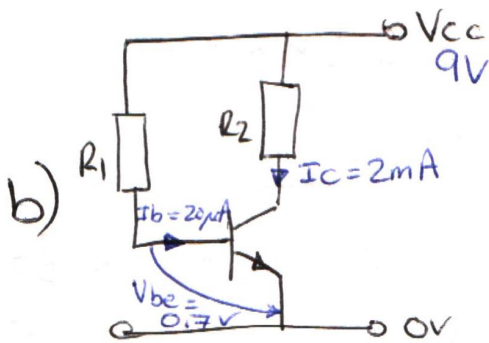
$$I_b = 9.74 \times 10^{-4} A$$

$$I_b = 9.74 \times 10^{-4} A$$

(ii) 
$$h_{FE} = \frac{I_c}{I_b}$$

$$h_{FE} = \frac{25 \times 10^{-3}}{9.74 \times 10^{-4}}$$

$$h_{FE} = 25.67$$



b)

(i) 
$$V = I \times R$$

$$8.3 = (20 \times 10^{-6}) \times R$$

$$R = \frac{8.3}{20 \times 10^{-6}}$$

$$R = 415 k\Omega$$

(ii)

$$V = I \times R$$

$$9 = (2 \times 10^{-3}) \times R$$

$$R = \frac{9}{2 \times 10^{-3}}$$

$$R = 4500 \Omega$$

(iii) 
$$h_{FE} = \frac{I_c}{I_b}$$

$$h_{FE} = \frac{2 \times 10^{-3}}{20 \times 10^{-6}}$$

$$(iii) V = I \times R$$

$$I_b = \frac{V}{R}$$

$$I_b = \frac{5.3}{100000}$$

$$\underline{\underline{I_b = 5.3 \times 10^{-5} A}}$$

$I_b$

$$I_c = h_{fe} \times I_b$$

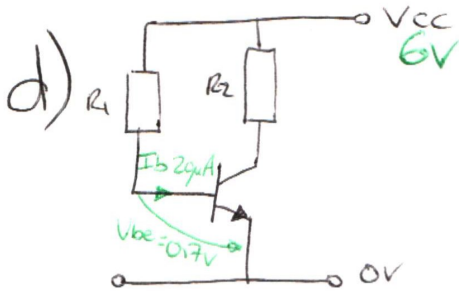
$$I_c = 60 \times (5.3 \times 10^{-5})$$

$$\underline{\underline{I_c = 3.18 \times 10^{-3} A}}$$

$$(iv) \text{ Across } R_2 \quad V_L = I_c \times R_2$$

$$\underline{\underline{7.6V}} \quad V_L = (3.18 \times 10^{-3}) \times 1000$$

$$\underline{\underline{V_L = 3.18V}}$$



$$V = I \times R$$

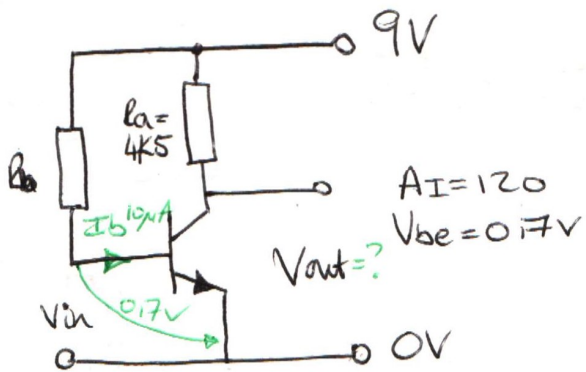
$$5.3 = I_b \times R_1$$

$$R_1 = \frac{5.3}{20 \times 10^{-6}}$$

$$\underline{\underline{R_1 = 265 k\Omega}}$$

# Homework 1.8.

$R_b = ?$



$$V = I \times R$$

$$R_b = \frac{V}{I_b}$$

$$R_b = \frac{8.3}{10 \times 10^{-6}}$$

$$\underline{\underline{R_b = 830k\Omega}}$$

$$h_{fe} = \frac{I_c}{I_b}$$

$$I_b \times h_{fe} = I_c$$

$$I_c = 120 \times (10 \times 10^{-6})$$

$$\underline{\underline{I_c = 1.2mA}}$$

$$V = I \times R$$

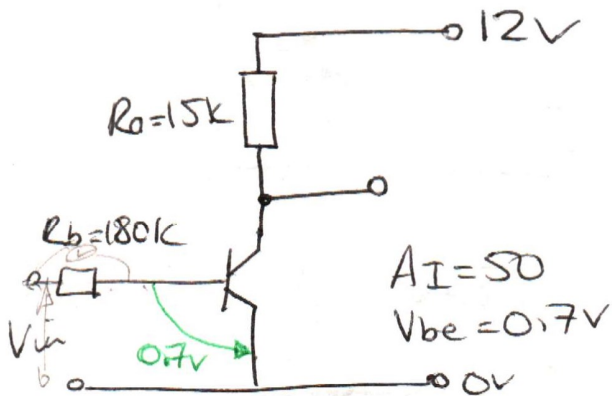
$$V = (1.2 \times 10^{-3}) \times 4500$$

$$V = 5.4V$$

$$V_{out} = 9 - 5.4$$

$$\underline{\underline{V_{out} = 3.6V}}$$

# Homework 1.9



$$I_C = ?$$

$$I_B = ?$$

$$V_i = ?$$

$$V = I \times R$$

$$I_C = \frac{V}{R}$$

$$I_C = \frac{12}{15000}$$

$$\underline{\underline{I_C = 8 \times 10^{-4} A}}$$

$$h_{fe} = \frac{I_C}{I_B}$$

$$50 = \frac{8 \times 10^{-4}}{I_B}$$

$$I_B = \frac{8 \times 10^{-4}}{50}$$

$$\underline{\underline{I_B = 1.6 \times 10^{-5} A}}$$

$$V = I \times R$$

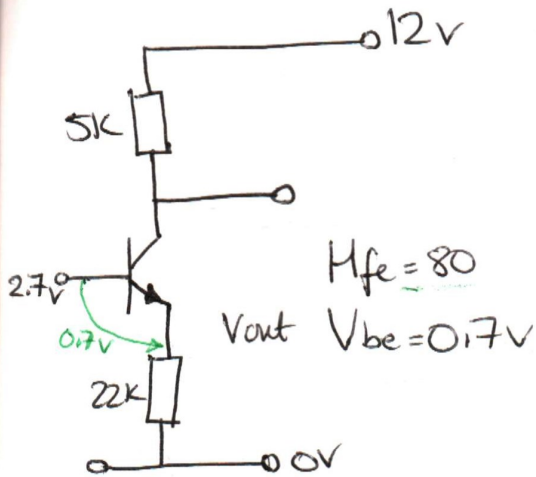
$$V = (1.6 \times 10^{-5}) \times 180000$$

$$\underline{\underline{V = 2.88V}}$$

$$V_{in} = 2.88 + 0.7$$

$$V_{in} = 3.58V$$

# Homework 1.10



$$V_{out} = ?$$
$$V_{gain} = ?$$

$$V_e = V_{in} - V_{be}$$

$$V_e = 2.7 - 0.7$$

$$\underline{V_e = 2V}$$

$$I_e = \frac{V_e}{R_e}$$

$$I_e = \frac{2}{22000}$$

$$\underline{I_e = 9.09 \times 10^{-5} A}$$

$$\underline{I_e = I_c}$$

$$V_c = I_c \times R_c$$

$$V_c = (9.09 \times 10^{-5}) \times 5000$$

$$\underline{V_c = 0.45V}$$

$$V_{out} = 12 - 0.45$$

$$\underline{\underline{V_{out} = 11.55V}}$$

$$V_{gain} = \frac{V_{out}}{V_{in}}$$

$$V_{gain} = \frac{11.55}{2.7}$$

$$\underline{V_{gain} = 4.28}$$