

BJT Characteristics (H.1)

20170111

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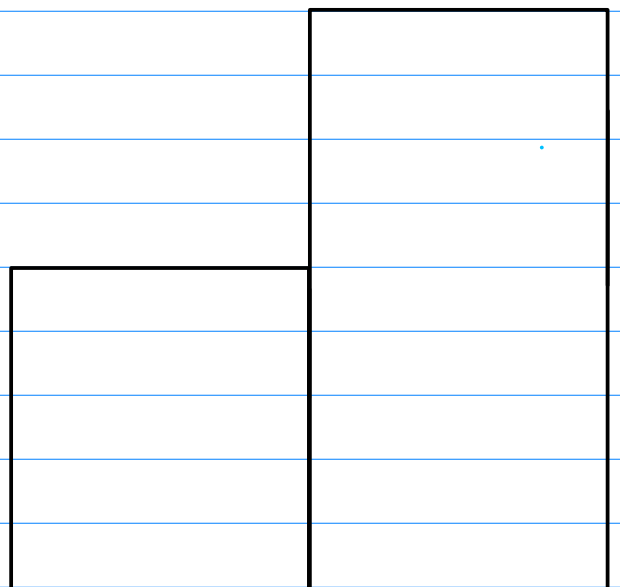
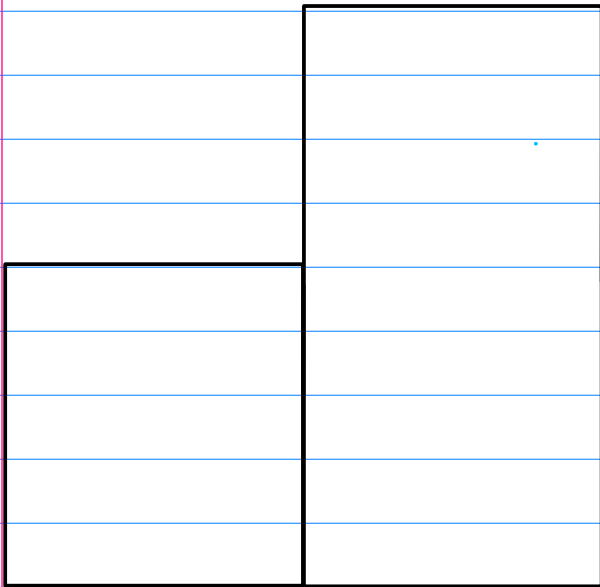
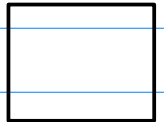
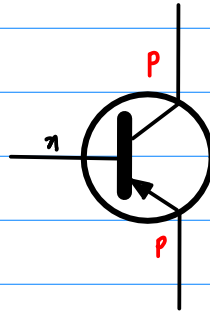
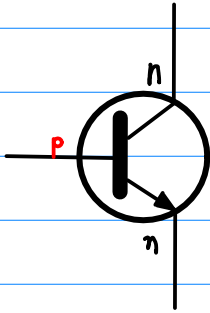
References

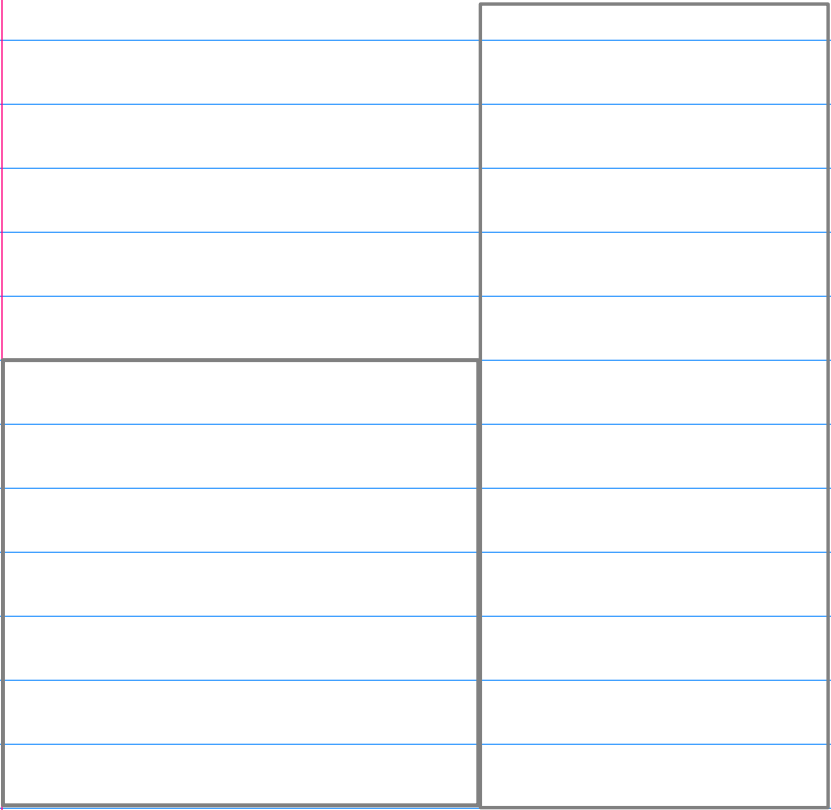
Based

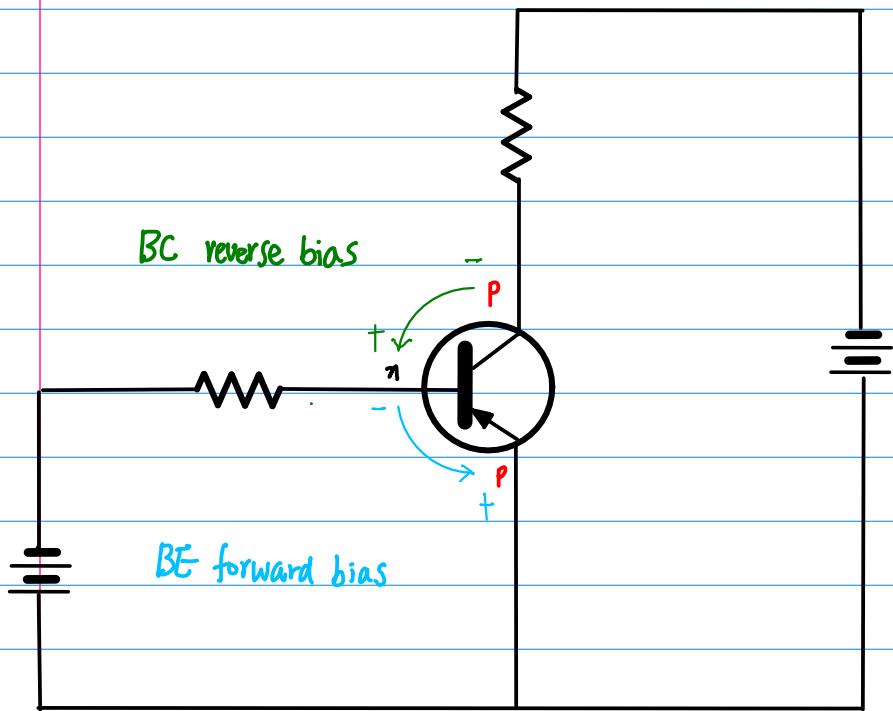
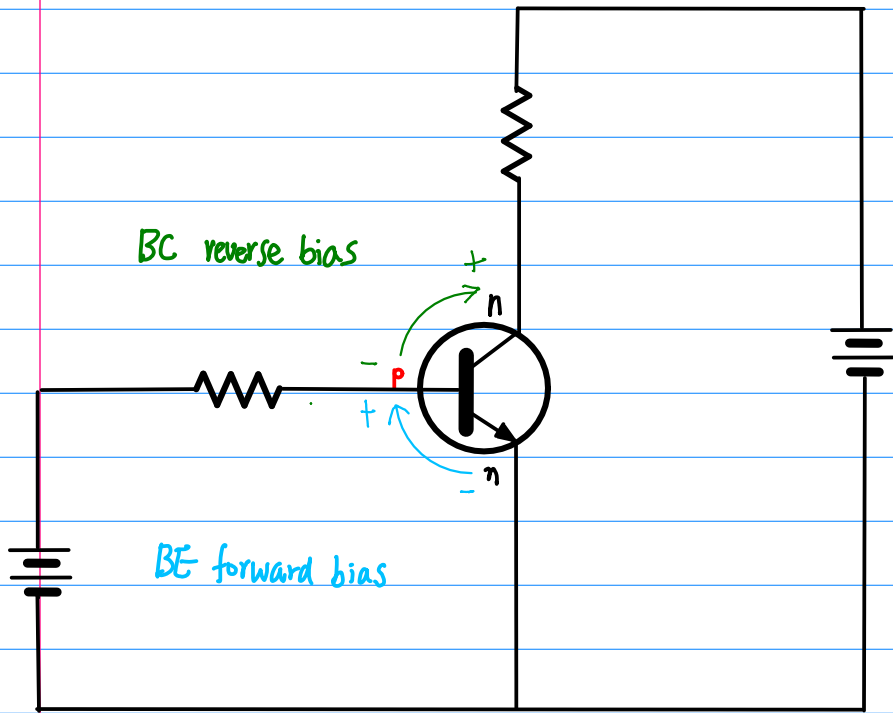
[1] Floyd, Electronic Devices 7th ed

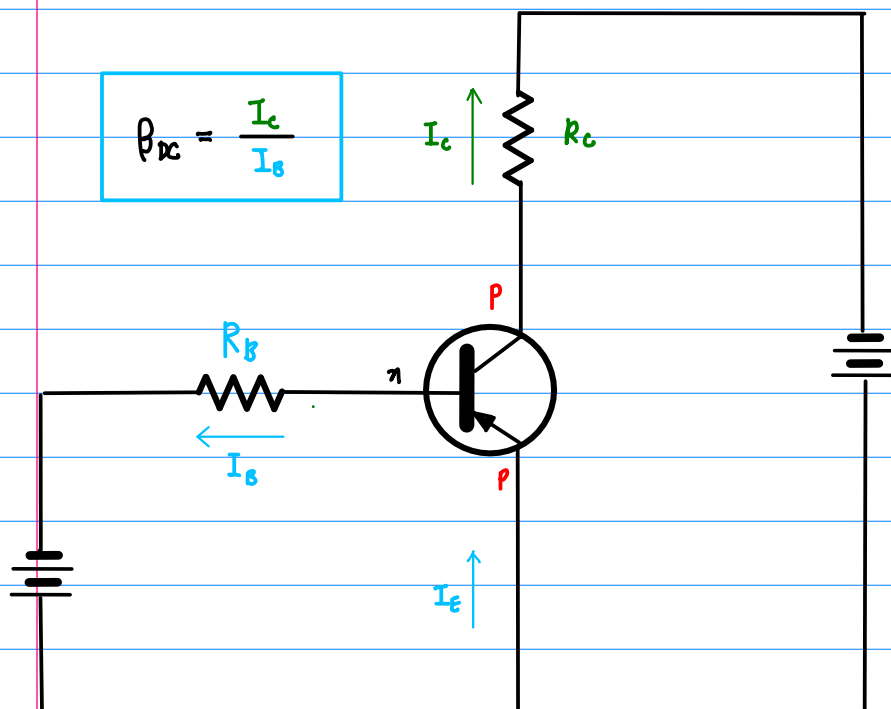
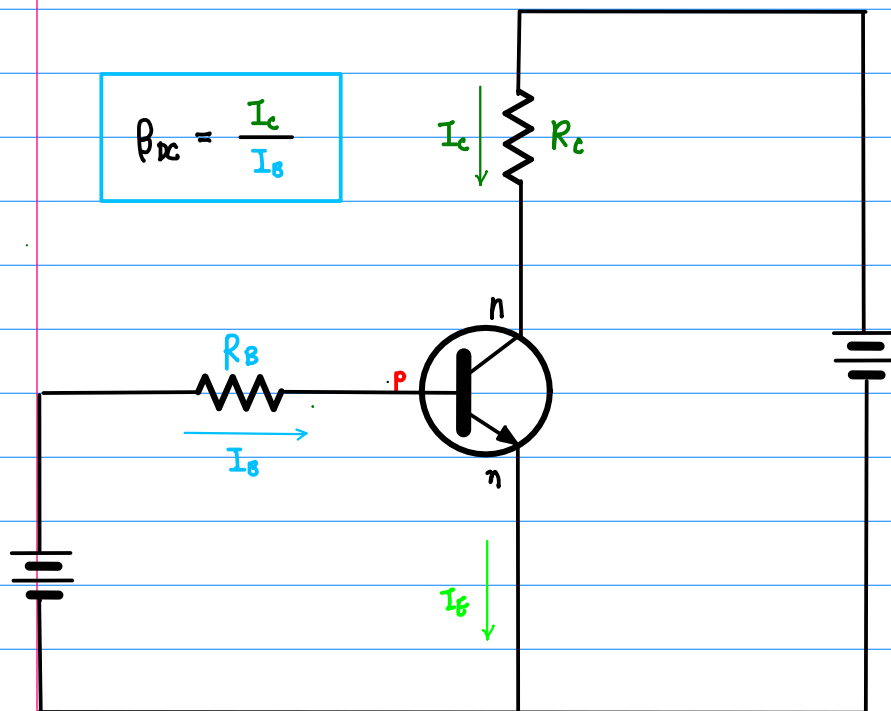
[2] Cook,

[2] en.wikipedia.org









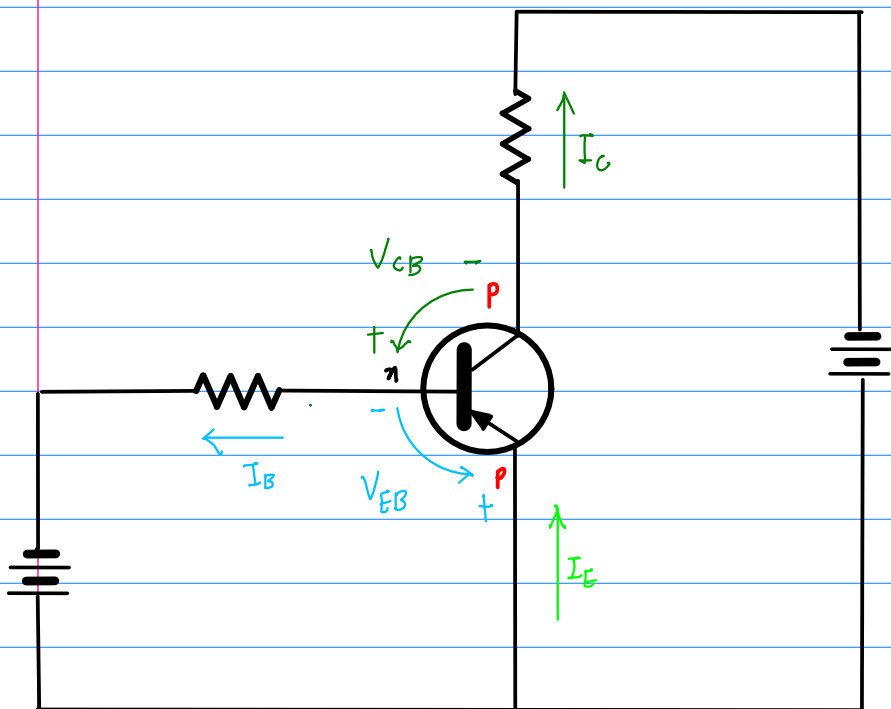
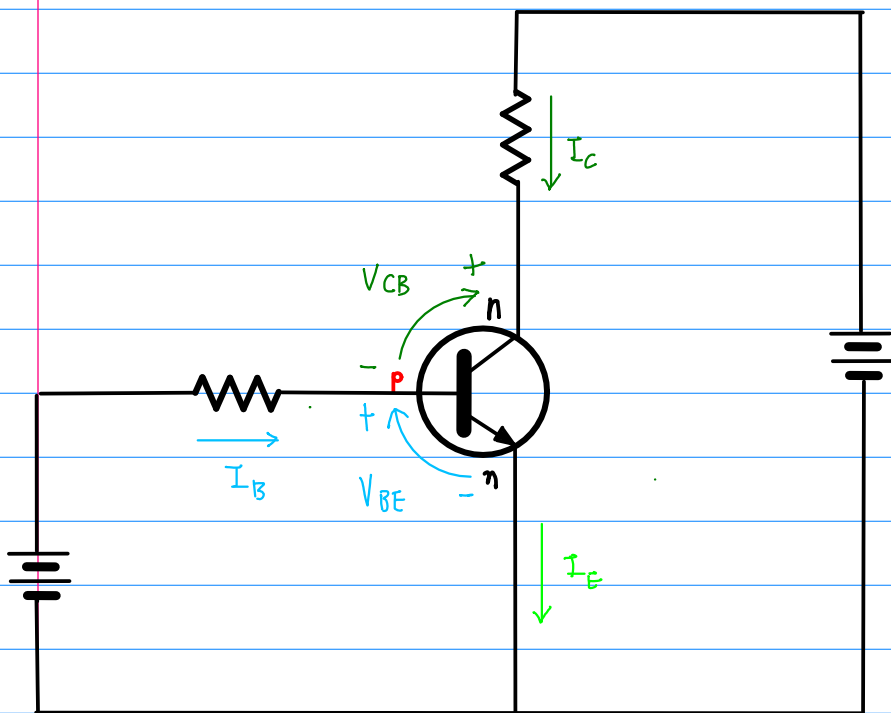
$$\beta_{DC} = \frac{I_c}{I_B}$$

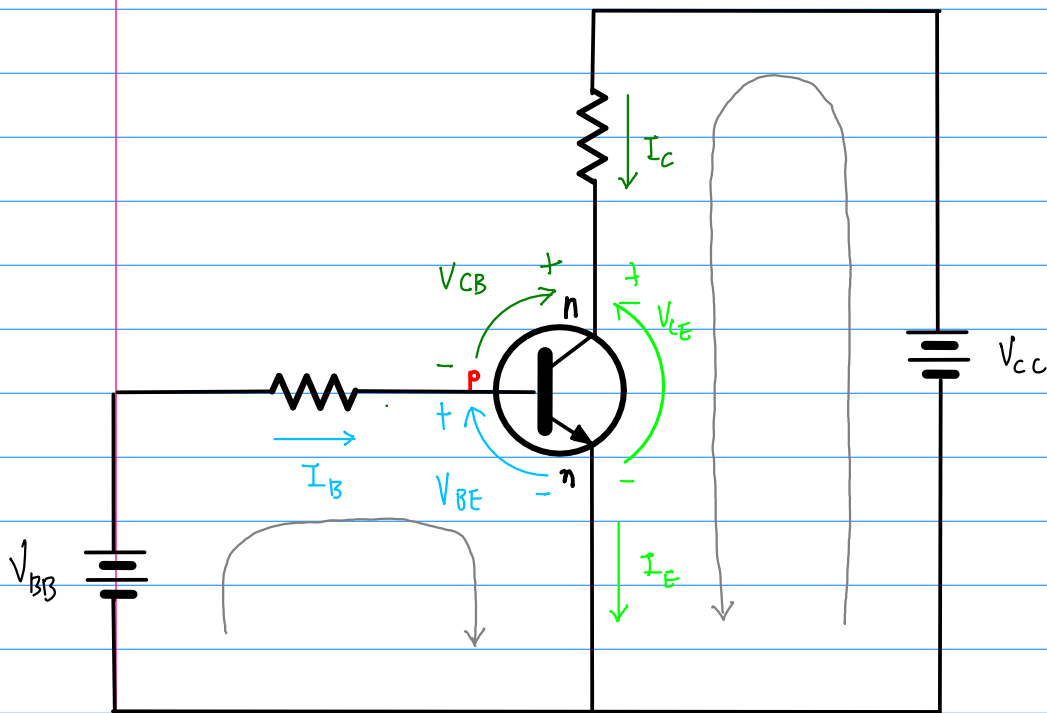
20 ~ 200

$$h_{FE} = \beta_{DC}$$

$$\alpha_{DC} = \frac{I_c}{I_E}$$

0.95 ~ 0.99





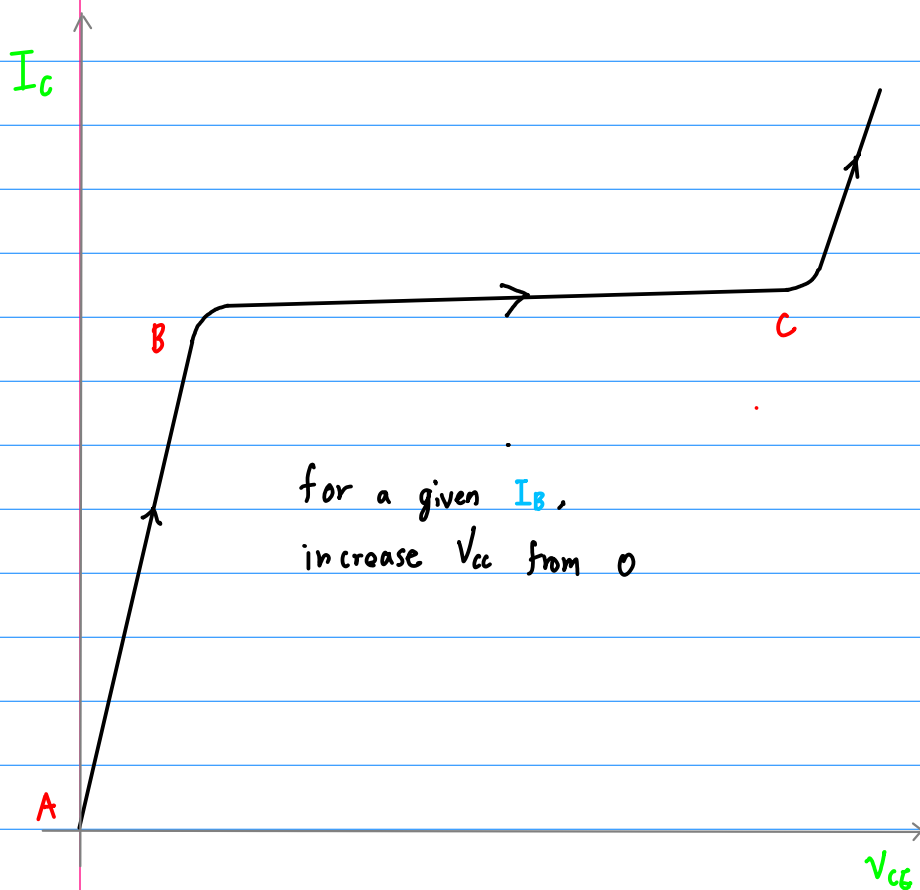
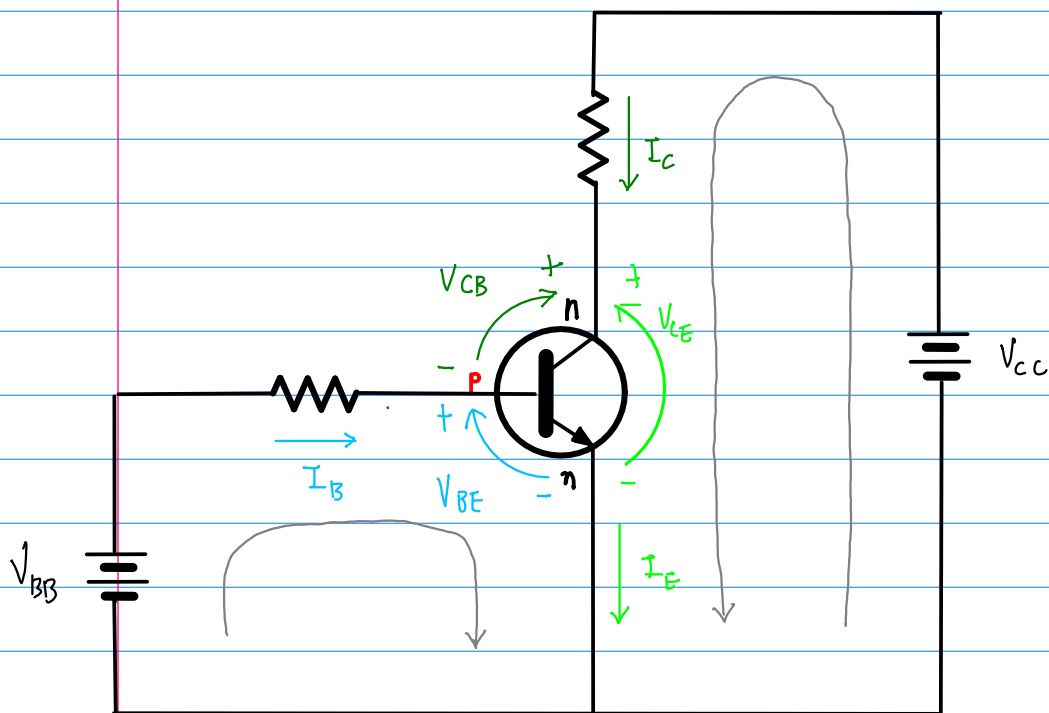
$$V_{BB} = I_B R_B + V_{BE}$$

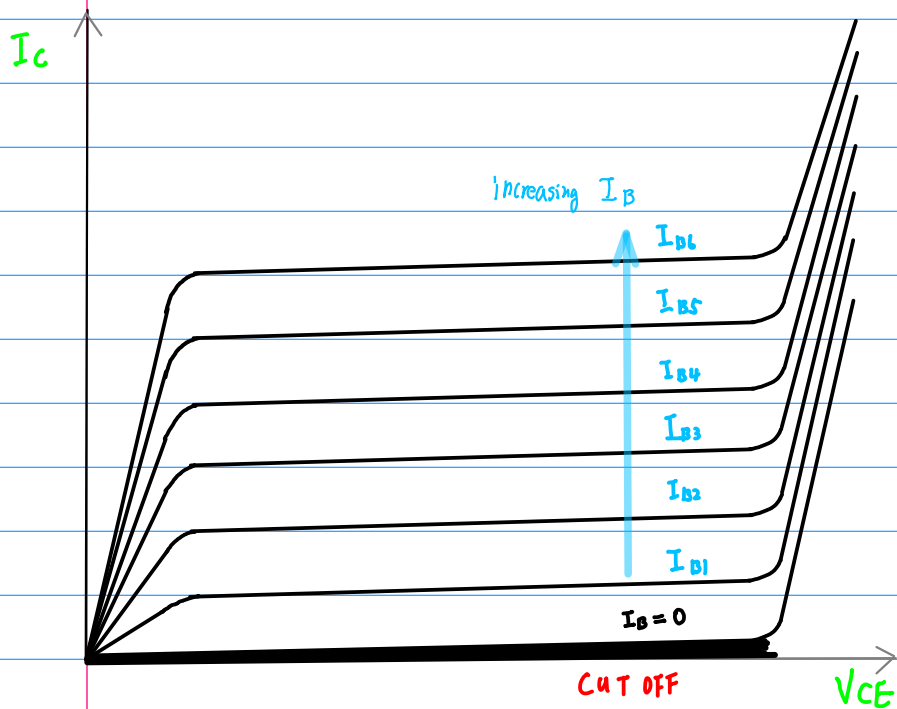
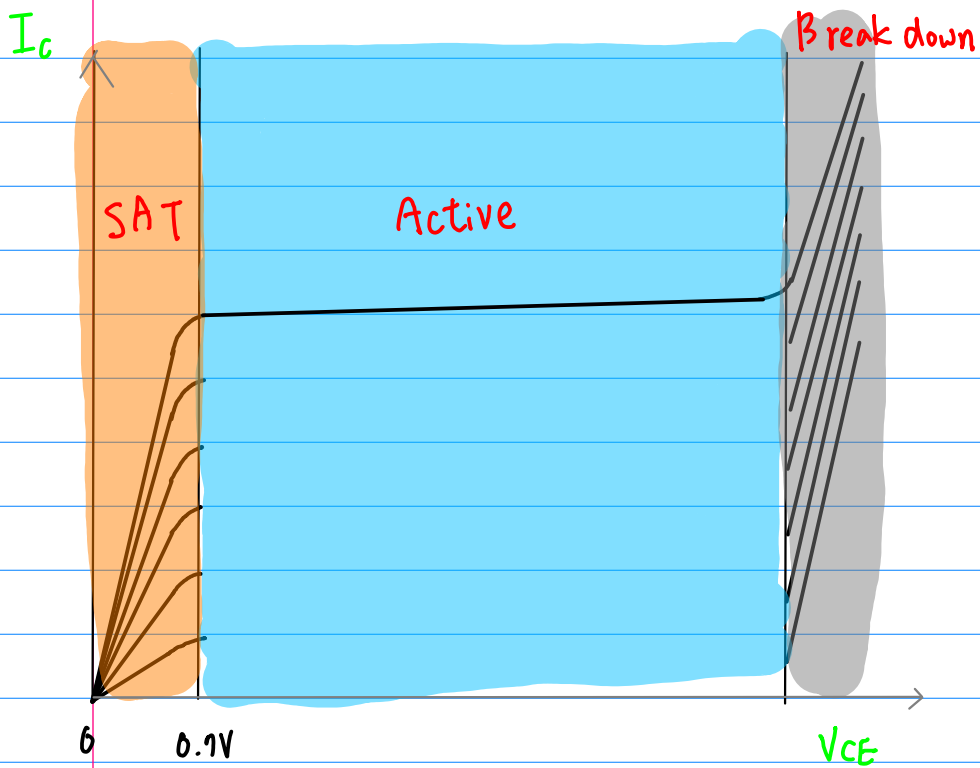
$$V_{CC} = I_C R_C + V_{CE}$$

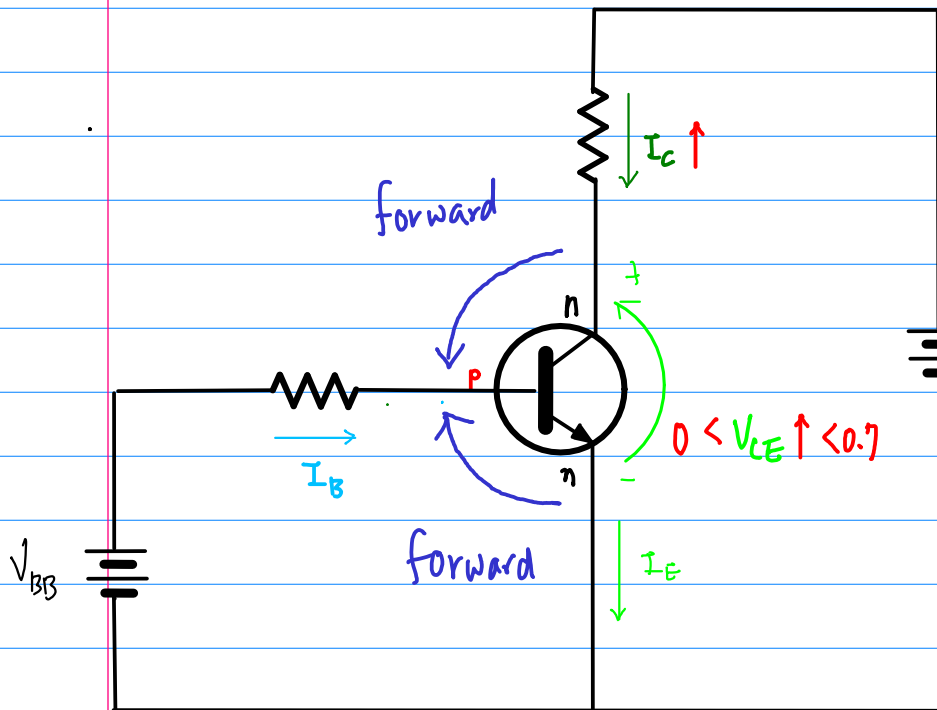
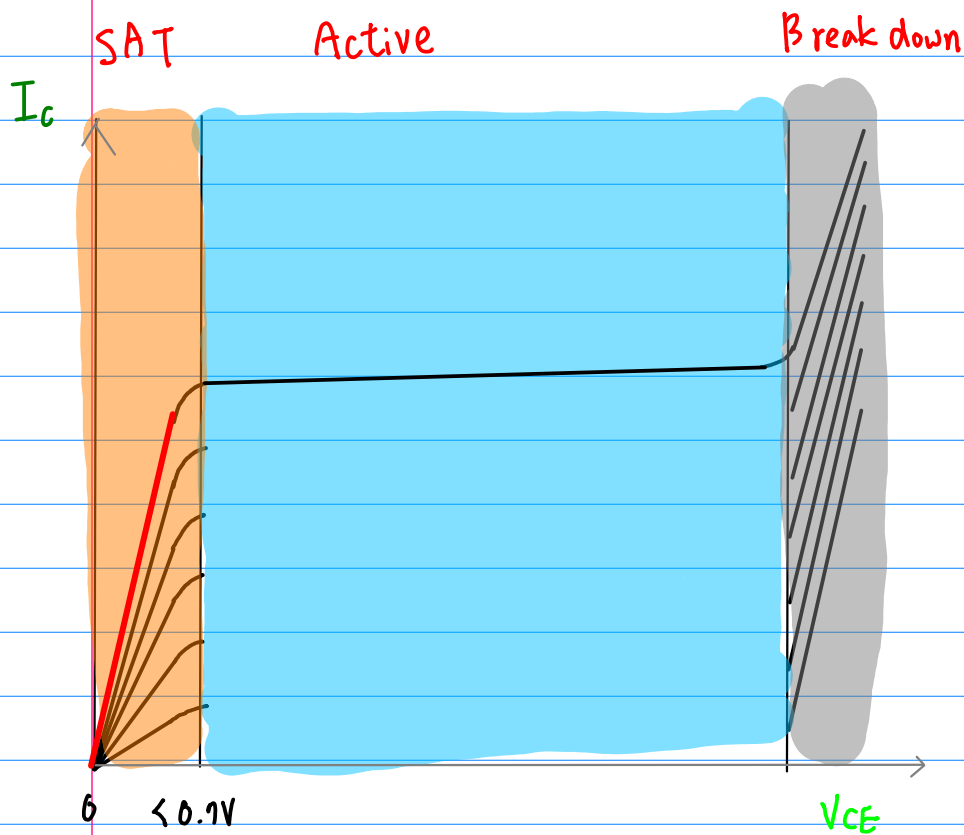
$$I_B = \frac{V_{BB} - V_{BE}}{R_B}$$

$$I_C = \frac{V_{CC} - V_{CE}}{R_C}$$

$$V_{CE} = V_{CC} - I_C R_C$$

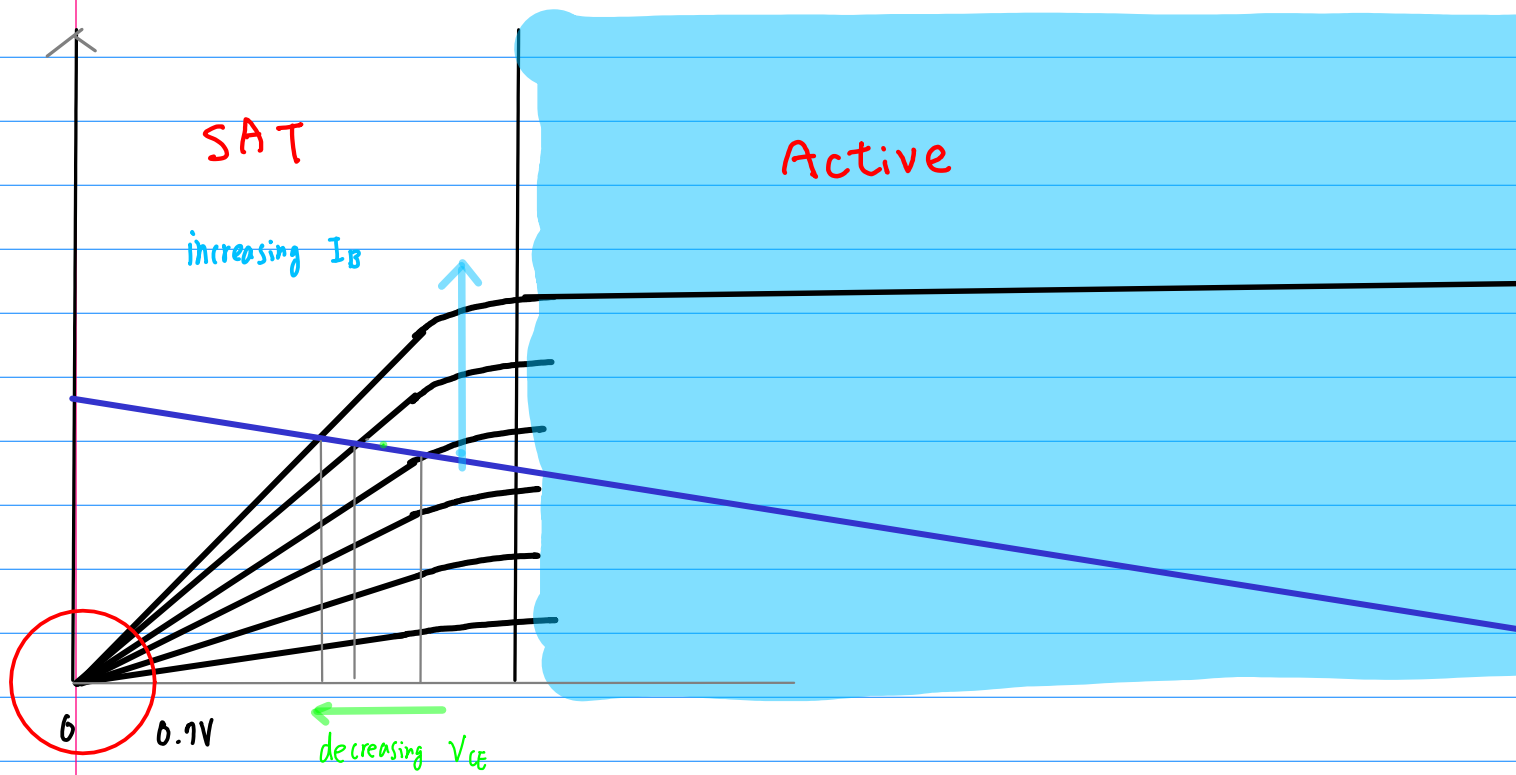






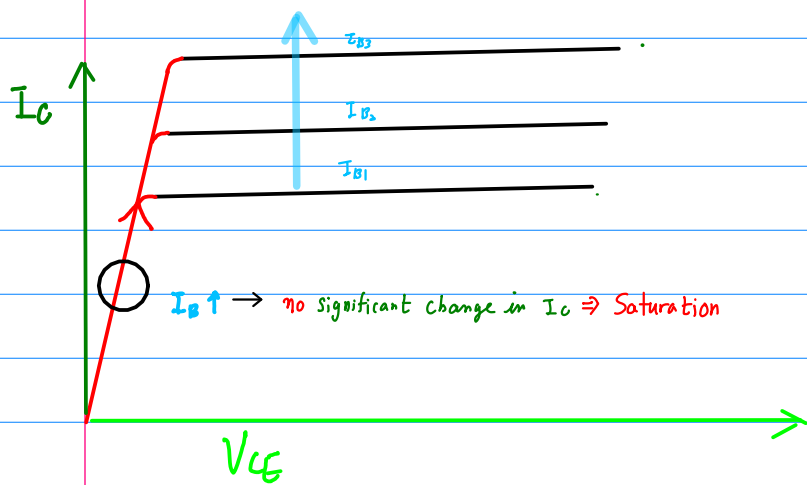
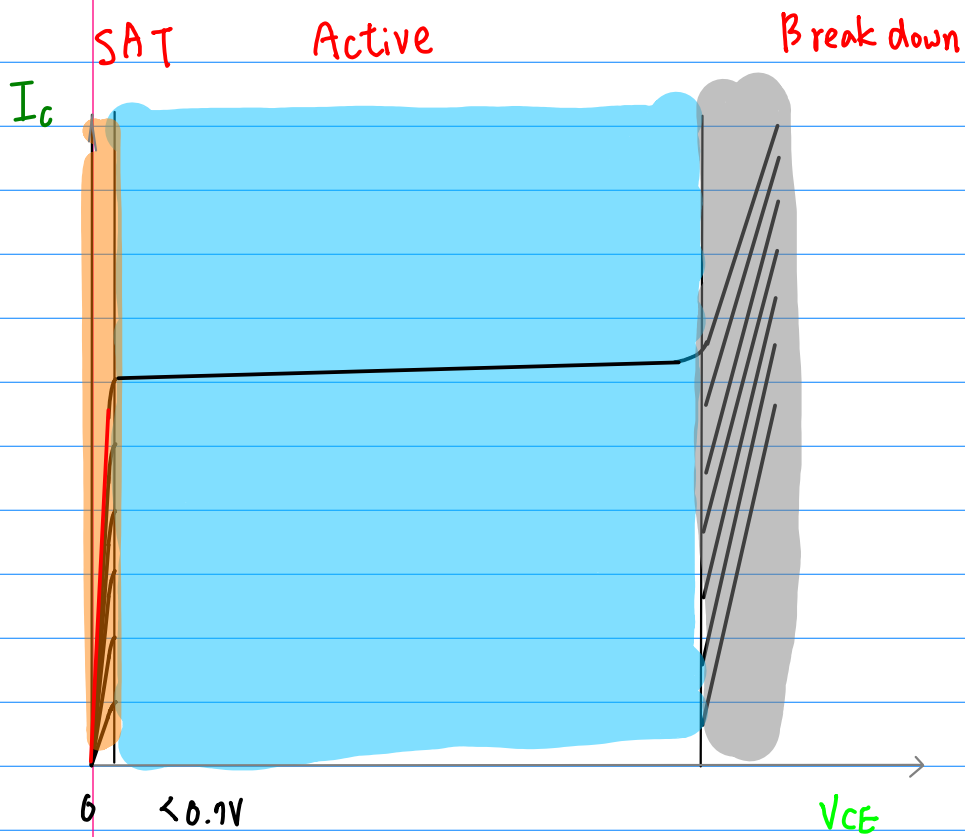
$I_c \uparrow$
 large R_c > small R_{ce}
 large V_{drop} small V_{drop}

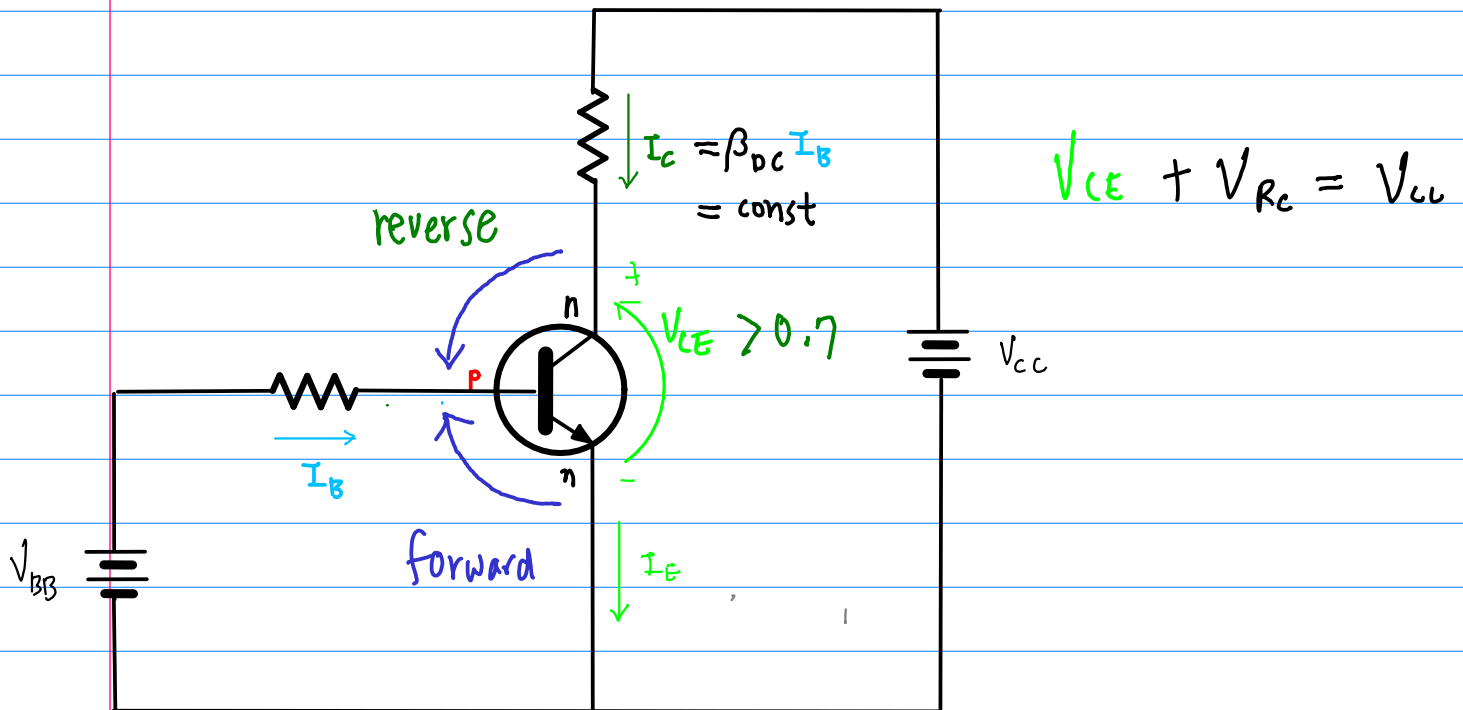
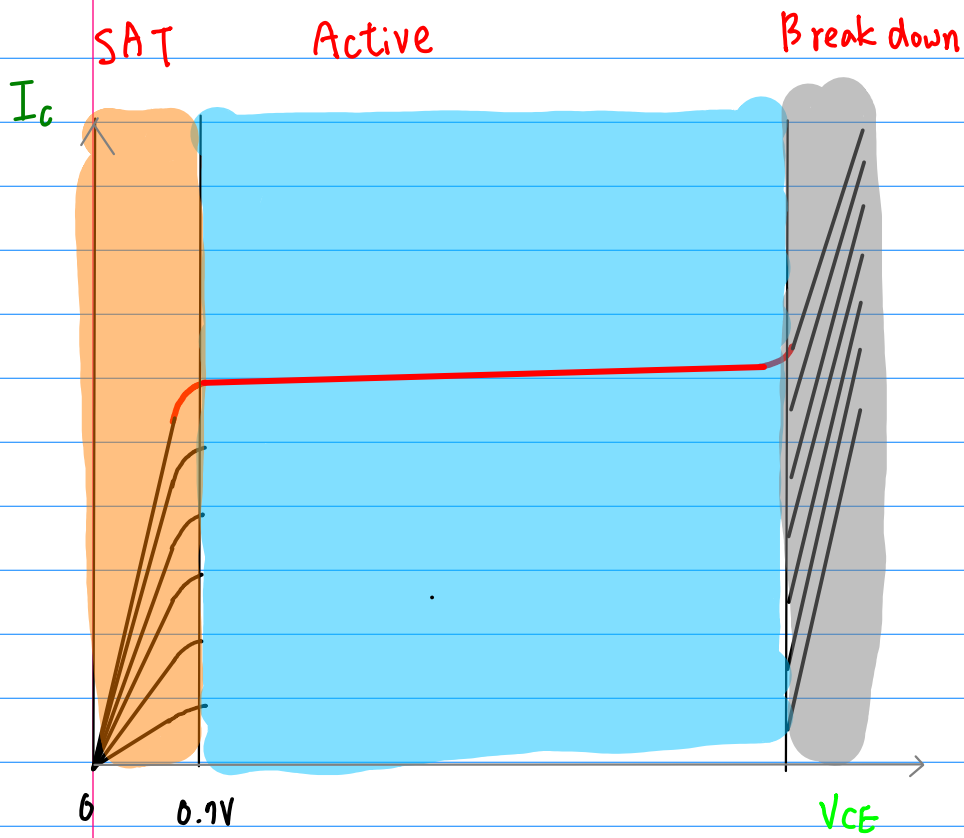
$V_{CE} < 0.7V$
 for forward bias



$I_B \uparrow \Rightarrow I_C \uparrow \Rightarrow \text{more } V_{\text{drop across } R_C}$
 $\Rightarrow V_{CE} \downarrow$

difference not much.. $V_{CE} \cong 0.3 \text{ V}$





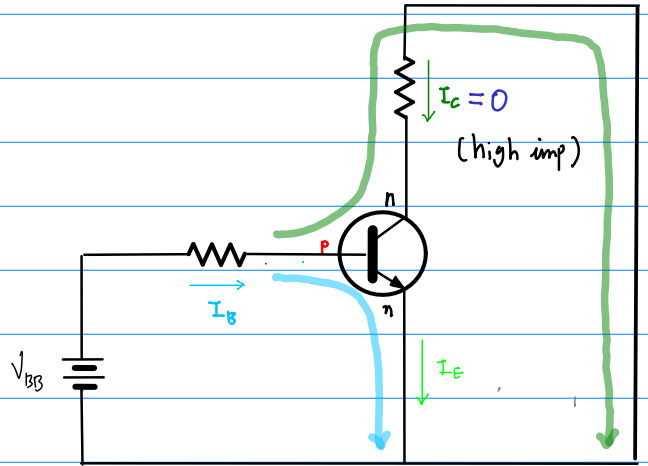
(A) $V_{CC} \approx 0$

2 paths

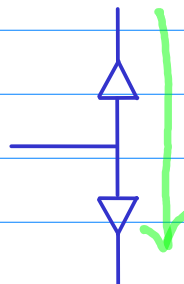
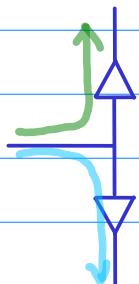
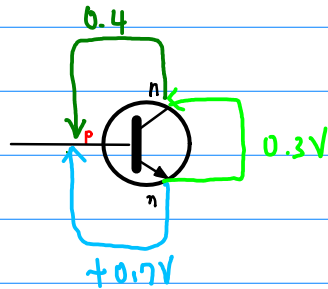
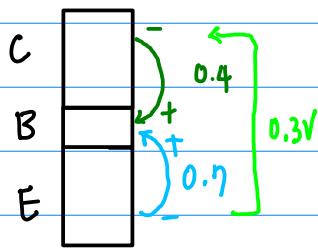
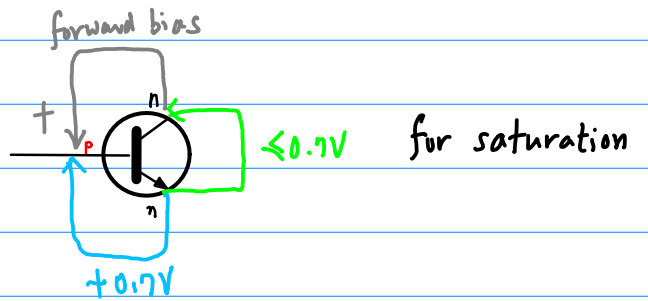
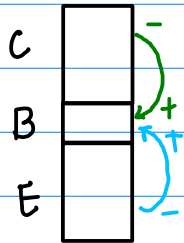
B → E

B → C

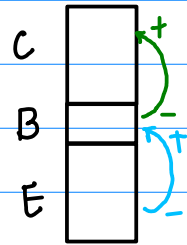
$R_C \rightarrow I_C = 0$



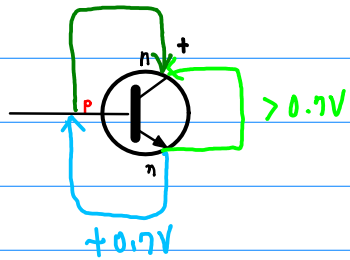
(A)-(B)



(B)-(C) Active (Linear)



reverse bias



active (linear)

