

# Lesson 8. Diode Circuit

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# Before....

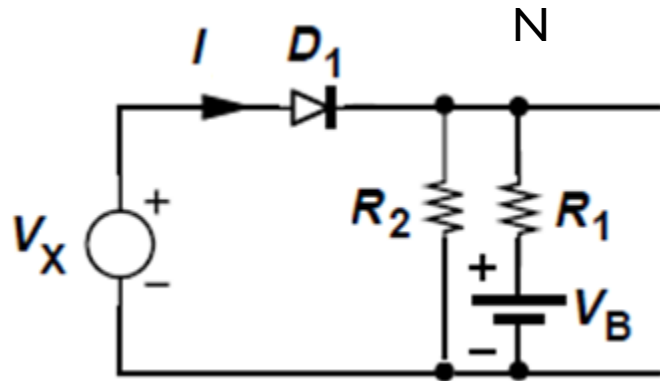
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## ▶ Three Principles

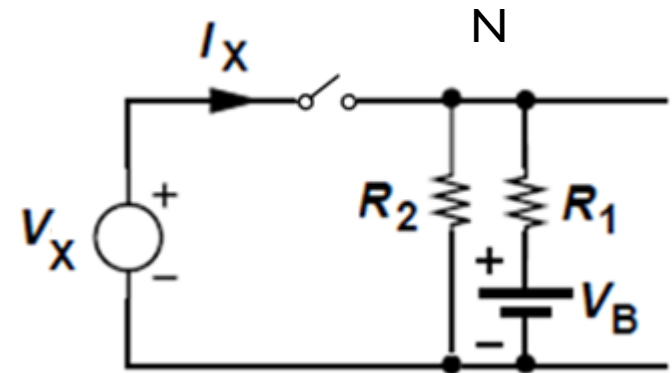
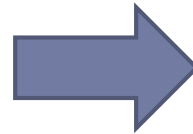
- ① Begin with an assumption for the state of each diode.  
(Be careful not to contradict the final results)
  - ② If a diode is about to turn on or off,  
voltage  $\approx V_{D,on}$       current  $\approx 0$
  - ③ If a diode carries a current, the current must flow  
from anode to cathode.
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# Example



$$V_X \ll 0$$



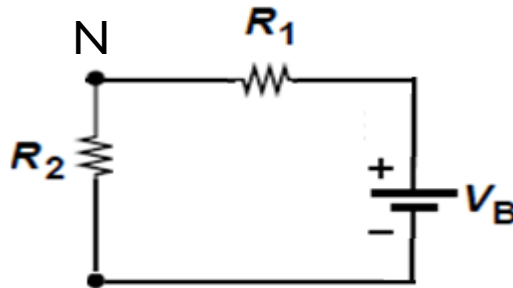
$$V_X = V_{X1}$$



$$\therefore I_X \approx 0$$

$$V_{X1} = V_{D,on} + V_N$$

$$\therefore I_X = 0$$

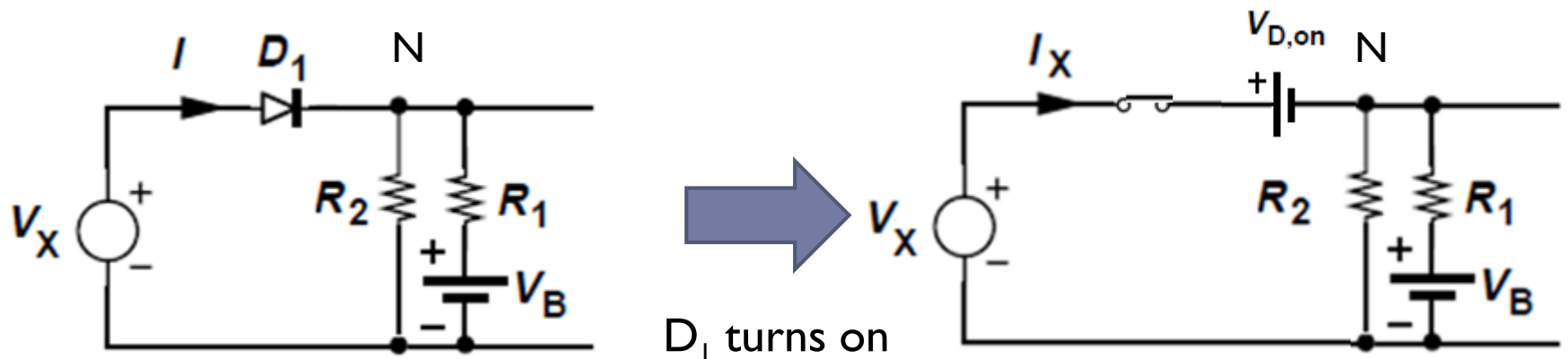


$$V_N = R_2 / (R_1 + R_2) * V_B$$

$$V_{X1} = V_{D,on} + V_N = R_2 / (R_1 + R_2) * V_B$$



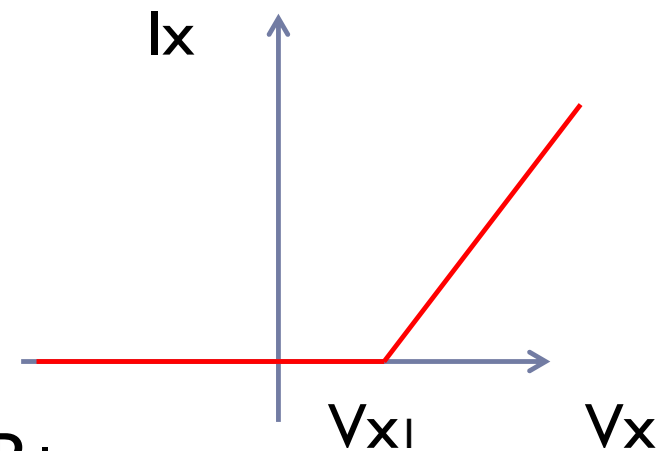
# Example



$$V_N + V_{D,on} = V_x$$

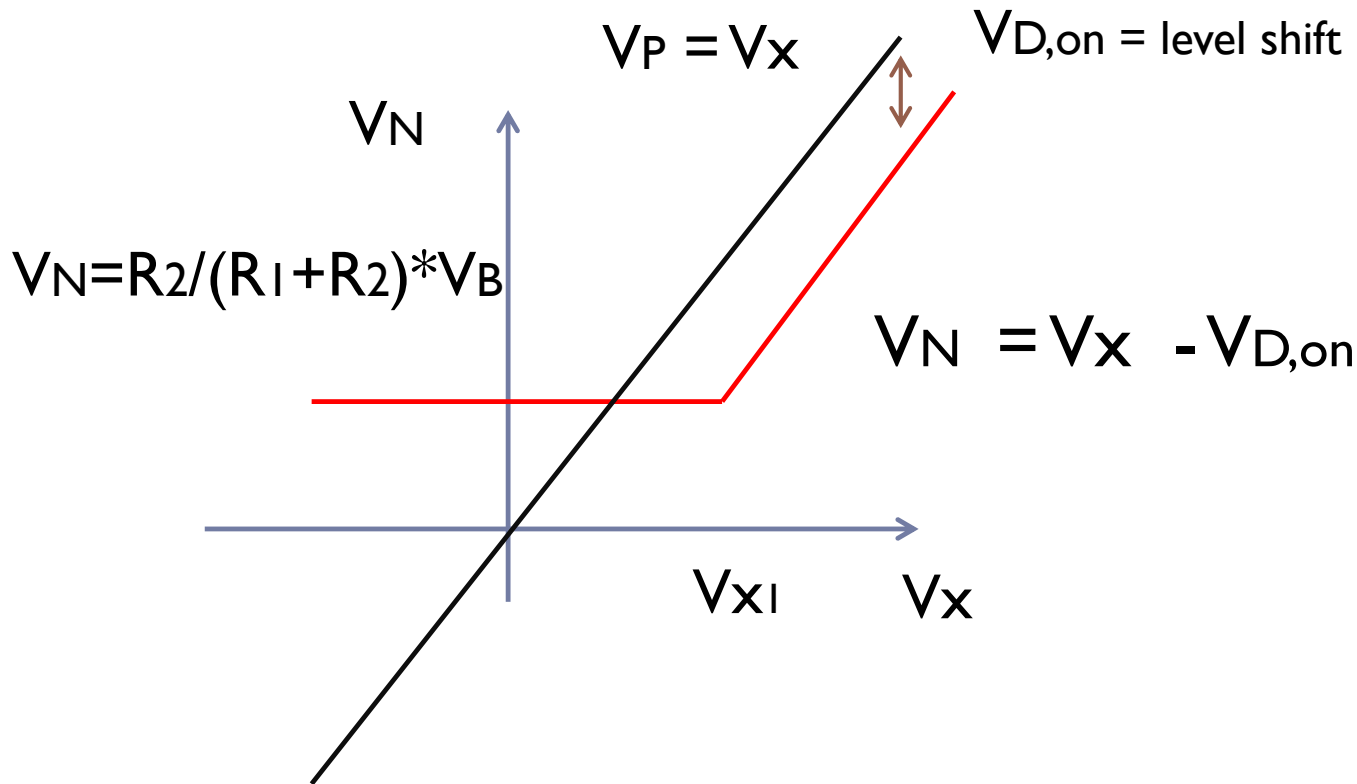
$$I_x = V_N / R_2 + (V_N - V_B) / R_1$$

$$\therefore I_x = (1/R_2 + 1/R_1)(V_x - V_{D,on}) - V_B/R_1$$



# Level shift

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Ideal Diode Model  $\rightarrow V_{D,on} = 0 \rightarrow$  Output is just  $V_X$ . No level shift  
Constant Voltage Model  $\rightarrow V_{D,on} \neq 0 \rightarrow$  Level shift exists.

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