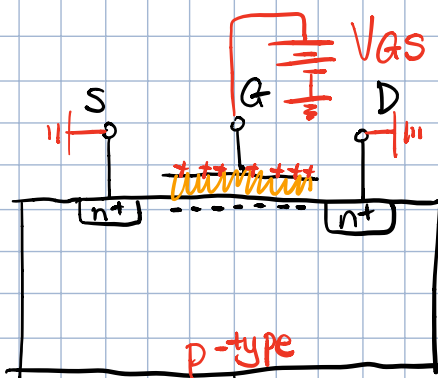
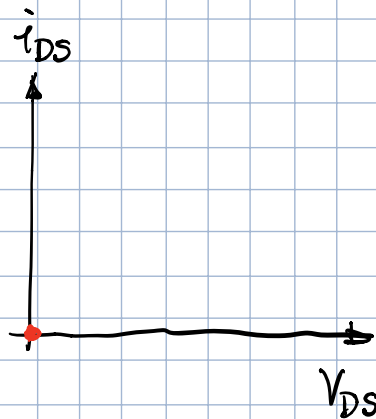
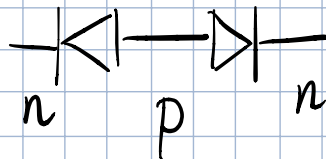
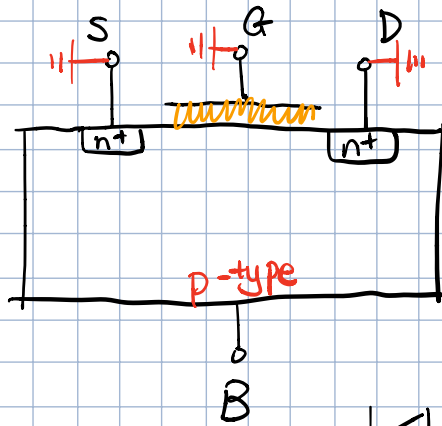
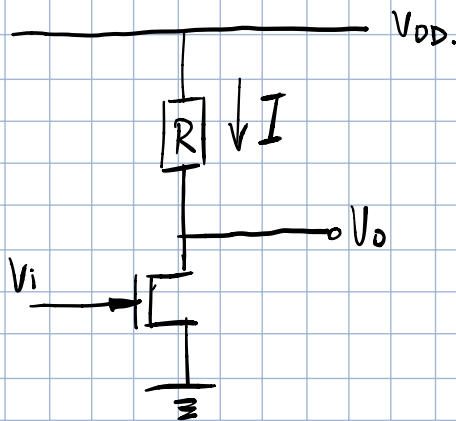
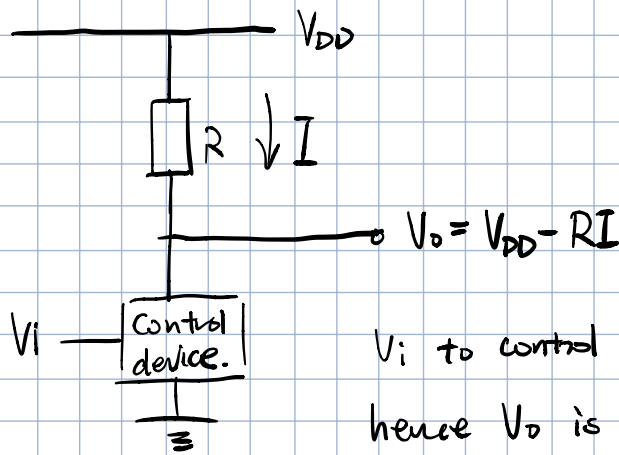


Introductions to Transistors, MOSFET.



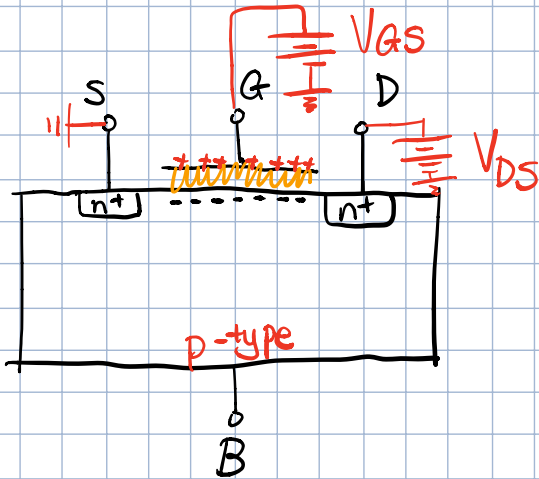
V_{GS} causes a channel of (e^-) to form under the gate (between D and S)

channel thickness $\propto V_{GS}$

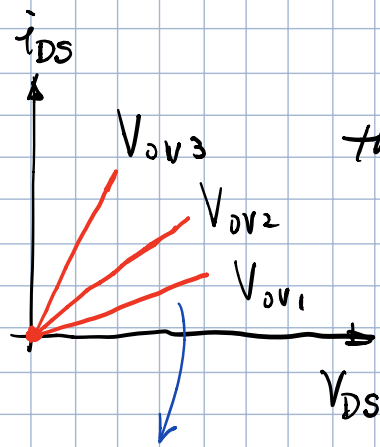
channel thickness $\propto V_{GS}$

$V_{th} = 0.3 \sim 1.0V$ needs to be overcome. before channel can be form.

$$V_{ov} = V_{GS} - V_{th}. \text{ (overdrive)}$$



raise the drain voltage. a bit.



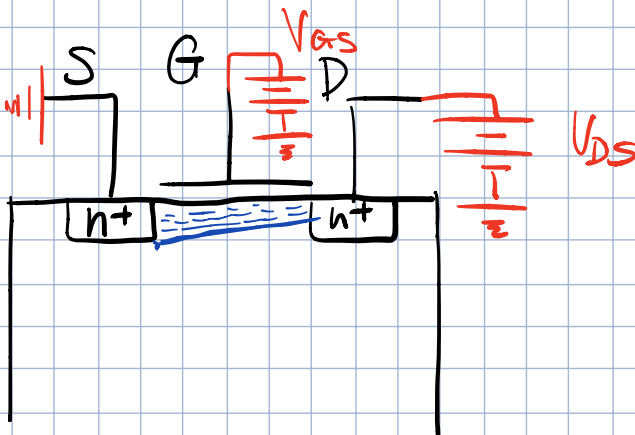
higher overdrive V
thicker the channel.
more current
flowing.



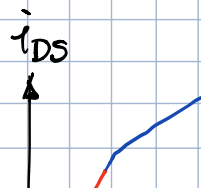
$$i_D = \left[(\mu_n C_{oxide}) \left(\frac{W}{L} \right) V_{ov} \right] V_{DS}$$

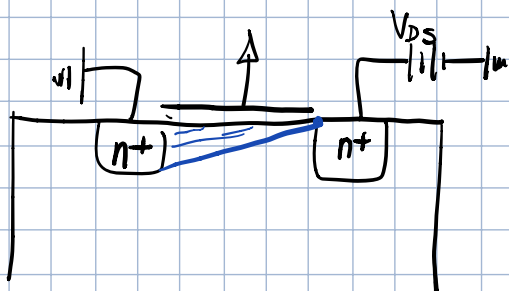
$\frac{1}{r_{DS}}$

$$\frac{1}{r_{DS}} = \frac{1}{(\mu_n C_{oxide}) \left(\frac{W}{L} \right) V_{ov}} = \frac{1}{K' \left(\frac{W}{L} \right) V_{ov}}$$

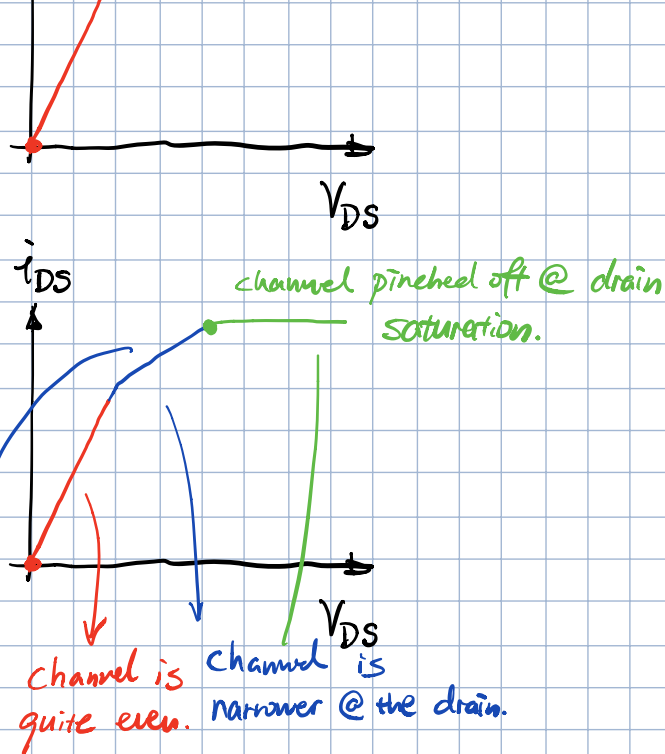


increase V_{DS} more, the channel is narrower @ the Drain.





channel @ the drain is
pinched off. when $V_{DS} = V_{OV}$
(completely kills the channel on the "D" side)



$$i_D = \left[(\mu_n C_{oxide}) \left(\frac{w}{L} \right) \left(V_{OV} - \frac{1}{2} V_{DS} \right) \right] V_{DS}$$

$$i_D = \left[(\mu_n C_{oxide}) \left(\frac{w}{L} \right) \left(V_{OV} - \frac{1}{2} V_{OV} \right) \right] V_{OV}$$

$$i_D = \frac{1}{2} (\mu_n C_{oxide}) \left(\frac{w}{L} \right) V_{OV}^2$$