

Ex. Market Demand : $D = 10 - Q$

MC_{upstream} : $MC_u = 2$

$$TR = (10 - Q)Q = 10Q - Q^2$$

$$MR = \frac{dTR}{dQ} = 10 - 2Q = D_u \quad \leftarrow \text{Demand upstream}$$

$$TR_u = (10 - 2Q)Q = 10Q - 2Q^2$$

$$MR = \frac{dTR_u}{dQ} = 10 - 4Q$$

Upstream Monopoly Max π

$$MR_u = MC_u$$

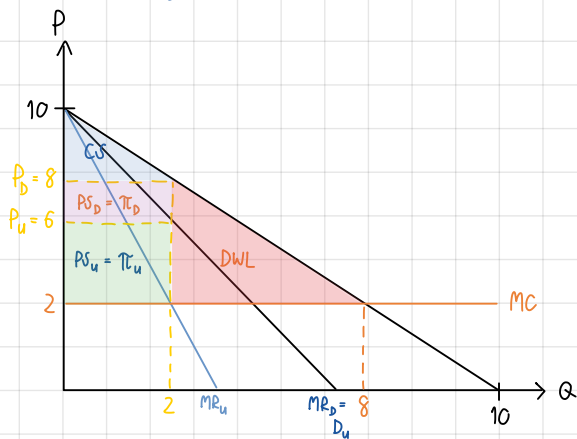
$$10 - 4Q = 2$$

$$4Q = 8$$

$$Q_u = 2$$

$$P_u = 10 - 2(2) = 6$$

$$P_D = 10 - 2 = 8$$



$$CS = \frac{1}{2} \times 2 \times 2 = 2$$

$$\left. \begin{array}{l} PS_D = 4 \\ PS_u = 8 \end{array} \right\} PS = PS_D + PS_u = 12$$

$$DWL = \frac{1}{2} \times 6 \times 6 = 18$$

$$\pi_u = TR_u - TC_u = 6(2) - 2(2) = 8$$

$$\pi_D = TR_D - TC_D = 8(2) - 6(2) = 4$$

$$\text{Ans: } \pi_{\text{total}} = 8 + 4 = 12$$

Ex. Market Demand : $D = 10 - Q$

MC : $MC_u = 2$

$$\therefore MR = 10 - 2Q = MC = 2$$

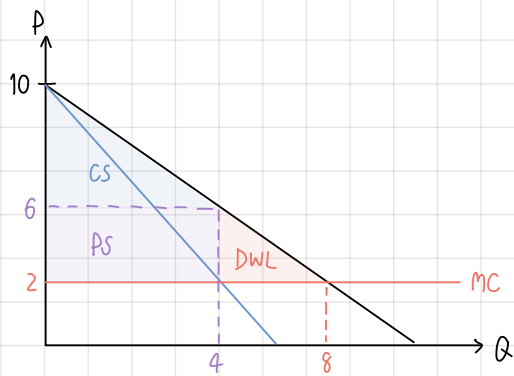
$$10 - 2Q = 2$$

$$2Q = 8$$

$$Q_M = 4$$

$$P_M = 10 - 4 = 6$$

$$\pi_M = 6(4) - 2(4) = 16$$



$$CS = \frac{1}{2} \times 4 \times 4 = 8$$

$$PS_M = 16$$

$$DWL = \frac{1}{2} \times 4 \times 4 = 8$$