

10. Another Way to deal with this:

$$\text{Given } \frac{dl}{dt} = -2. \text{ Find } \frac{dA}{dt} \Big|_{l=6} \underset{\substack{\uparrow \\ A=lw}}{=} \frac{d(lw)}{dt} \Big|_{l=6} = \frac{dl}{dt} \Big|_{l=6} w + \frac{dw}{dt} \Big|_{l=6} l \quad (*)$$

Since $l^2 + w^2 = 100$, so, as $l=6$, $w=8$

(need $\frac{dw}{dt} \Big|_{l=6}$ and w as $l=6$)

Furthermore, do " $\frac{d}{dt}$ " to " $l^2 + w^2 = 100$ ", we obtain. $2l \frac{dl}{dt} + 2w \frac{dw}{dt} = 0$.

$$\text{as } \underline{l=6, w=8} \rightarrow 2 \cdot 6 \cdot (-2) + 2 \cdot 8 \cdot \frac{dw}{dt} = 0 \Rightarrow \frac{dw}{dt} = \frac{24}{16} = \frac{3}{2},$$

put those informations back to (*). we get

$$\frac{dA}{dt} \Big|_{\substack{l=6 \\ w=8}} = \frac{dl}{dt} \Big|_{\substack{l=6 \\ w=8}} \cdot 8 + \frac{dw}{dt} \Big|_{\substack{l=6 \\ w=8}} \cdot 6$$

$$= (-2) \cdot 8 + \frac{3}{2} \cdot 6 = -16 + 9 = -7$$