8.5

Q47.

total weight of anchor and chain in water:

$$100 \text{ lbs} + 3 \text{ lbs/ft} \, (25-h) \text{ ft}.$$

$(25-h)$ is the length of the chain when the anchor is lifted through h feet.

The work done to lift the anchor and chain through a small change in height Δh:

$$\text{weight} \times \text{distance}$$

$$\left[100 + 3(25-h)\right] \Delta h.$$

$\therefore$ total work done to lift anchor and chain from a 25ft depth to the surface:

$$W = \int_0^{25} 100 + 3(25-h) \, dh.$$

$$= \int_0^{25} 175 - 3h \, dh.$$

$$= 175h - \frac{3h^2}{2}\Big|_0^{25}$$

$$= 3437.5 \text{ ft lbs.}$$

Comments

For most of you who got this part wrong your major problem was how to get the right expression for the integrand.