

HW 15

SOLUTIONS

1. LIFT 5 LB BOOK 3 ft

$$W = F \cdot D = 5(3) = \boxed{15 \text{ LB}\cdot\text{ft}}$$

2. 28 m 20 kg

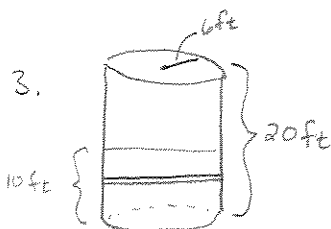


$$F_{\text{CHAIN}} = 20(9.8) = 196 \text{ N} \Rightarrow F = \frac{196 \text{ N}}{28 \text{ m}} (\Delta y)$$

$$W = \int_0^{28} \frac{196}{28} y \, dy = \frac{98}{28} y^2 \Big|_0^{28}$$

$$= \frac{98}{28} (28)^2 = 98(28) \text{ N}\cdot\text{m}$$

$$= \boxed{2744 \text{ N}\cdot\text{m}}$$



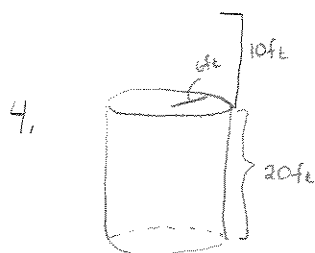
$$F = \pi (6)^2 \Delta y (62.4)$$

$$W = \int_0^{10} 36(62.4)\pi (20-y) \, dy$$

$$= 36(62.4)\pi \left[20y - \frac{1}{2}y^2 \right]_0^{10}$$

$$= 36(62.4)\pi \left[200 - \frac{100}{2} \right]$$

$$= \boxed{36(62.4\pi)(150) \text{ LB}\cdot\text{ft}}$$



$$W = \int_0^{20} 36(62.4)\pi (30-y) \, dy$$

$$= 36(62.4)\pi \left[30y - \frac{1}{2}y^2 \right]_0^{20}$$

$$= 36(62.4\pi)(600 - 200)$$

$$= \boxed{36(62.4\pi)(400) \text{ LB}\cdot\text{ft}}$$

5. 6 LB REQUIRED 0.5 ft STRETCH

WORK STRETCH 0.5 ft + SPRING CONSTANT

$$F(x) = kx$$

$$6 = k(0.5)$$

$$\boxed{12 = k}$$

$$F(x) = 12x$$

$$W = \int_0^{\frac{1}{2}} 12x \, dx$$

$$= 6x^2 \Big|_0^{\frac{1}{2}}$$

$$= 6\left(\frac{1}{2}\right)^2 = \frac{6}{4} = \boxed{\frac{3}{2} \text{ LB}\cdot\text{ft}}$$

$$6. W = \int_0^2 12x \, dx = 6x^2 \Big|_0^2 = 6(4) = \boxed{24 \text{ LB}\cdot\text{ft}}$$

7. ANSWERS WILL VARY.