

1.4 Problems

1. $27.9 \frac{\text{kN}}{\text{m}^3}$

$$37.7 \text{ cm} \cdot 3.75 \pi \text{ cm}^2 = 1670 \text{ cm}^3 \cdot \frac{\text{m}^3}{100^3 \text{ cm}^3} = 1.67 \times 10^{-3} \text{ m}^3$$

$$4747 \text{ g} \cdot \frac{\text{kg}}{1000 \text{ g}} \cdot 9.8 \text{ m/s}^2 = 46.52 \text{ N} \cdot \frac{\text{kN}}{1000 \text{ N}} = 0.04652 \text{ kN}$$

$$\frac{0.04652 \text{ kN}}{1.67 \times 10^{-3} \text{ m}^3} = 27.9 \frac{\text{kN}}{\text{m}^3}$$

2. 30.2 kN/m^3

$$3.08 \text{ g/cm}^3 \cdot \frac{\text{kg}}{1000 \text{ g}} \cdot 9.8 \text{ m/s}^2 = 3.02 \times 10^{-2} \text{ N/cm}^3 \cdot \frac{\text{kN}}{1000 \text{ N}} \cdot \frac{100^3 \text{ cm}^3}{\text{m}^3} = 30.2 \frac{\text{kN}}{\text{m}^3}$$

3. 1.52 m^3

$$4570 \text{ kg} \cdot 9.8 \text{ m/s}^2 = 44786 \text{ N} \cdot \frac{\text{kN}}{1000 \text{ N}} = 44.8 \text{ kN}$$

$$\frac{44.8 \text{ kN}}{29.5 \text{ kN/m}^3} = 1.52 \text{ m}^3$$

4. a.) 26.0 kN/m^3
b.) 2.66

$$1.24 \text{ m} \cdot 0.820 \text{ m} \cdot 0.933 \text{ m} = 0.949 \text{ m}^3$$

$$\frac{26.0 \text{ kN}}{\text{m}^3} \cdot \frac{1000 \text{ N}}{\text{kN}} = \frac{26000 \text{ N}}{9.8 \text{ m/s}^2} = 2700 \frac{\text{kg}}{\text{m}^3} \cdot \frac{1000 \text{ g}}{\text{kg}} \cdot \frac{\text{m}^3}{100^3 \text{ cm}^3} = 2.66 \frac{\text{g}}{\text{cm}^3}$$

5. 8230 cm^3

$$45.0 \text{ cm} \cdot 37.2 \text{ cm} \cdot 12.8 \text{ cm} = 21400 \text{ cm}^3 \cdot 0.384 = 8230 \text{ cm}^3$$

7. 9.38 m^3

$$12.74 \text{ m}^3 \cdot 0.2640 = 3.363 \text{ m}^3$$

$$12.74 \text{ m}^3 - 3.363 \text{ m}^3 = 9.38 \text{ m}^3$$

8. 34%

$$1.22 \text{ m} \cdot 2.40 \text{ m} \cdot 1.81 \text{ m} = 5.30 \text{ m}^3$$

$$16.6 \text{ Mg} - 14.7 \text{ Mg} = 1.9 \text{ Mg}$$

$$1 \text{ g/cm}^3 \cdot \frac{\text{Mg}}{1 \times 10^6 \text{ g}} \cdot \frac{100^3 \text{ cm}^3}{\text{m}^3} = 1 \text{ Mg/m}^3$$

$$1.9 \text{ Mg} / 1 \text{ Mg/m}^3 = 1.9 \text{ m}^3$$

$$\frac{1.9 \text{ m}^3}{5.30 \text{ m}^3} = 0.34 \cdot 100 = 34\%$$

11. 40.3%

$$d = 3.82 \text{ mm}$$

$$\frac{4\pi r^3}{3} = 29.2 \text{ mm}^3 \cdot \frac{\text{cm}^3}{10^3 \text{ mm}^3} \cdot 1270 = 37.1 \text{ cm}^3$$

$$\frac{37.1 \text{ cm}^3}{92.0 \text{ cm}^3} = 0.403 \cdot 100 = 40.3\%$$

$$21. 5.6 \times 10^8 \text{ gal}$$

$$28.9 \text{ kN/m}^3 - 26.3 \text{ kN/m}^3 = 2.6 \text{ kN/m}^3 = \frac{2.6 \text{ kN/m}^3}{5.80 \text{ kN/m}^3} = 0.45$$

$$4.72 \times 10^6 \text{ m}^3 \cdot 0.45 \cdot \frac{26417 \text{ gal}}{\text{m}^3} = 5.6 \times 10^8 \text{ gal}$$

$$23. 0.66 \text{ g/cm}^3$$

$$\frac{0.311 \text{ m}^3}{0.779 \text{ m}^3} = 0.402$$

$$278 \text{ kN/m}^3 - 252 \text{ kN/m}^3 = 26 \text{ kN/m}^3$$

$$\frac{26 \text{ kN/m}^3}{0.402} = 65 \text{ kN/m}^3$$

$$65 \text{ kN/m}^3 \cdot \frac{1000 \text{ N}}{\text{kN}} \cdot \frac{1}{9.8 \text{ m/s}^2} \cdot \frac{\text{m}^3}{1000 \text{ m}^3} \cdot \frac{1000 \text{ g}}{\text{kg}} = 0.66 \text{ g/cm}^3$$