

## Chapter 9 Exercise 9A

**Q. 1.**  $0.83 \times 1,000 = 830 \text{ kg/m}^3$

**Q. 2.**  $\frac{375}{1,000} = 0.375$

**Q. 3.** (i)  $1 \text{ m}^3$  has mass  $13.6 \times 1,000,000$   
 $= 13,600,000$  grammes  
 $= 13,600 \text{ kg}$   
 $\therefore$  Density  $= 13,600 \text{ kg/m}^3$

(ii)  $\frac{13,600}{1,000} = 13.6$

**Q. 4.** Volume  $= 0.1 \times 0.06 \times 0.02$   
 $= 0.00012 \text{ m}^3$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$= \frac{1.08}{0.00012} = 9,000 \text{ kg/m}^3$$

$$\text{Relative density} = \frac{9,000}{1,000} = 9$$

**Q. 5.** Volume  $= \frac{\text{Mass}}{\text{Density}}$   
 $= \frac{70}{980} = \frac{1}{14} \text{ m}^3$

$$\text{Mass} = \text{Volume} \times \text{Density}$$

$$= \frac{1}{14} \times 2,450 = 175 \text{ kg}$$

**Q. 6.**

s	v	sv
1	60	60
0.95	40	38
	100	98

$$\bar{s} = \frac{98}{100} = 0.98$$

**Q. 7.**

s	v	sv
7	10	70
9	1	9
	11	79

$$\bar{s} = \frac{79}{11} = 7.182$$

**Q. 8.**

s	v	sv
1	100	100
0.9	x	0.9x
	100 + x	100 + 0.9x

$$\frac{100 + 0.9x}{100 + x} = 0.9625$$

$$\Rightarrow 100 + 0.9x = 96.25 + 0.9625x$$

$$\Rightarrow x = 60 \text{ ml}$$

**Q. 9.** Volume  $= 0.4 \times 0.3 \times 0.2 = 0.024 \text{ m}^3$   
 Weight  $= V\rho g = (0.024)(1,000 \text{ g}) = 24 \text{ g N}$

**Q. 10.** Volume  $= \pi r^2 h = \pi(0.03)^2(0.1)$   
 $= 0.00009\pi \text{ m}^3$

$$\text{Weight} = V\rho g = (0.00009\pi)(800 \text{ g})$$

$$= 0.072\pi \text{ g N}$$

**Q. 11.** (i)  $V = \frac{1}{3}\pi h(R^2 + Rr + r^2)$   
 $= \frac{1}{3}\pi(18)(81 + 54 + 36)$   
 $= 1,026\pi \text{ cm}^3 = 0.001026\pi \text{ m}^3$

$$\text{Weight} = V\rho g = (0.001026\pi)(1,000 \text{ g})$$

$$= 1.026\pi \text{ g N}$$

(ii)  $V = \frac{1}{3}\pi h(R^2 + Rr + r^2)$   
 $= \frac{1}{3}\pi(6)(49 + 42 + 36)$   
 $= 254\pi \text{ cm}^3 = 0.000254\pi \text{ m}^3$

$$\text{Weight} = V\rho g = (0.000254\pi)(950 \text{ g})$$

$$= 0.2413\pi \text{ g N}$$

(iii) Density  $= \frac{\text{Mass}}{\text{Volume}}$   
 $= \frac{1.026\pi + 0.2413\pi}{0.001026\pi + 0.000254\pi}$   
 $= \frac{1.2673}{0.00128} = 990$

$$\text{Specific gravity} = \frac{990}{1,000} = 0.99$$

## Exercise 9B

**Q. 1.** (i) Pressure  $= h\rho g = (2)(1,000 \text{ g})$   
 $= 2,000 \text{ g N/m}^2$

(ii) Thrust  $= \text{Pressure} \times \text{Area}$   
 $= 2,000 \text{ g} \times (2)^2 = 8,000 \text{ g N}$

$$\text{Weight} = V\rho g = (2)^3(1,000 \text{ g})$$

$$= 8,000 \text{ g N}$$

**Q. 2.** (i) Pressure  $= h\rho g = (0.11)(850 \text{ g})$   
 $= 93.5 \text{ g N/m}^2$

(ii) Thrust  $= \text{Pressure} \times \text{Area}$   
 $= (93.5 \text{ g})\pi(0.05)^2$   
 $= 0.23375\pi \text{ g N}$

(iii) Weight  $= V\rho g = \pi r^2 h\rho g$   
 $= \pi(0.05)^2(0.11)(850 \text{ g})$   
 $= 0.23375\pi \text{ g N}$