1. a) 14.7 psi b) ≈ 10,000 pa

2. The air pressure in an empty tire is 14.7 psi. The gauge reads the pressure difference between tire pressure and 1 atm.

3. $1\text{ atm} \approx 101{,}000\text{ pa} = \rho g h = 1000\text{ kg/m}^3 (9.8\text{ m/s}^2) h$

$h = 10.3\text{ m}$ ← 1 atm ×2 ⇒ 20.6 m

4. $P = \rho g h = 1029\text{ kg/m}^3 (9.8\text{ m/s}^2)(10{,}924\text{ m}) = 1.1 \times 10^8\text{ pa}$

$\frac{1.1 \times 10^8\text{ pa}}{6895\text{ pa/psi}}$

15,977 psi ←

$\frac{39.37\text{ inches}}{1\text{ meter}} \left(\frac{1\text{ foot}}{12\text{ inches}}\right) = \frac{3.28\text{ feet}}{1\text{ m}}$ Dividing top & bottom by 3.28 ⇒ $\frac{1\text{ foot}}{0.305\text{ m}}$

$35{,}840\text{ feet}\left(\frac{0.305\text{ m}}{\text{foot}}\right) = 10{,}924\text{ m}$

5. $150\text{ lbs}\left(\frac{1\text{ kg}}{2.2\text{ lbs}}\right) = 68\text{ kg}$ $\rho = \frac{m}{V}$

$1000\text{ kg/m}^3 = \frac{68\text{ kg}}{V}$

$V = 0.068\text{ m}^3$

$0.068\text{ m}^3\left(\frac{1000\text{ l}}{\text{m}^3}\right) = 68\text{ l}$

6. mass = 68 kg = mass of Hg displaced

$\rho_{Hg} = \frac{m}{V} = \frac{68\,kg}{V} = 14{,}000\ kg/m^3$

$V_{Hg\ displaced} = 0.00496\ m^3$

Total Human Volume = 68 L = 0.068 m^3

$V'_{\text{Submerged part of human}} \rightarrow \frac{V_{Hg\ displaced}}{V_{Human\ total}}(100\%) = \frac{0.00496\ m^3}{0.068\ m^3}(100\%) = 7.1\%$

8

7.1% of human in Hg

% sticking out = 100% − 7.1%

= 92.9% sticking out

7. $P = \rho g h = (14{,}000\ kg/m^3)(9.8\ m/s^2)(0.76\ m) = 104{,}475\ Pa$

29.96 inches = 2.50 feet $\left(\frac{0.305\ m}{foot}\right)$ = 0.76 m

1 inch = 25.4 mm

1 psi = 6895 Pa

15.2 psi

14.7 psi

8. Assuming a human is $1m^3$, mass must be 1000kg, so that human displaces 1000kg of dead sea H_2O

$$\rho = \frac{m}{V} \qquad 1240 kg/m^3 = \frac{1000 kg}{V_{displaced}}$$

$V = 0.806 m^3$ of dead sea H_2O

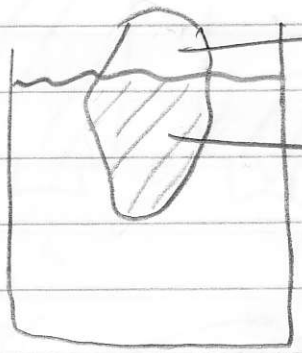
Volume sticking out = Total Human Vol. − Displaced H_2O

$= 1m^3 - 0.806 m^3$

$= 0.194 m^3$

As a % $\Rightarrow \frac{0.194 m^3}{1 m^3} =$ 19.4% sticking out

9.



1kg Frozen H_2O in iceberg

1kg liquid H_2O displaced

When melted, the 1kg frozen water will be exactly the same thing as 1kg liquid H_2O, so it will fill the displaced H_2O's spot perfectly