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H. Physics
Chp 3 Q 1-22 Problems; 1-13 odd

1. Surface tension resists the increase in surface area. When a rain drop is falling a sphere has the least surface area so the surface tension makes it spherical. Surface tension resists the needle bending the water's surface so it holds it on top with that resisting force

2. Cohesion is attraction between molecules of the same type, while adhesion is attraction between molecules of different types

3. Capillarity is the tendency of a liquid to rise in a narrow tube. A meniscus is the curved surface of a liquid in a tube.

4. Adhesion, Cohesion, Atmospheric pressure

5. Normal, Perpindicular

6. Pressure is force over a certain area; force is at a point

7. $P = \rho g h$ The downward pressure on a surface given by the density, gravity, and depth h

8. They have different shapes proving only depth matters

9. When its a confined liquid

10. They are the same

11. the flow is the fastest at the bottom one but the greatest range is from the middle

12. I have no clue

13. Water Out of a gatorade cooler

14 $\rho$ 1000 $\frac{kg}{m^3}$

15. $P_b = \rho g h$, $F = \frac{1}{2} A \rho g h$
Flat surface

16. pressure applied to any surface of a confined liquide is transmitted equally in every direction throughout the liquid

18. force at the expense of distance

17. force multiplication of hydraulics

19. Ration of the Force of the Large piston force to the small piston force

20. The bouyant force acting on a body submerged in a liquid is equal to the weight of the liquid displaced by that body

21. Objects of less density will float, equal density will remain motionless, Greater density will sink

22. Archimede's principle; the iron ship holds air making its total density less than that of water

Problems

1. $1.52 \times 10^4 \text{ Pa} = 1.52 \frac{N}{m^2}$ $\quad N = \frac{kg \cdot m}{s^2}$

$1.52 \times 10^4 \frac{N}{m^2} \cdot 135 \text{ m}^2 =$

$2.05 \times 10^6$ N total force

3.

$V = \pi r^2 h$

$V = \pi (1.0)^2 (3.0 m)$

$V = 9.424 \text{ m}^3 \times 1000 \frac{kg}{m^3} \times 9.8 \frac{m}{s^2}$

$F_w = \frac{kg \cdot m}{s^2}$

$r = 1.0 \text{ m}^2$ $\quad h = 3.0 m$

$P = (1000 \frac{kg}{m^3})(9.8 \frac{m}{s^2})(3.0 m)$

(a) $P = 2.9 \times 10^4 \frac{kg}{m \cdot s^2}$ (b) $9.2 \times 10^4$ N

5. $\frac{4}{3} \pi$ 20.0 cm

20.0 cm h

$(0.200 m)(9.80 \frac{m}{s^2})(805 \frac{kg}{m^3})$

1,580 Pa

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7. Assume h is equal

$$\frac{A_L}{A_S} = \frac{F_L}{F_S}$$

$$1.3\times10^{4}\,N \;\frac{0.0200\,m}{0.100\,m} = F_L$$

$$F_L = 2.6\times10^{3}\,N$$

9. $A = \pi\frac{d^2}{4}$ $A_1 = \pi\frac{(0.025)^2}{4}$ $A_2 = \pi\frac{(0.005)^2}{4}$

$A_1 = 4.9087\times10^{-4}$ $A_2 = 1.9635\times10^{-5}$

$$\frac{A_1 V_1}{A_2} = V_2$$

$$\frac{(4.9087\times10^{-4}\,m^2)(3.0\,\frac{m}{s})}{(0.19634\,m^2)} = V_2$$

$$V_2 = 75\,\frac{m}{s}$$

11. $\frac{\pi (0.040)^2}{4} \quad \frac{(1.25663706 \times 10^{-3})(1.4\ \frac{m}{s})}{(0.00001963495)}$

$\pi t \quad 0.0050$

$0.020$

0.50cm $9.0 \times 10^{1}\ \frac{m}{s}$

2.0cm $5.6\ \frac{m}{s}$

13. $2.16\ m^3$ raft

~~$2.16\ m^3 \cdot 598\ kg - 1291.68\ kg$~~

$\frac{598\ kg}{m^3}$ $2.16\ m^3$ raft $\frac{1\ g}{cm^3}$

$\frac{1000\ kg}{m^3} \cdot 2.16\ m^3 \quad 2,160\ kg$

$2,160\ kg - 1291.68$

$868\ kg \times 9.8\ \frac{m}{s^2} =$

~~8,509 N~~ 8,510 N load