1. Variation of Pressure w/ Depth

2. Pascal's Principle (quick problem...not going into much detail)

3. Buoyancy and Archimedes' Principle

$P(d) = P_0 + \rho g d$

$P_A = P_B$

$P_0 = P_s + \rho g h_{max}$

$10^5 P_a = \left(10^3 \text{m}^3 \text{m}^{-3}\right) \left(10^{-3} \text{m}^3\right)$

$h_{max} = 10 \text{m}$
Nitrogen
(sealed)

\[ P = P_A = \beta \cdot P_B = P_0 + \rho g d \]

What is the pressure of the Nitrogen?

(A) Equal to atm
(B) Less than atm
(C) Greater than atm

area \( A_2 = (10)^2 A_1 \)

Melt sweet ride, 1000 kg

If the radius of the larger platform is 10x the radius of the smaller cylinder, what force is required from \( F_{app} \) to hold the car up?

(A) 10 N
(B) 100 N
(C) 1000 N
(D) 10,000 N

\[ F_{app} = \frac{A_1}{A_2} (10^4 N) \]

\[ = (10^{-2}) (10^5 N) \]
The surrounding water pushes up with exactly the same force it would if there were water there.

Archimedes' Principle

\[ F_{\text{buoy}} = \rho_{\text{surrounding fluid}} \cdot g \cdot V_{\text{displaced}} \]

What is \( V_{\text{displaced}} \)?

\[ V_{\text{displaced}} = V_{\text{original}} \]

\[ V_{\text{displaced}} = V_{\text{drop}} \]
7. Blocks a, b, and c in FIGURE Q14.7 have the same volume. Rank in order, from largest to smallest, the sizes of the buoyant forces \( F_a \), \( F_b \), and \( F_c \) on a, b, and c. Explain.

(A) \( F_a > F_b > F_c \)  
(B) \( F_c > F_b > F_a \)  
(C) \( F_a = F_c > F_b \)  
(D) All same \( F_{\text{buoy}} \)

FIGURE Q14.7

9. The two identical beakers in FIGURE Q14.9 are filled to the same height with water. Beaker B has a plastic sphere floating in it. Which beaker, with all its contents, weighs more? Or are they equal? Explain.

(A) A  
(B) B  
(C) Same weight  
(D) Dunno
What's the tension in the string?

\begin{equation}
F_{\text{ buoyancy }} = \rho_0 g V_{\text{ air }} - \rho_1 g \left( \frac{M}{\rho_1} \right)
\end{equation}

\begin{align*}
T &= F_{\text{ buoyancy }} - Mg \\
    &= Mg \left[ \frac{\rho_0}{\rho_1} - 1 \right] \\
T &= Mg \left( \frac{\rho_0 - \rho_1}{\rho_1} \right)
\end{align*}