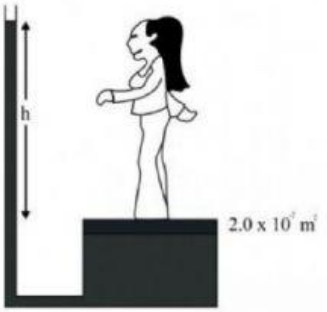
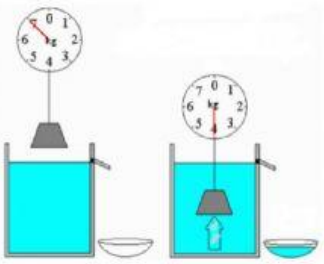
19. In the diagram below a person of mass 65 kg is standing on a platform over the piston of area 2.0×10^{-2} m². What height of water, h will just support her? Assume that the density of water is 1000 kg m^{-3}.



20. From the figure below, find the buoyant force acting on the object.



$F_B = W_1 - W_2$

Mass = − kg

= kg

∴ F_B = X

= N

21. The volume of a 0.75 kg sealed packet is 3.5×10^{-4} m³. If the density of water is 1000 kgm^{-3},

i. Will the packet float or sink in water?

ii. Find the volume of the water displaced by this packet.

iii. Find the buoyant force

iv. Find the mass of water displaced by this packet.

m = kg

V = 3.5×10^{-4} m³ @

= m³

Answers

i) ρ = −

=

=

= kgm^{-3}

So the packet will ✱

ii) $V_{water} = V_{obj}$

= m³ ✱

iii) $F_B = \rho_w V_w g$

= X X

= N

iv) ρ = −

m = Vρ

= X

= kg ✱

22. A stone weight 160N. When it is fully immersed in the liquid A, its apparent weight is 115N. Calculate the density of the liquid A if the volume of the liquid A displaced by the stone is 3640cm³.

W_1 = N

W_2 = N

V = $cm^3 \times \frac{m^3}{cm^3}$

= m^3

$F_B = W_1 - W_2 = \rho V g$

= $\rho \times$ ×

= $\rho \times 0.0357084$

∴ ρ = kgm^{-3}

23. An object of mass 0.2kg sinks in cooking oil of density 0.92gcm⁻³. When the object fully immersed in the oil, it has been apparent weight of 0.94N. Calculate its density.

m = kg

W_1 = x

= N

ρ_{oil} = gcm^{-3}

= $x \frac{kg}{g} \times \frac{cm^3}{m^3}$

= kgm^{-3}

W_2 = N

$F_B = W_1 - W_2$

= −

=

$F_B = \rho_{oil} \cdot V_{oil} \cdot g$

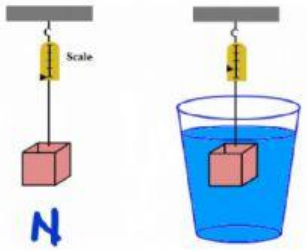
= x x

V_{oil} = m^3

$V_{obj} = V_{oil}$

$\rho_{obj} = \frac{m}{V}$ = — =

24. Figure shows the weight of block W in the air is 6N. The block is immersed in a beaker of water and its weight becomes X N. Given that the density of block is 2x10³ kgm⁻³. Find the value of X.



W_1 = N

W_2 = x

ρ_{block} = $2 \times 10^3 kgm^{-3}$

= kgm^{-3}

ρ_{water} = kgm^{-3}

V_{water} = V_{block} (because the block fully immersed in water)

W_{block} = mg

= m x

m_{block} = — = kg

V_{block} = — = —

= m^3

$F_B = \rho_w V_w g$

= x x

= N

$F_B = W_1 - W_2$

= −

So x = −

= N

kgm^{-3}