NALANDA COLLEGE – COLOMBO 10

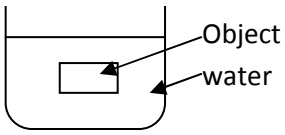
NALANDA VIDYALAYA COLOMBO 10

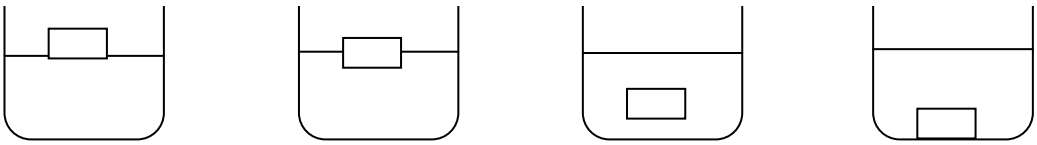
Unit Test

Grade 10	Science	Unit 15

Hydrostatics Pressure & its application

01. The diagram shows how an object stays when immersed in water. It was taken out and put into a vessel containing kerosene oil. Which of the following diagram shows the position of the object in kerosene oil.



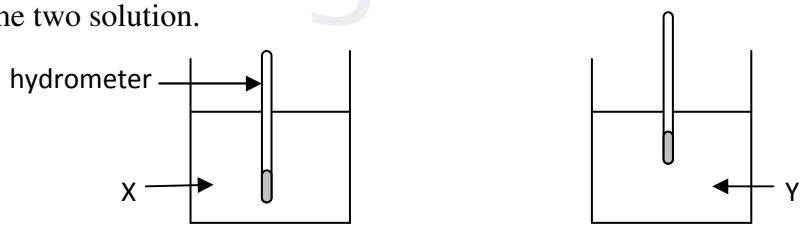


(1) (2) (3) (4)

02. A man tries to dive in a big basin. Select the correct statement about the displaced water by the dive.

1) the volume of the man is equal to the volume of water displaced. Weight of the man is also equal to the weight of the water.
2) Displaced volume of water is not equal to the volume of the man. Displaced volume is equal to the weight of the man.
3) Displaced volume of water is not equal to the volume of the man. Displaced volume of water is equal to the up thrust.
4) The sum of the volume of the water and the weight of the water is equal to the up thrust.

03. The two diagrams show, identical hydrometers, immersed in two solutions X & Y. Followings are some changes suggested to make the two hydrometers immerse and float equally in the two solution.



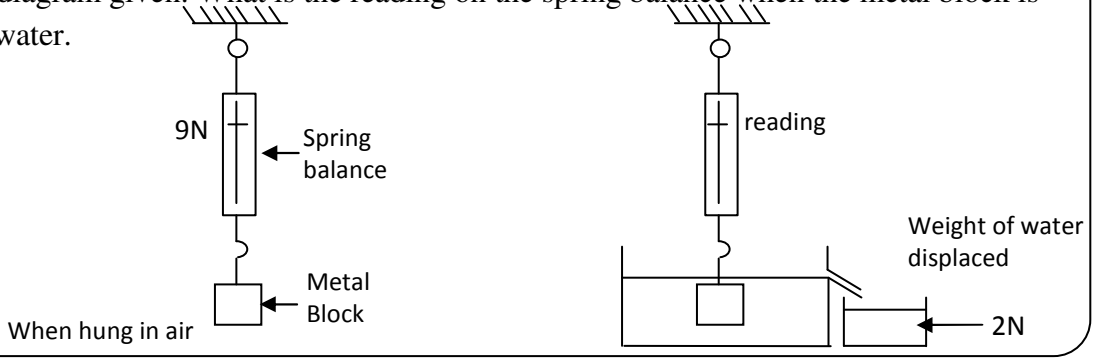
A) To add water to the solution X
B) To add powdered salt to the solution X
C) To add powdered salt to the solution Y
C) To add alcohol to the solution Y

Out of these the correct procedures are,

1) A & C 2) A & D 3) B & C 4) B & D

04. Consider the diagram given. What is the reading on the spring balance when the metal block is immersed in water.

1) 0N
2) 4N
3) 7N
4) 9N



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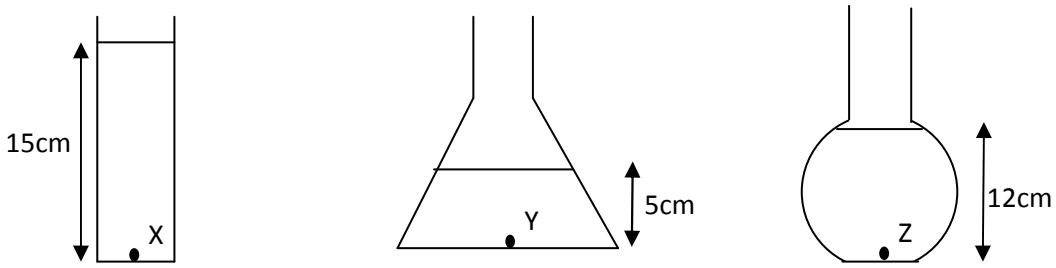
05) The pressure exerted on the earth by a heap of soil covering $8m^3$ of area is 160Pa. What is the force exerted by the heap of soil on earth?

1) 0.05N 2) 200N 3) 20N 4) 1280N

06. What is the SI unit of pressure

1) N 2) Nm^{-2} 3) Nm^{-3} 4) Pa

07. Consider the following containers A, B & C. The three containers are filled with water. X, y & z are points located at the bottom of the containers. Arrange the points with descending order of the pressure exert due to water

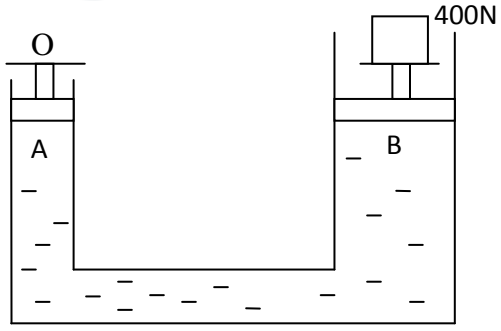


1) X, z, y 2) x, y, z 3) z, x, y 4) y, z, x

08. Which of following in not a characteristic of liquid pressure

1) Liquid exert pressure on all the direction.
2) Liquid pressure decrease with the height of the liquid column.
3) Liquid pressure does not change according to the shape of the vessel
4) Liquid exert more pressure on the bottom of the tank

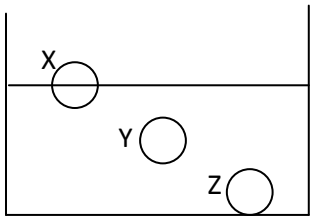
09. The set up shown in the diagram was made to work by transferring pressure through liquid. If the area of piston A is $0.01m^2$ and the area of the B piston is $0.04m^2$, what will be the minimum force required to at 'O' to lift the object at B?



1) 200N 2) 400N 3) 50N 4) 10N

10. X,Y,Z are three balls that are made with three different materials. According to the diagram up thrust of which object/objects will be equal to the weight of the object.

1) Only X
2) Only Y
3) Only X & Y
4) Only Y & Z



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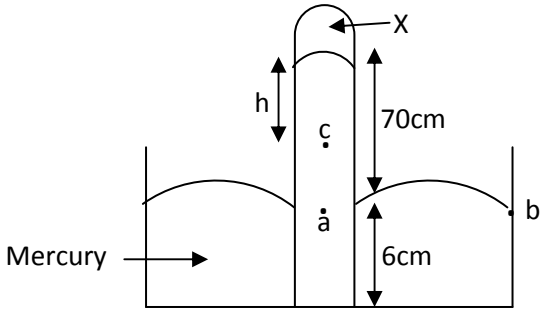
Structured essay

01.A) Atmospheric pressure is measured by mercury pressure guage as shown in the diagram. Density of mercury is 13600kgm^{-3}. Gravitational acceleration is 10ms^{-2}



i) What is the pressure at the place X? …….

ii) Explain the reason for the value you mentioned in (i) above?.....
……

iii) Mention the advantage of using mercury in producing pressure guage?
……..

iv) What is the atmospheric pressure in the above instance?
……
……

v) Write an expression to calculate the pressure in pascal at point 'C'
……....

vi) If the pressure guage is taken to a higher elevation. What would be the change observed in the height of mercury column?
……..
……

vii) Calculate the liquid pressure at 'a' in Pascal
……..

viii) A student suggest that it is safer to use water in the above apparatuses than mercury

a) Are you agree with that? Explain the reason
……..

b) Calculate the height of the water column in the apparatuses if water is used
……..
……..

c) What is the practical problem be could face in doing so
……..

d) Write 2 instances where air pressure is applied
……..
……..

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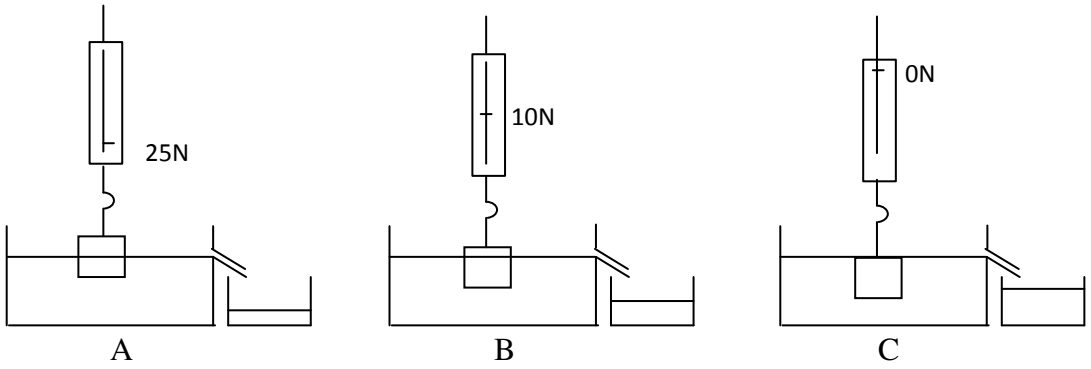
B. The diagrams show three instances of immersing an object in water and the reading on the spring balance in each instance. 50N of water is displaced in the instance given as C



i) What is the weight of the object?

……

ii) Find the weight of the displaced water in the instance 'A'

……

iii) What is the up thrust in the instance 'B'

……

iv) State the two forces acting in the instance 'C'

……

v) What can you say about the up thrust on the object in 'C' if the object is immersed in a denser liquid.

……

vi) What is the law explain about the above phenomena.

……

vii) Write the law

……

……

Essay

01.A) A body has mass of 70kg. When it is immersed in water, it is totally submerged & floating . If so,

i) Find the up thrust exert on that body (density of water = $1000kgm^{-3}$, g = $10ms^{-2}$)

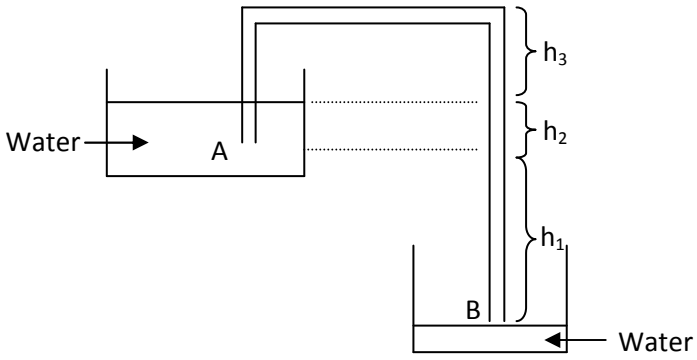
ii) If you want to float the object on water, what is the change that you can do?

iii) Mention an instrument made according to the above principle.

iv) Write the law explain the function of the above mentioned instrument.

v) What is the change of location of the above instrument question (iv) occurs, when salt is gradually dissolved in the water.

B. The diagram shows a set up used to remove water by siphoning. Atmospheric pressure is π, density of water is d & acceleration due to gravity is g



i) How should the tube stay at the beginning to remove water by this method?

ii) State whether the speed of water at the end of B increases or decreases or remains the same in each of following instances.

a) Immersing the end A deeper in the tank

b) Adding some more water to the tank A

c) Increasing the length of h_1

iii) Write an expression using the given symbols to find the pressure at a point near A in the tank.

iv) State the height of the tube which affects removal of water at B

v) Write an application of liquid pressure