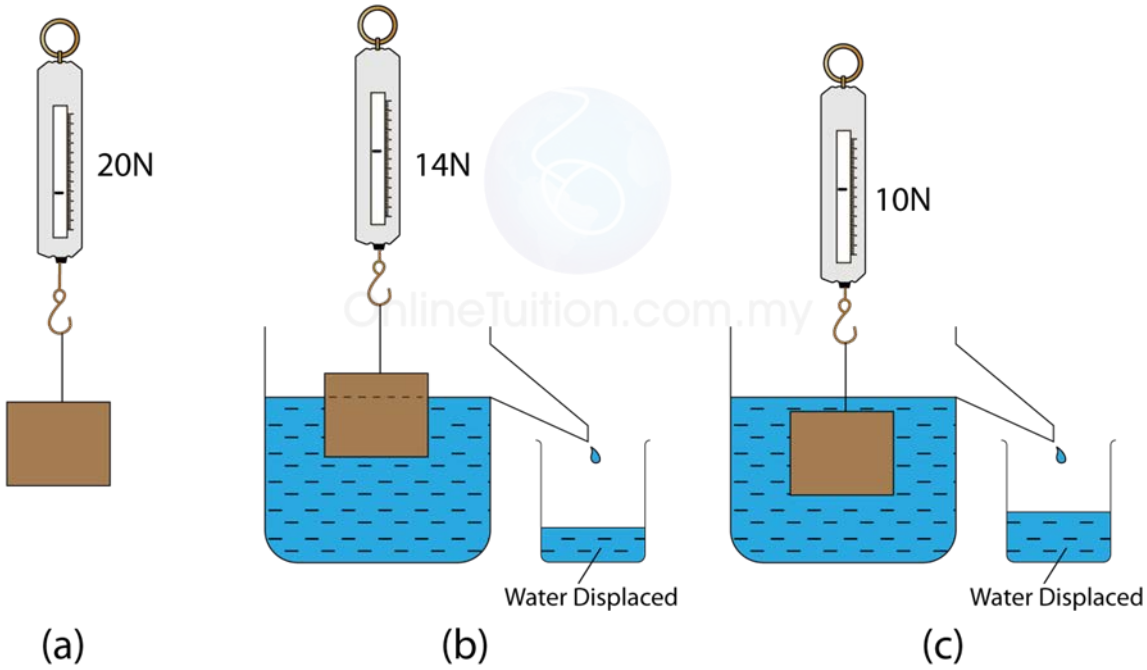
Archimedes' Principle



1. Diagram (a) above shows a metal block supported by a spring balance. Diagram (b) shows the block partially immerses in water while diagram (c) shows the block fully immerses in water.

   a. What is the mass of the metal block?

   b. In diagram b), the reading of the balance became 14N.
      i. What is the effective weight loss of the block when partially immense in water as shown in diagram (b)?

      ii. What is the value of the upthrust that act on the block?

      iii. Find the weight of the displaced water?

   c. In diagram c), when the block is fully immerse in water, the reading of the spring balance became 10N.
      i. Name 3 forces that acted on the block.

      ii. State and explain the relationship between the forces in (c) (i)

Archimedes' Principle

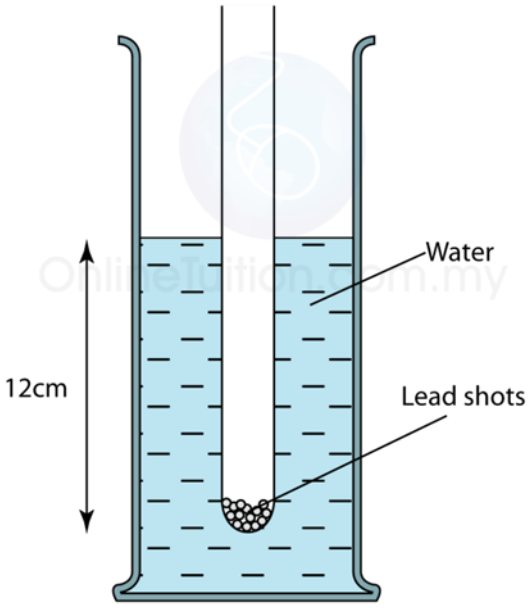
iii. Find the volume of the block. [Density of water = 1000 kg m^{-3}]

iv. Name the principle you used in the calculation in question (c) (iii).

v. What will happen to the reading of the spring balance if the water is replaced with cooking oil.

vi. Explain your answer in (c) (v)

[Answer: http://spmphysics.myhometuition.com/2013/06/archimedes-principle-structure-question.html]



2. Figure above shows a glass tube with cross-sectional area of 10 cm^2 and mass 10 g. It is filled with lead shots and immerse in water. The tube floats upright in the water. [Density of water is 10 g cm^{-3}]

a. State the name of this device.

Archimedes' Principle

b. State one use of this device in a laboratory.

c. Explain the function of the lead shots in the glass tube?

d. The length of the glass tube immerse in water is 12 cm. Calculate
   i. the volume of water displaced by the glass tube

   ii. the weight of the displaced water.

e. The glass tube together with the lead shots are then placed inside a container that filled with cooking oil. Again, the tube floats upright.
   i. What can be observed in the part of tube that is immerse in the oil when compared with the condition in figure above?

   ii. Explain your answer in (b)(i).

[Answer: http://spmphysics.myhometuition.com/2013/06/archimedes-principle-structure-question_24.html]

3. A balloon filled with helium gas has negligible mass. The volume of the balloon is 120cm^3. [Density of air = 1.23 kgm^{-3}.Density of helium gas = 0.18 kgm^{-3}]
   a. i. Calculate the mass of the helium gas in the balloon?

[1 mark]

   ii. Find the weight of the helium gas?

Archimedes' Principle

[1 mark]

b. The balloon is then tied to a load of mass *m* kg, as shown in figure above. The balloon and the load float in the air stationary.

i. Mark in the diagram, all the forces that acted on the balloon.

[2 marks]

ii. Write an equation to relate all the forces in)b) (i).

[1 mark]

iii. Calculate the mass of the load, *m*.

c. If the string that is tied to the balloon is cut, Find upward acceleration experienced by the balloon?

[2 marks]

[Answer: http://spmphysics.myhometuition.com/2013/06/archimedes-principle-structure-question_1043.html]