NAME	**INDEX NUMBER**
SCHOOL	**DATE**

FLOATING AND SINKING

1. 1994 Q5a P2

(a) State Archimedes's principal (1 mark)

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2. 1996 Q29 P1

A solid copper sphere will sink in water while a hollow copper sphere of the same mass many float. Explain this observation (2 marks)

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3. 1998 Q2b P2

Fig. 1 shows a block with a graduated side, and of dimension 4cm x-4cm x 4cm x 16cm, just about to be lowered into a liquid contained in an overflow can.

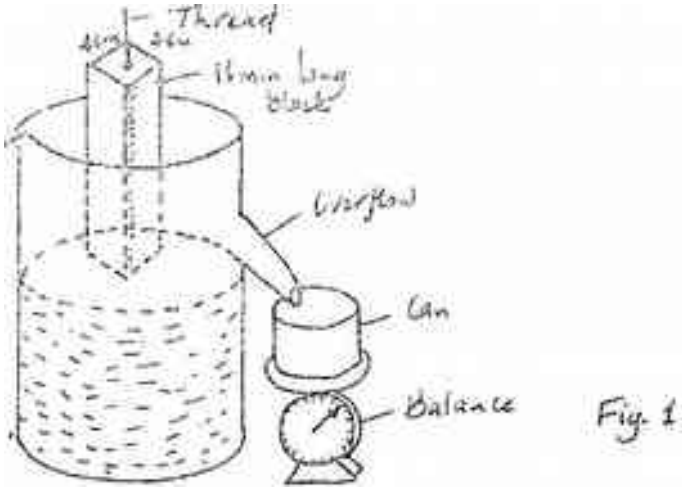

Fig. 1

During an experiment with this set-up, the following information was recorded;
-The block floated with three quarters of it submerged
-Initial reading of balance=0 grammes
-final reading of balance= 154 grammes.

Use the information to determine the density of the:
(i) Block (ii) Liquid
(Use g= 10ms^2 . give your answers to 1 decimal place.)

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4. 1999 Q29 P1

A concrete block of volume V is totally immersed in seawater of density p.Write an expression for the up thrust on the block..

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5. 1999 Q6 P2

a) Explain the following observations: ice cube float on water and solid benzene sinks in liquid benzene.

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b) (i) You are provided with the following:
-An overflow can - A beaker -A spring balance
- A metal block -Water and - String

Describe an experiment to verify Archimedes principle.

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ii) A block of wood weighing 2.0N is held under water by a string attached to the bottom of a container. The tension in the string is 0.5N. Determine the density of the wood.

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6. 2000 Q4b P2

(b) **Fig 7** represents a block of uniform cross sectional area of 6.0cm^2 floating on two liquids A and B. The lengths of the block in each liquid are shown.

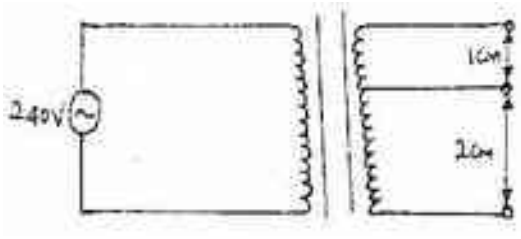

Fig. 6

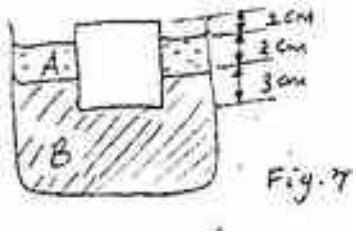

Fig. 7

Given that the density of liquid A is 800kgm^{-3} and that of liquid B is 1000kgm^3 determine the:

(i) b weight of liquid A displaced

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(ii) Weight of liquid B displaced

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(iii) Density of the block

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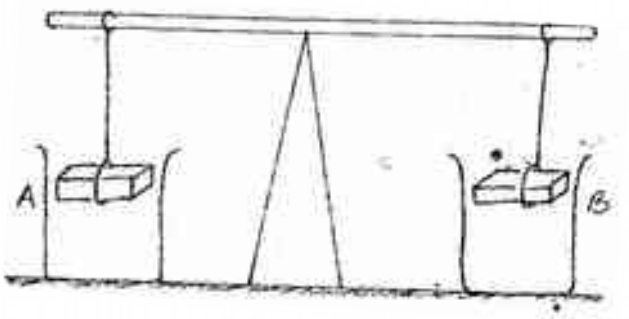
7. 2001 Q2 P1

Fig 2 shows a uniform bar in equilibrium.



When water is added into the beakers A and B until the weights are submerged, it is observed that the bar tips towards B. Explain this observation.

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8. 2001 Q22 P1

Fig. 15 shows a tall jar containing two fluids A and B. The viscosity of A is higher than that of B. A solid sphere is released at the top of the jar and falls through the fluids.

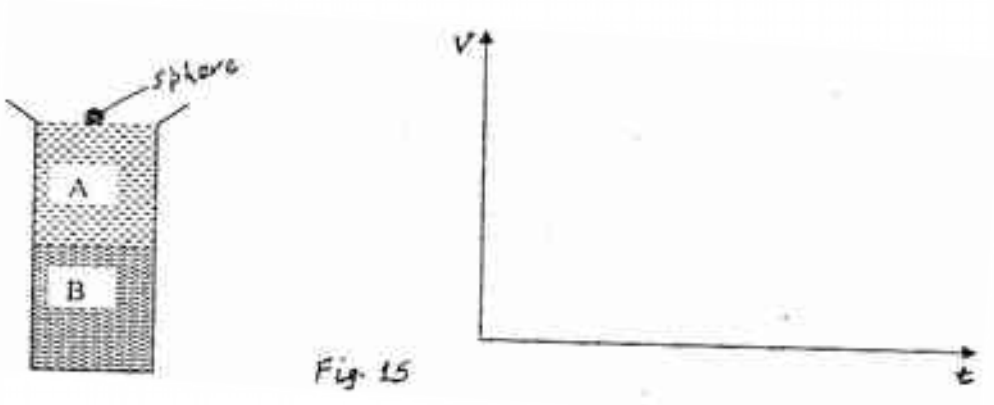

Fig. 15

On the axes provided, sketch the velocity – time graph for the motion of the spheres through the fluids.

9. 2001 Q28 P1

Fig. 19 shows two spheres made of wax each of mass 0.10kg held in a liquid by strings A and B.

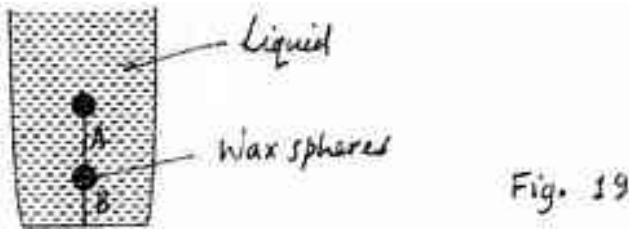

Fig. 19

If the upthrust on each sphere is 1.05N, determine the tension in each string. (acceleration due to gravity g = 10ms^{-2})

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10. 2002 Q25 P1

A block of glass of mass 250g floats in mercury. What volume of glass lies under the surface of the mercury? (Density of mercury is 13.6 x 103 kgm^{-3}).

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11. 2003 Q20 P1

When a piece of metal is placed on water, it sinks. But when the same piece of metal is placed on a block of wood, both are found to float. Explain this observation.

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12. 2004 Q1 P2

a) A test tube of uniform cross-section loaded so that it can float upright in Water. With the aid of a labeled diagram, describe how the test tube may be calibrated to measure the density of liquid.

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b) In an experiment to determine the density of a liquid, a uniform metal cylinder of cross-section area 6.2cm was hang from a spring balance and lowered gradually into the liquid. The up thrust was determined for various submerged lengths. The results obtained are shown on the graph in Fig 1.

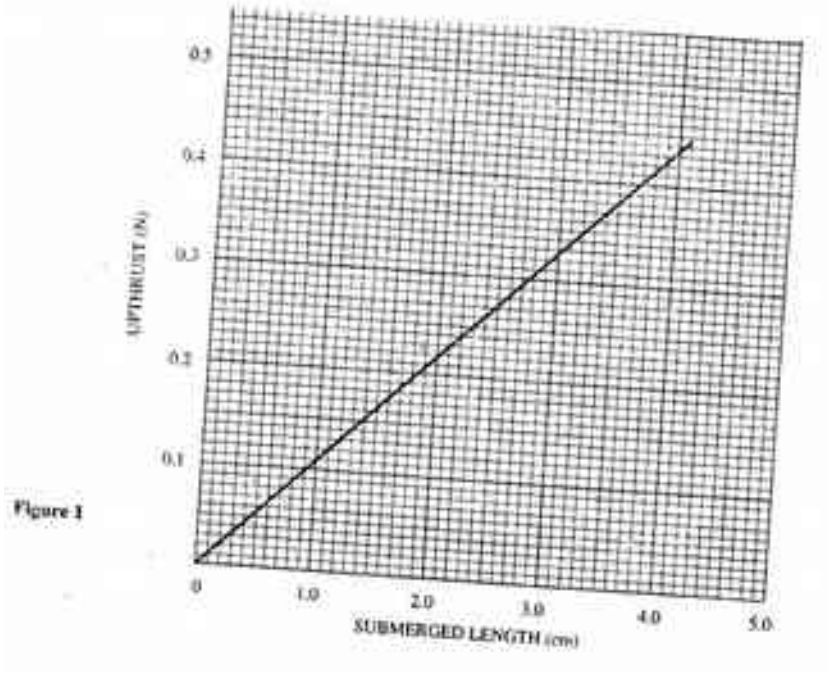

Figure 1

Figure 1

Using graph, determine;

(i) The value of the up thrust when the cylinder is fully submerged

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(i) The Density of the liquid

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13. 2005 Q3 P1

The light uniform bar in **Fig 3** is equilibrium. The two beakers A and B contain water at the same temperature. The two blocks are made of the same material.

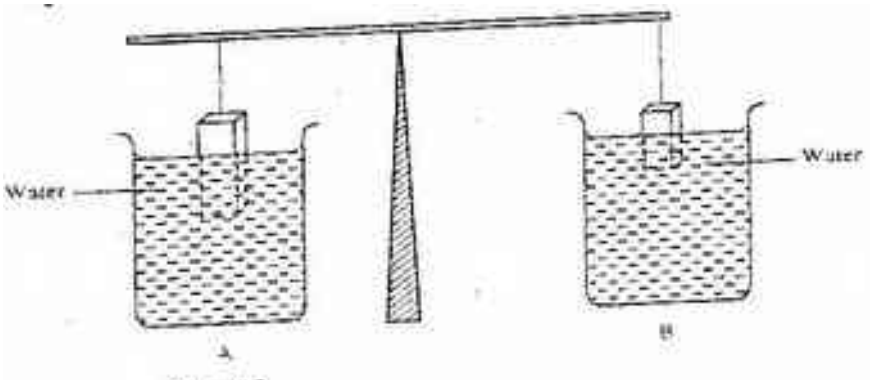

Figure 3

If the temperature of the water in beaker A is now raised, explain why the beam tips to side A. (Assume the solid does not expand.)

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14. 2006 Q12 P1

The uniform bar in **figure 7** is provided at its midpoint. It is in equilibrium under the action of two identical balloons filled with equal volumes of different light gases at the same temperature.

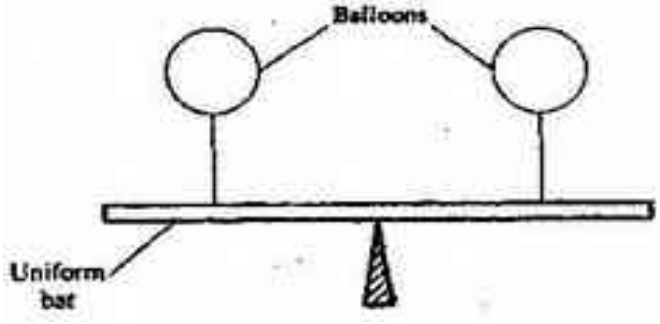

Figure 7

Explain why the bar may not remain in equilibrium if the temperature of the surrounding changes. (2 marks)

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15. 2006 Q17 P1

(a) state Archimedes principle (4 marks)

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(b) in an experiment to determine the relative density of methylated spirit applying Archimedes Principal, the following were provided, a spring balance, some masses, a piece of thread, water in a beaker and methylated spirit in a beaker. The table below shows the results obtained.

Mass (g)	100	150	200
Weight in air (N)	1.00	1.50	2.00
Weight in water (N)	0.88	1.32	1.76
Weight in spirit (N)	0.91	1.36	1.82

(i) Draw labeled sketch diagrams to show how the readings in the table were obtained (1 mark)

(ii) For each mass, determine the upthrust in water and the upthrust in the Spirit (2 marks)

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(iii) Determine the average relative density of the spirit (3 marks)

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(c) A weather balloon of volume $1.2m^3$ is tied to a rigid support while being filled with helium gas. The mass of the fabric making the balloon is 0.30kg.

Determine the maximum tension on the string trying the balloon to the rigid support

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16. 2007 Q19 P1

a) State the law of floating (1 mark)

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(b) Figure 13 shows a simple hydrometer

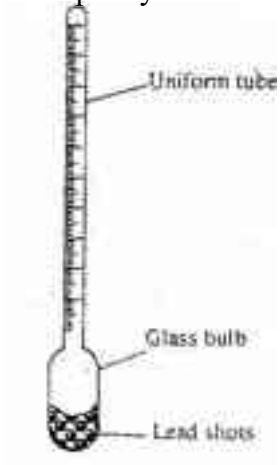

Figure 13

(i) State the purpose of the lead shots in the glass bulb (1 mark)

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(ii)How would the hydrometer be made more sensitive? (1 mark)

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(iii) Describe how the hydrometer is calibrated to measure relative density

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(c) Figure 14 shows a cork floating on water and held to the bottom of the beaker by a thin thread.

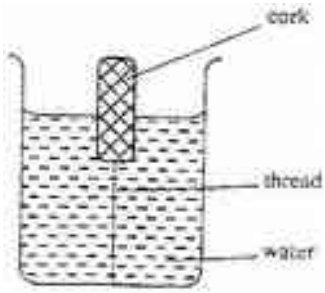

Figure 14

(i) Name the forces acting on the cork (3 marks)

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(ii) Describe how each of the forces mentioned in (i) above changes when water is added into the beaker until it fills up. (3 marks)

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17. 2009 Q17 P1

(a) State the law of flotation (1 mark)

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(b) **Figure 10** shows a rectangular metal block of density 10500 kgm^3 and dimensions 30cm x 20cm x 20cm suspended inside a liquid of density 1200kgm^3 by a string attached to a point above the liquid. The three forces acting on the block are; the tension T, on the string, weight W of the block, and the upthrust, U, due to the liquid.

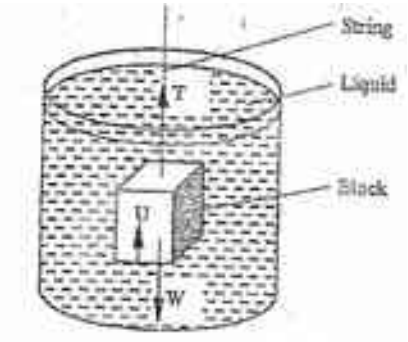

Figure 10

(i) Write the expression relating T, W and U when the block is in equilibrium inside the liquid. (1 mark)

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(ii) Determine the weight, W, of the block. (3 marks)

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(i) Determine the weight of the liquid displaced by the fully submerged block. (2 marks)

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(iv) Hence determine the tension, T, in the string. (1 mark)

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(c) A certain solid of volume 50cm^3 displaces 10cm3 of kerosene (density 800 kgm^3) when floating. Determine the density of the solid. (4 marks)

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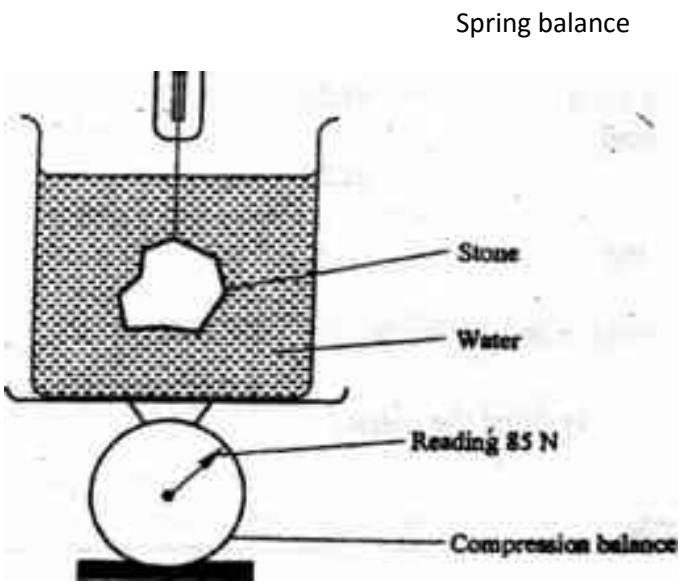
18. 2010 Q18 P1

Figure 8 shows a stone of mass 4.0kg immersed in water and suspended from a spring balanced with a string. The beaker was placed on a compression balance whose reading was 85N. The density of the stone was 3000kg-3 while the density of the liquid was $800kg^{-3}$.



Determine the:

a) Volume of the liquid displaced. (2 marks)

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b) Upthrust on the tone (4 marks)

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c) Reading of the spring balance: (2 marks)

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d) Reading of the compression balance when the stone was removed from the water. (2marks)

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19. 2011 Q19a, b,e P1

(a) State the conditions necessary for a body to float in a fluid. (1mark)

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(b) A ship made of steel is observed to float on water yet the density of steel is approximately eight times that of water. Explain this observation. (2marks)

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(c) **Figure 18** shows parts of a simple submarine, a ship that can travel both on water and under water.

To do this water is pumped in or out of the ballast tanks.

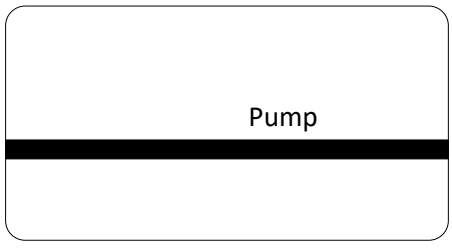

Figure 18

Explain how the tanks are used to change the depth of the submarine. (2marks)

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20. 2012 Q6 P1

State two environmental hazards that may occur when oil spills over a large surface area of the sea. (2marks)

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21. 2012 Q18b P1

Figure 13 shows a log of wood of mass 20kg submerged in water in a pond and held in position by striking fixed to the bottom of the pond.

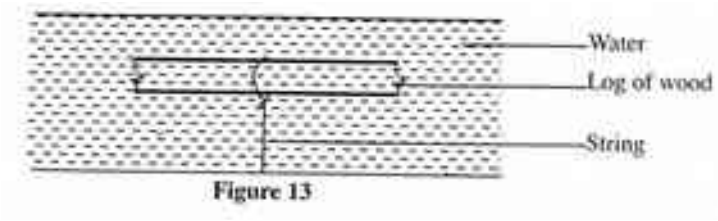

Figure 13

given that density of water is 1000kgm^{-3} and that of wood is 800kg-3, determine the;

(i) Volume of the log, (3marks)

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(ii) Upthrust on the log. (2marks)

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(iii) Tension in the string (2marks)

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