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**Worksheet**

Problem For Practice :

**Based on Thrust And Pressure :**

1. The force on a phonogram needle is 1.2 N. The point has a circular cross-section of radius 0.1 mm. What pressure does it exert on the record in (a) Pa (b) atm?
2. A force of 15 N is uniformly distributed over an area of 150 cm2. Find the pressure in pascals.
3. How much force should be applied on an area of 1 cm2 to get a pressure of 15 Pa?
4. The pressure due to atmosphere is 1.013 x 105 Pa. Find the force exerted by the atmosphere on the top surface of a table 2 m long and 1 m wide .
5. A block of wood is kept on a table top. The mass of the wooden block is 5 Kg and its dimensions are 40 cm X 20 cm x 10 cm. Find the pressure exerted by the wooden block on the table top, if it is made to lie on the table with its sides of dimensions : (a) 20 cm x 10 cm (b) 40 cm x 20 cm.
6. A cube of edge length 10 cm is placed inside a liquid. The pressure at the centre of the face is 15 Pa. Find the force exerted by the liquid on this face .
7. Find the thrust acting on the human body due to atmospheric pressure. Take the surface area of a man of middle size to be 1.5 m2 and atmospheric pressure (1 atm) = 1.013 x 105 Pa.
8. A force of 16 N is distributed uniformly on one surface of a cube of edge 8 cm. Find the pressure.
9. A force of 100 N is applied on an object of area 2 m2. Calculate the pressure.
10. A boy weighing 60 Kg f is wearing shoes with heel of area of cross-section 20 cm2 while a girl weighing 45 Kg f is wearing shoes with heel of area of cross-section 1.5 cm2. Compare the pressures exerted on the ground by their heels when they stand on the heel of one foot.
11. A nail is driven into a wooden board by using a hammer. The impact of the hammer on the head of the nail produces a thrust of 25 N. If the area of the head is 0.5 mm2 and of the tip 0.1 mm2, find the pressure on the head and the tip of the nail.
12. A car weighs 1200 kg. This weight is evenly distributed on 4 wheels . If the pressure in each tyre is 15 kg wf/cm2, what is the area of each tyre in contact.
13. A hydraulic automobile lift is designed to lift cars with a maximum mass of 3000 kg. The area of the piston carrying the load is 425 cm2. What maximum pressure would the smaller piston have to bear?
14. An airplane window has an area of 825 cm2. Cabin pressure is 1 atm, and the outside pressure is 0.3 atm. Find the force produced by air pressure on the window.
15. Find the pressure exerted on skin of balloon with a force of 2.1 N using: (a) Your finger (b) a needle. Assume the area of your finger tip is 1 x 10 – 4 m2, and the area of needle tip is 2.5 x 10 – 7 m2. (c) Find the maximum force necessary to burst the balloon with the needle, given that the balloon bursts with a pressure of 3 x 10 5 N/m2.

**Based on Density And Relative Density :**

1. A wooden block of dimensions 10 cm x 20 cm x 50 cm weighs 6.5 kg. Calculate the density of the block.
2. Calculate the mass of a body whose volume is 2 m3 and density 0.52 g/cm3.
3. A dining hall has dimensions 50 m x 15 m x 3.5 m. Calculate the mass of air in the hall. Given density of air = 1.3 Kg/m3.
4. A piece of copper of mass 106 g is dipped in a measuring cylinder containing water at 22 ml mark. The water rises to 34 ml. Find (a) volume of copper piece (b) The density of copper.
5. A thread of mercury of 10.2 g is in a tube of uniform cross-section 0.1 cm2. Calculate the length of the thread. The density of Mercury = 13.6 g/cm3. [ Volume = Length x Area]
6. An iron cylinder of radius 1.4 cm and length 8 cm is found to weigh 369.6 g. Calculate the density of iron.
7. Calculate the mass of air enclosed in a room of length, breadth and height equal to 5 m , 3 m and 4 m respectively. Density of air = 1.3 kg/m3.
8. The mass of a solid rectangular block of iron is 23.6 g and its dimensions are 2.1cm x 1.2 cm x 1.1 cm. Calculate the density of iron.
9. The mass of a empty 40 litre petrol tank of a vehicle is 8 kg. What will be its mass when filled completely with a fuel of density 700 kg/m3.
10. A weather forecasting plastic balloon of volume 15 m3 contains hydrogen of density 0.09 kg/m3. The mass of the empty balloon is 7.15 kg. Calculate :

(a) The mass of hydrogen in the balloon (b) The mass of the balloon filled with the hydrogen.

1. Relative density of silver is 10.8. The density of water is 103 kg/m3. What is the density of silver in SI units?
2. A bottle weigh 30 g when empty, 53.4 g when filled with a liquid and 48 g when filled with water. Calculate the density of the liquid. Given, density of water at 4 = 1000 kg/m3.
3. The mass of a density bottle is 25 g when empty. 50 g when filled completely with water and 365 g when filled completely with mercury. Find the density of mercury.
4. Calculate the mass of a body whose volume is 2 m3 and relative density is 0.52.
5. Find the mass of air in the empty room with dimensions 5 m by 4 m and a ceiling 3 m high. What is the weight of this mass in air? Density of air = 1.2 kg/m3.

**Based on Archimedes’ Principle (Buoyant Force) :**

1. A cubical block of water is dipped completely in water. Each edge of the block is 1 cm in length. Find the buoyant force acting on the block.
2. A body of mass 2 kg and density 8000 kg/m3 is completely dipped in a liquid of density 800 kg/m3. Find the force of buoyancy on it.
3. A piece of iron of density 7.8 x 10 – 3 kg/m3 and volume 100 m3 is totally immersed in water. Calculate (a) The weight of iron piece in air (b) the upthrust (c) Apparent weight in water.
4. A body of 50 cm3 is completely immersed in water. Find the force of buoyancy in it.
5. A metallic sphere of radius 2 cm is completely dipped in water. Find the force of buoyancy on it.
6. A body of 2 kg floats in a liquid . What is the buoyant force on the body?
7. A solid of density 5000 kg/m3 weighs 0.5 kg f in air. It is completely immersed in water of density 1000 kg/m3. Calculate : (a) Calculate the apparent weight of the solid in water.

(b) What will be its apparent weight if water is replaced by a liquid of density 8000 kg/m3.

1. The mass of a block made of certain material is 13.5 kg and its volume is 15 x 10 – 3 m3. Will the block float or sink?
2. A solid body of mass 4 x 103 kg and volume 2 m3 is put in water. Will the body floats or sink?
3. A solid body of mass 150 g and volume 250 cm3 is put in water. Will the body float or sink?
4. The volume of 50 g of a substance is 20 cm3. If the density of water is 1 g/cm3, will the substance float or sink?
5. The volume of 500 g sealed packet is 350 cm3. Will the packet float or sink if the density of water is 1 g/cm3? What will be the mass of the water displaced by this packet?

**Answers**

**1.** (a) 382 x 105 Pa (b) 378 atm **2.** 1000 Pa **3.** 15 x 10 – 4 N **4.** 2.026 x 105 N

**5.** (a) 2500 Pa (b) 625 Pa **6.** 0.15 N **7.** 1.52 x 105 N **8.** 2500 Pa **9.** 50 Pa **10.** 5 x 107 Pa , 25 x 107 Pa **11.** 10 times **12.** 20 cm2 **13.** 705882 Pa

**14.** 5.83 x 102 N **15.** (a) 2.1 x 104 N/m2 (b) 8.4 x 106 N/m2 (c) 0.075 N

**16**. 650 kg /m3 **17.** 1040 kg **18.** 3412.5 kg **19.** (a) 12 cm3 (b) 883 kg/m3

**20.** 7.5 cm **21.** 7500 kg/m3  **22.** 78 kg **23.** 8514 kg/m3 **24.** 36 kg

**25.** (a) 1.35 kg (b) 8.5 kg **26.** 10.8 x 103 kg/m3 **27.** 1300 kg/m3 **28.** 13600 kg/m3

**29.** 1040 kg **30.** 706 N **31.** 10 – 2 N **32.** 2 N **33.** (a) 7.8 N (b) 1 N (c) 6.8 N

**34.** 0.5 N **35.** 0.335 N **36.** 20 N **37.** (a) 0.4 Kg f (b) 0 **38.** 900 kg/m3 , floats

**39.** 2 x 103 kg/m3 , sink **40.** 0.6 g/cm3 , float **41.** 2.5 g/cm3 , sink

**42.** 1.428 g/cm3 , sink , 350 g