1.

Hi Class

Reed Richards, otherwise known as Mr. Fantastic, has the curious ability to stretch out his limbs.  Suppose he were trying to stop a fleeing thief by grabbing that individual.  Considering the conservation of matter, to what extent would Mr. Fantastic be able to extend his arms before he would lose cohesion?  And what might his density be at that point?  Again making some reasonable assumptions, discuss how you would answer these questions.

**Students:** You will receive no points for a plagiaristic post of material and/or the majority of the post is not original work (in your own words—i.e., cut/paste content from a website or paper).

2 The mass density of an object is 17.3 g/cc, and its volume is determined to be 20.7 cc. What is the mass of the object?

3. The mass density of an object is 16.0 g/cc, and its mass is determined to be 198 g. What is the volume of the object?   


4. The mass of an object is 332 g, and its volume is determined to be 110 cc. What is the mass density of the object?

5. The SI units of mass density are kg/m3, but there are several other common units. One of the most commonly used units of mass density is gram per cubic centimeter, or g/cc. This is because pure water has a mass density of 1 g/cc. It turns out that 1 mL of liquid is equal to 1 cc of volume. So it is also possible to express the mass density of water as 1 g/mL. This makes water a useful tool since it is possible to use graduated cylinders to measure volumes.  
  
An object with a mass of 27.0 g displaces 545.0 ml of water when it is completely immersed. What is the buoyant force on the mass? (Use

*g* = 9.8 N/kg

 as necessary.)   


The water in the plumbing in a house is at a gauge pressure of 320,000 Pa. What force does this cause on the top of the tank inside a water heater if the area of the top is 0.9 m2? (Ignore atmospheric pressure.)

A viewing window on the side of a large tank at a public aquarium measures 33 in. by 43 in. The average gauge pressure from the water is 3 psi. What is the total outward force on the window?

A small statue is recovered in an archaeological dig. Its weight is measured to be 12.6 lb and its volume 0.06 ft3.

(a) What is the statue's weight density?  
   
(b) What substance is it, most likely?

ebony woodjuniper wood    irondiamondsilver

A certain part of an aircraft engine has a volume of 2.7 ft3.

(a) Find the weight of the piece when it is made of lead.  
   
(b) If the same piece is made of aluminum, what is its weight?  
   
Determine how much weight is saved by using aluminum instead of lead.  


The depth of the Pacific Ocean in the Mariana Trench is 36,198 ft. What is the gauge pressure at this depth?

A storage tank 27 m high is filled with gasoline. (Assume the tank is open and exposed to the atmosphere at the top.)

(a) Find the gauge pressure at the bottom of the tank.  
   
(b) Calculate the magnitude of the force produced by the fluid that acts on a square access hatch at the bottom of the tank that measures 0.2 m by 0.2 m.  


A modern-day zeppelin holds 8,390 m3 of helium. Compute its maximum payload at sea level. (Assume the helium and air to be at 0°C and 1 atm.)

A juniper-wood plank measuring 0.27 ft by 1 ft by 18 ft is totally submerged in water.

(a) What is its weight?  
   
(b) What is the buoyant force acting on it?  
   
(c) What is the size and the direction of the net force on it?

|  |  |
| --- | --- |
| size |  |
| direction |  |
| A rectangular block of ice with dimensions 2 m by 2 m by 0.2 m floats on water. A person weighing 960 N wants to stand on the ice. Would the ice sink below the surface of the water?  YesNo |  |

The wing of an airplane has an average cross-sectional area of 11 m2 and experiences a lift force of 66,000 N. What is the average difference in the air pressure (in N/m^2)between the top and bottom of the wing?

Describe the four phases of matter. Compare their external, observable properties.

Solids: (Select all that apply.)

are generally good conductors of electricity and interact strongly with magnetic fieldscan be compressed or squeezed into a smaller volume readilyflow readily, conforming to the shape of their containerhave a well-defined boundary or surfaceare rigid, and generally retain their shape unless distorted by a force

Liquids: (Select all that apply.)

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Gases: (Select all that apply.)

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Plasmas: (Select all that apply.)

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Compare the nature of the forces between atoms or molecules (or both) in the solid, liquid, and gas phases.

Solids:

The attractive forces bind particles together, but not rigidly so; each atom or molecule can move about relative to the others but is always in contact with other atoms or molecules.The attractive forces between particles are too weak to bind them together; atoms or molecules move about freely with high speed and are widely separated, only coming into contact when they collide.    The attractive forces are so strong that the atoms or molecules are rigidly bound to their neighbors and can only vibrate.

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The pressure in the air along the upper surface of an aircraft's wing (in flight) is lower than the pressure along the lower surface. Compare the speed of the air flowing over the wing to that of the air flowing under the wing.