Grade 8 Science Fluids Full Unit Review 2023

1. What is a fluid?
   Any material that is capable of flowing (includes liquids and gases).

2. List the 5 main ideas of the particle theory.
   a) All matter is made of tiny particles (atoms)

   b) Each pure substance has a specific type of particle

   c) Particles are in constant movement (vibration)

   d) There is mostly empty space between particles and within particles

   e) Particles are attracted to one another

   f) Particles vibrate more and take up more space when heated (thermal expansion) and take up less space when cooled (thermal contraction)

3. What are the 3 states of matter? Compare and contrast them.

	Solid	Liquid	Gas
Temp/energy	Low	Medium	high
Density	High	medium	low
Can flow	No	Yes	Yes
Takes form of container	No	Yes (only bottom)	Yes (entire container)

4. Explain the Archimedes Principle?

Archimedes' principle states that any **object** immersed in a fluid is acted upon by an upward, or buoyant, force equal to the weight of the fluid displaced by the **object**

5. What is displacement?

The volume of fluid that is occupied by another object or that it pushes away due to its volume

6.
What is density?

The amount of mass divided by the volume of an object or material. d = m/V

7. What is buoyancy?

Buoyancy is the amount of force that is applied to an object when it is placed in a fluid. It is equal to the amount of fluid displaced by that fluid.

8. When we compare the density of two materials of the same volume, which one is heavier? The one that has less mass?

If the volumes are the same, the material with the greater density is heavier since it has a greater mass per volume. Density = mass / Volume.

9. What is the difference between adhesion and cohesion?

Adhesion is the sticking of fluid particles to another material (this explains the meniscus and capillary action) while cohesion is the sticking of particles within a fluid to each other (this explains viscosity and surface tension of fluids).

10. How can you change viscosity?

You can change viscosity by changing the temperature of a fluid or the pressure of the fluid if it is a gas). You can also change the viscosity if you change the fluid concentration (think of maple syrup).

11. Hot air balloons use heated air to rise and sink in the air. An air ship or submarine does not. What do they do to rise and sink? (hint: they use the compressibility of air).

Both airships and submarines use compressed gases to change their volumes. Air ships use a large amount of lighter than air gases such as helium to create enough buoyant force to lift the whole airship. Submarines use compressed air in their ballast tanks to change their volume and either sink (dive) or rise to the surface.
https://youtu.be/BTis6GioP2g

12. Are scuba tanks buoyant? Why.

Most tanks are close to neutrally buoyant so that the diver can go under water without having to fight the buoyancy of the tanks. As they use up the air, the tanks become more buoyant but the diver uses their buoyancy compensator vest to adjust their buoyancy.

13. Explain Pascal's Law.

Pascal's Law states that the pressure in an enclosed system is applied through the entire system. Meaning that if there is a positive pressure, it is applied in all directions in the fluid – including every surface.

14. How can you get Mechanical advantage in a fluid system??

Because of Pascal's Law, if you have moving pistons in an enclosed system (hydraulic or pneumatic system), you can create a large force if you change the pressure within the system. You can change the volume of the system by pumping in fluid into the cylinder or pumping it out - thus changing the volume and moving the piston.

15. Find the density of the following materials

Volume (cm^3)	Mass (g)	Density (g/cm^3)	Float/Sink in water?	Material*
15	15	1.00	Neither	water
0.621	12	19.32	Sink	gold
50	2.5	0.05	Float	Styrofoam
3000	0.6	0.0002	Float	helium
20	54	2.70	Sink	granite

*Which one is the following – granite, gold, Styrofoam, helium and water.

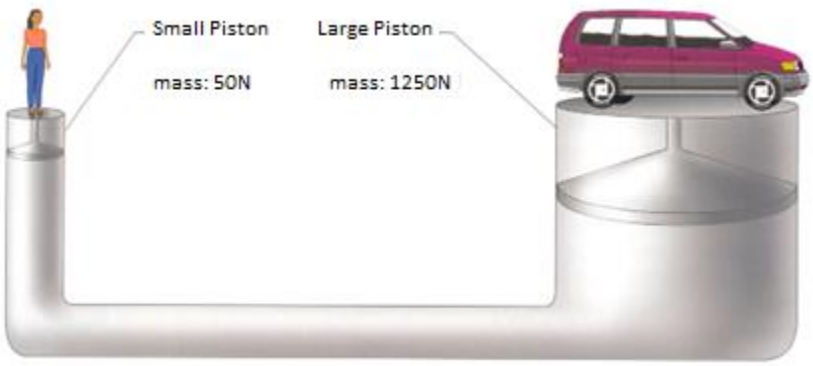
16. Do gases have density too? Explain.

Gases have density too. Since all matter has mass and takes up volume and density is calculated by taking the mass of a material and dividing it by the volume of that material, all gases have density.

17. A ship rides higher when in salty ocean water compared to fresh lake water? What does this tell us about the different densities of salt water and fresh water?

Since the ship rides higher in salt water and the mass of water is the same as the ship (and the ship's mass doesn't change), the volume of water needed to float the ship is less than in fresh water. This means that the density of the salt water is greater since the mass stays the same and the volume is less (density = m/V). The greater buoyant force means the density of the salt water is greater.

18. What is the Hydraulic Advantage of this system? Show all your work.



The Hydraulic Advantage is found by finding the ratio of forces. We are given the input and output forces and therefore we can find the Hydraulic Advantage if we use the following formula:

HA = Output Force ÷ Output Force
= 1250N ÷ 50N
= 25

∴The Hydraulic Advantage of this system is 25 since it can lift 25 times as much mass (force).