

The properties of fluids explained by the particle model of matter.

Student Name \_\_\_\_\_

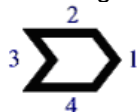
Class \_\_\_\_\_

**Viscosity & Flow Rate**

- The **viscosity** of liquids can be compared by observing their ...
  - clarity
  - volume
  - resistance to flow**
  - resistance to acceleration
- In order to **increase the speed of flow** of oil in a pipeline, the oil should be ...
  - heated**
  - cooled
  - expanded
  - compressed
- Using the **ramp method** to determine viscosity, a student found out that Fluid A has a flow rate of 10.5 ml, per second. Fluid B has a flow rate of 11.3 ml, per second. Compared to fluid A, fluid B is ...
  - more viscous
  - less viscous**
  - more dense
  - less dense

- Use the illustration to answer the question.

The shape shown here travels through a fluid. This shape would



experience the **most drag**

if it were moving in direction ...

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- 2
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- When your dad or mom start the cold car in the morning, they may mention that the **viscosity** of the motor oil would be **decreased** by ...
  - running the engine**
  - charging the battery
  - changing the antifreeze
  - replacing the thermostat
- To explain **viscosity** using **the particle model**, the following statement would be correct ...
  - the particles can slide and roll over each other**
  - the particles move randomly
  - the particles bump into each other
  - the particles rearrange themselves

**Density**

- An everyday situation, like a 'crowded' elevator, can represent the particle model, which helps us to visualize empty spaces between the particles. In this example a 'spacing box' is used in an elevator. Each person has his or her own individual 'spacing box'. This idea of spaces between the particles, helps us to understand the concept of **density**, if we consider the ...
  - placement of the spacing boxes in the elevator**
  - type of spacing box used
  - size of the spacing box
  - number of spacing boxes

8. The **particles** in a liquid cannot support the particles of a solid, unless the ...  
A. liquid is less dense  
B. liquid particles have less attractive force between them  
C. solid particles have more attractive force between them  
**D. solid is less dense**
9. Which of the following statements best describes the correct difference, in terms of density?  
A. liquids are less dense than gases  
**B. gases are less dense than liquids**  
C. gases are more dense than solids  
D. liquids are more dense than solids
10. A student made the following statement, "*All liquids are less dense than all solids and more dense than all gases*". Which of the following substances proves this student's statement to be **INCORRECT**?  
**A. mercury**  
B. gold  
C. iron  
D. helium
11. The formula for density is **Density = Mass / Volume**. If a substance has a volume of  $100\text{cm}^3$  and has a mass of 1932 grams, what is the density of the substance?  
A.  $193.20\text{ g/cm}^3$   
**B.  $19.32\text{ g/cm}^3$**   
C.  $1.932\text{ g/cm}^3$   
D.  $0.1932\text{ g/cm}^3$

### Buoyancy

12. **Buoyancy** is the tendency of an object to float. A diver demonstrates **neutral buoyancy** when ...  
**A. force of gravity equals force of buoyancy**  
B. force of buoyancy is greater than force of gravity  
C. force of buoyancy is less than force of gravity  
D. force of gravity does not affect force of buoyancy
13. Large ocean liners, and cargo ships, can float on the water because ...  
**A. its average density is lower than saltwater**  
B. the metal it was made of is less dense than water  
C. the metal is more dense and therefore can float  
D. saltwater is more dense and can hold up steel
14. Archimedes principle states that '*the buoyant force acting on an object equals the ...*'  
A. mass of the fluid displaced by the object  
B. force that holds the object afloat  
C. weight of the object displaced by the fluid  
**D. weight of the fluid displaced by the object**
15. Fresh and saltwater systems have different densities. All cargo ships have a special line that shows how much the ship should be safely loaded so it won't sink as it goes from freshwater to saltwater. This line is called the ...  
A. Sinking Line  
B. Buoyancy Line  
**C. Plimsoll Line**  
D. Density Line

16. Density and buoyant force are related. As the ...
- A. density of a fluid increases, the buoyant force decreases
  - B. density of a fluid decreases, the buoyant force increases**
  - C. density of a fluid increases, the buoyant force remains the same
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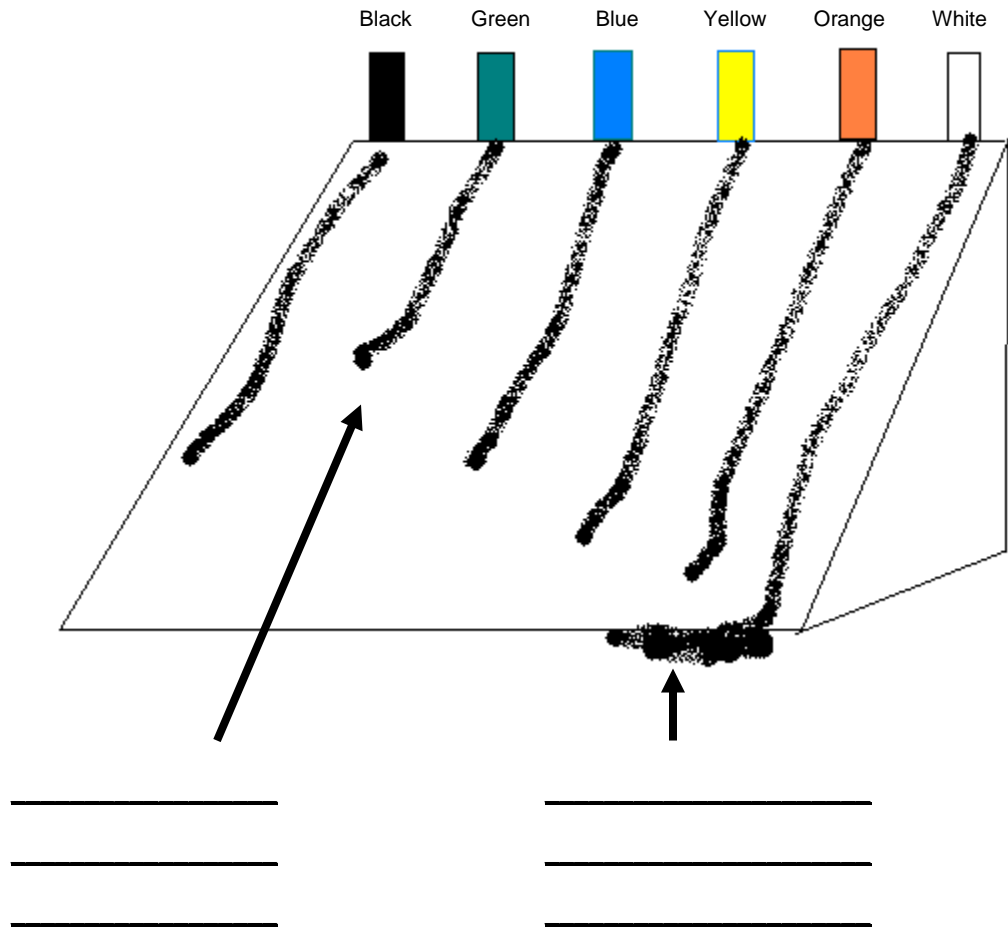
### Compression

17. A gas can be **compressed** more than a liquid because the gas particles ...
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  - B. need extra energy to take up more space
  - C. have more space between them than the liquid particles do**
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18. When a force is applied to a substance and the particles cannot be forced closer together the substance is said to be **incompressible**. What happens to the force?
- A. It changes the volume
  - B. It is absorbed by the substance
  - C. It is applied throughout the substance**
  - D. It changes direction

### Pressure

19. **Pressure** is the amount of force applied to a given area. This is measured in ...
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  - B. Meters squared
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20. When we suck on a straw in a Tetra Pak juice container, the sides of the container collapse. This happens because ...
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  - C. the pressure inside the container is increased and collapses from the added pressure
  - D. we are lowering the strength of the container when we suck on the straw
21. **Pascal's Law** states that an **enclosed** fluid transmits pressure in ...
- A. an upward direction
  - B. a downward direction
  - C. a sideways direction
  - D. all directions equally**
22. In a model **hydraulic press** model built by an apprentice, a pedal is used to push down the large piston, while the small piston lifts up a load. The apprentice's model didn't work. What is wrong with it?
- A. The pistons should have the same diameter.
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23. Two identical syringes are used to build a model of a hydraulic press. The press does not lift the loads you expect. To remedy the situation, you should use ...
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24. In terms of design, a **pneumatic device** (such as a compressor) resembles a hydraulic press. The distinguishing difference is that this pneumatic device uses ...  
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25. Hydraulic and pneumatic devices are able to function properly only if this occurs. These systems are ...  
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26. Using the Particle Model - illustrate the concept of **VISCOSITY** as it is demonstrated/tested used the **RAMP METHOD**.



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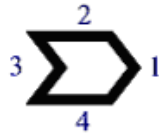
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