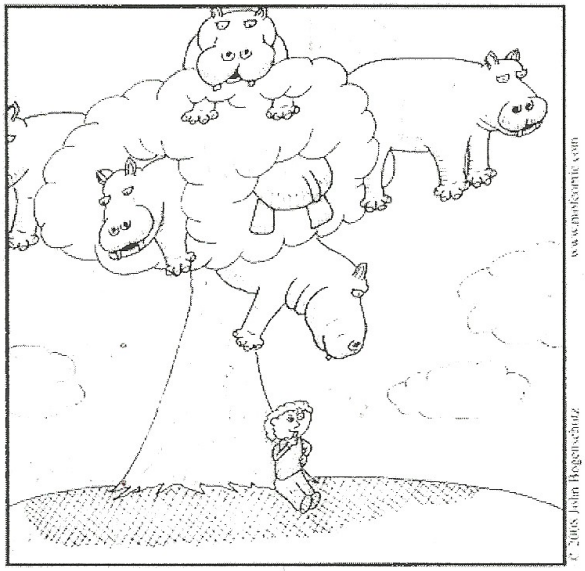
Science 8

Fluids and Dynamics Unit Test

Name: Key

1. You have the whole block to write the test.
2. You may use a 1 pg handwritten "cheat sheet" to assist you.
3. You may not use other notes or the textbook during the test.
4. You must write in black pen, blue pen or pencil.
5. Please answer all questions.




It was, actually, under this hippo tree where Isaac Newton's fierce physicist rival, Bernard Johns, would soon *first* discover the theory of gravity.
*...however...*

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## Section 1: Fill in the Blank

Use the following words to fill in the blanks; each word will be used only once, some words will not be used at all:

| | | |
|---|---|---|
| Action-at-a-distance force | Fluid | Pressure |
| Adhesion | Heat | Respiratory system |
| Circulatory system | Hydraulic | Static pressure |
| Cohesion | Hydraulic multiplication | Surface tension |
| Compression | Implosion | Thermal energy |
| Contact force | Matter | Temperature |
| Deformation | Mass | Viscosity |
| Density | Newtons | Volume |
| Displacement | Pascals | Weight |
| Explosion | Pneumatic | |

1. Anything with mass and volume is matter.
2. How much space an object takes up is called its volume.
3. The total kinetic energy from the particles in an object moving is the object's thermal energy.
4. The energy which transfers from an object with higher temperature to an object with lower temperature is called heat.
5. Anything which flows is called a(n) fluid.
6. If a solid floats on a liquid it pushes some of the liquid out of the way, this is called displacement.
7. The force of gravity on an object is that object's weight.
8. If force is applied to an object and it changes its shape <u>without</u> changing its volume this is called deformation.
9. If the pressure inside a container is extremely high this could cause a(n) explosion.
10. A substance with a low flow rate has a high viscosity.
11. A drop of water sticks to the inside of glass, this is an example of adhesion.
12. A stone can skip across a lake even though it is denser than water due to surface tension.
13. A full 2 liter pop bottle is squeezed; this creates static pressure since the water has nowhere to go.
14. A(n) pneumatic system uses compressed gasses.

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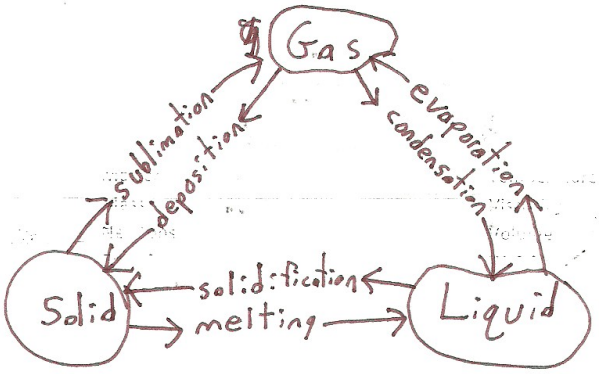
## Section 2 Diagrams:

15. Draw and label a diagram with the 6 changes of matter: **melting**, **sublimation**, **evaporation**, **deposition**, **solidification**, and **condensation**.

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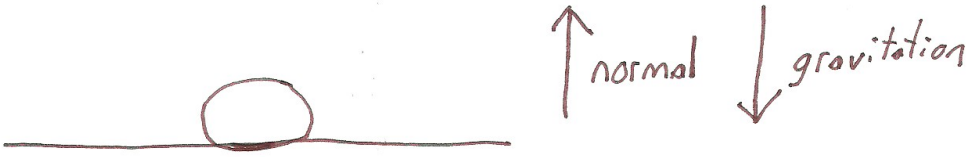
16. Create a force arrow diagram of an object resting on the ground with **gravitation force** and **normal force** labeled with arrows of appropriate length.

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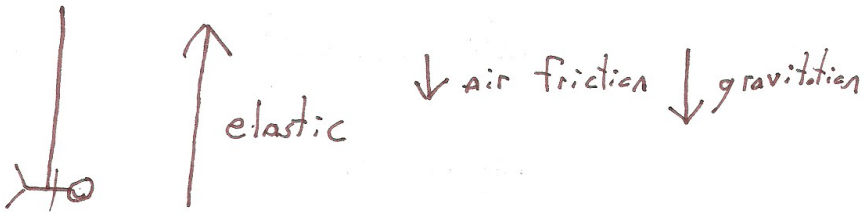
17. A person goes bungee jumping, they fall a certain distance and then are pulled up by the bungee cord. Create a force arrow diagram of a person being **pulled up** by a bungee cord, labeling **gravitation**, **elastic** and **air friction** forces with arrows of appropriate length.

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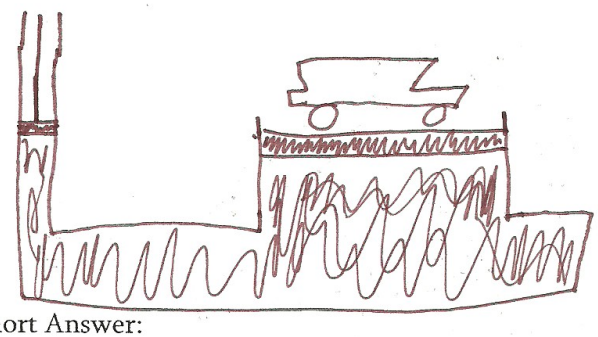
18. Draw a diagram of a hydraulic system which uses hydraulic multiplication to transform a small force into a force large enough to lift a car.



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## Section 3 Short Answer:

19. Give the order the following liquids would layer from **top to bottom** based on their densities. The density of water is not given as it is expected you know this:

| Liquids | Order |
|---|---|
| A. Gasoline (0.737 g/ml) | 1. A |
| B. Iodine (4.927g/ml) | 2. D |
| C. Water | 3. C |
| D. Sunflower oil (0.920 g/ml) | 4. F |
| E. Mercury (13.59 g/ml) | 5. B |
| F. Milk (1.05g/ml) | 6. E |

/3

20. List three action-at-a-distance forces

| |
|---|
| Gravity |
| Static electricity |
| Magnetism |

/3

21. List the four principles of the kinetic theory of matter.

| | |
|---|---|
| 1. | All matter is made of tiny particles |
| 2. | There is empty space between particles |
| 3. | Particles are constantly moving |
| 4. | Energy makes the particles move |

/4

22. List 3 fluids with higher viscosity than water.

| |
|---|
| corn syrup |
| dish soap |
| honey |

/3

23. Next to each situation put a **B** if the forces are balanced, put a **U** if they are unbalanced.

a) A car is driving at a steady speed of 80km/hr along a highway. B

b) A car slows down before a red light. U

c) An airplane speeds up as it moves down the runway prior to take off. U

d) A textbook sits on a desk. B

/4

24. Give an example of two objects where one has a higher thermal energy but lower temperature than the other.

A lit match has a higher temperature than an iceberg but the iceberg has more thermal energy since it is much larger. /1

25. Describe in detail how you would find the density of an irregularly shaped piece of wax.

1. Use a scale to find its mass

To find its ~~density~~ volume:

2. Fill graduated cylinder with 50ml of water
3. ~~Bomb~~ Submerge wax and read new volume
4. Subtract ~~[illegible]~~ 50 from number in step 3. This is the volume of the wax piece.
5. Divide mass from step 1 by volume in step 4, this is the density

/5

26. When people climb very high mountains they often bring oxygen tanks to breathe. Explain why this is necessary.

Air is less dense in the mountains since they are higher. /1

27. Explain why a balance scale would measure mass correctly on another planet while a spring scale would not.

Balance scale works since gravity (any gravity) pulls equally on both sides. Spring scale is calibrated to Earth's gravity. /2

28. Explain how an implosion could occur, use the term pressure.

If the pressure outside a container is greater than the pressure inside /1

29. A helium balloon floats upwards and eventually pops, explain why it pops.

As it rises the pressure outside the balloon increases, the balloon expands until it can not expand any more, then it pops /1

30. A liquid is heated in the microwave.

a. How will this affect the viscosity of the liquid?

decrease

b. How will this affect the flow rate of the liquid?

increase /2

31. Explain why clay shaped like a boat floats in water while a flat piece of clay sinks.

For the clay shaped like a boat to sink any lower air needs to displace water. At the point where it stops sinking the air + clay of the boat has equal density to the water. The flat piece of clay always has a lower density than water. /3

32. Blood pressure readings give two numbers, what does each number represent?

First number is pressure of blood being pumped, second is pressure when heart relaxes.

/2

33. Explain what happens when you breathe in using the terms, **diaphragm**, **lower pressure**, and **higher pressure**.

Deformation Mass Viscosity
Density Newtons Volume
Displacement Pascals Weight

The diaphragm lowers creating lower pressure in the chest cavity, air from the higher pressure outsides rushes into the lungs

/3

**Section 4: Bonus**, attempt only after all other questions have been completed.

Give complete directions for constructing a Cartesian diver using a 2L pop bottle, a balloon and some paperclips. Explain how it works.

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