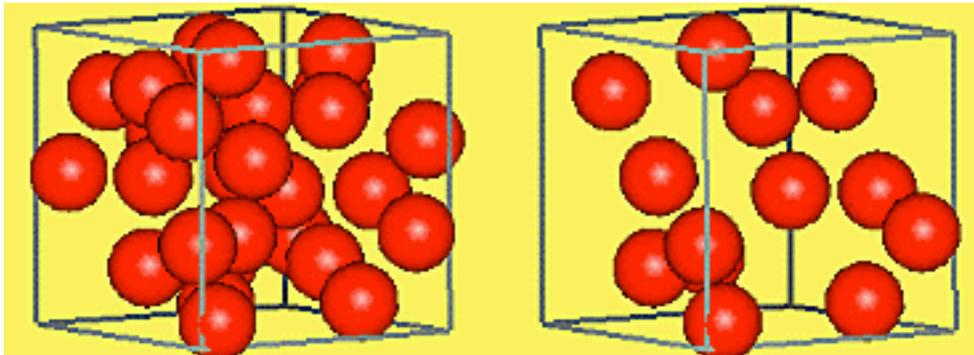


Name \_\_\_\_\_ Date \_\_\_\_\_

## Density

Take a look at the two boxes below. Each box has the same volume. ***If each ball has the same mass, which box would weigh more? Why?***



The box that has more balls has more \_\_\_\_\_ per unit of volume. This property of matter is called \_\_\_\_\_. The density of a material helps to distinguish it from other materials. Since mass is usually expressed in grams and volume in cubic centimeters, density is expressed in grams/cubic centimeter.

We can calculate density using the formula:

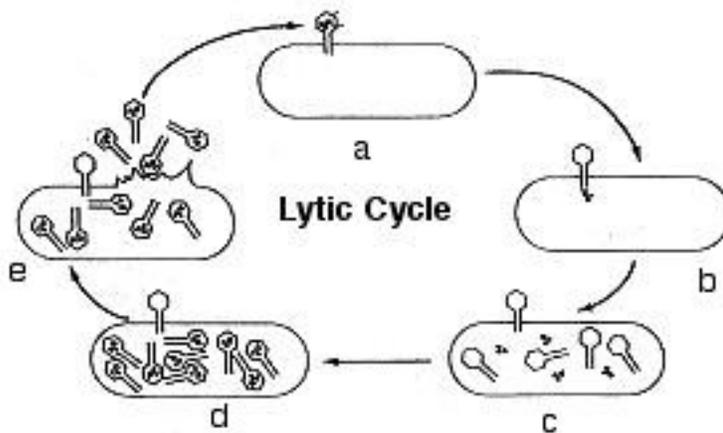
$$\text{Density} = \text{Mass} / \text{Volume}$$

The block on the left contains 27 spheres and the one on the right contains 13. Each sphere has a mass of .2 grams. The volume of each box is 100 cubic centimeters. Calculate the density of each of the boxes.

Density of Box 1 \_\_\_\_\_ Density of Box 2 \_\_\_\_\_

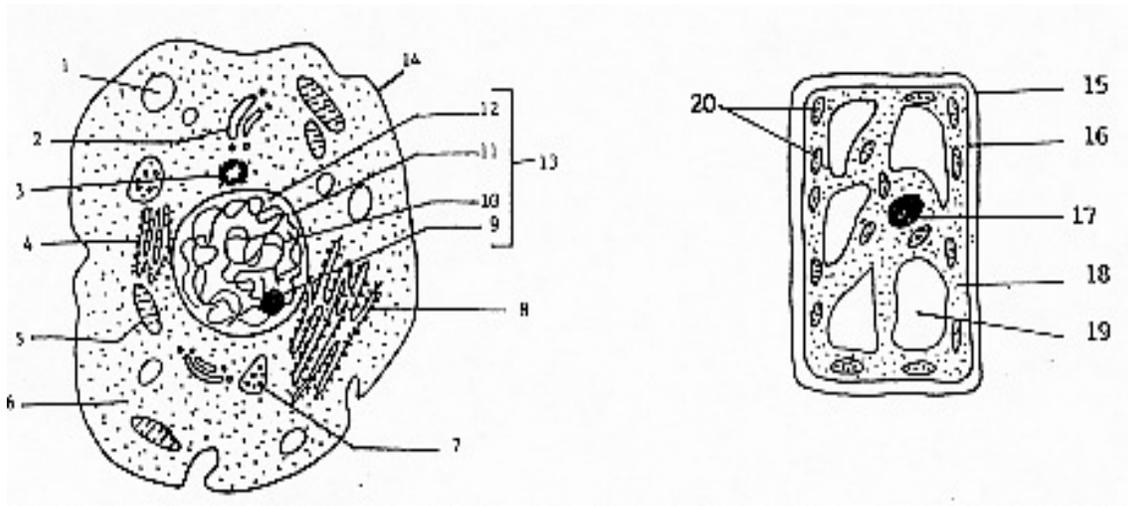
Below, find figure 1.2 Lytic cycle. This is the reproductive cycle of a virus. This type of virus infects cells in order to reproduce. If each virus has a mass of 0.5 ng (nanograms) and the volume of the cell is .25 ul (microliters<sup>3</sup>). What would be the density of viruses in cell marked d?

Figure 1.2



Examine figure 1.3 and answer the questions that follow. The cell on the left is an animal cell. The large circular organelle in its center is the \_\_\_\_\_. Some times it is called the brain of the cell. The spaghetti-like material contains DNA, which is responsible for an organism's \_\_\_\_\_. The volume of this circular structure is .55 ul (microliters<sup>3</sup>), and the mass of its genetic material is 125 ng (nanograms). Calculate the density of nucleus.

Figure 1.3 The Cells



**1. Which of these is not an accurate unit for mass?**

- a) gram
- b) slug
- c) pound
- d) kilogram

**2. Four immiscible liquids are mixed and form four layers. From top to bottom what will be observed?**

- a) corn oil, carbon tetrachloride, water, mercury
- b) carbon tetrachloride, corn oil, water, mercury
- c) corn oil, water, carbon tetrachloride, mercury
- d) corn oil, water, mercury, carbon tetrachloride

**3. An 8 oz. empty glass is filled with ice. It has a mass of 254 grams. After the ice melts the total mass would be**

- a) approximately 260 grams
- b) 254 grams
- c) approximately 250 grams
- d) much greater than 260 grams

**4. A volume of 50 cu.cm. of dry sand is added to 30 cu. cm. of water for a total volume of 60 cu cm. What is the volume of water that goes into the air spaces?**

- 50 cu.cm.
- 60 cu. cm,
- 10 cu. cm.
- 20 cu. cm.

**5. A large piece of rock salt is added to a test tube containing water. The level of water is marked and the test tube is sealed. After all the rock salt**

**dissolves it is noted that the level of liquid is below the original marked level. What conclusion(s) can we draw from this experiment?**

- 1) The mass of the system has decreased.
- 2) When salt is added to water a chemical change occurs
- 3) The density of salt water is greater than the density of pure water
- 4) the volume of the system has decreased as a result of a physical change.

- a) 1 only is true
- b) 2 and 3 are true
- c) 3 and 4 are true
- d) 1,2, and 3 are true

**6. When the space shuttle circles the earth objects within the ship become weightless. The most likely reason for this is because**

- a) The shuttle is actually falling back to earth while circling the earth; so all objects within the ship are in free-fall.
- b) The shuttle is so far away from earth that the effect of gravity is negligible.
- c) There is no air
- d) none of the above

**7. Liquid water is denser than ice because-**

- a) A liquid H<sub>2</sub>O molecule has more mass than an ice H<sub>2</sub>O molecule.
- b) A chemical change occurs when ice melts that causes the mass of water to increase
- c) When ice melts there is an increase in the amount of water molecules
- d) there are a greater number of H<sub>2</sub>O molecules per unit of volume in liquid water than ice.

**8. The density of water in SI units (International System of Units) is:**

- a) 1 pound/cu. ft
- b) 1000 g/1000 ml.
- c) 1 kg/L
- d) 1 g/cm<sup>3</sup>

**9. A graduated cylinder is filled with 50cc. of water. A glass stopper is dropped into the graduated cylinder. The volume now reads 65.4 cc. If we know glass has a density of 2.5 g/cm<sup>3</sup>, what would we expect the mass of the stopper to be closest to?**

- a) 38.5 grams
- b) 20 grams
- c) 26.7 grams
- d) 42 grams

**10. The specific gravity of a substance is the ratio of the mass of a substance to the mass of an equal volume of water. What is the specific gravity of glass?**

- a) 2.5 grams
- b) 1.0
- b) 2.5
- d) 2.0 grams