ChemQuest 12

Density, Mass and Weight

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_\_

# **Information**: Density

|  |  |  |  |
| --- | --- | --- | --- |
| **Object** | **Mass of Object (g)** | **Volume of Object (mL)** | **Density of Object (g/mL)** |
| **1** | 21.50 | 18.40 | 1.168 |
| **2** | 12.6 | 14.7 | 0.857 |
| **3** | 41.90 | 31.60 | 1.326 |
| **4** | 32.90 |  | 2.560 |
| **5** | 59.5 | 61.7 |  |
| **6** |  | 0.574 | 1.035 |
| **7** | 17.23 | 21.67 |  |

### **Critical Thinking Questions**

1. Consider the data for objects 1, 2 and 3. Which of the following equations correctly show the relationship(s) between mass (M), volume (V) and density (D)? There may be more than one answer.



A) B) C) D) E)

F) V = DM G) M = DV H) D = MV

1. For objects 4, 5, 6 and 7 there are blanks in the table. Using your answers to question 1, fill in the blanks.
2. What are the units for density if the mass of an object was measured in kilograms and the volume in liters?
3. In your own words, define “density”.
4. Calculate the density of an object that has a mass of 45.0 kg and a volume of 20.0 L. Include units.

### **Information: Mass and Weight**

The following is a table that relates the mass of an object and the weight of the same object. The pull of gravity is a constant. As long as you stay in the same place, the pull of gravity (g) does not change. For example, at sea level g is always equal to 9.8 m/s2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Object** | **Place** | **Mass** | **Pull of Gravity** | **Weight** |
| **1** | Earth, sea level | 42 kg | 9.8 m/s2 | 411.6 N |
| **2** | Earth, sea level | 29 kg | 9.8 m/s2 | 284.2 N |
| **3** | Earth, Mt. Everest | 38 kg | 9.1 m/s2 | 345.8 N |
| **4** | Moon | 51 kg | 6.2 m/s2 | 316.2 N |

**Critical Thinking Questions**

1. What is the relationship between mass (M), the pull of gravity (g) and weight (W)?

A) M = gW B) g = MW C) W = Mg

1. What is the weight of a 42 kg object (like object 1) if the object was on the moon where g is always 6.2 m/s2?
2. **Mass measures how much matter an object has.** It is an indication of how much “stuff” is in the object. It does not describe the size of the object or the weight of the object. What is the difference between mass and weight?
3. In question 8, you calculated the weight of object 1 on the moon. How did that weight compare to the object’s weight on Earth?