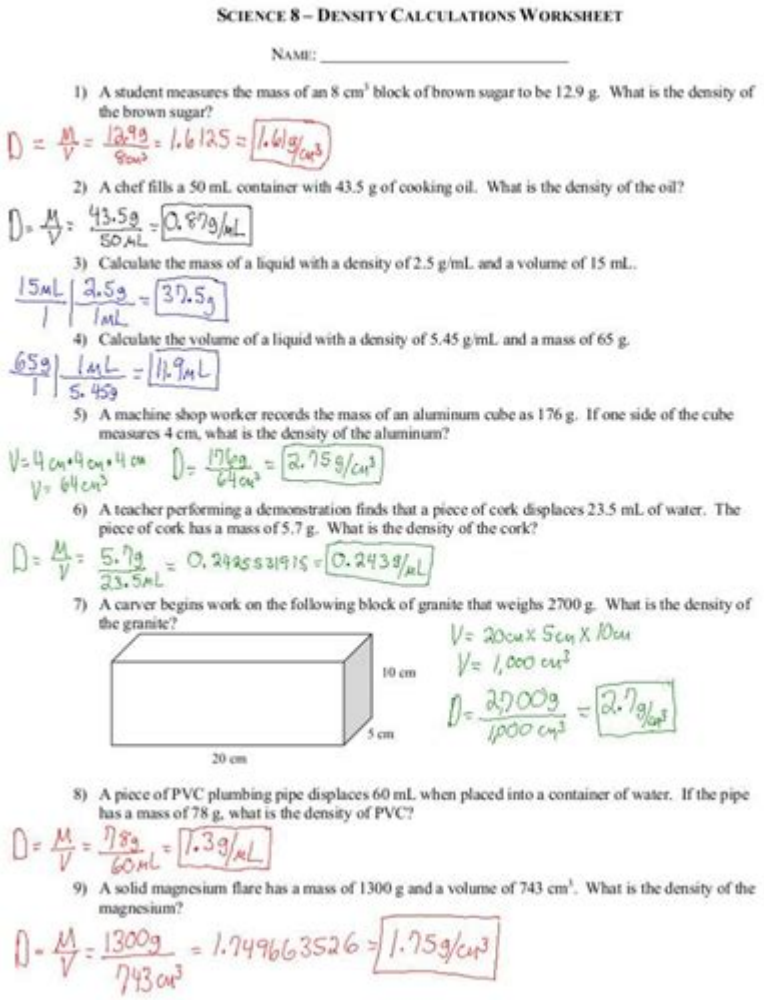
Density Word Problems Answer Key



SCIENCE 8 – DENSITY CALCULATIONS WORKSHEET

NAME: _____

1) A student measures the mass of an 8 cm^3 block of brown sugar to be 12.9 g. What is the density of the brown sugar?

$D = \frac{M}{V} = \frac{12.9g}{8cm^3} = 1.6125 = 1.61 g/cm^3$

2) A chef fills a 50 mL container with 43.5 g of cooking oil. What is the density of the oil?

$D = \frac{M}{V} = \frac{43.5g}{50mL} = 0.87 g/mL$

3) Calculate the mass of a liquid with a density of 2.5 g/mL and a volume of 15 mL.

$\frac{15mL}{1} \left| \frac{2.5g}{1mL} \right. = 37.5g$

4) Calculate the volume of a liquid with a density of 5.45 g/mL and a mass of 65 g.

$\frac{65g}{1} \left| \frac{1mL}{5.45g} \right. = 11.9mL$

5) A machine shop worker records the mass of an aluminum cube as 176 g. If one side of the cube measures 4 cm, what is the density of the aluminum?

$V = 4cm \cdot 4cm \cdot 4cm$
$V = 64cm^3$
$D = \frac{176g}{64cm^3} = 2.75 g/cm^3$

6) A teacher performing a demonstration finds that a piece of cork displaces 23.5 mL of water. The piece of cork has a mass of 5.7 g. What is the density of the cork?

$D = \frac{M}{V} = \frac{5.7g}{23.5mL} = 0.2425531915 = 0.243 g/mL$

7) A carver begins work on the following block of granite that weighs 2700 g. What is the density of the granite?

$V = 20cm \times 5cm \times 10cm$
$V = 1,000 cm^3$
$D = \frac{2700g}{1000 cm^3} = 2.7 g/cm^3$

8) A piece of PVC plumbing pipe displaces 60 mL when placed into a container of water. If the pipe has a mass of 78 g, what is the density of PVC?

$D = \frac{M}{V} = \frac{78g}{60mL} = 1.3 g/mL$

9) A solid magnesium flare has a mass of 1300 g and a volume of 743 cm^3. What is the density of the magnesium?

$D = \frac{M}{V} = \frac{1300g}{743cm^3} = 1.749663526 = 1.75 g/cm^3$

Density word problems answer key are essential for students and educators alike. They serve as a guide to understanding the concept of density, the calculations involved, and the application of these principles in real-world scenarios. Density is defined as mass per unit volume, and it can be expressed mathematically as:

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

Understanding how to solve density problems is crucial in various fields, including chemistry, physics, and engineering. This article will provide a comprehensive overview of density word problems, along with an answer key that will facilitate learning and comprehension.

Understanding Density

Before delving into word problems, it's vital to have a clear understanding of what density is and how it is calculated. Density can help identify materials, understand buoyancy, and predict how substances will interact in various conditions.

Key Concepts

1. Mass: The amount of matter in an object, typically measured in grams (g) or kilograms (kg).
2. Volume: The amount of space an object occupies, usually measured in cubic centimeters (cm^3) or liters (L).
3. Units of Density: Common units include grams per cubic centimeter (g/cm^3) and kilograms per cubic meter (kg/m^3).

Formula Derivation

To derive the density formula, consider the following relationship:

- If you know the mass (m) and volume (V) of an object, you can rearrange the formula to find density (D):

$$
D = \frac{m}{V}
$$

- Conversely, if you need to find mass or volume, you can rearrange the formulas as follows:

$$
m = D \times V \quad \text{and} \quad V = \frac{m}{D}
$$

Types of Density Word Problems

Density word problems can come in various forms, often requiring the application of the density formula in different contexts. Here are some common types:

1. Finding Density

These problems typically provide mass and volume, asking students to calculate the density of a given material.

Example Problem 1: A block of wood has a mass of 300 grams and a volume of 150 cm^3. What is the density of the wood?

Solution:

$$
D = \frac{m}{V} = \frac{300 \, \text{g}}{150 \, \text{cm}^3} = 2 \, \text{g/cm}^3
$$

2. Finding Mass

In these problems, the density and volume are given, and students must calculate the mass.

Example Problem 2: A liquid has a density of 1.5 g/cm³ and occupies a volume of 200 cm³. What is the mass of the liquid?

Solution:

$$
m = D \times V = 1.5 \, \text{g/cm}^3 \times 200 \, \text{cm}^3 = 300 \, \text{g}
$$

3. Finding Volume

These problems provide density and mass, asking for the volume of the object.

Example Problem 3: A metal piece has a mass of 500 grams and a density of 10 g/cm³. What is its volume?

Solution:

$$
V = \frac{m}{D} = \frac{500 \, \text{g}}{10 \, \text{g/cm}^3} = 50 \, \text{cm}^3
$$

4. Real-World Applications

Many density problems relate to real-world situations, such as determining whether an object will float or sink in a liquid.

Example Problem 4: An object with a density of 0.8 g/cm³ is placed in water (density = 1 g/cm³). Will it float or sink?

Solution: Since the object's density is less than that of water, it will float.

Answer Key for Sample Density Word Problems

To further assist with understanding, here’s an answer key for various sample problems that can be

used for practice.

Sample Problem Set:

1. A rock has a mass of 600 grams and a volume of 200 cm^3. What is its density?
- Answer: 3 g/cm^3

2. A cylinder has a density of 8 g/cm^3 and occupies a volume of 100 cm^3. What is its mass?
- Answer: 800 g

3. A gas has a mass of 2 kg and a density of 0.5 kg/m^3. What is its volume?
- Answer: 4000 m^3

4. A piece of ice (density = 0.92 g/cm^3) is placed in a glass of water. Will it float?
- Answer: Yes, it will float.

5. If a material has a density of 5 g/cm^3, what would be the mass of a 200 cm^3 sample?
- Answer: 1000 g

6. A fish has a mass of 2 kg and a volume of 1.5 L (1500 cm^3). What is its density?
- Answer: 1.33 kg/L or 1.33 g/cm^3

Common Mistakes in Density Problems

When solving density word problems, students often make common mistakes. Here are some pitfalls to avoid:

1. Incorrect Unit Conversion: Always ensure mass and volume are in compatible units before performing calculations. For example, converting grams to kilograms or cm^3 to m^3 may be necessary.

2. Ignoring Significant Figures: Pay attention to significant figures based on the precision of the measurements provided.

3. Misunderstanding the Problem: Read the problem carefully to determine what is being asked. Misinterpreting the information can lead to incorrect calculations.

4. Not Checking Work: Always double-check calculations for arithmetic errors.

Conclusion

Density word problems are a fundamental aspect of understanding physical properties in science. Mastering the concept of density, along with the ability to solve related word problems, is essential for students in various scientific fields. By practicing with the examples and answer key provided in this article, learners can enhance their problem-solving skills and gain confidence in applying density principles in real-life situations. Understanding density not only aids in academic success but also fosters a deeper appreciation for the materials and substances we interact with daily.

Frequently Asked Questions

What are density word problems?

Density word problems involve calculating the density of an object using its mass and volume, often requiring the application of the formula density = mass/volume.

How do you solve a density word problem?

To solve a density word problem, identify the mass and volume given, use the density formula to find the unknown, and ensure the units are consistent.

What is the formula for density?

The formula for density is Density (D) = Mass (m) / Volume (V).

Can density word problems involve different units?

Yes, density word problems can involve different units; it's important to convert them to a consistent set of units before performing calculations.

What is an example of a density word problem?

An example could be: 'If a rock has a mass of 300 grams and occupies a volume of 100 cubic centimeters, what is its density?' The answer would be 3 g/cm³.

Why are density word problems important in science?

Density word problems are important in science because they help in understanding material properties, buoyancy, and the behavior of substances in different environments.

Where can I find answer keys for density word problems?

Answer keys for density word problems can typically be found in textbooks, educational websites, or online resources specifically dedicated to math and science education.

Density Word Problems Answer Key

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The mass density of an object is defined as its mass per unit volume. This parameter can be expressed using several different units, including kilograms per meter cubed (kg/m3) and pounds per square foot (lb/ft2).

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首先，Orbital-Free Density Functional Theory (OFDFT)和Kohn-Sham DFT (KSDFT)都是属于密度泛函理论（Density Functional Theory，简称DFT)家族的，只是前者研究的圈子较小，名气远不如KSDFT，但是近年来也有越来越多的组开始关注OFDFT。究其原因，还是因为OFDFT快，而KSDFT相对慢很多。

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