

What is Matter?

Teacher's Guide Middle School

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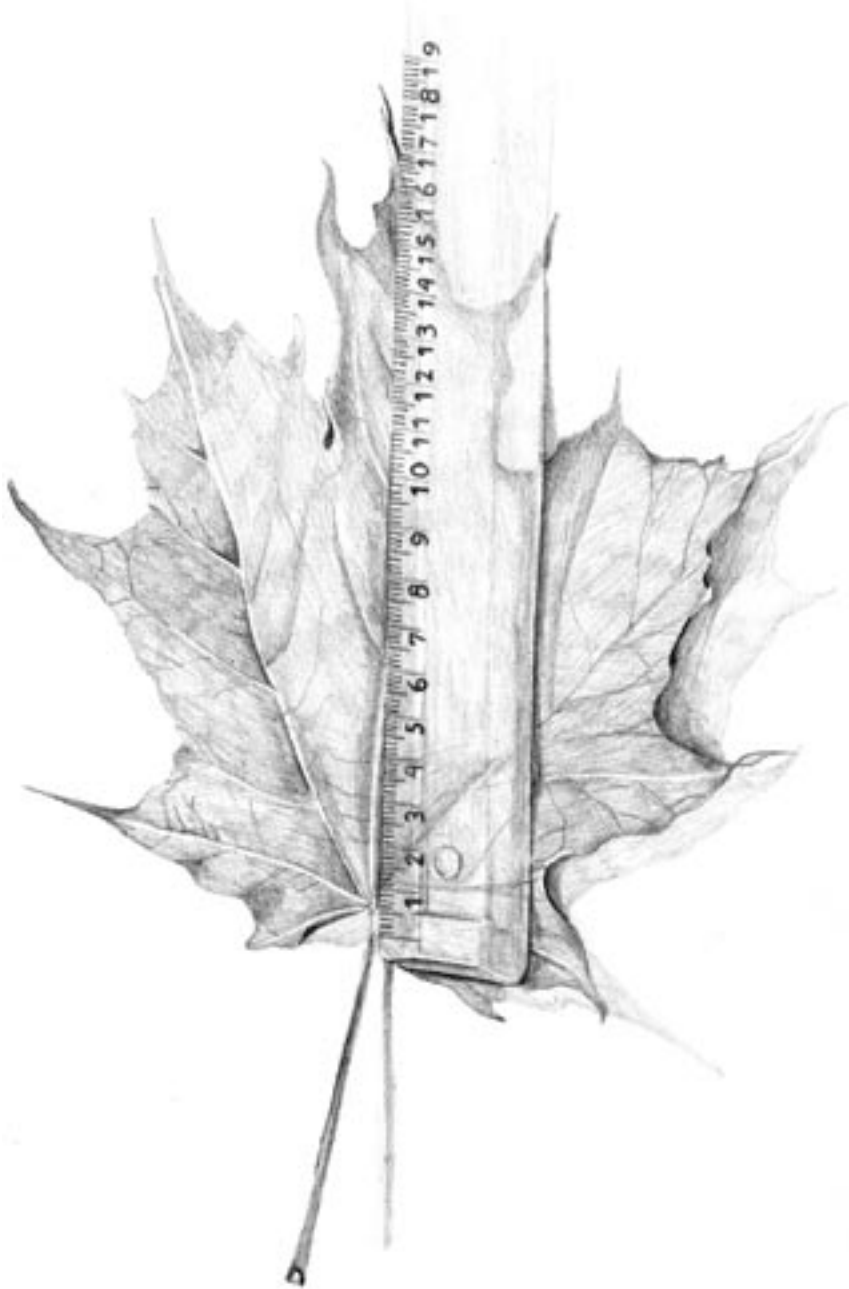
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A Message from our Company...

Dear Educator:

Thank you for your interest in the educational videos produced by the Visual Learning Company. We are a Vermont-based, family owned and operated business specializing in the production of quality educational science videos and materials.

We have a long family tradition of education. Our grandmothers graduated from normal school in the 1920's to become teachers. Brian's mother was an elementary teacher and guidance counselor, and his father was a high school teacher and superintendent. This family tradition inspired Brian to become a science teacher, and to earn a Ph.D. in education, and led Stephanie to work on science educational programs at NASA.

In developing this video, accompanying teacher's guide, and student activities, our goal is to provide educators with the highest quality materials, thus enabling students to be successful. In this era of more demanding standards and assessment requirements, supplementary materials need to be curricular and standards based - this is what we do!

Our videos and accompanying materials focus on the key concepts and vocabulary required by national and state standards and goals. It is our mission to help students meet these goals and standards while experiencing the joy and thrill of science.

Sincerely,

Brian and Stephanie Jerome



National Standards Correlations

National Science Education Standards

(Content standards: 5-8, National Academy of Sciences, c. 1996)

As a result of their activities in grades 5-8, all students should develop an understanding that:

Physical Science - Content Standard A:

- Mathematics is important in all aspects of scientific inquiry.

Physical Science - Content Standard B:

- Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals are an example of such a group.

Physical Science - Content Standard E:

- Students should organize materials and other resources, plan their work, make good use of group collaboration where appropriate, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy.

Benchmarks for Science Literacy

(Project 2061 – AAAS, c. 1993)

The Physical Setting - The Structure of Matter - (4D)

By the end of 8th grade, students should know that:

- All matter is made up of atoms, which are far too small to be seen directly through a microscope. The atoms of any element are alike but are different from atoms of other elements. Atoms may stick together in well-defined molecules or may be packed together in large arrays. Different arrangements of atoms into groups compose all substances.



Student Learning Objectives

Upon viewing the video and completing the enclosed student activities, students will be able to do the following:

- Differentiate between the physical and chemical properties of matter.
- Provide examples of physical and chemical properties of different types of matter.
- Describe why the process of measurement is important in describing our world.
- Describe and measure the length of objects using metric units of centimeters or meters.
- Differentiate between the mass of an object and the weight of an object.
- Measure the weight of objects using metric units of grams or kilograms.
- Describe volume as the amount of space something takes up.
- Measure the volume of a liquid using metric units of milliliters or liters.
- Compute the volume of a regularly shaped solid object using a metric ruler or a meter stick.
- Calculate the volume of an irregularly shaped solid using the process of water displacement.
- Describe density as the amount of mass per unit of volume.
- Calculate the density of an object using the equation: $\text{Density} = \text{mass}/\text{volume}$.



Assessment

Preliminary Assessment:

The Preliminary Assessment, provided in the Student Masters section, is an assessment tool designed to gain an understanding of students' pre-existing knowledge. It can also be used as a benchmark upon which to assess student progress based on the objectives stated on the previous pages.

Video Review:

The Video Review, provided in the Student Masters section, can be used as an assessment tool or as a student activity. There are two main parts. The first part contains questions that can be answered during the video. The second series of ten questions consists of a video quiz to be answered at the conclusion of the video.

Post Assessment:

The Post Assessment, provided in the Student Masters section, can be utilized as an assessment tool following completion of the video and student activities. The results of the Post Assessment can be compared against the results of the Preliminary Assessment to evaluate student progress.



Introducing the Video

Before showing the program find several small common objects and place each one in its own small box. Seal the box with tape. Tell students that each box contains a different object. Pass the boxes around the room, and tell students to write their observations about what they hear and feel inside the box. Have them guess what the objects are by writing their guesses on a piece of paper.

Blindfold three students. Take the objects out of their boxes and hand each student an object. Have them describe what they feel and smell. Have them guess what they think the object is. As a class describe the properties of each object. As a class discuss what senses we use to describe the different properties of matter. Discuss the different properties of the objects in the boxes which were observed without actually seeing the objects. Then discuss how seeing the objects helped further describe the properties of the object.

Ask students to name some different types of measurements that could be made on the objects. Possible answers might include length, circumference, weight, volume, and density. Write these terms on the blackboard. Tell students to pay close attention to the program to learn more about ways to describe and measure matter.

Video Viewing Suggestions

The student Master “Video Review” is provided for distribution to students. You may choose to have your students complete this Master while viewing the program or to do so upon its conclusion.

The program is approximately 20-minutes in length and includes a ten-question video quiz. Answers to the Video Quiz are not provided on the video, but are included in this teacher’s guide. You may choose to grade student quizzes as an assessment tool or to review the answers in class.

The video is content-rich with numerous vocabulary words. For this reason you may want to periodically stop the video to review and discuss new terminology and concepts.



Video Script: What is Matter?

1. Have you ever stubbed your toe on something?
2. Or bumped your head on a hard object?
3. Perhaps you have had a hard landing?
4. Or run into something or someone that hurt?
5. If you have had any of these uncomfortable experiences, you have had a firsthand experience with matter.
6. What exactly is matter?
7. How can matter be measured?
8. And how is matter described?
9. During the next few minutes we are going to explore these questions...
10. ... and others, as we investigate the fascinating world of matter.
- 11. Graphic Transition – What is Matter?**
12. Look around you. What do you see?
13. Chances are you see furniture, walls, and other objects. All these things are made of matter.
14. **You Decide!** What is Matter?
15. Matter is anything that takes up space.
16. When you take a walk outside it is easy to recognize different types of matter.
17. You may see plants, animals, and other things, but what about the different types of matter you can't see?
18. For example, we can't see the air around us, but it does have matter.
19. How do we describe the different types of matter, and how do we differentiate between them?
20. For example, is all air the same?
21. Or are these trees the same?
22. In order for us to distinguish and describe different types of matter...
23. ...we must know something about the characteristics of matter.
- 24. Graphic Transition – Properties of Matter**
25. Matter, such as that in this pencil eraser, is made up of tiny particles we can't see.
26. These particles are in constant motion.
27. Particles in other types of matter, such as dirt or ice cream, vary in shape, size, motion, and in the way they are arranged.
28. These factors affect the properties of matter.
29. What is a property? A property describes the characteristics of matter.
- 30. You Describe it!** What would you say are the characteristics or properties of this tennis ball?



Script (cont.)

31. This tennis ball is green. It has a round shape, and has a fuzzy texture.
32. Color, shape, and texture are common physical properties used to describe matter.
33. A physical property is a characteristic of matter that is observed without a change in the substance. These apples, for example, have a round shape, are red and green, and feel smooth.
34. Size is another physical property. For example, you would describe horses as large animals...
35. ... and spiders as relatively small animals.
36. Many metals such as silver and gold have a shiny appearance called luster.
37. Other types of matter, such as the iron in paper clips have a property that is attracted to magnets.
38. And some matter such as the metal in this switch has conductivity, which means...
39. ...electricity can easily pass through it.
40. Beyond physical properties, matter has certain chemical properties. A chemical property describes how a substance changes into a new substance. For example, the metal iron has the ability to rust. Wood has a chemical property called flammability which means it can burn.
41. These are just a sampling of some of the many properties of matter.
42. Let us now take a look at some of the ways you can measure those properties.
- 43. Graphic Transition – Measuring Matter**
44. If you wanted to buy a certain amount of gasoline, you would need to watch the pump closely as it was measured.
45. And if you wanted to buy a board that was a certain length at a lumberyard, you would need to measure it with a tape measure.
46. As you can see, we measure matter all the time. What is measurement?
47. Measurement is the process of explaining the characteristics of matter with numbers.
48. Tools frequently used to measure matter include scales, measuring tapes, measuring cups, and rulers.
49. Let us take a closer look at the process of measurement.
- 50. Graphic Transition – Measuring Length**
51. These skiers are on a ski course that is about 8 kilometers in length.
52. These trees have a height of about 20 meters.
53. And this leaf has a width of about 13 centimeters.
54. Height, and width are measurements of length.
55. In the metric system the basic unit of length is a meter...
56. ...and in the English system it is the foot.



Script (cont.)

57. Scientists such as these fisheries biologists use common tools such as rulers and meter sticks, to measure the length of fish.

58. **You Compute!** What is the length of this skull in centimeters?

59. This metric ruler tells us the skull is 11 1/2 centimeters long.

60. Next time you measure something, try measuring it in metric units.

61. Graphic Transition – Mass and Weight

62. You Compare! What will be more difficult – pushing this wheelbarrow that is full of stones or pushing an empty wheelbarrow?

63. Of course, the wheelbarrow full of stones will be more difficult to push.

64. This is because it contains more mass.

65. Mass is the amount of matter in an object.

66. This mountain contains mass...

67. ...as do these snowmobiles flying through the air.

68. The mass of a given object stays constant,...

69. ...while its weight can vary depending on certain conditions.

70. The pull of gravity on an object determines its weight.

71. Gravity is the force that pulls objects, such as this skier, toward earth.

72. It is also the force that keeps earth in orbit around the sun.

73. This car on earth has a certain weight.

74. But, on the moon it would weigh less. This is because the force of gravity on the moon is much less than the force of gravity on Earth.

75. In fact, on the moon, the car would weigh only about 1/6 of its weight on Earth!

76. But even though the car weighs less on the moon its mass is the same as it was on earth. Its mass did not change.

77. Graphic Transition – Weighing Objects

78. Remember that weight is the measure of the force of gravity on an object.

79. And mass is the amount of matter in an object.

80. Mass is measured in metric units of grams or kilograms.

81. The mass of this coin for instance is about five grams

82. This stack of paper has a mass of about one kilogram.

83. Scientists measure weight in units called newtons.

84. A newton is the amount of force needed to cause an object with the mass of one gram to accelerate at a speed of one meter per second for each second of motion.

85. When you step on a scale, you do not read your weight in newtons. You read it in pounds or kilograms.



Script (cont.)

86. For everyday simplicity, we discuss the weight of objects without changing mass to newtons.
87. This tool called a balance is a device used to measure the weight of objects.
88. And this electronic scale is used to measure the weight of boxes in this warehouse.
- 89. Graphic Transition – Measuring Volume**
90. Have you ever bought a 1-liter bottle of water?
91. ...or used a measuring spoon while cooking?
92. These are just a couple of examples of how volume can be measured.
93. Volume is the amount of space something takes up.
94. The basic unit of volume in the metric system is the liter.
95. If you were cooking in a country that uses the metric system, you would measure smaller amounts of volume in units called milliliters and larger amounts of liquids in liters.
96. This measuring cup contains 250 milliliters of noodles.
97. There are 1,000 milliliters in a liter.
98. In science a graduated cylinder is often used to measure the volume of liquids.
99. This graduated cylinder contains 7 milliliters of liquid.
100. Beakers are also often used to measure liquid.
101. The volume of solids can be measured in a couple of different ways.
102. The volume of solids that have a regular square or rectangular shape can be easily calculated using a metric ruler.
103. By measuring the length, height, and width, and then multiplying all three, the volume can be computed.
104. The volume of solids is commonly expressed in cubic centimeters or cubic meters.
105. With smaller, irregularly shaped solids, such as this rock, it is possible to calculate volume using a process called water displacement.
106. One way this can be done is by filling a graduated cylinder with water to a certain point such as 50 milliliters. . .
107. ...then placing the object in the water. See how the level rises to 60 milliliters.
108. **You Compute!** What is the volume of the rock?
109. The volume is computed by subtracting 50 milliliters from 60 milliliters to get a volume of 10 milliliters.
110. Ten milliliters of water is equivalent to 10 cubic centimeters, making the volume of the rock 10 cubic centimeters.
111. **Graphic Transaction - Density**
112. **You Decide!** What weighs more, 100 grams of rock or 100 grams of foam?



Script (cont.)

113. The answer is neither. They both weigh the same – 100 grams.
114. Even though they both weigh the same, you would much rather have the foam fall on your foot than the rock. Why?
115. The answer lies in something called density.
116. Density is the amount of mass per unit of volume.
117. The foam has less density than the rock.
118. Let us compare the two. The mathematical formula for density is density equals mass divided by volume.
119. We already know the mass of the foam is 100 grams. The foam occupies a volume of 3300 cubic centimeters.
120. We divide 100 grams by 3,300 cubic centimeters to get a density of .03 grams per cubic centimeter.
121. The rock also has a mass of 100 grams and a volume of 50 cubic centimeters. When we divide 100 grams by 50 cubic centimeters we get a density of 2 grams per cubic centimeter, a much higher density than the foam.
122. The density of water is one gram per cubic centimeter.
123. Things that have a density of greater than one sink, and those that have a density of less than one float.
124. **Graphic Transition – Summing up**
125. During the past few minutes we have explored many of the interesting characteristics of matter including the fact that matter is made up of tiny, moving particles.
126. We explored some of the physical properties of matter including shape, size, color, texture, and magnetism.
127. We also discussed how matter also has certain chemical properties.
128. The importance of measuring matter was explored...
129. ... while specifically discussing how length can be measured.
130. Mass and weight were compared, and the process of weighing matter was demonstrated.
131. The concept of volume was explored, and some techniques of measuring volume were discussed.
132. Finally, the density of different objects was discussed, and the formula for computing density was demonstrated.
133. So, the next time you observe some of the characteristics of matter...
134. ... measure some matter, or compare the density of different objects. . .
135. . . . think about some of the things we have discussed during the past few minutes.
136. You just might look at matter a little differently.



Script (cont.)

Fill in the correct word to complete the sentence. Good luck and let's get started.

1. A _____ describes the characteristics of matter.
2. Flammability is an example of a _____ property.
3. Some metals have a shiny _____.
4. The _____ is the basic unit of metric length.
5. _____ is the amount of matter in an object.
6. The pull of _____ determines an object's weight.
7. _____ is the amount of space something takes up.
8. The volume of liquids is measured in _____.
9. _____ is the amount of mass per unit of volume.
10. This rock is _____ dense than foam.



Student Assessments and Activities

Assessment Masters:

- Preliminary Assessment
- Video Review
- Post Assessment

Student Activity Masters:

- Metric Madness
- Identifying Properties of Matter - Measurement
- Identifying Properties of Matter - Density
- Vocabulary of *What is Matter?*



Answers to Student Assessments

Preliminary Assessment (pgs. 20-21)

1. matter
2. physical
3. chemical
4. numbers
5. mass
6. weight
7. volume
8. 1,000
9. cubic
10. density
11. false
12. true
13. true
14. false
15. false
16. true
17. false
18. true
19. true
20. false

Video Review (pg. 22)

1. Matter is anything that takes up space.
2. Answers will vary. Physical properties used to describe matter include color, shape, and texture. The tennis ball is green, has a round shape, and a fuzzy texture.
3. The skull is about 11.5 centimeters long.
4. It will be more difficult to push the wheelbarrow full of stones.
5. The volume of the rock is 10 milliliters or 10 cubic centimeters.
6. 100 grams of rock and 100 grams of foam both weigh 100 grams.

Video Quiz (p. 22)

1. property
2. chemical
3. luster
4. meter
5. mass
6. gravity
7. volume
8. liters or milliliters
9. density
10. more

Post Assessment (pgs. 23-24)

1. 1,000
2. cubic
3. volume
4. numbers
5. chemical
6. matter
7. density
8. weight
9. physical
10. mass
11. false
12. false
13. true
14. false
15. true
16. true
17. true
18. true
19. false
20. false



Answers to Student Activities

Metric Madness (pg. 25)

1. meter
2. kilograms
3. liters
4. milliliters
5. length
6. kilometers
7. volume
8. centimeters
9. grams
10. 12
11. 54 grams
12. 27 cubic centimeters
13. 2,000
14. one
15. 8 cubic centimeters

Identifying Properties of Matter - Measurement (pgs. 26-27)

The data that the students fill in on the data charts will vary.

1. There are 100 centimeters in 1 meter.
2. Answers will vary. Mass should be expressed in grams.
3. Volume = length X height X width

Identifying Properties of Matter - Density (pgs. 28-29)

The data that the students fill in on the data charts will vary.

1. Density is the amount of mass per unit of volume of an object.
2. Density = mass/volume
3. The rock has a greater density than the block of wood.
4. The block of wood should float and the rock should sink because objects with a density of less than 1 g/cm³ float and objects with a density of more than 1 g/cm³ sink. The block of wood has a density of less than 1 g/cm³ and the rock has a density of more than 1 g/cm³.

Vocabulary of *What is Matter?* (p. 30)

1. f - mass
2. b - conductivity
3. i - liter
4. j - density
5. a - physical property
6. d - measurement
7. e - meter
8. c - chemical property
9. g - weight
10. h - volume

Assessment and Student Activity Masters





Preliminary Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. All the objects we see and touch are made of _____.
2. Color, shape, and texture are _____ properties.
3. Flammability is an example of a _____ property.
4. Measurement is the process of describing matter with _____.
5. _____ is the amount of matter in an object.
6. _____ is a measure of the force of gravity on an object.
7. _____ is the amount of space something takes up.
8. There are _____ milliliters in a liter.
9. The volume of solids is commonly expressed in units of _____ centimeters or meters.
10. _____ is the amount of mass per unit of volume.

1,000
chemical
cubic
density
mass

matter
numbers
physical
volume
weight



Preliminary Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|----------------------------------------------------------------------------------------------------------|---|---|
| 11. The texture of an object is an example of a chemical property. | T | F |
| 12. Many metals have a shiny appearance called luster. | T | F |
| 13. The mass of an object remains constant when its location changes. | T | F |
| 14. Objects weigh the same on the moon as on earth. | T | F |
| 15. The basic unit of volume in the metric system is the centimeter. | T | F |
| 16. A meter is commonly used to measure length or distance. | T | F |
| 17. Scientists often use balances to measure the volume of liquids. | T | F |
| 18. The volume of a regularly shaped solid can be computed by multiplying its length, height, and width. | T | F |
| 19. The density of water is one gram per cubic centimeter. | T | F |
| 20. A sponge has a greater density than a rock. | T | F |



Video Review

Directions: During the course of the program, answer the questions as they are presented in the video. At the end of the video, answer the Video Quiz questions.

You Decide!

1. What is matter?

You Describe It!

2. What would you say are the characteristics or properties of this tennis ball?

You Compute!

3. What is the length of this skull in centimeters?

You Compare!

4. What will be more difficult - pushing this wheelbarrow full of stones or pushing an empty wheelbarrow?

You Compute!

5. What is the volume of the rock?

You Decide!

6. What weighs more, 100 grams of rock or 100 grams of foam?

Video Quiz:

1. A _____ describes the characteristics of matter.
2. Flammability is an example of a _____ property.
3. Some metals have a shiny _____.
4. The _____ is the basic unit of metric length.
5. _____ is the amount of matter in an object.
6. The pull of _____ determines an object's weight.
7. _____ is the amount of space something takes up.
8. The volume of liquids is measured in _____.
9. _____ is the amount of mass per unit of volume.
10. This rock is _____ dense than foam.



Post Assessment

Directions: Fill in the blank with the correct word. A list of possible answers is provided at the bottom of the page.

1. There are _____ milliliters in a liter.

2. The volume of solids is commonly expressed in units of _____ centimeters or meters.

3. _____ is the amount of space something takes up.

4. Measurement is the process of describing matter with _____.

5. Flammability is an example of a _____ property.

6. All the objects we see and touch are made of _____.

7. _____ is the amount of mass per unit of volume.

8. _____ is a measure of the force of gravity on an object.

9. Color, shape, and texture are _____ properties.

10. _____ is the amount of matter in an object.

1,000
chemical
cubic
density
mass

matter
numbers
physical
volume
weight



Post Assessment

Directions: Decide whether the statement is true (T) or false (F).

- | | | |
|----------------------------------------------------------------------------------------------------------|---|---|
| 11. A sponge has a greater density than a rock. | T | F |
| 12. Objects weigh the same on the moon as on earth. | T | F |
| 13. The volume of a regularly shaped solid can be computed by multiplying its length, height, and width. | T | F |
| 14. The basic unit of volume in the metric system is the centimeter. | T | F |
| 15. The density of water is one gram per cubic centimeter. | T | F |
| 16. Many metals have a shiny appearance called luster. | T | F |
| 17. A meter is commonly used to measure length or distance. | T | F |
| 18. The mass of an object remains constant when its location changes. | T | F |
| 19. The texture of an object is an example of a chemical property. | T | F |
| 20. Scientists often use balances to measure the volume of liquids. | T | F |



Metric Madness

Answer the following questions using your knowledge of the metric system.

1. You would use a _____ stick to measure the length of a carpet.
2. The mass of an object is commonly measured in units of _____.
3. Gasoline is measured in units of _____.
4. When cooking, measuring spoons are based on units of _____.
5. Meters and centimeters are units of _____.
6. Distances driven in a car are measured in _____.
7. Liters and milliliters are units of _____.
8. A child's height is measured in _____.
9. Small amounts of cheese are measured in _____.

In the metric system, 1 milliliter of water occupies a volume of 1 cubic centimeter, and has a mass of 1 gram. Complete these metric conversions.

10. Twelve milliliters of water have a mass of _____ grams.
11. A given amount of water occupy a volume of 54 cubic centimeters. What is its mass? _____
12. Twenty seven milliliters of water occupy a volume of _____
13. Two liters of water have a mass of _____ grams.
14. One thousand grams of water occupy a volume _____ liter(s).
15. A square shaped object with the dimensions of 2 cm by 2 cm by 2 cm has a volume of _____.



Identifying Properties of Matter - Measurement

Background: We measure things all the time. When you step on a scale you are measuring your body's weight. When you use a ruler you are measuring length. And when you are measuring foods during cooking you are measuring the amounts of ingredients. Measurement is the process of describing matter using numbers.

For example, if you buy bottled water, the bottle states the amount of liquid in liters or ounces, and when you purchase meat, cheese, fruits, or vegetables in the store they are weighed in kilograms, grams, ounces, or pounds. The units of measurement are just as important as the number because they give the number meaning.

Measurement involves the use of numbers. A person's mass may be 48 kilograms. The distance of a sprint may be 100 meters, and the amount of gasoline placed in a car may be 12 liters. Numbers give measurement meaning.

In science the metric system is used in most of the world. Metric measurement is the international standard unit of measurement. Scientists throughout the world can easily communicate with each other because they all use the metric system. In the following activities you will use the metric system to measure length, mass, and volume.

Measuring Length: Use a meter stick, metric ruler, and the other materials your teacher provided to measure length. Record your measurements in the data table provided.

Object	Length in Centimeters (cm)	Length in Meters (m)
String		
Paper clips		
Thumbnail		
Height of desk		
Your height		



Measuring Mass: Using the materials and the balance provided by your teacher, measure the mass of various objects. Make your measurements to the nearest tenth. Record your measurements in the data table.

Object	Grams (g)	Kilograms (kg)
5 coins		
8 paper clips		
rock		
pencil		
24 pieces of paper		

Measuring Volume: Use the metric ruler your teacher provided to calculate the volume of various objects. Record your observations in the data table.

Object	Length	Height	Width	Volume in cubic centimeters (cm³)
Wooden block				
Book				
Eraser				

Questions:

1. How many centimeters are in 1 meter?
2. Which object was the heaviest? How much was its mass in grams?
3. What is the formula for computing the volume of a regularly shaped object?



Identifying Properties of Matter - Density

Background: What weighs more, a 100 gram rock or a 100 gram sponge? They both weigh the same: 100 grams! But you would much prefer a sponge to fall on your foot than a rock. Why? The answer has something to do with density. Density is the amount of matter per amount of volume. In other words, it is the amount of mass packed into a given space.

Some objects have more mass per unit of volume than others. For example, a brick has a lot more mass per unit of volume than a pillow. That is why you would rather rest your head on a pillow than a brick.

It is possible to compute a numerical value for density using the formula: $\text{Density} = \text{mass}/\text{volume}$. Water has a density of 1 gram/cubic centimeter. Objects with a density of greater than 1 gram/cubic centimeter sink, and those with less density than that float.

Materials: Block of wood, rock, balance, graduated cylinder, metric ruler

Instructions:

1. In the first part of this activity you will calculate the density of a block of wood. First you must compute its volume. Using a metric ruler, measure the length, height, and width of the wood. Record these values in the data chart below.
2. Now multiply them together to get the volume.
3. Weigh the block of wood on a balance. Record the value in grams.
4. Remember that the formula for density is: $\text{Density} = \text{mass}/\text{volume}$. Compute the density by putting the values into this equation.

Length	Height	Width	Volume in cubic centimeters (cm ³)	Mass	Density
cm	cm	cm	cm ³	g	g/cm ³



5. In the second part of the activity you will compute the density of an irregularly shaped rock.
6. To compute the volume of an irregularly shaped object it is not possible to compute it by measuring its length, height, and width with a metric ruler. Instead you must use the process of water displacement. Obtain a graduated cylinder or beaker. Fill it with water to a given point and record the value.
7. Carefully place the rock into the graduated cylinder or beaker. Now record the new value.
8. To get the volume subtract the original value from the second value.
9. In the metric system 1 milliliter (mL) of water occupies a volume of 1 cubic centimeter. Record the volume of the rock in cubic centimeters.
10. Using a balance compute the mass of the rock.
11. Compute the density of the rock using the formula: density = mass/volume.

Initial volume of water	Volume of water with rock	Volume of rock	Volume in cubic centimeters (cm³)	Mass	Density
mL	mL	mL	cm ³	g	g/cm ³

Questions:

1. What is density?

2. What is the mathematical equation used to compute density?

3. Which object has a greater density?

4. The density of water is 1 g/cm³. Based on the values of the objects, which object would float and what would sink? Why?



Vocabulary of What is Matter?

Directions: Unscramble the vocabulary words in the first column. Match the words to the definitions in the second column.

_____ 1. ssma _____

_____ 2. ivoductniyt _____

_____ 3. itlre _____

_____ 4. endstiy _____

_____ 5. hypsclia ytropper _____

_____ 6. esurmaentme _____

_____ 7. reemt _____

_____ 8. limechca roeppryt _____

_____ 9. hiewgt _____

_____ 10. mulvoe _____

a. a characteristic of matter such as color, shape, or texture

b. a physical property involving the ability to transfer electricity

c. a characteristic of matter such as flammability, conductivity, or how a substance changes into a new substance

d. the process of explaining the characteristics of matter with numbers

e. basic unit of length in the metric system

f. the amount of matter in an object

g. a measure of the pull of gravity on an object

h. the amount of space something takes up

i. the basic unit of volume in the metric system

j. amount of mass per unit of volume.