Understanding Density

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Grade Level: 8
Subject: Science

Project Summary: This is a collection of lessons that will help students to understand the concept of density. Students will be guided through visual representations of density using a PowerPoint slideshow, lecture, and note taking. Students will then gain hands-on experience taking measurements of mass and volume in order to calculate the density of a wide variety of materials. Density's role in floating and sinking is also addressed. Included are lab activities for the students to measure the density of rectangular objects, irregular objects, and liquids. At the end of this unit students will have a clear understanding of what density is/what it means, how it is measured for a variety of substances, and how it relates to an object's tendency to float or sink.

Introduction:

Project Description: One reason that this project is so successful is that it is a complete unit of lessons with a wide variety of instructional techniques that is able to reach and engage all students. The teacher-directed, student input part of this project is based on a PowerPoint slideshow that I have created. The slides are graphic-rich and simply worded. The reading level of the majority of students in my classes is fairly low, so I use lecture and discussion, with heavy emphasis on visuals and demonstrations, to get the concepts into the students. The pictures and demonstrations allow the students to see what I am explaining and helps to bring the learning out of the textbook and into the "real world". Graphics automatically increase student engagement because they enjoy looking at pictures and diagrams. A page full of text is a turn-off for many students. In addition to the graphics and notes, there is a complete set of hands-on density measuring/calculating lab activities and demonstrations that have been classroom tested over several years. These activities have undergone several revisions, and now I believe them to be very solid, thorough, and engaging activities. A technology component is included as well. The students will be able to be involved with an interactive density/buoyancy simulation on a computer. This can be shown as a demonstration to the class, or if facilities are available, students can run through the simulation website on their own. There is also a video resource included which the students will find entertaining as well as educational. These lessons can be used as the complete package in which I present them, or individual pieces can be pulled and used as teachers see fit.

Student Impact:

At the end of this unit students will have a clear understanding of what density is/what it means, how it is measured for a variety of substances, and how it relates to an object's tendency to float or sink. They will gain hands-on experience measuring mass and volume, and using those values to calculate densities.

Assessment:

Each lab activity has a worksheet/lab sheet, which goes along with it. These, as well as teacher observation during the activities, makes up the bulk of the unit's assessment opportunities. I have also included a test that can be given at the end of the unit as a final evaluation of the students' learning.

Standards:

8.a. Students know density is mass per unit volume.
8.b. Students know how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
8.d. Students know how to predict whether an object will float or sink.
9.f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure × area, volume = area × height).

Materials/Budget:

Common science classroom materials needed:

- computer with the ability to project

- graduated cylinders
- triple-beam balances
- rulers
- calculators (optional)
- hairdryer
- glass marbles
- several 2-liter bottles

Additional Purchases:

- Density Blocks - Science Kit, $20/set x 16 sets = $320
- Transfer Pipettes - Science Kit, $30 for a box of 500
- Clear glass cylinder (500mL) - Science Kit, $40
- Solar Tube - Educational Innovations, $13
- Glycerin, alcohol, corn syrup, mineral oil - grocery / drug store, $20

Lesson Plans:

Lesson 1- Introduction to Density (One 84 minute class period)

This lesson will introduce the concept of density and will allow students to experience density with real objects and to visualize density with illustrations on a Power Point slideshow.

Objectives:

Students will know the simple definition of density, but more importantly they will be able to describe why objects can have different densities. They will also be able to describe the role that density plays in determining whether an object will float or sink in a fluid.

Establishing interest in the topic:

I begin this first lesson by offering objects to students that have the same volume, but different masses. One set is a brick, a sponge, and a block of wood. The other is a set of two-liter bottles that are filled with different materials (air, water, sand, and pillow stuffing). I ask the class if the objects are the same size (volume), then I ask the question, “If they are all the same volume, then how can they have different masses?” We have a discussion which leads to them realizing that the matter must be more crowded in some objects than in others. This idea of “crowdedness” leads perfectly into the idea of density.

Lecture/Guided Note-taking:

In my classes, students copy information from PowerPoint slideshows into their notebooks. There is text that appears red and yellow on the slides. They highlight that text with two different colors of highlighter. Use the PowerPoint slides and any diagrams/visuals in your textbook to explain the definition and description of density. Once they get the idea of density, move on to the slides that explain densities role in floating and sinking.

Demonstration:

Once the lecture and notes are complete, this is a great time to pour a density column. A lot of textbooks have a photo of one, but there is no substitute for seeing it happen in front of you. You will need a large (500mL) clear glass graduated cylinder, and these five liquids: **water, rubbing alcohol, glycerin, corn syrup,** and **mineral oil**. All of the liquids are commonly available at grocery or drug stores. Use a bit of food coloring to dye each of the liquids a different color. The oil will remain clear because it will not mix with the water-based dye. When the liquids are poured into the cylinder they will form layers with the least dense on top and the most dense on the bottom. (see photo) The order, top-to-bottom will be: alcohol, oil, water, glycerin, syrup. If you pour the glycerin last, it will sink through the alcohol, oil, and water, and then float on top of the syrup. This completely reinforces the idea that more dense matter will sink in less dense matter.

Lesson 2- Changing Density with Temperature (One 84 minute class period)

This lesson will continue reinforcing the idea that substances will sink if they are more dense than the fluid that they are in.

Objective:

Students will be able to explain the role that density plays in the floating of hot air balloons.

Establishing Interest:

Use a hairdryer to fill up a plastic garbage bag with hot air and let it float around the room a bit. The small trash bags that custodians use in my room work perfectly. This will lead into the next set of PowerPoint slides.

Lecture/Guided Note-taking:

Use the PowerPoint slides pertaining to hot air balloons to explain that the hot air particles are moving faster than the cold particles, and thus are more spread out and less dense. If the balloon is filled with air that is less dense than the atmosphere, it will float.

Video Support:

Show the "Deconstructed: How Lava Lamps Work" video clip from the science channel website. http://science.discovery.com/videos/deconstructed-how-lava-lamps-work.html This is an excellent three minute clip that shows via animation and real-life video how the "lava" changes density as it is heated and cooled by the lamp.

Outdoor Demonstration:

Now it is time to demonstrate the same ideas with a giant 60-foot long solar tube bag. These are available from many educational science supply companies for about $13. They come with instructions, but the idea is that you fill this giant black plastic bag with air and it will absorb heat from the sun. In very little time at all, the bag will begin to float up in the air, just like the hot air balloon in the class and in the PowerPoint photos. It is very dramatic and sure to be remembered by the students.

Lesson 3 - Measuring and Calculating Density (One 84 minute class period)

Today the students will learn how density is measured. Density is not directly measured, but must be derived from measurements of mass and volume. If your students have not taken these measurements yet, then you might want to take a bit more time on the instruction of how to measure mass and volume. The PowerPoint slides review the measurement of mass, and measurements of volume for liquids, rectangular solids, and irregular solids. Students need to be familiar with measuring volume of irregular solids using the displacement method.

Objective:

Students will demonstrate how to measure the mass and volume of irregular objects and use those measurements to calculate the density of the objects.

Lecture/ Guided Note-taking:

The PowerPoint slides today will show the students the formula for calculating density as well as review the procedure for measuring mass and volume. Once they know how to do it, it is time for them to try it on their own.

Lab Activity (Density of Irregular Objects):

Now students will use what they learned from the last section of the PowerPoint notes session. The included *Density of Irregular Objects* worksheet will guide them step-by-step through their first attempt at measuring and calculating density. The students will work in pairs using the displacement method to find the volume, and balances to find the mass of some amount of pennies. The number of pennies given to each group should vary. Pay attention to the dates on the pennies because prior to 1982, pennies were solid copper and since then they are mostly zinc. Copper and zinc have different densities, so student groups will end up with different results. They will use their measured values to calculate the density of the pennies. They will repeat the same steps for some number of glass marbles (the number doesn't matter as long as they all can be submerged in a graduated cylinder). At the end of the activity when all students have their calculated densities, you can compare between student groups to see how accurate they were. If their densities are fairly accurate, then it is a good time for them to notice that the amount of the material does not effect the density. Groups that had 15 pennies should get the same overall density as groups that had 20 pennies.

Density of Irregular Objects Worksheet:

Name ____________________________Date ____________ Period _______

Density of Irregular Objects

Part I

1. How many marbles do you have? _____ Find the **mass** of your marbles.

   Mass of marbles = ___________

2. Find the **volume** of the marbles using the displacement method.

   Beginning water level = _____________

   Water level with marbles = ______________

   Volume of marbles = ______________

3. Calculate the **density** of the marbles.

   Write the formula for calculating density in this box.

   Use the formula to calculate the density of the marbles.

   Density = ______________ =

Part II

4. How many pennies do you have? _____ Find the **mass** of your pennies.

   Mass of pennies = ___________

5. Find the **volume** of the pennies using the displacement method.

   Beginning water level = _____________

   Water level with pennies = ______________

   Volume of pennies = ______________

6. Use the density formula to calculate the **density** of the pennies.

   Density = ______________ =

Lesson 4- Density of Rectangular Objects (One class period)

Begin today with a review of the steps for measuring the volume of a cube and for calculating density.

Objectives:

Students will know how to measure the volume and mass of a cube, and then use those values to calculate density. They will also know that if an object is more dense than a fluid, it will sink, and if it is less dense, it will float.

Lab Activity:

Today students will use a set of density blocks ($20/set from Science Kit) to find the density of a variety of substances in the shape of a cube. The included *Matter Cubes* lab sheet has complete instructions for them to follow. They will predict if each of the cubes will float or sink, calculate the densities, and then compare their results to the true densities to see how accurate their predictions were. Use the *Matter Cubes* PowerPoint slide with the names of the materials for them to write their predictions, then after they have their results, show the true densities so they can see how accurate they were. (The true densities are hidden on the slide until you play the slideshow, click to advance the slide and the true densities will reveal themselves.) Sometimes a small prize for the most accurate group can add a little competition fun and encourage them to be more careful.

* As an alternative to buying the $20 pre-made sets, you could go to a local cabinet shop and ask them to cut small rectangular pieces of wood from a variety of species. There are some varieties of wood that are too dense to float. Some examples are lignum vitae (iron wood) and Ipe. I have included a worksheet to use with this activity as well.

Density of Rectangular Solids Worksheet:

Names________________________ Date ______________ Period ____

Density of Rectangular Solids

Question: Which type of wood is more dense?

Hypothesis: I think ____

1. Explain how to calculate the volume of a *rectangular* solid.

2. Use the proper tools to determine the density of some different blocks of wood. Record the data in the table below. **Always label numbers with their proper units!**

Block #	Length	Width	Height	Volume of block	Mass of block	Density **D=m/v**

3. How can you use density to determine if an object will float or sink?

4. Which types of wood do you think will float? Are there any that you think will sink?

Conclusion: My hypothesis was _______________ because
____

Matter Cubes Worksheet:

Names ___________________________ Date ___________ Period ________

Matter Cubes

1. Observe the nine cubes and predict their order of density (from lowest to highest).
2. Predict whether each would float or sink in water.
3. Measure the **mass** of each cube.
4. Measure the **volume** of each cube.
5. Calculate the **density** of each cube.
6. Determine the actual order of density.
7. Determine whether each cube will float or sink in water.

8. How accurate were your predictions compared to the actual results? Why do you think that you were right/wrong?

9. Compare your calculated densities to the known densities of each cube. If there are differences, hypothesize about what could have caused the differences.

Lesson 5- Density of Liquids (One class period)

This lesson will continue their practice of measuring and calculating density. You will want to review the idea of measuring the mass of a liquid in a graduated cylinder. (They will have to subtract the mass of the cylinder to find the mass of liquid alone.)

Objective:

Students will be able to demonstrate how to measure the mass and volume of a liquid, and to use those values to calculate density. They will also know that density is a characteristic property of matter, which means that a small amount of water has the same density as a large amount of water.

Lab Activity:

Students will hone their density measuring skills with a new substance: water. The included *Density of Liquids* worksheet has complete instructions for them to follow. They will be measuring/calculating the density of several different volumes of water. In the end, they should be able to see that it will always be the same, regardless of volume.

Density of Liquids Worksheet:

Names__________________________________ Date _______________
Period __________________________________

Density of a Liquid

Question: Which is more dense, a large amount of water, or a small amount?

Hypothesis: I Think____

3. What piece of equipment do you use to find the ***volume*** of a liquid?

4. Describe how to take an accurate reading in a cylinder. (Include the word meniscus)

5. What piece of equipment is use to find the ***mass*** of a liquid?

4. Describe how you can find the mass of water using a balance.

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5. Use the proper methods of measuring mass and volume for each amount of water. Record your results in the data table below. **Always label numbers with the proper units!**

Volume of water	Mass of water and cylinder	Mass of cylinder	Mass of water only	Density of object **D=m/v**
5mL				
10mL				
25mL				
50mL				
100mL				

6. Density is a derived quantity. Explain how you calculated the density of an object.

7. Conclusion: Was your hypothesis correct or incorrect? Explain.

Lesson 6- Cartesian Diver Activity (One class period)

This lesson is always a big hit with the students. It does not require them to make any calculations or measurements. They will make a toy that is an excellent demonstration of principles of density and buoyancy.

Objective:

Students will be able to explain that the diver in their bottle sinks when they increase the density of air inside.

Lab Activity:

Prior to this activity (about a week or so) I ask the students to bring in small bottles (with lids!) from soda, water, or juice. You will need one bottle for each student. There are several ways to make the "diver", but the method I describe here is simple, inexpensive, and effective. Each student will need a bottle, a plastic transfer pipette (like a long narrow eyedropper), and a large paper clip. (Transfer pipettes are available from Science Kit, $30 for a box of 500.) They will need to cut the pipette about half way up the narrow stem, and insert the paper clip. (See photo) Next they need to fill the bottle to the very top with water and then insert the diver. They will need to suck water up into the diver to increase its mass and overall density. This is the trickiest part of the whole activity. They need to adjust the amount of water in the diver so that it just barely floats. Put the cap on the bottle and squeeze it with both hands. The diver should sink. If it does not sink or if it requires a large amount of squeezing effort, then they will need to pull the diver out and try to get more water inside. If the diver is still too buoyant, they could try adding a second paper clip. Once their diver is sinking with a minimal effort, it is time for them to think about why it happens. The included worksheet will help them to see that when they squeeze the bottle, the air bubble inside the diver gets smaller. They are forcing the air molecules in the diver to get closer together and therefore more dense. When the overall density of the diver becomes greater than water, it sinks. Another great aspect of this activity is that they get to take the project home and share it with their family. A homework option could be just that: take the bottle home and explain to your parents why the diver sinks when you squeeze the bottle.

Cartesian Diver Worksheet:

Name ______________________________ Date ____________ Period_______

The Cartesian Diver

1. Look carefully at the bubble of air inside your "diver" while you squeeze the bottle. What happens to the size of the bubble when you squeeze the bottle?

2. What is happening to the particles of air in the bubble when you squeeze the bottle?

3. When you squeeze the bottle you are ____________ the pressure. When the pressure increases, the volume of the gas in the bubble ______________.

4. How are you changing the density of the "diver" when you squeeze the bottle?

Name ______________________________ Date ____________ Period_______

The Cartesian Diver

1. Look carefully at the bubble of air inside your "diver" while you squeeze the bottle. What happens to the size of the bubble when you squeeze the bottle?

2. What is happening to the particles of air in the bubble when you squeeze the bottle?

3. When you squeeze the bottle you are ____________ the pressure. When the pressure increases, the volume of the gas in the bubble ______________.

4. How are you changing the density of the "diver" when you squeeze the bottle?

Lesson 7- Submarine Density (computer simulation)

Objective: Students will know that submarines float or sink by adding water or air to their ballast tanks in order to change their overall density.

Lesson:

There isn't a whole lot of teacher input here, as long as you have access to a computer lab at your school. Students will be able to get all the information on their own from reading and interacting with the website. This website: http://www.onr.navy.mil/focus/blowballast/sub/work1.htm has a great, short interactive presentation about how submarines can change their overall density by adding water or air to their ballast tanks. It is very similar to how the Cartesian Diver works above. There is an included worksheet that I have my classes fill out as they move through the simulation on the computers.

Assessment Paperwork:

For assessment in addition to the worksheets that accompany each activity, I have included a density calculations practice sheet that I give for homework, and an end-of-unit test. The test has two versions for students who sit next to each other.

Density Calculations Practice Sheet:

Name ___________________________

Date _____________ Period _____

Density Calculating Practice

(show your work!)

1. If 96.5 grams of aluminum has a volume of 35 cm3, what is the density of aluminum?

2. If a 32 gram piece of wood has a volume of 40 cm3, what is the density?

3. If the density of a diamond is 3.5g/cm3, what would be the mass of a diamond with a volume of 0.5 cm3?

4. A pure gold ring has a mass of 12 grams. The density of gold is 19.3g/cm3. What is the ring's volume?

5. A graduated cylinder contains 250mL of water. After adding a gold nugget to the cylinder, the water level rises to 265mL. What is the mass of the gold nugget?

End-of-Unit Test – Version 1:

Name ______________________________ Date _____________ Period ____ A

Density Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. If a shoe box measures 6 cm high, 7 cm wide, and 20 cm long, what is its volume?
a. 420 cm
b. 420 cm^3
c. 840 cm^3
d. 840 cm

____ 2. A metal washer has a mass of 0.27 g and a volume of 0.1 cm^3. What is its density?
a. 0.027 g/cm^3
b. 0.37 g/cm^3
c. 2.7 g/cm^3
d. 2.7 g/cm^2

____ 3. An appropriate SI unit for density would be
a. g.
b. L/m^3.
c. g/cm^3.
d. m.

____ 4. A large quartz crystal is added to a graduated cylinder containing 80 mL of water, raising the level to 90 mL of water. What is the volume of the quartz?
a. 10 cm^3
b. 80 cm^3
c. 90 mL
d. 90 cm^3

____ 5. When you put oil and water into the same container, the oil floats on the water because the oil
a. is more dense.
b. is less dense.
c. has more volume.
d. has less volume.

____ 6. Although a submarine is made of steel, it can float on water by pumping air into its ballast tanks. It can float because the average ____ of the submarine is less than water.
a. length.
b. volume.
c. mass.
d. density.

____ 7. A plastic disk's density is less than water but greater than oil. If you put all three into a glass container, where would you see the disk?
a. floating on top of the oil
b. between the water and the oil
c. at the bottom of the container
d. none of the above

____ 8. What tool is used to measure mass?
a. ruler
b. graduated cylinder
c. balance
d. thermometer

____ 9. What tool is used to measure the volume of an irregularly-shaped solid?
a. ruler
b. graduated cylinder
c. balance
d. thermometer

____ 10. A graduated cylinder contains 250 mL of water. After adding a nugget of gold to the water, the glass holds 265 mL of liquid. What is the volume of the gold nugget?
a. 15 cm^3
b. 15 mL
c. 265 cm^3
d. 265 mL

____ 11. If an object has a mass of 90 g and a volume of 30 cm^3, what is its density?

a. 0.33 g/cm^3
b. 3 g/cm^3
c. 60 g/cm^3
d. 270 g/cm^3

____ 12. When you add a rock to 70 mL of water in a graduated cylinder, the water rises to 80 mL. The mass of the rock is 20 g. What is the rock's density?
a. 0.25 g/cm^3
b. 0.5 g/cm^3
c. 2 g/cm^3
d. 3.5 g/cm^3

____ 13. A helium-filled balloon will float in air because
a. there is more air than helium.
b. helium is less dense than air.
c. helium is as dense as air.
d. helium is more dense than air.

____ 14. What is the density of a 20 cm^3 sample of liquid with a mass of 25 g?
a. 0.8 g/cm^3
b. 1.25 g/cm^3
c. 45 g/cm^3
d. 500 g/cm^3

____ 15. A 546 g fish displaces 420 cm^3 of water. What is the density of the fish?
a. 0.77 g/cm^3
b. 1.3 g/cm^3
c. 126 g/cm^3
d. 966 g/cm^3

____ 16. A submarine can travel both on the surface of the water and underwater because it can change its
a. interior pressure.
b. gravitational force.
c. density.
d. volume.

____ 17. When water fills a submarine’s flotation tanks, the overall density of the submarine
a. decreases.
b. stays the same.
c. increases.
d. reduces the buoyant force.

____ 18. The mass per unit volume of a substance is its
a. density.
b. buoyancy.
c. weight.
d. fluid pressure.

____ 19. An object that is more dense than the fluid in which it is immersed will
a. sink.
b. rise.
c. neither rise nor sink.
d. sink at first, than rise slowly.

____ 20. Which of these substances is the LEAST dense?
a. wood
b. copper
c. mercury
d. rubber

Density Test
Answer Section

MULTIPLE CHOICE

1.	ANS: C	PTS: 1	BLM: application
2.	ANS: C	PTS: 1	BLM: application
3.	ANS: C	PTS: 1	
4.	ANS: A	PTS: 1	
5.	ANS: B	PTS: 1	
6.	ANS: D	PTS: 1	
7.	ANS: B	PTS: 1	
8.	ANS: C	PTS: 1	
9.	ANS: B	PTS: 1	
10.	ANS: A	PTS: 1	
11.	ANS: B	PTS: 1	
12.	ANS: C	PTS: 1	
13.	ANS: B	PTS: 1	
14.	ANS: B	PTS: 1	
15.	ANS: B	PTS: 1	
16.	ANS: C	PTS: 1	
17.	ANS: C	PTS: 1	BLM: comprehension
18.	ANS: A	PTS: 1	BLM: knowledge
19.	ANS: A	PTS: 1	BLM: comprehension
20.	ANS: A	PTS: 1	BLM: comprehension

End-of-Unit Test – Version 2:

Name ______________________________ Date _________________ Period _____ B

Density Test

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. If an object has a mass of 90 g and a volume of 30 cm^3, what is its density?
a. 0.33 g/cm^3 c. 270 g/cm^3
b. 3 g/cm^3 d. 60 g/cm^3

____ 2. What tool is used to measure mass?
a. graduated cylinder c. balance
b. thermometer d. ruler

____ 3. A 546 g fish displaces 420 cm^3 of water. What is the density of the fish?
a. 0.77 g/cm^3 c. 966 g/cm^3
b. 1.3 g/cm^3 d. 126 g/cm^3

____ 4. An appropriate SI unit for density would be
a. L/m^3. c. g.
b. m. d. g/cm^3.

____ 5. An object that is more dense than the fluid in which it is immersed will
a. rise.
b. sink.
c. sink at first, than rise slowly.
d. neither rise nor sink.

____ 6. A graduated cylinder contains 250 mL of water. After adding a nugget of gold to the water, the glass holds 265 mL of liquid. What is the volume of the gold nugget?
a. 15 cm^3 c. 265 cm^3
b. 265 mL d. 15 mL

____ 7. A large quartz crystal is added to a graduated cylinder containing 80 mL of water, raising the level to 90 mL of water. What is the volume of the quartz?
a. 10 cm^3 c. 90 cm^3
b. 90 mL d. 80 cm^3

____ 8. What is the density of a 20 cm^3 sample of liquid with a mass of 25 g?
a. 0.8 g/cm^3 c. 500 g/cm^3
b. 45 g/cm^3 d. 1.25 g/cm^3

____ 9. A submarine can travel both on the surface of the water and underwater because it can change its
a. density. c. volume.
b. interior pressure. d. gravitational force.

____ 10. A metal washer has a mass of 0.27 g and a volume of 0.1 cm^3. What is its density?
a. 2.7 g/cm^2
b. 0.027 g/cm^3
c. 2.7 g/cm^3
d. 0.37 g/cm^3

____ 11. Although a submarine is made of steel, it can float on water by pumping air into its ballast tanks. It can float because the average ____ of the submarine is less than water.
a. density. c. length.

b. mass. d. volume.

____ 12. What tool is used to measure the volume of an irregularly-shaped solid?
a. thermometer
c. ruler
b. balance
d. graduated cylinder

____ 13. When you add a rock to 70 mL of water in a graduated cylinder, the water rises to 80 mL. The mass of the rock is 20 g. What is the rock's density?
a. 3.5 g/cm^3
c. 0.5 g/cm^3
b. 2 g/cm^3
d. 0.25 g/cm^3

____ 14. A plastic disk's density is less than water but greater than oil. If you put all three into a glass container, where would you see the disk?
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b. between the water and the oil
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a. decreases.
b. stays the same.
c. increases.
d. reduces the buoyant force.

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a. there is more air than helium.
c. helium is less dense than air.
b. helium is as dense as air.
d. helium is more dense than air.

____ 17. Which of these substances is the LEAST dense?
a. mercury
b. copper
c. rubber
d. wood

____ 18. When you put oil and water into the same container, the oil floats on the water because the oil
a. has less volume.
c. is less dense.
b. is more dense.
d. has more volume.

____ 19. If a shoe box measures 6 cm high, 7 cm wide, and 20 cm long, what is its volume?
a. 840 cm
b. 840 cm^3
c. 420 cm^3
d. 420 cm

____ 20. The mass per unit volume of a substance is its
a. density.
b. buoyancy.
c. weight.
d. fluid pressure.

Density Test
Answer Section

MULTIPLE CHOICE

1.	ANS: B	PTS: 1	
2.	ANS: C	PTS: 1	
3.	ANS: B	PTS: 1	
4.	ANS: D	PTS: 1	
5.	ANS: B	PTS: 1	BLM: comprehension
6.	ANS: A	PTS: 1	
7.	ANS: A	PTS: 1	
8.	ANS: D	PTS: 1	
9.	ANS: A	PTS: 1	
10.	ANS: C	PTS: 1	BLM: application
11.	ANS: A	PTS: 1	
12.	ANS: D	PTS: 1	
13.	ANS: B	PTS: 1	
14.	ANS: B	PTS: 1	
15.	ANS: C	PTS: 1	BLM: comprehension
16.	ANS: C	PTS: 1	
17.	ANS: D	PTS: 1	BLM: comprehension
18.	ANS: C	PTS: 1	
19.	ANS: B	PTS: 1	BLM: application
20.	ANS: A	PTS: 1	BLM: knowledge