Soap, Wood, and Water
Task Information

Subject: Earth Science

Content:

- NYS Earth Science syllabus (1970 ed.) - Topic I - Observation and Measurement of the Environment B-2
- Earth Science syllabus (Pro. Mod.) - Unit 4 Surface processes and landscape D - Deposition - 1
- Framework - Standard 4 - Science - Matter has observable properties and is made up of particles that may interact
- Middle Level Science Block - D - Processes I - Earth's surface C-1

Format: Manipulative

Purpose:

- To measure the properties of 3 objects and calculate their densities. To predict if they would float or sink in fresh or salt water.

Skills:

Primary: Measure, record data, apply math, predict
Secondary: Interpreting data

Time: 10-15 minutes

Materials:

Teacher	per Student

• soap recommendation:
  square white soap (Ivory)
  sharp cornered amber
  colored soap
(i.e. Neutrogena)
	• 1 calculator
	• 1 balance (gm)
	• 1 metric ruler
	• 1 wood sample
	• 1 soap sample A
	• 1 soap sample B

Preparation:

- Label the blocks of soap A and B. If the labeled blocks are the same for all stations in the class label the sets 1A, 1B, 2A, 2B, etc.
- Measure the mass and dimensions of the soap block and record the mass and volume on the teacher scoring rubric.

Safety: N/A

Extensions/modifications:

- Use soda pop examples. Explain the density differences between Coca-cola Classic; an Uncola diet; and an empty can (filled w/air) because of how they float.

Soap, Wood and Water

Task: At this station, you will determine the density of some common objects and predict how they would behave in water.

Materials:

- balance (gm)
- metric ruler
- soap sample A
- calculator
- wood sample
- soap sample B

Background: Some objects float and some sink when placed in fresh water. The density of a material is a physical property and can be used as an identifying characteristic. Fresh water has a density of 1.0 gm/cm³.

Directions:

A. Do **not** remove the wrapper from the soap. This will help protect their soft surfaces.

B. Place your answers on the answer sheet. Complete the chart and answer questions 2, 3, and 4.

C. Disregard the effects of the wrappers on the soap samples. Again, do **not** remove the wrapper from the soap.

1. Fill in the chart below by determining the mass, volume, and density of the three samples to the nearest tenth place. You may disregard the effects of the wrappers. (Keep wrappers on the soap to help protect their soft surfaces.)

Sample	Mass (gm)	Dimensions (cm)	Volume (LxWxH) = cm³	Density = g/cm³ (D = M/V)
Wood		L - W - H -		
Soap A		L - W - H -		
Soap B		L - W - H -		

> **Please Continue on the Next Page**

2. The picture below represents a glass container with fresh water. Assume that these three (3) samples were actually placed in such a container. Based on your calculations in the data table, sketch and label the diagram where you think each of the three samples (wood, soap A and soap B) would be.

beaker ⟶
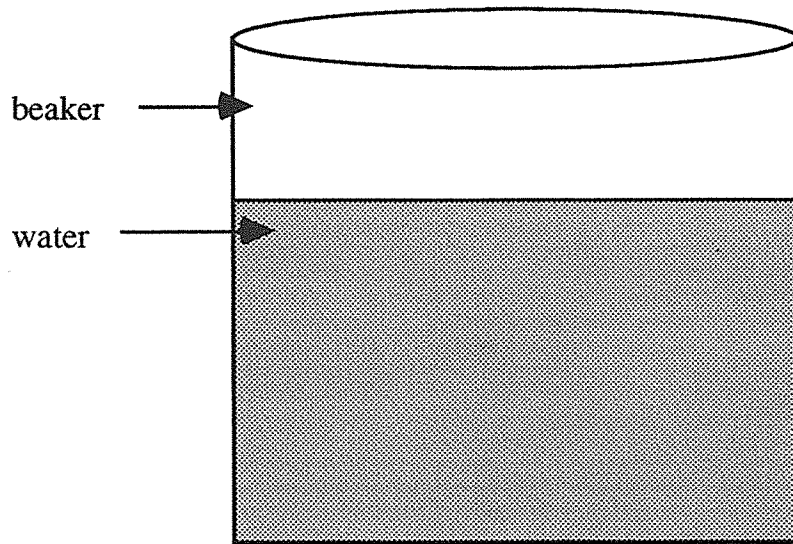
water ⟶

3. Assume that an ice cube were also placed in the container. Based on past experiences sketch and label in the picture above where you think the ice cube would be.

4. If the same four (4) objects (wood, soap A, soap B, ice cube) were placed in ocean water, explain in complete sentences what you think would happen to the way they would float.

_____

_____

_____

Soap, Wood, and Water - Scoring Rubric
Maximum Score - 18 points

Task 1 Data Table   12 points total

Standard: The student will accurately record data on a data table.

Criteria:

 A. Accurately measured mass of each of the samples
  within +/-0.5 grams.   **3 points**
      Teacher Answers

   • wood _____ 1 point

   • Soap A _____ 1 point

   • soap B _____ 1 point

 B. Accurately measuring sample dimensions =/- 0.5cm **3 points**
   • All nine (9) measurements correct   3 points
   • eight (8) measurements correct   2 points
   • seven (7) measurements correct   1 point
   • less than seven (7) measurements correct 0 points

 C. Accurately calculating volume of the samples
  according to their measurements.   **3 points**
      Teacher Answers

   • wood _____ 1 point

   • soap A _____ 1 point

   • soap B _____ 1 point

 D. Accurately calculate density based on student data for
  each sample.   **3 points**
      Teacher Answers

   • wood _____ 1 point

   • soap A _____ 1 point

   • soap B _____ 1 point

Task 2. Sketch and Label   3 points total

Standard: The student will correctly place and label each of the samples in the
    diagram (based on the student's calculated densities).

Criteria:

   • 3 samples correctly placed and labeled 3 points
   • 2 samples correctly placed and labeled 2 points
   • 1 sample correctly placed and labeled 1 point
   • no samples correctly placed or labeled 0 points

Task 3. Ice Cube   1 point total

<u>Standard:</u> The student will accurately sketch and label an ice cube in the given diagram.

<u>Criteria:</u>

- An accurate sketch and label in the location of the ice cube   1 point
- Inaccurate or no sketch and label of ice cube   0 points

Task 4. Ocean Water   2 points total

<u>Standard:</u> The student will describe and explain in a complete sentence what would happen to the four objects in ocean water.

<u>Criteria:</u>

- A logical, reasonable answer in a complete sentence.   2 points

<u>Examples:</u>

- All objects float higher in ocean water than in fresh water.

or

- Ocean water is more dense than fresh water and would push the objects higher.
- A logical, reasonable answer not in a complete sentence.   1 point
- No answer or improbable answer given even if a complete sentence.   0 points

Highest Possible Score - 18 points

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Data Table

   A. Measure mass

   - wood   0   1
   - Soap A   0   1
   - Soap B   0   .1

   B. Sample Dimensions   0   1   2   3

   C. Calculate Volume

   - wood   0   1
   - Soap A   0   1
   - Soap B   0   1

   D. Calculate Density

   - wood   0   1
   - Soap A   0   1
   - Soap B   0   1

2. Sketch and Label   0   1   2   3

3. Ice Cube   0   1

4. Ocean Water   0   1   2

TOTAL SCORE _____
Total possible score - 18 points

Student ID _SWW #3_   Scoring Form - Soap, Wood and Water

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Data Table

    A. Measure mass
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

    B. Sample Dimensions   0   1   2   (3)

    C. Calculate Volume
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

    D. Calculate Density
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

2. Sketch and Label   0   1   2   (3)

3. Ice Cube   0   (1)

4. Ocean Water   0   (1)   2

TOTAL SCORE + 17

(Total possible score - 18 points)

Soap, Wood and Water

<u>Task</u>: At this station, you will determine the density of some common objects and predict how they would behave in water.

MATERIALS:

- balance (gm)
- metric ruler
- soap sample A
- calculator
- wood sample
- soap sample B

BACKGROUND: Some objects float and some sink when placed in fresh water. The density of a material is a physical property and can be used as an identifying characteristic. Fresh water has a density of 1.0 gm/cm^3.

DIRECTIONS:

1. Do **not** remove the wrapper from the soap. This will help protect their soft surfaces.
2. Place your answers on the answer sheet. Complete the chart and answer questions 2, 3, and 4.
3. Disregard the effects of the wrappers on the soap samples. Again, do **not** remove the wrapper from the soap.

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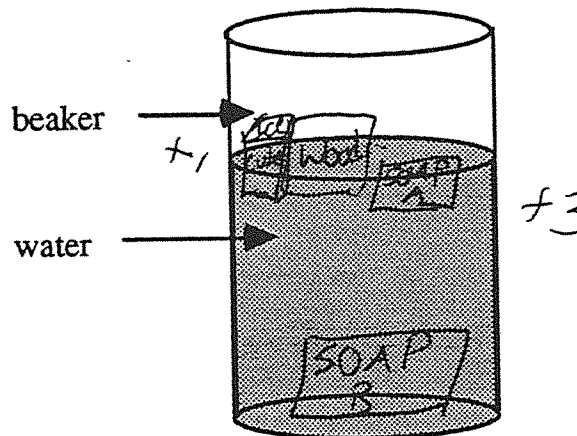
Soap, Wood, and Water
Answer Sheet

1. Fill in the chart below by determining the mass, volume, and density of the three samples. You may disregard the effects of the wrappers. (Keep wrappers on the soap to help protect their soft surfaces.)

Sample	Mass (gm)	Volume $(L \times W \times H) = cm^3$	Density $(D = M/V)$
Wood	69.4	$7.5 \cdot 5 \cdot 2.5 =$ 93.75	.74
Soap A	124.4	$9.5 \cdot 5.5 \cdot 2.5 =$ 130.625	.95
Soap B	83.6	$7 \cdot 4.5 \cdot 2.5 =$ 78.75	1.06

+12

2. The picture below represents a glass container with fresh water. Assume that these three (3) samples were actually placed in such a container. Based on your calculations in the data table, sketch and label the diagram where you think each of the three samples (wood, soap A and soap B) would be.

3. Assume that an ice cube were also placed in the container. Based on past experiences sketch and label in the picture above where you think the ice cube would be.

> **Please Continue on the Next Page**

Soap, Wood, and Water
Answer Sheet (cont.)

4. If the same four (4) objects (wood, soap A, soap B, ice cube) were placed in ocean water, explain in complete sentences what you think would happen to the way they would float.

If the same 4 objects were placed in Ocean water, I think they would all float, on occount of the salt

+1

Student ID ~~Essuw~~ # 4   Scoring Form - Soap, Wood and Water

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Data Table

    A. Measure mass
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

    B. Sample Dimensions   (0)   1   2   3

    C. Calculate Volume
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

    D. Calculate Density
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

2. Sketch and Label   0   1   2   (3)

3. Ice Cube   0   (1)

4. Ocean Water   0   1   (2)

TOTAL SCORE +/5

(Total possible score - 18 points)

Soap, Wood and Water

Task: At this station, you will determine the density of some common objects and predict how they would behave in water.

Materials:

- balance (gm)
- metric ruler
- soap sample A
- calculator
- wood sample
- soap sample B

Background: Some objects float and some sink when placed in fresh water. The density of a material is a physical property and can be used as an identifying characteristic. Fresh water has a density of 1.0 gm/cm³.

Directions:

1. Do **not** remove the wrapper from the soap. This will help protect their soft surfaces.
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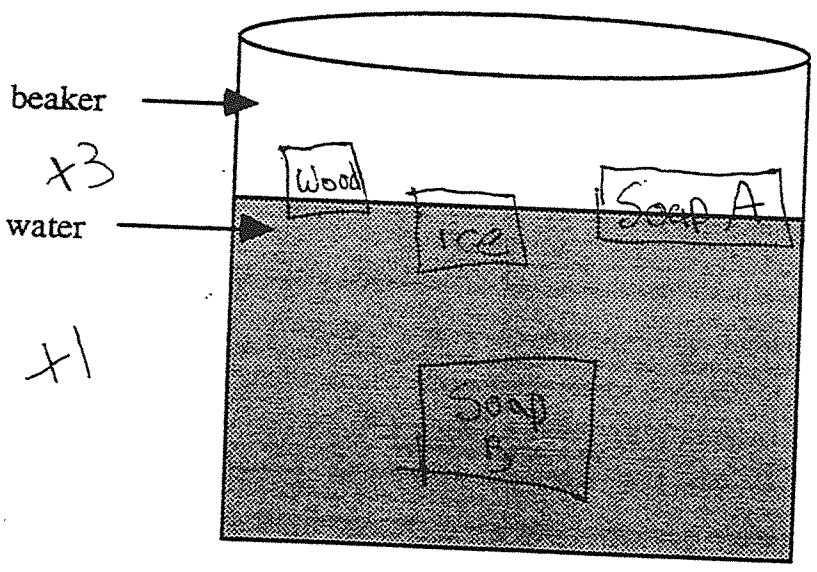
Soap, Wood, and Water - Answer Sheet

1. Fill in the chart below by determining the mass, volume, and density of the three samples to the nearest tenth place. You may disregard the effects of the wrappers. (Keep wrappers on the soap to help protect their soft surfaces.)

Sample	Mass (gm)	Dimensions (cm)	Volume (LxWxH) = cm3	Density = g/cm3 (D = M/V)
Wood	66	L - W - H -	87.4	.7551
Soap A	115.7	L - W - H -	132	.876515
Soap B	82.6	L - W - H -	78.144	1.0570229

2. The picture below represents a glass container with fresh water. Assume that these three (3) samples were actually placed in such a container. Based on your calculations in the data table, sketch and label the diagram where you think each of the three samples (wood, soap A and soap B) would be.

beaker

x3

water

x1

Wood   ice   Soap A

Soap B

3. Assume that an ice cube were also placed in the container. Based on past experiences sketch and label in the picture above where you think the ice cube would be.

Please Continue on the Next Page

4. If the same four (4) objects (wood, soap A, soap B, ice cube) were placed in ocean water, explain in complete sentences what you think would happen to the way they would float.

If all four samples were placed in ocean
water, I think all four samples would
float on top of the water

x 2

Student ID ES3ww #6   Scoring Form - Soap, Wood and Water

Male / Female (circle one)

Circle the student's score for each question. Add the points for each question and write the total score at the bottom of the scoring form.

1. Data Table

     A. Measure mass
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

     B. Sample Dimensions   (0)   1   2   3

     C. Calculate Volume
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

     D. Calculate Density
- wood   0   (1)
- Soap A   0   (1)
- Soap B   0   (1)

2. Sketch and Label   0   (1)   2   3

3. Ice Cube   0   (1)

4. Ocean Water   (0)   1   2

TOTAL SCORE   + 11

(Total possible score - 18 points)

Soap, Wood and Water

Task: At this station, you will determine the density of some common objects and predict how they would behave in water.

Materials:

- balance (gm)
- metric ruler
- soap sample A
- calculator
- wood sample
- soap sample B

Background: Some objects float and some sink when placed in fresh water. The density of a material is a physical property and can be used as an identifying characteristic. Fresh water has a density of 1.0 gm/cm³.

Directions:

1. Do **not** remove the wrapper from the soap. This will help protect their soft surfaces.
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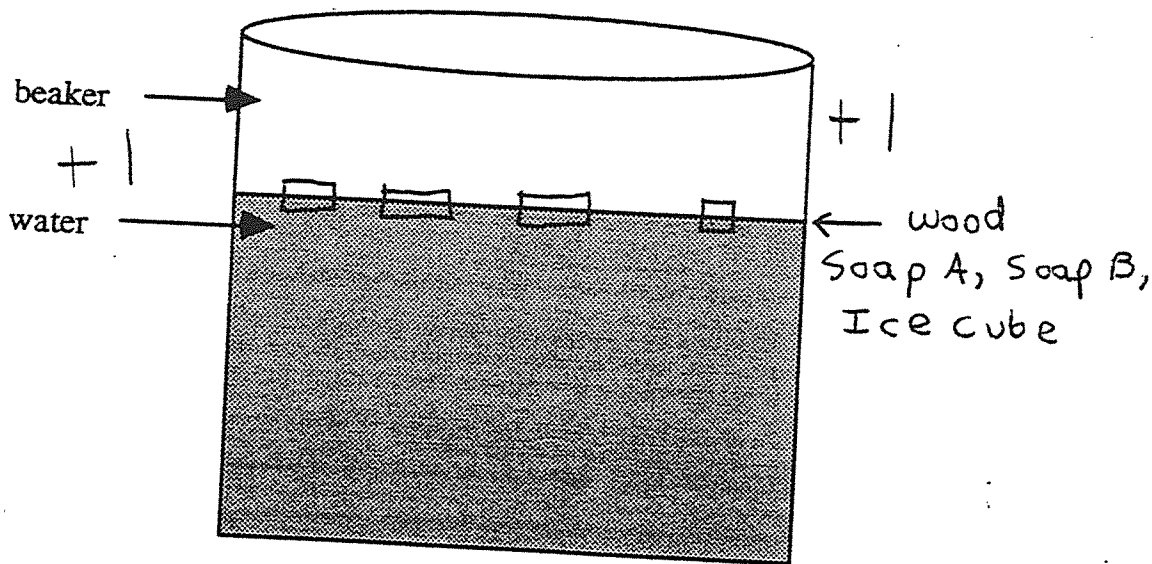# Soap, Wood, and Water - Answer Sheet

1. Fill in the chart below by determining the mass, volume, and density of the three samples to the nearest tenth place. You may disregard the effects of the wrappers. (Keep wrappers on the soap to help protect their soft surfaces.)

Sample	Mass (gm)	Dimensions (cm)	Volume (LxWxH) = cm3	Density = g/cm3 (D = M/V)
Wood	64.2 gm	L - W - H -	100.572 cm³	.638 g/cm³
Soap A	84 gm	L - W - H -	89.032 cm³	.943 g/cm³
Soap B	120.3 gm	L - W - H -	141.075 cm³	.850 g/cm³

2. The picture below represents a glass container with fresh water. Assume that these three (3) samples were actually placed in such a container. Based on your calculations in the data table, sketch and label the diagram where you think each of the three samples (wood, soap A and soap B) would be.

beaker →

+ | + |

water →   ← wood
                        Soap A, Soap B,
                        Ice cube

3. Assume that an ice cube were also placed in the container. Based on past experiences sketch and label in the picture above where you think the ice cube would be.

Please Continue on the Next Page

Soap, Wood, and Water
Answer Sheet (cont.)

4. If the same four (4) objects (wood, soap A, soap B, ice cube) were placed in ocean water, explain in complete sentences what you think would happen to the way they would float.

I think that if the same 4 objects were placed in ocean water, they would all float and nothing except the density of the water would change.

+0