Intro to Density

Lesson: 5/11
Topic: Density
Process: Demonstration & Think-Pare-Share
Grade: 2
Materials: 3 pop bottles (with wet-sand, water, air), 20 containers (four of each with sand, water, cotton balls, steelies/magnets), density worksheet
Vocabulary: density
Learning Outcomes: Students will
-define density
-show understanding of density by comparing two objects

The Lesson

Introduction:
1) Show pop-bottles filled with different materials (air, water, wet-sand).
2) As a class, discuss which one of the pop bottles is heavier and why.
3) Ask questions to help lead students to a definition of density. For example, "How full are each of the containers?" **(each container is full).** "Why does one weigh more than another?" **(because one is thicker than another).**

Development:
4) Ask the students to think of two same-sized objects that weigh different amounts.
5) Have students come together with a partner to share their ideas.
6) Bring the class together to listen to the different ideas/objects.
7) Write on board written rule for density – **"Density is the thickness of an object or liquid."**
8) Hand out worksheets.
9) Explain activity – "In your groups, choose 2 of the 4 containers I will give you, and write on your worksheet which two you chose, which one you believe is denser, and why you think it is."
10) Hand out containers and allow students to start their task.

Conclusion:
11) Come back together as a group and take volunteers to share which containers they chose, which one they believe is denser, and why they think it is.
12) Clean up.

Assessment/evaluation:
Take in worksheet. Check for comprehension of density by observing their ability to determine the denser of the two containers they chose.

Reflection:
I believe this to be a very basic lesson with the potential for the majority of students to do quite well in understanding density in general. I think the use of 3 differently weighted

pop bottle will really help in the understanding of the concept, and I think it will segway nicely into their group activities of determining the density of given containers. I hope that by starting off the 2-part lesson on density with something as basic as this it will pay-off in the second half. My success in explaining the concept will come through in both this lesson – through the assessment of their predictions of which containers are denser – and the next.

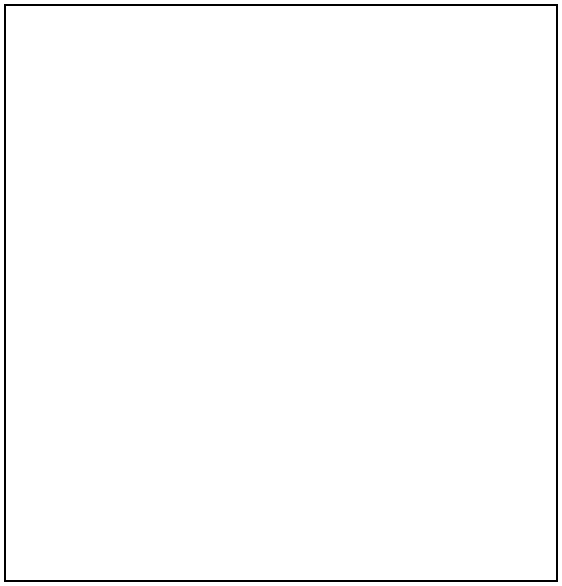
Name:_____ Date:_____

DENSITY

Density is _____

_____.

I chose: (either magnets, cotton balls, flour, water)



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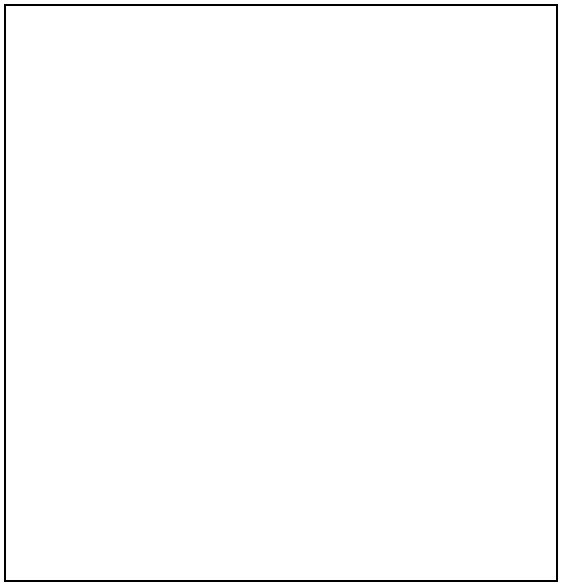

I believe that the denser container is the one filled with _____ because _____

_____.

Liquid Densities

Lesson: 6/11
Topic: Liquid Densities
Process: Demonstration & Prediction
Grade: 2
Materials: syrup, glycerol, water, food colouring, vegetable oil, rubbing alcohol, vinaigrette salad dressing, chocolate syrup, milk, spoon, clear container, copies of predictions worksheet
Vocabulary: density
Learning Outcomes: Students will

-describe two liquids with different densities
-define density
-make reasonable predictions of which of two liquids are denser

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The Lesson

Introduction:
1) Recap what we know about density from yesterday – **"Density is the thickness of an object or liquid."**
2) Ask the questions, "Can two liquids have different densities? Can one liquid be more dense than another?"
3) Give short while to think, then take answers, thoughts, potential examples.

Development:
4) Gather students at the front and do the "five liquid" demonstration.

→ Slowly pour 50 ml of each of the following liquids into the glass, in the following order: syrup (at the bottom), glycerol (2^{nd}), water mixed with red food colouring (3^{rd}), vegetable oil (4^{th}), rubbing alcohol mixed with blue food colouring (top).

→ Pour the liquids into a spoon to avoid splashing and mixing.

5) Ask the students questions to have them come to the conclusion that some liquids are more dense than others. For example, "What do we see?" **(the liquids are sitting on top of each other in layers)** "Why do you think it is this way?" **(some of the liquids are heavier than others)**
6) Ask a question to help students think about liquids of different densities in their everyday life, such as, "Can you think of any place where you can see two liquids of different densities together?" **(oil spill, chocolate milk, salad dressing, oil & vinegar)**
7) Hand out worksheet.
8) Using the chocolate syrup & milk, water & oil, and oil & vinegar, ask the students to circle on their handout which liquid in each combination they believe is denser.

Conclusion:
9) Once class has made their predictions, mix the above liquids and discuss the results.
10) Have the students complete sentence at the bottom of the worksheet – **"Density is…"**
11) Clean up.

Assessment/evaluation:
Take in worksheet. Check for ability to determine the denser of the two mixed liquids. Check for completion of copying the statement on density.

Reflection:
I'm anticipating this lesson to be a bit of stretch for some of the students, which is why I'm glad we will have the previous lesson to introduce the concept of density. However, because of the application it has to everyday life (I'm assuming that every child has at least mixed their own chocolate milk, seen and oil spill, or had to shake up a salad dressing) I think there is potential for some students to understand that liquids can have different densities very quickly. I'm quite excited to see the final answers each student has for "density is…" – I think their ability to articulate that will inform me of my ability to teach the concept in this way.

Name:_____ Date: _____

LIQUID DENSITY

1) Circle the liquid you think is **denser** (which one will sit under the other).

Milk ←→ Chocolate Syrup

Water ←→ Oil

Milk ←→ Water

TICKET OUT THE DOOR

Density is

_____

_____

_____

_____

_____

_____

Liquid-Solid Interactions

Lesson: 7/11
Topic: Dissolving
Process: Demonstration & Self-guided Discovery
Grade: 2
Materials: 3 cups (one of each marbles, Styrofoam, sugar), jar of water, 5 clear containers of water, containers (five of each cocoa powder, pennies, marbles, bread, fabric, sand, chips), student worksheet
Vocabulary: density, dissolve
Learning Outcomes: Students will

-understand relationship of solids in liquids (float, sink, dissolve)
-be able to make reasonable predictions of interactions between given materials

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The Lesson

Introduction:
1) Do "3 Interactions" demonstration to show that solids either float, sink, or dissolve.
→ Pour a cup of marbles, Styrofoam, and sugar into a jar of water. Stir it around a little bit (until the sugar dissolves).
2) Discuss with the class what they see (one floats, one sinks, and one disappeared).
3) Ask the question, "Why each solid does what it does (float, sink, dissolve)."
4) Ask the students "What has happened to the sugar?" "Was it less dense than the water? More dense than the water? What has happened to it?"
5) Define dissolving and write definition on the board – **Dissolving is when a solid breaks down into smaller parts within a liquid.**
6) Explain that the sugar is still there, but has been broken down so that it is too small to see any more.

Development:
7) Explain to the students that in groups, they will be given a few different solids that they are to try dissolving in a cup of water.
8) Inform the students that they are to mark their results (dissolve/not dissolve) on the provided worksheet.
9) Hand out worksheet and materials.
10) Allow students to start experiment.

Conclusion:
11) After some time, come back together and recap by asking each group to share with the class which solids dissolved they tested dissolved, and which did not.
12) Ask the class if they agree with each other's findings.
13) Ask the students to predict, at the bottom of the worksheet, what they think will happen to a raison and a lifesaver if left in a jar of water overnight. Explain that they must give a reason for their answer (if time allows).
14) Clean up.

Assessment/evaluation:
Take in worksheet. Check for completion of each experiments (based upon circled results). Check for completed prediction of the raison and lifesaver experiment.

Reflection
I will know if I have done a good job of explaining the concept of dissolving to the students if they successfully mark on their worksheet the results of their experiments. Individual substances are not known to be able to dissolve or not without some prior knowledge or experience with them, so I expect this to be a very "deep" lesson for the students. I do not anticipate they will have much knowledge on the subject, so I am anticipating lots of questions and excitement.

Name:_____ Date: _____

LIQUID and SOLID INTERACTIONS

1) Predict what each solid will do when put in water (circle what you believe will happen).

Puffed Wheat – SINK / FLOAT / DISSOLVE

Coffee – SINK / FLOAT / DISSOLVE

Salt – SINK / FLOAT / DISSOLVE

Coins – SINK / FLOAT / DISSOLVE

2) Test your predictions (circle what *actually* happened).

Puffed Wheat – SINK / FLOAT / DISSOLVE

Coffee – SINK / FLOAT / DISSOLVE

Salt – SINK / FLOAT / DISSOLVE

Coins – SINK / FLOAT / DISSOLVE

Dissolving is _____

_____

_____

Water – Surface Tension

Lesson: 8/11
Topic: Surface Tension
Process: Demonstration & Self-guided Discovery
Grade: 2
Materials: glass, water, pennies, dishes for each student, paperclips, small rocks, science booklet to write in
Vocabulary: surface tension, bulging, surface area
Learning Outcomes: Students will
-understand surface tension
-experiment to see if they can float a paperclip on water

The Lesson

Introduction:
1) Start by doing the Pennies in Water demonstration:
→Fill a glass almost to the very top (not so it is bulging, but just about).
→Ask the students how many pennies they believe we will be able to fit into the glass before the water spills over. Write predictions on the board.
→Slowly start dropping pennies into the glass by holding them vertically against the inside of the glass (minimize splashing – it will confuse the students with "overflow")
2) As you are putting pennies in keep count, and ask the students "What do you see?" "What is happening?" "Why is the water bulging?"
3) Explain to the students the concept of surface tension, and write definition on the board – **Surface tension is when liquid molecules stick to each other and form a barrier.**

Development:
4) Introduce the experiment to the students. Explain that when you say "go" they will find a partner and try to float both a paper clip and a small rock on the water in their container.
5) Hand out materials and instruct students to start.
6) After students have had time to attempt the task, discuss as a class each group's results.
→ Ask the questions, "Which objects were you able to get to float?" **(paperclip)** "Why do you think it was not always possible to float the paperclip?" **(dropped it to fast or on the side)** "Did it matter which way you dropped it into the water?" **(yes – it only floated when dropped flat)** "Why didn't the rock float if it was the same weight as the paperclip?" **(the rock was bumpy and was more dense)**

Conclusion:
7) Hand out science journals and ask the students to write down why the paperclip was able to float and why the rock did not.
8) Clean up.

Assessment/evaluation:
Take in science journal. Check for completion and understanding of why the paperclip was able to float but not the rock.

Reflection:
I think that on a whole the students will come away from this lesson knowing that water has surface tension, understanding that it allows both things to float on it and allow it bulge, but will not completely understand the physics behind it. However, I don't expect them to understand all the physics behind molecular cohesion and the polarity of water – I want them know that there is such as surface tension, know what it does, and begin to think outside the box (ie. what surface tension can be used for in a practical sense). I hope that student understanding will come through in their science journal, but I guess I won't know until I perform the lesson.