Sound

Field Teaching Lesson Plan on Vibrations

Overall Purpose:
The students will identify objects based on the sounds that they make. By shaking each object in a plastic egg, the student will be able to describe and compare the vibrations that are heard.

Rationale:
This lesson is worthwhile because students need to understand what makes a vibration. It does not just happen by itself, rather it is caused by an outside force. Furthermore, students will be able to distinguish the different vibrations that each object makes itself. The Michigan Cirriculum Framework for this standard is benchmark IV.4.e.2: All sounds are created by vibrations of matter. In order for vibrations to occur, a force must be applied to the object. The size of the vibration can be described as being large or small. The rate of vibration can be described as being fast or slow. The sound that is created by an object's vibration then exists in and spreads out through the air (or other surrounding matter), separate from the object or source of the sound. When these traveling vibrations reach our ears, they cause our eardrums to vibrate and we "hear" the sound.

First Learning Activity:
"Eggs-Full of Sound" (AIMS Education Foundation © 1990)

Objectives:
Students will shake 12 eggs with various objects in them to determine the sound they make and correctly identify each object.

Opening:
We will divide the class in half allowing each group to have a full set of eggs to experiment with. The eggs will be labeled 1-12, corresponding to the items found inside. This will be done in a random order from the worksheet. To ensure the groups work well together, two of us will be in charge in one half of the class, making sure that each student is allowed ample time to shake each egg.

What Will Happen?
Students will take turns shaking each egg and attempt to identify its belongings on a worksheet that will be distributed to them. The worksheet has a list of the items in the eggs, corresponding to the number of eggs distributed.

Assessment:
We will discuss with the class as a whole what they think is inside each egg, then show them the correct answer. Students will be asked to explain why certain materials sound different or the same when shaken in the egg, and if it makes a difference how hard the egg is shook.

Approximate Time:
30 minutes

Preparation/Materials:
* Plastic Eggs
* Marshmallows
* Rice
* Beans
* Cotton
* Dice
* Paper Clips
* Keys
*Marbles
* Pennies
* Toothpicks
* Macaroni
* Spool of Thread

Things to Consider:
Students will think that certain objects sound the same and may mix them up when identifying eggs. It will be important to explain to them that this is very common among objects and may create a similar sound while vibrating. It will also be vital to make sure that each student is allowed equal time to experiment with each egg so that they can correctly identify the object inside. Also, it will be necessary to explain that vibrations can be loud or soft. We will demonstrate this to the students by shaking each egg slowly and gradually faster.

Loud or Quiet?

What is Volume?

1. Describe the volume of the tuning fork. Loud or Quiet?

   What did you have to do to change the volume?

2. Describe the volume of your voice. Loud or Quiet?

   What did you have to do to change the volume?

3. Describe the volume of the wooden blocks. Loud or Quiet?

   What did you have to do to change the volume?

4. Describe the volume of the drum. Loud or Quiet?

   What did you have to do to change the volume?

Sound Unit – Pitch Lesson

Overall Purpose: The centers will be designed to give the 2nd graders the chance to experience finding different pitches using different objects. The students will learn that the rate of the object/medium that is vibrating determines the pitch.

Rationale: Sound is worthwhile to learn because it is all around us, so it is important to know how sound is made.

- All students will describe sounds in terms of their properties – Standard IV.4 Waves and Vibrations
- Explain how sounds are made – Standard IV.4 Waves and Vibrations

1st Learning Activity: Four centers – bottles filled with water, a ruler hanging over a desk, a long straw compared to a short straw, and a rubber band stretched out and not stretched out

Objectives: After the centers are complete, all of the 2nd graders will be able to identify high and low pitch and be able to recognize that the size of the object vibrating determines the pitch of the object.

Opening: We will open the activities by having the students tell us what they believe pitch is and what properties pitch can have. We will also describe what will happen in each of the 4 centers.

What Will Happen? At the first center, the students will hit glass bottles filled with water and determine if the one with the least amount of water or the most amount of water has the higher pitch.

The second center will be a drinking straw that the students can blow into. As the students are blowing into the straw, the straw will be cut by one of us and the students will find out if the short straw or the long straw has the higher pitch.

The third center will be a ruler hanging over the edge of the desk. The ruler will be placed with 9 inches hanging over the desk and the students will hit it so the ruler makes a noise. Then the ruler will be placed with 3 inches hanging over the desk and hit so a noise is heard. The students will establish where the ruler needs to be placed in order to have a higher pitch.

The fourth center will be a rubber band stretched out and plucked compared to a rubber band that is not stretched out and plucked. Again, the students will be looking for the way that carries out the higher pitch.

Assessment: Filling out a worksheet while rotating through the centers will assess the students' learning of pitch, followed by a class discussion. During each of the centers, the students will be led by a MSU Senior and will be asked questions throughout the experiments to assess their learning.

Approximate Time: 20 minutes – 5 minutes/center

Preparation/Materials:

Worksheet
Glass bottles filled with water
Straws
Rubber bands
Rulers

Things to Consider: Some of the activities may not work properly and effectively so the students will not gather the concept of pitch. Also, if the activities don't work, then the students can't see the relationship between the size of the object and pitch. Some of the students may not have the attention span to sit for 20 minutes or be intrigued with these activities.

Transition to Next Learning Activity: After the conclusion of the centers, each of the students will be called back to their desks and given the opportunity to share their answers and reasoning for their answers with the rest of the class.

2nd Learning Activity: A class discussion

Objectives: After the class discussion, the students will understand that pitch is described as high and low and be able to identify patterns of the size of the object that is vibrating compared to high pitch.

Opening: We will go through the worksheet and ask students for their answers and why they chose a particular answer.

What Will Happen? The students will be given opportunities to share their answers and we will ask for their ideas about patterns of pitch. This activity will also help them think about real life examples that incorporate pitch, such as musical instruments.

Assessment: By listening to their answers, we will be able to judge whether or not the students understood what to listen for when making objects make sound.

Approximate Time: 10 minutes

Preparation/Materials: none

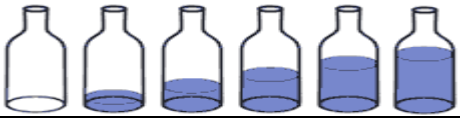
Things to Consider: Not all of the students will be able to see patterns of pitch, especially if the activities don't work the way we are hoping they work. We also need to consider how to approach a student if they believe that they an answer is correct when they are not. This group is also a very opinionated group and everyone wants to be

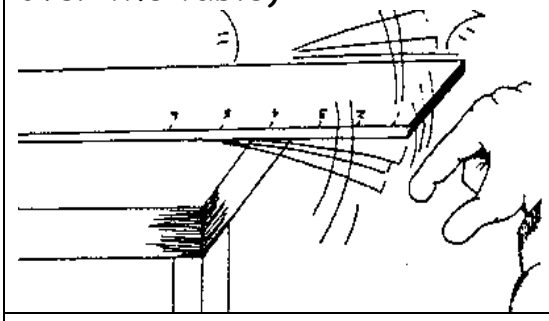
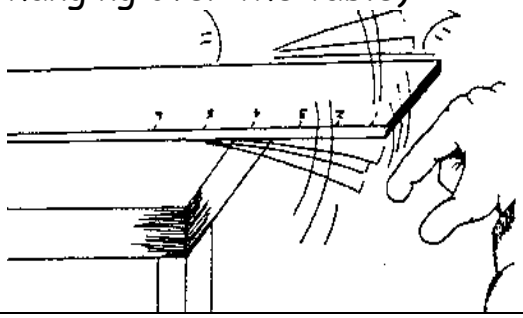
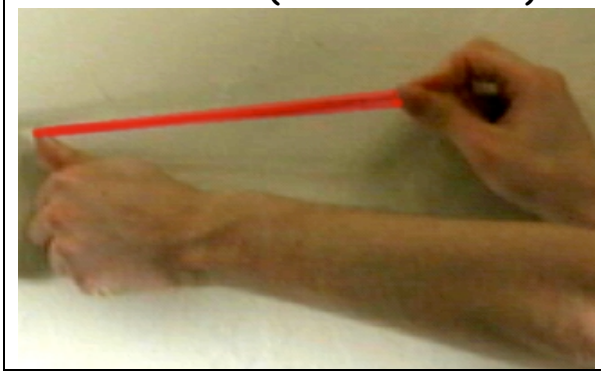
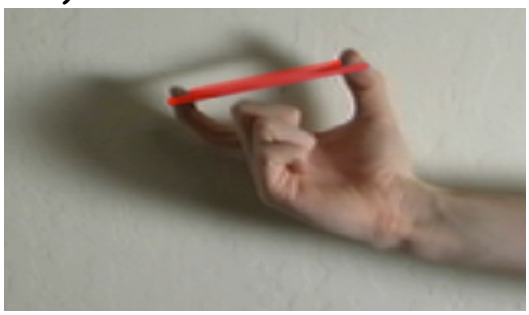
heard, so we also need to be considerate of who we call on and how often we call on them for an answer, especially if other students are willing to share answers.

Pitch: High or Low?

Circle the object that has the higher pitch

Bottles filled with water



Long Straw 	Short Straw 
Ruler (3 inches, or less, hanging over the table) 	Ruler (9 inches, or more, hanging over the table) 
Rubber bands (stretched out) 	Rubber bands (not stretched out) 

Sound Unit – Sound Travels

Overall Purpose: The purpose of this lesson is that students will be able to explain that sound can travel from its source to the human ear through any type of matter (solid, liquid, or gas). Student will also become aware that sound can be potentially harmful if they are exposed to overly loud sounds.

Rationale: This lesson is worthwhile because students need to understand that sound can travel through different types of matter.

- MCF Standard IV.4.E.1 – Describe or compare motions of common objects in terms of speed and direction.

1st Learning Activity: There will be six activities for the students to experience how sound travels through matter. They are a megaphone, tapping on a desk, tin cans connected by a string, a coat hanger tied to a piece of string, a zip lock bag filled with water, and a bowl of water and a tube with one end submerged in the water.

Objectives: With these activities the students will gain an understanding that sound travels through solids, liquids, and gases.

Opening: We will begin the lesson by splitting the class into two groups. Next, we will ask the students what they know about how sound travels. One group will experiment with the megaphone, the zip lock bag with water, and the tin cans and string. The other group will have the hanger and string, the bowl of water and tube, and a pencil tapping on the desk. After fifteen minutes the groups will switch to the other activities.

What Will Happen: To demonstrate how sound travels through solids, each student will have the opportunity to talk into the tin can to another student listening on the other end of the string. Using the coat hanger and string, students will wrap the string around their fingers and bang the hanger against an object. The students will listen to the sound then put their fingers in their ears and compare the difference in sound.

To demonstrate how sound travels through water, each student will hold the zip lock bag of water against his or her ear while someone taps on the bag. Using the tube to listen through, each student will submerge one end of the tube into a bowl of water to listen to how tapping on the side of the bowl travels through the water.

To demonstrate how sound travels through gas (air), each student will tap a pencil on a desk and listen to the sound. Using a megaphone, students will demonstrate how sound travels through the air. They will listen for the difference in sound as the megaphone is pointed in various directions.

Assessment: We will assess student understanding by how they fill out their worksheet. Further, we will look for how they respond to the activities and the questions we ask. Noted, will be their comments about how sound is traveling.

Approximate Time: 30 minutes – 5 minutes for each activity.

Preparation / Materials: Worksheet, pencils, megaphone, tin cans, string, coat hanger, zip lock bags, desk, a tube, water.

Things to Consider: There are a lot of activities for this lesson so the students' attention span may be a problem. It will be important to keep them on task. Some students may have difficulty understanding the concept of how sound travels. We must watch for this and try to help them by explaining the principle.

Transition to Next Learning Activity: We will come back together as one group to share experiences.

2nd learning Activity: Class Discussion.

Objectives: The students will have an opportunity to share their learning experiences with their classmates. This will help the students confirm what they learned and clear up any misconceptions. Students will be able to explain that sound can be harmful.

Opening: We will begin by asking the students what they learned and open it up for discussion.

What Will Happen: The students will share their ideas and observations. We will also go over the worksheet. Finally, we will talk to the students about how loud sounds can be harmful and the importance of wearing hearing protection such as earplugs. We will give each student a pair of earplugs to wear.

Assessment: We will assess the students by their responses during the class discussion.

Approximate Time: 10 minutes.

Preparation / Materials: Earplugs.

Things to Consider: Misconceptions that some students may have. If some students do not participate in the discussion, do they understand the concepts of the lesson? We must make sure that all answers are treated with respect by everyone.

Sound Travels Through:

Solids (like a table)	Liquids (water)	Gases (air)

What is the sound traveling through at each center?

1. Megaphone	**Solid**	**Liquid**	**Gas**
2. Ziplock bag with water	**Solid**	**Liquid**	**Gas**
3. Tin cans connected by a string	**Solid**	**Liquid**	**Gas**
4. Tapping on a desk	**Solid**	**Liquid**	**Gas**
5. A tube in water	**Solid**	**Liquid**	**Gas**
6. A string tied to a hanger	**Solid**	**Liquid**	**Gas**

Sound Unit: Volume

Overall Purpose: The purpose of this lesson is for students to be able to explain that sound can have different volumes. The students will learn the definition of volume, how it relates to sound, and what creates it. To explain how different volumes of sounds are created, students will need to understand and explain energy. To do this, we will have the students be involved in experimenting with different energies to create different sound volumes.

Rationale: This lesson is worthwhile because students need to understand that sound has different volumes, and how these different volumes are created.

MCF Standard IV.4.e.1: Describe sounds in terms of their properties.

Opening: We will first discuss what the students think "volume" and "energy" means to get them prepared for the activity. Energy is a complex term, so we will be sure they understand what energy is and how it is used before we learn about volume. We will describe quickly each center, so the students will know what to expect, and hand out the ditto for them to fill out (see the back for the "Loud or Quiet?" ditto).

1st Learning Activity: There will be four different centers for the students to go to that all involve volume of sound. Each station will involve the students in experimenting with different volumes of sound and the energy required to produce different volumes. The centers are as followed:

Center 1: Students will whisper their name, and then yell their name.
Center 2: Students will tap on a drum, and then hit the drum hard.
Center 3: Students will tap a tuning fork lightly, and then hit the tuning fork harder.
Center 4: Students will tap two blocks together, and then hit them together.

While doing this, students will be filling out the "Loud or Quiet?" ditto we will hand out prior to the activities.

Objectives: With these activities, the students will gain an understand that sounds can be both loud and quiet, and the more energy exerted, the louder the volume, and the less energy used to produce sound, the softer the volume.

What Will Happen: To demonstrate the different volumes of sound, each student will have the opportunity to experiment with different types of energy used to create different volumes of sound. They will be able to apply a lot of energy to create a sound, as well as a small amount of energy to create a sound, to learn how volume works and how it relates to the amount of energy used. Each student will be able to ask questions, try each experiment, talk with one another, and fill out their ditto in order to understand volume of sound. Each student will have a chance to be involved in experimenting with Centers 1-4.

Assessment: We will assess students' understanding by how they fill out their ditto, and by listening to the discussions they have or how they answer questions. We will see how

they respond to the experiments, as well as how well they can explain their thoughts and ideas on volume and how different forms of energy play a role in producing different volumes of sound.

Approximate Time: 30-40 minutes: Approximately 5 minutes for pre-activity discussion, and 5 minutes for each center.

Preparation/Materials:

1. Worksheet
2. Two wooden blocks
3. Plastic bowl
4. Saran wrap cover
5. Pencil
6. Tuning forks

Things to Consider: Sound travels in waves. To have the students understand the concept of "Large wave, Large sound," to "Small wave, Small sound" may be confusing. They seemed to have understood the "Fast wave, High pitch," to "Slow wave, Low pitch" real well, so these concepts of sound waves may or may not be confusing for the students. Students may get carried away with any of the centers, especially the voice center, so we will have to be prepared to step in quickly. Students may say they have an understanding of energy or sound waves, which needs to be understood before they can understand volume, but in fact do not understand those terms. To avoid this, we will try to pre-assess their notions about these terms and clarify any misunderstandings or confusion.

2nd Learning Activity: Class Discussion.

Objectives: The students will have the opportunity to share their learning experiences, thoughts, and ideas on volume with their classmates. This will help the students more fully understand the topic by teaching to, and learning from, their classmates.

Opening: We will begin by asking the students what they observed and learned, which will lead to a class discussion.

What Will Happen: Students will share ideas, thoughts, and opinions. During this time we will help clarify any misconceptions, or confused ideas the students may still have.

Assessment: We will collect the dittos they had filled out throughout the lesson and assess them according to their answers they had filled out.

Approximate Time: 10 minutes.

Preparation/Materials:

1. Chalk to write ideas/thoughts/draw diagrams, etc. on the board.
2. Chalk board.

Things to Consider: Misconceptions that students may have on either energy or volume. If some students do not participate in the discussion, how will we know if they have grasped the concept of the lesson? We will try to include everyone, whether they have their hands raised or not to get an overall view on what the students are thinking, and what they have learned.

MORE INFO:

http://www.sciencekidsathome.com/science_topics/what_is_sound.html

http://www.imcpl.org/kids/blog/?p=8946

http://www.colby.edu/cpse/equipment2/chem/tuning.html

http://learningideasgradesk-8.blogspot.com/2011/02/transparent-translucent-and-opaque.html?m=1

http://teacher.scholastic.com/lessonrepro/lessonplans/profbooks/sound.htm

http://www.learn4yourlife.com/transparent-versus-translucent.html

http://reggiokids.blogspot.com/2011/04/is-shadow-always-black.html

http://www.teacherspayteachers.com/Product/NGSS-Grade-1-Sound-Vibrations-Movie-1155

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http://thehappyscientist.com/next-generation-science-standards-first-grade

http://www.stevespanglerscience.com/lab/experiments/category/light-and-sound

http://www.discoveryeducation.com/teachers/free-lesson-plans/the-phenomenon-of-sound-waves.cfm

http://www.exploratorium.edu/listen/activities/doniga/quietest_sound/lg_doniga_quietest_downloads.php

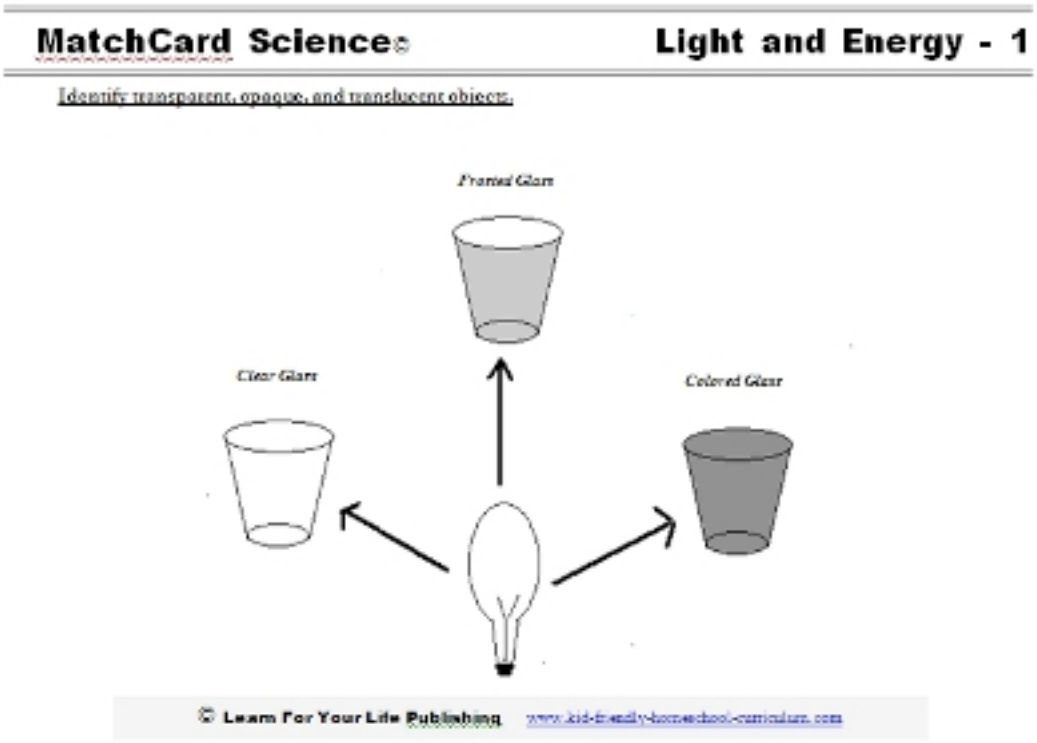
http://www.sciencekids.co.nz/gamesactivities/lightshadows.html (online simulation for exploration)
http://www.sciencekids.co.nz/gamesactivities/changingsounds.html (online sound exploration)
http://www.sciencekids.co.nz/gamesactivities/lightdark.html (online light/dark exploration)

http://www.iknowthat.com/ScienceIllustrations/sound/science_desk.swf
http://www.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp_sound/sound-vibrations/

Transparent versus Translucent

Identify Translucent, Opaque, and Transparent Objects

Demonstrate characteristics of transparent versus translucent versus opaque objects.



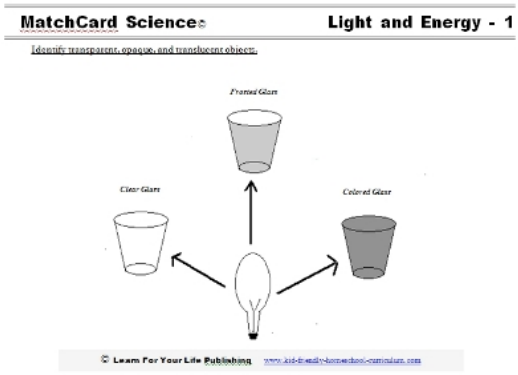
Free Download Below

Translucent, Transparent, Opaque

Objective: Identify transparent, translucent, and opaque objects.

Most students have no difficulty recognizing transparent (clear) objects and opaque (non-transparent) objects. But translucent is somewhat in-between.

Download the Transparent, Translucent, Opaque MatchCard

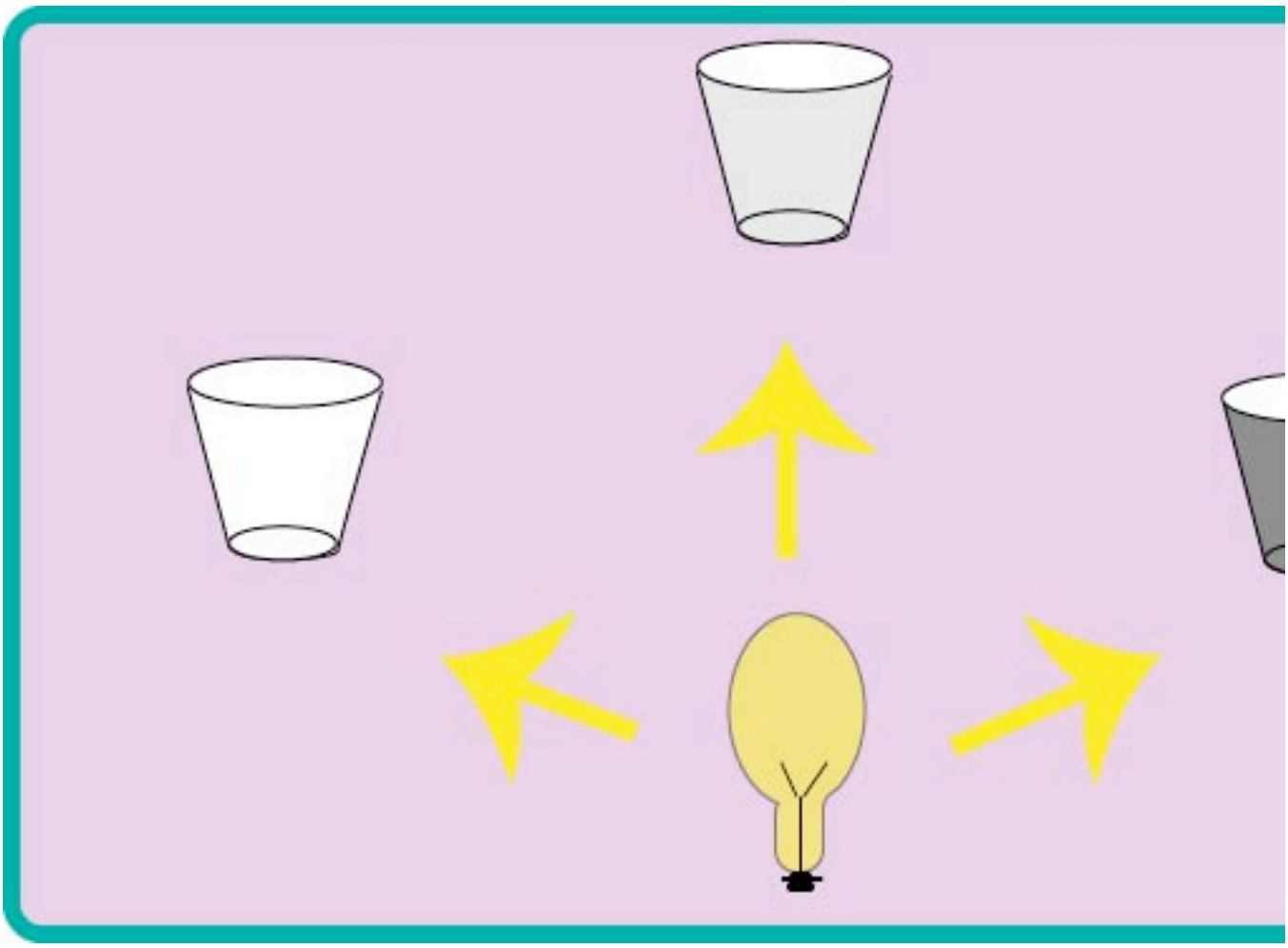


This is **MatchCard #1** of the Energy Unit Study. Find more information on MatchCard Science below.

Definitions of Transparent, Opaque, and Translucent

Give the students the following definitions:

- Transparent - Light passes through
- Opaque - Light does not pass through
- Translucent - Some light passes, but is diffused in different directions.



Hands-On Learning

Match Dishes and Cards

Take one of the following sets of items:

- Drinking glasses - clear, frosted, and solid colored mug
- Bowls - clear, translucent storage bowl, and solid colored
- Paper - clear kitchen wrap, waxed paper, construction paper or aluminum foil sheet

Print the words of transparent, opaque, and translucent on an index card. The students should match the words with the objects from the group.

The Hunt

Look around the room and name objects that can be seen that are either transparent, translucent, or opaque.

The opaque list will likely be the longest.

Then, have them name items they can think of that are transparent or translucent. Likely, transparent will the longer of the two.

Next, have them go on a hunt for other translucent objects. Often, the bathroom and kitchen are good places to find translucent containers.

Finally, have them make an on-going list of translucent objects they find over a one month period. See how long it takes to get to 20 objects.

The Test

Have a set of items (such as the glasses, bowls, or paper listed above) on a table. You will want at least 2 to 3 of each type.

You will also need a large book or other stand-up divider to block the students' view.

A flashlight or other light source is needed.

Here is how to do the translucent object test:

The room does not need to be completely dark, but it helps to turn off or dim the lights so the flashlight beam can be easily seen.

Put the objects behind the book, so they are not seen.

Shine the flashlight on a clear object, so it goes through the glass, and the beam can be seen by the person on the other side of the book.

Then, shine the flashlight on the translucent object. Can they tell the difference?

Take turns shining the light on different objects. The student needs to guess which it is.
- See more at: http://www.learn4yourlife.com/transparent-versus-translucent.html#sthash.0SPnenoG.dpuf