South East High School
Advisory Curriculum: 10th Grade
Mindset

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10/18/12

Date of Lesson: Day 3

Objective:

Given the selections of brain teasers (riddles and optical illusions), students will work independently and collaboratively with classmates to solve examples.

ESLR

Critical Thinkers who:

- Analyze and interpret information
- Utilize effective strategies to solve problems
- Demonstrate technology literacy

Anticipatory Set
Time: 5 min.

- Agenda written on board

- **Teacher Action:** Review agenda items with students. Then, Teacher will say, "Last week, you worked on an alphabet goal game. This week, we have a different game: now, you'll work together using all your minds to solve some riddles and optical illusions."

  Student volunteer will distribute handouts (one set to each group) while Teacher takes roll.

- **Teacher Action:** After student groups have reviewed handouts to become familiar with questions and tasks, Teacher prompts: "What do you notice about the riddles and optical illusions?"

- **Student Action:** Students may feel encouraged, saying, "I've done something like this before," or they may feel discouraged, saying, "This is math – I'm not good at it!" Voluntarily, or at Teacher discretion, three students respond.

- **Teacher Action:** Teacher will acknowledge Student responses and redirect emphasis back to task, saying, "I understand that you or others may feel encouraged because you like riddles, or discouraged because you may not like riddles. The idea is to work together with your group to do your best to solve these examples. Do you have questions, or comments, or concerns before we start?"

Lesson/Activity
Time: 20 min.

During the first 15 min., the class will:

- **Teacher Action:** Teacher distributes handouts for riddles and optical illusions, and reviews sample; monitors room and ensures that progress is made; suggests that if they feel stuck, to move on to the next example. Teachers will have transparencies (sample and student handout) for overhead or an email document for laptop-projector.

- **Student Action:** Working collaboratively with one set of handouts for each group.

During the last 5 min., the class will:

- **Teacher Action:** Teacher will prompt class by saying, "Now, I'd like the groups to focus on one of the examples and think about how you came up with a solution for the riddle, or what you noticed about the illusion."

- **Student Action:** Voluntarily, or at Teacher discretion, three students respond.

Closure/Reflection
Time: 5 min.

- **Teacher Action:** Distribute exit ticket with question, "Which brain teaser did you like best and why? Which did you like least and why?"

- **Student Action:** Complete exit ticket – eager to find out opinions of other students next week.

EXPECTED SCHOOLWIDE LEARNING RESULTS – ESLRS   South East High School will prepare students to be:

Aware and Socially Responsible Citizens who:
- Practice ethical behavior
- Accept civic responsibility
- Respect and appreciate diversity
- Maintain an informed world view

Critical Thinkers who:
- Analyze and interpret information
- Utilize effective strategies to solve problems
- Demonstrate technology literacy

Effective Communicators who:
- Speak confidently
- Write effectively
- Read critically
- Listen reflectively

Riddle #1

A Fox, A Sheep, and A Sack of Hay

A farmer is travelling with a fox, a sheep and a small sack of hay. He comes to a river with a small boat in it. The boat can only support the farmer and one other animal/item. If the farmer leaves the fox alone with the sheep, the fox will eat the sheep. And if the farmer leaves the sheep alone with the hay, the sheep will eat the hay.

How can the farmer get all three as well as himself safely across the river?

Answer:

1. The farmer takes the sheep across the river, then returns back.
2. The farmer takes the fox across the river.
3. The farmer takes the sheep back to the first side of the river.
4. The farmer leaves the sheep back on the first side of the river, and takes the hay to the other side.
5. The farmer returns to the first side of the river.
6. The farmer brings the sheep back to the second side.

Riddle #2

A Liar and a Truth Teller

You are walking down a path when you come to two doors. Opening one of the doors will lead you to a life of prosperity and happiness, while opening the other door will lead to a life of misery and sorrow. You don't know which door leads to which life.

In front of the doors are two twin brothers who know which door leads where. One of the brothers always lies, and the other always tells the truth. You don't know which brother is the liar and which is the truth-teller.

You are allowed to ask one single question to one of the brothers (not both) to figure out which door to open.

What question should you ask?

Answer:

Ask "If I asked your brother what the good door is, what would he say?"

If you ask the truth-telling brother, he will point to the bad door, because this is what the lying brother would point to.

Alternatively, if you ask the lying brother, he will also point to the bad door, because this is NOT what the truth-telling brother would point to.

So whichever door is pointed to, you should go through the other one.

Riddle #3

A Fly Between Trains

Two trains are traveling toward each other on the same track, each at 60 miles per hour. When they are exactly 120 miles apart, a fly takes off from the front of one of the trains, flying toward the other train at a constant rate of 100 miles per hour. When the fly reaches the other train, it instantly changes directions and starts flying toward the other train, still at 100 miles per hour. It keeps doing this back and forth until the trains finally collide.

If you add up all the distances back and forth that the fly has travelled, how much total distance has the fly travelled when the trains finally collide?

Answer:

The fly has travelled exactly 100 miles. We can figure this out using some simple math. Because the trains are 120 miles apart when the fly takes off, and are travelling at 60 mph each, they will collide in exactly 1 hour. This gives the fly exactly 1 hour of flying time, going at a speed of 100 miles per hour. Thus, the fly will travel 100 miles in this hour.
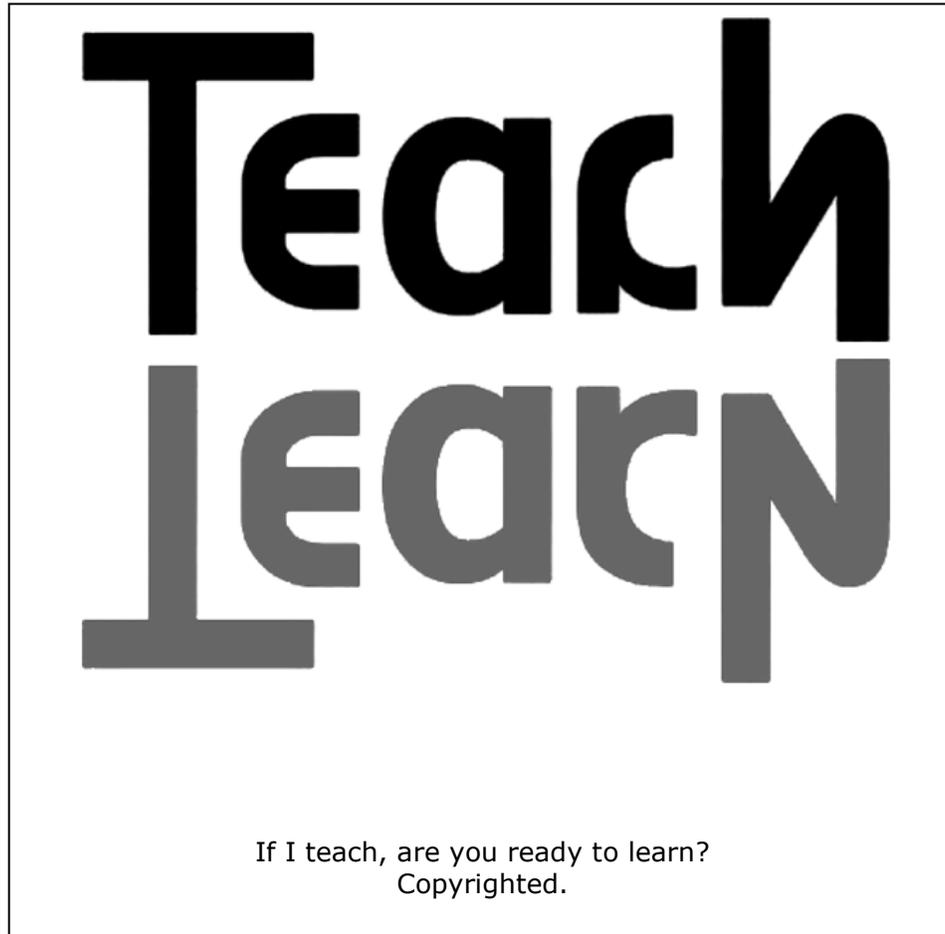
Optical Allusion #1
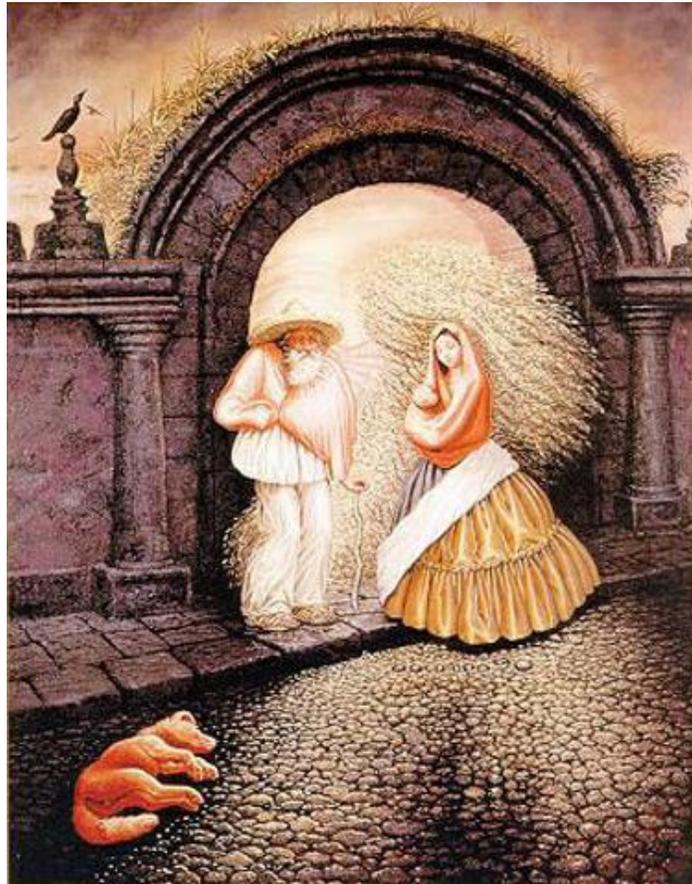
Can you find the nine hidden people?
The General's Family © Octavio Ocampo

1. Large head of a man in the centre looking to the left, with white hair and beard.
2. Man in the centre left carrying a walking stick (whose head is the eye of #1)
3. Lady beside #2 holding a baby.
4. Baby in #3's arms.
5. Profile of woman's head above right hand column.
6. Mirror image of #5 above the left column.
7. Another face in profile on the opposite side of the #6's bird statue (a mirror of #6).
8. Another face in profile directly above #6, the bird forms the nose and forehead.
9. A face looking towards you in the extreme left, to the side of #8.

Optical Allusion #2

If I teach, are you ready to learn?
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An optical illusion, or visual illusion is characterized by visually perceived images that differ from objective reality. What does this mean? Basically your eyes see one thing, and your brain 'sees' something else. The information that your eyes feed back to the brain has to be understood by the brain, and the brain is very clever at guessing what it should be seeing and sometimes this difference can be quite astounding.

http://www.brainbashers.com/

Optical Allusion #3

Same size white bars?
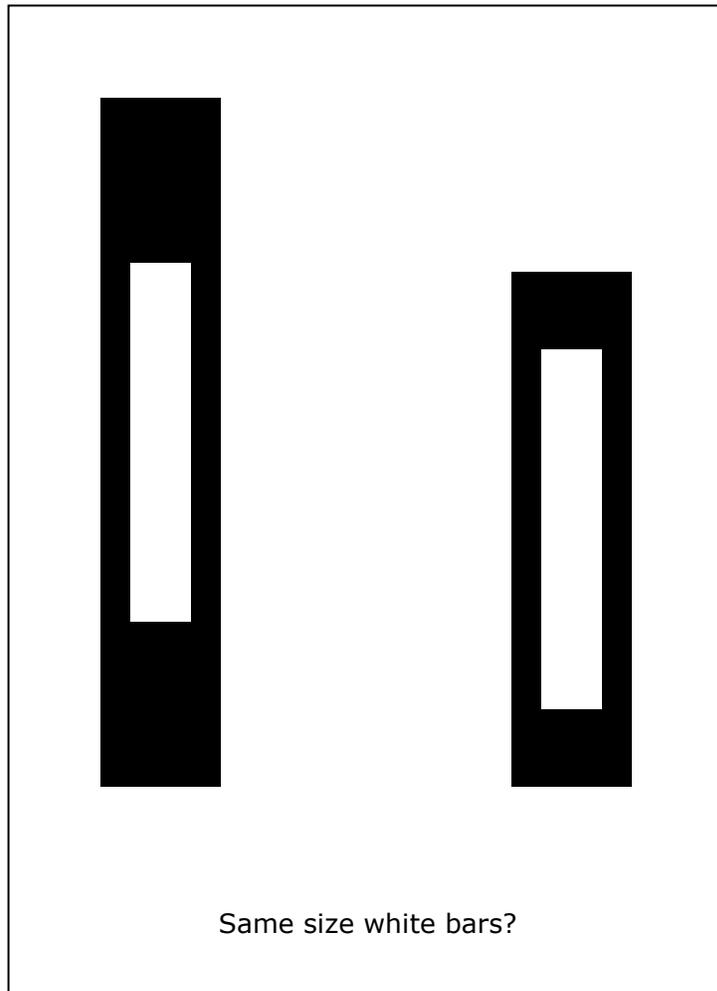
Although we have 5 major senses, most of the information from our surroundings comes from the eyes, making sight a very important part of our lives. The eye contains many rods and cones and they gather information and send it to the visual processing part of the brain, the information is sent via electric signals. Optical illusions can be caused by our brain expecting to see something, and processing the eye's signals in a way that creates something that makes sense on one hand, but on further looking begins to make less sense.

Optical Allusion #4

Can you see both the old lady and the young lady?
This image appeared in a 1915 edition of Puck.

Optical illusions are often described as visual images that differ from reality - the eyes and brain 'sees' something that doesn't quite match the physical measurement of the image. Optical illusions can work in various ways, they can be images that are different from the objects that make them, they can be ones that come from the effects on the eyes and brain through excessive stimulation, and others where the eye and brain make unconscious inferences.