Teaching for Change
Final Project

Name: Samantha Rupp
Class section: 10:30 am

Step 1
Before Lesson Plan #1:

Finding Symmetry

Grade Level: 9-11
Time: One to Two days

Objective: Students will work with geometric shapes and designs from various cultures to reinforce their understanding of transitional, reflectional, and line symmetry.

Suggested Procedures:

1. Define transformations (transitional, reflectional, rotational, and line symmetry) as in the "Before" plan, and have students explore the concepts by drawing simple figures on grid paper and polar graph paper. Ask students if they know of any real-life examples of transformations. (Hopefully, students will talk about things like wrapping paper, fabric, art designs, etc.)
2. Begin the connection with culture by asking students to think of various examples from their own cultures. Show a slide show or a video of examples of Native American, Asian, and African art that reflect these concepts as you lecture about how the various peoples use symmetry and transformations to create designs in weaving, beadwork, and art.
3. Give a brief lecture on, and show students examples of, how weavers from African tribes and Native American tribes use symmetry to create patterns in weaving and beadwork. Examples include the following:
    a. Men are the weavers in many African tribes, and they use long, narrow looms. In Africa, the pinwheel design represents the Circle of Life. This design is an example of rotational symmetry. The type of clothing and quantity of designs in the fabric determine power, status, and wealth.
    b. The Ashante people of Ghana make a cloth called Adinkra. Long ago it was worn at funerals to honor the memory of the dead. The Adinkra cloth is large and has many rectangles sewed together.
    c. The Navajo burntwater rug designs show line symmetry. Many tribes use beadwork and a variety of materials to create their designs.
    d. People in the Great Lakes area made flower designs.
4. Hand out several sheets of grid paper. Ask the students to build at least one African-inspired and one Native American-inspired design using the grid paper and color pencils.

Evaluation

1. Give worksheet questions on the type of symmetry of their designs.
2. Expand the lesson by having students bring in cultural examples of symmetry and report on the type of symmetry in the design.

In its original form, this lesson is a *good* demonstration of: "Meaningfully relating curriculum to students' diverse backgrounds" (Chapter 2) because the lesson includes lectures on art designs from different cultures.

Step 2
Lesson Plan #1:

Finding Symmetry

Grade Level: 9-11
Time: One to Two days

Objective: Students will work with geometric shapes and designs from various cultures to reinforce their understanding of rotational, reflectional, and line symmetry.

Suggested Procedures:
1.Define transformations reflectional, rotational, and line symmetry) as in the "Before" plan, and have students explore the concepts by drawing simple figures and writing down the definitions. Ask students if they know of a few real-life examples of transformations and have them include them on the handout. (Hopefully, students will talk about things like wrapping paper, fabric, art designs, buildings, bridges etc.)

2.Begin the connection with culture and have a longer by asking students *in groups of three or four* to think of various examples from their own cultures. *Then have students share their ideas as a large group(Large group ideas could include Native American blankets, pots. African beads and looms, Chinese lanterns.* Show a slide show or a video of examples of Native American, Asian, and African art that reflect these concepts as you lecture about how the various peoples use symmetry and transformations to create designs in weaving, beadwork, and art.

3.*Bring parents from various cultures or guest speakers (6 to 8 minutes) from the community or students to* show students examples of, how weavers from African tribes and Native American tribes use symmetry to create patterns in weaving and beadwork. Examples *could include* the following:

a. Men are the weavers in many African tribes, and they use long, narrow looms. In Africa, the pinwheel design represents the Circle of Life. This design is an example of rotational symmetry. The type of clothing and quantity of designs in the fabric determine power, status, and wealth.
b. The Ashante people of Ghana make a cloth called Adinkra. Long ago it was worn at funerals to honor the memory of the dead. The Adinkra cloth is large and has many rectangles sewed together.

c. The Navajo burntwater rug designs show line symmetry. Many tribes use beadwork and a variety of materials to create their designs.
d. People in the Great Lakes area made flower designs.
e. *Engineers and Construction managers and how symmetry is an important role in their jobs.*

4.Hand out several sheets of grid paper. Ask the students to build at least one design based on the guest speaker or another culture they have been inspired to study.

Evaluation

1. Give worksheet questions on the type of symmetry of their designs.
2.Expand the lesson by having students bring in cultural examples of symmetry and report on the type of symmetry in the design.

Step 3

Write a one-paragraph summary of *After* Lesson Plan #1 and explain the changes you have made to modify it from its *Before* version:

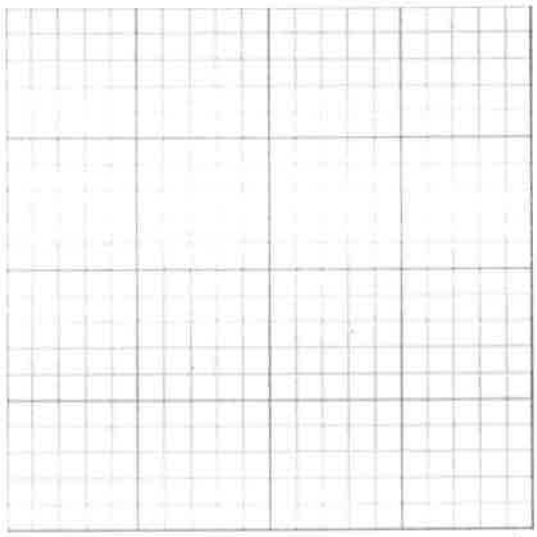
First, the teacher will introduce the concept of rotation, reflection, transitional and line symmetry. Then students will have a small short discussion giving a few examples on transformations in real life. Then the teacher will form students into small groups to discuss more examples of reflections, rotations and line symmetry in their cultures and other cultures. The class will then discuss their ideas as a large group. The teacher then will show a few photos of examples from different cultures, preparing students for the guest speaker. Have students listen to the guest speaker from cultures in the community. Have students create pictures of reflections, rotations, transitions or line symmetry based on the guest lecturer or a culture they decide to base it on. Then hand out a short worksheet in order to evaluate students' needs.

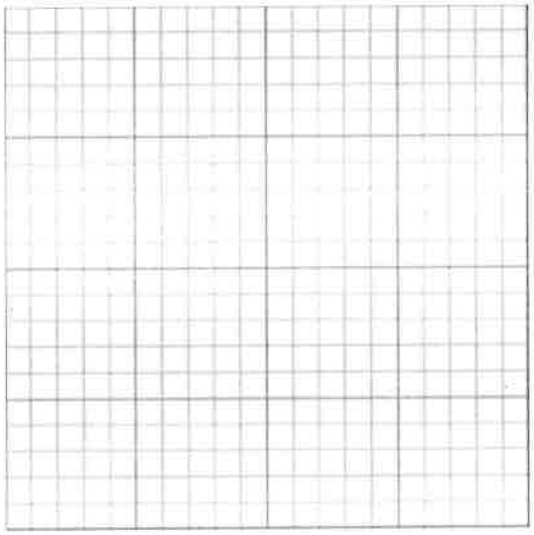
Step 4
Lesson Plan #1 Development

1. **A handout for students to take notes on reflection, rotation, line symmetry.**
2. **A handout filled out for a sub filled out.**
3. **A power point with pictures of different types of symmetry.**
4. **Graph paper to hand out to the students, which I have not included here but can be found in the back right hand basket of the classroom**

Find Symmetry

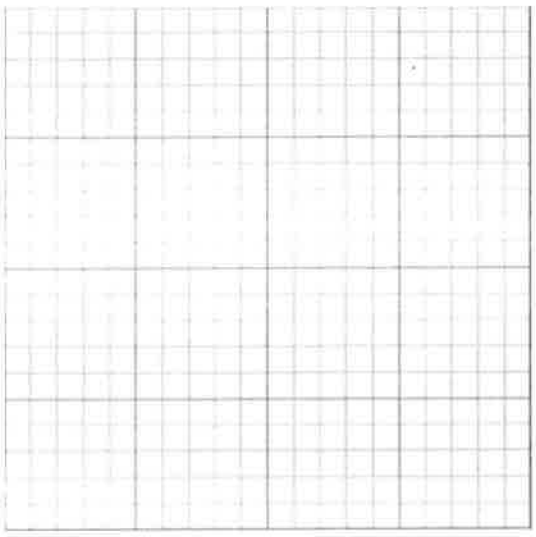
Definition of Rotational:

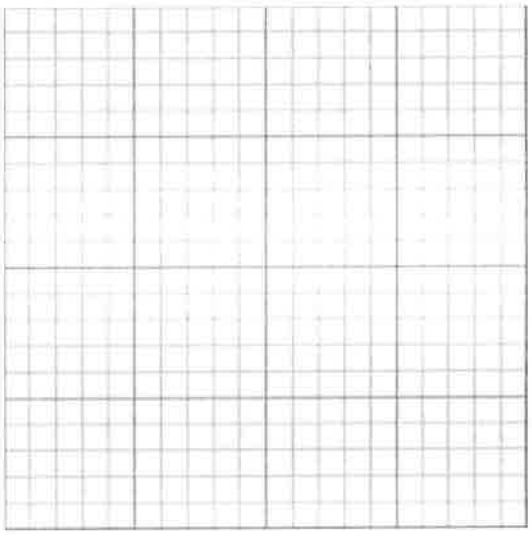




Real Life Examples:

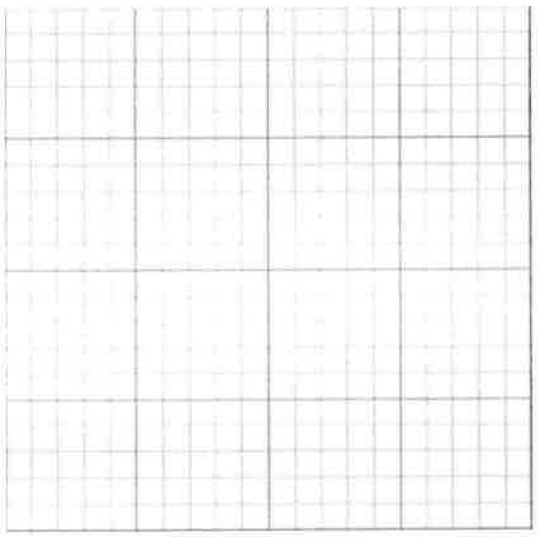
Definition of Reflection:

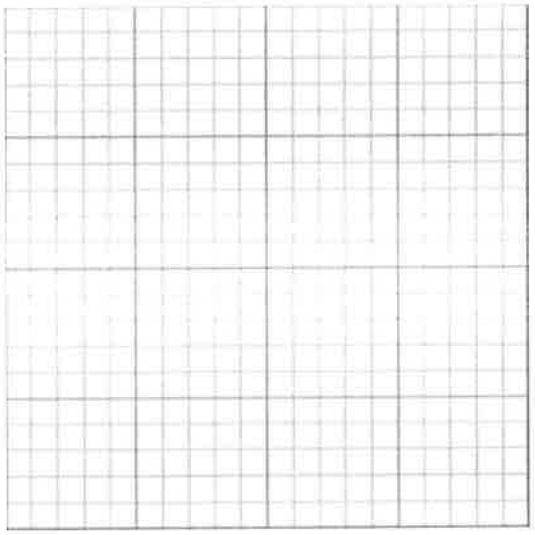




Real Life Examples:

Definition of Line Symmetry:

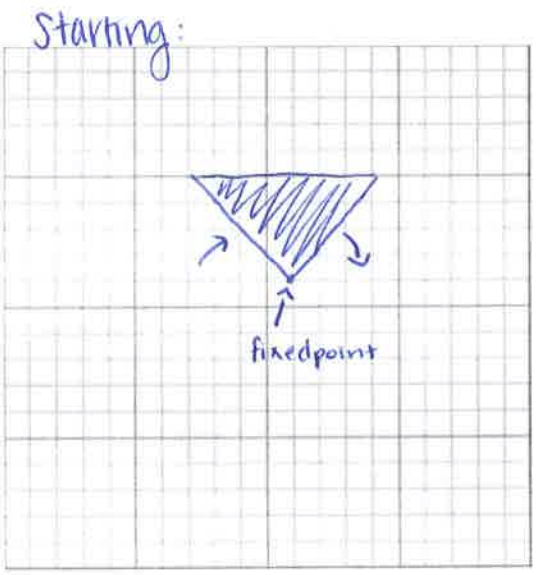


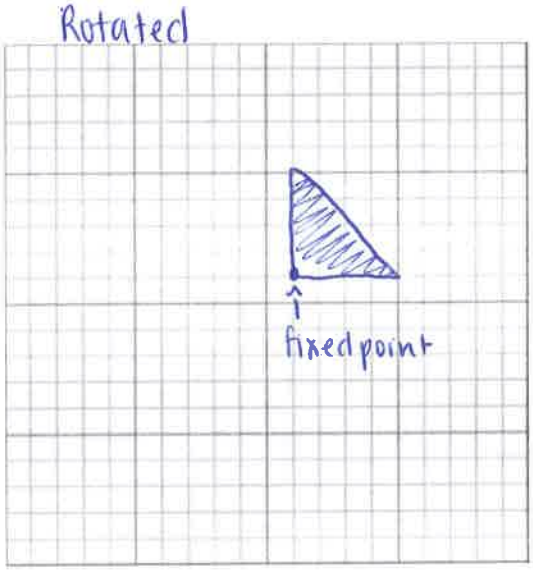


Real Life Examples:

Find Symmetry

Definition of Rotational: *A figure that has a point that stays fixed and everything else in the figure moves around that fixed point.*

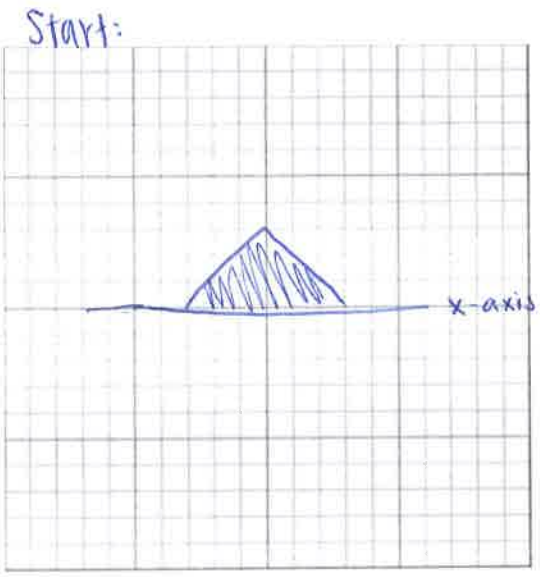


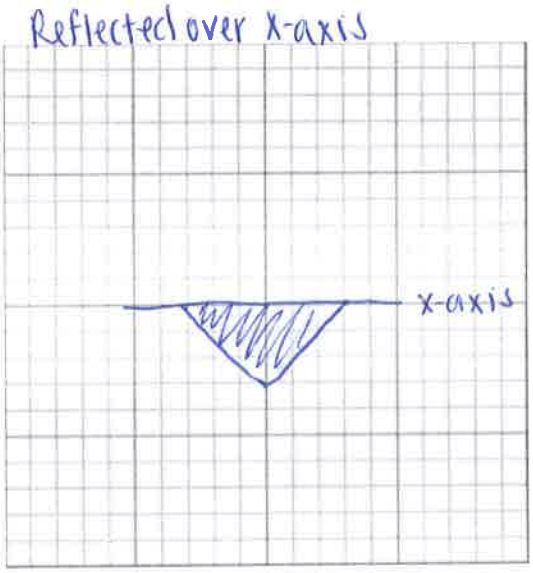


Real Life Examples:

We can see examples of these on patterns of shirts or wrapping paper. A figure will stay the same shape but will rotate in direction.

Definition of Reflection:
An image or shape that is seen as mirrored across the x or y axis.



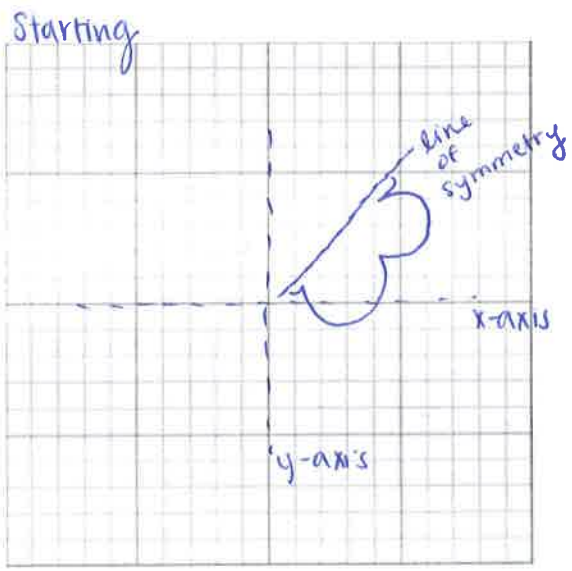


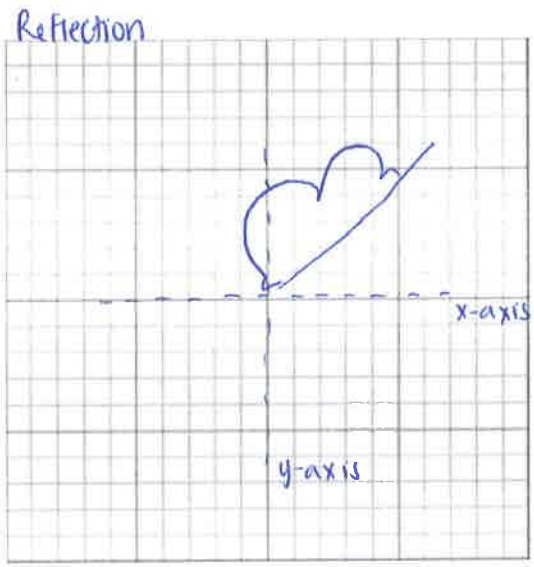
Real Life Examples:

Looking at words backwards in a mirror.

Definition of Line Symmetry:

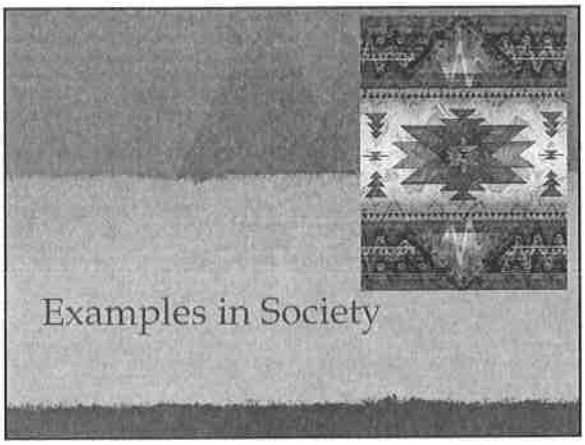
Reflecting an image over a line. Such as you do with reflection but it does not need to be the x or y axis.

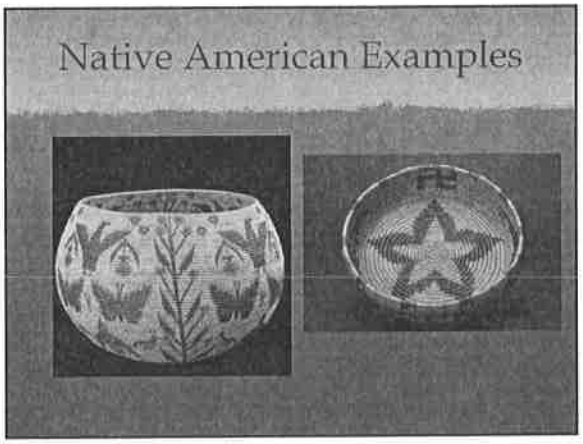


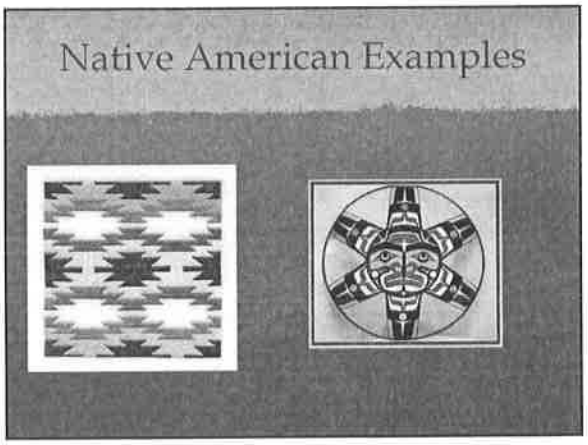


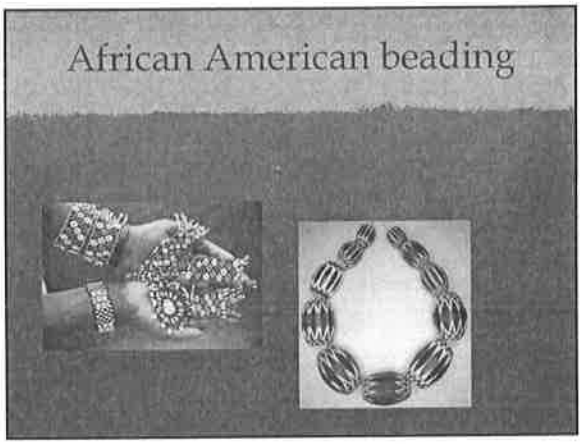
Real Life Examples:

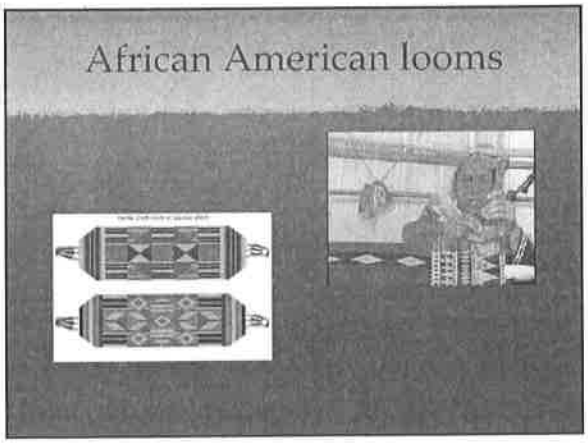
Folding a piece of paper in half and cutting out a snowflake or heart.

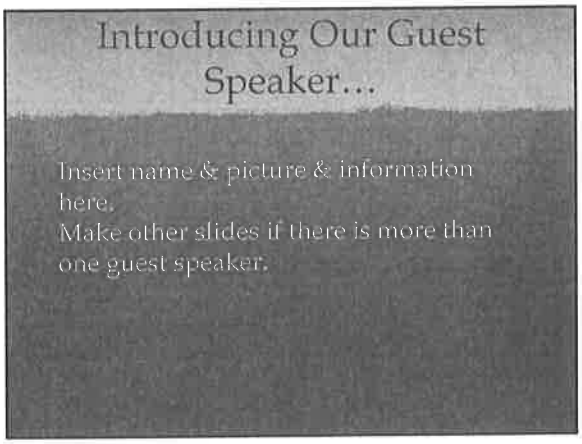

Examples in Society


Native American Examples


Native American Examples


African American beading


African American looms


Introducing Our Guest Speaker…
Insert name & picture & information here.
Make other slides if there is more than one guest speaker.

Step 5

One of the changes I made was having students discuss in small groups different real-life/cultural examples before we have a big group discussion. In this way students that don't feel comfortable sharing in a big group from shyness or lack of English will still have an opportunity to share their ideas and experiences. This comes from Chapter 3 in "Turning on Learning," "Using thoughtfully structured cooperative learning to build supportive, interactive relationships among students." A second change I made was to have guest speakers from the community or experienced students talk and show examples of symmetry in their cultures and what they can represent. This highlights a concept of Chapter 2 in "Turning on Learning," "Building meaningful school connections to the home and/or community."

Explain how this lesson plan better addresses the goals you have stated and established.
Students will work with geometric shapes and designs from various cultures to reinforce their understanding of transitional, reflectional, and line symmetry.

I believe I have better reached the objective on the after lesson better than in the before lesson because I am allowing all students to have the opportunity to share examples of rotation, reflection, line symmetry and reflection. Every student having the opportunity to reinforce their understanding by sharing in the small group. Just having a large group discussion could lose some students that would like to speak but don't feel comfortable doing so in large groups. I also changed the lecture about symmetry examples in cultures from being given by me to be given by guest lectures because it will allow students to see more diversity in the classroom. Furthermore students will have a greater opportunity to learn specific examples of symmetry and their meanings in different cultures.

Teaching for Change
Final Project

Name: Samantha Rupp
Class section: 10:30 am

Step 1
Before Lesson Plan #2:

Lessons in Logic

Grade Level: 9-11
Time: One to Two days

Objective: Students will be able to define and describe what an argument is and be able to identify characteristics to both mathematical and nonmathematical arguments, connect different but relatable ideas in a sentence structure to help them understand the definition of syllogism, summarize the article "Logic" and discuss how stereotypes are not logical.

1. ***Students will begin by receiving handout #1 that discusses the definition of argument, examples of good and bad arguments and when/why arguments are used. Once the small groups have had a good 8 to 10 minutes to discuss as small groups, the class will arrange in a large group. The same handout will be filled out on the overhead, written by the teacher and answers given by the students. The teacher will fill in any missing links that the students didn't catch and highlight the important things the students will need to know.***
2. ***On the overhead teacher will display handout #2 that shows an example of a syllogism. The teacher will explain the syllogism and then students will read a portion of the article and they will write their own syllogism with the words 1.seven 2. Odd 3.divisible and 4. Even. In their original groups and then once again share as a class and give an example.***
3. ***Students will then use "Magnet summaries" as they read the rest of the articles. They will find words that relate to "Logic." They will also do this in their groups. Once they have completed this in their groups the class will have a large discussion and the teacher will write on words found relating to Logic on the board. The students will then be put into a competition to write a summary of the article using the words on the board, they will write these summaries in their group and then those who feel comfortable and read them to the class. The teacher will then collect them and tally scores based on number of words used and number of words used correctly.***

In its original form, this lesson is a *good* demonstration of *"Using thoughtfully structured cooperative learning to build supportive, interactive relationships among students" from Chapter 3 of "Turning on Learning."*

Step 2
Lesson Plan #2: Chapter 6

Lessons in Logic

Grade Level: 9-11
Time: One to Two days

Objective: Students will be able to define and describe what an argument is and be able to identify characteristics to both mathematical and nonmathematical arguments, connect different but relatable ideas in a sentence structure to help them understand the definition of syllogism, summarize the article "Logic" and discuss how stereotypes are not logical.

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3. ***Students will then use "Magnet summaries" as they read the rest of the articles. They will find words that relate to "Logic." They will also do this in their groups. Once they have completed this in their groups the class will have a large discussion and the teacher will write on words found relating to Logic on the board. The students will then be put into a competition to write a summary of the article using the words on the board, they will write these summaries in their group and then those who feel comfortable and read them to the class. The teacher will then collect them and tally the points based on number of words used and number of words used correctly.***

4. ***We will then discuss as a class if stereotypes are logical or not and how they affect society (look at handout #3). The teacher will start the discussion by asking students about some stereotypes they have heard and then make examples of syllogisms that do not work. Thus, making the stereotypes illogical. The teacher will then ask "How can we help to break stereotypes?" Looking for answers as, we shouldn't use them when talking about one another, we shouldn't let others around us use them and we should not think we have to live to fit a certain stereotype.***

Step 3

Write a one-paragraph summary of *After* Lesson Plan #2 and explain the changes you have made to modify it from its *Before* version:

First the teacher will assemble students into groups as they come into classroom. The teacher will then give the students the hand out about arguments, explain the directions and have students complete the handout in their groups. The teacher will then go over the handout on the overhead, making sure to highlight key points she would like students to get from the hand out. The teacher would then given an example of a syllogism, have the students read the section of the article on syllogism and write their own. Finally the students will read the whole article and use magnet summaries to make a summary of the article centered around the word "Logic." The part of the lesson that I changed was the very end. I added into the lesson the teacher then leading a discussion on typical stereotypes that we see, making examples of syllogisms with those stereotypes so that students can see that stereotypes are not truthful or logical. Then ending the discussion by asking students how we can break the stereotypes we have around us.

Step 4
Lesson Plan #2 Development:

1. Argument sheet to copy and give to students
2. An argument sheet filled out in case of a sub.
3. The sheet with an example of a syllogism.
4. The example of seven, even, divisible, odd to show the students when they finish.
5. A copy of the "Logic" article.
6. The Logic "magnet summary"
7. A list of groups that stereotypes could be made about in the area.

WHAT IS IT?

WHEN IS IT USED / WHY IS IT USED?

ARGUMENT

CHARACTERISTICS OF A *GOOD* ARGUMENT

CHARACTERISTICS OF A *BAD* ARGUMENT

Julisa Gonzales, Samantha Fletcher, Trevor Brown

WHAT IS IT?

persuading someone to your point-of-view or proving something is true or logical on the basis of facts and order

ARGUMENT

WHEN IS IT USED / WHY IS IT USED?

proofs

court rooms

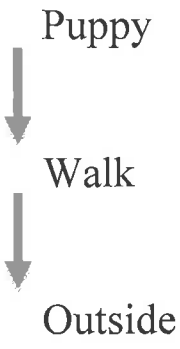
CHARACTERISTICS OF A *GOOD* ARGUMENT

facts	has an order	makes sense	proving / logical

CHARACTERISTICS OF A *BAD* ARGUMENT

opinions	angry		

Julisa Gonzales, Samantha Fletcher, Trevor Brown



Puppies like to go on walks.
Walks are always outside.
Therefore puppies like to go outside.

The Ancient Greeks were the first to really develop logic, in particular Aristotle who lived from 384 to 322 BC. Aristotle put forward the notion of a **syllogism** . This is an argument in three parts, like the examples above. A syllogism consists of two **premises** and a **conclusion** . The first premise must have one thing in common with the second premise. The second premise must have one thing in common with the first premise. The conclusion must have one thing in common with both premises. Aristotle's example is:

i. Every Greek is a person -- first premise
ii. Every person is mortal -- second premise
iii. Every Greek is mortal -- conclusion

Aristotle believed that logic should be investigated before any other areas of knowledge. He made a lot of progress in the understanding of logic, but all of his analysis was done in everyday language.

Seven
To
Even
To
Divisible
To
Odd

Seven is not an even integer.
Even integers are divisible by two.
Odd integers are not divisible by two.
Therefore Seven is an odd integer.

'Logic' printed from http://nrich.maths.org/

Show menu

What exactly do we mean by logic? The Oxford Compact English Dictionary gives the definition as:

The science of reasoning, proof, thinking or inference.

But what does logic mean to us and is that different to **mathematical logic** ? We will explore these questions here.

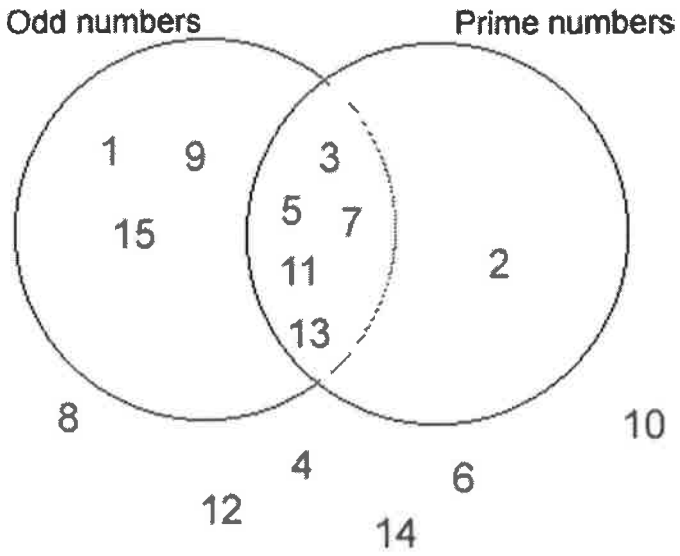
One way to think of logic is as the understanding of how ideas are used in arguments. We often think of arguments as loud discussions between two or more people who don't agree with each other. I am sure that you can think of times when you have argued recently - perhaps it was with a brother or sister over what to watch on TV or when they should go to bed.

However, an argument can simply be putting forward ideas which explain your point of view, not necessarily in front of someone who isn't of the same opinion. If these ideas are not logical, then your argument will fall flat on its face. Let us look at this in more detail:

We use reasoning in the world around us without really thinking anything of it. For example, if I were told that David Beckham is an Englishman and that all the English are Europeans, then I can work out that David Beckham is a European. The steps that I have taken to come to this final statement involve logic. On the other hand, if I were told that Emma is in class 4G and some pupils in 4G are right-handed, then if I conclude that Emma is right-handed, I wouldn't be thinking very logically.

However, Emma *could* be right-handed couldn't she? It is very important to realise that logic and truth are not the same thing. It may be that Emma is indeed right-handed and I am correct, but I have not used logic to arrive at this conclusion. Similarly, David Beckham is only European if the two facts that I was originally told are true. So, even though I have used logical thinking, if in fact David Beckham isn't an Englishman then he is not necessarily European.

In coming to the conclusion that David Beckham is a European (let's assume that we know for certain he is English so our conclusion is right), we are really using our understanding of "sets" and "subsets" of these. English people are a subset of the set of Europeans. In maths, Venn diagrams are often used to show this sort of information. Below is an example which shows how you would place the numbers 1 to 15 in the sets of "Odd numbers" and "Prime numbers":



Venn diagrams frequently help us to make our deductions more quickly.

The Ancient Greeks were the first to really develop logic, in particular Aristotle who lived from 384 to 322 BC. Aristotle put forward the notion of a **syllogism** . This is an argument in three parts, like the examples above. A syllogism consists of two **premises** and a **conclusion** . The first premise must have one thing in common with the second premise. The second premise must have one thing in common with the first premise. The conclusion must have one thing in common with both premises. Aristotle's example is:

i. Every Greek is a person -- first premise
ii. Every person is mortal -- second premise
iii. Every Greek is mortal -- conclusion

Aristotle believed that logic should be investigated before any other areas of knowledge. He made a lot of progress in the understanding of logic, but all of his analysis was done in everyday language.

It wasn't until much later that Leibniz took Aristotle's ideas a stage further. Leibniz (who lived between 1646 and 1716) was taught Aristotle's theories at school, but wasn't satisfied with them. He suggested that a scientific language needed to be developed which could be more precise than using everyday words. Leibniz got a long way in creating **symbolic logic** which used formulae to help work through deductions.

Boole refined these formulae to produce a special form of algebra called Boolean algebra. Mathematicians can use this to write and analyse logical ideas. Others followed in his footsteps, for example Frege and Peano who were convinced that maths could be reduced to logic. More recently, Bertrand Russell and Alfred Whitehead wanted to prove this. In the process they found that this could generate **paradoxes** . A paradox is an expression that seems to contradict itself, like "this statement is false" or "I am telling you the truth when I say I am a liar".

Even though Russell and Whitebread encountered these problems with mathematical logic, it is used a great deal in the world today. Boolean algebra has wide applications in telephone switching and computer technology.

The St Andrew's website www-gap.dcs.st-and.ac.uk/~history/Mathematicians/ has more details on all of these logicians as well as hundreds of other mathematicians

Truth

Point of View

Proof

Logic

Reasoning

David Beckham is European

Ideas & Arguments

Emma could be right-handed

What are some stereotypes that we may hear about:

Latinos/Hispanics

Caucasians

Athletes

Students with good grades

African Americans

Students that like art

Step 5

I added the discussion on stereotypes at the end because it allows the students to see how they can use this skill of logic in their lives right now. It also "guides students in critical questioning regarding social justice and the status quo" that come from stereotypes and what steps the students can take to break these stereotypes (Chapter 6, Turning on Learning).

Explain how this lesson plan better addresses the goals you have stated and established.

In the after lesson plan students are actually able to discuss in class about stereotypes and how they are illogical. This process is not mentioned in the first lesson plan so I assume the teacher would mention it and have no discussion in class. The in-class discussion will help students to gain ideas from one another and be able to work as a team to stop stereotyping around themselves. Adding this discussion about stereotypes also helps the students to see why it is so important to understand logic and how it will and can be used in their everyday lives.

Final Project
Lesson #3

Subject Area: Mathematics
Grade Level: 4-8
Time: One class period

Objective: 1. *Students will divide whole numbers using division.*
2. Students will appreciate the contributions made by mathematicians and scientists of various racial backgrounds and both sexes.
3.Student will enjoy practicing mathematics skills.

Suggested Procedures:

1. *After having demonstrated division with two-digit divisors the day before, distribute the worksheet show in Figure 5.3 (displayed on pg 218 of Turning on Learning). Explain that it contains a puzzle—a peson's name—that they should solve by computing the division problems.*
2. *When students have completed the exercise, have them tell you the name on the worksheet; it is Kovalevskaya. Tell students who Sonya Kovalevskaya was, using the resource material like that shown in Figure 5.4 (displayed on pg. 219 of Turning on Learning). Discuss the difficulties she faced because people did not believe a woman should be an excellent mathematician or a university professor.*
3. *Review the math problems in class. Work any problems on the board that students found difficult.*

Evaluation

1. *Assess students' mastery of division by evaluating their worksheets individually.*
2. *Through their participation in the activity, assess student's enjoyment and appreciation of math.*

In its original form, this lesson is a good demonstration of "Proactively countering stereotyping, prejudice, and negative attitudes toward non-mainstream individuals and groups" from Chapter 3 of "Turning on Learning."