

AQUINAS COLLEGE SCHOOL OF EDUCATION

MODEL LESSON PLAN - ELEMENTARY

Name: T. Bennett

Grade Level: 4th

Subject/Content Area: Science

Michigan Curriculum Framework Science Content Standards and Benchmarks:

I. Constructing New Scientific Knowledge (C)

All students will ask questions that help them learn about the world.

B1 Generate questions about the world based on observation.

All students will design and conduct investigations using appropriate methodology and technology.

B2 Develop solutions to problems through reasoning, observation, and investigations.

B3 Manipulate simple devices that aid observation and data collection.

II. Reflecting on Scientific Knowledge (R)

All students will analyze claims for their scientific merit and explain how scientists decide what constitutes scientific knowledge.

B1 Develop an awareness of the need for evidence in making decisions scientifically.

III. Waves and Vibrations (PWV)

All students will explain shadows, color, and other light phenomena.

B4 Describe ways in which light interacts with matter.

Unit Outcome:

The Learner Will observe the behavior of light energy as it interacts with various surfaces in order to compare and contrast the results and relate the observations to events involving light encountered in everyday life.

Lesson Outcomes:

TLW read simple instructions and act on the information.

TLW make a general rule when specific facts are used.

TLW predict the number of letters of the alphabet and numbers in a set from 0 to 9 that will appear the same in a mirror as they do printed on paper.

TLW use a mirror to check the prediction and record the results.

TLW produce a generalization or rule which defines how to tell when any object will appear the same in a mirror as it does as a real image.

TLW evaluate the generalization by testing it on several given designs to determine its effectiveness and then modifying it if necessary.

Rationale/Purpose for Lesson:

Students experience mirrors in their daily lives (i.e. bathroom mirrors, car mirrors, locker mirrors). Students need to know that some objects, like mirrors, reflect light in a regular pattern that is predictable. Formulating a generalization from a series of observations and then testing

out the validity of the generalization are key elements in the process of constructing new scientific knowledge.

Assessment:

Teacher will collect and assess journal responses to today's questions and the generalization written by each student.

Criteria:

Student generalizations must include the idea that the **symmetry** of an object determines whether or not it will appear the same in a mirror as in real life. Answers to questions in the journal must include the idea that **images are reversed** left to right in mirrors and elaborate on what that means when viewing objects in mirrors. The list of "other uses of mirrors" needs to include at least three items.

Resources/Materials Required:

Text - Sound and Light, Prentice Hall Science Unit book

25 two by three inch plane mirrors

25 AIMS worksheets titled, "Mirror/Mirror"

One "Mirage" reflective hologram apparatus

Pencils for all

Introduction:

The "Mirage" hologram reflector is set up and placed on a front table in control of the teacher. Students are encouraged to observe but not dismantle the display. After all have had a chance to observe the holographic reflection and students are settled at their work spaces, volunteers are randomly selected to take guesses as to how it works. The "secret" is to be revealed at the end of today's lesson that centers around how light energy behaves when it comes in contact with mirrors (a hint!).

Procedures:

1. Hand out AIMS worksheet titled, "Mirror/Mirror".
2. All read instructions silently as teacher reads them aloud.
3. Ask if there are any questions. ("I don't get it" is not a question. It is a statement. Insist that learners seek help by asking a question so I know *exactly* how to help.) Check further by randomly asking some to repeat parts of the directions and by asking leading questions.
4. Describe and demonstrate the proper way to handle the breakable glass mirrors students will be using. If a *mirror* is broken, **restitution** is expected. Mirrors cost \$1.00 each and if the accident occurred as a result of willful behavior, further restitution may be required.
5. Hand out the mirrors to cooperative groups previously created by ability grouping. Partners begin the worksheet. Figure on some "play" time with the mirrors but encourage students to eventually get down to the task at hand.
6. Students check answers with partners up to step 5.
7. Stop and put down pencils at step 5. Students read their "choice book" or work on the "challenge pack" for the week until others have finished.
8. When all have finished step 5, explain and give examples of what a generalization is. It is a rule that can be applied to all situations.

9. The learner's task is to write a generalization (rule) which explains why certain letters and numbers appear the same in the mirror and others do not. The student's rules must work on all figures and designs (not just letters and numbers) when checked with a mirror.
10. When all have had a chance to write their rule, draw several imaginary figures on the board (some with symmetry and some without) and randomly select students (use opportunity cards) to test their generalizations.
11. As a class, collaboratively identify the key characteristic an object must have to appear the same in a mirror (symmetry) and encourage everyone to include that in their rule if it is not there already.
12. Key questions to answer in journals to summarize learning, "What does a mirror do to an object's image when it reflects it? It reverses it. How does this affect what you see in bathroom mirrors? Rear view mirrors of cars? Full length mirrors in stores? What are some other uses of mirrors?"
13. Guided Study: Answer the questions about plane mirrors on page 65 in the "Review of Concepts" section. Answers can be found on pages 63 to 65 and need to be written in complete sentences.

Homework:

Make a list of all of the places and uses of plane mirrors found in and around your home.

Closure:

All students write an explanation in their Science Journals of how the "Mirage" apparatus works based on what they know of the behavior of light and reflection. Take volunteers to share their responses and explain how they used their knowledge of mirrors to develop the explanation. Dismantle and explain how the "Mirage" works (uses curved mirrors inside to produce the three dimensional image seen on the top of the dish). Students evaluate in the journals how close their explanation came to the actual mechanisms at work. Tomorrow we will investigate how magicians use mirrors to create some of the illusions they use.

Evaluation and Reflection:

The "Mirage" introduction and closure works very well. The idea of writing a generalization was very difficult for students. I need to supply more instruction and examples of what generalizations are and how they are formulated.