Reflection Lesson Plan

Terminal Objective: By the end of the two-day lesson, students will be able to use ray diagrams to predict the size, position, and orientation of the image of an object when it is reflected off a concave mirror. **Standard:** S5C5PO2

Sub Objectives	Teaching Strategies	Active Student Participation
1. SWBAT draw the path of a reflected light ray off a flat mirror using $\theta_i = \theta_r$ (application) 15 min including bell work	1. Bell work: If you throw a tennis ball to the ground at an angel (show picture), what direction do you predict it will go after it bounces? Direct Instruction: Explain that angle of incidence is equal to angle of reflection, and model drawing the path of one light ray as it bounces off a straight mirror	1. Students complete bell work in notebooks Students take notes in notebooks, then complete a few practice problems on their worksheet using a ruler and a protractor
2. SWBAT give the physics definition of the word "image" in the context of reflection (knowledge) 15 min	2. Discussion: Definition of "image" Activity: Mirror images. Students examine the reflection of themselves and simple objects in flat and curved mirrors, and discuss what they are seeing Instruction: whole-class builds scientific definition of "image" based on the mirror observations. Guide and clarify when needed	2. Students define "image" in their own words Students experiment with mirrors and make observations about what the "mirror image" of an object is. Students work with tables to come up with scientific definition of image, then class shares the agreed-upon definitions.
3. SWBAT identify the location and size of an image in a flat mirror by drawing ray diagrams (application) 15 min	3. Direct Instruction: Extend ray diagram discussion from part 1 to finding the location of an image. Model drawing process with one example.	3. Students take notes in their notebooks. Students practice drawing ray diagrams with images on their worksheet
4. SWBAT locate the focus point of a concave mirror (knowledge) 10 min	4. Direct Instruction: Define focus point and demonstrate two examples	4. Students take notes Final Closure: if you look in the mirror from up close and from far away, how does the image of your body change with your distance from the mirror?

Day 2		
5. SWBAT draw the path of horizontal light rays as they reflect off a concave mirror and pass through the focus (application) 15 min	5. Bell work: Imagine bouncing the tennis ball from yesterday into a curved crater instead of off a flat court (show picture). In what direction do you think it would bounce? Direct Instruction: Rule for reflection of horizontal rays off a concave mirror.	5. Students complete bell work in notebooks Students take notes in notebooks, then complete a practice problem on their worksheet
6. SWBAT draw the path of a single angled light ray as it passes through the focus of a concave mirror and is reflected out horizontally (application) 10 min	6. Direct Instruction: Rule for reflection of rays through the focus of a concave mirror and model one or two examples	6. Students take ntoes in notebooks, then complete practice problems on their worksheet
7. SWBAT apply the two basic rules of reflection off a concave mirror (steps 5 and 6) to identify the location, size, and orientation of the image of an object in a concave mirror (application). 35 min	7. Activity: Demonstration of images in concave mirrors Activity: Demonstration of online tool that shows reflection off concave mirrors Direct Instruction: Model process for combining rules 5 and 6 into finding the location, size, and orientation of an image in a convex mirror.	7. Students experiment with locating the image of an object in concave mirrors, and note the difference between real and virtual images. Students participate in manipulation of online tool and discussion. Students take notes, then complete several practice problems on their worksheets. Check for understanding: individual whiteboard slates to complete one problem. Final closure: if you were designing a telescope, why might it be a good idea to use a concave mirror?

Homework: Finish ray diagram worksheets

Materials: Ray diagram worksheets, rulers, protractors, examples of curved and flat mirrors, individual whiteboards and markers, online simulation (http://www.edumedia-sciences.com/en/a308-concave-mirror)