# Non-Reversing (True) Mirror

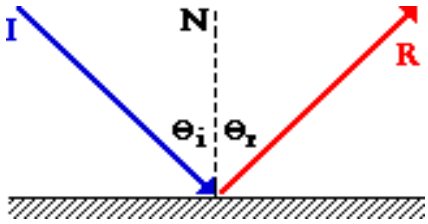
**Description**: This activity has two mirrors placed at right angles to one another, so two mirror images bounce off of each other. Typically we see ourselves and words backwards in a mirror, but the non-reversing mirror allows us to see the actual image without reversing. If you put a piece of paper with a word on it in front of the mirror, you will see that you can read the word in the reflected image.

**Physics Principles:**

- Reflection and Ray Diagrams
- Non-reversing Mirrors

**Reflection:**

- Light rays from a point source spread out (diverge) in all directions as the light is emitted from the object.
- A certain distance away from the object, they strike a smooth, reflecting surface, like a mirror. The rays are reflected from the surface at an angle size relative to the that is the same as the angle of the incident ray, as seen in the picture below:




Courtesy of The Physics Classroom © Tom Henderson 1996-2007

- The reflected light rays continue to diverge (spread apart) as they travel further from the mirror's surface at the same rate they were spreading before the reflection.
- Your eyes and brain cannot discern that the rays entering your eye are reflected, and it appears as though the image is coming from a point behind the mirror. This is a virtual image, which appears to be the same distance away as the real image in front of the mirror. Note: a *real image* is when the light rays originate from the image.
- A single, flat mirror shows us an image with a front-back reversal (if you hold up your right hand, it appears that you are looking at a left hand in the mirror) which gives an *apparent* right-left reversal.
- See a more thorough description with ray diagrams from: http://www.glenbrook.k12.il.us/gbssci/phys/Class/refln/u13l2c.html

**Non-Reversing Mirrors and How it Applies to this Kit:**

- A non-reversing mirror is formed when two flat mirrors are placed at right angles to one another.
- You can actually see three images in this configuration, one reversed image in each individual mirror as you face it head on and a third, non-reversed, image as you look in the corner created by the two flat mirrors.
- See a complete description of how this works with ray diagrams at: http://www.glenbrook.k12.il.us/gbssci/phys/Class/refln/u13l2e.html

# Non-Reversing (True) Mirror

**Questions to Investigate:**

- Stand in front of a single flat mirror with writing on a transparency. Hold the transparency in front of you so you can read the writing. You will also be able to read the writing in the mirror image.
- Hold up an object with writing on it to each individual mirror in the top of the kit box. Note that if you look into each of the mirrors, the letters are reversed, but when you look in the center you can read the writing.
- Draw the ray diagram for an object in front of a plane mirror. Now draw the ray diagrams for two plane mirrors at right angles to each other to show why the 3rd image in non-reversing.

**Online Resources:**

- The Physics Classroom, Right Angle Mirrors Discussion with Ray Diagrams: http://www.glenbrook.k12.il.us/gbssci/phys/Class/refln/u13l2e.html
- A worksheet to do in class (be sure to also see Related Documents at the bottom of the page and select each subtopic for more classroom ideas): http://dev.physicslab.org/Document.aspx?doctype=5&filename=GeometricOptics_TwoMirrors.xml

**References:**

Serway, R.A and R.J. Beichner, 2000. *Physics for Scientists and Engineers,* Vol. 4, 5th ed., Saunders College Publishing, Philadelphia, PA, 183pp.

Tillery, B.W., 2005. *Physical Science*, 6th ed., McGraw-Hill, New York, NY, 666pp.