**Astronomy Demonstration Video – Optics 1: Reflection – Worksheet**

to follow viewing of the astronomy demonstration video [https://www.youtube.com/watch?v=](https://www.youtube.com/watch?v=_Yxg7hs6N3c)bgTjPs9lmx4

1. The Law of Reflection is written as a mathematical formula.
2. Write out this equation using only words. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. An air-mirror interface is shown with a ray of light incident upon it. Draw in the reflected ray and label θi and θr.

**Mirror**

1. If θi increases, then θr\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. When I look into a mirror, θi is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and θr is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Two perpendicular mirrors are shown with a ray of light from a red laser incident. Note that the twice reflected ray is drawn for you (and the normals at both locations of reflection are drawn as well).
4. Indicate θi1 and θr1 in the diagram (the law of reflection for the first mirror).

**Mirror #1**

**Mirror #2**

1. Indicate θi2 and θr2 in the diagram (the law of reflection for the second mirror).
2. In the space below, write an equation relating θr1 and θi2.  (Hint: Use the fact that the sum of angles in a triangle is 180°)

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1. Indicate the sum of all of the angles between the incident ray and the outgoing doubly reflected ray in the equation below:

θi1 + θr1 + θi2 + θr2 = \_\_\_\_\_\_\_\_\_

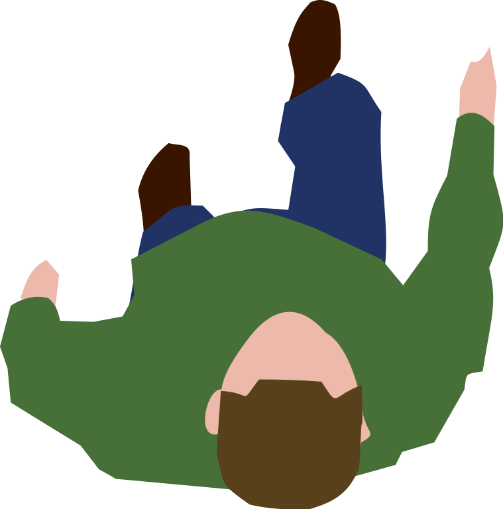
1. What does the equation for part d) tell you about the direction of the final outgoing ray?

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1. The picture to the right (which opens the video) shows a pair of mirrors. Note that the angle between the mirrors is slightly less than 90°. When a marker is placed before the mirrors, note that 4 images of the marker are seen by a centrally located observer.

In the diagram below, the apparatus is shown from the top view. The light from the marker that is forming one of the images is shown (ending on a path toward you). Draw in the path of light for the other 3 images (and for those image where the light only reflects off of one mirror – indicate the normal as well).



**Mirror #1**

**Mirror #2**