

MIRROR MAGIC



Westminster College

STANDARDS:

Students know basic energy types, sources, and conversions

Students know the characteristics of light (reflection, refraction, absorption)

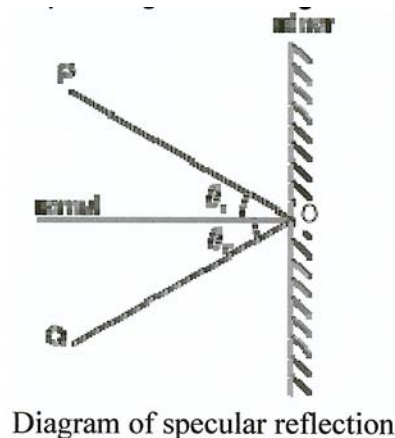
OBJECTIVES:

The students will gain basic understanding of how light is reflected using mirrors and flashlights.

BACKGROUND:

Light travels in straight lines as waves. A reflection is the change in direction of a light wave produced by a mirror or other similar object. A mirror is commonly made of a glass sheet in front of a metallic coating where the reflection actually occurs. It is also possible for reflection to occur from the surface of transparent media, such as water or glass.

The **law of reflection** states that the direction of outgoing reflected light and the direction of incoming light make the same angle with respect to the surface normal. In other words, light from a single incoming direction is reflected into a single outgoing direction (at the same angle) making the reflected image appear normal with one exception. The image may be flipped or reversed depending on the angle of reflection. See the image below: $\theta_i = \theta_r$



MATERIALS:

- mirrors (one per student)
- 'Alex the Alligator' worksheet
- pencil
- flashlights with batteries

ACTIVITY 1:

ALEX THE ALLIGATOR PAGE:

1. Pass out a mirror to each student.
2. Have them make a funny face at themselves. Ask them what they are looking at (their reflection). Explain that in our activity, they will be experimenting and learning about reflection.
3. Past out “Alex” worksheet.
4. Have everyone point to the single alligator at the top of the page. Have them hold the mirror facing the alligator, standing up, near the fish. Tell them that they will keep their mirror on this alligator, not move their mirror down the page. If they look in the mirror, they can see the first image below-2 alligators face-to-face going after 2 fish.
5. Instruct them to try to find the other 4 images using their mirror and the ‘Alex’ at the top of the page. They will have to move the mirror around the ‘Alex’, maybe turning it in the opposite direction or at an angle.
6. Help the students if needed.
7. After students have found all the other images, see if they can create their own unique images using the ‘Alex; at the top of the page. (a heart, a girl’s wig, a worm, a taco, etc)

ACTIVITY 2:

1. Have the students turn their paper over to the blank side.
2. Have the students draw a triangle with the sides approximately 2-3 inches (about the size of a triangle they would make by putting their two thumbs and two index fingers together form a triangle.)
3. Have them place the mirror directly in front of them (perpendicular to their line of sight), facing the triangle, so that they can see the triangle reflection in the mirror.
4. Explain that they will trace the triangle (or go over again with their pencil) by looking at the reflection in the mirror only. Encourage them to try not to look at the paper.
5. Once they have mastered this, they can attempt a more difficult shape like a star or heart.

ACTIVITY 3:

1. Have the students write their name on the paper.
2. Again, have them hold the mirror directly in front of them so they can see their name reflected in the mirror.
3. Ask them if they can read their name clearly. No. Why not? Allow for answers.
4. Tell them that when the letters are reflected, they are flipped.
5. Their task is to write their name on the paper, so that when they look at the reflection, their name is correctly written in the reflection, but not on the paper.

ACTIVITY 4:

1. Similar to the above activity, have students write a secret message so that in order to read the message, one would have to use a mirror.
2. Have students trade messages and read them.

ACTIVITY 5:

1. An ambulance has the word 'AMBULANCE' written on the front of the vehicle so that when someone is driving and sees the word in the rearview mirror, they can read the word correctly.
2. Write the word 'AMBULANCE' like it would appear on the front of the vehicle. To test it, put the paper on your should or chest and hold your mirror straight out in front of you. Careful: It is different than the above activity. (it is filled vertically and horizontally-written backwards)

ACTIVITY 6:

1. Have students form two lines facing each other. Pair the students up. Give one student a flashlight, their partner a mirror.
2. Have student with light shine it onto the mirror.
3. Have the student with the mirror try to reflect the light onto specific objects: ceiling, their shoes, their partner shoe, the wall of the class, etc.
4. Have students trade mirror and flashlight. Repeat activity.

DISCUSSION:

What did you learn about reflection?

Why is it difficult to trace your shape in the mirror?

How did the letters have to be written in order to read them correctly in the reflection?

How did 'AMBULANCE' have to be written in order to be read in a rear-view mirror? (flipped vertically and horizontally)

ALEX. THE ALLIGATOR CARD

