LENS SET ACTIVITY GUIDE

Cat. No. LSTA38, LSTA50, LSTA75

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OPTICAL HISTORY

From antiquity to the present time, people have been fascinated by optical lens.

° Claudius Ptolemy, a Greek astronomer, has been credited with experiments relating to the laws of refraction.

° In the 11th century, a book on optics was written by an Arabian, Alhazen. He investigated the magnification produced by lenses and atmospheric refraction.

° In the 13th century, Roger Bacon studied the magnification of small objects using convex lenses.

° In the 16th century, Zacharius Jensen from the Netherlands, constructed a compound microscope using convex and concave lenses.

° In the 17th century, Johannes Kepler explained how vision occurred by the lens in the eye. He also correctly described the causes of near-sightedness and far-sightedness. A few years later, he developed the principles of a compound microscope and the telescope.

° Galileo Galilei from Italy, in the 17th century, constructed a telescope for astronomical observations which led to many astronomical discoveries that included Jupiter having four moons.

° Later that century, Willebrord Snell discovered the relationship between the angle of incidence and the angle of refraction.

° Robert Hooke of England during that century described his observations using a compound microscope. His compound microscope had a converging objective lens and a converging eyepiece.

° A French scientist in the 19th century, Augustin Jean Fresnel presented his laws which determined how refracted light would be calculated.

Lenses today are used in many optical devices such as microscopes, movie projectors, slide projectors, enlargers, cameras, and telescopes.

INVESTIGATING THE MAGNIFICATION WITH A DOUBLE CONVEX LENS

Investigate what happens with magnification using a double convex lens.

Materials provided:
a double convex lens

Materials to be collected:
a dime

Procedures:

° Place your dime on a flat surface so that the face of the person is towards you and upright.

° Observe it with your eyes.

° Draw what you have observed.

° Hold the double convex lens carefully between your thumb and index finger.

Safety First:
Your double convex lens is made of acrylic which could shatter if dropped.

° Hold it directly over the dime.

° Record your observations.

° Raise the double convex lens carefully by holding it between your thumb and index finger until you have a clear image of the face on the dime.

What do observe now?

° Draw your observations.

What did your double convex lens do to the face of the dime?

° Now raise the double convex lens even higher.

What happens when you raise the double convex lens higher?

° Record your observations.

Analysis:
Your double convex lens works because it functions as a converging lens. The waves of light travel toward the center of the lens. When the picture on the dime is clear, you have magnified the image on the dime. If you raise it even higher, the image becomes cloudy.

Critical Thinking:
Whose picture appears on a dime?

DETERMINING THE MAGNIFICATION OF A CONVEX LENS

Determining the magnification of convex lens.

Materials provided:
a double convex lens, a plano-convex lens, a concavo-convex lens.

Materials to be collected:
lined paper

Procedures:

° Place a lined sheet of paper on the table.

° Observe it with your eyes.

° Draw what you have observed.

° Hold the double convex lens carefully between your thumb and index finger.