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Mirrors and Reflection Worksheet

Data

40° Quadrant 4

Cork Position: _____

Real object angle: _____

Eye position: _____

Real object appearance compared to reflection:

Cork Position: _____

Real object angle: _____

Eye position: _____

Real object appearance compared to reflection:

Cork Position: _____

Real object angle: _____

Eye position: _____

Real object appearance compared to reflection:

Post-Lab Questions

1. What is the relationship between the apparent size of the object when positioned behind the mirror at the apparent location of the image and the size of the reflected image?

2. Formulate a statement that describes the direction that light reflects off a flat mirror.

3. What type of image does a flat mirror form—virtual or real? How do you know?

4. What is the minimum height a flat mirror must be in order for a person to view his or her feet when the mirror stands vertically?

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Refraction Worksheet

Observations

Air to Water

Water to Air

Data

Media Direction	Pin and Cork Position on Protractor	Lone Pin Position on Protractor
Air to Water	50° Quadrant 4	
Air to Water		
Air to Water		
Water to Air	50° Quadrant 1	
Water to Air		
Water to Air		

Post-Lab Questions

1. What happens to the direction of the light rays when they pass into different media (i.e., from air to water, or water to air)?

2. Use the data and Equation 2 from the *Refraction Background* to calculate the index of refraction of water. Assume that the index of refraction of air is equal to 1.0.

3. When light passes from a medium with a high index of refraction into a medium with a lower index of refraction, which direction does the light bend?

4. When trying to catch a fish, would a bird (such as a pelican) dive into the water horizontally in front of or behind the image the fish it sees? Explain. Draw a picture if necessary.

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Thin Lenses Worksheet

One-Lens System

Data Table

Lens Type and Focal Length	Pin Position	Lens Position	Target Position
Convex, 15 cm	10 cm	60 cm	
Convex, 15 cm	10 cm		
Convex, 5 cm	10 cm	60 cm	
Convex, 5 cm	10 cm		
Concave, 5 cm	10 cm	60 cm	

Observations

15-cm convex lens

5-cm convex lens

5-cm concave lens

Two-Lens System

Data Table

Lens Type	Pin Position	15-cm Lens Position	5-cm Lens Position
Convex, 5 cm	10 cm	70 cm	
Concave, 5 cm	10 cm	70 cm	

Observations

Convex lens

Concave lens

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Post-Lab Questions

1. Use the data and Equation 1 from the *Background* to calculate the experimental focal length of each lens. Remember that distances are measured from the lens in centimeters.

   15-cm convex lens

   5-cm convex lens

   5-cm concave lens

2. How is the image orientated for the convex lens?

3. When the two lenses where used in combination, what type of instrument was created?

4. Where was the 5-cm concave lens positioned in relation to the focal point of the objective lens when the image was in focus?

5. How many lenses are actually being used to see the image produced by the two-lens system?

6. Is the image that is viewed in the two-lens system virtual or real? Explain.

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Polarization Worksheet

Observations

Single Polarizer

Two Polarizers

Two Crossed Polarizers and Plastic Bag

Two Crossed Polarizers and Plasticware

Post-Lab Questions

1. What is the definition of polarization?

2. How does an analyzer work?

3. Why might the plasticware, when viewed through an analyzer, change color?

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Color Worksheet

Prism — Teacher Demonstration

Observations

Analysis

Explain why white light "changed" into rainbow colors after transmitting through a prism.

What would happen if the rainbow colors projected by the prism entered another prism?

Color Wheels

Observations

Analysis

Explain how the color wheels display the color that is seen when they are stationary, and when they are spinning.

Color Filters

Data Table

Color Paddles Crossed	Observed Color
Red Yellow	
Blue Yellow	
Red Blue	
Red Yellow Green	
Red Yellow Blue	

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Analysis

By what process—color mixing by subtraction or color mixing by addition—do the color filters transmit the color of light that is visible?

Compare the resultant colors from the experiment to those in the color wheel (Figure 1) located in the *Color Background* section.

Benham's Disk

Observations

Initial colors on the Benham's disk:

Appearance of clockwise spinning Benham's disk:

(Draw a picture to illustrate any observed pattern. Use colored pencils if desired.)

Appearance of counterclockwise spinning Benham's disk:

(Draw a picture to illustrate any observed pattern. Use colored pencils if desired.)

Analysis

Develop a hypothesis explaining the change in appearance of the disk when rotated clockwise and counterclockwise.

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