

Name: _____ Date: _____

PHYSICS: Light and Optics
Activity: Refraction Air to Water

Use complete sentences when you answer the questions and describe your observations.

#1: Vertical Straw Inside the Cups

Instructions

- Hold the straw vertically (up-and-down) inside the **empty cup**.
- Hold the straw vertically (up-and-down) inside the **water-filled cup**.
- View the straws through the cups at table level.

Compare and contrast the shape, size, and position of the straw as seen through the empty cup and through the water-filled cup.

#2: Tilted (30°) Straw Inside the Cups

Instructions

- Hold the straw at a 30° angle from vertical inside the **empty cup**.
- Hold the straw at a 30° angle from vertical inside the **water-filled cup**.
- View the straw through the cups at table level.

Compare and contrast the shape, size, and position of the straw as seen through the empty cup and through the water-filled cup.

#3: Horizontal Straw Behind the Cups

Instructions

- Hold the straw horizontally behind the **empty cup**.
- Hold the straw horizontally behind the **water-filled cup**.
- View the straw through the cups at table level.

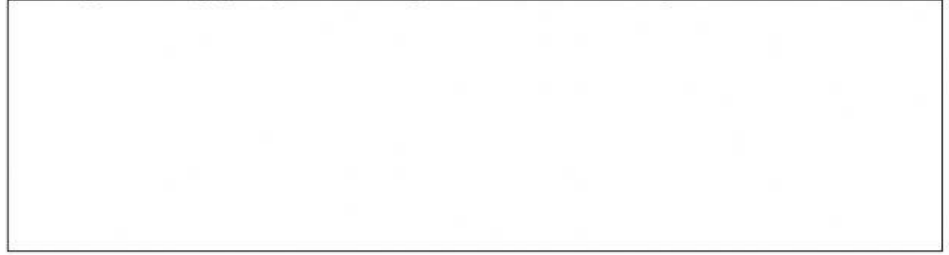
Compare and contrast the shape, size, and position of the straw as seen through the empty cup and through the water-filled cup.

#4: Tilted (45°) Straw Behind the Cups

Instructions

- Hold the straw at $\sim 45^\circ$ angle behind the **empty cup**.
- Hold the straw at $\sim 45^\circ$ angle behind the **water-filled cup**.
- View the straw through the cups at table level.

Compare and contrast the shape, size, and position of the straw as seen through the empty cup and through the water-filled cup.



#5: LEFT Sign Behind the Cups

Instructions

- View the LEFT sign through the **empty cups** and **water-filled cups**.
- Move the cups away from the signs until the entire image can be seen through the cup.

Compare and contrast the shape, size, position, and orientation of the letters as seen through the empty cup and through the water-filled cup.



#6: CIRCLE & TRIANGLE Sign Behind the Cups

Instructions

- View the CIRCLE and TRIANGLE sign through the **empty cups** and **water-filled cups**.
- Move the cups away from the signs until the entire image can be seen through the cup.

Compare and contrast the shape, size, position, and orientation of the CIRCLE & TRIANGLE as seen through the empty cup and through the water-filled cup.



#7: CIRCLE & TRIANGLE Sign Behind the Cups

Instructions

- View the SOLID ARROW sign through the **empty cups** and **water-filled cups**.
- Move the cups away from the signs until the entire image can be seen through the cup.

Compare and contrast the shape, size, position, and orientation of the SOLID ARROW as seen through the empty cup and through the water-filled cup.

