

# Different Perspectives

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## Investigation 3

### Instructor Data Record



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### Scientist's Glossary



Tool: **Rehearsal**

1. **Depth perception:** The ability to see in three dimensions.
2. **Dimensions:** The measurements of an object such as its length, width and height.
3. **Eye:** The organ that contains all of the structures needed for sight.
4. **Field of view:** The entire area that is able to be seen at any one time.
5. **Image:** The appearance of an object produced by the reflection or refraction of light. An image of an object is formed on the retina when light passes through the lens of the eye.
6. **Point of view:** The direction from which an object or scene is observed.
7. **Perspective:** The way in which objects appear in a person's view.



# Different Perspectives

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## Investigation 3

### Scientist Data Record

Name:

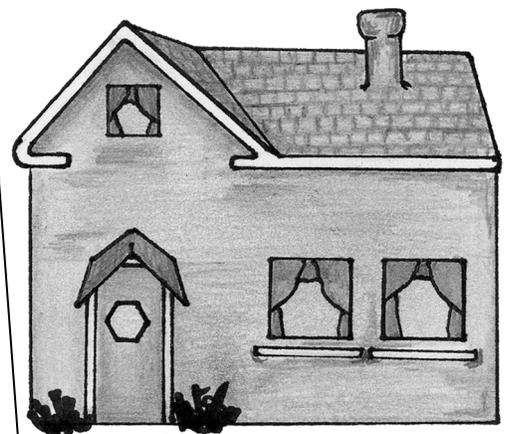
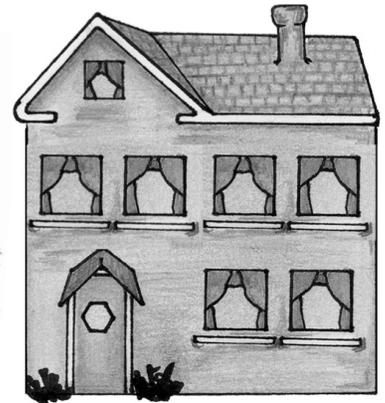
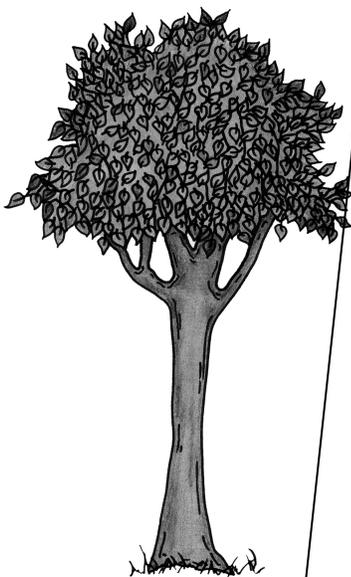


Tool: **Apply**

1. Try your hand at creating a drawing that shows depth. Think about how artists use vanishing points in their drawings. Use the instructions below to create your drawing. Create your drawing on the next page.

- **Draw a road that continues in the distance.**
  - Think of how the meter sticks appeared when you looked at them from the 0 centimeter mark.
  - Did the meter sticks appear to be parallel?
  - Or did they appear to meet at their ends?
  
- **Imagine you are standing 20 feet in front of where the road begins. Add some objects along the road.**
  - Add two trees to the drawing: one close to the “front” of the road, one at the end of the road (in the distance.) However, imagine that if the trees were side by side, they would be the same height.
  - The tree in the distance should be a pine tree.
  - The tree close to the front of the road should not be a pine tree. It should be one with broad leaves like a maple or oak tree.
  - Add two houses to the drawing: one that is close to the viewer and one that is farther from the viewer.
  - The house close to the viewer should be one level.
  - The house far from the viewer should be two levels.
  - Think about the size of the houses in comparison to the trees.

**Student drawings may vary. A sample drawing is shown.**

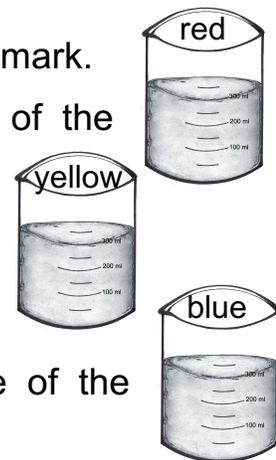


## 2. Setting up for Trials 1 and 2

### a. Prepare the beakers.

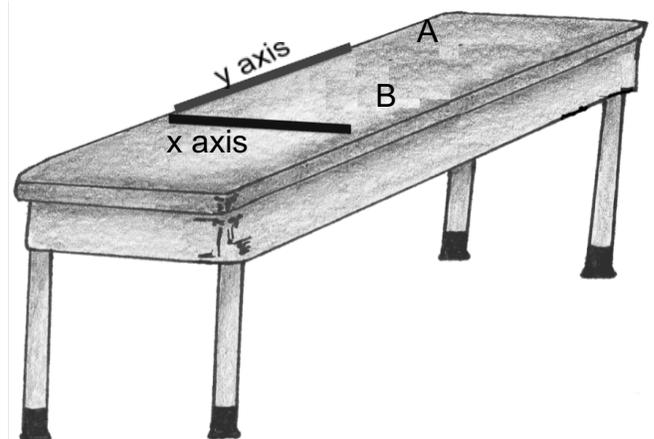


- Obtain 3 400 ml beakers
- Pour water into each beaker up to the 300 ml mark.
- Add one drop of red food coloring to one of the beakers of water.
- Add one drop of yellow food coloring to one of the beakers of water.
- Add one drop of blue food coloring to one of the beakers of water.



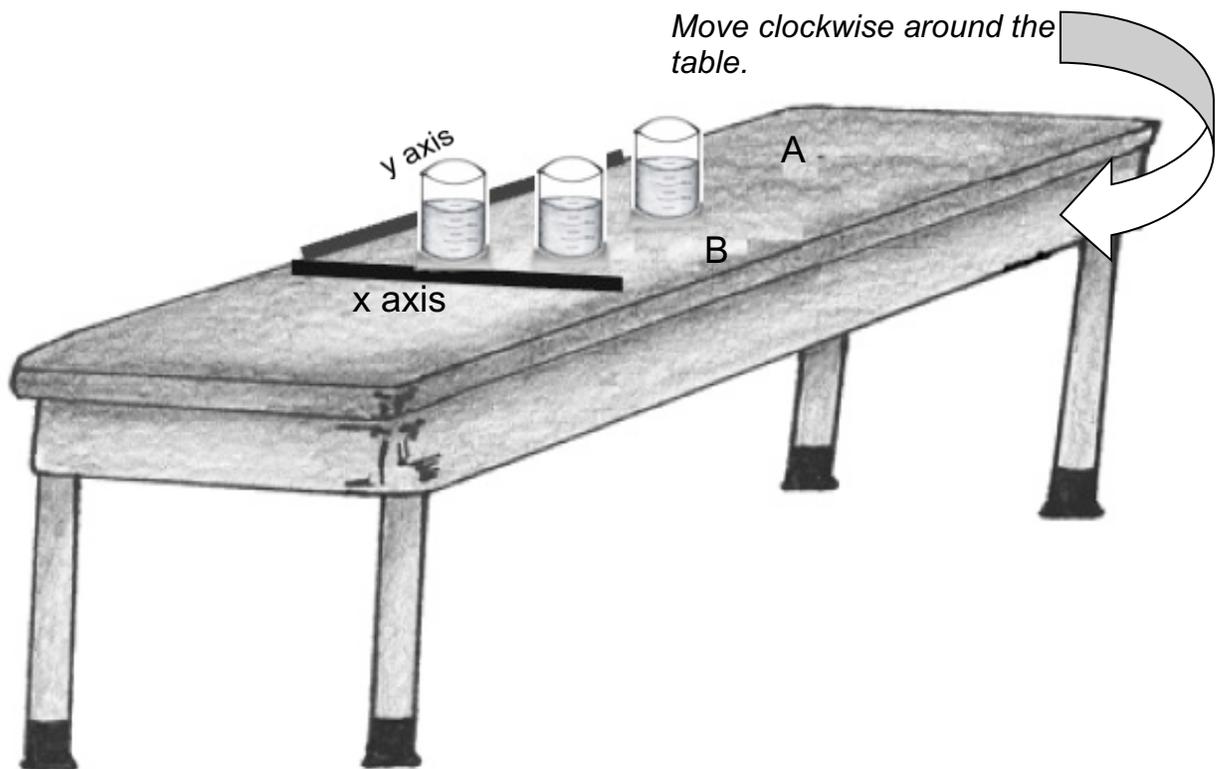
### b. Assemble the meter sticks. Use the picture to help you.

- Create an X and Y axis on the table using the meter sticks.
- Place one meter stick along the short end of the table. Place a piece of masking tape below the meter stick. Label this X axis.
- Place the second meter stick along the long end of the table. Place a piece of masking tape below the meter stick. Label this Y axis.
- Move the meter sticks so that the 0 cm ends of both meter sticks are touching. This point will be the origin of the X and Y axis.
- Find the side of the table opposite the X axis. Use a piece of masking tape to label this side "A."
- Find the side of the table opposite the Y axis. Use a piece of masking tape to label this side "B."



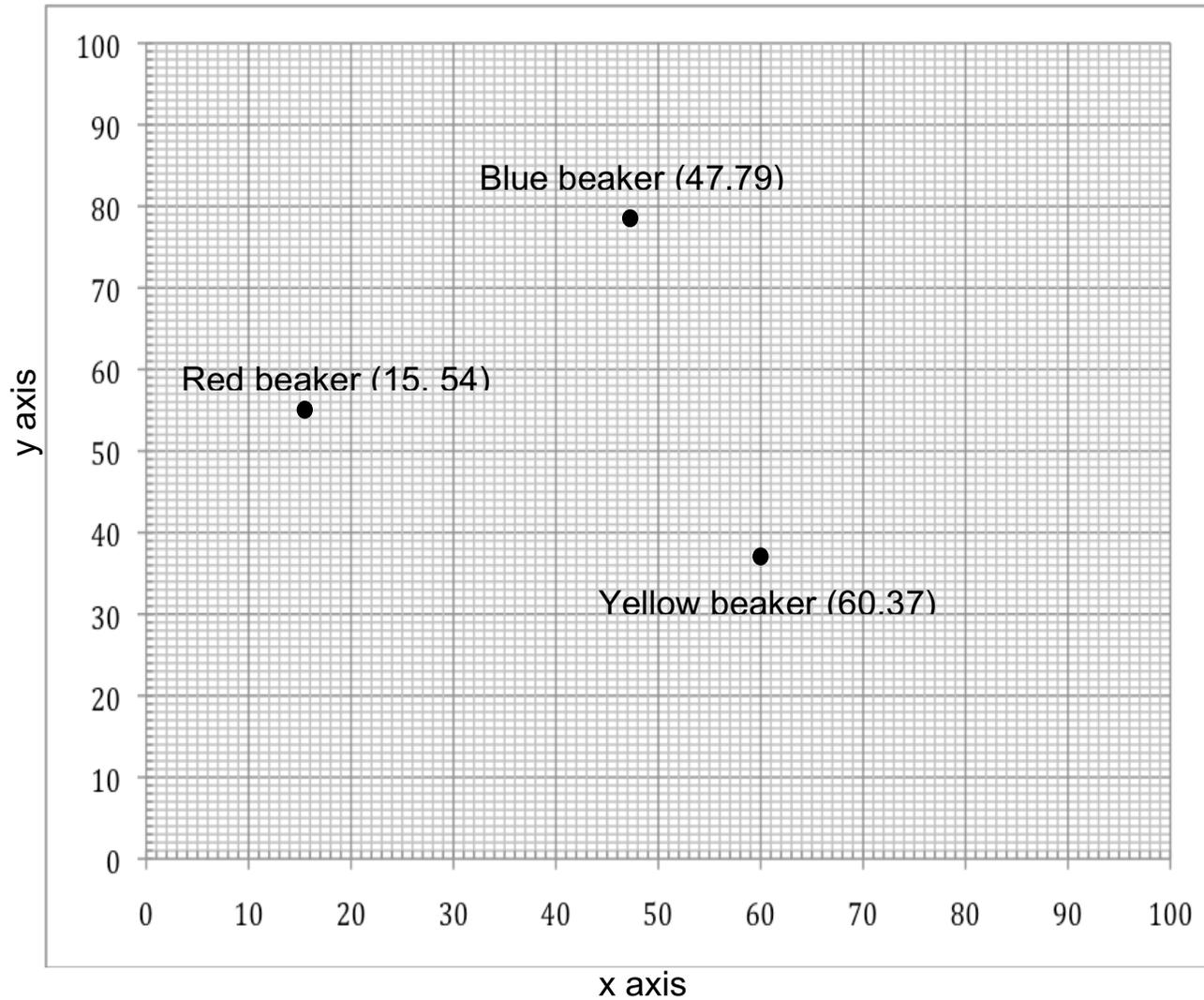
c. Review the directions.

- Each trial will show you where to place each beaker on the table by using a set of x and y coordinates.
- **Stand at the X axis** and place the beakers at the correct X and Y coordinates.
- Find a seat and observe the beakers from eye level. Each person in your group should start at a different side of the lab table. This is position 1.
- Draw how each beaker appears from this position. Make sure you indicate the size and color of each beaker.
- When everyone in your group is finished, move clockwise around the table to the next position. This will be position 2.
- Draw what you see from this perspective.
- Continue the process until you have drawn the beakers from all four positions.
- Move to Trial 2 and repeat the procedures.



3. Trial 1: How does your perspective (point of view) affect the appearance of objects?

Use the information below to place the beakers at the correct position on the table.

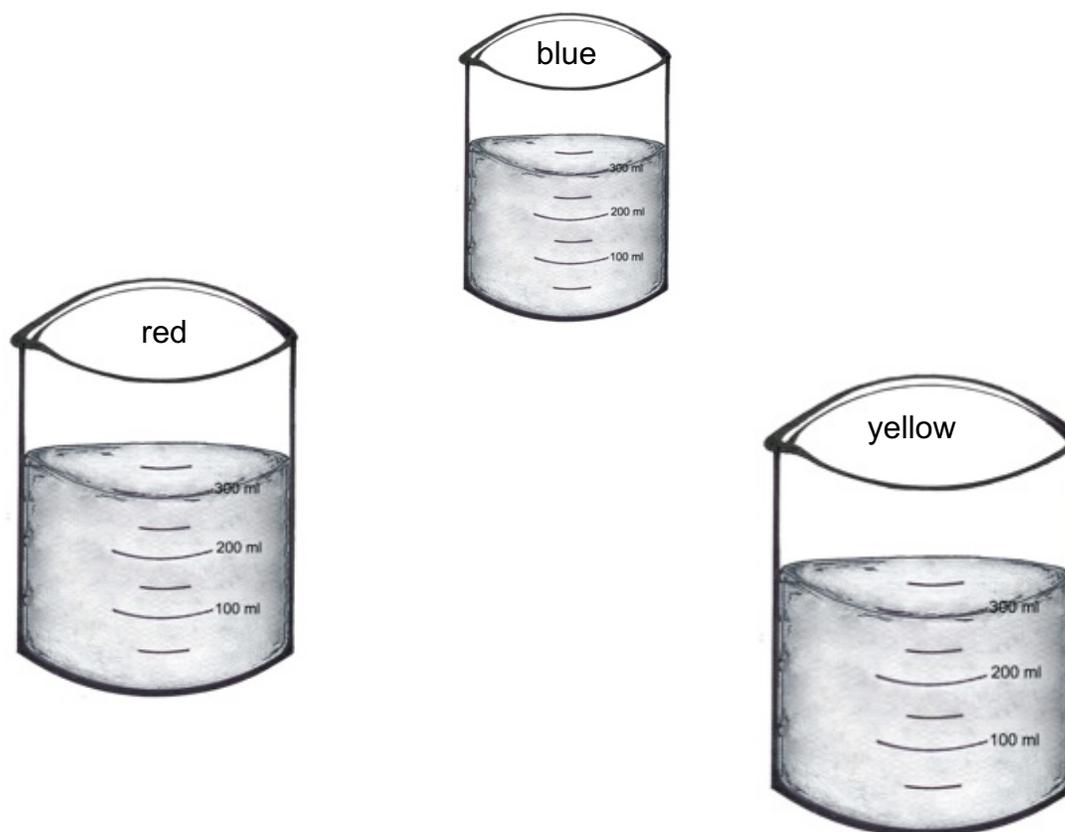


**Trial 1: Position 1** (Draw the beakers. Observe color and dimensions.)

Which beaker is in the middle? **Blue**  
Which beaker is on the right? **yellow**  
Which beaker is on the left? **red**

Which beaker is in front? **yellow**  
Which beaker is in the back? **blue**  
Which beaker is between the front and back? **red**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 1 as along the X axis.*

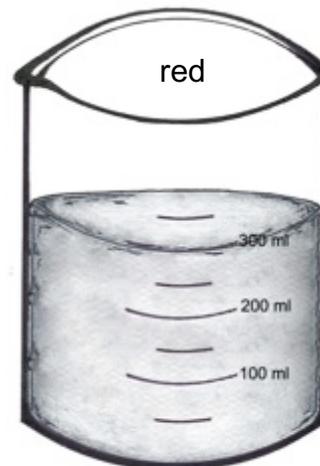
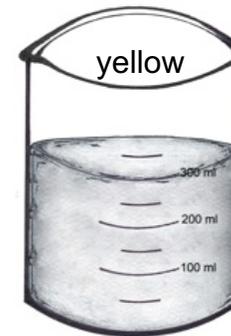
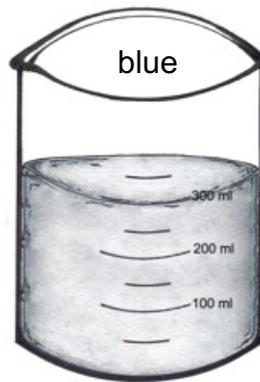


**Trial 2: Position 1** (Draw the beakers. Observe color and dimensions.)

Which beaker is in the middle? red  
Which beaker is on the right? yellow  
Which beaker is on the left? blue

Which beaker is in front? red  
Which beaker is in the back? yellow  
Which beaker is between the front and back? blue

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 2 as along the Y axis. This represents a move clockwise around the table.*



**Trial 1: Position 3** (Draw the beakers. Observe color and dimensions.)

Which beaker is in the middle? **Blue**

Which beaker is on the right? **red**

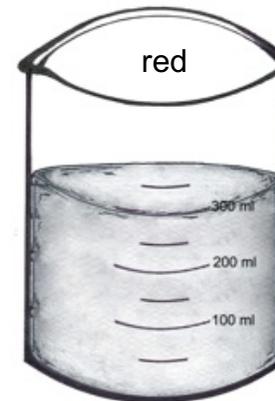
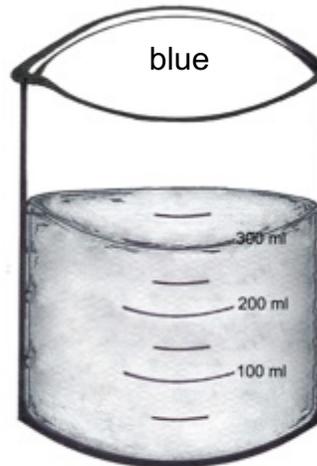
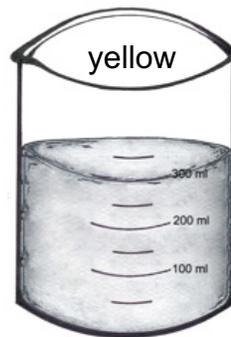
Which beaker is on the left? **yellow**

Which beaker is in front? **blue**

Which beaker is in the back? **yellow**

Which beaker is between the front and back? **red**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 3 as along the side A. This represents a move clockwise around the table.*

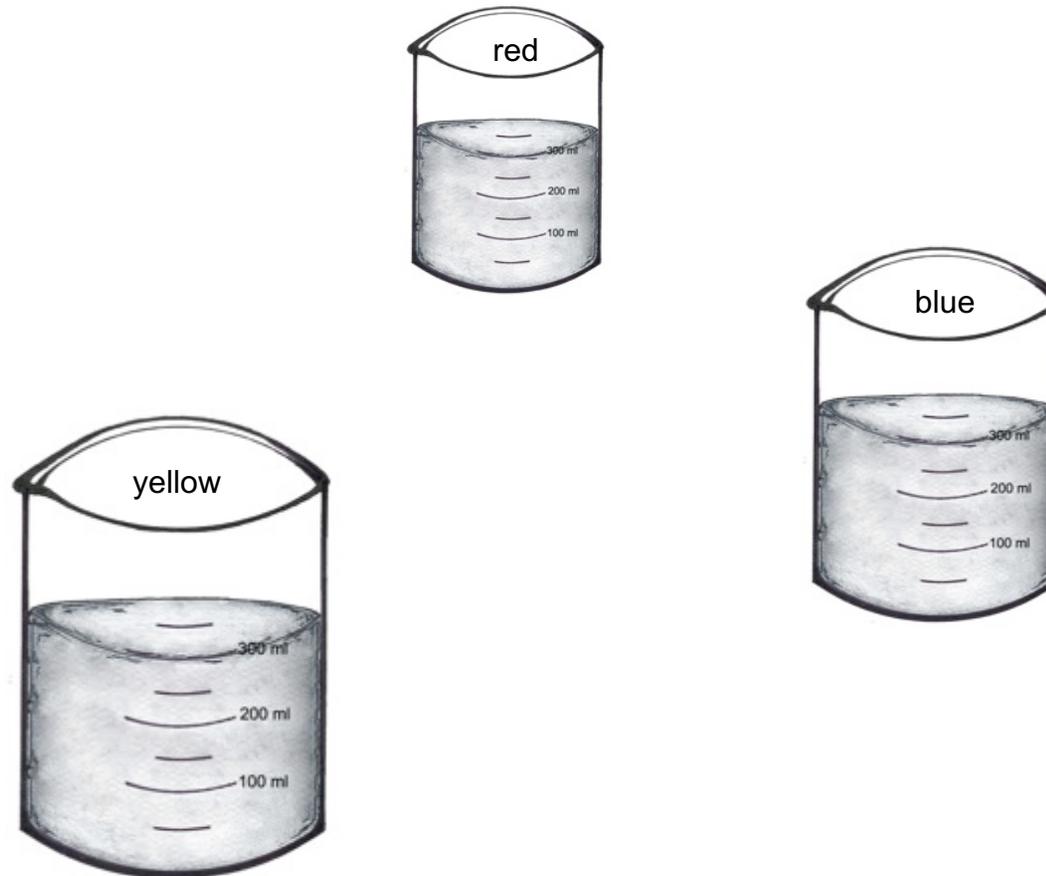


**Trial 1: Position 4** (Draw the beakers. Observe color and dimensions.)

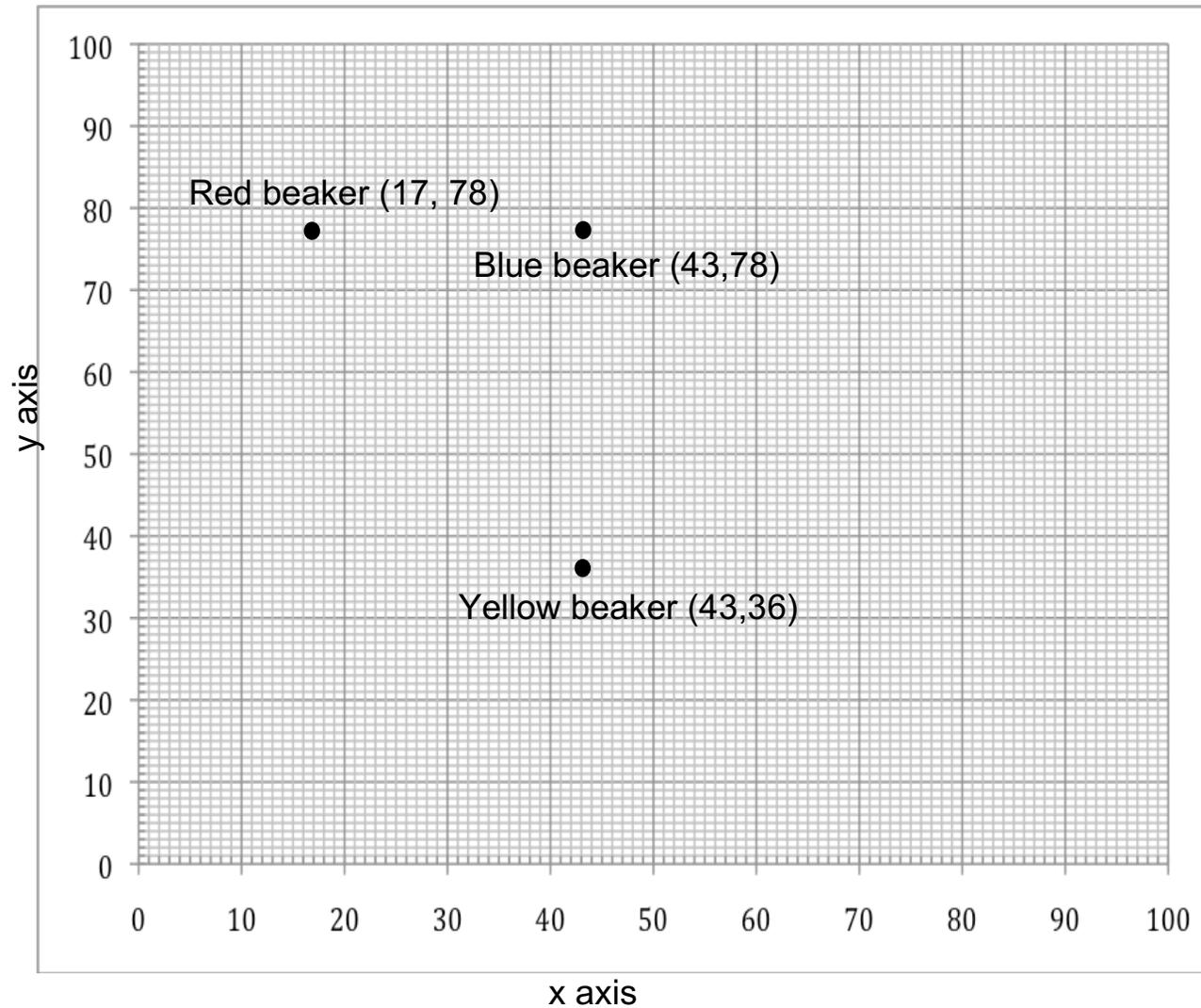
Which beaker is in the middle? **red**  
Which beaker is on the right? **blue**  
Which beaker is on the left? **yellow**

Which beaker is in front? **yellow**  
Which beaker is in the back? **red**  
Which beaker is between the front and back? **blue**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 4 as along the side B. This represents a move clockwise around the table.*



4. **Trial 2: How does your perspective (point of view) affect the appearance of objects?**  
Use the information below to place the beakers at the correct position on the table.

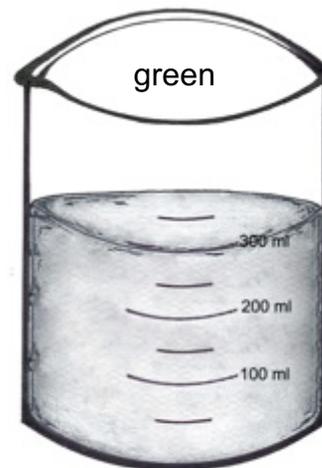
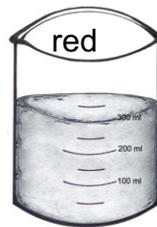


**Trial 2: Position 1** (Draw the beakers. Observe color and dimensions.)

Which beaker is on the left? **red**  
Which beaker is on the right? **green**

Which beaker appears to be in front? **green**  
Which beaker appears to be in the back? **red**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 1 as along the X axis. Notice that the drawing reflects that the blue beaker is viewed as directly behind the yellow beaker. Therefore, from this point of view, the blue beaker is not seen as a separate object. Rather, the colors of yellow and blue combine to create the color green which appears to be the color of the liquid of the beaker that is directly in front of the viewer.*

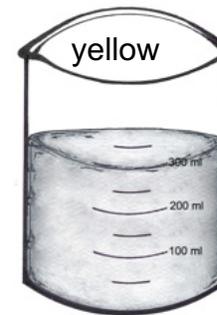
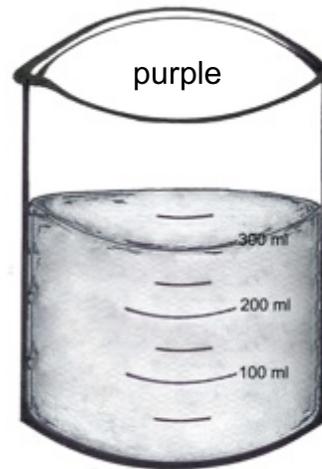


**Trial 2: Position 2** (Draw the beakers. Observe color and dimensions.)

Which beaker is on the left? **purple**  
Which beaker is on the right? **yellow**

Which beaker appears to be in front? **purple**  
Which beaker appears to be in the back? **yellow**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 2 as along the Y axis. Notice that the drawing reflects that the blue beaker is viewed as directly behind the red beaker. Therefore, from this point of view, the blue beaker is not seen as a separate object. Rather, the colors of red and blue combine to create the color purple which appears to be the color of the liquid of the beaker that is directly in front of the viewer.*



**Trial 2: Position 3** (Draw the beakers. Observe color and dimensions.)

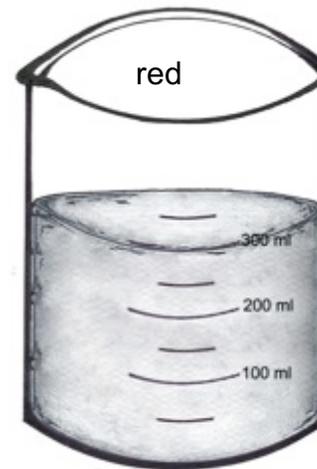
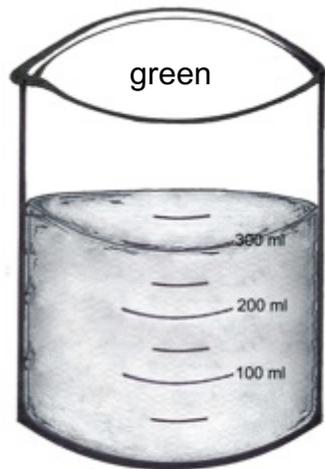
Which beaker is on the left? **green**

Which beaker is on the right? **red**

Which beaker appears to be in front? **green and red**

Which beaker appears to be in the back? **none**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 3 as along the side A. Notice that the drawing reflects that the blue beaker is viewed as directly behind the yellow beaker. Therefore, from this point of view, the blue beaker is not seen as a separate object. Rather, the colors of yellow and blue combine to create the color green which appears to be the color of the liquid of the beaker that is directly in front of the viewer.*

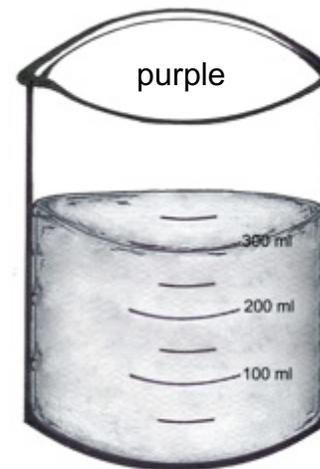
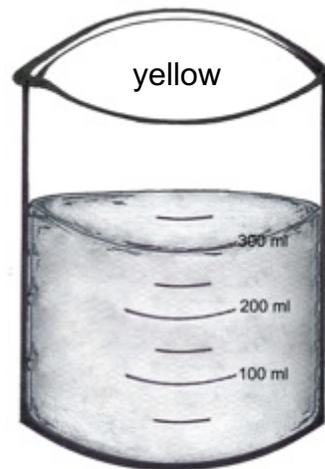


**Trial 2: Position 4** (Draw the beakers. Observe color and dimensions.)

Which beaker is on the left? **Yellow**  
Which beaker is on the right? **purple**

Which beaker appears to be in front? **yellow and purple**  
Which beaker appears to be in the back? **none**

*Student drawings and answers will vary depending upon their starting position. A sample drawing and answers are shown for position 2 as along the side B. Notice that the drawing reflects that the blue beaker is viewed as directly behind the red beaker. Therefore, from this point of view, the blue beaker is not seen as a separate object. Rather, the colors of red and blue combine to create the color purple which appears to be the color of the liquid of the beaker that is directly in front of the viewer.*



1. Compare your drawings for Trial 1.
  - a. Look your drawing for Trial 1, position 1. Compare your drawing with the other members of your group. Discuss the following:
    - Which beaker is in the front, back and middle of the paper?
    - Which beaker is in the middle, right and left of the drawing?
    - How big are the beakers? Are they the same size? Which are taller or shorter than the others? Which are wider or more narrow than the other?
  - b. How are the drawings the same?

**Students should indicate that all of the drawings included three beakers of different colors: red, blue and yellow. The drawings all included beakers that could be described using the terms left, right, middle, front and back.**

- c. How are the drawings different?

**Students should indicate that the location of the different colored beakers was not the same in each drawing. In addition the size of the beakers was not the same in all of the drawings. For example, one student may indicate that in position 1, the yellow beaker was in the front right, the blue in the middle back and the red in the left halfway back. The yellow beaker was the largest, the blue the smallest and the red a size in between the two. A second student may indicate that the blue beaker in the middle front, the yellow beaker in the left back and the red beaker on the right halfway between the blue and yellow beaker. (See the sample drawings in problem 3. Each of the drawings is position 1 for some of the students.**

- d. Is there anyone else in the class whose drawing is the same as yours? Why?

**Students should realize that at least one person in each group and maybe one other person within their own group will have a drawing similar to theirs. Students whose position 1 drawings were the same all started at the same position at the lab table. In other words, all of these students had the same point of view or perspective.**

- e. Compare your drawings for positions 2, 3 and 4 for Trial 1. How did your perspective affect how you described the color and size of the beakers?

**Sitting at different positions around the table resulted in a different point of view or perspective. When observing the beakers, this meant that different beakers were in the center, right and left of my field of view at each of the four locations around the table. It also meant that different beakers were different distances from my eyes (front, middle, back) at each of the four locations around the table. The closer the beakers were to my eyes for a particular point of view, the larger they appeared. The farther the beakers were to my eyes for a particular point of view, the smaller they appeared.**

4. Compare your drawings for Trial 2. How did your perspective affect how you describe the color and size of the beakers?

**Sitting at different positions around the table resulted in a different point of view or perspective. When observing the beakers, this meant that different beakers were in front of or next to each other of my field of view at each of the four locations around the table. For example, in position 1 the blue beaker was directly behind the yellow beaker. As a result, it appeared as if there were only one beaker in that position with the color green. Looking through the yellow beaker to the blue beaker in back of it created the appearance of one green beaker. However, for position 2, the blue beaker was directly behind the red beaker. Looking through the red beaker to the blue beaker in back of it created the appearance of one purple beaker.**

**It also meant that different beakers were different distances from my eyes (front and back) at each of the four locations around the table. The closer the beakers were to my eyes for a particular point of view, the larger they appeared. The farther the beakers were to my eyes for a particular point of view, the smaller they appeared.**

5. The directions for Trials 1 and 2 indicated that beakers were to be placed at specific x and y coordinates on the lab table. Why do you think x and y coordinates were used instead of the directions of “right,” “left,” and “middle?”

**Students should indicate that the description of left, right, middle, front and back are relative to their location or point of view. As their point of view around the table changed, the beakers in the positions of right, left, middle, etc. also changed. However, the x and y axis were labelled, and these axes remained the same when rotating around the table. Therefore, the x and y coordinates for each beaker were the same regardless of where a person sat at the table.**

6. Does science involve studying an event from different perspectives? Give an example.

**Student answers may vary. However, students should be able to support their answers. A sample answer is given below.**

**Three people observe an experiment in which a block of wood is slid along a table. Even though they all observed the block sliding across the table, one person may obtain information about the heat that was produced as the block slide across the table. Another person may have was focused on the force of friction. The other person may have focused on the velocity of the block. The same event was studied, but each scientist focused on a different perspective or aspect of the motion of the block.**