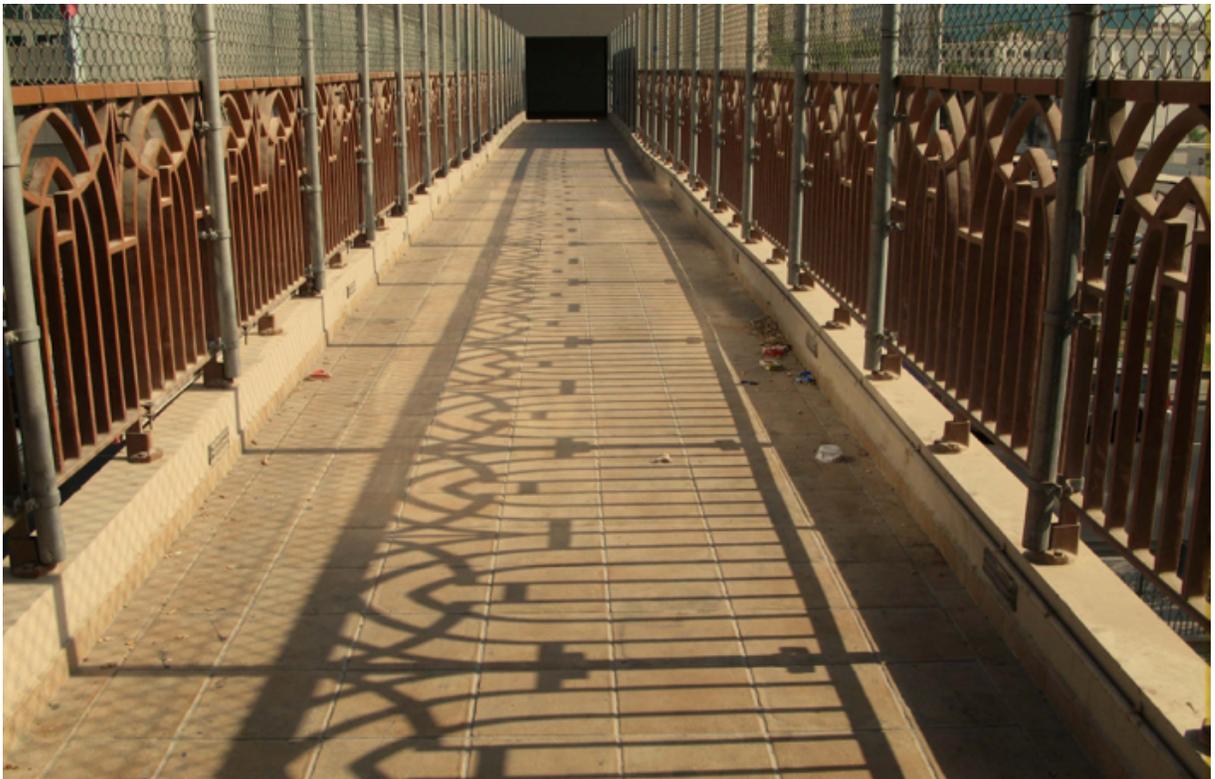


# Discovering Perspective

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## Investigation 1

### Student Data Record



# Discovering Perspective

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## Investigation 1

### Scientist's Glossary

1. **Depth:** How deep something is or appears to be. Depth may be the measurement from the top of an object to its bottom, from its front to back, or from its outside to its inside.
2. **Depth perception:** The ability to see in three dimensions.
3. **Field of view:** The entire area that is able to be seen at any one time.
4. **Point of view:** The direction from which an object or scene is observed.
5. **Perspective:** The way in which objects appear in a person's view. In art, perspective is thought of as a way to show on paper how an image appears to the human eye.
6. **Vanishing point:** A point in a drawing, painting or in space at which parallel lines seem to meet. A point in space at which objects seem to disappear.



# Discovering Perspective

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## Investigation 1

### Scientist Data Record

**Name:**

1. Read the information below.

As you can imagine, art has changed in many ways throughout history. One of the most interesting is a period of time between the 14<sup>th</sup> and 16<sup>th</sup> centuries called the Renaissance.

You'll probably recognize the names of some of the artists that lived during the Renaissance; names such as Leonardo da Vinci and Michelangelo. One of the names that you might not recognize is **Filippo Brunelleschi**. However, it is his work that many people say changed the way in which artists painted and the way in which we view their work.

What is it about Brunelleschi's work that makes it so important? Well, think about this. Most people see the world in three dimensions. Yet, drawings and paintings are done in two dimensions. For a long time before the Renaissance, paintings were "flat." They appeared as a two dimensional image.

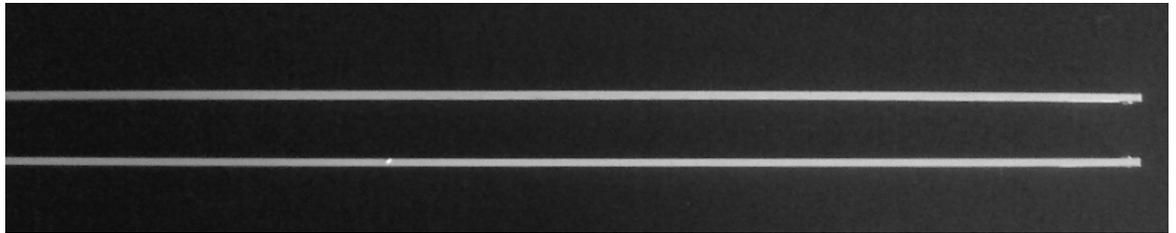
However, Brunelleschi and other artists of the Renaissance are credited with changing that. They painted so that paintings appeared to have three dimensions. Many people believe Brunelleschi was the first to create a way to show depth in paintings and drawings.

Seeing "depth" in a painting is one of the reasons that we may think of the painting as more "real." As you perform your experiments in the lab, think about how objects appear and how you might draw them so that they look "real." Brunelleschi did this when he observed the world. To think like him, think about how objects appear when they are close and when they are far. This is part of understanding how we see depth.

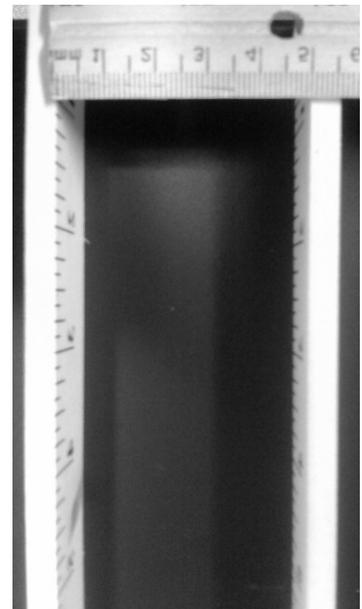


## 2. Trial 1: How does your point of view affect how objects appear?

- a. In this trial you will compare how two lines appear from different points of view.
- b. Create a set of parallel lines. Use the picture and steps below to help you.
  - Place two meter sticks at one end of the lab table. The meter sticks should extend from the **edge** of the table to the center of the table.



- Move the meter sticks so that they are 5 cm apart at the 0 cm end and the 100 cm ends. You have now created two parallel lines.



c. Stand at the 50 cm mark of both meter sticks. Look down on the meter sticks. Observe both ends.

- Does the distance between the meter sticks appear the same at both ends?

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- Use the metric ruler. Measure the distance between the meter sticks at the 0 cm ends and the 100 cm ends. Record the distances below.

Observed distance at 0 cm end \_\_\_\_\_

Observed distance at 100 cm end \_\_\_\_\_

- Were the measurements the same at both ends of the meter sticks?

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d. Change your point of view and view the lines from a different direction. Use the picture to help you.

- Sit at the 0 cm ends of the meter sticks.
- Place a metric ruler at the edge of the table.
- Place your nose at the other end of the metric ruler. You should now be sitting 30 cm from the 0 cm ends of the meter sticks.
- Look at the meter sticks from one end to the other end.
- Does the distance between the meter sticks appear the same at both ends?




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- Measure the distance between the meter sticks at the 0 cm end using a metric ruler. You will need to close one eye to do this. Remember to measure the distance between the two “inside” parts of the meter sticks. Record the distance below.

Observed distance at 0 cm end \_\_\_\_\_

- Stay where you are. Measure the distance between the meter sticks at the 100 cm ends using the same procedure described above. Record the distance below.

Observed distance at 100 cm end \_\_\_\_\_

- Were the measurements the same at both ends of the meter sticks?

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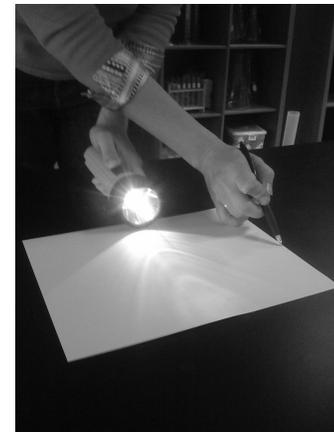
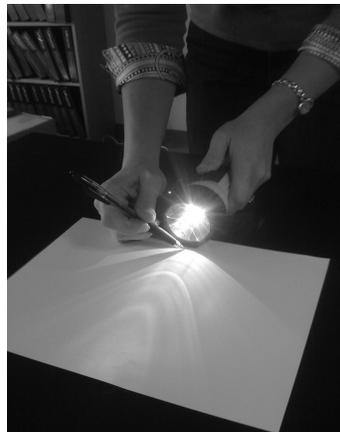
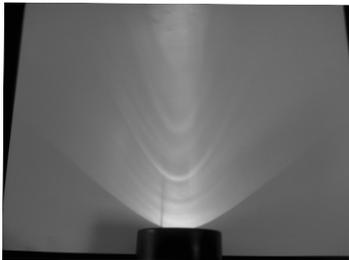


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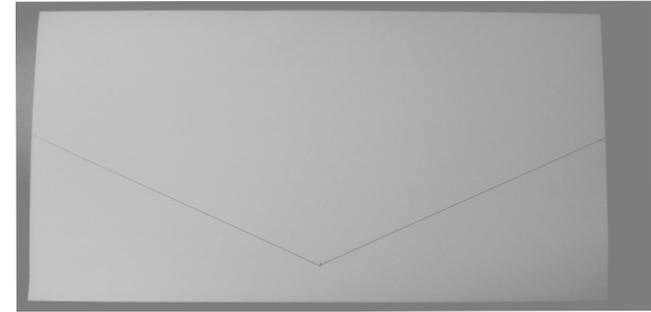


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3. Trial 2: How does the distance from an object change its appearance? Does the field of view change?
- In this trial you will create a model of a field of view and an object in the field of view. You will compare the width of the field of view to the width of the object.
  - Read the directions below. Use the blank page with the picture of the eye to set up your experiment.
  - Create the model of the field of view.**
    - The flashlight will model your eye and the field of view.
    - Turn on the flashlight and place it on the picture of the eye.
    - Mark the center of the beam of light.
    - Observe how far the light reaches on the left and right sides. Mark these places.

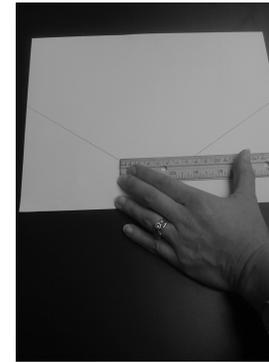
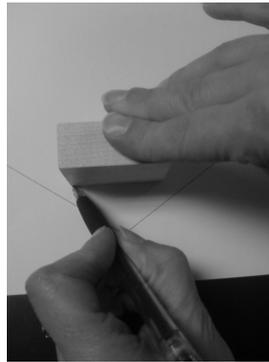
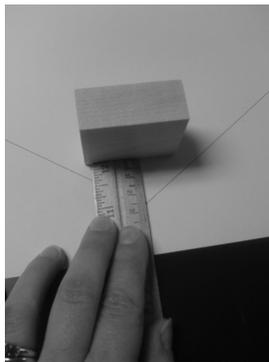


- Show the field of view by drawing a line from the point that showed the center of the beam of light to the marks on the left and right sides of the paper.



**d. Distance 1: wood block 2.5 cm from the eye.**

- Place the wood block 2.5 cm from the picture of the eye.
- Trace the width of the wood block on the paper.
- Using the metric ruler, measure the width of the wood block and the width of the light. Record the measurements on the next page.



**e. Distance 2: wood block 5 cm from the eye.**

- Move the wood block so that it is 5 cm from the picture of the eye.
- Repeat the procedure. Make your marks on the diagram on the next page.





4. Trial 3: How does the wood block appear at different distances from the eye?

- a. In this trial you will compare how you see the wood block at different distances from your eye.
- b. Move all papers and the meter sticks off the lab table.
- c. Place a wood block 2.5 cm from the edge of one of the narrow ends of the lab table.
- d. Sit at the edge of the lab table, directly in front of the wood block.
- e. Close one eye and use the other eye to look at the wood block and anything else in your field of view.
- f. Describe what you see.



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- g. Move the block 5 cm from the edge of the table.
- h. Close one eye and use the other to look at the wood block and anything else in your field of view. Describe what you see.

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- i. Move the block 50 cm from the edge of the table. Repeat your observations. What do you see?

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4. Complete the following table using data collected from Trial 1.

<b>Trial</b>	<b>Point of view</b>	<b>Width measured at 0 cm end</b>	<b>Width measured at 100 cm end</b>
1	Observe meter sticks from above (50 cm mark)		
1	Observe meter sticks at eye level from 0 cm mark		

5. Using the data in the table, answer the following questions:

- a. Compare the distance between the two meter sticks when looking from the 50 cm mark and the 0 cm mark. Was there a difference in how close the meter sticks appeared?

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- b. Did the meter sticks move between measurements?

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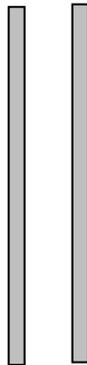
c. Were your eyes in the same or a different location each time?

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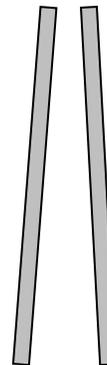
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d. The two pictures below show the meter sticks from Trial 1. One shows the actual position of the meter sticks. One shows how the meter sticks appeared when viewed from the edge of the table. Label each one correctly.



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6. Complete the following table using data collected from Trials 2 and 3.



<b>Position of wood block</b>	<b>Width of wood block</b>	<b>Width of field of view</b>	<b>Appearance of wood block</b>	<b>Ratio (wood block to field of view)</b>
<b>2.5 cm from eye</b>				
<b>5 cm from eye</b>				

7. Compare trials 2 and 3.

a. Did the size of the wood block change?

\_\_\_\_\_

b. Remember the light from the flashlight modeled your field of view. Did the field of view change when the object moved from 2.5 cm to 5 cm in front of the eye?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

c. Compare the size of the wood block to the size of the field of view when it was at different distances from the eye. Show this relationship as a ratio. Write the ratios in the table.

d. Which ratio is larger? Which is smaller?

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e. Did the wood block take up a larger part of the field of view when it was 2.5 cm from the eye or 5 cm from the eye?

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f. Did the wood block take up a smaller part of the field of view when it was 2.5 cm from the eye or 5 cm from the eye?

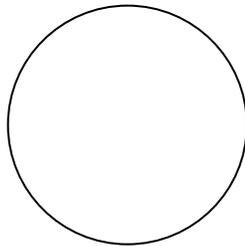
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- g. Look at the pie graphs below. Label each correctly. One has already been labelled for you. Use following labels.

Field of view taken up when wood block is closer to eye (2.5 cm)

Field of view taken up when wood block is farther from eye (5 cm)

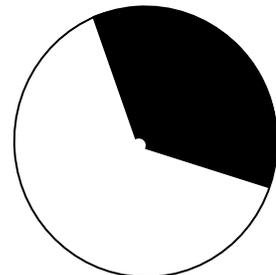
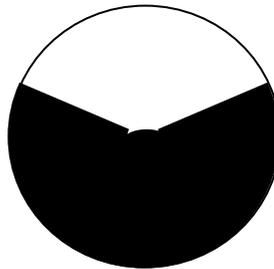


Field of view  
with no object

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8. Look at the data in the tables and in the pie graphs. Can you find any patterns or rules?



Tool: **Rules**

Think about whether there is a relationship between your point of view, the field of view and how objects appear. Use the sentences below to help you.

- As the distance from the eye increased, the object appeared \_\_\_\_\_.
- The closer the object was to the eye the \_\_\_\_\_ the object appeared.
- As the distance from the eye increased, the field of view \_\_\_\_\_.
- Objects closer to the eye take up \_\_\_\_\_ of the field of view than objects farther from the eye.