

# Applied Math Lab for CORD Algebra 1

**Text:** Eye Spy

**Volume:** 2    **Chapter:** 3

**Unit number:** 17    **Title of unit:** Graphing Data

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## Outline:

1. Overview and Standards
2. Lab Instructions
3. Student Handout(s)
4. Rubric and/or Assessment Tool

Students will view a large measuring tape (or poster and ruler) from various distances through a tube put up to their eye. The height of the viewing area will be recorded as it changes with the distance of the viewer from the wall. The data will then be graphed and the students will be asked to make inferences about the relationship (linear function) between the viewable area and distance.

The lab can be extended to switch to tubes of varying diameters or lengths. Students would compare their effect on viewing height and make inferences about how this could be represented as a linear or non-linear function.

## Eye Spy

### LAB PLAN

#### **TEACHER:**

##### ⤴ **Lab Objective**

Students will work collaboratively, but report individually, to successfully record and graph “field of view” height measurements that vary by distance from the target.

##### ⤴ **Statement of prerequisite skills needed**

Students must be familiar with measuring, recording data into a table, and graphing on a coordinate system.

##### ⤴ **Vocabulary**

Table, coordinate system, slope, y-intercept, slope-intercept form, ordered pairs, line of best fit, linear equation.

##### ⤴ **State Standards addressed:**

###### ⤴ **Algebra**

A.1.2B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables

A.1.4.C Identify and interpret the slope and intercepts of a linear function

A1.8.A Analyze a problem situation and represent it mathematically

A1.8.B Select and apply strategies to solve problems

▲ **Communication**

Applies skills and strategies to contribute responsibly in group settings.

▲ **Leadership:**

Students work together to collect data for their tubes. Each student in the group uses a different distance from the target.

▲ **SCAN Skills/Workplace Skills:**

▲ **Writing:**

▲ Records information completely and accurately

▲ **Arithmetic**

Performs basic computations

D. And uses tables, graphs, diagrams and charts to obtain or convey quantities of information

▲ **Teacher Preparation:**

▲ **Materials and set-up:**

Each group needs:

▲ Large Measuring Tape (or alternately a poster and ruler) placed vertically on the wall from the floor upward.

▲ Cardboard or plastic tubes with a fixed length and diameter to correspond to the investigation assigned to each group

▲ Masking tape to mark standing positions on the floor in front of the measuring tape

▲ Grid paper for each group

▲ Calculator

▲

▲ **Lab Organizational Strategies:**

1. Students will work in groups at designated "viewing stations."
2. Each viewing station has a measuring tape to use and standing positions marked on the floor in front of the wall.
3. Each student standing at indicated distances from the wall will use a tube to view the measuring tape. They then describe to other group members what portion of the tape is visible.
4. Other group members will measure the height of the described viewable portion to the nearest inch.
5. Data is recorded as collected for each member of the group.
6. Graphs of best-fit lines are drawn and interpretations made.

Investigating the relationship between the dimensions of the tubes, slopes, and intercepts should reveal:

- When tube length and diameter are constant, the viewable height is a linear function of the distance from the wall. The intercept is the diameter of the tube.

## EYE SPY LAB – STUDENT DIRECTIONS & DATA TABLE

- **Collect the Data:** Each member of the group will view the poster with the given tubes at varying distances from the wall. Others will mark the top and bottom of the described portion to determine the measurement in inches of the viewing height. Calculate the average visible height for each of the distances.
- **Graph the Data:** Choose appropriate labels and scales for the horizontal and vertical axes. Plot the data as ordered pairs, (x, y).
- **Read the Results:** Looking at your points, do they seem to lie along a line or a curve? Draw the line that best fits your data.
- Describe in words how to determine the height of the visible portion if you know the distance from the wall.
- Describe by equation how to determine the height of the visible portion (y) if you know the distance from the wall (x).  
 $y =$
- Predict the height of the visible portion, if you were standing 10 feet from the wall.
- Predict the distance from the wall you would have to stand in order to see a 25-inch portion of the poster.

### Viewing Height: Same Tube Length & Tube Diameter Varying Distances from Wall

Student name	Distance from Poster							
	1 foot	2 feet	3 feet	4 feet	5 feet	6 feet	7 feet	8 feet
<b>Total</b>								

- ⤴ **Expectations:**
  - ⤴ **Time-line:**
    - Two 45 minutes sessions
    - Second session includes at least 15 minutes for discussion of graphs and linear functions from the groups
  
- ⤴ **Post Lab Follow-Up/Conclusions**
  - ⤴ Discuss real world application of learning from lab:
  - ⤴ Career Applications:
  
- ⤴ **Optional or Extension Activities:**
  - ⤴ Change the diameters and length of the tubes. Graph to learn if these are linear functions or not with respect to the viewable height.

## SCORING RUBRIC

Item	Points
Measure height of viewable areas at all distances on table provided	5
Graph Data	5
Label axes on graph	1
Title graph	1
Label points used to calculate slope	3
Generate “ $y=mx + b$ ” equation <ul style="list-style-type: none"> <li>- copy the slope-intercept equation</li> <li>- calculate the slope (do the algebra)</li> <li>- estimate or calculate Y-intercept</li> <li>- label equation on the graph</li> </ul>	1 2 2
Summary Compare the slopes to the other slopes in your group and write about the relationship between the slopes and the distance from the tape or poster. Write this on a separate paper and staple it along with this sheet, the table and the graph	1 to 10
TOTAL POSSIBLE	20
POINTS	