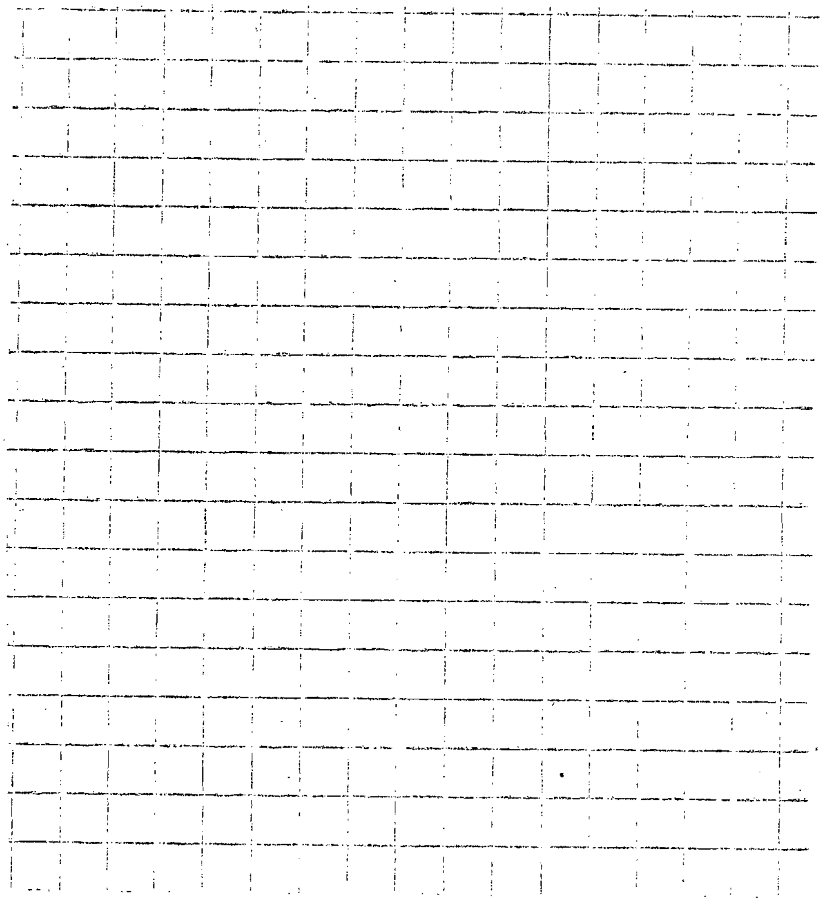
Problem 1.1

Part A

Bridge Thickness	Number of coins
1	
2	
3	
4	
5	

Part B



Part C

s the relationship between bridge thickness and breaking weight linear or non-linear?

n the table you can see this because ______________________________

n the graph you can tell because __________________________________

Part D

he breaking weight for a 2.5 layer thick bridge would be about _________. I
redicted this since ____

Part E

1. The breaking weight for a 6 layer thick bridge would be about ________. I predicted this since ____

2. After testing your prediction, why might your prediction not match the test results?____
____

Problem 1.2

Part A

Bridge Length	Number of coins
4	
6	
8	
9	
11	

Part B

Part C

s the relationship between bridge thickness and breaking weight linear or non-linear?

n the table you can see this because ___________________________

n the graph you can tell because ______________________________

Part D

Bridge Length	Number of coins
3	
5	
10	
12	

Part E

The bridge thickness and length experiments are the same because

-

The bridge thickness and length experiments are different because

-
-
-
-

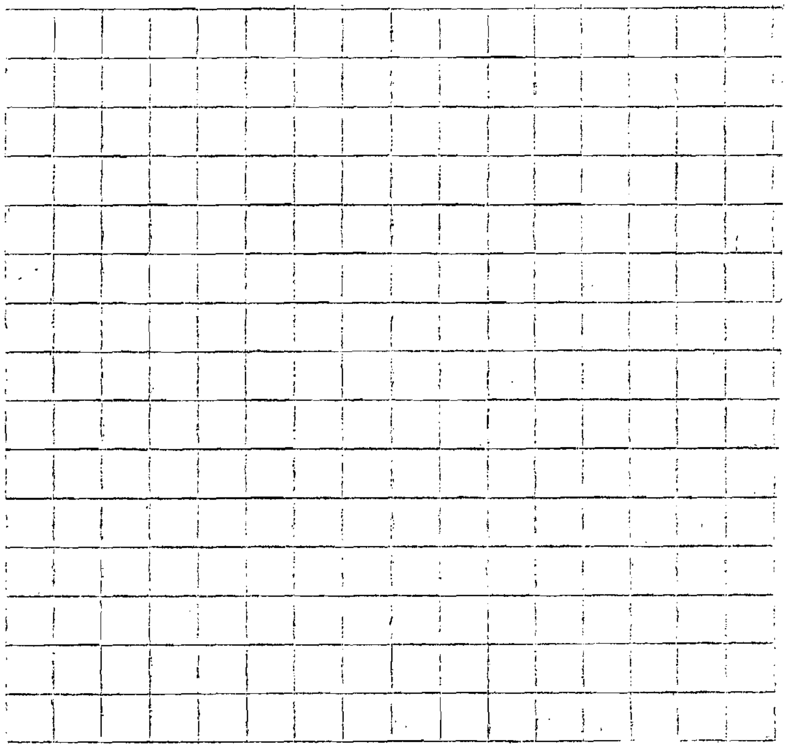
Problem 1.3

Part A

1.

Beam Length	1	2	3	4	5	6	7	8
Number of rods	3	7					27	

2.



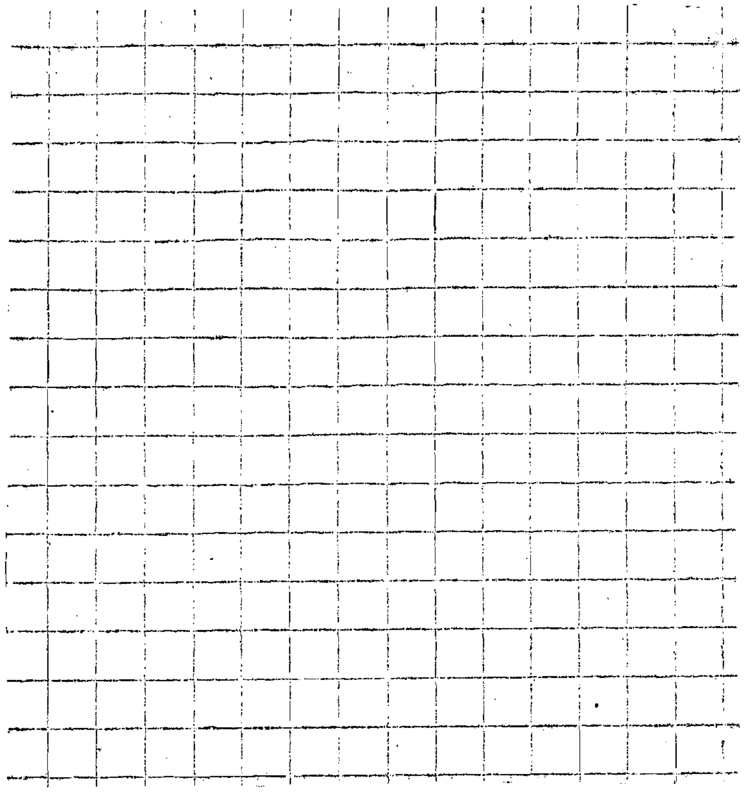
3. As the beam length increases, the number of rods changes by ________________
4. You can see this pattern in the table by ______________________________
   You can see this pattern in the graph because ______________________________
5. A beam of length 50 feet would have ________ steel rods.

Part B

1.

Number of Steps	1	2	3	4	5	6	7	8
Number of Rods	4	10	18					

2.



3. As the number of steps increase, the number of rods change by ________________
____

4. You can see this pattern in the table by ______________________________
You can see this pattern in the graph because _________________________

5. A staircase with 12 steps would have ________ steel rods.

Part C

The pattern in A is similar to the pattern in B

-
-

The pattern in A is different from the pattern in B

-
-

Part D

The beam and bridge-thickness relationships are both ______________________

The bridge-length and staircase relationships are both _______________________

Problem 2.1

Standard form of a line y=mx +b

x is dependent variable
y is independent variable
M is slope/pattern in table/constant rate of change
B is the y intercept/starting point

Part A

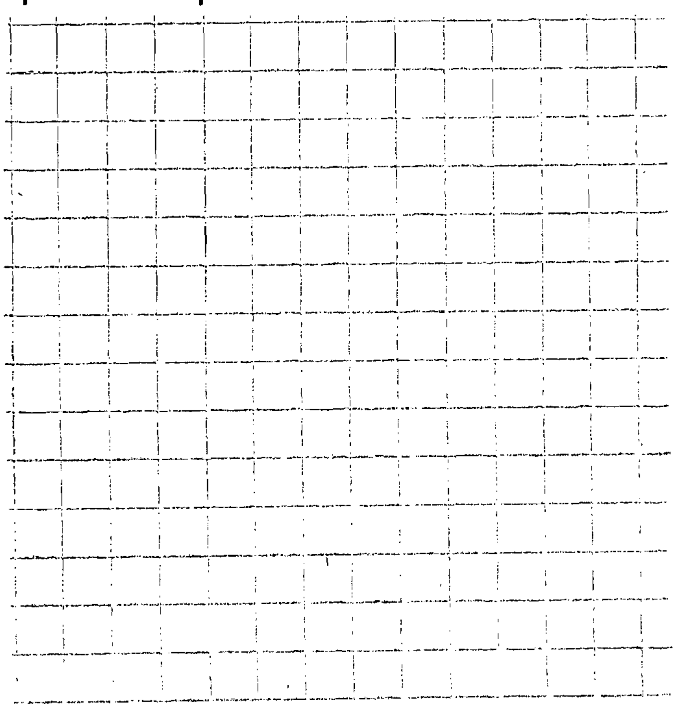
1. Write an equation for the line on page 25. ____________________
2. Use the line on page 25 or the equation above to estimate the painting costs for a bridge that is
   - 175 feet long
   - 280 feet long
3. Use the line on page 25 or the equation above to estimate the lengths for a bridge that costs
   - $10,000
   - $60,000

Part B

1. First State Bridge-Painting Costs

Bridge Number	Length	Cost
3	150	$50,000
4	300	$80,000
5	500	$140,000

On the graph below plot these points. Draw a line that models the pattern in the data points.



2.Write an equation for this line. ______________________________

3. Use your line or equation to estimate the painting cost for a bridge that is 200 feet.

____

4. Use your line or equation to estimate the length of a bridge that cost $100,000 to paint. ______________________________

Problem 2.2

Standard form of a line y=mx +b

x is dependent variable
y is independent variable
M is slope/pattern in table/constant rate of change
B is the y intercept/starting point

Part A

Squeaky Clean Car Wash Charges

Time	5	10	15	20	25
Charge	$8	$13	$18	$23	$28

1. How do you know that this is a linear relationship? ______________________________

____

2. The slope is ______________________
   The y-intercept is ________________________
3. The equation for this line is __________________________

Part B

Looking at the graph on page 28, write an equation for the charge plan at Euclid's.

____

y represents ___________

______ represents _________

x represents ________________

______ represents _________________

Part C

Look at the receipts on page 29. Let charge c be your y and time t be your x. The relationship between (x,y) is linear.

1. Each receipt represents a point (x,y) on the line. Find the coordinates of the two points. (______,_______)
2. What is the slope of this line _____________. What is the y-intercept of this line________________.
3. Write an equation for this line. ______________________________

Part D

Write an equation for the line with slope -3 that passes through the point (4,3).

____

Part E

Write an equation for the line with points (4,5) and (6,9). ____________________

____

Part F

Suppose you want to write an equation of the form y=mx+b to represent a linear relationship. What is your strategy if you are given...

1. a description of the relationship in words? ______________________________

   ____

   ____

2. two or more (x,y) values or a table of (x,y) values?

   ____

   ____

   ____

3. a graph showing pints with coordinates? ______________________________

   ____

   ____

Problem 2.3

Standard form of a line y=mx +b

x is dependent variable
y is independent variable
M is slope/pattern in table/constant rate of change
B is the y intercept/starting point

Part A

Use the graph on page 30 to explain how you would use the graph to estimate the answers to the manager's questions.

1. What is the charge for renting a canoe for 30 minutes?____________________

____

2. A customer is charged $8.50. How long did he use the canoe? ____________

____

3. A customer has $10 to spend. How long can she use a canoe? ____________

____

Part B

Explain how you could use a table to answer the manager's questions above.

1.
2.
3.

Part C

Serena wants to find exact answers, not estimates. For the second question she solves the linear equation $0.15x + 2.50 = 8.50$. She reasons:

- If $0.15x + 2.50 = 8.50$, then $0.15x = 6.00$
- If $0.15x=6.00$, then $x =40$
- I check my answer by substituting 40 for x: $0.15(40) + 2.50 = 8.50$

Serena is/is not correct. How do you know?______________________________

____

Part D

For the third question, Rashida says, "She can use the canoe for 50 minutes if she has $10." Serena says there are other possibilities—for example, 45 minutes or 30 minutes. She says you can answer the question by solving the *inequality* $0.15x + 2.50 \leq 10$. This inequality represents the times for which the rental charge is *at most* $10.

____

1. Use a table, graph and the equation $0.15x + 2.50 = 10$ to find all of the times for which the inequality is true.____
2. Express the solution as an inequality. ______________________________

Part E

River Fun Paddle Boats competes with Sandy's. The equation $y=4 +0.10x$ gives the charge in dollars y for renting a paddle boat for x minutes.

1. A customer a River Fun is charged $9. How long did the customer use a paddle boat? ____
2. Suppose you want to spend $12 at most. How long could you use a paddle boat? ____
3. What is the charge to rent a paddle boat for 20 minutes? ____________________

Problem 2.4

Standard form of a line y=mx +b

x is dependent variable
y is independent variable
M is slope/pattern in table/constant rate of change
B is the y intercept/starting point

Saturday Resort Attendance

Probability of rain	0	20	40	60	80	100
Big Fun Attendance	1,000	850	700	550	400	250
Get Reel Attendance	300	340	380	420	460	500

Part A

Use the table above to find a linear equation relating the probability of rain y to:

1. Saturday attendance at Big Fun____________________________________
2. Saturday attendance at Get Reel ____________________________________

Part B

Use your equations from Part A to answer these questions. **Show all your work.**

1. Suppose there is a 50% probability of rain this Saturday. What is the expected attendance at each attraction?

2. Suppose 460 people visited Big Fun one Saturday. Estimate the probability of rain on that day.

3. What probability of rain would give a predicted Saturday attendance of at least 360 people at Get Reel?

4. Is there a probability of rain for which the predicted attendance is the same at both attractions? Explain.

Problem 3.1

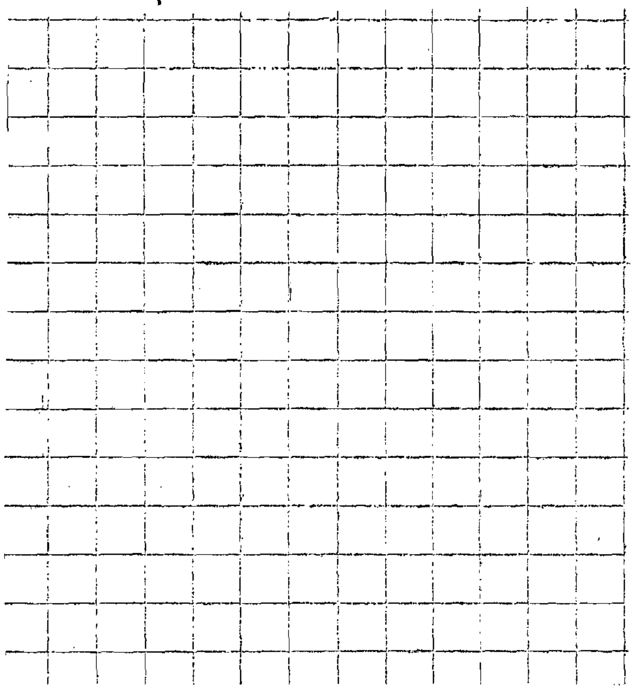
Part A

1. Rectangles with area 24 in^2

Length(in.)	1	2	3	4	5	6	7	8
Width(in.)								

2. Plot your data from the table above on the grid below. Then, draw a line or curve that seems to model the pattern in the data.

Rectangles with area 24 in^2



3. As the length increases the width ______________________________________. This relationship is/is not linear.
4. Write an equation that shows how the width y depends on the length x for rectangles with an area of 24 square inches.

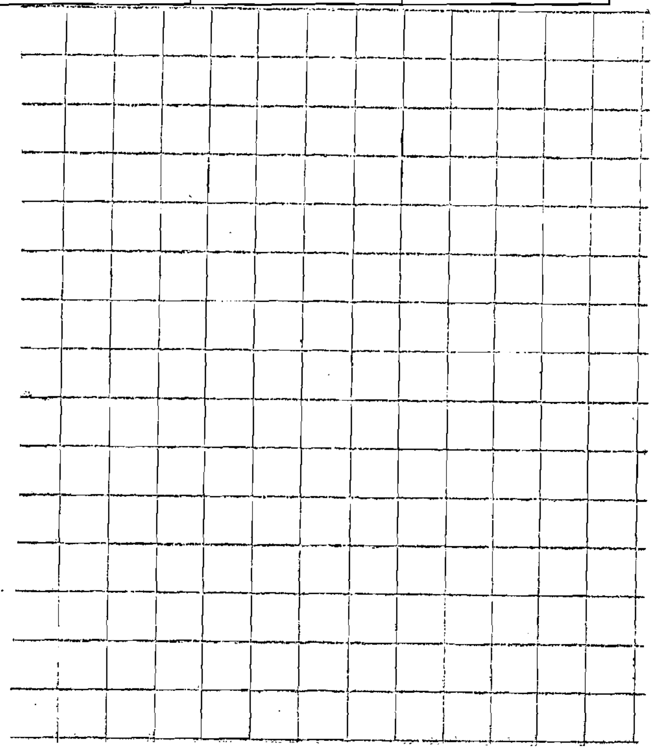
Part B

Now consider rectangles with an area of 32 square inches.

1. Write an equation for the relationship between the length x and the width y.

2. Graph your equation. Show lengths from 1 to 15 inches.

Length(in)	1	2	4	8
Width(in)				



Part C

1. Compare your equations. How are they similar?

How are they different?

Part D

Compare your graphs. How are they similar?

How are they different?

Problem 3.2:

An **inverse variation** is a relationship between two non-zero integers if

$y=\frac{k}{x}$ or xy = k where k is a constant that is not 0

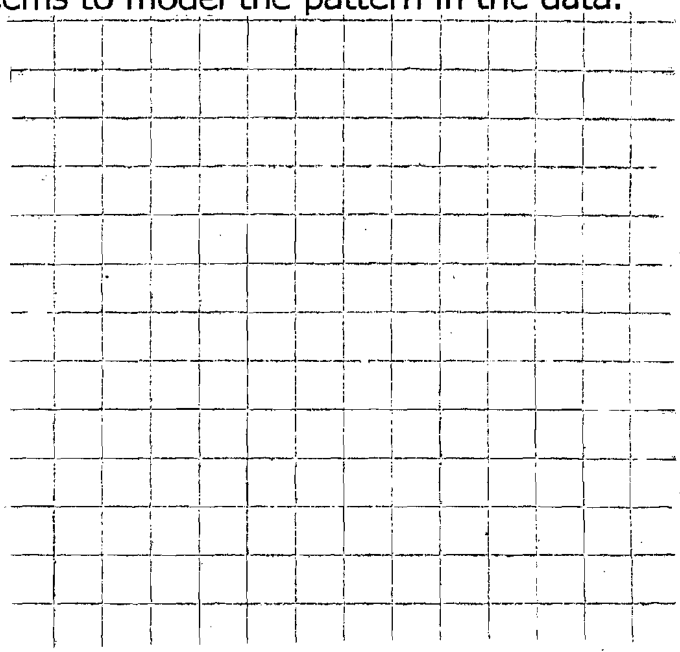
Part A

1. Calculate the average speed in miles per hour for each trip. Record the results in the table below.

Cordova's Baltimore Trips

Travel time (hr)					
Ave. Speed (mph)					

2. Plot your data from the table above on the grid below. Then, draw a line or curve that seems to model the pattern in the data.



As the travel time increases, the average speed ______________________.

3. Write an equation for the relationship between travel time x and average speed y.

4. Use your equation to find the average speed for 500 mile trips that take:

6 hours

8 hours

12 hours

16 hours

5. Add the (travel time, average speed) data from part (4) to your graph. Do the new points fit the graph model you sketched for the original data?

Part B

Travel times for different speeds

Ave speed (mph)	30	40	50	60	70
Travel time (hr)	10	7.5	6	5	4.3

1. How far is it from Detroit to Mackinac Island?

2. What equation relates travel time x to average speed y?

3. As the average speed increases, the travel time ______________________.
   How would that pattern appear in a graph of the data?

   How is it shown by your equation?

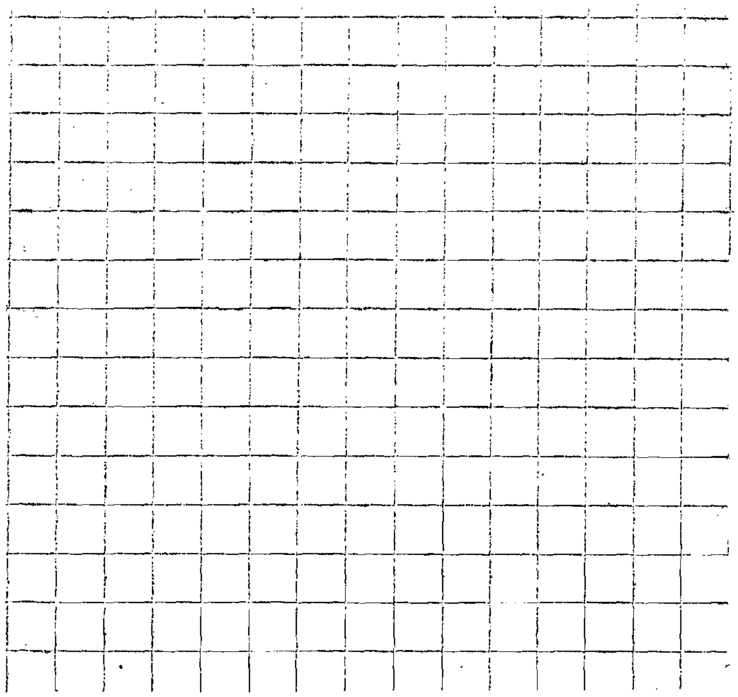
4. Predict the travel times if the Cordovas drive at average speeds of:
   45 mph

   65 mph

Part C Suppose Mr. Cordoa deides to aim for an average speed of 50 mph for the trip to Mackinac Island.

1.

Travel time (hr)	1	2	3	4	5	6
Distance (mi)						



2. Write an equation for the distance *d* the family travels in *t* hours.

3. As time passes, the distance ________________________________.

4. Compare the (time, distance traveled) graph and equation with the (time, average speed) graphs and equations in Part A and B.

Problem 3.3

An **inverse variation** is a relationship between two non-zero integers if

$$y = \frac{k}{x} \text{ or } xy = k \text{ where k is a constant that is not 0}$$

Part A Read the top of page 52.

1. Write an equation relating the cost y per student to the number of students x.

2. Use your equation to make a graph showing how the cost per student changes as the number of students increases.

Part B

1. Find the change in the cost per student as the number of students increases from:

a) 10 to 20 b) 100 to 110 c) 200 to 210

2. How do your results show that the relationship between the number of students and the cost per student is not linear?

Part C

1. Find the change in the per-student cost as the number of students increases from:

a) 20 to 40 b) 40 to 80 c) 80 to 160

2. Describe the patter in your results.

Explain how your equation from Question A shows this pattern.

Part D The science teachers decide to charge $5 per student for the trip. They will use any extra money to buy science equipment for the school.

1. Write an equation for the amount y the teachers will collect if x students fo on the trip.

2. Sketch a graph of the relationship.

3. This is a linear relationship/inverse variation.