

## **Title: Maryland Is for Crabs!**

### **Brief Overview:**

Students will be involved in planning a class crab feast. They will be introduced to correlations utilizing scatter plots. This unit will encompass the skills of line plots, measurement, and glyphs.

### **Links to NCTM 2000 Standards:**

- **Standard 1: Number and Operation**  
Mathematics instructional programs should foster the development of number and operation sense so that all students use computational tools and strategies fluently and estimate appropriately.
- **Standard 4: Measurement**  
Mathematics instructional programs should include attention to measurement so that all students understand attributes, units, and systems of measurement; and apply a variety of techniques, tools, and formulas for determining measurements.
- **Standard 5: Data Analysis, Statistics, and Probability**  
Mathematics instructional programs should include attention to data analysis, statistics, and probability so that all students pose questions and collect, organize, and represent data to answer those questions; interpret data using methods of exploratory data analysis; and develop and evaluate inferences, predictions, and arguments that are based on data.
- **Standard 6: Problem Solving**  
Mathematics instructional programs should focus on solving problems as part of understanding mathematics so that all students build new mathematical knowledge through their work with problems; and apply a wide variety of strategies to solve problems and adapt the strategies to new situations.
- **Standard 7: Reasoning and Proof**  
Mathematics instructional programs should focus on learning to reason and construct proofs as part of understanding mathematics so that all students select and use various types of reasoning and methods of proof as appropriate.
- **Standard 8: Communication**  
Mathematics instructional programs should use communication to foster an understanding of mathematics so that all students organize and consolidate their mathematical thinking to communicate with others; express mathematical ideas coherently and clearly to peers, teachers, and others; and use the language of mathematics as a precise means of mathematical expression.
- **Standard 9: Connections**  
Mathematics instructional programs should emphasize connections to foster an understanding of mathematics so that all students demonstrate that they can recognize and use connections among different mathematical ideas; understand how mathematical ideas build on one another to produce a coherent whole; and recognize, use, and learn about mathematics in contexts outside of mathematics.

- **Standard 10: Representation**

Mathematics instructional programs should emphasize mathematical representations to foster an understanding of mathematics so that all students create and use representations to organize, record, and communicate mathematical ideas;

**Grade/Level:**

Grades 4 and 5

**Duration/Length:**

This unit takes approximately 5 class periods (60 minutes each) to complete.

**Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

- Learning how to conduct a survey
- Constructing line plots, glyphs, and line graphs
- Measuring to the nearest centimeter
- Finding the median

**Student Outcomes:**

Students will:

- collect, organize, interpret, analyze, and display data using glyphs, line plots, line graphs, and scatter plots.
- work cooperatively in small groups and pairs.
- apply data analysis to a real life situation.
- use a ruler to measure to the nearest centimeter.
- find the median and use it to estimate the number of crabs needed.
- write to inform.

**Materials/Resources/Printed Materials:**

- Grow-a-Creature (preferably a crab- can be found at local dollar stores or can be ordered at Educational Supplies, Inc. at 1-800-797-8775)
- Rulers
- Centimeter graph paper
- Tape measure
- Teacher Resource Sheets 1-6
- Student Resource Sheets 1-6

**Development/Procedures:**

**Day 1:**

- Lead a brief discussion on crabs and crabbing.
- Display vignette transparency (Teacher Resource Sheet #1) and read it over with the class.
- Introduce and name crab mascot (grow-a-crab). A “grow-a-crab” is made of a soft spongy material that, when soaked in water, grows slowly over time.

- Distribute centimeter grid paper. Develop a line graph to chart the growth of the grow-a-crab and take the first measurement. Students will measure the width of the crab to the nearest centimeter. This will continue for the week. Be sure to measure the crab at the same time each day.
- Distribute crab glyph instructions and patterns (Student Resource Sheets #1A, 1B, and 1C). You may choose to assign this for homework. Collect glyph for day five activity.

### **Day 2:**

- Measure mascot to the nearest centimeter and record on line graph.
- Survey class as to the number of crabs they can eat in one sitting. Display this data on the overhead on a class list.
- Distribute Student Resource Sheet #2. Have students construct a line plot with the given information and respond to the analysis questions.
- Discuss results and responses to questions. Collect papers for evaluation.

### **Day 3:**

- Measure mascot and record measurements on the line graph.
- While students are measuring the mascot, select 10 students of different heights and measure their heights. Record their heights and shoe sizes on chart paper.
- Introduce and define **scatter plot**. Compare and contrast a scatter plot to a line graph. **Emphasize** that a line graph shows one set of data, while a scatter plot shows two sets of data.
- Model construction of the scatter plot using the Teacher Resource Sheet #2 transparency. Use data on student heights and shoe sizes taken at the beginning of class.
- Introduce **correlation** and its definition. Display the Teacher Resource Sheet #3 transparency to identify correlations between sets of data.
- Refer back to Teacher Resource Sheet #2 and discuss whether a correlation exists between the heights and shoe sizes. Have students brainstorm ideas as to why there may or may not be a correlation between the data sets.

### **Day 4:**

- Measure mascot and record data on line graph.
- Review terms (scatter plot and correlation).
- Display class list transparency from Day 2 with the 10 students from Day 3 highlighted.
- Distribute Student Resource Sheet #3 to groups of four students. Have groups work cooperatively to construct a scatter plot for the heights of the students and the number of crabs they can eat.
- Circulate. Have students stop when they have finished the scatter plot. Discuss the scatter plot using Teacher Resource Sheet #4.
- Have groups work together to answer questions regarding the correlation.
- Discuss responses with the whole class when complete.

### **Day 5:**

- Measure mascot and record data on line graph.
- Display vignette on overhead (Teacher Resource Sheet #1) and reread with class. Distribute completed glyphs.
- Distribute Student Resource Sheets #4, 5, and 6. Students will work in pairs to complete the scatter plot. Paragraphs should be written independently.

**Performance Assessment:**

Students will be assessed through teacher observation, Student Resource Sheets #2, 4, 5, and 6. Rubrics are provided for Student Resource Sheet #6 (Teacher Resource Sheet #5) and Student Resource Sheets #4 and 5 (Teacher Resource Sheet #6).

**Extension/Follow Up:**

- Read novel Trouble At Marsh Harbor and do simulation of how scientists gather information on crabs and their population.
- Students could collect actual prices of all of the materials needed for the class crab feast. They would provide a comprehensive plan of how much an actual class crab feast would cost.
- For culminating activity, have the party that the students have planned.

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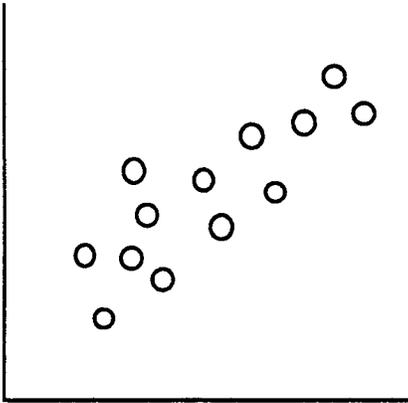
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# *Vignette*

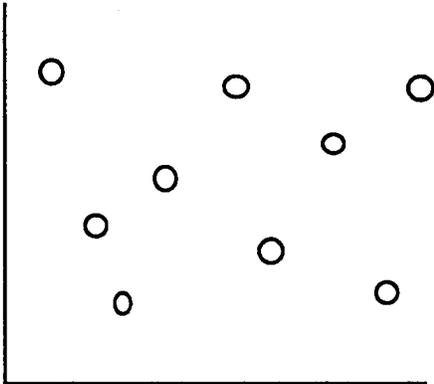
Autumn in Maryland brings about the end of crab season. To celebrate the beginning of the school year and the end of the crab season, our class has decided to hold a crab feast. For the next five days, we will be collecting, organizing, and analyzing data. At the end of the five days, you will write a plan describing the perfect crab feast!



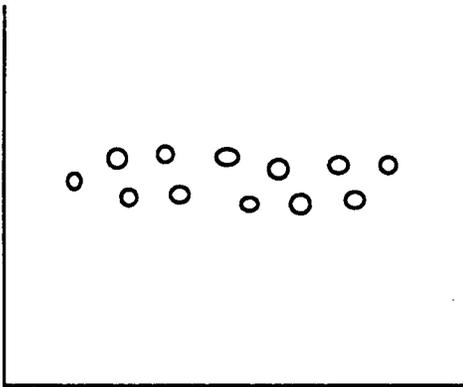
# Correlation or Not a Correlation?



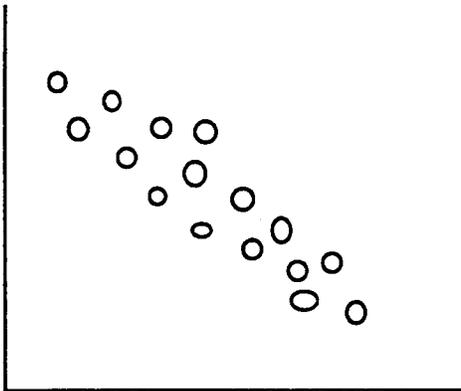
(correlation)



(not a correlation)



(not a correlation)



(correlation)



# Writing Scoring Rubric

(for Student Resource #6)

## 3 Points:

- Writing is clear and understandable.
- Paragraph reflects all findings from glyph, line plot, and scatter plot.
- Writing connects the results of the scatter plot to the decision of where to buy crabs.
- Few grammar, punctuation, and spelling errors.

## 2 Points:

- Writing is somewhat clear and understandable.
- Paragraph reflects most findings from glyph, line plot, and scatter plot.
- Writing connects the results of the scatter plot to the decision of where to buy crabs.
- Some grammar, punctuation, and spelling errors.

## 1 Point:

- Writing is not clear and understandable.
- Paragraph reflects some findings from glyph, line plot, and scatter plot.
- Writing does not connect the results of the scatter plot to the decision of where to buy crabs.
- Many grammar, punctuation, and spelling errors.

## 0 Points:

- Paragraph reflects no findings from glyph, line plot, and scatter plot.

# Scatter Plot Scoring Rubric

(for Student Resources #4 and #5)

## 3 Points:

- Title provided.
- Axes labeled correctly.
- Points plotted correctly.
- Correct use of scale.
- Can prove or disprove evidence of correlation.

## 2 Points:

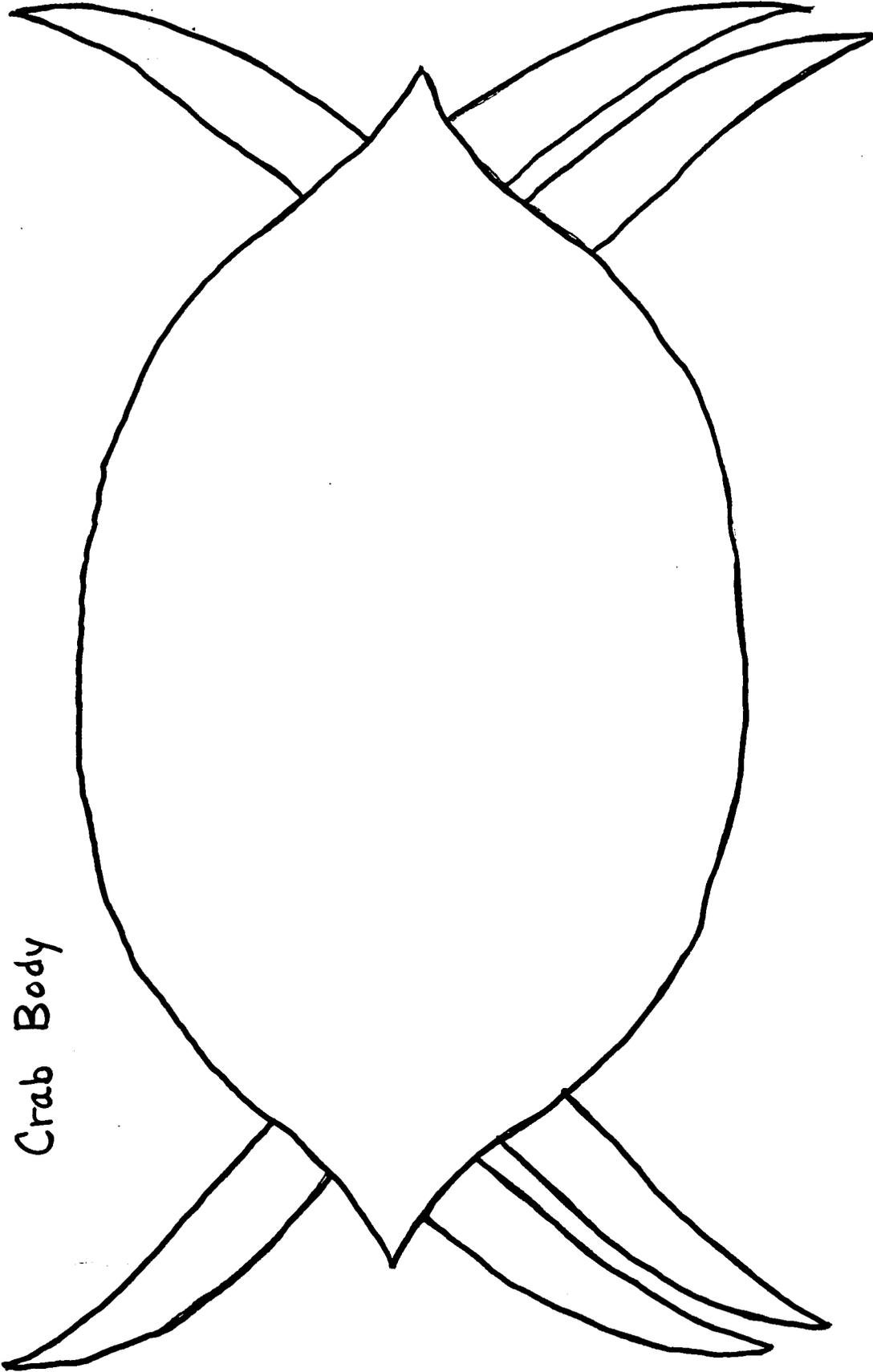
- Title provided.
- Axes labeled correctly.
- Points plotted correctly.
- Scatter plot is somewhat to scale.
- Has a statement regarding correlation.

## 1 Point:

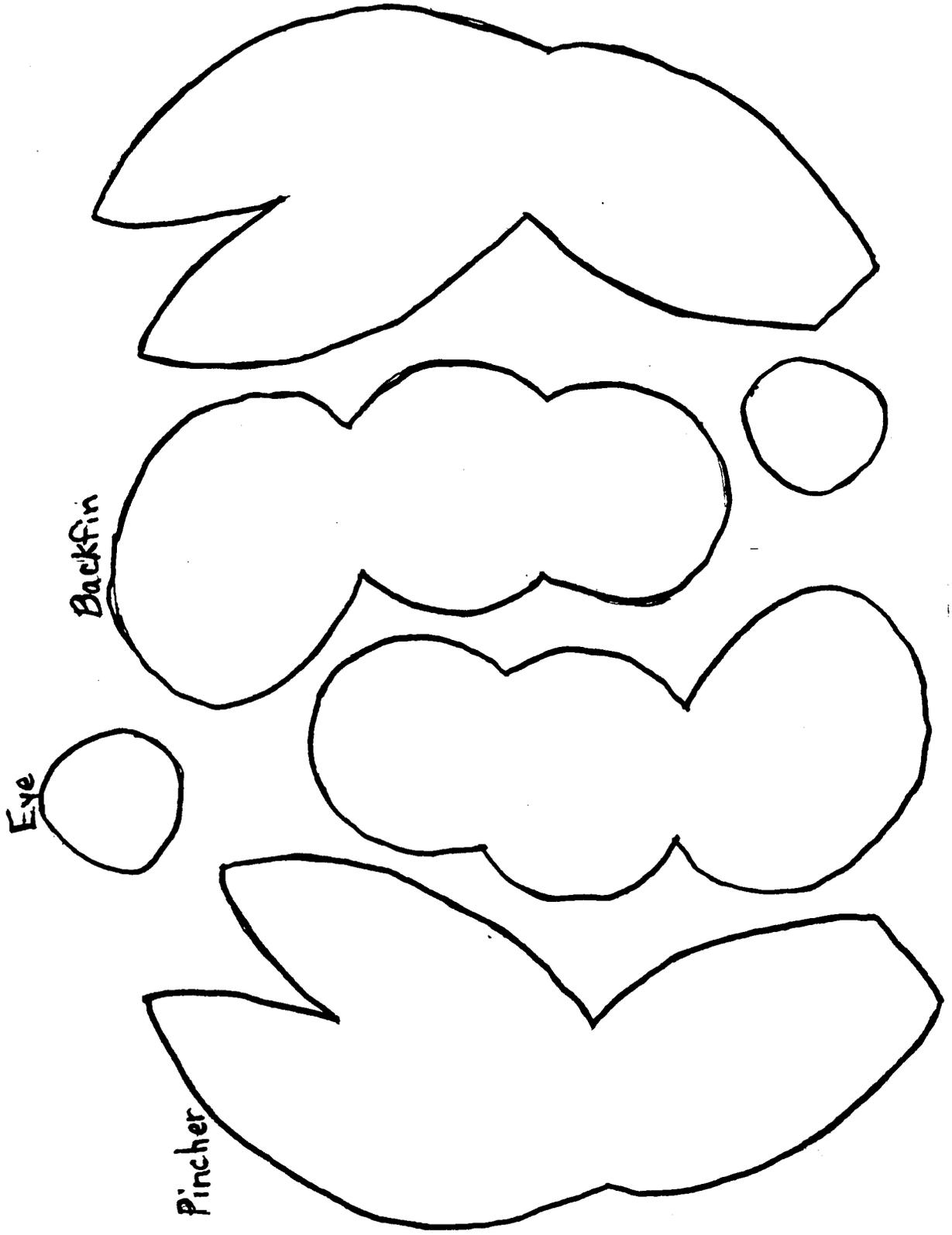
- Title provided.
- Axes labeled somewhat correctly.
- Points plotted somewhat correctly.

## 0 Points:

- Scatter plot does not represent data given.



Crab Body



## Directions For Crab Glyph

A glyph is a picture that shows many kinds of data on one graphical display. Today you will create a crab glyph to show your crab feast plans. Using colors, you will show what snacks, desserts, and drinks you plan to serve. You also will show where you plan to hold the party.

Use this key and your crab pattern to complete your glyph. Color each part of the crab according to your choice in each category.

**Crab Body:** This will represent snacks (You may only choose one kind.).

- Pretzels - Blue
- Potato Chips - Red
- Nacho Chips - Yellow

**Pinchers:** This will represent desserts (Choose one.).

- Cake - Blue
- Cookies - Red
- Candy - Yellow

**Backfins:** This will represent drinks (Choose one.).

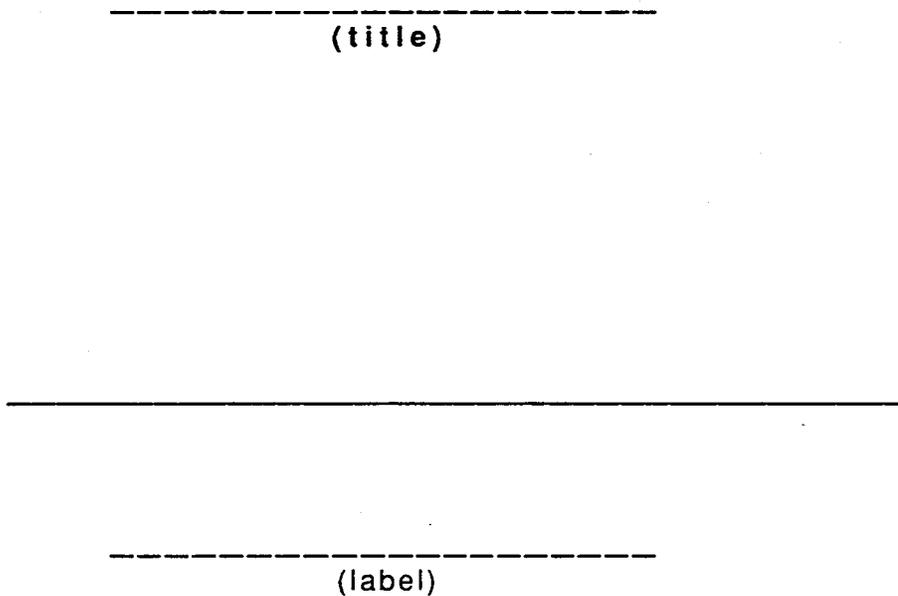
- Soda - Blue
- Juice - Red
- Lemonade - Yellow

**Eyes:** This will represent the location of your crab feast.

- Outside - Blue
- Classroom - Red
- Cafeteria - Yellow

Name \_\_\_\_\_

**Complete the line plot below with the data collected on the overhead.**



**Respond to the following questions.**

1.) What is the range of the number of crabs your peers can eat in a sitting?

\_\_\_\_\_

2.) What is the median of the number of crabs your peers can eat?

\_\_\_\_\_ (Label this on your line plot.)

3.) How can you use this information to help plan your crab feast?



**Student Resource #3 B**

**Using the scatter plot you just made, respond to the following questions.**

1.) Describe the shape and pattern of your data on your scatter plot.

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2.) After analyzing data, do you believe there is a correlation between height and the amount of crabs a person can eat? Support your answer.

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3.) Can you think of any other correlations you might like to investigate? Name one and describe how you would conduct this investigation.

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## Maryland Is For Crabs!



<u>CITY</u>	<u>DISTANCE FROM BAY</u>	<u>PRICE</u>
Westminster	38 miles	\$35.00
Middle River	4 miles	\$22.00
Ellicott City	18 miles	\$30.00
Annapolis	1 mile	\$28.00
Glen Burnie	7 miles	\$30.00
Easton	6 miles	\$22.00
Dundalk	6 miles	\$24.00



## MARYLAND IS FOR CRABS!

It is finally time to plan our crab feast. We have collected several pieces of data this week and have displayed it in several ways. Using your crab glyph, line plot, and final scatter plot, write a paragraph describing your plans for our crab feast. Be sure to include the location of the party, the snack, the dessert, and the drink that you will serve. Also, you will need to determine the number of crabs for the party and where you plan to buy them. Remember to explain how you made both of these decisions.

When you have completed your paragraph, self-evaluate your work using the rubric on the overhead.