

Grade Band: 3-5

Lesson Length: Approximately 2 days

NCTM Standard and Expectation

Algebra Standard

1. Understand patterns, relations, and functions
2. Use mathematical models to represent and understand quantitative relationships

Learning Objectives

1. The student will analyze and represent weekly sales figures using tables, bar graphs, and pie charts.
2. The student will draw conclusions using bar graphs and pie charts.

Connection to Bloom's Taxonomy

- ✓ Comprehension
- ✓ Application
- ✓ Analysis
- ✓ Synthesis

RG's Literary Connection



Lemonade for Sale by Stuart J. Murphy is a delightful book about four young children and their parrot Petey who operate a lemonade stand. The kids decide to run a lemonade stand in order to raise money for their clubhouse that is in need of some repairs. They construct a simple bar graph to show the sales from their neighborhood lemonade stand. This book is well illustrated with a touch of amusement that is sure to catch the eyes of the reader.

Word Origin by Hannie



Graph, the shortened version of the word *graphic*, is implied in the word *graphical* from the Latin word *graphicus* which means “picturesque”. Picturesque is from the Greek word *graphikos* meaning “for writing or belonging to drawing”, which is from the word *graphe* meaning “writing or drawing”.

In math a graph is used to illustrate different information and numbers so that it is easier to understand. For example, rainfall is graphically shown by using a bar graph. Ask students to think of other everyday uses for graphs.

Vocabulary Words



1. Table – data that is displayed in a format using labeled columns and rows
2. Bar Graph – a chart that visually presents data as categories that vary in height.
3. Pie chart – a graph that displays data in a circular format. Each section of the pie chart represents a portion or percentage of the total.

Learning Model Component

- ✓ Making Connections
- ✓ Exploring and Learning
- ✓ Extended Learning and Practice
- ✓ Assessment
- ✓ Closure

Teaching Strategies

- ✓ Brainstorming
- ✓ Guided Practice
- ✓ Paired Learning

Materials List

- ✓ Lunch Survey– Guided Practice
- ✓ Pencils
- ✓ Calculators
- ✓ Geddes Kit which Includes the following school store products:
 - Retro Pencils**
 - Pet Silhouettes Pencil**
 - Astral Wonders Pencils**
 - Munchin' Mike Sharpener
 - Pirahna Sharpener
 - Mouse Sharpener
 - Happy Cap Erasers
 - Dessert Erasers**
 - Twister Eraser**
 - Mini Fish Erasers
 - G Mechanical Pencil**
 - Traction Mechanical Pencil**
 - Cushion Click Mechanical Pencil**
 - .7mm Value Lead
 - Study Buddy Inferno**
 - 6 Color Pen**
 - Bracelet Pen
 - Twister Pen**
 - Erasing Grip
 - Criss Cross Critters
- ✓ RG Weekly Sales Worksheet
- ✓ RG Weekly Sales Worksheet Key
- ✓ Assessment of Student Progress
- ✓ Index Cards
- ✓ Crayons or colored pencils

Charting Sales

Making Connections

Explain to students that each day at school they have the option of buying or bringing a lunch from home. Survey the class to find out how many students will buy or eat a lunch from home on the day of the lesson. Have students brainstorm how this information or data can be represented other than merely stating the facts in words or with simple numbers-- can they think of any visual tools that can be used to show this information?

Explain to students that your survey tells you that eight students purchased lunch today and fourteen brought a lunch. State that visualizing this information or data would be more interesting, and at times easier to understand rather than simply saying it. Tables, pie charts, and bar graphs are all useful tools for visually representing data. Often times the more data you have, the easier it is to understand using visual tools.

Discuss the following questions:

1. Where have you seen pie charts and graphs?
(newspapers, magazines, brochures, text books)
2. What type of information would be better represented in a pie chart or graph?
(sales figures, financial information, attendance, sports data, demographics)
3. What are some benefits of representing data in a visual format?
(easy to understand, can make comparisons, able to represent a lot of information in a simpler format)

Exploring and Learning

1. In the Making Connections section, a survey was taken to compare the number of students who purchased lunch verses those who pack a lunch. Show a simple bar graph that visually represents the two data numbers collected during the survey. Explain that a graph can represent more than just two data points.
2. Ask students to categorize their main lunch choices into one of the following options (or any other categories that might be appropriate): sandwich, salad, soup, hot meal, fruit, or yogurt. Write the information on the board. In a class of 22 students, perhaps 5 had a sandwich, 3 ate a salad, 1 had soup, 8 selected the hot meal, 3 had fruit, and 2 ate yogurt.

3. Ask students to think about how this information could be presented visually. Using class specific information gathered from student input or data from the example above, demonstrate how the information could be presented as a bar graph and pie chart. Guide students through the process by using Lunch Survey – Guided Practice. The guided practice worksheet can be used as a transparency.

Note: The bar graph and pie chart can be created by hand or by using any graphing software available to students. Explain that a bar graph is constructed using the raw data numbers collected. However, the pie chart uses percentages created from the data. Remind students that a percent is a ratio whose second term is 100. For example, the ratio of 30 : 100 is 30%. More simply, percent means parts per hundred. Follow these 5 simple steps to finding the percentage in the lunch survey.

Finding the percentage for the category Sandwich

Step 1: How many total students completed the survey? (22)

Step 2: How many students ate a Sandwich? (5)

Step 3: Write the result as a fraction? (5/22)

Step 4: Solve the fraction using a calculator. (.227)

Step 5: Change the fraction to a percent. ($.227 \times 100 = 22.7$ or 23)

4. Using the completed Lunch Survey worksheet ask students the following questions:
 - Look at the bar graph and pie chart. Which lunch choice was the most popular today? (hot meal)
 - Which choice was the second most popular? (sandwich)
 - Which choice was the least popular today? (soup)
 - Do you find one visual tool easier to analyze than the other?
5. The school cafeteria manager might be very interested in analyzing the lunches students prefer or what lunches they purchase on a daily or weekly basis. Have students brainstorm reasons why this information might be useful. Possible answers might include the following:
 - a monthly menu can be planned based on student preferences
 - the correct ingredients can be purchased in advance
 - the right amount of ingredients can be purchased in advance
 - time needed to prepare the meals can be determined

6. Present students with the following scenario:



RG and Hannie are working at the Raymond Geddes Elementary School Store. This week they are offering eleven items for sale. They want to analyze their weekly sales by major product categories – pens, erasers, pencils, and mechanical pencils. Can you help RG and Hannie create a table, bar graph, and pie chart to represent their weekly sales information? What product categories generated the most total sales and the least total sales in dollars?

7. To help complete the scenario, divide students into pairs and provide them with a copy of [RG Weekly Sales Worksheet](#).

Note: If you have a school store, change the quantity sold and the retail price to meet the needs of your individual sale and store. Or, if you are using the Geddes School Store Kit, use this opportunity to run your school store and record your own quantities sold. There are 11 items of the kit used in the exercise, however, the same exercise could be done using the complete kit.

The worksheet provides quantity and retail price information. It is also color coded to help student's group information into product categories. If time is limited, calculate and complete the total sale column of the worksheet for students prior to distributing the handout. Provide students with the following instructions:

Step 1: Using calculators, calculate the total sale for each item using the quantity provided. Record the amounts in the column labeled "total sale". Calculate the total sales amount for the entire week and record that figure in the "Total Weekly Sales" box.

Step 2: Tally by product category and complete the table. What were the weekly total sales figures for pens, erasers, pencils, and mechanical pencils?

Calculate sales percentages for each product category. For example, pens represent what percentage of the week's total sales?

Step 3: Create a bar graph showing the total sales for each product category.

Step 4: Create a pie chart using percentages generated in Step 2.

Conclusion: Answer the following two questions:

- Which product category had the most total sales at RG and Hannie's school store? (pens)
- Which product category had the least total sales this week? (pencils)

Extended Learning and Practice

1. Provide students with a scenario that the school store manager would like more detailed information about the sale at the school store. Create a chart that provides detail at the product level for each individual item. There are eleven product items in total. Find out which individual product item had the most total sales and the least total sales?
2. Create a pie chart to analyze individual categories of pens, pencils, erasers, or mechanical pencils. For example, which type of pen had the highest total sales for the week – the Study Buddy, 6 Color Pen, or the Twister Pen?
3. This lesson analyzed sales in dollars. Review the sales information again, but analyze the quantities sold instead of dollar amount. How many items were sold in total? (168 items) What does the breakdown look like by product category? (Pens = 55 or 20% of total items, Erasers = 72 or 27% of total items, Pencils = 72 or 27% of total items, and Mechanical Pencils = 69 or 26% of total items)
4. Visit National Center for Education Statistics (NCES) *Kids Zone – Create a Graph* at <http://nces.ed.gov/nceskids/createagraph/> for additional graphing activities.

Assessment

The lesson objectives can be assessed by evaluating students' abilities to:

1. Use the RG Weekly Sales Worksheet Key to assess each team's ability to analyze and represent weekly sales figures using tables, bar graphs, and pie charts.
2. Use the Assessment of Student Progress to assess students' overall abilities to meet the lessons learning objectives which include creating visual representations of data and drawing conclusions from tables, bar graphs, and pie charts.

Closure

Provide each student with an index card and have them answer the following questions on one side of the index card:

1. Describe two new things that you have learned.
2. What else would you like to learn about this topic?

On the back side of the index card, instruct the students to draw a picture of something they learned about during this lesson. The index cards can be hole punched and held together with a simple shower curtain ring.

Charting and Graphing Sales

Lunch Survey- Guided Practice

Step 1: Collect Data and Fill in Table

<u>Student Name</u>	<u>Lunch Choice</u>	<u>Lunch Category</u>
Tanya	Ham sandwich	Sandwich
David	Pizza	Hot meal
Joelle	Spaghetti	Hot meal
Tory	Caesar salad	Salad
Pedro	Chicken fingers	Hot meal
Kevin	Strawberry yogurt	Yogurt
Sarah	Chicken noodle soup	Soup
Jackie	Tuna rollup	Sandwich
Carl	Caesar salad	Salad
Mike	Pizza	Hot meal
Joanne	Spaghetti	Hot meal
Garcia	Raspberry yogurt	Yogurt
Emanuel	Banana	Fruit
Tyrone	Pizza	Hot meal
Matt	Chicken fingers	Hot meal
Marco	Garden salad	Salad
Laura	Peanut butter & jelly	Sandwich
Taylor	Melon	Fruit
Tasha	Apple	Fruit
Jamal	Ham sandwich	Sandwich
Eric	Roast beef sandwich	Sandwich
Seth	Pizza	Hot meal

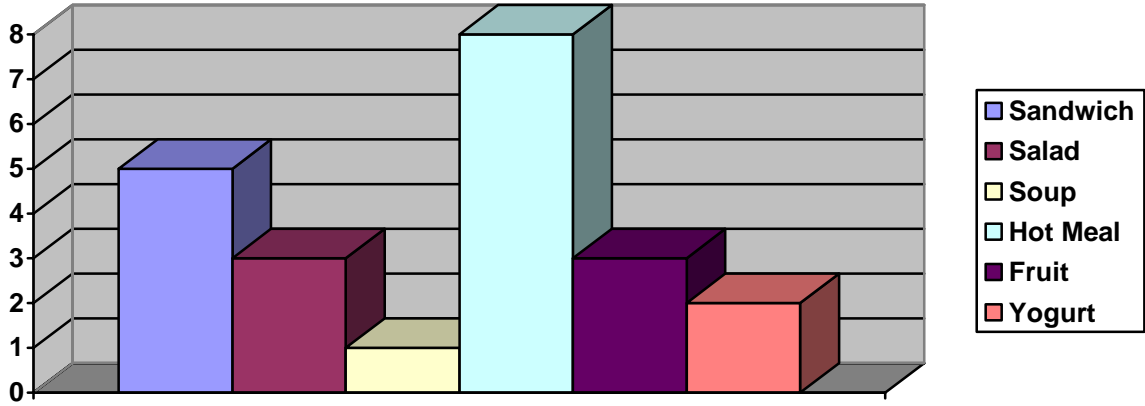
Step 2: Complete Lunch Category Table

Lunch Category	Number	% of Total Lunches
Sandwich	5	$5/22 = 23\%$
Salad	3	$3/22 = 14\%$
Soup	1	$1/22 = 5\%$
Hot Meal	8	$8/22 = 35\%$
Fruit	3	$3/22 = 14\%$
Yogurt	2	$2/22 = 9\%$
Total Lunches	22	100%

Charting and Graphing Sales

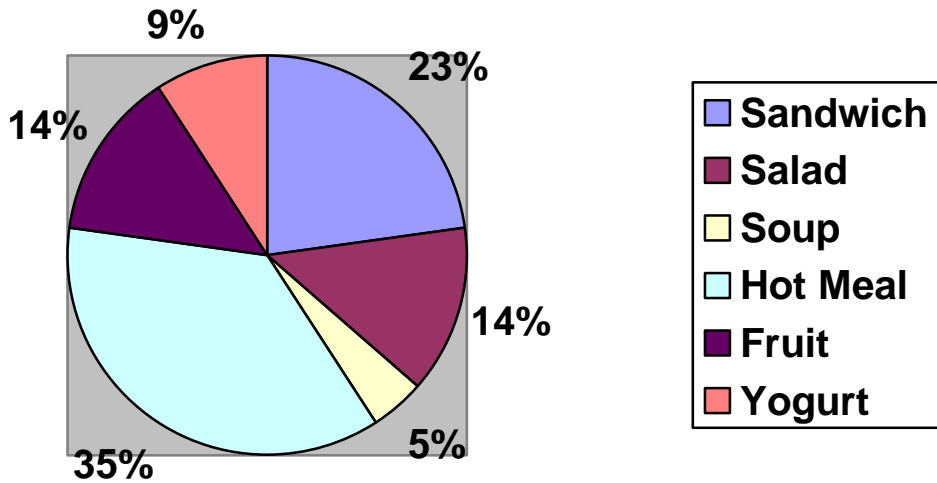
Lunch Survey- Guided Practice

Step 3: Create a Bar Graph
Use data in Step 2 to create a bar graph.



Lunch Choices

Step 4: Create a Pie Chart
Use percentages in Step 2.





Charting and Graphing Sales

RG Weekly Sales Worksheet

Step 1: Calculate Total Sales -> Qty x Retail Price

Day	Item #	Product Description	Product Category	Qty	Retail Price	Total Sale
Mon.	66967	Study Buddy Inferno	Pen	5	\$.50	
Mon.	67027	Twister Eraser	Eraser	20	\$.35	
Mon.	66685	6 Color Pen	Pen	10	\$.75	
Mon.	66921	Twister Pen	Pen	6	\$.35	
Mon.	67176	Retro Pencil	Pencil	10	\$.20	
Mon.	67039	G Mechanical Pencil	MP	6	\$.35	
Tues.	67027	Twister Eraser	Eraser	14	\$.35	
Tues.	67175	Pet Silhouettes Pencil	Pencil	25	\$.20	
Tues.	67124	Astral Wonders Pencil	Pencil	3	\$.20	
Tues.	66993	Dessert Eraser	Eraser	25	\$.15	
Tues.	67013	Traction Mechanical Pencil	MP	10	\$.35	
Tues.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	
Wed.	66921	Twister Pen	Pen	12	\$.35	
Wed.	66967	Study Buddy Inferno	Pen	5	\$.50	
Wed.	67039	G Mechanical Pencil	MP	6	\$.35	
Wed.	67176	Retro Pencil	Pencil	10	\$.20	
Wed.	67027	Twister Eraser	Eraser	3	\$.35	
Thurs.	66993	Dessert Eraser	Eraser	25	\$.15	
Thurs.	67176	Retro Pencil	Pencil	10	\$.20	
Thurs.	67175	Pet Silhouettes Pencil	Pencil	25	\$.20	
Thurs.	67013	Traction Mechanical Pencil	MP	10	\$.35	
Thurs.	66685	6 Color Pen	Pen	10	\$.75	
Thurs.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	
Fri.	67013	Traction Mechanical Pencil	MP	10	\$.35	
Fri.	66967	Study Buddy Inferno	Pen	5	\$.50	
Fri.	66921	Twister Pen	Pen	6	\$.35	
Fri.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	
Fri.	66993	Dessert Eraser	Eraser	25	\$.15	
		Total Weekly Sales				

Price is subject to change and based on current Raymond Geddes retail price.



Charting and Graphing Sales

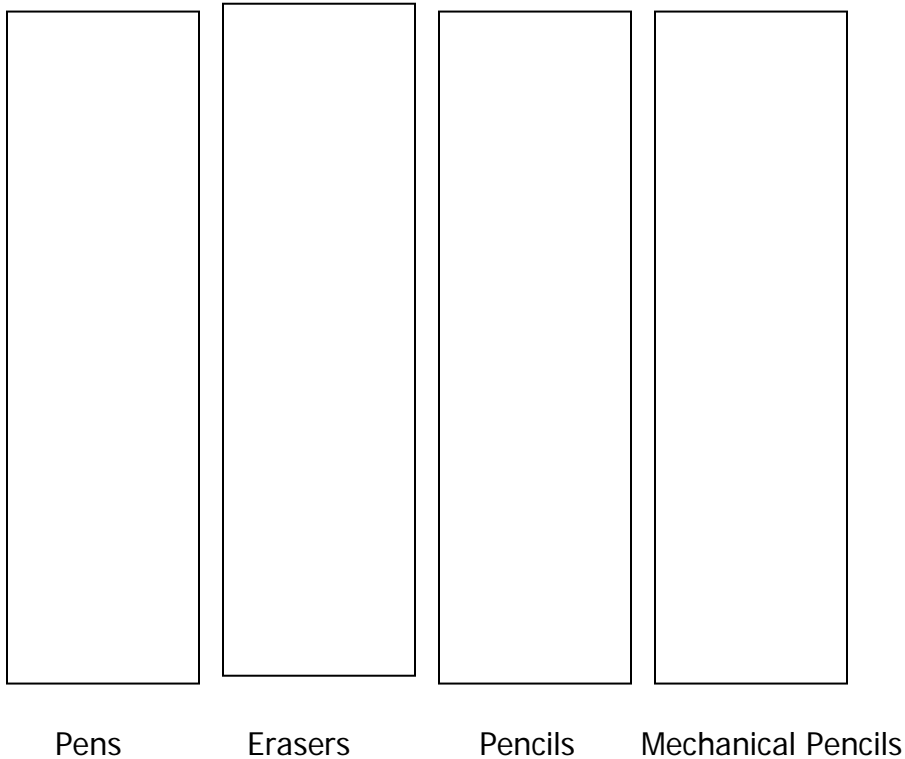
RG Weekly Sales Worksheet

Step 2: Complete Product Category Table

Product Category	Total Sales	% of Total Sales
Pen		
Eraser		
Pencil		
Mechanical Pencils		
Total Weekly Sales		

Step 3: Create a Bar Graph

Use total sales information in Step 2 to create a bar graph.



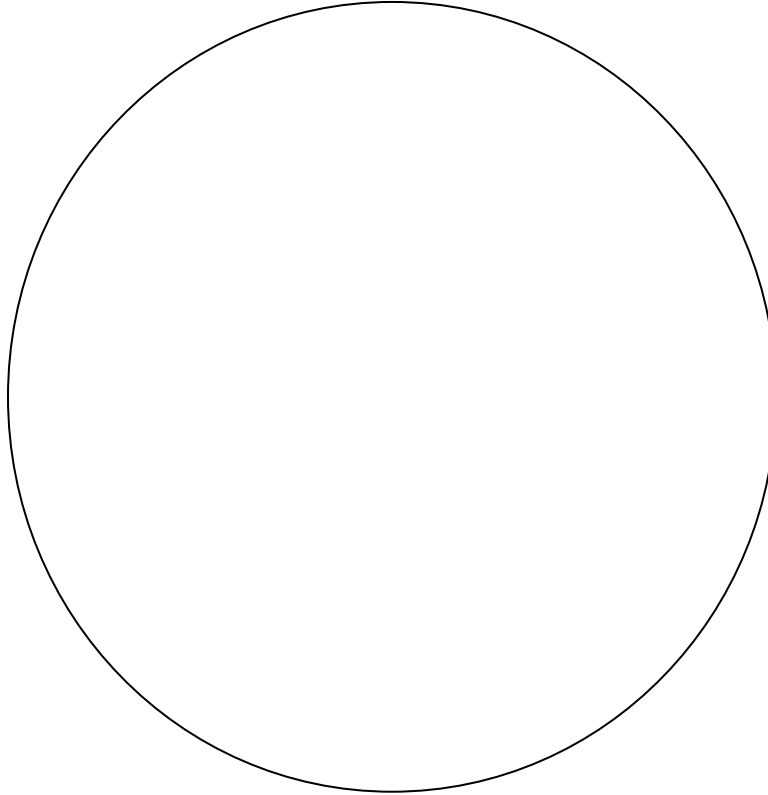


Charting and Graphing Sales

RG Weekly Sales Worksheet

Step 4: Create a pie chart.

Use the percentages in Step 2 to create a pie chart.



Charting and Graphing Sales

RG Weekly Sales Worksheet Key

Step 1: Calculate Total Sales -> Qty x Retail Price

Day	Item #	Product Description	Product Category	Qty	Retail Price	Total Sale
Mon.	66967	Study Buddy Inferno	Pen	5	\$.50	\$2.50
Mon.	67027	Twister Eraser	Eraser	20	\$.35	\$7.00
Mon.	66685	6 Color Pen	Pen	10	\$.75	\$7.50
Mon.	66921	Twister Pen	Pen	6	\$.35	\$2.10
Mon.	67176	Retro Pencil	Pencil	10	\$.20	\$2.00
Mon.	67039	G Mechanical Pencil	MP	6	\$.35	\$2.10
Tues.	67027	Twister Eraser	Eraser	14	\$.35	\$4.90
Tues.	67175	Pet Silhouettes Pencil	Pencil	25	\$.20	\$5.00
Tues.	67124	Astral Wonders Pencil	Pencil	3	\$.20	\$0.60
Tues.	66993	Dessert Eraser	Eraser	25	\$.15	\$1.25
Tues.	67013	Traction Mechanical Pencil	MP	10	\$.35	\$3.50
Tues.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	\$1.75
Wed.	66921	Twister Pen	Pen	12	\$.35	\$4.20
Wed.	66967	Study Buddy Inferno	Pen	5	\$.50	\$2.50
Wed.	67039	G Mechanical Pencil	MP	6	\$.35	\$2.10
Wed.	67176	Retro Pencil	Pencil	10	\$.20	\$2.00
Wed.	67027	Twister Eraser	Eraser	3	\$.35	\$1.05
Thurs.	66993	Dessert Eraser	Eraser	25	\$.15	\$3.75
Thurs.	67176	Retro Pencil	Pencil	10	\$.20	\$2.00
Thurs.	67175	Pet Silhouettes Pencil	Pencil	25	\$.20	\$5.00
Thurs.	67013	Traction Mechanical Pencil	MP	10	\$.35	\$3.50
Thurs.	66685	6 Color Pen	Pen	10	\$.75	\$7.50
Thurs.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	\$1.75
Fri.	67013	Traction Mechanical Pencil	MP	10	\$.35	\$3.50
Fri.	66967	Study Buddy Inferno	Pen	5	\$.50	\$2.50
Fri.	66921	Twister Pen	Pen	6	\$.35	\$2.10
Fri.	66315	Cushion Click Mechanical Pencil	MP	5	\$.35	\$1.75
Fri.	66993	Dessert Eraser	Eraser	25	\$.15	\$3.75
		Total Weekly Sales				\$89.15

Price is subject to change and based on current Raymond Geddes retail price.

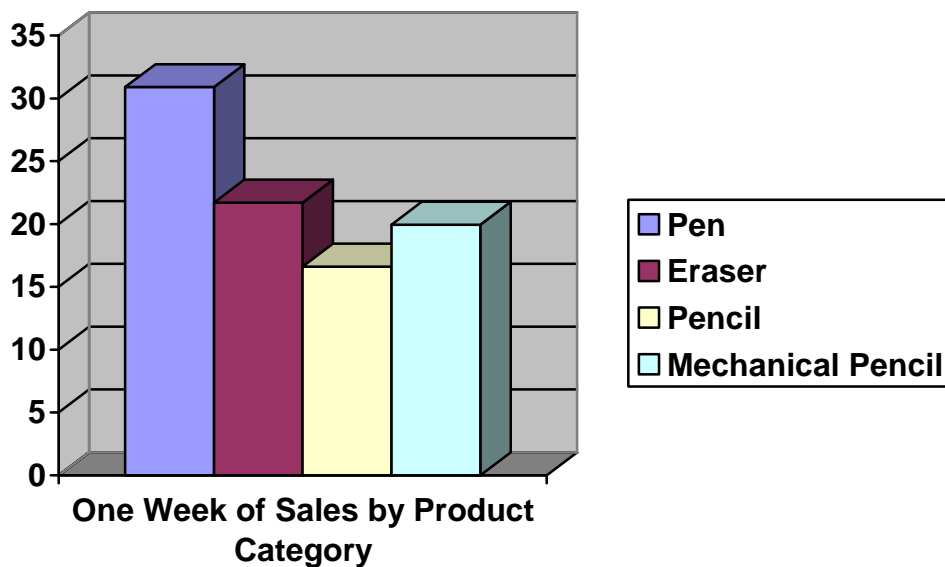
Charting and Graphing Sales

RG Weekly Sales Worksheet Key

Step 2: Complete Product Category Table

Product Category	Total Sales	% of Total Sales
Pen	\$ 30.90	$\$30.90/\$89.15 = 35\%$
Eraser	\$ 21.70	$\$21.70/\$89.15 = 24\%$
Pencil	\$ 16.60	$\$16.61/\$89.15 = 19\%$
Mechanical Pencils	\$ 19.95	$\$19.95/\$89.15 = 22\%$
Total	\$89.15	100%

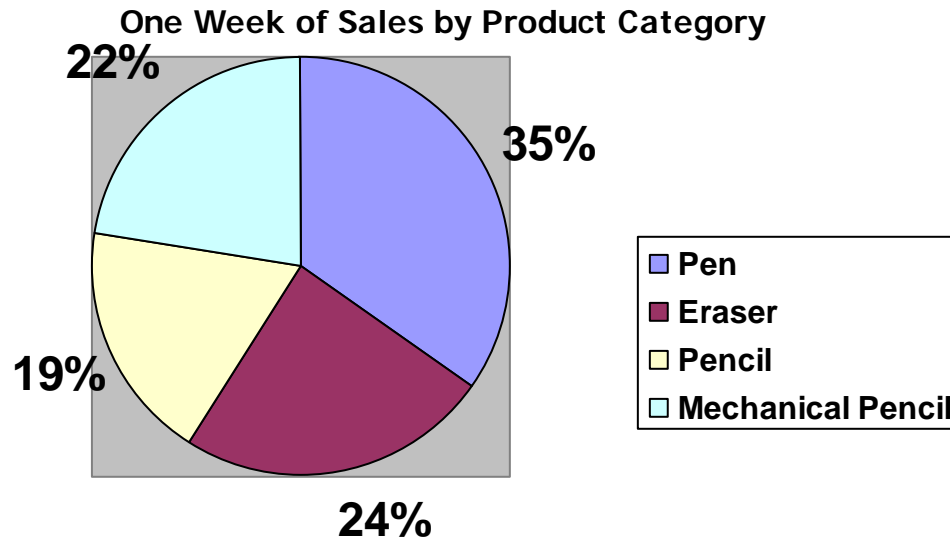
Step 3: Create a Bar Graph



Charting and Graphing Sales

RG Weekly Sales Worksheet Key

Step 4: Create a Pie Chart



Charting and Graphing Sales Assessment of Student Progress

Use the following summary to assess a student's abilities and performance throughout the lesson. Share this assessment with students at the start of the lesson so that students will understand how they will be assessed prior to beginning the Exploring and Learning section. Use this tool as a basis for providing feedback to the student. Use the scale below to score each of the following items:

Making Connections:

_____ Student participates in discussion by offering answers to one or more of the questions asked by the teacher.

Exploring and Learning

_____ Student participates in discussion by offering answers to one or more of the questions asked by the teacher, as well as teacher-led brainstorming sessions.

_____ Student works with partner using a calculator to compute total sales for products sold each day and a total sales figure for the week in Step 1 of worksheet.

_____ The student uses calculator to tally sales total by product category (pen, eraser, pencil, and paper), as well as percentages in Step 2 of the worksheet.

_____ The student creates a bar graph displaying sales by product category in Step 3 of the worksheet. The bar graph accurately reflects total sales in dollars by product category.

_____ The student creates a pie chart displaying product category sales percentages in Step 4 of the worksheet. The pie chart accurately reflects total sales in percentages by product category.

_____ The worksheet contains accurate data in Steps 1-4 of the worksheet.

_____ The student correctly identifies the product category that had the most sales in RG & Hannie's store. The student correctly identifies the product category with the fewest sales (in dollars).

Charting and Graphing Sales Assessment of Student Progress

SCALE

4 – Excellent

Student completes the activity, task or assignment with no errors and demonstrates mastery of concepts and/or lesson objectives.

3 – Good

Student completes the activity, task, or assignment with few major errors and demonstrates an understanding of the concepts and/or lesson objectives.

2 – Fair

Student completes the activity, task, or assignment with some major errors and demonstrates difficulty with the concepts and lesson objectives.

1 – Poor

Student does not complete the activity, task, or assignment and demonstrates no understanding of the concepts and/or lesson objectives.