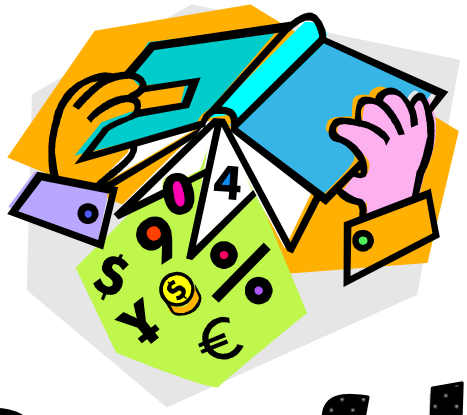
Mathematics:



"A Story of Units"

Parent Handbook

Grade 3

Module 6

Grade 3 • Module 6

Collecting and Displaying Data

OVERVIEW

This 10-day module builds on Grade 2 concepts about data, graphing, and line plots. Topic A begins with a lesson in which students generate categorical data, organize it, and then represent it in a variety of forms. Drawing on Grade 2 knowledge, students might initially use tally marks, tables, or graphs with 1 to 1 correspondence. By the end of the lesson, they show data in tape diagrams where units are equal groups with a value greater than 1. In the next two lessons, students rotate the tape diagrams vertically so that the tapes become the units or bars of scaled graphs. They understand picture and bar graphs as vertical representations of tape diagrams, and apply well-practiced skip-counting and multiplication strategies to analyze them. In Lesson 4, students synthesize and apply learning from Topic A to solve one- and two-step problems. Through problem solving, opportunities naturally surface for students to make observations, analyze, and answer questions such as, "How many more?" or, "How many less?" .

In Topic B, students learn that intervals do not have to be whole numbers, but can also have fractional values that facilitate recording measurement data with greater precision. In Lesson 5, they generate a six-inch ruler marked in whole-inch, half-inch, and quarter-inch increments, using the Module 5 concept of partitioning a whole into parts. This creates a conceptual link between measurement and recent learning about fractions. Students then use the rulers to measure the lengths of pre-cut straws and record their findings to generate measurement data.

Lesson 6 reintroduces line plots as a tool for displaying measurement data. Although familiar from Grade 2, line plots in Grade 3 have the added complexity of including fractions on the number line. In this lesson, students interpret scales involving whole, half, and quarter units to analyze data. This experience lays the foundation for them to create their own line plots in Lessons 7 and 8. To draw line plots they learn to choose appropriate intervals within which to display a particular set of data. For example, to show measurements of classmates' heights, students might notice that their data falls within the range of 45 to 55 inches, and construct a line plot with the corresponding interval.

Students end the module by applying learning from Lessons 1–8 to problem solving. They work with a mixture of scaled picture graphs, bar graphs, and line plots to problem solve using both categorical and measurement data.

Terminology

New or Recently Introduced Terms

- Axis (vertical or horizontal scale in a graph)
- Frequent (most common measurement on a line plot)
- Measurement data (e.g., length measurements of a collection of pencils)
- Scaled graphs (bar or picture graph in which the scale uses units with a value greater than 1)
- Survey (collecting data by asking a question and recording responses)

Familiar Terms and Symbols

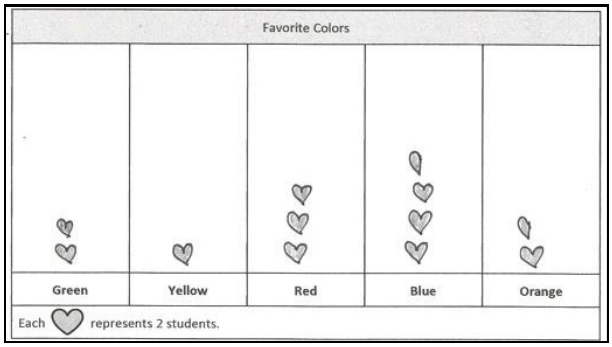
- Bar graph (graph generated from categorical data with bars to represent a quantity)
- Data (information)
- Fraction (numerical quantity that is not a whole number, e.g., $\frac{1}{3}$)
- Line plot (display of measurement data on a horizontal line)
- Picture graph (graph generated from categorical data with graphics to represent a quantity)

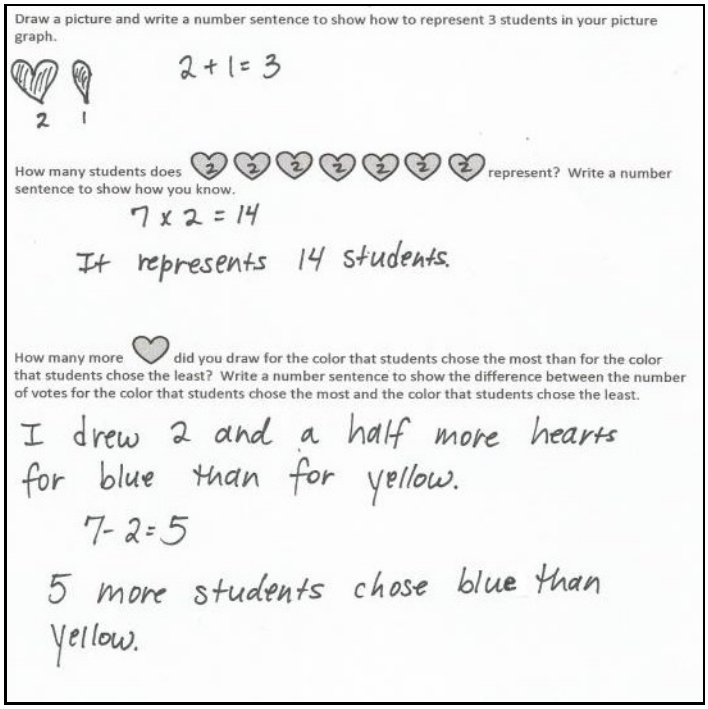
Suggested Tools and Representations

- Bar graph
- Grid paper
- Line plot
- Picture graph
- Rulers (measuring in inches, half inches, and quarter inches)
- Tape diagram
- Sentence strips

Lesson 1

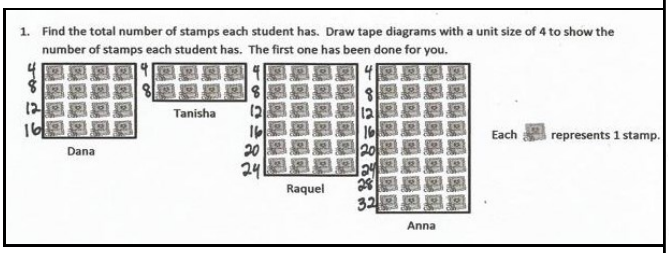
Objective: Generate and organize data.

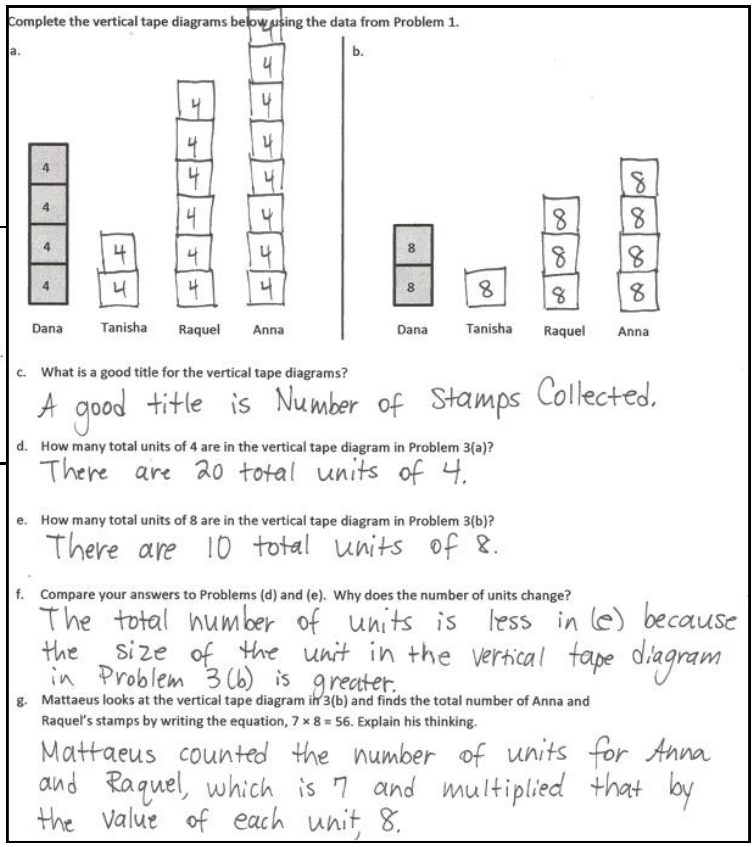




Lesson 2

Objective: Rotate tape diagrams vertically.

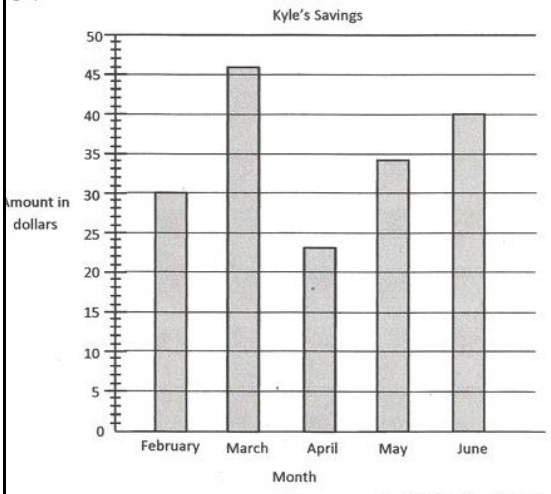




Lesson 3

Objective: Create scaled bar graphs.

This bar graph shows Kyle's savings from February to June. Use a straight edge to help you read the graph.



a. How much did Kyle save in May? He saved $34 in May.

b. In which months did Kyle save less than $35? February, April, and May.

c. How much more did Kyle save in June than April? Write a number sentence to show your thinking. $40 - $23 = $17

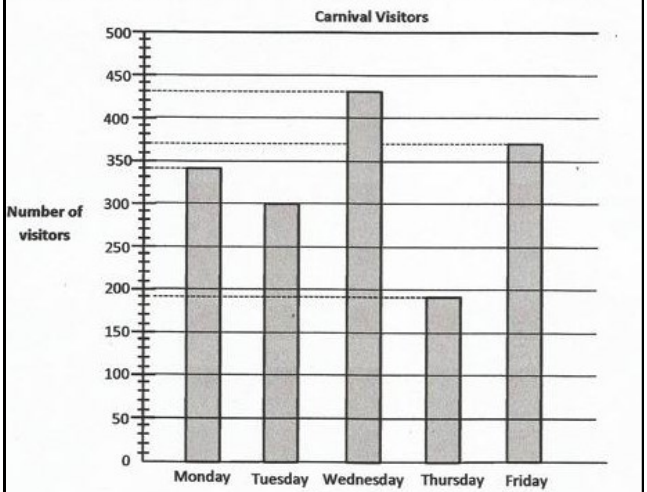
d. The money Kyle saved in April was half the money he saved in March.

Months	February	March	April	May	June
Amount in dollars saved	$30	$46	$23	$34	$40

Lesson 4

Objective: Solve one- and two-step problems involving graphs.

The bar graph shows the number of visitors to a carnival from Monday through Friday.



a. How many fewer visitors were there on the least busy day than on the busiest day?

least busy: 190 visitors
busiest: 430 visitors

$$\begin{array}{r} 3\not{4}\overset{1}{3}0 \\ -\,190 \\ \hline 240 \end{array}$$

There were 240 fewer visitors.

b. How many more people attended the fair on Monday and Tuesday combined than on Thursday and Friday combined?

Monday & Tuesday: 340 + 300 = 640

Thursday & Friday: (190 + 370) = 560

200 10 360

640 - 560 = 80

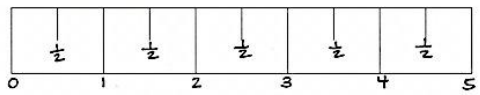
40 600 40

The difference is 80 people.

Lesson 5

Objective: Create ruler with 1-inch, 1/2 -inch, and 1/4-inch intervals and generate measurement data.

Jenna marks a 5-inch paper strip into equal parts as shown below.



a) Label the whole and half inches on the paper strip.

b) Estimate to draw the $\frac{1}{4}$ inch marks on the paper strip. Then fill in the blanks below.

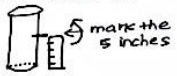
1 whole inch is equal to 2 half-inches.

1 whole inch is equal to 4 quarter-inches.

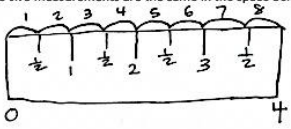
$\frac{1}{2}$ inch is equal to 2 quarter-inches.

c) Describe how Jenna could use this paper strip to measure an object that is longer than 5 inches.

Jenna could mark the first 5 inches. Then she can place the paper strip on top to measure the rest of the object. Then Jenna will need to add the measurements together.



Sari says her pencil measures 8 half-inches. Bart disagrees and says it measures 4 inches. Explain to Bart why the two measurements are the same in the space below. Use words, pictures or numbers.



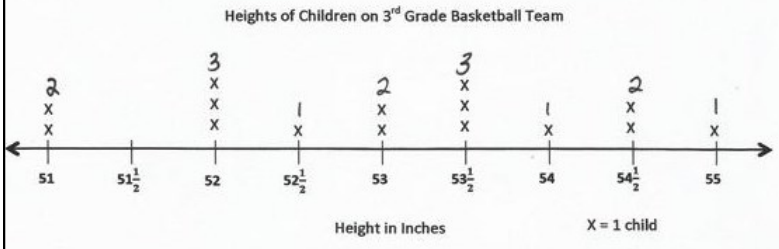
Since 2 half-inches is equal to 1 inch, we know that 8 half-inches is equal to 4 inches.

$8 \div 2 = 4$

Lesson 6

Objective: Interpret measurement data from various line plots.

Coach Harris measures the heights of the children on his 3rd grade basketball team in inches. The heights are shown on the line plot below.



a. How many children are on the team? How do you know?

There are 15 children on the team. I know because I counted the x's.

b. How many children are less than 53 inches tall?

Six children are less than 53 inches tall.

c. Coach Harris says that the most common height for the children on his team is $53\frac{1}{2}$ inches. Is he right? Explain your answer.

No, he's not right. There are 2 most common heights, 52 inches and 53½ inches because they both have the most children, 3.

d. Coach Harris says that the player who does the tip-off in the beginning of the game has to be at least 54 inches tall. How many children could do the tip-off?

Four children could do the tip-off.

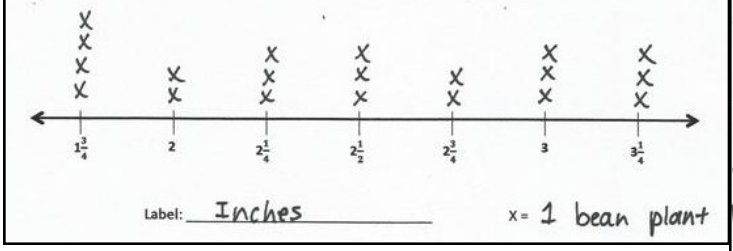
Lesson 7

Objective: Represent measurement data

Heights of Bean Plants (in inches)				
$2\frac{1}{4}$ ✓	$2\frac{3}{4}$ ✓	$3\frac{1}{4}$ ✓	$1\frac{3}{4}$ ✓	$1\frac{3}{4}$ ✓
$1\frac{3}{4}$ ✓	3 ✓	$2\frac{1}{2}$ ✓	$3\frac{1}{4}$ ✓	$2\frac{1}{2}$ ✓
2 ✓	$2\frac{1}{4}$ ✓	3 ✓	$2\frac{1}{4}$ ✓	3 ✓
$2\frac{1}{2}$ ✓	$3\frac{1}{4}$ ✓	$1\frac{3}{4}$ ✓	$2\frac{3}{4}$ ✓	2 ✓

a. Use the data to complete the line plot below.

Title: Heights of Bean Plants



Label: Inches X = 1 bean plant

How many bean plants are at least $2\frac{1}{4}$ inches tall?

14 bean plants are at least $2\frac{1}{4}$ inches tall.

How many bean plants are taller than $2\frac{3}{4}$ inches?

6 bean plants are taller than $2\frac{3}{4}$ inches.

What is the most frequent measurement? How many bean plants were plotted for this measurement?

The most frequent measurement is $1\frac{3}{4}$ inches. 4 bean plants were plotted for that measurement.

George says that most of the bean plants are at least 3 inches tall. Is he right? Explain your answer.

George is not right. Only 6 bean plants are at least 3 inches tall. 14 bean plants are shorter than 3 inches. 14 is more than 6.

Savannah was absent the day the class measured the height of their bean plants. She measures hers when she returns to school, and it is $2\frac{2}{4}$ inches tall. Can Savannah plot the height of her bean plant on the class line plot? Why or why not?

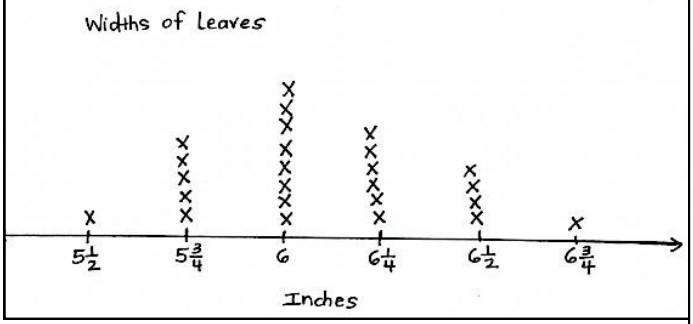
Yes, Savannah can plot the height of her bean plant. $2\frac{2}{4}$ is the same as $2\frac{1}{2}$, so she can draw an 'X' at $2\frac{1}{2}$ inches.

Lesson 8

Objective: Represent measurement data with line plots.

Widths of Leaves (in inches)				
$5\frac{3}{4}$ ✓	6 ✓	$6\frac{1}{4}$ ✓	6 ✓	$5\frac{3}{4}$ ✓
$6\frac{1}{2}$ ✓	$6\frac{1}{4}$ ✓	$5\frac{1}{2}$ ✓	$5\frac{3}{4}$ ✓	6 ✓
$6\frac{1}{4}$ ✓	6 ✓	6 ✓	$6\frac{1}{2}$ ✓	$6\frac{1}{4}$ ✓
$6\frac{1}{2}$ ✓	$5\frac{3}{4}$ ✓	$6\frac{1}{4}$ ✓	6 ✓	$6\frac{3}{4}$ ✓
6 ✓	$6\frac{1}{4}$ ✓	6 ✓	$5\frac{3}{4}$ ✓	$6\frac{1}{2}$ ✓

a) Use the data to draw a line plot below.



b) Explain the steps you took to create the line plot. What did you do first? Next?

First I found the smallest and largest measurement on the table to find where to start and end my number line.

Then I marked and labeled my scale.

Finally I started recording the data, and I had to be careful not to miss any of the numbers. I put check marks next to the numbers after I plotted them on the line.

c) How many more leaves were 6 inches wide than $6\frac{1}{2}$ inches wide?

8 − 6"
4 − $6\frac{1}{2}$"

8 − 4 = 4

4 more leaves were 6 inches wide than $6\frac{1}{2}$ inches wide.

d) Find the 3 most frequent measurements on the line plot. What does this tell you about the widths of Silver Maple Tree leaves?

The 3 most frequent measurements on the line plot are $5\frac{3}{4}$ inches, 6 inches, and $6\frac{1}{4}$ inches. This tells me that most of Silver Maple Tree leaves are between $5\frac{3}{4}$ and $6\frac{1}{4}$ inches wide.

Lesson 9

Objective: Analyze data to problem solve.

1. Four children went apple picking. The chart shows the number of apples each child picked.

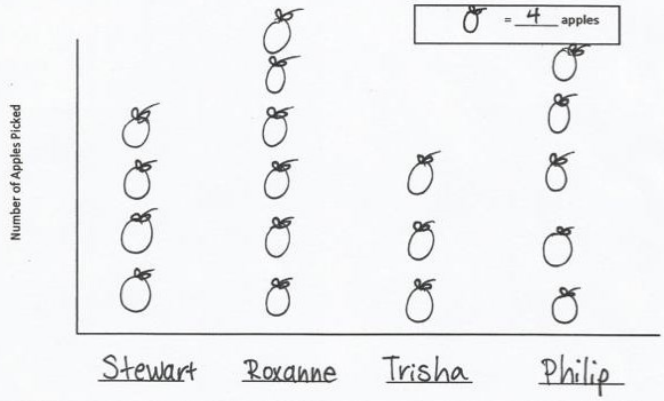
Name	Number of Apples Picked
Stewart	16
Roxanne	24
Trisha	12
Philip	20
	Total: 72

a) Find the number of apples Roxanne picked to complete the chart.

$16 + 12 + 20 = 48$

$72 - 48 = 24$

b) Create a picture graph below using the data in the table.



2. Use the chart or graph to answer the following questions.

b) How many more apples did Stewart and Roxanne pick than Philip and Trisha?

Stewart and Roxanne: $16 + 24 = 40$ ($16 = 10 + 6$, $24 = 30$)

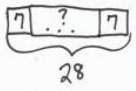
Philip and Trisha: $12 + 20 = 32$

$40 - 32 = 8$

Stewart and Roxanne picked 8 more apples than Philip and Trisha.

c) Trisha and Stewart combine their apples to make apples pies. Each pie takes 7 apples. How many pies can they make?

Trisha and Stewart: $12 + 16 = 28$



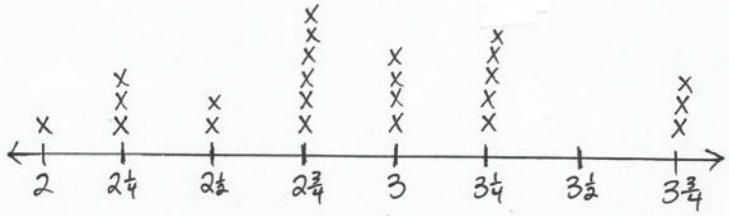
$28 \div 7 = 4$

They can make 4 pies.

3. Ms. Pacho's science class measured the lengths of blades of grass to the nearest $\frac{1}{4}$ inch from their school field. The lengths are shown below.

Lengths of Blades of Grass in Inches					
$2\frac{1}{4}$ ✓	$2\frac{3}{4}$ ✓	$3\frac{1}{4}$ ✓	3 ✓	$2\frac{1}{2}$ ✓	$2\frac{3}{4}$ ✓
$2\frac{3}{4}$ ✓	$3\frac{3}{4}$ ✓	2 ✓	$2\frac{3}{4}$ ✓	$3\frac{3}{4}$ ✓	$3\frac{1}{4}$ ✓
3 ✓	$2\frac{1}{2}$ ✓	$3\frac{1}{4}$ ✓	$2\frac{1}{4}$ ✓	$2\frac{3}{4}$ ✓	3 ✓
$3\frac{1}{4}$ ✓	$2\frac{1}{4}$ ✓	$3\frac{3}{4}$ ✓	3 ✓	$3\frac{1}{4}$ ✓	$2\frac{3}{4}$ ✓

a) Make a line plot of the grass data. Explain your choice of scale.



I chose fourths for my scale because I looked at all of the lengths and saw fourths was a common unit.

b) How many blades of grass were measured? Explain how you know.

24 blades of grass were measured. I know because I multiplied the number of rows of data in the chart times the columns.

c) What was the length measured most frequently on the line plot? How many blades of grass had this length?

The length measured most frequently is $2\frac{3}{4}$ inches. six blades of grass had this length.

d) How many more blades of grass measured $2\frac{3}{4}$ inches than both $3\frac{3}{4}$ inches and 2 inches combined?

$3\frac{3}{4}$ and 2: $3 + 1 = 4$

$6 - 4 = 2$

Two more blades of grass measured $2\frac{3}{4}$ inches than both $3\frac{3}{4}$ and 2 inches combined.