Focus Questions

Background

The student book is organized around three to five investigations, each of which contain three to five problems and a Mathematical Reflection that students explore during class.

In the Teacher Guide the Goals for each unit include two to four big concepts with an elaboration of the essential understandings for each.

In the Teacher Guide, a Focus Question is provided for each problem in an investigation. The Focus Question collapses the mathematical understandings and strategies embedded in the problem into one overarching question. The teacher can use the Focus Question to guide his/her instructional decisions throughout his/her planning, teaching, and reflections on student understanding.

Description

The Goals of the unit describe the mathematics content developed in the unit. The Focus Questions provide a story line for the mathematical development of an investigation. The set of Mathematical Reflections in the student book provide a story line for the mathematical development of the unit. The following contain all of the Goals, Focus Questions and Mathematical Reflections for each unit in CMP3.

Purpose

These stories can serve as an overview of the unit and as a guide for planning, teaching and assessing.

The Goals, Mathematical Reflections, and Focus Questions can be laminated and used a bookmark for the Teacher.

6-7: Data About Us

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Statistical Process Understand and use the process of statistical investigation

- Ask questions, collect and analyze data, and interpret data to answer questions
- Describe data with respect to its shape, center, and variability or spread
- Construct and use simple surveys as a method of collecting data

Attributes of Data Distinguish data and data types

- Recognize that data consist of counts or measurements of a variable, or an attribute; these observations comprise a distribution of data values
- Distinguish between categorical data and numerical data, and identify which graphs and statistics can be used to represent each kind of data

Multiple Representations for Displaying Data Display data with multiple representations

- Organize and represent data using tables, dot plots, line plots, ordered-value bar graphs, frequency bar graphs, histograms, and box-and-whisker plots
- Make informed decisions about which graphs or tables can be used to display a particular set of data
- Recognize that a graph shows the overall shape of a distribution, whether the data values are symmetrical around a central value, and whether the graph contains any unusual characteristics such as gaps, clusters, or outliers

Measures of Central Tendency and Variability Recognize that a single number may be used to characterize the center of a distribution of data and the degree of variability (or spread)

- Distinguish between and compute measures of central tendency (mean, median, and mode) and measures of spread (range, interquartile range (IQR), and mean absolute deviation (MAD))
- Identify how the median and mean respond to changes in the data values of a distribution
- Relate the choice of measures of central tendency and variability to the shape of the distribution and the context
- Describe the amount of variability in a distribution by noting whether the data values cluster in one or more areas or are fairly spread out
- Use measures of center and spread to compare data distributions

Focus Questions and Mathematical Reflections

Investigation 1 **What's in a name? Organizing, Representing, and Describing Data**	**Investigation 2** **Who's in Your Household? Using the Mean**	**Investigation 3** **What's Your Favorite…? Measuring Variability**	**Investigation 4** **What Numbers Describe Us? Using Graphs to Group Data**
Problem 1.1 How Many Letters Are in a Name? **Focus Question** What are "data"? How do you represent data using a frequency table or a line plot? How can you compare two distributions of data?	**Problem 2.1 What's a Mean Household Size?** **Focus Question** How do you go about finding a number that is a good estimate of typical household size based on the given data?	**Problem 3.1 Estimating Cereal Serving Sizes: Determining the IQR** **Focus Question** What information does the interquartile range provide about how data vary in a distribution?	**Problem 4.1 Traveling to School: Histograms** **Focus Question** How can you use a histogram to help you interpret data?
Problem 1.2 Describing Name Lengths: What Are the Shape, Mode, and Range? **Focus Question** What are the measures of central tendency and variability (or spread)? How do you compare and use mode and range?	**Problem 2.2 Comparing Distributions With the Same Mean** **Focus Question** How do you interpret, compute, and use the mean?	**Problem 3.2 Connecting Cereal Shelf Location and Sugar Content: Describing Variability Using the IQR** **Focus Question** How is the interquartile range used to make comparisons among distributions?	**Problem 4.2 Jumping Rope: Box-and-Whisker Plots** **Focus Questions** How can you interpret data using a box-and-whisker plot?
Problem 1.3 Describing Name Lengths: What is the Median?	**Problem 2.3 Making Choices: Mean or Median?** **Focus Question** How do the	**Problem 3.3 Is It Worth the Wait? Determining and Describing Variability Using the MAD**	**Problem 4.3 How Much Taller Is a 6th Grader Than a 2nd Grader? Taking Variability Into**

Focus Question How do you identify and use the median? How can you compare two distributions of data using the medians?	median and the mean respond to the data in a distribution? How do you choose which measure of center to use when describing what is typical?	**Focus Question** What information does the mean absolute deviation provide about how data vary in a distribution?	**Consideration** **Focus Question** How can you compare and contrast data represented by dot plots, histograms, and box plots?
	Problem 2.4 Who Else is in Your Household? Categorical and Numerical Data **Focus Question** How do you distinguish different types of data? What statistics are used with different types of data?		
Mathematical Reflection 1. The process of carrying out a statistical investigation involves asking a question, gathering and analyzing data, and interpreting the results to answer the question. Choose a data set from this Investigation. Use the data set to answer each question below. • What was the question asked? • How were the data collected? • How were the data analyzed and represented? • How did the results from the analysis help you answer the question?	**Mathematical Reflection** 1. Describe a method for calculating the mean of a set of data. Explain why your method works. 2. You have used three measures of center – mode, median, and mean – to describe distributions. a. Why do you suppose they are called "measures of center"? b. What does each tell you about a set of data? c. How do you decide which measure of center to use when describing a distribution? d. Why might you want to	**Mathematical Reflection** 1. Explain and illustrate the following words. a. Range b. Interquartile Range c. Mean absolute deviation 2. a. Describe how you can use the range to compare how two data distributions vary. b. Describe how you can use the IQR to compare how two data distributions vary. c. Describe how you can use the MAD to compare how two data distributions vary.	**Mathematical Reflection** 1. Describe how you can display data using a histogram. 2. Describe how you can display data using a box plot. 3. a. How can you use histograms to compare two data sets? b. How can you use box plots to compare two data sets? 4. Numerical data can be displayed using more than one type of graph. How do

2. You can represent a set of data using displays such as a data table, a frequency table, and a dot or line plot. Explain how these displays are related. 3. The median and mode are two measures of the center of a data distribution. The range is a measure of variability, or how spread out the data are. a. What does each measure of center tell you about the data set? b. Can the mode and the median for a data set have the same value? Can they have different values? Explain your answers. c. How does the range tell you how much the data vary? d. Suppose we add a new data value to the set of data. Does this new value affect the mode? The median? The range? Explain. 4. What strategies can you use to make comparisons among data sets?	include both the range and a measure of center when reporting a statistical summary? 3. a. One student says you can only use the mode to describe categorical data, but you can use the mode, median, and mean to describe numerical data. Is the student correct? Explain. b. Can you find the range for categorical data? Explain.		you decide when to use a dot plot, bar graph, histogram, or box plot?