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.

7-5: Moving Straight Ahead

Unit Goals, Focus Questions, and Mathematical Reflections

Unit Goals

Linear Relationships Recognize problem situations in which two variables have a linear relationship

- Identify and describe the patterns of change between the independent and dependent variables for linear relationships represented by tables, graphs, equations, or contextual settings
- Construct tables, graphs, and symbolic equations that represent linear relationships
- Identify the rate of change between two variables and the x- and y-intercepts from graphs, tables, and equations that represent linear relationships
- Translate information about linear relationships given in a contextual setting, a table, a graph, or an equation to one of the other forms
- Write equations that represent linear relationships given specific pieces of information, and describe what information the variables and numbers represent
- Make a connection between slope as a ratio of vertical distance to horizontal distance between two points on a line and the rate of change between two variables that have a linear relationship
- Recognize that $y=mx$ represents a proportional relationship
- Solve problems and make decisions about linear relationships using information given in tables, graphs, and equations

Equivalence Understand that the equality sign indicates that two expressions are equivalent

- Recognize that the equation $y=mx+b$ represents a linear relationship and means that $mx+b$ is an expression equivalent to y
- Recognize that linear equations in one unknown, $k=mx+b$ or $y=m(t)+b$, where k, t, m, and b are constant numbers, are special cases of the equation $y=mx+b$
- Recognize that finding the missing value of one of the variables in a linear relationship, $y=mx+b$, is the same as finding a missing coordinate of a point (x,y) that lies on the graph of the relationship
- Solve linear equations in one variable using symbolic methods, tables, and graphs
- Recognize that a linear inequality in one unknown is associated with a linear equation
- Solve linear inequalities using graphs or symbolic reasoning
- Show that two expressions are equivalent
- Write and interpret equivalent expressions

Focus Questions and Mathematical Reflections

Investigation 1 **Walking Rates**	**Investigation 2** **Exploring Linear Relationships with Graphs and Tables**	**Investigation 3** **Solving Equations**	**Investigation 4** **Exploring Slope: Connecting Rates and Ratios**
Problem 1.1 Walking Marathons: Finding and Using Rates **Focus Question:** What equation represents the relationship between the time and the distance you walk at a constant rate? What are the dependent and independent variables?	**Problem 2.1** Henri and Emile's Race: Finding the Point of Intersection **Focus Question:** When is it helpful to use a graph or table to solve a problem?	**Problem 3.1** Solving Equations Using Tables and Graphs **Focus Question:** How are the coordinates of a point on a line or in a table related to the equation of the line?	**Problem 4.1** Climbing Stairs: Using Rise and Run **Focus Question:** How is the steepness of a set of stairs related to a straight-line graph?
Problem 1.2 Walking Rates and Linear Relationships: Tables, Graphs, and Equations **Focus Question:** How can you predict whether a relationship is linear from a table, a graph, or an equation that represents the relationship?	**Problem 2.2** Crossing the Line: Using Tables, Graphs, and Equations **Focus Question:** How does the pattern of change for a linear relationship appear in a table, a graph, or an equation?	**Problem 3.2** Mystery Pouches in the Kingdom of Montarek: Exploring Equality **Focus Question:** What does equality mean?	**Problem 4.2** Finding the Slope of a Line **Focus Question:** How can you find the y-intercept and the slope of a line from data in a table, graph, or equation?
Problem 1.3 Raising Money: Using Linear Relationships	**Problem 2.3** Comparing Costs: Comparing Relationships	**Problem 3.3** From Pouches to Variables: Writing Equations	**Problem 4.3** Exploring Patterns with Lines **Focus Question:** How can you

Focus Question: What is the pattern of change in a linear relationship?	**Focus Question:** How can you decide if a table or an equation represents a linear relationship?	**Focus Question:** How can the properties of equality be used to solve linear equations?	predict if two lines are parallel or perpendicular from their equations?
Problem 1.4 Using the Walkathon Money: Recognizing Linear Relationships **Focus Question:** How can you determine if a linear relationship is increasing or decreasing?	**Problem 2.4** Connecting Tables, Graphs, and Equations **Focus Question:** How are solutions of an equation of the form y = b + mx related to the graph and the table for the same relationship?	**Problem 3.4** Solving Linear Equations **Focus Question:** What are some strategies for solving linear equations?	**Problem 4.4** Pulling it All Together: Writing Equations for Linear Relationships **Focus Question:** What information do you need to write an equation for a linear relationship? Is the expression for the dependent variable always the same?
		Problem 3.5 Finding the Point of Intersection: Equations and Inequalities **Focus Question:** How can you find when two expressions are equal, or when one expression is greater or less than the other?	
Mathematical Reflections: 1. Describe how the dependent variable changes as the independent variable changes in a linear relationship. Give examples. 2. How does the pattern of change between two variables in a linear relationship show up in a. a contextual situation? b. a table?	**Mathematical Reflections:** 1. a. Explain how the information about a linear relationship is represented in a table, a graph, or an equation. b. Describe several real-world situations that can be modeled by equations of the form y = mx + b and y = mx. Explain how the latter equation represents a proportional relationship.	**Mathematical Reflections:** 1. a. Suppose that, in an equation with two variables, you know the value of one of the variables. Describe a method for finding the value of the other variable using the properties of equality. Give an example to illustrate your method. b. Compare the method you described in part (a) to the	**Mathematical Reflections:** 1. Explain what the slope of a line is. How does finding the slope compare to finding the rate of change between two variables in a linear relationship? 2. How can you find the slope of a line from a. an equation? b. a graph?

c. a graph? d. an equation?	2. a. Explain how a table or graph that represent a linear relationship can be used to solve a problem. b. Explain how you have used an equation that represents a linear relationship to solve a problem.	methods of using a table or a graph to solve linear equations. 2. a. Explain how an inequality can be solved by methods similar to those used to solve linear equations. b. Describe a method for finding the solution to an inequality using graphs. 3. Give an example of two equivalent expressions that were used in this investigation. Explain why they are equivalent.	c. a table of values of the line? d. the coordinates of two points on the line? 3. For parts (a) and (b), explain how you can write an equation of a line from the information. Use examples to illustrate your thinking. a. the slope and the y-intercept of the line b. two points on the line