Linear Relations and Functions

Opener

***Mathematics 10,* pages 266–267**

Suggested Timing

30–40 min

Materials

- sheets of 11 × 17 paper
- stapler

Blackline Masters

BLM 6–2 Chapter 6 Prerequisite Skills
BLM 6–4 Chapter 6 Unit 3 Project
BLM U3–2 Unit 3 Project Checklist

Key Terms

relation
non-linear relation
continuous data
dependent variable
range
function notation
slope
linear relation
discrete data
independent variable
domain
function
vertical line test

What's Ahead

In this chapter, students learn about linear functions and relations. Students graph functions and relations in a variety of ways, including with technology. They learn to distinguish between a function and a relation and how to determine the domain and range of a function or relation. Students express domains and ranges in different formats, including interval notation. For linear functions, students use function notation to express and work with the function. Also, for linear functions and relations, they explore the concept of the slope of a line, including lines that are horizontal or vertical.

Planning Notes

The chapter opener asks students to consider the interpretation and analysis of data. You could begin this chapter by having students consider the amount of data available to them and ways to effectively find, use, and organize data. Ask them to consider their mathematical experience so far and to brainstorm the methods that they know to organize data, represent data, and use data. In particular, you may wish to have them articulate how numerical data can be used to make predictions or decisions in a situation.

Unit Project

The Unit 3 Project focuses on forensics, and how mathematics might be useful in forensic science. You might take the opportunity to discuss the Unit 4 project described in the Unit 4 opener if you have not done so already. See TR page 206. In this chapter, there are individual questions related to the unit project that will help students as they work on the project. You will find these related questions in section 6.4 of the student resource. While students may not need to complete these questions to successfully complete the project, the questions are intended to be helpful and it is recommended that students complete them when possible.

Foldables™ Study Tool

Discuss with students the benefits of keeping a summary of what they are learning in the chapter. If they have used Foldables before, you may wish to have them report on how useful they found various designs.

- What designs have they used?
- Which designs were the most useful?
- Which, if any, designs were hard to use?
- What disadvantages do Foldables have?
- What other method(s) could they use to summarize their learning?

Discuss the Foldable design on page 267 and how it might be used to summarize Chapter 6. Encourage students to suggest revisions for this Foldable, or to replace this Foldable with another design of their choice. Allowing personal choice in this way will increase student ownership in their work.

Give students time to develop the summary method they have chosen. Ask them to include some method of keeping track of what they need to work on; discuss the advantage of doing this.

The Foldable is designed to provide students a place to write notes as well as collect, diagram, and model different lines, slopes, and function applications. Each section of the Foldable has a blank page facing

a page with a pocket. There are exactly enough pages for each of the five sections in the chapter. Encourage students to write terms and explanations on the blank page and insert examples, quizzes, and any information related to each section into the pocket that faces it. The middle section for section 6.3 will be the only page to have two facing pockets. Encourage students to put the title What I Need to Work On on the back page to keep track of difficulties they have. As students progress through the chapter, provide time for them to keep track of what they need to work on, which they can record on the back of the Foldable. This will assist them in identifying and solving any difficulties with concepts, skills, and processes. Have them check off each item as they deal with it.

Meeting Student Needs

- Consider having students complete the questions on **BLM 6–2 Chapter 6 Prerequisite Skills** to activate the prerequisite skills for this chapter.
- You may wish to post the student learning outcomes and discuss the entire chapter prior to beginning. Involve students in a discussion about the learning outcome terms they do not understand.
- Post three or four linear graphs found on the Internet, withholding what the graphs represent. Ask students to suggest what the graphs might illustrate. At the end of the discussion, reveal what the graphs actually represent. Discuss how close students' ideas were.
- Encourage students to create a bookmark that lists all the Key Terms of the chapter. Discuss the terms prior to beginning the chapter.
- Relate the topic of this chapter to something students are familiar with, such as global warming. You might ask the following questions:
  - What would happen if all the polar ice melted?
  - How does this affect Northern communities?
  - Do you need math to understand these changes?
- Ask students which TV programs about forensics they watch. Ask them to describe what they do.
- Consider having students staple a copy of **BLM U3–2 Unit 3 Project Checklist** to the back of the Foldable. This master provides a list of all the related questions for the Unit 3 project. Students can use it to keep track of the questions they have completed.
- Some students may benefit from completing all unit project questions.
- If you have students do the Unit 3 project questions, consider offering them the option of working on these alone or with a partner.
- **BLM 6–4 Chapter 6 Unit 3 Project** includes all of the unit project questions for this chapter. These provide a beginning for the Unit 3 project analysis.

ELL

- Encourage students to create their own vocabulary dictionary for the Key Terms using written descriptions, examples, and diagrams.

Enrichment

- Challenge students to create a real-life context for a graph of a vertical line involving two variables. Have them explain what a vertical line implies on a time-versus-distance graph for a car. (Examples: On a price-versus-sales graph, a vertical line means that the price of an item remained constant while the sales increased. A vertical line on a time-versus-distance graph means that the car was in more than one place at the same time.)

Gifted

- Present students with the following scenario: Suppose a population of endangered falcons is declining according to a linear relation. Ask students the following questions:
  - What might a scientist predict from the graph?
  - How might a scientist use the graph to find the cause of the decline?

  (Example: Scientists might predict when extinction might occur. Working backward to the beginning of the decline and seeing what might have occurred in that time frame could identify the cause of the decline.)

Career Connection

The career connection in this chapter is forensics. Many students will be familiar with forensic science, especially as it is represented in the media and popular culture. If you have Internet access, you may wish to have students spend a few minutes searching to see how mathematics can be an important part of the work of a forensic scientist. If Internet access is not available, choose a few mathematical topics and ask students to suggest how they could be used in forensics. For instance, you could ask the following questions:

- What are some ways that geometry could be important to a forensic specialist?
- What is a situation in which a forensic scientist would use a graph?
- When would an equation be used in an investigation?