Measurement Systems

Opener

***Mathematics 10*, pages 6–7**

Suggested Timing

50–60 min

Blackline Masters

BLM 1–1 Chapter 1 Self-Assessment
BLM 1–2 Chapter 1 Prerequisite Skills
BLM 1–4 Chapter 1 Unit 1 Project
BLM U1–2 Unit 1 Project Checklist

Key Terms

referent
imperial system

What's Ahead

In this chapter, students develop referents for linear measurements, in both imperial and SI (Système International d'Unités) units, and they measure in standard units using measuring instruments, such as a ruler and caliper. Students learn the similarities and differences between the SI system and the imperial system, and they estimate linear measurements in both imperial and SI units. Students convert linear measurements within and between the imperial and SI systems using a variety of techniques, and they develop personal strategies for measuring objects. You may wish to point out that SI measurement is derived from the metric system.

Planning Notes

Begin Chapter 1 by inviting students to discuss what they already know about measurement. Many students may have experience with measurement in part-time jobs, hobbies, or in working in and around their homes. It may be particularly instructive to elicit any experiences with the results of measurement errors or miscommunications.

Referring to the collage in the opener, you may want to ask students to think of uses for measurement in the scenarios depicted. Students may also have relevant experience with some of the measuring tools depicted. Ask students to list the careers of the people shown in the images.

To address the Big Ideas, you could choose to have the class begin a K-W-L chart, in which they specify what they "Know" and "Want to know." At the conclusion of the unit, students can complete the "what we Learned" column. It is possible that some students will have some experience with the Key Terms, and in your discussion, you could have these students relate their experience and knowledge.

Unit Project

You might take the opportunity to discuss the Unit 1 project described in the Unit 1 opener. See TR page 2. Throughout the chapter, there are individual questions for the unit project. These questions are not mandatory but are recommended because they provide some of the work needed for the final report for the Unit 1 project assignment. You will find questions related to the project throughout the Check Your Understanding and in the section 1.3 Investigate.

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. Consider asking students the following questions:

- 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 7 and how it might be used to summarize Chapter 1. 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 students' 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.

Point out to students that each lesson has its own tab, as well as space for them to write in or cut out and paste in various conversions. Encourage students to write conversions that are new and may require referencing in the future. Point out that Unit 1 is a measurement unit and that the conversions used in Chapter 1 may be used again in subsequent chapters. Encourage students to write in examples of their own that model the concepts learned in each section.

As students progress through the chapter, provide time for them to keep track of what they need to work on, which is one of the opening tabs in the Foldable. This will assist students in identifying and solving any difficulties with concepts, skills, and processes. Have students check off each item as they deal with it. Some students may benefit from stapling **BLM U1–2 Unit 1 Project Checklist** to the back of the Foldable to help them keep track of the questions they have completed toward the project.

Meeting Student Needs

- Hand out to students **BLM U1–2 Unit 1 Project Checklist**, which lists *all* of the questions related to the Unit 1 project.
- Some students may benefit from completing all unit project questions.
- **BLM 1–4 Chapter 1 Unit 1 Project** includes all of the unit project questions for this chapter. These questions provide a beginning for the Unit 1 project.
- Consider having students complete the questions on **BLM 1–2 Chapter 1 Prerequisite Skills** to activate the prerequisite skills for this chapter.
- Ask students to brainstorm ways they use measurement in their lives or ways that people have historically used measurement. Some suggestions are designing clothes; building a komatik (sled), a shed, or a cabin; choosing duffle, fur, and fabric for parkas, duffle socks, or mitts; calculating the length of strips required for the webbing of snowshoes; and talking about distances to cabins, fishing spots, or hunting grounds.
- Post student learning outcomes. Get students involved in rewriting the outcomes so that they understand what they will accomplish by the end of the chapter. As you work through the chapter, refer to the outcomes and encourage students to make connections to the current topic. The posted outcomes may be helpful when reviewing the entire chapter because students can identify the outcomes that they still need to review in order to successfully complete the material in the chapter.

ELL

- Have students record definitions for the Key Terms and write examples into their Foldable that model the various approaches used in the chapter.

Enrichment

- Ask students to develop referents for very small measurements, such as the measurement for which the diameter of a human hair could be a referent.
- Ask students to visualize one half of a cup and two thirds of a metre. Many imperial measurements are based on fractions. Encourage students to conjecture as to why fractional references were once so common and why SI measurements have come to replace them in the scientific world.

Gifted

- Suggest students explore the effect of temperature on measurement. For example, if an engineer is designing a bridge, how can he or she compensate for changes in length of steel beams as they heat up in the sun and expand?
- Encourage students to explore the sources of measurements in other cultures.

Career Connection

You may wish to have students who are interested in learning more about photogrammetrists research the career and report to the class how mathematics relates to the career.

WWW Web Link

For more information about photogrammetry, go to www.mhrmath10.ca and follow the links.