

MEASUREMENT
GRADE 4

Western and Northern Canadian
Protocol (WNCP) Edition

hands-on
mathematics
Grade 4

Project Editor

Jennifer E. Lawson

Writer

Suzanne Mole

Mathematics Consultants

Meagan Mutchmor

Dianne Soltess



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Series Editor: Leslie Malkin
Book and Cover Design: Relish Design Ltd.
Illustrations: Jess Dixon
Mathematics Consultants: Meagan Mutchmor
Dianne Soltess

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PORTAGE & MAIN PRESS
100-318 McDermot Avenue
Winnipeg, Manitoba, Canada R3A 0A2

Email: books@portageandmainpress.com
Tel: 204-987-3500
Toll Free: 1-800-667-9673
Fax: 1-866-734-8477

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Introduction

In grade four, the primary objective of the ***Hands-On Mathematics*** measurement module is to strengthen students' understanding of a variety of measurement techniques. The lessons in this module create opportunities for students to use measurement in everyday situations. They measure items using their own bodies both for exploration of measurement concepts and as referents for measuring other objects.

In this module, students begin by measuring time and then move to activities that involve linear measurement. They also progress beyond linear measurement and apply their knowledge toward the concepts of perimeter and area of two-dimensional shapes, strengthening their understanding of these concepts and their interdependency. Each lesson is multi-step and is designed to be completed over several days, allowing time for students to reflect on previous learning and to strengthen their understanding of the concepts being addressed.

Measurement concepts can be challenging for some students. The very nature of measurement requires a certain *exactness*; students who tend to rush through activities sometimes lack the patience for accurate measurement. For other students, the dovetailing of the base-ten model of metric measurement and of place value can be a challenge. It is beneficial to stretch the lessons that focus on these challenging areas over the entire year and to review and revisit difficult concepts over time.

Mathematical Vocabulary

A mathematics word wall for displaying new vocabulary is a valuable reference for students. Dedicate a classroom bulletin board to your math word wall, and display the letters of the alphabet along the top. Use index cards to record math vocabulary introduced in each lesson, attaching these to the board under the appropriate letter. Encourage students to refer to the math word wall during classroom activities and assignments.

Throughout this module, use, and encourage students to use, vocabulary such as the following: *time, hour, minute, second, analog clock, digital clock, twenty-four hour clock, estimate, measure, compare, perimeter, area, length, height, width, centimetre, and metre.*

3 Using the Twenty-Four Hour Clock

Materials

- *About Time: A First Look at Time and Clocks*, a book by Bruce Koscielniak, or another time-related book
- twenty-four hour clock illustration (included. Make an overhead copy of this sheet.) (3.3.1)
- overhead projector
- non-permanent overhead markers
- analog teaching clock
- clock spinner (included with lesson 2) (3.2.3)

Activity: Part One

Read with students the book *About Time: A First Look at Time and Clocks* or another time-related book. Review with students what they learned previously about time and reading time on analog and digital clocks. Ask:

- What are the two types of clocks that we use everyday?
- Where do we use and see each kind of clock?
- What are the benefits to each kind of clock?
- Which kind do you prefer to use?

Display the overhead copy of the twenty-four hour clock. Ask:

- How is this clock different from the other clocks we have studied?

Explain to students that this is called a twenty-four hour clock, and it shows each of the twenty-four hours in a day, from midnight to midnight. Ask:

- How many times a day does an analog clock show seven o'clock?
- Could this be confusing? When?
- When do we use the terms AM and PM?

Explain that we use AM to refer to the morning hours, from midnight until one second before noon, and we use PM to refer to the afternoon, evening, and nighttime hours, from noon until

one second before midnight. The term AM is an abbreviation for *ante meridiem*, which means *before the middle of the day* in Latin (0000 to 1159) and PM is an abbreviation for *post meridiem*, which means *after the middle of the day* in Latin (1200 to 2359). Record these terms on chart paper.

Further explain that when we use a twenty-four hour clock, we do not need the terms AM and PM. Instead, the hours past noon are recorded as 1300, 1400 and so on. It is also not necessary to place colons between hours and minutes.

Explain to students that the twenty-four hour clock is the international standard notation for time as well as the most commonly used means of keeping time around the world—except in North America. In Canada and the U.S. it is often referred to as *military time*, with the military being the largest user of this means of time keeping. Twenty-four hour time is also used in the medical field, particularly in hospitals.

Explain that when reading the twenty-four hour clock, we read the hour first; the minutes that have passed within the hour follow. For example, seven o'clock PM is recorded as 1900 and read as *nineteen hundred hours*. A quarter to five PM is recorded as 1645 and is read as sixteen forty-five. Times of day are never described in quarter or half hours.

Record several different times of day on chart paper, using the AM/PM numeric format. Have volunteer students show these times on the analog teaching clock or on a clock spinner (3.2.3) and then record the same times in the twenty-four hour format on the chart paper. For example:

- | | |
|---------------------------------|-----------------------------|
| ■ 10:00 PM
(teacher records) | ■ 2200
(student records) |
| ■ 8:14 PM
(teacher records) | ■ 2014
(student records) |

3

- 2:58 AM (teacher records)
- 9:38 PM (teacher records)
- 0258 (student records)
- 2138 (student records)

Distribute Activity Sheet A (3.3.2) to students. For each row on the chart, have them record the time that *is* displayed in the two other formats that are *not* displayed. Display the overhead copy of the twenty-four hour clock for students' reference while completing the activity sheet.

Activity Sheet A

Directions to students

For each row on the chart, record the time that *is* displayed in the two other formats that are *not* displayed (3.3.2).

Problem Solving

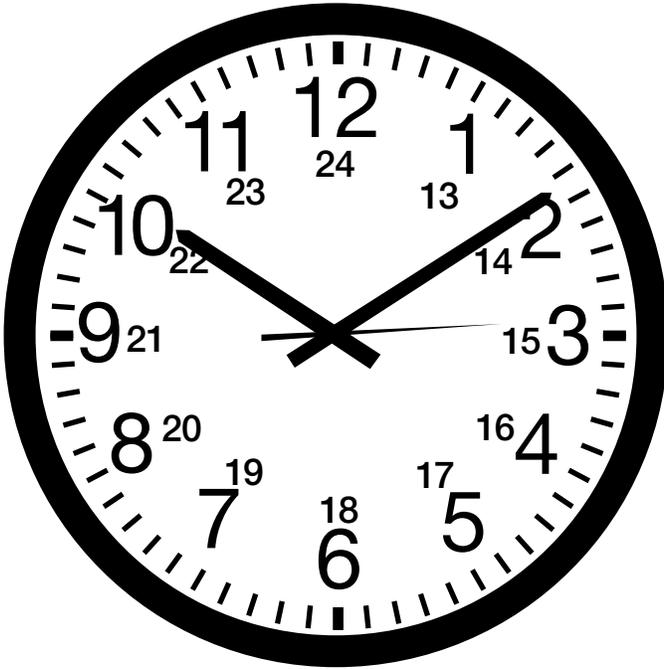
Marianne will be attending hockey camp during spring break. It is two weeks away, and Marianne is counting the hours. How many hours does she need to count?

Note: A reproducible master for this problem can be found on page 80.

Extension

Visit airline and railway websites with students to explore use of the twenty-four hour clock for travel.

Twenty-Four Hour Clock



24-Hour Clock	12-Hour Clock
2400/0000	12:00 AM—midnight (start of day)
0100	1:00 AM
0200	2:00 AM
0300	3:00 AM
0400	4:00 AM
0500	5:00 AM
0600	6:00 AM
0700	7:00 AM
0800	8:00 AM
0900	9:00 AM
1000	10:00 AM
1100	11:00 AM
1200	12 PM—noon
1300	1:00 PM
1400	2:00 PM
1500	3:00 PM
1600	4:00 PM
1700	5:00 PM
1800	6:00 PM
1900	7:00 PM
2000	8:00 PM
2100	9:00 PM
2200	10:00 PM
2300	11:00 PM (11:59 PM—end of day)