

INTRODUCTION

In Grade 5 mathematics, students build on what they have already learned and are introduced to several new concepts. While working through the different topics, it is important that students work on their **Social and Emotional Learning**, using applications and activities from each content area.

CONTENT

The mathematical content in Grade 5 builds on what was learned in Grade 4. In addition to new topics, a review of material already learned is covered before going deeper into the topics.

Number and Financial Literacy

Topics include working with numbers up to a magnitude of 100 000. Included are number sense and operations with both whole numbers and rationals. These areas are applied in a section on Financial Literacy that covers the use of money.

Patterns, Variables, Equations, and Inequalities

Students will work with patterns in tables and charts. Variables, equations, and inequalities are introduced, and a problem-solving approach is used.

Measurement

This chapter includes working with perimeter and area, measuring angles and triangles, and volume and capacity.

Geometric and Spatial Sense

The area deals with properties of two-dimensional shapes and three-dimensional objects. This area also introduces the plotting of points in the first quadrant and transformations of 2-dimensional shapes.

Data and Probability

This chapter provides an introduction to samples and populations and includes ways of displaying and interpreting data. The concept of probability includes applications in business and everyday life through the use of experimental and theoretical probability.

The section covering each content area begins with a description of the concept, followed by examples with clear step-by-step solutions. Students are then provided with questions that range from easy to difficult. Each chapter contains a set of extra practice questions on key concepts from each section in the chapter. Each chapter ends with a chapter test. Answers to all exercises and chapter tests are provided.

SOCIAL EMOTIONAL LEARNING

Social and emotional skills are important when working with mathematics. If you use these skills, it will help you think about how to solve problems. These skills are enhanced by developing problem-solving methods and selecting the best tools and ways to solve a problem.

Chapter 10 goes into more details on these skills and includes examples with answers or explanations. Each set of examples is followed by a set of exercises.

Communicating

Communicating is the process of expressing mathematical ideas and understanding. This is done by using numbers, symbols, pictures, graphs, diagrams, and words. It is important that you are able to communicate to express, describe, explain, and apply mathematical ideas in several different ways.

Representing

Representing involves different ways of showing mathematical ideas. These include drawings, physical models, equations, charts, and graphs. Being able to represent mathematical ideas in different ways and making connections among them to solve problems are important skills.

Connecting and Relating

When you **relate** mathematical concepts to each other, it is called **connecting**. In doing this, you should also be able to make mathematical connections to the real world.

Reasoning and Proving

Reasoning and proving involve an understanding the relationships that apply to numbers, shapes, or operations. Steps involved in this process include defining the relationship, analyzing why it is true, and determining if it can be applied to numbers, shapes, or operations.

CODING

Learning how computers follow instructions is an important part of **coding** in mathematics. It involves writing a set of instructions that a computer understands. Chapter 11 will help to strengthen the coding knowledge that students already have. It will also introduce the idea of conditional statements that can change the outcome based on whether a condition is met.

CHAPTER 1

NUMBER CONCEPTS

1.1 Representing and Describing Whole Numbers

1.2 Comparing and Ordering Numbers

1.3 Rounding and Estimation

If you need additional help, there are more resources available at www.dynamicmath.ca.

$$4617 = 4 \times 1000 + 6 \times 100 + 1 \times 10 + 7 \times 1$$

Examples:

- | | |
|----------------------------------|--|
| 1. Use 35 172 instead of 35,172. | Leave a space with three digits to the right. |
| 2. Use 53 873 instead of 53,873. | Leave a space with three digits to the right. |
| 3. Use 4215 instead of 4,215. | Since there are only 4 digits, do not leave a space. |

Examples with Solutions

1. Write a numeral for each of the following word numbers.

- | | |
|--|--------|
| a. two hundred fifty-three | 253 |
| b. one hundred twenty | 120 |
| c. three thousand four hundred seventy | 3470 |
| d. six thousand fifty-seven | 6057 |
| e. five thousand six hundred two | 5602 |
| f. fifty thousand three hundred six | 50 306 |

2. Write a word number for each of the following numerals.

- | | |
|-----------|---|
| a. 509 | five hundred nine |
| b. 3238 | three thousand two hundred thirty-eight |
| c. 4044 | four thousand forty-four |
| d. 6305 | six thousand three hundred five |
| e. 8230 | eight thousand two hundred thirty |
| f. 41 206 | forty-one thousand two hundred six |

3. Write as many different numerals as possible from the following digits.

7, 3

Possible numerals with one digit are 3 and 7.

Possible numerals with two digits are 37 and 73.

All possible numerals are: 3, 7, 37, 73.

4. Use proper spacing and delete commas to rewrite each numeral shown incorrectly on the left.

Incorrectly Written Numeral

Correct Version

a. 4,678

4678 (remove comma, no space)

b. 7 349

7349 (remove space)

c. 10,348

10 348 (remove comma, insert space)

d. 72,431

72 431 (remove comma, insert space)

e. 45,689

45 689 (remove comma, insert space)

Place Value

When we write numerals from 0 to 9, they involve only the “ones” digits.

Examples:

1. 9 is equal to nine ones.
2. 2 is equal to two ones.

When we write numerals from 10 to 99, they involve both “tens” and “ones” digits.

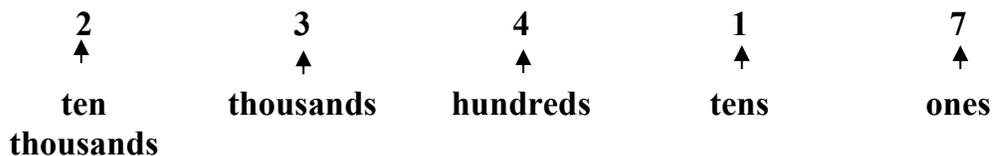
Examples:

1. 16 is equal to 1 ten and 6 ones.
2. 68 is equal to 6 tens and 8 ones.

When we write numerals between 100 and 999, they involve **hundreds, tens, and ones digits**.

Example: 962 is equal to 9 hundreds, 6 tens, and 2 ones.

Numerals between 1000 and 99 999 can include the “**ten thousands, thousands, hundreds, tens, and ones**” digits. The number 23 417 is shown below with the place value for each digit.



So 23 417 has 2 ten thousands, 3 thousands, 4 hundreds, 1 ten, and 7 ones
(twenty-three thousand four hundred seventeen)

↑
Combine the thousands.

↑
Combine the tens and ones.

Examples with Solutions

1. What is the value of the underlined digit in each of the following numerals?

- | | |
|-------------------|---|
| a. <u>4</u> 53 | The digit 5 is in the tens place, so it is equal to $5 \times 10 = 50$. |
| b. 68 <u>2</u> | The digit 2 is in the ones place, so it is equal to $2 \times 1 = 2$. |
| c. <u>5</u> 09 | The digit 5 is in the hundreds place, so it is equal to $5 \times 100 = 500$. |
| d. <u>2</u> 345 | The digit 3 is in the hundreds place, so it is equal to $3 \times 100 = 300$. |
| e. <u>5</u> 230 | The digit 5 is in the thousands place, so it is equal to $5 \times 1000 = 5000$. |
| f. <u>5</u> 4 895 | The digit 4 is in the thousands place, so it is equal to $4 \times 1000 = 4000$. |
| g. <u>2</u> 4 305 | The digit 2 is in the ten thousands place, so it is equal to $2 \times 10\ 000 = 20\ 000$. |

2. Write each numeral described below.

- | | |
|--|--------|
| a. I have 4 hundreds, 5 tens, and 3 ones. | 453 |
| b. I have 2 thousands, 3 hundreds and 7 ones. | 2307 |
| c. I have 7 thousands, 9 hundreds, and 8 ones. | 7908 |
| d. I have 6 ten thousands and 2 hundreds. | 60 200 |
| e. I have 3 ten thousands, 1 thousand, and 5 tens. | 31 050 |
| f. I have 6 thousands and 3 ones. | 6003 |
| g. I have 7 thousands and 3 hundreds. | 7300 |

3. Write each numeral as a word number.

- | | |
|-----------|--|
| a. 25 040 | twenty-five thousand forty |
| b. 62 305 | sixty-two thousand three hundred five |
| c. 70 027 | seventy thousand twenty-seven |
| d. 85 808 | eighty-five thousand eight hundred eight |

4. Write each word number as a numeral.

- | | |
|--|--------|
| a. twenty-five thousand two hundred nine | 25 209 |
| b. twelve thousand six hundred forty-eight | 12 648 |
| c. thirty-three thousand three hundred ten | 33 310 |
| d. sixty thousand thirty-five | 60 035 |

Expressing a Numeral using Expanded Form

We can show a numeral as a sum of the values of its digits. This is called writing the numeral in **expanded form**. For example, 526 is equal to $500 + 20 + 6$. Keep in mind the place values of the digits.

Examples:

$$1. \quad 34 = (3 \times 10) + (4 \times 1) = 30 + 4$$

$$2. \quad 793 = (7 \times 100) + (9 \times 10) + (3 \times 1) = 700 + 90 + 3$$

$$3. \quad 8408 = (8 \times 1000) + (4 \times 100) + (0 \times 10) + (8 \times 1) = 8000 + 400 + 8$$

Examples with Solutions

1. Write each numeral in expanded form.

a. 5642

$$5642 = (5 \times 1000) + (6 \times 100) + (4 \times 10) + (2 \times 1)$$

b. 4059

$$4059 = (4 \times 1000) + (5 \times 10) + (9 \times 1)$$

c. 24 040

$$24\ 040 = (2 \times 10\ 000) + (4 \times 1000) + (4 \times 10)$$

2. Write the numeral that has 5 thousands, 2 hundreds, 3 tens, and 0 ones.

$$\underline{5} \times 1000 + \underline{2} \times 100 + \underline{3} \times 10 + \underline{0} \times 1 \\ = 5000 + 200 + 30 + 0 = 5230$$

3. Write the word number for the numeral **7215**.

The numeral has 7 thousands, 2 hundreds, 1 ten, and 5 ones.

The word number is **seven thousand two hundred fifteen**.

4. Write 30 574 in words.

The numeral has 3 ten thousands, 5 hundreds, 7 tens, and 4 ones.

The word number is **thirty thousand five hundred seventy-four**.

5. Write three thousand five hundred twenty as a numeral.

There are 3 thousands, 5 hundreds, and 2 tens.

The numeral is **30 520**.

6. In the numeral 70 218,
- a. What is the value of the 2? The 2 is in the hundreds column, so its value is $2 \times 100 = 200$.
 - b. What is the value of the 1? The one is in the tens column, so its value is $1 \times 10 = 10$.
 - c. What is the value of the 7? The 7 is in the ten thousands column, so its value is $7 \times 10\,000 = 70\,000$.

Exercises 1.1

1. Write a numeral for each of the following word numbers.
 - a. one hundred seventy
 - b. five hundred nine
 - c. four hundred twenty-four
 - d. six thousand fifteen
 - e. two thousand thirty-six
 - f. twenty-two thousand ten
 - g. thirty thousand two hundred one
 - h. two thousand six hundred
2. Write a word number for each of the following numerals.
 - a. 345
 - b. 304
 - c. 1250
 - d. 2253
 - e. 32 753
 - f. 70 150
 - g. 62 344
 - h. 33 303
3. Write as many different numerals as possible from the following digits.
 - a. 5, 2
 - b. 1, 7

4. Rewrite each numeral using proper spacing and removing commas.

- a. 4 790
- b. 7,666
- c. 5,555
- d. 12,456
- e. 30,148
- f. 22,088
- g. 47,031
- h. 30,022

5. Fill in each blank with the correct digit in the table below.

	ten thousands	thousands	hundreds	tens	ones
a. 405					
b. 2210					
c. 6070					
d. 5055					
e. 20 245					
f. 31 042					
g. 78 103					

6. Write each numeral using expanded notation.

- a. 4522
- b. 3022
- c. 40 250
- d. 12 090
- e. 38 0 80
- f. 12 790

7. Write each numeral described below.

- a. I have 3 thousands, 2 tens, and 7 ones.
- b. I have 6 hundreds and 9 ones.

12. I have 15 ones and 9 tens.
13. I have 30 tens and 2 ones.
14. I have 14 hundreds, 6 tens,
and 18 ones.
15. I have twice as many thousands as tens,
twice as many tens as ones,
and 2 less than 4 ones.
16. I have 6 thousands, half as many hundreds
as thousands, and the same number of
tens and ones as hundreds.
17. I have the same number of thousands,
hundreds, tens, and ones. The sum of my
digits is 28.
18. List all of the 3-digit numerals that can be made from the digits 3, 6, and 9.
19. List all of the numerals containing one, two, or three digits that can be made from the
digits 5, 2, and 3.

CHAPTER 11

CODING

11.1 The Structure of Coding

11.2 Simplifying the Code

11.3 Code Blocks

11.4 Conditional Statements

11.5 Writing Code in *Scratch*

Coding at the Grade 5 Level

This chapter will help strengthen the coding knowledge you already have and will introduce new concepts that will teach you how to use **conditional statements** to change the outcome based on whether a condition is met. We will then explore how these conditional statements can be nested to produce different outcomes.

We will be relying on your knowledge of the content in previous chapters. You should complete those chapters before doing this chapter on coding. We will be exploring coding examples that require your understanding of the following topics:

- Geometry of squares, rectangles, triangles, and shapes created from the combination of these shapes
- Classification of angles, such as right, acute, obtuse, and reflex.
- Compass directions (north, east, south, west), and translations on a grid
- Parallel and perpendicular lines
- Inequalities (greater than “>” and less than “<”)

The best way for students to understand how coding works is for them to write some code and see the outcome.

This chapter provides explanations, examples, and practice questions that do not require the use of a computer or other technology. It also includes references to some optional online resources and tools that you can use to practice writing your own code using a free coding platform. Internet access will be needed to participate in the optional online part of this chapter.

The free coding platform that is used is called *Scratch*. This program makes use of coding blocks that you can drag and drop to create your own code and execute it on the screen. We use screenshots of these coding blocks in this chapter.

It is okay if access to the Internet is not possible, as all the topics are covered directly in this book. You will probably enjoy this unit more if you are able to create your own code and test it online.

Scratch is part of the MIT Media Lab and is free to use. (<https://scratch.mit.edu>)

11.1 The Structure of Coding

Have you ever played a game where one person is blindfolded and the other person gives them instructions to help them move through a maze or obstacle course? The person giving the instructions must give very specific instructions so that the blindfolded person doesn't run into a wall or trip over something. This is exactly what we are doing when we are coding.

Coding is writing a set of instructions that a computer can understand so that the computer can complete a specific task. If you want a computer to do something, like move a character through a maze, then you need to give it a set of instructions that it can understand and follow. These instructions make up the **code**. When a computer follows these instructions, it is **executing the code**.

Let's think about the instructions we would give to help a blindfolded person move through an obstacle course. We would probably give instructions like the following:

1. Move two steps forward.
2. Turn 90 degrees to your right.
3. Move three steps forward.

These instructions are in sequence, meaning one instruction follows another. In coding, we call these instructions **sequential events**.

If we wanted the blindfolded person to jump over a rope, our instructions would be to jump and move forward at the same time. In coding, instructions that happen at the same time are called **concurrent events**.

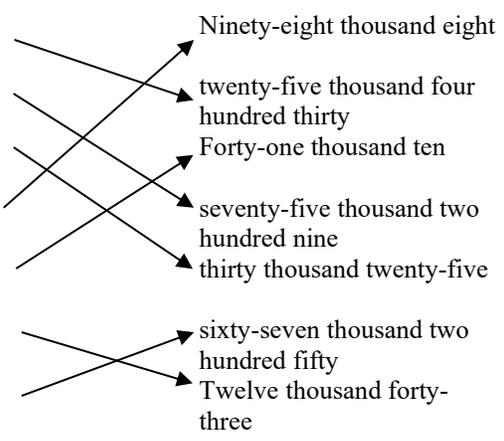
Exercises 11.1

1. Try the blind fold game. Find a partner. One of you will be blindfolded and the other one will direct them through a maze or obstacle course. How did it go? What were some of the challenges? What successes do you have?

ANSWERS TO EXERCISES AND UNIT TESTS

CHAPTER 1

Exercises 1.1 (page 7)

1. a) 170 b) 509 c) 424 d) 6015 e) 2036
 f) 22 010 g) 30 201 h) 2600
 2. a) three hundred forty-five
 b) three hundred four
 c) one thousand two hundred fifty
 d) two thousand two hundred fifty-three
 e) thirty-two thousand seven hundred fifty-three
 f) seventy thousand one hundred fifty
 g) sixty-two three hundred forty-four
 h) thirty-three thousand three hundred three 3.
 a) 2, 5, 25, 52 b) 1, 7, 17, 71
 4. a) 4790 b) 7666 c) 5555 d) 12 456
 e) 30 148 f) 22 088 g) 47 031 h) 30 022
 5. a) 0 0 4 0 5 b) 0 2 2 1 0 c) 0 6 0 7 0
 d) 0 5 0 5 5 e) 2 0 2 4 5 f) 3 1 0 4 2
 g) 7 8 1 0 3
 6. a) $4 \times 1000 + 5 \times 100 + 2 \times 10 + 2 \times 1$
 b) $3 \times 1000 + 2 \times 10 + 2 \times 1$
 c) $4 \times 10\ 000 + 2 \times 100 + 5 \times 10$
 d) $1 \times 10\ 000 + 2 \times 1000 + 9 \times 10$
 e) $3 \times 10\ 000 + 8 \times 1000 + 8 \times 10$
 f) $1 \times 10\ 000 + 2 \times 1000 + 7 \times 100 + 9 \times 10$
 7. a) 3027 b) 609 c) 20 352 d) 8035
 8. a) 600 b) 90 c) 3000 d) 50 000
 9.
 a. 25 430 
 b. 75 209
 c. 30 025
 d. 98 008
 e. 41 010
 f. 12 043
 g. 67 250
 Ninety-eight thousand eight
 twenty-five thousand four hundred thirty
 Forty-one thousand ten
 seventy-five thousand two hundred nine
 thirty thousand twenty-five
 sixty-seven thousand two hundred fifty
 Twelve thousand forty-three
 10. 3202 11. 261 12. 105 13. 302 14. 1478
 15. 8042 16. 6333 17. 7777
 18. 369, 396, 639, 693, 936, 963 19. 2, 3, 5, 23,
 32, 25, 52, 35, 53, 523, 532, 253, 235, 352, 325

Exercises 1.2 (page 13)

1. a) 520 b) 31 002 c) 11 018 d) 19 911

2. a) 499 b) 3028 c) 13 389 d) 19 299
 3. a) 1610, 1605, 1599, 1598
 b) 43 100, 43 090, 43 033, 43 017
 4. a) 158, 159, 162, 200, 201
 b) 11 009, 11 029, 11 034, 11 040
 5. 217, 271, 127, 172, 721, 712 6. 7, 8, 9

Exercises 1.3 (page 17)

1. a) 60 b) 90 c) 200
 d) 12 200 e) 19 000 f) 2540 g) 72 000
 h) 1660 i) 90 900 j) 91 920 k) 65 000
 2. a) 30×40 ; 1200 b) 100×300 ; 30 000
 c) 50×100 ; 5000 d) 300×300 ; 90 000
 e) 1000×100 ; 100 000 3. $300 + 300 + 600$;
 1200 4. $500 + 600 + 500 + 600$; 2200 km
 5. $40 + 60 + 70 + 110$; 280 tickets
 6. $300 + 500 + 200 + 500$; 1500 cards
 7. $70 + 70 + 40 + 70 + 90 + 90 + 90 + 60$;
 580 students 8. 15 675, 15 676, 15 677,
 15 678, 15 679 9. 1, 2, 3, 4 10. Round 21
 months down to 20 and round the number of
 days in each month to 30. $30 \times 20 = 600$
 11. a) 35, 36, 37, 38, 39 40, 41, 42, 43, 44
 b) 8550, 8551, 8552, 8553, 8554, 8555
 12. a) 9842 b) 2489

Extra Practice – Chapter 1 (page 21)

1. a) 230 b) 702 c) 639 d) 4012 e) 20 076
 f) 58 003 2. a) six hundred fifteen b) seven
 hundred seven c) four thousand nine hundred
 eighty d) four thousand seventy-eight
 e) thirty-two thousand forty-four
 f) eighty thousand five 3. a) 5, 6, 56, 65
 b) 1, 2, 7, 12, 17, 21, 71, 27, 72, 127, 172, 217,
 271, 712, 721 4. a) 25 066 b) 4550
 c) 72 003 d) 43 005 5. a) 7 b) 60 000 c) 50
 d) 2000 6. a) $(4 \times 1000) + (5 \times 10) + (7 \times 1)$
 b) $(2 \times 10\ 000) + (3 \times 1000) + (6 \times 100) +$
 $(4 \times 10) + (2 \times 1)$ c) $(1 \times 10\ 000) + (5 \times 1000)$
 $+ (3 \times 100) + (9 \times 1)$ d) $(2 \times 10\ 000) +$
 $(6 \times 1000) + (1 \times 100) + (7 \times 10) + (4 \times 1)$
 7. a) 2007 b) 905 c) 50 802 d) 4016
 e) 2912 f) 32 315 8. 51 010 9. 35 090
 10. a) 4630 b) 4600 c) 5000 d) 37 260
 e) 37 300 f) 37 000 g) 40 000 h) 60 010
 11. a) 40×70 ; 2800 b) 200×300 ; 60 000