Grade 7 Mathematics: Number

Free sample lesson

Ontario curriculum: Mathematics (2020), Strand B: Number (B1 Number Sense, B2 Operations). 20 days.

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This is Lesson 1 of 12 from the full unit, exactly as it appears in the Teacher Guide, followed by the student worksheet. The full unit is at unitplans.ca.

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Lesson 1: Reading and writing numbers to one billion

1 day · about 60 minutes · B1.1

Learning goal

- We are learning to read, write, compare and expand numbers up to one billion using place value and powers of ten.

Success criteria

- I can say the value of any digit in a number up to one billion.
- I can write a large number in expanded form with powers of ten.
- I can compare and order large numbers and explain how I know.

Materials

- Place value chart (to billions)
- Digit cards 0–9
- Calculators

Minds On (10 min)

1. Show the numbers 48 300 000 and 483 000 000 side by side. Ask: "Which number is bigger, and how can you tell without counting digits one at a time?"
2. Take two or three answers and record the strategies (count digits, compare the leftmost digit).

Action (35 min)

1. Build a number on the place value chart one digit at a time. Group digits in threes with spaces, the way we write numbers in Canada.
2. Model expanded form: each digit times the power of ten for its place. Link $10 \times 10 \times 10$ to 10^3.
3. Compare numbers by lining up place values and starting at the left. Students do worksheet questions 1–6 in pairs.

Consolidation (15 min)

1. Share question 5. Ask where we meet numbers this large (populations, distances, money in a national budget).
2. Exit: "What is the value of the digit 4 in 142 603 975, and how do you know?"

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Questions to ask

- How many zeros are in one million? In one billion?
- What happens to the value of a digit when it moves one place to the left?
- Why do we leave a space between groups of three digits?

Watch for

- Students read a number from the right, or ignore zeros as placeholders (48 030 000 vs 48 300 000). Keep the place value chart visible and say each place aloud.
- Students think a number with more non-zero digits is larger. Compare the leftmost places first.

Differentiation

Support	Extend
Use a place value chart with the columns pre-labelled and colour-coded in groups of three. Start with numbers up to 9 999 999 before moving to hundreds of millions.	How many millions are in one billion? How many thousands? Write each as a power of ten. Find a real statistic in the news that is over one million and write it in expanded form.

Answer key: Numbers to one billion

1. Write 405 072 316 in expanded form using powers of ten.

   > **Answer:** $4 \times 10^8 + 5 \times 10^6 + 7 \times 10^4 + 2 \times 10^3 + 3 \times 10^2 + 1 \times 10^1 + 6$
   > Each non-zero digit times its power of ten: $4 \times 10^8 + 5 \times 10^6 + 7 \times 10^4 + 2 \times 10^3 + 3 \times 10^2 + 1 \times 10^1 + 6$

2. In the number 273 845 106, what is the value of the digit 7?

   > **Answer:** 70 000 000 (7 ten millions)
   > The digit 7 is in the ten millions place.

3. Write the number shown in expanded form: $6 \times 10^8 + 2 \times 10^5 + 9 \times 10^3 + 4$.

   > **Answer:** 600 209 004

4. Order these numbers from least to greatest: 48 300 000, 483 000 000, 48 030 000, 84 300 000.

   > **Answer:** 48 030 000 < 48 300 000 < 84 300 000 < 483 000 000

5. The population of a province is 38 250 000 (made-up). How many millions is that? (Write a decimal.)

> **Answer:** 38.25 million
> 38 250 000 ÷ 1 000 000 = 38.25

6. Ana says one billion is written as 10^9 because it is a 1 followed by nine zeros. Is she correct? Explain.

> **Answer:** Yes. 10^9 has nine factors of 10, which gives 1 followed by 9 zeros: 1 000 000 000.

7. How many times as large as one million is one billion?

> **Answer:** 1000
> 1 000 000 000 ÷ 1 000 000

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Student worksheet: Numbers to one billion

Success criteria

- I can say the value of any digit in a number up to one billion.
- I can write a large number in expanded form with powers of ten.
- I can compare and order large numbers and explain how I know.

Show your work. Group digits in threes with spaces.

1. Write 405 072 316 in expanded form using powers of ten.

2. In the number 273 845 106, what is the value of the digit 7?

3. Write the number shown in expanded form: $6 \times 10^8 + 2 \times 10^5 + 9 \times 10^3 + 4$.

4. Order these numbers from least to greatest: 48 300 000, 483 000 000, 48 030 000, 84 300 000.

5. The population of a province is 38 250 000 (made-up). How many millions is that? (Write a decimal.)

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7. How many times as large as one million is one billion?

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