

GRADE 8

Mathematics



COMPLETE GRADE 8 MATH CURRICULUM



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- ✦ chapter tests included

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Teachers and schools can buy class sets of the Dynamic Math books to use in their classrooms as workbooks or textbooks. Since the books are specifically aligned with the curriculum in each province, they are a great resource for schools.

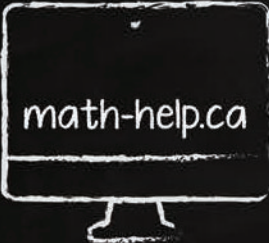
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WHY DYNAMIC MATH?

Dynamic Math workbooks are written by teachers directly for each province. This ensures that you are getting the exact same material that is being taught in the classroom. Our teachers also produce engaging online content to further support and enhance learning.

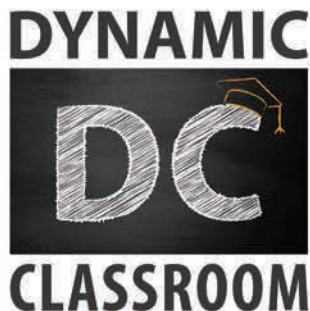
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Dear Parents,

Helping kids understand and apply mathematics knowledge and skills is a collective responsibility of parents, teachers, and principals.

Students need to learn mathematics in a way that will serve them throughout their lives. Understanding mathematics can provide our students with many job and career opportunities.

This is why students need to know why mathematics works the way it does, how to use it with confidence and competence when solving problems.

Understanding mathematics enables us to:

- Solve problems, make sound decisions and perform calculations with ease
- Explain how we solved a problem and why we made a particular decision
- Understand patterns and trends so that we can make predictions
- Understand Financial Literacy to manage time and money
- Handle everyday situations that involve numbers and feel confident

Before your child can learn mathematics, he or she needs to believe in his or her ability to do so. That's where you come in!

Parents, you are your child's first role model for learning. When you engage with your child in a supportive, relaxed atmosphere, your child will enjoy exploring the world of mathematics.

Dynamic Math is committed to helping parents and students. We understand that not everyone learns the same way, and not everyone feels the same about math. This is why we are continually working to create math resources that help students of all abilities, while supporting the many learning styles and varying levels of enthusiasm towards math.

From our clear concise instructions and straightforward guided examples to our additional practice material and tests, there's something to suit everyone. Combined with our video tutorials, students will be able to get a tutor-like experience from anywhere and at a fraction of the cost of standard tutoring or after-school help programs.

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UNIT 1

NUMBER CONCEPTS

1.1 Rational and Irrational Numbers

1.2 Two and Three Term Ratios

1.3 Percent

1.4 Square Root Concept

1.5 Square Roots and Calculators

1.6 Cubes of Numbers

1.7 Rates

1.8 Scientific Notation

If you need additional help, there are more resources available at math-help.ca/more.

1.1 Rational and Irrational Numbers

Rational Numbers

A **rational number** is any number that can be written in the form $\frac{a}{b}$ where a and b are integers and $b \neq 0$. This includes the natural numbers (the counting numbers: 1, 2, 3, ...), the whole numbers (add 0 to the counting numbers to get 0, 1, 2, 3, ...), and integers (add the negatives of counting numbers to the set to get ..., -2, -1, 0, 1, 2, ...). Natural, whole, and integer numbers are rational since each can be written in the form $\frac{a}{b}$ ($1 = \frac{1}{1} = \frac{2}{2}$, $-3 = \frac{-3}{1}$, $0 = \frac{0}{4}$).

Examples of Rational Numbers:

All fractions and mixed numbers, both positive and negative

Examples: $\frac{2}{3}$, $\frac{-3}{4}$, $\frac{5}{2}$, $-3\frac{1}{4}$ (note: $\frac{0}{7} = 0$ is rational, but $\frac{7}{0}$ is **not rational** since it is not defined when the denominator equals 0).

All integers

Examples: -11, -3, 0, 1, 5, 68

All terminating and repeating decimals, both positive and negative

Examples: 0.8, -0.32, $0.\overline{3}$, $7.\overline{12}$

Irrational Numbers

A number that cannot be written as the quotient ($\frac{a}{b}$) of two integers is called an **irrational number**.

Examples of Irrational Numbers:

Numbers that are roots of whole numbers that cannot be simplified to obtain a rational number

Examples: $\sqrt{2}$, $\sqrt{5}$, $\sqrt{11}$ ($\sqrt{9}$ is rational since it is equal to 3)

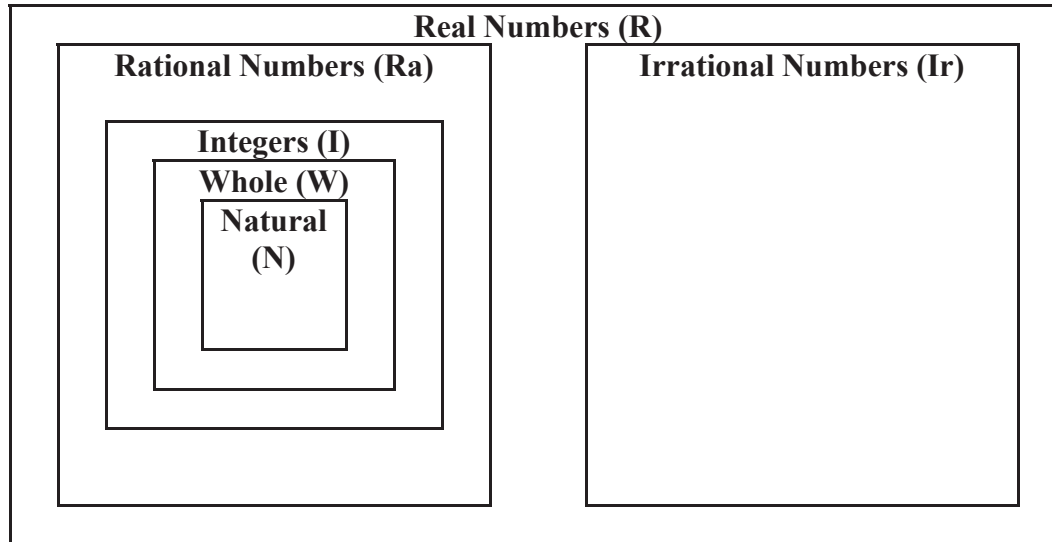
Numbers whose decimal representation does not repeat in a pattern

Examples: 0.1357421... ($0.\overline{3}$ is rational since it repeats a pattern and is equal to $\frac{1}{3}$)

Special numbers such as π

Real Numbers

Real numbers consist of the set of all rational and all irrational numbers. The diagram below shows the relationship among the sets of numbers discussed so far.



Sets of rational numbers include the following:

Natural numbers: $N = \{1, 2, 3, 4, \dots\}$

Whole numbers: $W = \{0, 1, 2, 3, 4, \dots\}$

Integers: $I = \{\dots -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$

Rational numbers: $Ra =$ All of the above plus any other number that can be written in the form $\frac{a}{b}$, $b \neq 0$

Identifying Rational and Irrational Numbers

Rational numbers can be shown in several different formats.

1. Natural numbers, whole numbers, and integers

Examples: 2, -23, 0, 5001, -673

2. Fractions, mixed numbers, or improper fractions

Examples: $\frac{2}{7}$, $-\frac{3}{5}$, $1\frac{1}{4}$, $\frac{7}{5}$, $-2\frac{1}{10}$, $-\frac{8}{3}$

3. Decimals (terminating or repeating)

Examples: 0.8, -0.25, $0.\overline{223}$, $2.\overline{61}$

Examples with Solutions

1. Put a check mark (\checkmark) if the number belongs to the set of numbers

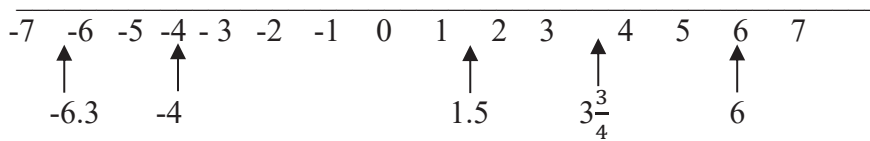
Set of Numbers

	Number	N	W	I	Ra	R
1.	3	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
2.	-10			\checkmark	\checkmark	\checkmark
3.	$\frac{11}{3}$				\checkmark	\checkmark
4.	0.9				\checkmark	\checkmark
5.	$0.\overline{7}$				\checkmark	\checkmark
6.	π					\checkmark
7.	$1\frac{5}{8}$				\checkmark	\checkmark
8.	1.25				\checkmark	\checkmark
9.	0		\checkmark	\checkmark	\checkmark	\checkmark
10.	$\sqrt{9}$	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark

Note: N = Natural Numbers, W = Whole Numbers, I = Integers, Ra = Rational Numbers, R = Real Numbers

Comparing and Ordering Rational Numbers

Each rational number corresponds to a point on the number line. Several examples are shown below.



Numbers **increase** in magnitude as you go from left to right on the line.

Examples: $1 < 3$, $2.1 < 4$; $-7 < -6$; and $2 > 1.8$; $-3 > -5$; $-1 > -10.5$

To compare the magnitudes of rational numbers where one is written in decimal and the other in common fraction form, write both either in decimal or else in common fraction form and then compare.

Examples with Solutions

1. Compare 0.1 with $\frac{3}{20}$.

Convert both to fractions first. Change 0.1 to $\frac{1}{10}$. The common denominator is 20, so $\frac{1}{10} = \frac{2}{20}$.

$$\frac{2}{20} < \frac{3}{20} \text{ or } 0.1 < \frac{3}{20}$$

2. Compare 3.15 with $3\frac{1}{11}$.

Convert both to decimals first. Change $3\frac{1}{11}$ to a decimal $\rightarrow 3.\overline{09}$.

$$3.15 > 3.\overline{09} \text{ or } 3.15 > 3\frac{1}{11}.$$

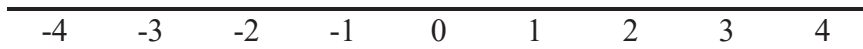
Exercises 1.1

Put a check mark (\checkmark) if the number belongs to the set of numbers

Set of Numbers

	Number	N	W	I	Ra	R
1.	7					
2.	-18					
3.	$\frac{7}{8}$					
4.	0.36					
5.	$0.\overline{5}$					
6.	$\sqrt{6}$					
7.	$2\frac{3}{4}$					
8.	-5.6					
9.	$\frac{0}{8}$					
10.	$\sqrt{16}$					

11. Locate the following numbers on the number line: $3.1, 2\frac{5}{8}, \frac{13}{12}, -\sqrt{6}, -\sqrt{16}$



12. Arrange the following numbers from smallest to largest.

a. $-0.57, -0.507, -5.07, -5.70$

b. $3.4, -\frac{11}{3}, -3.4, -3.5$

c. $-\frac{3}{8}, \frac{2}{3}, -0.6, -0.4$

13. Put the correct symbol ($>$, $=$, $<$) between each pair of numbers.

a. 0.15 $\frac{7}{40}$

b. -1.8 $-\frac{9}{5}$

c. -2.8 $-\frac{13}{5}$

Extra for Experts

14. Express each term in common fraction form (as a quotient of two integers).

a. 0.17

b. $-\overline{0.5}$

c. $-1\frac{2}{3}$

d. 3.07

15. Which rational number is greater?

a. $-\overline{0.6}$ or -0.6 ?

b. -0.25 or $-\frac{1}{3}$?

c. $-\frac{2}{3}$ or $-\frac{4}{5}$?

ABORIGINAL APPLICATIONS

THE RAVEN



BT Collection



The principal character in many aboriginal myths is the Raven, who is considered to be a crafty bird and a maker of mischief. Many of the myths about how daylight began and why seasons alternate are attributed to this feathered symbol. He is known as the keeper of secrets and a long-distance healer. The Raven signifies creation and knowledge, as well as the complexity of nature and the intricacy of truth.

It is thought that the Raven was called upon to clarify the truths in visions and by some was considered a god. Members of Northwest Coast First Nations are clans that are linked to animal life. The Raven sees the unknown and can share his knowledge with members of his Clan.

Math Applications

1. If a raven flew a distance of 112 km in 5 hours, what was its average rate of speed in kilometres per hour?
2. Seven ravens were looking for fish on a beach. Three of them, at one end of the beach, found and ate 14 herring. The other 4 ravens, at the other end of the beach, found and ate 8 herring. What was the ratio of ravens to the number of herring eaten?

Answers

1. $112 \div 5 = 22.4$
The average rate of speed was 22.4 km/h.
2. The 7 ravens ate 22 herring.
The ratio of ravens to herring eaten was 7:22
or $\frac{7}{22}$.

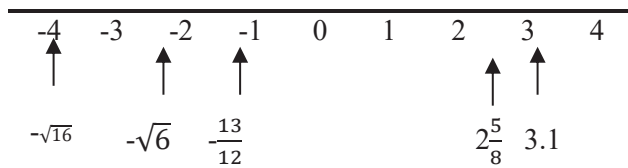
ANSWERS TO EXERCISES AND UNIT TESTS

UNIT 1

Exercises 1.1 (page 5)

	Set of Numbers					
	No.	N	W	I	Ra	R
1.	7	√	√	√	√	√
2.	-18			√	√	√
3.	$\frac{7}{8}$				√	√
4.	0.36				√	√
5.	0.5				√	√
6.	$\sqrt{6}$					√
7.	$2\frac{3}{4}$				√	√
8.	-5.6				√	√
9.	$\frac{0}{8}$		√	√	√	√
10.	$\sqrt{16}$	√	√	√	√	√

11.



12. a) -5.70, -5.07, -0.57, -0.507

b) $-\frac{11}{3}$, -3.5, -3.4, 3.4 c) $-\frac{2}{3}$, -0.6, -0.4, $-\frac{3}{8}$

13. a) < b) = c) < 14. a) $\frac{17}{100}$ b) $-\frac{5}{9}$ c) $-\frac{5}{3}$

d) $3\frac{7}{100} = \frac{307}{100}$ 15. a) -0.6 It is to the right of $-0.\bar{6}$ on the number line. b) -0.25

c) $-\frac{2}{3}$ (change to $-\frac{10}{15}$ and $-\frac{12}{15}$)

Exercises 1.2 (page 9)

1. a) 1 : 3 b) $\frac{2}{5}$ c) 8 to 3 d) 4 : 2 : 1 e) $\frac{5}{4}$

2. a) $x = 20$ b) $x = 4$ c) $x = 35$ d) $x = 4$

e) $x = 1$ 3. a) $x = 6$ b) $x = 16$ c) $x = 1.8$

d) $x = 3$ e) $x = 36$ 4. a) $x = 5, y = 27$

b) $x = 5, y = 4$ c) $x = 45, y = 10$

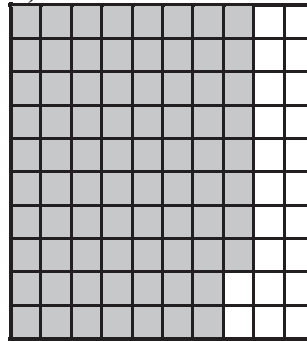
d) $x = 30, y = 75$ e) $x = 28, y = 35$

5. a) $x = 2, y = 9$ b) $x = 12, y = 18$ c) $x = 1$

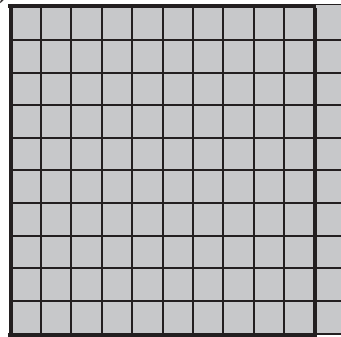
d) $x = 31.5, y = 13.5$ e) $x = 1.2, y = 11$

Exercises 1.3 (page 14)

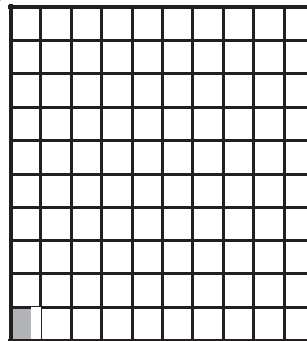
1. a)



b)



c)



2. a) 4% b) 118%

3.

	Ratio	Fraction	Decimal	Percent
a)	3 : 8	$\frac{3}{8}$	0.375	37.5%
b)	6 : 5	$\frac{6}{5}$	1.2	120%
c)	39 : 100	$\frac{39}{100}$	0.39	39%
d)	7 : 100	$\frac{7}{100}$	0.07	7%
e)	11 : 3	$\frac{11}{3}$	$3.\bar{6}$	$366.\bar{6}\%$
f)	17 : 6	$2\frac{5}{6}$	$2.8\bar{3}$	$283.\bar{3}\%$
g)	51 : 10	$5\frac{1}{10}$	5.1	510%



Dynamic Math Resources

Dynamic Classroom has created resources that align with the provincial curriculum for Grades 3 to 12. The following resources are available in British Columbia.

Math Workbooks

ELEMENTARY	HIGH SCHOOL
Grade 3 Mathematics	Grade 8 Mathematics
Grade 4 Mathematics	Grade 9 Mathematics
Grade 5 Mathematics	Grade 10 Foundations and Pre-Calculus
Grade 6 Mathematics	Grade 11 Pre-Calculus
Grade 7 Mathematics	Grade 12 Pre-Calculus

Orders can be placed online at www.dynamicmath.ca.

Video Subscriptions

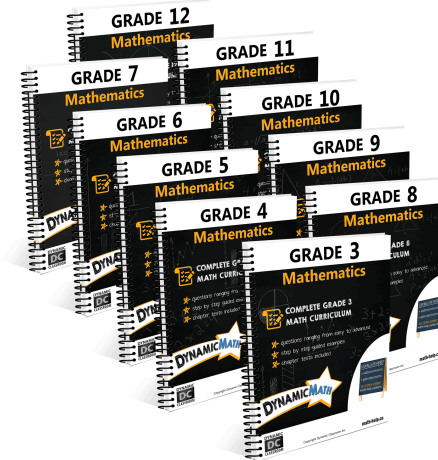
Access to all videos for Grades 4-10	Monthly - \$9.95 per month
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Orders for videos can be placed online at www.dynamicmath.ca.

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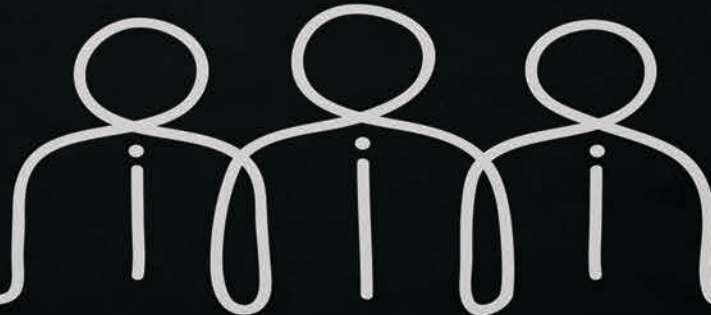
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My son would never have passed grade 10 without Dynamic Math. Thank you!

My daughter loves your math books because she can work through them on her own. We'll definitely be buying the next grade in the fall.

I was so happy to finally find a math workbook that was exactly what my son was doing in class.



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