Vermont SBAC Grade 9 Math Step by Step

A Beginner Friendly Guide to Learning Math

Dr. A. Nazari

Published by View Math Education
ViewMath.com

PRACTICE & TRACK

Take Your Learning Online with ViewMath Academy!

For Parents, Teachers & Students

*Love what you're reading? ViewMath Academy is your **free online companion** to this book — practice what you learn, track your progress, and master every topic!*

- ***Topic Quizzes*** — *Test yourself on each topic right after you study it in this book*
- ***Interactive Lessons*** — *Revisit any concept with online lessons that match each chapter*
- ***Progress Tracking*** — *Watch your mastery grow as you work through the book*
- ***Adaptive Practice*** — *Get more questions on topics where you need extra help*
- ***Practice Tests*** — *When you're ready, take a full practice test and analyze your score online*

Scan to visit ViewMath Academy

ViewMath.com/VT-Algebra1

Free to use • No downloads required • Works on any device

CHAPTER

1

Foundations of Algebra

What's Inside

1.1 Classifying Real Numbers

Learning Goals

- Classify numbers as natural, whole, integer, rational, or irrational
- Know that rational decimals terminate or repeat

Number Subsets

Every number you use belongs to at least one of these groups:

- **Natural numbers:** $1, 2, 3, \ldots$ (counting numbers)
- **Whole numbers:** $0, 1, 2, 3, \ldots$ (naturals plus zero)
- **Integers:** $\ldots, -2, -1, 0, 1, 2, \ldots$ (whole numbers and negatives)
- **Rational numbers:** any number that equals $\frac{a}{b}$ where a, b are integers and $b \neq 0$
- **Irrational numbers:** decimals that never end and never repeat ($\sqrt{2}$, π)

These sets nest like rings. Natural $\subset$ Whole $\subset$ Integer $\subset$ Rational. Rational and Irrational together make the **real numbers**.

Classifying Numbers

Place each number in all groups that fit.

1. 7 — Natural, Whole, Integer, Rational ($\frac{7}{1}$), Real
2. 0 — Whole, Integer, Rational ($\frac{0}{1}$), Real
3. -3 — Integer, Rational ($\frac{-3}{1}$), Real
4. $\frac{2}{5} = 0.4$ — Rational (terminates), Real
5. $\sqrt{3} = 1.7320\ldots$ — Irrational (never repeats), Real

> Every integer is rational! Just write it over 1. For example, $-5 = \frac{-5}{1}$.

Rational Numbers	*Irrational Numbers*
• *Written as* $\frac{a}{b}$, $b \neq 0$	• *Cannot be written as* $\frac{a}{b}$
• *Decimals terminate or repeat*	• *Decimals never terminate or repeat*
• *Examples:* $\frac{3}{4}$, -2, $0.\overline{6}$	• *Examples:* $\sqrt{2}$, π, $\sqrt{10}$

Classifying Real Numbers

1. *Classify* -12*: natural, whole, integer, rational, or irrational?*
2. *Is* $\sqrt{25}$ *rational or irrational?*
3. *Is* $\sqrt{7}$ *rational or irrational?*
4. *Write* $0.\overline{3}$ *as a fraction.*
5. *All whole numbers are integers.* True ○ False ○

CHAPTER

2

Introduction to Functions

What's Inside

2.1 What Is a Function?

Learning Goals

- Decide whether a relation is a function
- Use the vertical line test on graphs

What Is a Function?

A **relation** is any set of ordered pairs (x, y).

A **function** is a special relation where every input (x) gives exactly one output (y). No x-value may repeat with a different y-value.

Think of a vending machine. Press button **A3**, you always get the same snack. If one button gave a random item each time, that machine would not be a function!

Ways to show a relation: ordered pairs, table, graph, mapping diagram, or equation.

Checking a Table

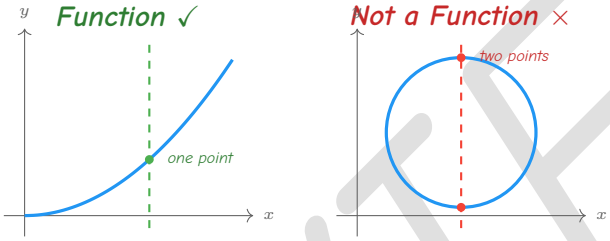
Is this relation a function?

x	1	2	3	1
y	5	8	10	7

The input $x = 1$ maps to both 5 and 7. One input gives two outputs, so this is **not a function**.

The Vertical Line Test

1. Draw or look at the graph of the relation.
2. Imagine sliding a vertical line across the graph from left to right.
3. If the vertical line ever hits the graph in **two or more points** at the same time, it is **not** a function.
4. If every vertical line hits at most one point, it **is** a function.



> A function is like a rule: one question, one answer. If one input gives two answers, it breaks the rule!

TIP

In a mapping diagram, each input arrow must point to exactly one output. An input with two arrows means it is not a function.

What Is a Function?

1. A relation has the pairs $(2, 4)$, $(3, 6)$, $(4, 8)$, $(5, 10)$. Is it a function?
2. A relation has the pairs $(1, 3)$, $(2, 5)$, $(1, 7)$. Is it a function?
3. A circle is drawn on a coordinate plane. Does it pass the vertical line test?
4. Every function is a relation. **True** ○ **False** ○
5. A mapping diagram shows $3 \to 9$, $4 \to 16$, $5 \to 25$. Is it a function?

Answer Key

Answer Key

Try each problem on your own first, then check your work here.

Chapter 1

Section 1.1

1. Integer, Rational
2. Rational
3. Irrational
4. $\frac{1}{3}$
5. True

Explanations

1. -12 is negative, so not natural or whole. It is an integer. Since $-12 = \frac{-12}{1}$, it is also rational.
2. $\sqrt{25} = 5$, a whole number. Every integer is rational: $5 = \frac{5}{1}$.
3. 7 is not a perfect square. So $\sqrt{7}$ is a non-repeating, non-terminating decimal.
4. $0.\overline{3} = 0.333\ldots$ The repeating decimal equals $\frac{1}{3}$, which is rational.

Chapter 2

Section 2.1

1. Yes
2. No
3. No
4. True
5. Yes

Explanations

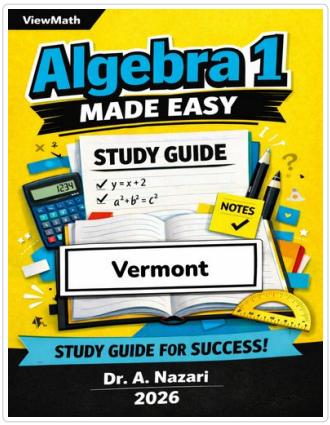
1. Each input appears only once. Every x-value maps to exactly one y-value, so it is a function.
2. The input $x = 1$ maps to both 3 and 7. One input gives two outputs, so it is not a function.
3. A vertical line through the middle of a circle hits it at two points. So a circle is not a function.
5. Each input maps to exactly one output. No input is repeated, so it is a function.

Well done checking your answers!

Keep practicing to strengthen your skills.

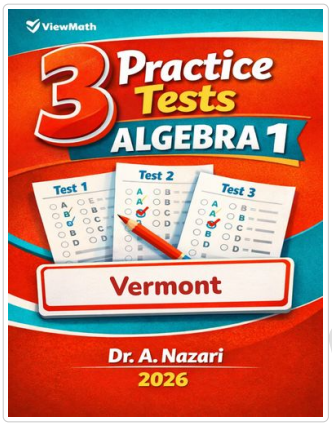
Great Job! Keep Learning with ViewMath!

*Keep up the great work! Visit **viewmath.com/VT-Algebra1** for free lessons, quizzes, and more.*



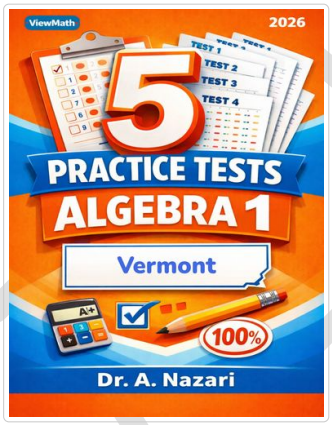
Study Guide

Scan Me



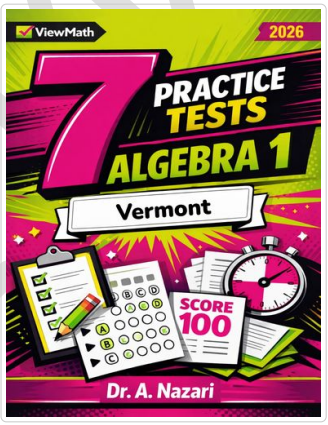
3 Practice Tests

Scan Me



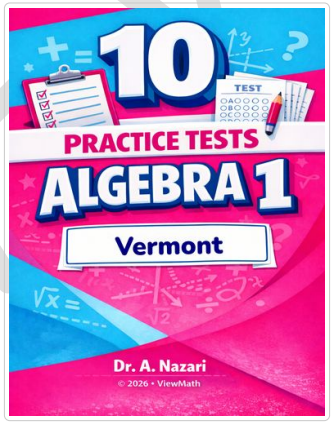
5 Practice Tests

Scan Me



7 Practice Tests

Scan Me



10 Practice Tests

Scan Me

THANK YOU

Enjoyed This Preview?

Get the Full Book!

This preview shows just a small sample of what's inside.

The complete book includes:

- *All chapters and topics*
- *Hundreds of practice problems*
- *Complete answer key with explanations*
- *Colorful visuals and step-by-step examples*
- *Reference sheets and progress trackers*

Visit us at **ViewMath.com** *for free resources and more books!*