

Pennsylvania Keystone Grade 9 Math Workbook

Practice Problems & Exercises with Answer Key

Dr. A. Nazari

Copyright © 2026 Dr. A. Nazari

Published by View Math Education

ViewMath.com

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the author, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law, including Section 107 or 108 of the 1976 United States Copyright Act.

The information in this book is distributed on an “as is” basis, without warranty. While every precaution has been taken in the preparation of this work, neither the author nor the publisher shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this book.

Copyright © 2026

PRACTICE MAKES PERMANENT

Algebra 1 Workbook

Practice Problems • Word Problems • Complete Answer Key

Algebra 1 is the gateway to all higher-level mathematics. This workbook gives you focused practice on every essential topic — from real numbers and exponents to linear equations, systems, polynomials, quadratic functions, exponential models, and data analysis.

Work through each section at your own pace, show every step, then check the answer key in the back. Mistakes are not failures — they are the moments where real learning happens.

 **37 Topics Across 9 Chapters**

Real numbers, linear equations, functions, systems, polynomials, quadratics, exponentials, and statistics — every Algebra 1 standard.

 **Progressive Difficulty**

Each topic builds from foundational recall to multi-step reasoning.

 **Real-World Applications**

Apply your skills to science, engineering, finance, and everyday problem solving.

 **Complete Answer Key**

Every problem has a detailed answer in the back. Check your work, identify mistakes, and strengthen weak spots.

© 2026 Dr. A. Nazari • ViewMath.com



Get Online



Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



How to Use This Workbook

Four steps to get the most out of every section.

1

Read the Quick Review

Every topic opens with a brief reminder of the key idea or formula. If something feels unfamiliar, pair this workbook with the matching study guide for a full explanation before diving into problems.

2

Work the Problems in Order

Problems are arranged from straightforward to challenging. Starting with the easier ones builds momentum and warms up your thinking before the tougher questions arrive.

3

Show Every Step

Write out your reasoning on scratch paper. When an answer is wrong, your written work reveals exactly where the logic broke down — and that is the fastest way to fix it.

4

Check Answers and Reflect

After finishing a section, flip to the Answer Key and mark every problem. For each mistake, figure out why it happened. Then try a similar problem again until it clicks.



Suggested Weekly Routine

- **Mon–Thu:** One topic per day (20–30 minutes).
- **Friday:** Review the week's mistakes and redo missed problems.
- **Weekend:** Rest — or tackle a challenge problem!



Tips for Parents & Teachers

- Let your student work independently first.
- Review mistakes together — focus on why, not just the answer.
- Praise effort and persistence, not just correct answers.

 **Pair It Up**

This workbook focuses on practice. For detailed explanations, worked examples, and teaching notes, use it alongside the Algebra 1 Math Made Easy Study Guide or your classroom textbook.

PREVIEW



Get Online



Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



What You'll Need

Gather these supplies before you start.



Pencils

Mechanical or sharpened



Eraser

Good erasers save time



Graph Paper

For graphing & coordinates



Straightedge

For neat graphs & lines



Scientific Calculator

For checking, not shortcuts



A Focused Mindset

Persistence is the key

A Note for Parents & Teachers

- *This workbook pairs perfectly with the **Algebra 1 Math Made Easy Study Guide**. Use the Study Guide to learn concepts, then this workbook for focused practice.*
- *Topics follow the same order as the Study Guide for easy cross-reference.*
- *Keep sessions to 20–30 minutes for best focus and retention.*
- *Encourage students to show all work — the process matters as much as the answer.*
- *Celebrate progress. Even a few problems each day builds lasting math confidence.*

Math Symbols & Vocabulary

A quick reference you can come back to any time.

X¹ Key Symbols & Notation

Symbol	Name	What It Means	
a^n	Exponent	a multiplied by itself n times.	$2^3 = 8$
$\sqrt{\quad}$	Square Root	The number that, multiplied by itself, gives the original.	$\sqrt{49} = 7$
$ x $	Absolute Value	Distance from zero on the number line.	$ -5 = 5$
\leq, \geq	Less/Greater or Equal	Includes the boundary value.	$x \leq 10$
\neq	Not Equal To	The two sides are different.	$3 \neq 5$
$f(x)$	Function Notation	The output of function f for input x .	$f(3) = 7$
\pm	Plus or Minus	Both the positive and negative value.	$x = \pm 5$
Δ	Discriminant	$b^2 - 4ac$; determines the number of solutions.	

Key Vocabulary for Algebra 1

- **Variable** — a letter representing an unknown value
- **Expression** — numbers, variables, and operations combined
- **Equation** — a statement that two expressions are equal
- **Inequality** — a statement using $<$, $>$, \leq , or \geq
- **Slope** — steepness of a line ($\frac{\text{rise}}{\text{run}}$)
- **y-intercept** — where a line crosses the y-axis
- **Function** — each input maps to exactly one output
- **Domain** — set of all possible inputs
- **Range** — set of all possible outputs
- **Polynomial** — expression with terms of whole-number exponents
- **Quadratic** — a polynomial of degree 2 ($ax^2 + bx + c$)
- **Vertex** — the highest or lowest point of a parabola
- **System of equations** — two or more equations solved together
- **Exponential** — growth or decay by a constant factor

Essential Formulas

Slope-intercept form: $y = mx + b$

Point-slope form: $y - y_1 = m(x - x_1)$

Standard form: $Ax + By = C$

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Vertex: $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

Exponential model: $f(x) = a \cdot b^x$

Arithmetic sequence: $a_n = a_1 + (n - 1)d$



Get Online



Find more at
ViewMath.com/PA-Algebra1



 **ViewMath.com**



My Progress Log

Track your work through every chapter and topic.

This book belongs to: _____

 Chapter 1: Foundations of Algebra

Done Score: _____ / _____

 Chapter 2: Linear Equations and Inequalities

Done Score: _____ / _____

 Chapter 3: Introduction to Functions

Done Score: _____ / _____

 Chapter 4: Linear Functions and Their Graphs

Done Score: _____ / _____

 Chapter 5: Systems of Equations and Inequalities

Done Score: _____ / _____

 Chapter 6: Polynomials and Factoring

Done Score: _____ / _____

 Chapter 7: Quadratic Functions and Equations

Done Score: _____ / _____

 Chapter 8: Exponential Functions and Sequences

Done Score: _____ / _____

 Chapter 9: Data Analysis and Statistics

Done Score: _____ / _____

 My Goal

I want to finish _____ topics each week.

Target date:

PREVIEW








Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



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/PA-Algebra1

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



CHAPTER

1

Foundations of Algebra

★ What's Inside ★

1.1 Classifying Real Numbers	2
------------------------------------	---



★ 1.1 Classifying Real Numbers ★

🎯 Learning Goals

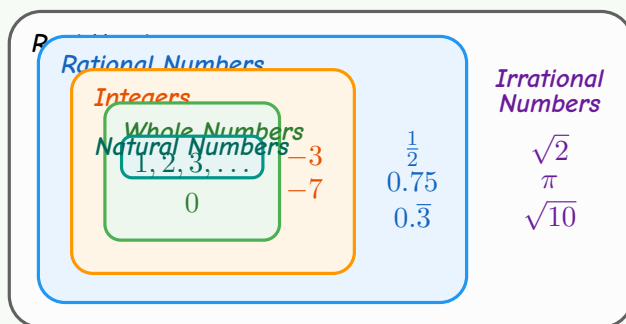
- Classify numbers as natural, whole, integer, rational, or irrational
- Know that rational decimals terminate or repeat

🎓 Number Subsets

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

- **Natural numbers:** 1, 2, 3, ... (counting numbers)
- **Whole numbers:** 0, 1, 2, 3, ... (naturals plus zero)
- **Integers:** ..., -2, -1, 0, 1, 2, ... (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 ($\sqrt{2}, \pi$)

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



Get Online



Find more at
ViewMath.com/PA-Algebra1



 ViewMath.com



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. $\sqrt{3} = 1.7320\dots$ — Irrational (never repeats), Real



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

Rational Numbers

- Written as $\frac{a}{b}$, $b \neq 0$
- Decimals terminate or repeat
- Examples: $\frac{3}{4}$, -2 , $0.\bar{6}$

Irrational Numbers

- Cannot be written as $\frac{a}{b}$
- Decimals never terminate or repeat
- 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 $0.\bar{3}$ as a fraction.
5. All whole numbers are integers.

True False



Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



CHAPTER

2

Introduction to Functions

★ What's Inside ★

2.1 What Is a Function?	5
-------------------------------	---



★ 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**.



Get Online

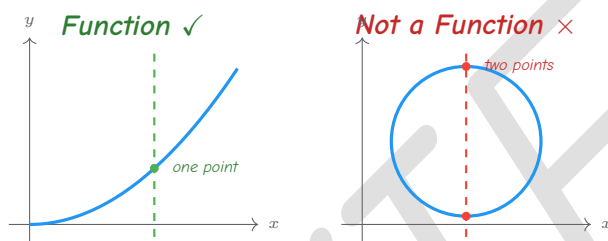


Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



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 $3 \rightarrow 9$, $4 \rightarrow 16$, $5 \rightarrow 25$. Is it a function?



Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



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 $0.\overline{3} = 0.333\dots$. The repeating decimal equals $\frac{1}{3}$, which is rational.

Chapter 2



Get Online



Find more at
ViewMath.com/PA-Algebra1



[> 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.



Get Online

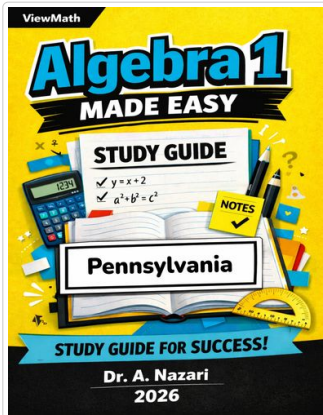


Find more at
[ViewMath.com/PA-Algebra1](https://www.viewmath.com/PA-Algebra1)



Great Job! Keep Learning with ViewMath!

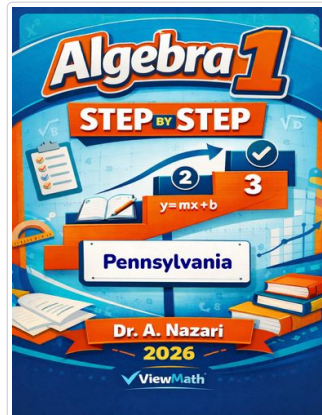
Keep up the great work! Visit viewmath.com/PA-Algebra1 for free lessons, quizzes, and more.



Study Guide



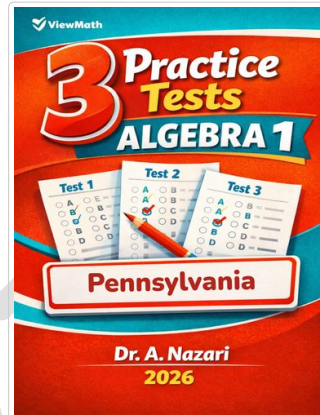
Scan Me



Step-by-Step



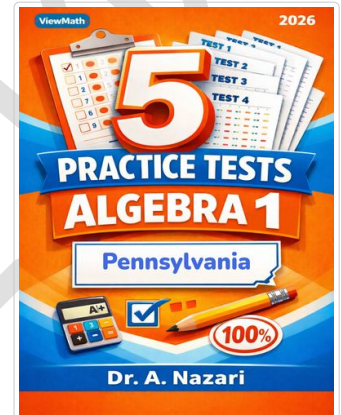
Scan Me



3 Practice Tests



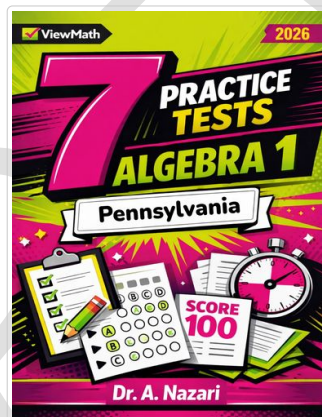
Scan Me



5 Practice Tests



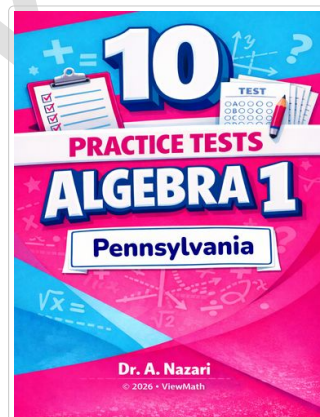
Scan Me



7 Practice Tests



Scan Me



10 Practice Tests



Scan Me



Find more at
[ViewMath.com/PA-Algebra1](https://viewmath.com/PA-Algebra1)



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](https://www.viewmath.com) for free resources and more books!