

# Oregon OSAS Grade 9 Math Step by Step

*A Beginner Friendly Guide to Learning Math*

**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*

# 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/OR-Algebra1](https://ViewMath.com/OR-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:**  $1, 2, 3, \dots$  (counting numbers)
- **Whole numbers:**  $0, 1, 2, 3, \dots$  (naturals plus zero)
- **Integers:**  $\dots, -2, -1, 0, 1, 2, \dots$  (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**.

### ✏️ 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,  $-5 = \frac{-5}{1}$ . ”



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



**Rational Numbers**

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

**Irrational Numbers**

- Cannot be written as  $\frac{a}{b}$
- Decimals never terminate or repeat
- Examples:  $\sqrt{2}$ ,  $\pi$ ,  $\sqrt{10}$

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

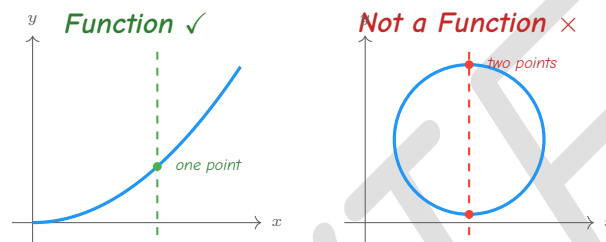


Find more at  
[ViewMath.com/OR-Algebra1](https://www.viewmath.com/OR-Algebra1)



## 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/OR-Algebra1](https://www.viewmath.com/OR-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/OR-Algebra1](http://ViewMath.com/OR-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

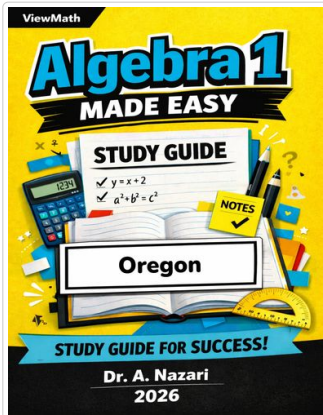


Find more at  
[ViewMath.com/OR-Algebra1](https://www.viewmath.com/OR-Algebra1)



 **Great Job! Keep Learning with ViewMath!**

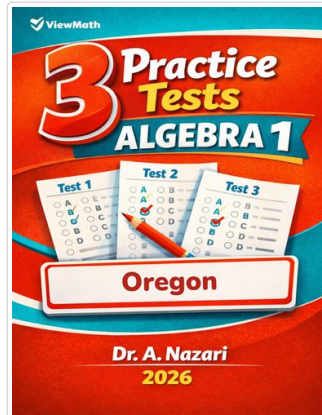
Keep up the great work! Visit [viewmath.com/OR-Algebra1](https://viewmath.com/OR-Algebra1) for free lessons, quizzes, and more.



Study Guide



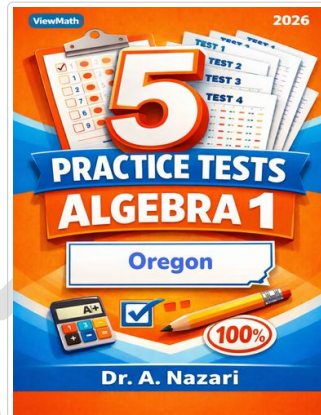
Scan Me



3 Practice Tests



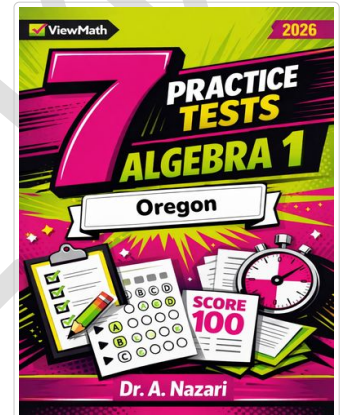
Scan Me



5 Practice Tests



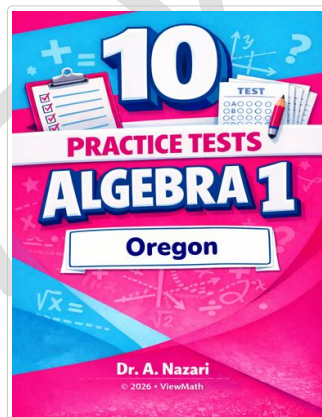
Scan Me



7 Practice Tests



Scan Me



10 Practice Tests



Scan Me



Find more at  
[ViewMath.com/OR-Algebra1](https://ViewMath.com/OR-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!