

South Carolina SC EOCEP Grade 9 Math Step by Step

A Beginner Friendly Guide to Learning Math

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CHAPTER

1

Foundations of Algebra

★ What's Inside ★

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★ 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, $-5 = \frac{-5}{1}$. ”



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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: $\sqrt{2}$, 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 

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CHAPTER

2

Introduction to Functions

★ What's Inside ★

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★ 2.1 What Is a Function? ★

🎯 Learning Goals

- Decide whether a relation is a function using multiple representations
- Represent relations as ordered pairs, tables, mapping diagrams, and graphs

🎓 What Is a Function?

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

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

Ways to represent a relation:

- **Set of ordered pairs:** $\{(1, 4), (2, 5), (3, 6)\}$
- **Table:** inputs in one row, outputs in another
- **Mapping diagram:** arrows from each input to its output
- **Graph:** points or curves on a coordinate plane

A relation is **discrete** if it has separate, countable points. A relation is **continuous** if it has a connected line or curve.

✏️ Checking Multiple Representations

Is the relation $\{(1, 5), (2, 8), (3, 10), (1, 7)\}$ a function?

Ordered pairs: $x = 1$ appears twice with outputs 5 and 7.

Mapping diagram: 1 has two arrows ($1 \rightarrow 5$ and $1 \rightarrow 7$).

One input gives two outputs, so this is **not a function**.



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The Vertical Line Test

- 1 Draw or look at the graph of the relation.
- 2 Slide a vertical line across the graph from left to right.
- 3 If the line ever hits **two or more points**, 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. In a mapping diagram, each input gets exactly one arrow! ”



TIP

Two different inputs **can** share the same output and still be a function. Only repeated inputs with different outputs break the rule.



What Is a Function?



1. Is $\{(2, 4), (3, 6), (4, 8), (5, 10)\}$ a function?
2. Is $\{(1, 3), (2, 5), (1, 7)\}$ a function?
3. A mapping diagram shows $3 \rightarrow 9$, $4 \rightarrow 16$, $5 \rightarrow 9$. Is it a function?
4. Is the relation $\{(1, 2), (3, 4), (5, 6)\}$ discrete or continuous?
5. Every function is a relation.

True False



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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



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[> Section 2.1](#)

1 Yes

2 No

3 Yes

4 Discrete

5 True

 Explanations

1 Each input appears only once. Every x -value maps to exactly one y -value.

2 $x = 1$ maps to both 3 and 7. One input gives two outputs.

3 Each input maps to one output. Two inputs may share an output—that is still a function.

4 The relation is a set of separate points. Discrete means individual, countable points.



Well done checking your answers!

Keep practicing to strengthen your skills.



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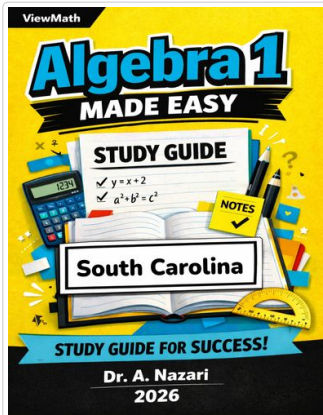


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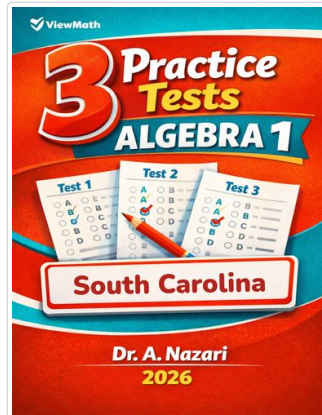
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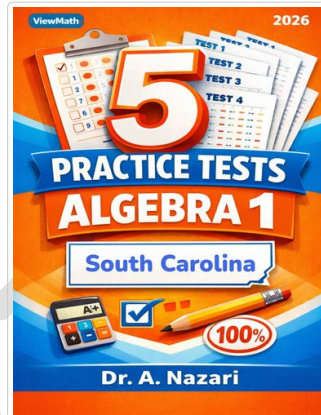
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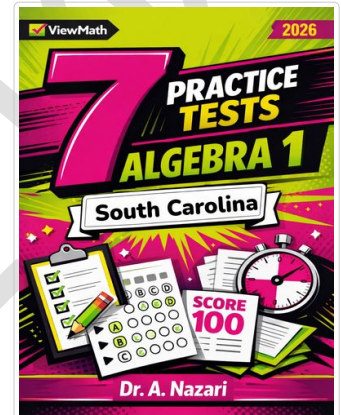
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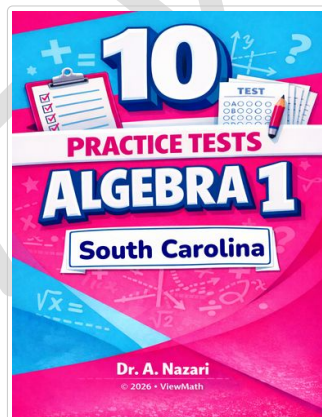
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7 Practice Tests



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10 Practice Tests



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