y = mx + b

x^2 + 5x + 6 = 0

# GEORGIA MILESTONES

sqrt

# 7th GRADE MATH



## MADE RIDICULOUSLY SIMPLE

A Comprehensive 7th Grade Math Study Guide to Acing the Milestones Test

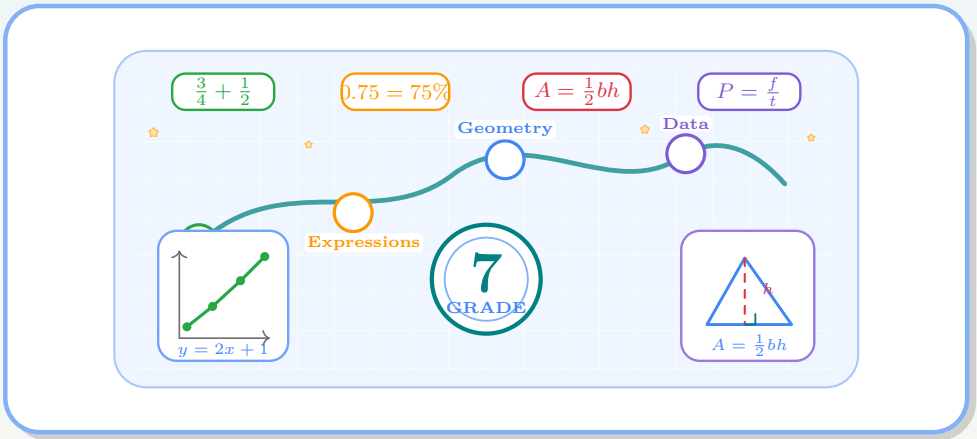
- COVERS ALL 7TH GRADE MATH STANDARDS
- EASY-TO-UNDERSTAND LESSONS & EXAMPLES
- PRACTICE QUESTIONS WITH DETAILED EXPLANATIONS
- TEST-TAKING STRATEGIES & TIPS
- BUILD CONFIDENCE. IMPROVE SCORES. SUCCEED!

**LEARN SMART. PRACTICE MORE. ACE THE MILESTONES!**

# Georgia Milestones

## 7th Grade Math Made Ridiculously Simple

A Comprehensive 7th Grade Math Study Guide to Acing the Milestones Test




**Reza Nazari**

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| | |
|---|---|
| 7.GSR.5.8 | Explore volume as a measurable attribute of cylinders and right prisms. Find the volume of these geometric figures using concrete problems |

## 7.NR | Georgia

*Grade 7 expectations grouped under 7.NR.*

| | |
|---|---|
| 7.NR.1 | Solve relevant, mathematical problems, including multi-step problems, involving the four operations with rational numbers and quantities in any form (integers, percentages, fractions, and decimal numbers) |
| 7.NR.1.1 | Show that a number and its opposite have a sum of 0 (are additive inverses). Describe situations in which opposite quantities combine to make 0 |
| 7.NR.1.2 | Show and explainp+qas the number located a distance \|q\| fromp, in the positive or negative direction, depending on whetherqis positive or negative. Interpret sums of rational numbers by describing applicable situations |
| 7.NR.1.3 | Represent addition and subtraction with rational numbers on a horizontal or a vertical number line diagram to solve authentic problems |
| 7.NR.1.4 | Show and explain subtraction of rational numbers as adding the additive inverse,p-q=p+ (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in contextual situations |
| 7.NR.1.5 | Apply properties of operations, including part-whole reasoning, as strategies to add and subtract rational numbers |
| 7.NR.1.6 | Make sense of multiplication of rational numbers using realistic applications |
| 7.NR.1.7 | Show and explain that integers can be divided, assuming the divisor is not zero, and every quotient of integers is a rational number |
| 7.NR.1.8 | Represent the multiplication and division of integers using a variety of strategies and interpret products and quotients of rational numbers by describing them based on the relevant situation |
| 7.NR.1.9 | Apply properties of operations as strategies to solve multiplication and division problems involving rational numbers represented in an applicable scenario |
| 7.NR.1.10 | Convert rational numbers between forms to include fractions, decimal numbers and percentages, using understanding of the part divided by the whole. Know that the decimal form of a rational number terminates in 0s or eventually repeats |

| | |
|---|---|
| 7.NR.1.11 | Solve multi-step, contextual problems involving rational numbers, converting between forms as appropriate, and assessing the reasonableness of answers using mental computation and estimation strategies |

## 7.PAR | Georgia

*Grade 7 expectations grouped under 7.PAR.*

| | |
|---|---|
| 7.PAR.2 | Use properties of operations, generate equivalent expressions and interpret the expressions to explain relevant situations |
| 7.PAR.2.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients |
| 7.PAR.2.2 | Rewrite an expression in different forms from a contextual problem to clarify the problem and show how the quantities in it are related |
| 7.PAR.3 | Represent authentic situations using equations and inequalities with variables; solve equations and inequalities symbolically, using the properties of equality |
| 7.PAR.3.1 | Construct algebraic equations to solve practical problems leading to equations of the formpx+q=randp(x+q)=r, wherep,q, andrare specific rational numbers. Interpret the solution based on the situation |
| 7.PAR.3.2 | Construct algebraic inequalities to solve problems, leading to inequalities of the formpx±q>r,px±q<r,px±q≤r, orpx±q≥r, wherep,q, andrare specific rational numbers. Graph and interpret the solution based on the realistic situation that the inequalities represent |
| 7.PAR.4 | Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations |
| 7.PAR.4.1 | Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units presented in realistic problems |
| 7.PAR.4.2 | Determine the unit rate (constant of proportionality) in tables, graphs (1,r), equations, diagrams, and verbal descriptions of proportional relationships to solve realistic problems |
| 7.PAR.4.3 | Determine whether two quantities presented in authentic problems are in a proportional relationship |
| 7.PAR.4.4 | Identify, represent, and use proportional relationships |

| | |
|---|---|
| 7.PAR.4.5 | Use context to explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1,r) whereris the unit rate |
| 7.PAR.4.6 | Solve everyday problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale |
| 7.PAR.4.7 | Use similar triangles to explain why the slope,m, is the same between any two distinct points on a nonvertical line in the coordinate plane |
| 7.PAR.4.8 | Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways |
| 7.PAR.4.9 | Use proportional relationships to solve multi-step ratio and percent problems presented in applicable situations |
| 7.PAR.4.10 | Predict characteristics of a population by examining the characteristics of a representative sample. Recognize the potential limitations and scope of the sample to the population |
| 7.PAR.4.11 | Analyze sampling methods and conclude that random sampling produces and supports valid inferences |
| 7.PAR.4.12 | Use data from repeated random samples to evaluate how much a sample mean is expected to vary from a population mean. Simulate multiple samples of the same size |

## 7.PR | Georgia

*Grade 7 expectations grouped under 7.PR.*

| | |
|---|---|
| 7.PR.6 | Using mathematical reasoning, investigate chance processes and develop, evaluate, and use probability models to find probabilities of simple events presented in authentic situations |
| 7.PR.6.1 | Represent the probability of a chance event as a number between 0 and 1 that expresses the likelihood of the event occurring. Describe that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event |
| 7.PR.6.2 | Approximate the probability of a chance event by collecting data on an event and observing its long-run relative frequency will approach the theoretical probability |

### Study Tips

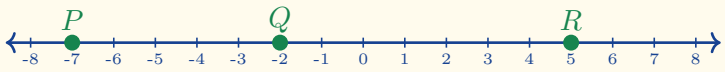
- ☞ Absolute value is **always** $\geq 0$. It measures distance, and distance is never negative.
- ☞ A negative sign *outside* the bars is applied **after** taking the absolute value: $-|-5| = -(5) = -5$.
- ☞ Work from the inside out: simplify what is inside $|\cdot|$ first, then evaluate the absolute value, then apply any outside operations.

### ✍ Word Problems

**16.** Two submarines depart from a dock at sea level (depth $= 0$). Submarine A dives to a depth of $-340$ feet and Submarine B dives to a depth of $-180$ feet. Use absolute value to determine which submarine is *closer* to the surface, and by exactly how many feet closer it is than the other submarine.

**17.** Alena's bank account balance was \$0 on Sunday. By Monday evening her balance had dropped to $-\$47$. By Tuesday evening it had dropped further to $-\$62$. Use absolute value to state her Tuesday balance as a positive amount owed. Then determine by how many dollars her balance changed between Monday evening and Tuesday evening, and express that change as an absolute value.

**18.** Three points $P$, $Q$, $R$ are marked on the number line shown here. Find $|P|$, $|Q|$, and $|R|$. Then determine which point is farthest from zero, and compute $|P| + |R|$ (the total distance from zero of the two outer points).






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## 1.3 Comparing and Ordering Integers

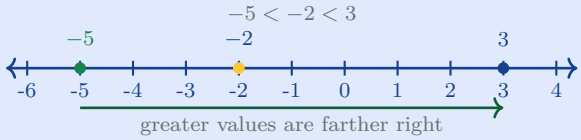
7.NR.1.4

The trick to comparing integers is to picture them on a number line. Numbers get larger as you move to the **right** and smaller as you move to the **left**. This is especially handy with negatives—for example, $-3$ is greater than $-8$ because $-3$ is closer to zero (farther right on the line). When a problem asks you to order integers from least to greatest, you are simply listing them in the same left-to-right order they appear on the number line. Once you have this picture in your head, symbols like $<$, $>$, and $=$ become second nature.

### Key Concepts & Quick Review

**Comparing:** $a > b$ means $a$ is to the **right** of $b$ on the number line. $a < b$ means $a$ is to the **left** of $b$.

**Negatives rule:** Among two negative integers, the one **closer to zero** is **greater**.
**Ordering:** list integers from least (leftmost) to greatest (rightmost).




### Examples

① Compare $-7$ and $-3$. Write $<$, $>$, or $=$.

**Think It Through:** Put both numbers on a number line in your mind. The number $-3$ is closer to zero, so it sits to the right of $-7$. Numbers to the right are greater, and numbers to the left are smaller. Therefore $-7 < -3$.

**Answer:** $-7 < -3$

② Order from **least to greatest**: $4,\ -9,\ 2,\ -1,\ -6$.

**Think It Through:** Imagine placing all five integers on a number line. The farthest left is $-9$, then comes $-6$, then $-1$. After the negatives come the positives: $2$ and then $4$. Reading from left to right gives the order from least to greatest.

**Answer:** $-9 < -6 < -1 < 2 < 4$

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## ✎ Practice Problems

*Write $<$, $>$, or $=$ in each box to make the statement true.*

**1.** $-5 \square -2$ _____

**2.** $-8 \square -11$ _____

**3.** $7 \square -7$ _____

**4.** $-4 \square 0$ _____

**5.** $-15 \square -15$ _____

**6.** $-1 \square -100$ _____

**7.** $-9 \square 3$ _____

**8.** $|-6| \square 6$ _____

**9.** $-|-4| \square -4$ _____

**10.** $|-10| \square |-12|$ _____

**11.** $-20 \square -19$ _____

**12.** $0 \square -1$ _____

**13.** $-(-3) \square -3$ _____

**14.** $-|7| \square -7$ _____

**15.** $-25 \square -52$ _____

### Study Tips

☞ Among two negative integers, the one with the **smaller absolute value** is **greater**: $-3 > -10$ because $3 < 10$.

☞ Any positive integer is always greater than any negative integer: $1 > -1{,}000{,}000$.

☞ When ordering a mixed set, negatives always come before zero, and zero comes before all positives.

### ✍ Word Problems

**16.** Five students competed in a math quiz bowl where correct answers earn points and incorrect answers lose points. Their final net scores were: $-16$, $8$, $-4$, $-21$, and $5$. Order the scores from *lowest to highest* and identify the student with the best score and the student with the worst score. Then find the range of scores (highest minus lowest).

_____

**17.** Four ocean animals are recorded at the following depths below the surface: a shark at $-85$ feet, a jellyfish at $-12$ feet, a sperm whale at $-210$ feet, and a yellowfin tuna at $-47$



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