y = mx + b

x^2 + 5x + 6 = 0

sqrt(x)

OHIO OST

7th GRADE MATH



MADE RIDICULOUSLY SIMPLE

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

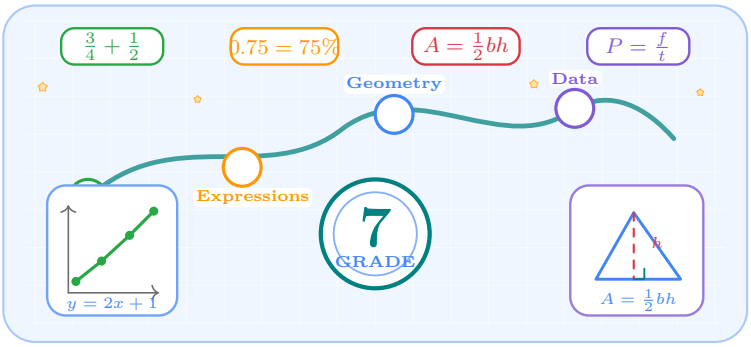
- COVERS ALL 7TH GRADE MATH STANDARDS
- EASY-TO-UNDERSTAND LESSONS & EXAMPLES
- PRACTICE QUESTIONS WITH DETAILED EXPLANATIONS
- TEST-TAKING STRATEGIES & TIPS
- BUILD CONFIDENCE. IMPROVE SCORES. SUCCEED!

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Ohio OST

7th Grade Math Made Ridiculously Simple

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7.EE.4b Solve word problems leading to inequalities of the formpx+q>rorpx+q<r, wherep,q, andrare specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem

7.G | Geometry

Draw, construct, and describe geometric figures and solve problems involving angle, area, and volume

7.G.1 Solve problems involving similar figures with right triangles, other triangles, and special quadrilaterals

7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric figures with given conditions

7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids

7.G.4 Work with circles

7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure

7.G.6 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms

7.G.1a Compute actual lengths and areas from a scale drawing and reproduce a scale drawing at a different scale

7.G.1b Represent proportional relationships within and between similar figures

7.G.2a Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle

7.G.2b Focus on constructing quadrilaterals with given conditions noticing types and properties of resulting quadrilaterals and whether it is possible to construct different quadrilaterals using the same conditions

7.G.4a Explore and understand the relationships among the circumference, diameter, area, and radius of a circle

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7.G.4b	Know and use the formulas for the area and circumference of a circle and use them to solve real-world and mathematical problems

7.NS | The Number System

Apply operations with rational numbers including integers, fractions, and decimals

7.NS.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram
7.NS.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers
7.NS.3	Solve real-world and mathematical problems involving the four operations with rational numbers. Computations with rational numbers extend the rules for manipulating fractions to complex fractions
7.NS.1a	Describe situations in which opposite quantities combine to make 0
7.NS.1b	Understandp+qas the number located a distance |q| fromp, in the positive or negative direction depending on whetherqis positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts
7.NS.1c	Understand 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 real-world contexts
7.NS.1d	Apply properties of operations as strategies to add and subtract rational numbers
7.NS.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts
7.NS.2b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. Ifpandqare integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts

7.NS.2c	Apply properties of operations as strategies to multiply and divide rational numbers
7.NS.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats

7.RP | Ratios and Proportional Relationships

Analyze proportional relationships and use them to solve problems

7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units
7.RP.2	Recognize and represent proportional relationships between quantities
7.RP.3	Use proportional relationships to solve multistep ratio and percent problems
7.RP.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin
7.RP.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships
7.RP.2c	Represent proportional relationships by equations
7.RP.2d	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) where r is the unit rate

7.SP | Statistics and Probability

Use random sampling to draw inferences and develop probability models

7.SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population
7.SP.2	Broaden statistical reasoning by using the GAISE model:
7.SP.3	Describe and analyze distributions

Examples

① Evaluate $-|-9|$.

Think It Through: Work from the inside out. First find the absolute value: $|-9| = 9$ because -9 is 9 units from zero. Then look at the negative sign outside the bars and apply it after the absolute value is finished. That gives $-(9) = -9$. A negative sign outside absolute value bars does not disappear.

Answer: -9

② Two hikers leave camp (position 0 on a trail). Hiker A walks 11 *mi* east $(+11)$ and Hiker B walks 11 *mi* west (-11). Use absolute value to compare the distances each hiker traveled. Then find $|+11| - |-11|$.

Think It Through: Absolute value tells distance from zero, so direction does not matter here. Hiker A traveled $|+11| = 11$ *mi* and Hiker B traveled $|-11| = 11$ *mi*. That means they are the same distance from camp even though they walked in opposite directions. Subtracting the two distances gives $11 - 11 = 0$.

Answer: 0; *both hikers traveled equal distances*

Practice Problems

Evaluate each expression.

1. $|-8| =$ _____
2. $|15| =$ _____
3. $-|-7| =$ _____
4. $|-34| =$ _____
5. $-|12| =$ _____
6. $|0| =$ _____
7. $|-23| =$ _____
8. $-|-20| =$ _____
9. $|-45| =$ _____
10. $|7| - |-7| =$ _____
11. $|-13| + |-8| =$ _____
12. $|-6| \cdot |-4| =$ _____
13. $|-3|^2 =$ _____
14. $|8 - 15| =$ _____
15. $|-100| \div |-25| =$ _____

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Study Tips

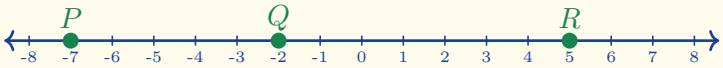
- Absolute value is **always** ≥ 0. It measures distance, and distance is never negative.
- A negative sign *outside* the bars is applied **after** taking the absolute value: $-|-5| = -(5) = -5$.
- Work from the inside out: simplify what is inside $|\cdot|$ first, then evaluate the absolute value, then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



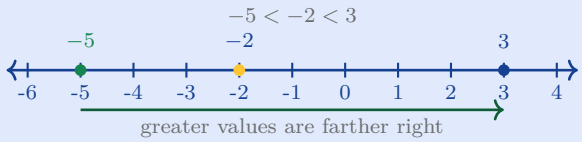
1.3 Comparing and Ordering Integers 7.NS.1

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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