y = mx + b

x^2 + 5x + 6 = 0

MINNESOTA

sqrt(x)

MCA-III



7th GRADE MATH

MADE RIDICULOUSLY SIMPLE

A Comprehensive 7th Grade Math Study Guide to Acing the MCA-III Test

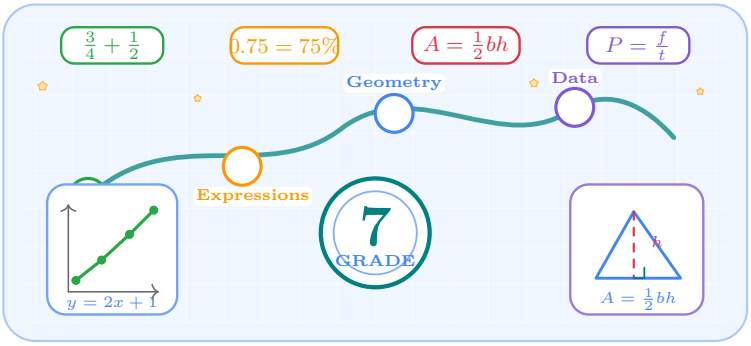
- COVERS ALL 7TH GRADE MATH STANDARDS
- EASY-TO-UNDERSTAND LESSONS & EXAMPLES
- PRACTICE QUESTIONS WITH DETAILED EXPLANATIONS
- TEST-TAKING STRATEGIES & TIPS
- BUILD CONFIDENCE. IMPROVE SCORES. SUCCEED!

LEARN SMART. PRACTICE MORE. ACE THE MCA-III!

Minnesota MCA-III

7th Grade Math Made Ridiculously Simple

A Comprehensive 7th Grade Math Study Guide to Acing the MCA-III Test



Reza Nazari

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7.1.2.1 Add, subtract, multiply and divide positive and negative rational numbers that are integers, fractions and terminating decimals; use efficient and generalizable procedures, including standard algorithms; raise positive rational numbers to whole-number exponents

7.1.2.2 Use real-world contexts and the inverse relationship between addition and subtraction to explain why the procedures of arithmetic with negative rational numbers make sense

7.1.2.3 Understand that calculators and other computing technologies often truncate or round numbers

7.1.2.4 Solve problems in various contexts involving calculations with positive and negative rational numbers and positive integer exponents, including computing simple and compound interest

7.1.2.5 Use proportional reasoning to solve problems involving ratios in various contexts

7.1.2.6 Demonstrate an understanding of the relationship between the absolute value of a rational number and distance on a number line. Use the symbol for absolute value

7.2 | Algebra

Use algebraic expressions, equations, and inequalities to represent and solve problems

7.2.1 Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships

7.2.1.1 Understand that a relationship between two variables,xandy, is proportional if it can be expressed in the formy/x=kory=kx. Distinguish proportional relationships from other relationships, including inversely proportional relationships (xy=kory=k/x)

7.2.1.2 Understand that the graph of a proportional relationship is a line through the origin whose slope is the unit rate (constant of proportionality). Know how to use graphing technology to examine what happens to a line when the unit rate is changed

7.2.2 Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context

7.2.2.1 Represent proportional relationships with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another. Determine the unit rate (constant of proportionality or slope) given any of these representations

7.2.2.2 Solve multi-step problems involving proportional relationships in numerous contexts

7.2.2.3 Use knowledge of proportions to assess the reasonableness of solutions

7.2.2.4 Represent real-world or mathematical situations using equations and inequalities involving variables and positive and negative rational numbers

7.2.3 Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions

7.2.3.1 Use properties of algebra to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents. Properties of algebra include associative, commutative and distributive laws

7.2.3.2 Evaluate algebraic expressions containing rational numbers and whole number exponents at specified values of their variables

7.2.3.3 Apply understanding of order of operations and grouping symbols when using calculators and other technologies

7.2.4 Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context

7.2.4.1 Represent relationships in various contexts with equations involving variables and positive and negative rational numbers. Use the properties of equality to solve for the value of a variable. Interpret the solution in the original context

7.2.4.2 Solve equations resulting from proportional relationships in various contexts

7.3 | Geometry & Measurement

Solve problems involving angle measure, area, surface area, and volume

7.3.1 Use reasoning with proportions and ratios to determine measurements, justify formulas and solve real-world and mathematical problems involving circles and related geometric figures

7.3.1.1 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is pi. Calculate the circumference and area of circles and sectors of circles to solve problems in various contexts

7.3.1.2 Calculate the volume and surface area of cylinders and justify the formulas used

7.3.2 Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures

7.3.2.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors

7.3.2.2 Apply scale factors, length ratios and area ratios to determine side lengths and areas of similar geometric figures

7.3.2.3 Use proportions and ratios to solve problems involving scale drawings and conversions of measurement units

7.3.2.4 Graph and describe translations and reflections of figures on a coordinate grid and determine the coordinates of the vertices of the figure after the transformation

7.4 | Data Analysis & Probability

Use sampling, data analysis, and probability to draw conclusions

7.4.1 Use mean, median and range to draw conclusions about data and make predictions

7.4.1.1 Design simple experiments and collect data. Determine mean, median and range for quantitative data and from data represented in a display. Use these quantities to draw conclusions about the data, compare different data sets, and make predictions

7.4.1.2 Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Know how to create data displays using a spreadsheet to examine this impact

7.4.2 Display and interpret data in a variety of ways, including circle graphs and histograms

7.4.2.1 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology

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Study Tips

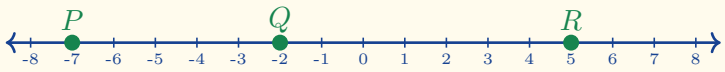
- ☞ Absolute value is **always** ≥ 0. It measures distance, and distance is never negative.
- ☞ A negative sign *outside* the bars is applied **after** taking the absolute value: $-|-5| = -(5) = -5$.
- ☞ Work from the inside out: simplify what is inside $|\cdot|$ first, then evaluate the absolute value,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



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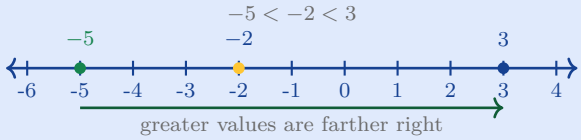
1.3 Comparing and Ordering Integers 7.1.2.6

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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