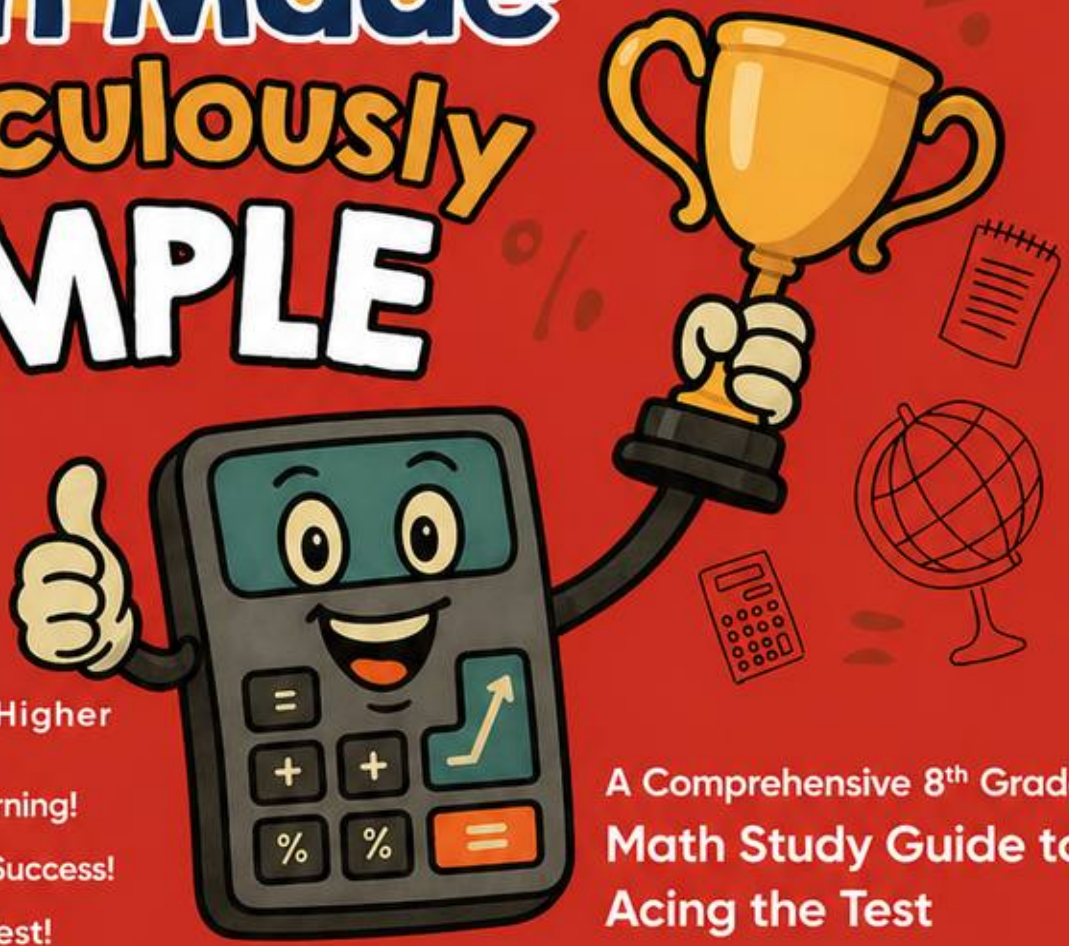
Florida FAST Grade 8

Math Made Ridiculously SIMPLE



- Smarter Practice. Higher Scores.
- Fast, Fun, Focused Learning!
- Your Shortcut to Math Success!
- Conquer the Math Test!

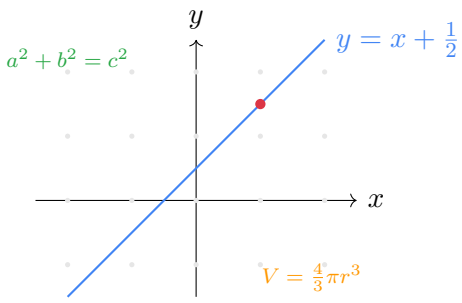
A Comprehensive 8th Grade Math Study Guide to Acing the Test

Learn Faster · Understand Deeper · Succeed with Confidence

Florida FAST Grade 8 Math

Made Ridiculously Simple

A Comprehensive 8th Grade Math Study Guide to Acing the FAST Test



Reza Nazari

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MA.8.DP.2.3 Solve real-world problems involving probabilities related to single or repeated experiments, including making predictions based on theoretical probability

MA.8.F | Florida

Grade 8 expectations grouped under MA.8.F.

MA.8.F.1 Define, evaluate and compare functions

MA.8.F.1.1 Given a set of ordered pairs, a table, a graph or mapping diagram, determine whether the relationship is a function. Identify the domain and range of the relation

MA.8.F.1.2 Given a function defined by a graph or an equation, determine whether the function is a linear function. Given an input-output table, determine whether it could represent a linear function

MA.8.F.1.3 Analyze a real-world written description or graphical representation of a functional relationship between two quantities and identify where the function is increasing, decreasing or constant

MA.8.GR | Florida

Grade 8 expectations grouped under MA.8.GR.

MA.8.GR.1 Develop an understanding of the Pythagorean Theorem and angle relationships involving triangles

MA.8.GR.1.1 Apply the Pythagorean Theorem to solve mathematical and real-world problems involving unknown side lengths in right triangles

MA.8.GR.1.2 Apply the Pythagorean Theorem to solve mathematical and real-world problems involving the distance between two points in a coordinate plane

MA.8.GR.1.3 Use the Triangle Inequality Theorem to determine if a triangle can be formed from a given set of sides. Use the converse of the Pythagorean Theorem to determine if a right triangle can be formed from a given set of sides

MA.8.GR.1.4 Solve mathematical problems involving the relationships between supplementary, complementary, vertical or adjacent angles

MA.8.GR.1.5 Solve problems involving the relationships of interior and exterior angles of a triangle

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MA.8.GR.1.6	Develop and use formulas for the sums of the interior angles of regular polygons by decomposing them into triangles
MA.8.GR.2	Understand similarity and congruence using models and transformations
MA.8.GR.2.1	Given a preimage and image generated by a single transformation, identify the transformation that describes the relationship
MA.8.GR.2.2	Given a preimage and image generated by a single dilation, identify the scale factor that describes the relationship
MA.8.GR.2.3	Describe and apply the effect of a single transformation on two-dimensional figures using coordinates and the coordinate plane
MA.8.GR.2.4	Solve mathematical and real-world problems involving proportional relationships between similar triangles

MA.8.NSO | Florida

Grade 8 expectations grouped under MA.8.NSO.

MA.8.NSO.1	Solve problems involving rational numbers, including numbers in scientific notation, and extend the understanding of rational numbers to irrational numbers
MA.8.NSO.1.1	Extend previous understanding of rational numbers to define irrational numbers within the real number system. Locate an approximate value of a numerical expression involving irrational numbers on a number line
MA.8.NSO.1.2	Plot, order and compare rational and irrational numbers, represented in various forms
MA.8.NSO.1.3	Extend previous understanding of the Laws of Exponents to include integer exponents. Apply the Laws of Exponents to evaluate numerical expressions and generate equivalent numerical expressions, limited to integer exponents and rational number bases, with procedural fluency
MA.8.NSO.1.4	Express numbers in scientific notation to represent and approximate very large or very small quantities. Determine how many times larger or smaller one number is compared to a second number
MA.8.NSO.1.5	Add, subtract, multiply and divide numbers expressed in scientific notation with procedural fluency
MA.8.NSO.1.6	Solve real-world problems involving operations with numbers expressed in scientific notation

MA.8.NSO.1.7 Solve multi-step mathematical and real-world problems involving the order of operations with rational numbers including exponents and radicals

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Study Tips

- **Here's a pattern:** the denominator always has as many 9s as there are digits in the repeating block. 1-digit repeating → 9 in denominator; 2-digit → 99; 3-digit → 999. Easy!
- **Mind-blower:** $0.\overline{9} = 1$ exactly (not an approximation!). Try it yourself with the subtraction method: $10x = 9.\overline{9}$, subtract to get $9x = 9$, so $x = 1$.
- For mixed decimals like $0.1\overline{6}$ (with a non-repeating part), shift the non-repeating part first by multiplying by 10: $10x = 1.\overline{6}$. Then convert to $1\frac{2}{3}$ and divide by 10 to undo the shift.

Word Problems

16. A factory machine cuts wire into pieces whose length in metres is $0.\overline{3}$. If a full spool holds exactly 12 metres of wire, how many complete pieces can be cut from one spool?

_____

17. Keiko divides 8 by 11 on her calculator and sees $0.727272\ldots$ on the screen. Her classmate Omar says the exact value is $\frac{8}{11}$, not a repeating decimal. Are both descriptions correct? Explain.

_____

18. A recipe calls for $0.\overline{142857}$ cups of vanilla extract. (a) Convert $0.\overline{142857}$ to a fraction. (b) Simplify the fraction. (c) If the recipe is tripled, how many cups of extract are needed? Express as a fraction.

_____

19. Two students each earn money per hour as a repeating decimal. Student A earns $\$12.\overline{3}$ per hour and Student B earns \$12.75 per hour. (a) Convert $12.\overline{3}$ to a mixed number. (b) Who earns more per hour? (c) How much more does the higher earner make in a 6-hour shift?

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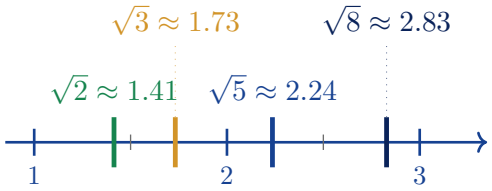
20. A scientist measures the density of a metal sample as $7.\overline{18}$ g/cm^3. (a) Convert $7.\overline{18}$ to a fraction. (b) A block of this metal is 10 cm^3. What is its mass as a fraction? (c) Round the mass to the nearest gram.

_____

1.3 Estimating Irrational Numbers

MA.8.NSO.1, MA.8.NSO.1.2

When a square root isn't a perfect square, you can't just write down the exact decimal, but here's the good news: you can estimate it super well! The trick is to squeeze it between two perfect squares. For example, since $36 < 45 < 49$, you immediately know that $6 < \sqrt{45} < 7$—your answer is somewhere in that range. Then test tenths or hundredths to narrow it down even more. **The why behind this:** when you square nearby numbers, they tell you if you're too low or too high. This clever method helps you place irrational numbers on a number line and compare them to regular whole numbers and decimals. You've got a superpower now!



Key Concepts & Quick Review

Squeeze between consecutive integers: Find n and $n+1$ such that $n^2 < x < (n+1)^2$; then $n < \sqrt{x} < n+1$.

Refine to tenths: Try $n.1$, $n.2, \ldots$ until you find $a^2 < x < b^2$; then $a < \sqrt{x} < b$.

Comparing irrationals: $\sqrt{a} < \sqrt{b}$ whenever $a < b$ $(a, b > 0)$, so larger radicand ⇒ larger square root.

Examples

① Between which two consecutive integers does $\sqrt{20}$ lie?

Find two perfect squares that squeeze 20: We have $4^2 = 16 < 20$ and $5^2 = 25 > 20$. So $\sqrt{20}$ must be between 4 and 5—you can be sure of that! **Now here's a helpful hint:** since 20 is closer to 25 than to 16, the square root is closer to 5. In fact, $\sqrt{20} \approx 4.47$—pretty close to 5, right?

Answer: $4 < \sqrt{20} < 5$

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② Estimate $\sqrt{45}$ to one decimal place.

First, squeeze with integers: $6^2 = 36 < 45 < 49 = 7^2$, so $6 < \sqrt{45} < 7$. Now refine to tenths. **Test:** $6.7^2 = 44.89 < 45$ and $6.8^2 = 46.24 > 45$. This tells us $6.7 < \sqrt{45} < 6.8$—we're narrowing it down! Since 45 is much closer to 44.89, we know $\sqrt{45} \approx 6.7$ is our best estimate to one decimal place.

Answer: $\sqrt{45} \approx 6.7$

Practice Problems

Give the two consecutive integers that bound each square root, then estimate to one decimal place where indicated.

1. $\sqrt{10}$ is between _____

2. $\sqrt{18}$ is between _____

3. $\sqrt{35}$ is between _____

4. $\sqrt{50}$ is between _____

5. $\sqrt{72}$ is between _____

6. $\sqrt{90}$ is between _____

7. $\sqrt{6} \approx$ _____ (1 d.p.)

8. $\sqrt{14} \approx$ _____ (1 d.p.)

9. $\sqrt{30} \approx$ _____ (1 d.p.)

10. $\sqrt{52} \approx$ _____ (1 d.p.)

11. Order: $\sqrt{5}$, 2, $\sqrt{3}$ _____

12. Greater: $\sqrt{11}$ or 3.3? _____

Study Tips

- Memorize perfect squares through 169 (13^2). This gives you the power to quickly bracket any square root and know which two integers it falls between. You're building your math toolkit!
- When estimating $\sqrt{x}$ to one decimal place, find the two tenths it falls between, then decide which is closer. If they're equally close, test hundredths for extra accuracy before rounding.
- **Here's a time-saver for comparing irrational numbers:** just compare the radicands directly—no estimation needed! Since $47 < 53$, you know right away that $\sqrt{47} < \sqrt{53}$. Smart thinking!