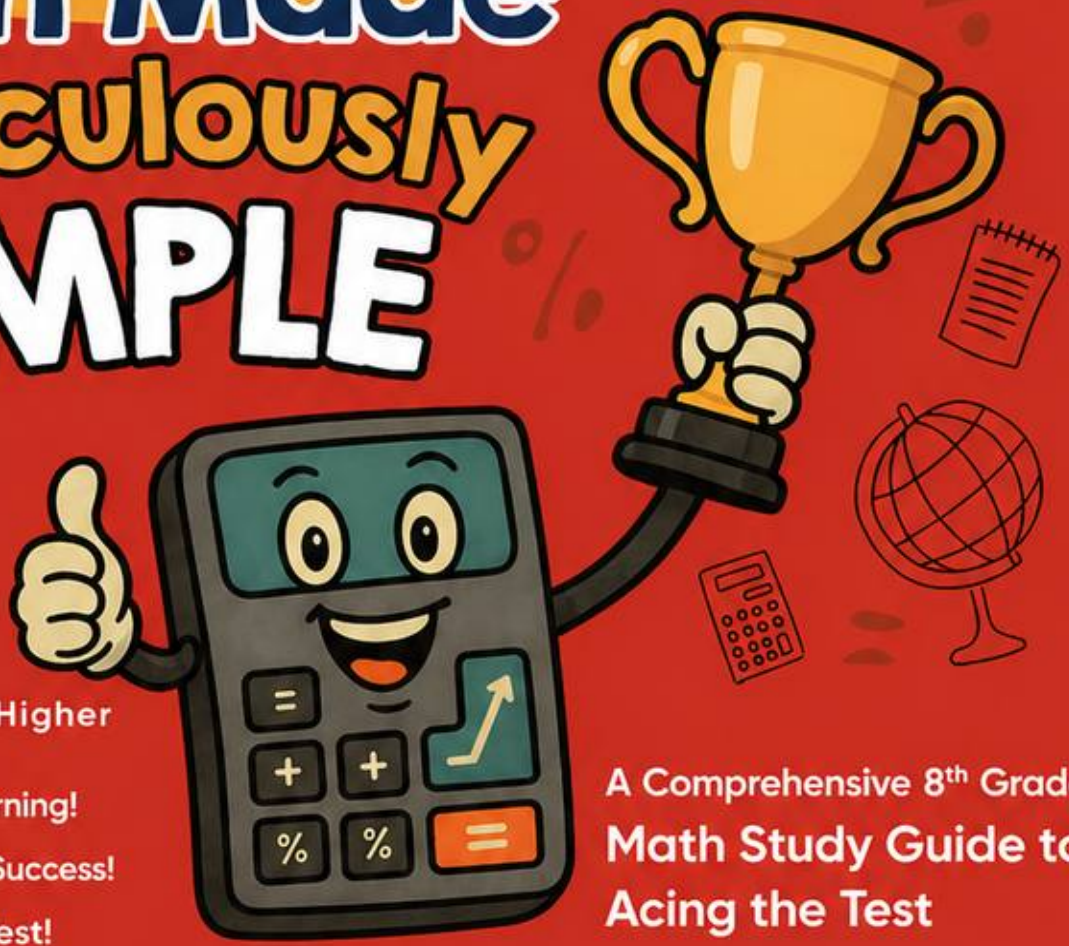
Arizona AASA Grade 8

Math Made Ridiculously SIMPLE



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

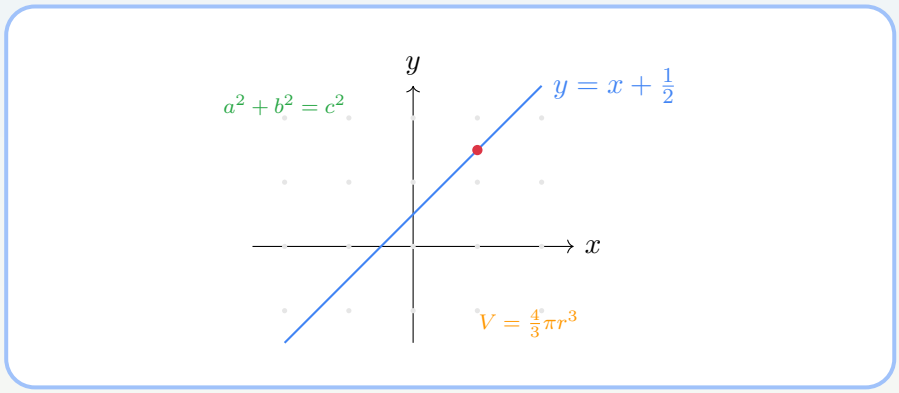
A Comprehensive 8th Grade Math Study Guide to Acing the Test

Learn Faster · Understand Deeper · Succeed with Confidence

Arizona AASA Grade 8 Math

Made Ridiculously Simple

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



Reza Nazari

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Understand congruence, similarity, and apply the Pythagorean Theorem

8.G.A	Understand congruence and similarity
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations. Properties include: lines are taken to lines, line segments are taken to line segments of the same length, angles are taken to angles of the same measure, parallel lines are taken to parallel lines
8.G.A.2	Understand that a two-dimensional figure is congruent to another if one can be obtained from the other by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that demonstrates congruence
8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates
8.G.A.4	Understand that a two-dimensional figure is similar to another if, and only if, one can be obtained from the other by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that demonstrates similarity
8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles
8.G.B	Understand and apply the Pythagorean Theorem
8.G.B.6	Understand the Pythagorean Theorem and its converse
8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world context and mathematical problems in two and three dimensions
8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system
8.G.C	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres
8.G.C.9	Understand and use formulas for volumes of cones, cylinders and spheres and use them to solve real-world context and mathematical problems

8.NS | The Number System

Understand and apply concepts of rational and irrational numbers

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8.NS.A	Understand that there are irrational numbers, and approximate them using rational numbers
8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion. Know that numbers whose decimal expansions do not terminate in zeros or in a repeating sequence of fixed digits are called irrational
8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers. Locate them approximately on a number line diagram, and estimate their values
8.NS.A.3	Understand that given any two distinct rational numbers,a<b, there exist a rational numbercand an irrational numberdsuch thata<c<banda<d<b. Given any two distinct irrational numbers,a<b, there exist a rational numbercand an irrational numberdsuch thata<c<banda<d<b

8.SP | Statistics and Probability

Investigate patterns of association in bivariate data

8.SP.A	Investigate patterns of association in bivariate data
8.SP.A.1	Construct and interpret scatter plots for bivariate measurement data to investigate and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association
8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line
8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept
8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables
8.SP.B	Investigate chance processes and develop, use, and evaluate probability models

8.SP.B.5 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation

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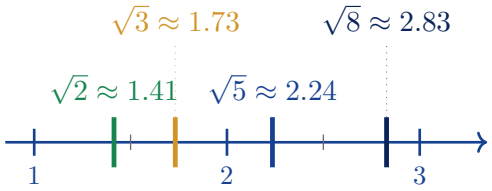
20. A scientist measures the density of a metal sample as $7.\overline{18}$ g/cm^3. (a) Convert $7.\overline{18}$ to a fraction. (b) A block of this metal is 10 cm^3. What is its mass as a fraction? (c) Round the mass to the nearest gram.

_____

1.3 Estimating Irrational Numbers

8.NS.A, 8.NS.A.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!