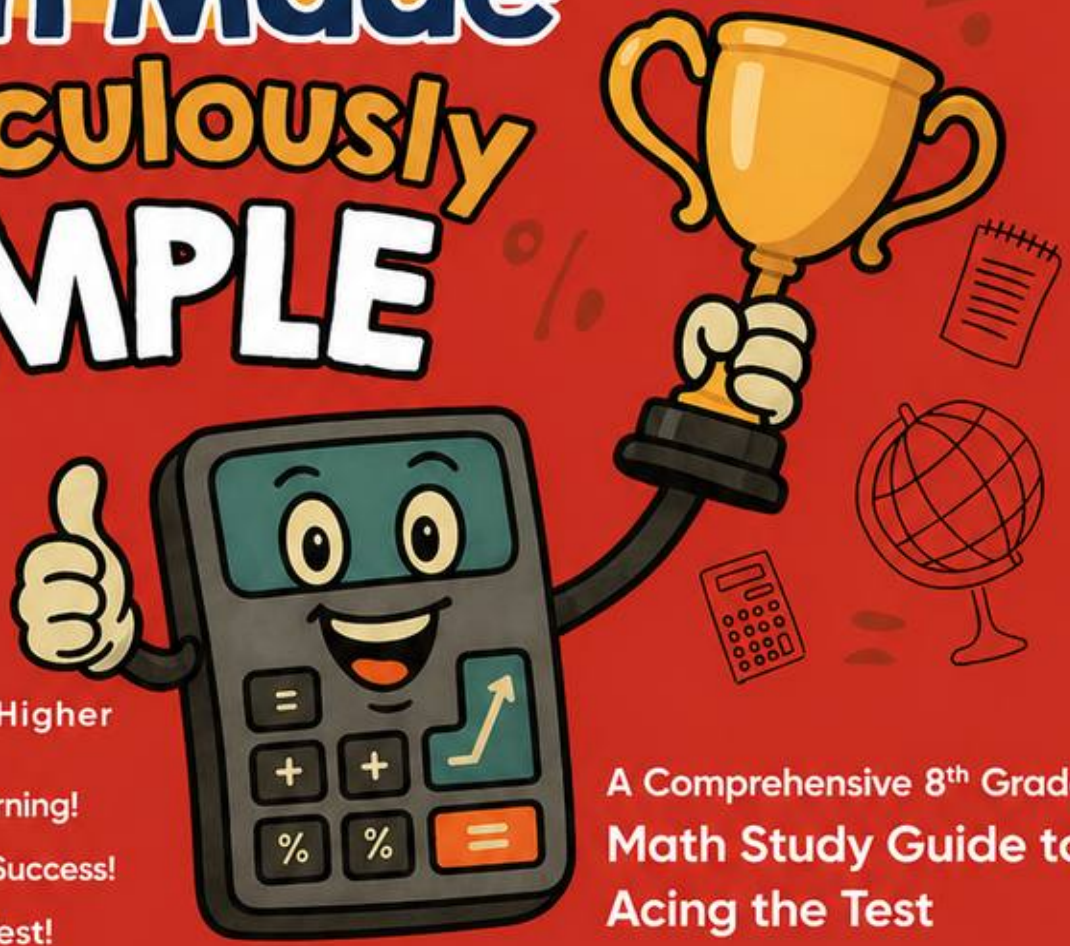
# South Carolina

# SC READY Grade 8

# Math Made Ridiculously SIMPLE



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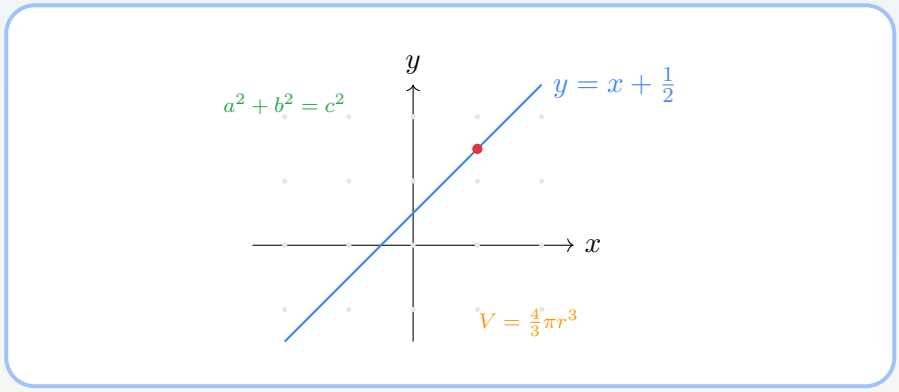
A Comprehensive 8th Grade Math Study Guide to Acing the Test

Learn Faster · Understand Deeper · Succeed with Confidence

# South Carolina SC READY Grade 8 Math

## Made Ridiculously Simple

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




**Reza Nazari**

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| | |
|---|---|
| 8.MGSR.3.7 | Describe the effect of a series of transformations, including dilations, translations, rotations, and reflections, on two-dimensional figures using coordinates on the coordinate plane |

## 8.NR | South Carolina

*Grade 8 expectations grouped under 8.NR.*

| | |
|---|---|
| 8.NR.1 | Translate among multiple representations of rational numbers |
| 8.NR.1.1 | Convert any form of a rational number to any other form including fractions (mixed numbers), decimals, and percentages |
| 8.NR.2 | Utilize real numbers in mathematical and real-world situations |
| 8.NR.2.1 | Compare real numbers and write statements usingis equal to(=),is not equal to($\neq$),is less than($<$),is greater than($>$),is greater than or equal to($\geq$), oris less than or equal to($\leq$) |
| 8.NR.2.2 | Classify and order the subsets of real numbers in the number system including natural, whole, integer, rational, and irrational numbers |

## 8.PAFR | South Carolina

*Grade 8 expectations grouped under 8.PAFR.*

| | |
|---|---|
| 8.PAFR.1 | Determine if a table, graph, verbal description, or equation represents a function and describe its characteristics |
| 8.PAFR.1.1 | Define an equation in slope-intercept form (y=mx+b) as being a linear function |
| 8.PAFR.1.2 | Identify and describe the constant rate of change and they-intercept of a linear function |
| 8.PAFR.1.3 | Determine if a graph, table, mapping, or verbal description is a function (linear or nonlinear) or not a function |
| 8.PAFR.1.4 | Describe the key features of given functions, includingdomain, range, intervals of increasing or decreasing, constant, discrete, continuous, andintercepts |
| 8.PAFR.1.5 | Use multiple representations including mappings, tables, graphs, verbal description, and equations (only when linear) of two functions to compare the functions and draw conclusions |



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| | |
|---|---|
| 8.PAFR.1.6 | Translate among the multiple representations, including mappings, tables, graphs, verbal description, and equations (only when linear) of a function |
| 8.PAFR.2 | Write, simplify, and evaluate algebraic expressions; write and solve algebraic equations and inequalities |
| 8.PAFR.2.1 | Solve multi-step one-variable equations and inequalities with variables on both sides with rational coefficients |
| 8.PAFR.2.2 | Describe single-variable equations as having one solution, no solution, or an infinite number of solutions |
| 8.PAFR.2.3 | Identify the rate of change for a linear function as the slope of the line |
| 8.PAFR.2.4 | Explain why the slope,m, is the same between any two distinct points on a linear graph |
| 8.PAFR.2.5 | Given a table or a graph, identify the slope and they-intercept of a line and write a linear equation to express that line |
| 8.PAFR.3 | Apply mathematical patterns, properties, and algorithms to the set of rational numbers to find sums, differences, products, and quotients and to write equivalent expressions |
| 8.PAFR.3.1 | Analyze patterns of perfect squares and perfect cubes to evaluate square roots and cube roots. Limit to square roots less than or equal to 400 and cube roots less than or equal to 1,000 |
| 8.PAFR.3.2 | Approximate non-perfect square roots and cube roots to nearest tenth. Limit to square roots less than or equal to 400 and cube roots less than or equal to 1,000 |
| 8.PAFR.3.3 | Apply laws of exponents to simplify algebraic expressions involving no more than three variables and integer exponents |

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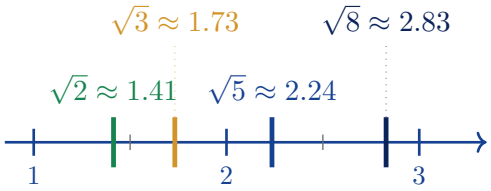
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## 1.3 Estimating Irrational Numbers

8.NR.2, 8.NR.2.1

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 $\Rightarrow$ 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:** $4 < \sqrt{20} < 5$

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!



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## ✍ Word Problems

**13.** A square garden has an area of 75 $m^2$. The gardener wants to know whether the side length is closer to 8 m or 9 m so she can decide how many fence posts to order. Between which two consecutive integers does the side length fall, and which integer is it closest to?

_____

**14.** Two drones take off from the same point and fly in perpendicular directions. Drone A travels $\sqrt{60}$ km and Drone B travels 7.5 km. Without using a calculator, determine which drone flies farther.

_____

**15.** A park ranger estimates the distance across a circular lake. The lake's area is 200 $m^2$. (a) The radius satisfies $\pi r^2 = 200$. Find $r^2$. (b) Estimate $r$ to the nearest tenth. (c) Estimate the diameter to the nearest metre.

_____

**16.** Between which two consecutive whole numbers does each value lie? (a) $\sqrt{50}$ (b) $\sqrt[3]{100}$ (c) Order from least to greatest: $\sqrt{50}$, $\sqrt[3]{100}$, 7.2

_____

**17.** A square garden has area 150 $ft^2$. You need to buy fencing for all four sides. Fencing is sold in whole-foot lengths. (a) Find the exact side length. (b) Estimate the perimeter to the nearest tenth of a foot. (c) How many whole feet of fencing must you buy?

_____