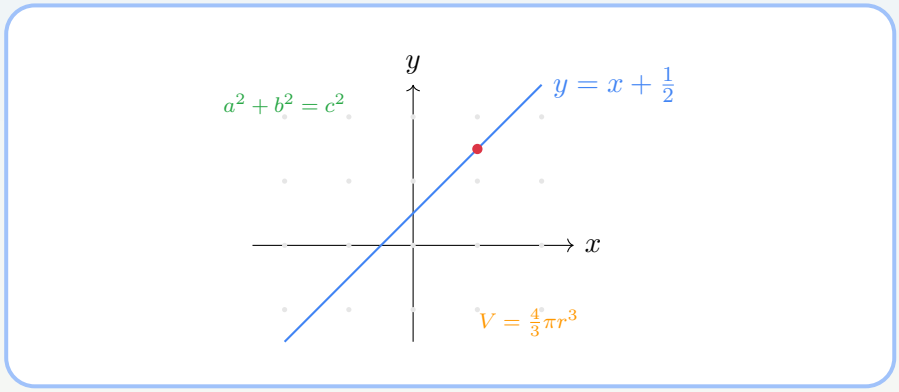
Tennessee TCAP
8th Grade Math Workbook

Comprehensive Practice, Challenging Exercises, and Strategic Guidance for Complete Test-Day Confidence



Reza Nazari

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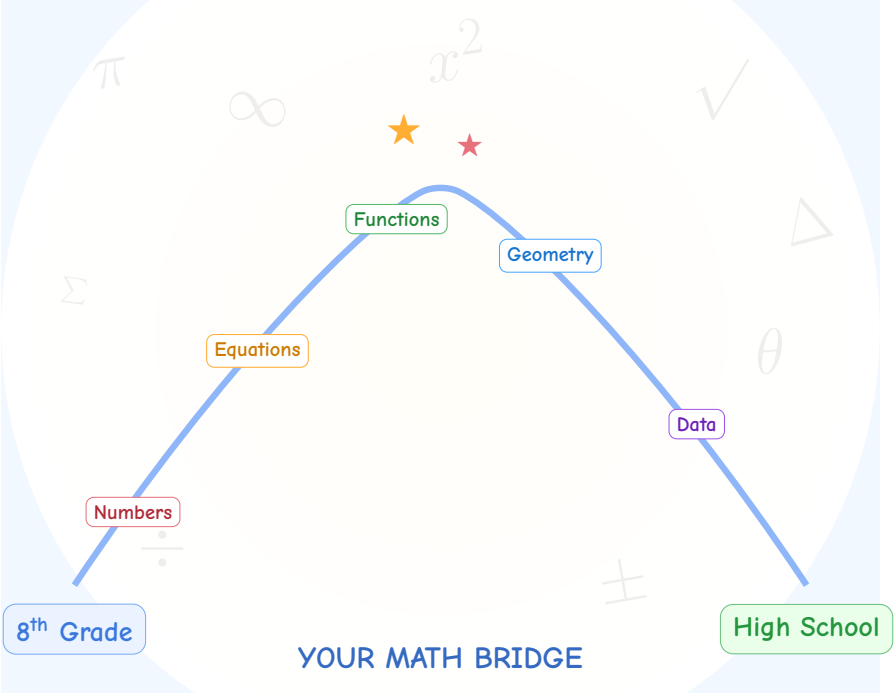
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Welcome, 8th Grader!

The Bridge Between Middle School and High School Starts Here



Dear Eighth Grader,

Welcome! This is *your* year. Everything you have built so far — working with fractions, decimals, ratios, and basic geometry — has been preparing you for this moment. Eighth-grade math is where all of those skills come together and open the door to high school and beyond.

8.G | Geometry

Understand congruence, similarity, and apply the Pythagorean Theorem

8.G.A	Understand and describe the effects of transformations on two-dimensional figures and use informal arguments to establish facts about angles
8.G.A.1	Describe the effect of translations, rotations, reflections, and dilations on two-dimensional figures using coordinates
8.G.A.2	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.3	Explain a model of the Pythagorean Theorem and its converse
8.G.B.4	Know and apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions
8.G.B.5	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.6	Apply the formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems

8.NS | The Number System

Understand and apply concepts of rational and irrational numbers

8.NS.A	Know that there are numbers that are not rational, and approximate them by rational numbers
8.NS.A.1	Know that real numbers that are not rational are called irrational (e.g., π, $\sqrt{2}$, etc.). Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually or terminates, and convert a decimal expansion which repeats eventually or terminates into a rational number

8.NS.A.2 Use rational approximations of irrational numbers to compare the size of irrational numbers by locating them approximately on a number line diagram. Estimate the value of irrational expressions (such as $\pi 2$)

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 patterns of association between two quantities. 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 linear 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 intercepts

8.SP.B Investigate chance processes and develop, use, and evaluate probability models

8.SP.B.4 Find probabilities of and represent sample spaces for compound events using organized lists, tables, tree diagrams, and simulation

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15. A walking trail runs along two straight segments. The first segment is $\sqrt{20}$ km and the second is π km. (a) Estimate $\sqrt{20}$ to the nearest tenth. (b) Using $\pi \approx 3.14$, estimate the total trail length. (c) If a hiker walks at 5 km/h, about how many minutes will the entire trail take? _____

16. A rectangular picture frame has dimensions $\sqrt{18}$ inches by $(2+\sqrt{5})$ inches. (a) Estimate each dimension to the nearest tenth. (b) Estimate the perimeter of the frame. (c) If framing material costs \$1.50 per inch, estimate the total cost. _____

17. The area of a circular garden is 50 m^2. (a) Using $A = \pi r^2$, solve for r in exact form. (b) Estimate r to the nearest tenth. (c) Estimate the circumference $C = 2\pi r$ to the nearest tenth of a metre. _____

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★ Chapter 1 Answer Key ★

Real Numbers & Number Sense

Topic 1 • Rational and Irrational Numbers

1) 3
2) 7
3) -12
4) Rational
5) Irrational
6) Irrational
7) Rational
8) Irrational
9) Rational
10) Irrational
11) Irrational
12) 13
13) Irrational
14) Yes
15) Irrational
16) No
17) Rational; 8 ft
18) 4 rational
19) False

Topic 2 • Turning Repeating Decimals into Fractions

1) $\frac{5}{9}$
2) $\frac{2}{9}$
3) $\frac{8}{9}$
4) 1
5) $\frac{1}{9}$
6) $\frac{2}{3}$
7) $\frac{5}{11}$
8) $\frac{3}{11}$
9) $\frac{2}{11}$
10) $\frac{7}{11}$
11) $\frac{1}{11}$
12) $\frac{6}{11}$
13) $\frac{1}{7}$
14) $\frac{1}{6}$
15) 36 pieces
16) Yes—the repeating decimal *is* the fraction $\frac{8}{11}$
17) $0.\overline{6} = \frac{2}{3}$; total $= \frac{2}{3} \times 5 = \frac{10}{3} = 3\frac{1}{3}$ cups
18) Both fractions are equal, but Eddie's is fully simplified: $\frac{5}{11}$
19) $\frac{1}{3} + \frac{2}{3} + \frac{5}{9} = \frac{14}{9} = 1\frac{5}{9}$ minutes

Topic 3 • Estimating Irrational Numbers

1) 3 and 4
2) 4 and 5
3) 5 and 6
4) 7 and 8
5) 8 and 9
6) 9 and 10
7) ≈ 2.4
8) ≈ 3.7
9) ≈ 5.5
10) ≈ 7.2
11) $\sqrt{3}$, 2, $\sqrt{5}$
12) $\sqrt{11}$
13) $8 < \sqrt{75} < 9$; closer to 9 since $\sqrt{75} \approx 8.66$
14) Drone A; $\sqrt{60} \approx 7.75 > 7.5$
15) Side ≈ 9.5 ft; fencing $\approx 4(9.5)(\$12) = \$456$
16) $\sqrt{113} \approx 10.6$ cm; need an 11 cm strip
17) 7.07 is more accurate; $7.07^2 = 49.9849 \approx 50$

Topic 4 • Estimating Expressions with Irrational Numbers

1) ≈ 6.28
2) ≈ 4.14
3) ≈ 5.64
4) ≈ 3.73
5) ≈ 4.42
6) 2
7) ≈ 6.21
8) ≈ 5.86
9) ≈ 1.86
10) ≈ 3.81
11) 5
12) ≈ 2.44
13) ≈ 9.4 m^2
14) Rope A; ≈ 0.55 m longer
15) Total $\approx 4.5 + 3.14 = 7.64$ km; time $\approx 7.64 \div 5 \times 60 \approx 92$ min
16) Perimeter $\approx 2(4.24 + 4.24) \approx 16.96$ in; cost $\approx \$25.44$
17) $r \approx 4.0$ m; $C \approx 25.1$ m

Answers and Explanations on page: 160

Full worked solutions for Chapter 1 are waiting there.

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