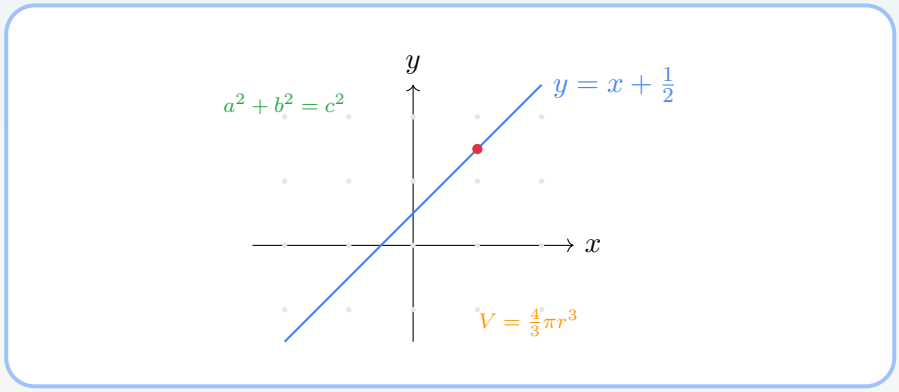
Minnesota MCA
8th Grade Math Workbook

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



Reza Nazari

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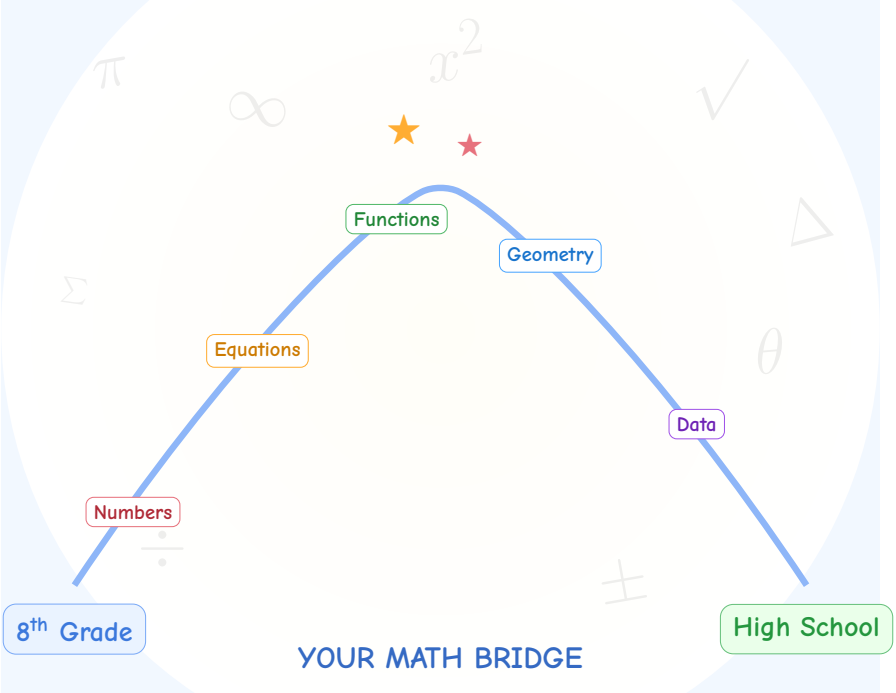
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Welcome, 8th Grader!

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.

8.2.3.1 Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables

8.2.3.2 Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols

8.2.4 Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context

8.2.4.1 Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships

8.2.4.2 Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used

8.2.4.3 Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line

8.2.4.4 Use linear inequalities to represent relationships in various contexts

8.2.4.5 Solve linear inequalities using properties of inequalities. Graph the solutions on a number line

8.2.4.6 Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line

8.2.4.7 Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically

8.2.4.8 Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations

8.2.4.9 Use the relationship between square roots and squares of a number to solve problems

8.3 | Geometry & Measurement

Apply geometric reasoning and measurement to solve problems

8.3.1 Solve problems involving right triangles using the Pythagorean theorem and its converse

8.3.1.1 Use the Pythagorean theorem to solve problems involving right triangles

8.3.1.2 Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean theorem to find the distance between any two points in a coordinate system

8.3.1.3 Informally justify the Pythagorean theorem by using measurements, diagrams and computer software

8.3.2 Solve problems involving parallel and perpendicular lines on a coordinate system

8.3.2.1 Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships

8.3.2.2 Analyze polygons on a coordinate system by determining the slopes of their sides

8.3.2.3 Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically

8.4 | Data Analysis & Probability

Analyze data, apply probability, and draw conclusions

8.4.1 Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data

8.4.1.1 Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit

8.4.1.2 Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set

8.4.1.3 Assess the reasonableness of predictions using scatterplots by interpreting them in the original context

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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) $\approx 9.4\ \text{m}^2$
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: 158
Full worked solutions for Chapter 1 are waiting there.

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