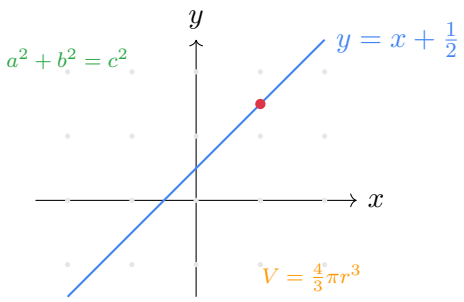
Kansas KAP

8th Grade Math Workbook

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



Reza Nazari

Copyrighted Material

Copyright © 2026

Effortless Math Education Inc

Published by Effortless Math Education

www.effortlessmath.com

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the author, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law, including Section 107 or 108 of the 1976 United States Copyright Act.

This publication is independently produced and has no official connection to any state, district, or national testing program.

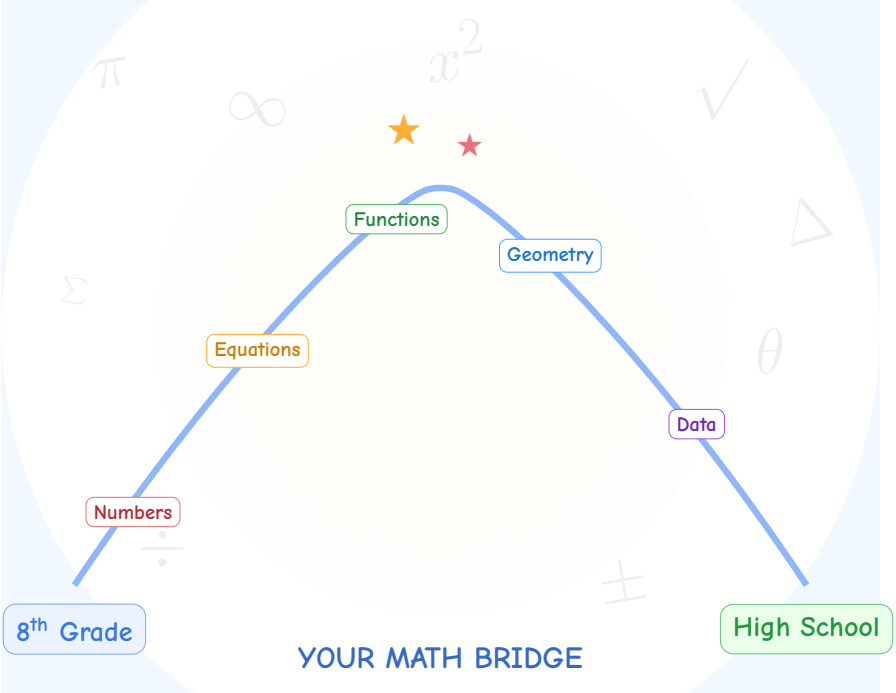
Test names and organizational names used herein are the property of their respective trademark holders.

Copyright © 2026

Copyrighted Material

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.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values

8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally

8.G | Geometry

Understand congruence, similarity, and apply the Pythagorean Theorem

8.G.1 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

8.G.2 Measure angles in whole-number degrees using a protractor. Draw angles of specified measure using a protractor and straight edge

8.G.3 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure

8.G.4 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and use them to solve simple equations for an unknown angle in a figure

8.G.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.6 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on drawing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle

8.G.7 Explain a proof of the Pythagorean Theorem and its converse

8.G.8 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.9	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system
8.G.10	Use the formulas or informal reasoning to find the arc length, areas of sectors, surface areas and volumes of pyramids, cones, and spheres
8.G.11	Investigate the relationship between the formulas of three dimensional geometric shapes
8.G.12	Solve real-world and mathematical problems involving arc length, area of two-dimensional shapes including sectors, volume and surface area of three-dimensional objects including pyramids, cones and spheres
8.G.11a	Generalize the volume formula for pyramids and cones (V= $\frac{1}{3}$Bh)
8.G.11b	Generalize surface area formula of pyramids and cones (SA = B + $\frac{1}{2}$ Pl)
8.G.1a	An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles
8.G.1b	An angle that turns throughnone-degree angles is said to have an angle measure ofndegrees

8.NS | The Number System

Understand and apply concepts of rational and irrational numbers

8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2)

8.SP | Statistics and Probability

Investigate patterns of association in bivariate data

8.SP.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.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.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept

1.4 Estimating Expressions with Irrational Numbers

8.NS.2

Quick Review and Helpful Hints

Useful approximations: $\sqrt{2} \approx 1.41$, $\sqrt{3} \approx 1.73$, $\sqrt{5} \approx 2.24$, $\pi \approx 3.14$

Strategy: Substitute ⇒ Simplify ⇒ Round to the required number of decimal places.

Bounding: Computing both a *lower bound* (using smaller approximations) and an *upper bound* (using larger ones) confirms how accurate the estimate is.

Example: Estimate π^2 to two decimal places.

Use $\pi \approx 3.14$. Then $\pi^2 \approx 3.14 \times 3.14$. Compute: $3 \times 3.14 = 9.42$ and $0.14 \times 3.14 = 0.4396$, so $\pi^2 \approx 9.42 + 0.44 = 9.86$. (The actual value is $9.8696\ldots$, confirming our estimate is close.)

Answer: $\pi^2 \approx 9.86$

Practice Problems

Estimate each expression to one decimal place. Use $\sqrt{2} \approx 1.41$, $\sqrt{3} \approx 1.73$, $\sqrt{5} \approx 2.24$, $\pi \approx 3.14$.

1. $2\pi \approx$ _____
2. $\pi + 1 \approx$ _____
3. $4\sqrt{2} \approx$ _____
4. $\sqrt{3} + 2 \approx$ _____
5. $3\pi - 5 \approx$ _____
6. $(\sqrt{2})^2 =$ _____
7. $2\sqrt{5} + \sqrt{3} \approx$ _____
8. $\pi^2 - 4 \approx$ _____
9. $5\sqrt{2} - 3\sqrt{3} \approx$ _____
10. $\frac{\pi}{2} + \sqrt{5} \approx$ _____
11. $(\sqrt{3})^2 + (\sqrt{2})^2 =$ _____
12. $\sqrt{2} \cdot \sqrt{3} \approx$ _____

Word Problems

13. A circular fountain has a radius of exactly $\sqrt{3}$ metres. Estimate the area of the fountain to the nearest tenth of a square metre. Use $\pi \approx 3.14$ and $\sqrt{3} \approx 1.732$. _____

14. Rope A has length $\pi + \sqrt{2}$ metres and Rope B has length 4 metres. Which rope is longer, and by approximately how much? Use $\pi \approx 3.14$ and $\sqrt{2} \approx 1.41$. _____

Scan Me

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 $50\ \text{m}^2$. (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. _____

★ 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; $7.07^2 = 49.9849 \approx 50$

Scan Me