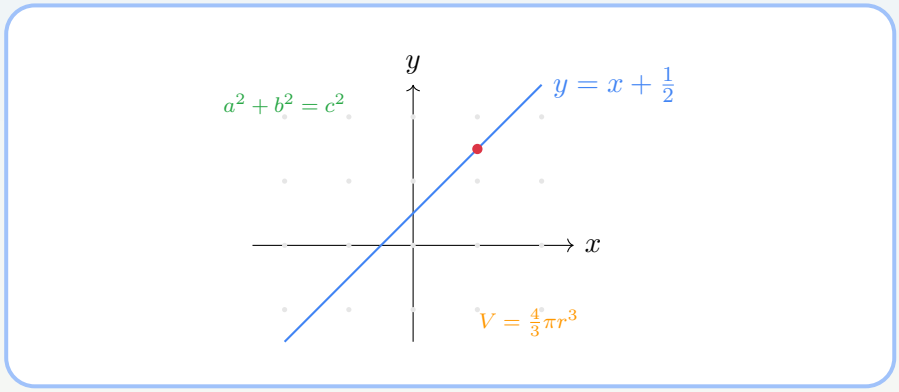
Texas STAAR
8th Grade Math Workbook

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



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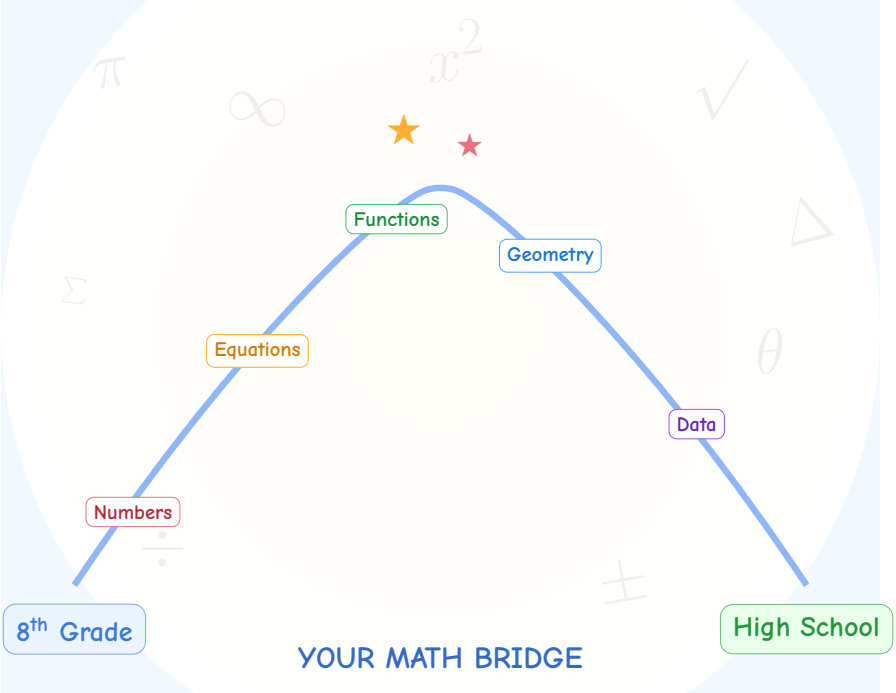
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Welcome, 8th Grader!

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.

8.4(A) use similar right triangles to develop an understanding that slope, m, given as the rate comparing the change in y-values to the change in x-values, (y2- y1)/(x2- x1), is the same for any two points (x1, y1) and (x2, y2) on the same line

8.4(B) graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship;

8.4(C) use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems

8.5 | The student applies mathematical process standards to use proportional and. . .

The student applies mathematical process standards to use proportional and non-proportional relationships to develop foundational concepts of functions

8.5(A) represent linear proportional situations with tables, graphs, and equations in the form of $y = kx$

8.5(B) represent linear non-proportional situations with tables, graphs, and equations in the form of $y = mx + b$, where $b \neq 0$

8.5(C) contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation

8.5(D) use a trend line that approximates the linear relationship between bivariate sets of data to make predictions

8.5(E) solve problems involving direct variation

8.5(F) distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form $y = kx$ or $y = mx + b$, where $b \neq 0$

8.5(G) identify functions using sets of ordered pairs, tables, mappings, and graphs

8.5(H) identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems;

8.5(I) write an equation in the form $y = mx + b$ to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations

8.6 | The student applies mathematical process standards to develop mathematical. . .

The student applies mathematical process standards to develop mathematical relationships and make connections to geometric formulas

8.6(A)	describe the volume formula V = Bh of a cylinder in terms of its base area and its height
8.6(B)	model the relationship between the volume of a cylinder and a cone having both congruent bases and heights and connect that relationship to the formulas;
8.6(C)	use models and diagrams to explain the Pythagorean theorem

8.7 | The student applies mathematical process standards to use geometry to solve problems

The student applies mathematical process standards to use geometry to solve problems

8.7(A)	solve problems involving the volume of cylinders, cones, and spheres
8.7(B)	use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders
8.7(C)	use the Pythagorean Theorem and its converse to solve problems;
8.7(D)	determine the distance between two points on a coordinate plane using the Pythagorean Theorem

8.8 | The student applies mathematical process standards to use one-variable equations or...

The student applies mathematical process standards to use one-variable equations or inequalities in problem situations

8.8(A)	write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants

8.8(B) write a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants

8.8(C) model and solve one-variable equations with variables on both sides of the equal sign that represent mathematical and real-world problems using rational number coefficients and constants;

8.8(D) use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles

8.9 The student applies mathematical process standards to use multiple representations to develop foundational concepts of simultaneous linear equations

8.10 | Two-dimensional shapes

Analyze properties and attributes of two-dimensional figures

8.10(A) generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane

8.10(B) differentiate between transformations that preserve congruence and those that do not

8.10(C) explain the effect of translations, reflections over the x- or y-axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation;

8.10(D) model the effect on linear and area measurements of dilated two-dimensional shapes

8.11 | Measurement and data

Use measurement and data analysis to solve real-world problems

8.11(A) construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data

8.11(B) determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points;

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. Which is greater: $\sqrt{11}$ or 3.3? _____

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 square patio has an area of 90 ft^2. (a) Between which two consecutive whole numbers does the side length fall? (b) Estimate the side length to the nearest tenth. (c) If fencing costs \$12 per foot, estimate the total cost to fence all four sides. _____

16. A science lab measures the diagonal of a rectangular table as $\sqrt{113}$ cm. The students must cut a strip of protective tape to cover the diagonal exactly. (a) Between which two whole numbers is $\sqrt{113}$? (b) Estimate $\sqrt{113}$ to the nearest tenth. (c) If tape only comes in whole-centimetre lengths, what is the shortest strip they should cut? _____

17. Two friends are estimating $\sqrt{50}$. Anya says it is about 7.0 because $7^2 = 49$. Ben says it is about 7.1 because $7.1^2 = 50.41$, which is closer to 50 than 49 is. (a) Which estimate is more accurate? (b) Find a better estimate to the nearest hundredth. _____

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1.4 Estimating Expressions with Irrational Numbers

8.2(D)

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 $\sqrt{2} \approx 1.41$. _____

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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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