

12 Illinois IAR Grade 8 Math Practice Tests

The Complete Coached Test Prep with Tips & Detailed Answer Keys

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12 Practice Tests

Welcome!

*This book contains **12 full-length practice tests** — the ultimate preparation program for your Grade 8 math assessment. Each test covers all six major topics:*

 *Irrational Numbers*  *Powers & Scientific Notation*

 *Linear Equations*  *Functions*

 *Geometry*  *Data & Relationships*

Twelve tests give you unmatched depth and repetition. By the time you finish, there won't be any surprises on test day.

Champions aren't born — they're prepared.



How to Use This Book

Your complete 12-test championship program

What's Inside

- **12 Full-Length Practice Tests** — each covers all 6 chapters of Grade 8 math: irrational numbers, exponents & scientific notation, linear equations, functions, geometry, and data analysis.
- **Detailed Answer Explanations** — every question includes a step-by-step solution so you learn from every mistake.
- **Formula Reference Sheet** — all the key Grade 8 formulas you need, organized and ready for quick review.
- **Test Tracker** — log your scores across all 12 tests and monitor your progress from start to finish.

Your 12-Test Championship Plan

★ **PHASE 1: Foundation (Tests 1–3)**

Untimed. Learn the format, discover your strengths and weak spots. Focus on understanding, not speed.

★★ **PHASE 2: Building (Tests 4–6)**

Soft-timed. Practice showing full solutions, and study the topics you missed between each test.

★★★ **PHASE 3: Sharpening (Tests 7–9)**

Timed (70 minutes). Build pacing and accuracy under real-time constraints. Review every mistake.

PHASE 4: Championship (Tests 10–12)

Full test conditions: strict timing, quiet space, no notes. These are your final dress rehearsals.

Schedule: Take one test every 3–4 days. Use study days between tests to review and improve.

 Types of Questions

• **Multiple Choice:** Four options — work the problem first, then match. Eliminate obviously wrong answers to narrow your choices.

 **Short Answer & Constructed Response:** Show every step: equations, substitutions, simplifications. Partial credit rewards correct reasoning even if the final answer is off.

 **Graphing & Data Analysis:** Plot points, draw lines, interpret graphs. Label axes clearly.



Tip: Twelve tests is a true championship program. Don't rush — the power is in what you do between tests. Study, review, and master your weak areas before moving on.



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💡 Test-Taking Tips 💡

Your complete test-day toolkit

🕒 Before the Test

- Review your notes from the previous test — focus on your weak topics
- Set up a quiet, clean workspace with all your materials ready
- Start with a positive mindset: you've prepared for this

✎ During the Test

- Read each problem fully before calculating anything
- Write the formula or set up the equation first, then substitute values
- Show all your work — every step, every operation
- If stuck for more than 2 minutes, mark it and move on
- Use estimation to check if your answers are reasonable

📖 After the Test

- Read the full explanation for every question you got wrong
- Write down which topics gave you trouble (not just question numbers)
- Study those topics before taking the next test
- Record your score in the Test Tracker

⚠ Common Mistakes in Grade 8 Math

⚠ Exponents: $(ab)^n = a^n b^n$, but $a^m + a^n \neq a^{m+n}$. Only multiply/divide to combine.

⚠ Slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ — keep the order consistent.

⚠ Systems of equations: The solution must satisfy both equations.

⚠ Transformations: Rotations and reflections change position; dilations change size.

⚠ Volume: Use $\pi \approx 3.14$ or leave as π — match what the question asks.



“ The students who improve the most aren't the ones who take the most tests — they're the ones who carefully review every mistake. Make that your priority. ”



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Grade 8 Formula Reference

Keep this page handy — you may use it during your practice tests!

Exponent Rules

$$a^m \cdot a^n = a^{m+n} \quad (a^m)^n = a^{mn} \quad (ab)^n = a^n \cdot b^n$$
$$\frac{a^m}{a^n} = a^{m-n} \quad a^0 = 1 \quad (a \neq 0) \quad a^{-n} = \frac{1}{a^n}$$

Lines & Linear Equations

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$

m = slope b = y -intercept

Slope-intercept: $y = mx + b$

Parallel lines: same slope

Proportional: $y = mx$

Proportional: passes through origin

Scientific Notation

$a \times 10^n$ where $1 \leq |a| < 10$

Multiply: add exponents

Divide: subtract exponents

Roots & Number Sense

Perfect squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

Perfect cubes: 1, 8, 27, 64, 125 $\sqrt{2} \approx 1.414$ $\sqrt{3} \approx 1.732$ $\pi \approx 3.14159$

Pythagorean Theorem & Distance

$a^2 + b^2 = c^2$ c = hypotenuse (longest side of a right triangle) **Distance:** $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Volume Formulas

Cylinder $V = \pi r^2 h$ **Cone** $V = \frac{1}{3} \pi r^2 h$ **Sphere** $V = \frac{4}{3} \pi r^3$

Angle Relationships

Triangle angle sum: 180°

Exterior angle = sum of two remote interior angles

Parallel lines + transversal: Alternate interior angles are equal • Co-interior angles sum to 180°

Functions

Each input $\rightarrow$ exactly one output **Vertical line test:** if any vertical line hits graph more than once $\Rightarrow$ not a function

Linear: constant rate of change ($y = mx + b$)

Nonlinear: rate of change varies

Transformations

Translation: slide

Reflection: flip

Rotation: turn

Dilation: resize

Congruent = same shape & size

Similar = same shape, proportional size



Tip: Bookmark this page! Review it before each test so these formulas become second nature.



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PRACTICE TEST

1

Practice Test 1

 10 Questions

Before You Start

- ✓ *Read each question carefully before choosing your answer.*
- ✓ *Show your work on scratch paper when you need to.*
- ✓ *Skip hard questions and come back to them later.*
- ✓ *Check your answers when you're done.*
- ✓ *Take your time — there's no rush!*

★ *You've Got This!* ★

Do your best and show what you know!



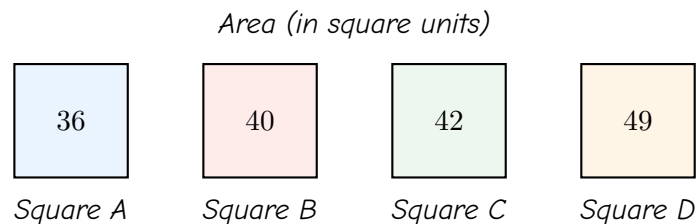
1. Which best explains why $\sqrt{\frac{1}{9}}$ is a rational number?

- (A) Because the fraction $\frac{1}{9}$ is less than 1
- (B) Because $\sqrt{\frac{1}{9}} = \frac{1}{3}$, which is a ratio of two integers
- (C) Because the square root of any fraction is always rational
- (D) Because 9 is a single-digit number

2. What is $0.\overline{3}$ written as a fraction?

- (A) $\frac{3}{10}$
- (B) $\frac{3}{99}$
- (C) $\frac{1}{3}$
- (D) $\frac{3}{100}$

3. The diagram shows four squares with their areas labeled. Which square has a side length closest to 6.5?



- (A) Square A (area 36)
- (B) Square B (area 40)
- (C) Square C (area 42)
- (D) Square D (area 49)

4. What is the exact value of $(\sqrt{3})^2$?

- (A) 1.73
- (B) 3
- (C) 9
- (D) $\sqrt{9}$



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5. Evaluate $\sqrt[3]{-64}$.

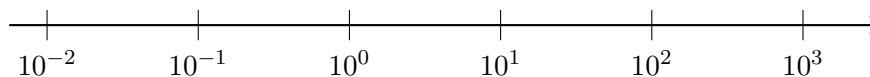
(A) -4

(B) 4

(C) -8

(D) Not a real number

6. The number line below shows powers of 10. Where does 5×10^1 fall on this number line?



(A) Between 10^{-1} and 10^0

(B) Between 10^0 and 10^1

(C) Between 10^1 and 10^2

(D) Between 10^2 and 10^3

7. A farm produces 4.5×10^6 kilograms of wheat. Each bag holds 5×10^1 kilograms. How many bags can be filled?

(A) 9×10^5

(B) 9×10^4

(C) 9×10^7

(D) 0.9×10^5

8. A table for a proportional relationship is shown below. What is the constant of proportionality?

x	5	10	15
y	17.5	35	52.5

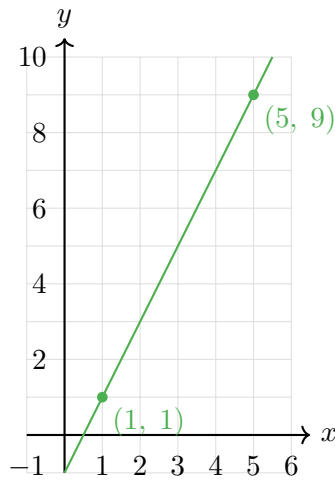
Your Answer:



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9. The graph below shows a line passing through two labeled points. Find the slope.



Your Answer:

10. Solve $\frac{x}{2} - 3 = \frac{x}{5} + 3$.

- (A) $x = 6$ (B) $x = 10$
(C) $x = 15$ (D) $x = 20$



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★ End of Practice Test 1 ★

Great job finishing the test!

My Score

I got _____ out of 10 questions right.

*Check your answers in the **Answer Key** at the back of the book.*

 *Review any questions you missed. That's how we learn!*

Answer Key & Explanations



Answer Key

First try each test on your own, then check your work here.

Practice Test 1 — Answer Key

1 B

2 C

3 C

4 B

5 A

6 C

7 B

8 3.5

9 2

10 D

Time to Learn!

Review the explanations below, *especially for the questions you missed*.

Understanding why each answer is correct builds stronger problem-solving skills.

Tip: Circle any questions you got wrong, then read their explanation carefully.

Practice Test 1 — Detailed Explanations

1 $\sqrt{\frac{1}{9}} = \frac{\sqrt{1}}{\sqrt{9}} = \frac{1}{3}$, which can be written as a fraction of integers. Choice C is false: $\sqrt{\frac{1}{2}}$ is irrational.

2 Let $x = 0.333\dots$. Then $10x = 3.333\dots$. Subtracting: $9x = 3$, so $x = \frac{3}{9} = \frac{1}{3}$.



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3 Side lengths: $\sqrt{36} = 6$, $\sqrt{40} \approx 6.32$, $\sqrt{42} \approx 6.48$, $\sqrt{49} = 7$. Since 6.48 is closest to 6.5, Square C is the answer.

4 By definition, $(\sqrt{3})^2 = 3$ exactly. Squaring a square root undoes the operation.

5 $(-4)^3 = (-4)(-4)(-4) = -64$, so $\sqrt[3]{-64} = -4$. Cube roots of negative numbers are real and negative.

6 $5 \times 10^1 = 50$. Since $10^1 = 10$ and $10^2 = 100$, the value 50 falls between 10^1 and 10^2 .

7 To divide in scientific notation, divide the coefficients and subtract the exponents. $\frac{4.5}{5} = 0.9$ and $10^{6-1} = 10^5$. Then adjust: $0.9 \times 10^5 = 9 \times 10^4 = 90,000$ bags.

8 The constant of proportionality is $k = \frac{y}{x}$. Using the first pair: $k = \frac{17.5}{5} = 3.5$. The other ratios $\frac{35}{10} = 3.5$ and $\frac{52.5}{15} = 3.5$ confirm this.

9 Use the slope formula $m = \frac{y_2 - y_1}{x_2 - x_1}$. From the labeled points: $m = \frac{9-1}{5-1} = \frac{8}{4} = 2$.

10 To clear fractions, multiply every term by the LCD (10): $5x - 30 = 2x + 30$. Collect variable terms: $3x = 60$, so $x = 20$.



Well done checking your answers!

Keep practicing to strengthen your skills.



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THANK YOU

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- ✓ *All chapters and topics*
- ✓ *Hundreds of practice problems*
- ✓ *Complete answer key with explanations*
- ✓ *Colorful visuals and step-by-step examples*
- ✓ *Reference sheets and progress trackers*

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