

# 3

# Illinois IAR

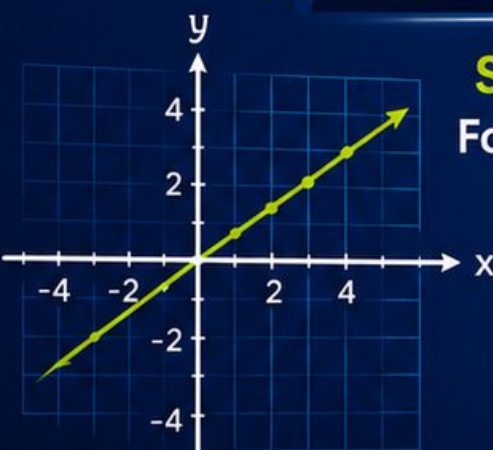
$$a^2 + b^2 = c^2$$
$$\sqrt{x}$$

## GRADE 8

# MATH

## PRACTICE TESTS

**Standards Aligned Problem Solving**  
For Comprehensive Assessment Programs



$$V = s^3$$



$$y = mx + b$$
$$2x + 5 = 13$$
$$x = 4$$



# 3

**PRINTED  
TESTS**

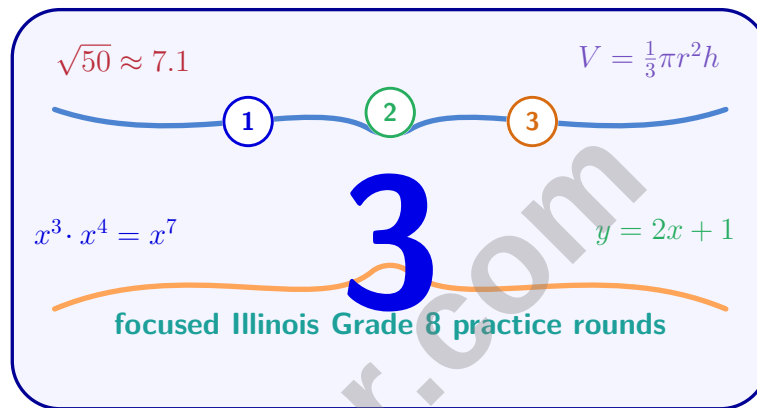
# 2

**ONLINE  
TESTS**

Use these **two additional online practice tests**  
for extra review after the printed tests in this book.

# 3 Illinois IAR Grade 8 Math Practice Tests

*Focused IAR Prep for Grade 8 Skills and Test Confidence*



Three complete 40-question Grade 8 IAR practice rounds with real numbers, exponents, scientific notation, equations, functions, transformations, geometry, data analysis, probability, answer keys, and clear explanations for every item.

**Jay Daie and Reza Nazari**

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# Welcome, Illinois Grade 8 Problem Solver!

Three focused rounds for sharper IAR math thinking

This book gives you three full Grade 8 IAR math practice tests. Each round is built to help you recognize structure, reason with real numbers and exponents, analyze linear relationships, connect equations with graphs, and explain your thinking with care.

## Your Illinois Practice Promise

I will read every question carefully, choose a strategy that fits, write enough work to prove my answer, and use corrections as training for the next test.

Read

Model

Verify

## How to Use This Book

A three-session plan for confident Grade 8 review

1. **Warm up with the review pages.** Notice the big ideas before starting the tests.
2. **Complete one test at a time.** Treat each 40-question round like a real practice session.
3. **Show your reasoning.** Jot an exponent rule, equation, graph, transformation, diagram, or quick estimate when it helps.
4. **Correct actively.** Rework missed items before reading the explanation.
5. **Choose the next target.** After each test, name one skill and one habit to improve.

**Illinois review rhythm:** Work a test, score it, study your misses, then come back ready for the next round with one clear goal.



## What Is Inside?

Three IAR tests, 120 questions, and a focused review path

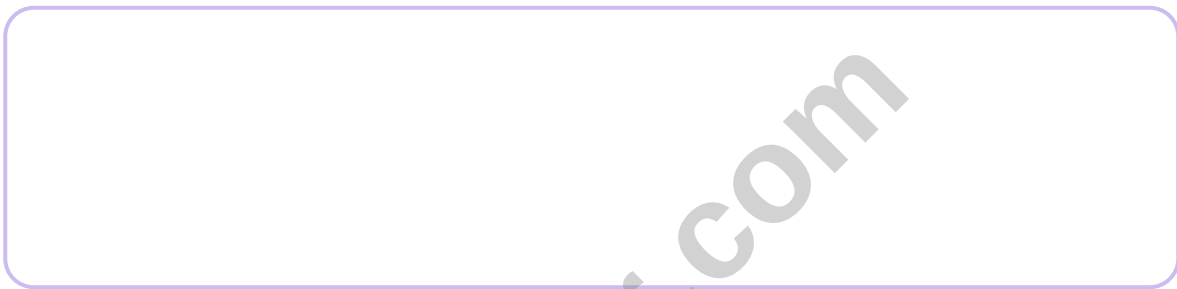
| Part         | What You Will Practice                                                                        |
|--------------|-----------------------------------------------------------------------------------------------|
| Tests 1–2    | Real numbers, exponents, scientific notation, equations, and careful reading.                 |
| Test 3       | Functions, systems, transformations, geometry, data analysis, and multi-step problem solving. |
| Answer Pages | Compact keys and explanations that show why each answer works.                                |

The tests are mixed on purpose. Grade 8 success means recognizing which idea is being tested even when the next question changes format.



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& answers

# Table of Contents



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- 1) A balloon loses 5 cm of altitude per second. It starts at 200 cm. Which equation gives altitude  $h$  after  $t$  seconds?

☐ A.  $h = -5t + 200$

☐ C.  $h = -5t - 200$

☐ B.  $h = 5t + 200$

☐ D.  $h = 200t - 5$

- 2) The mass of the Sun is approximately  $2 \times 10^{30}$  kg. How many times more massive is the Sun than Earth, which has mass  $6 \times 10^{24}$  kg?

- 3) A cube with edge 2 m is attached to a rectangular prism with dimensions  $4 \times 2 \times 2$  m (where the cube shares a  $2 \times 2$  face). If we ignore the shared face, what is the total surface area of the composite solid?

☐ A.  $40 \text{ m}^2$

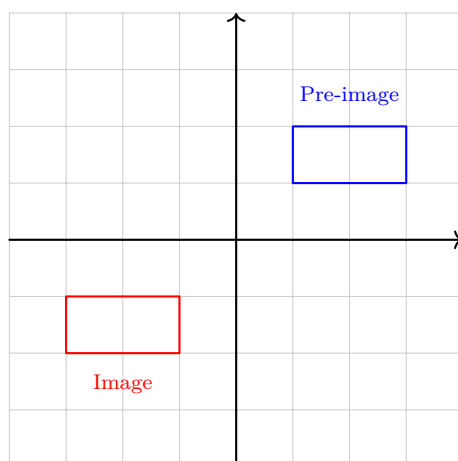
☐ C.  $64 \text{ m}^2$

☐ B.  $56 \text{ m}^2$

☐ D.  $72 \text{ m}^2$



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4)

Looking at the two rectangles, which transformation was applied?

- ☐ A. Reflection across the  $x$ -axis      ☐ C.  $180^\circ$  rotation about the origin  
☐ B. Reflection across the  $y$ -axis      ☐ D. Dilation by scale factor 2

5) The slope of line  $\ell_1$  is  $\frac{3}{4}$ . If line  $\ell_2$  is perpendicular to  $\ell_1$ , what is the slope of  $\ell_2$ ?

- ☐ A.  $\frac{3}{4}$       ☐ C.  $-\frac{4}{3}$   
☐ B.  $-\frac{3}{4}$       ☐ D.  $\frac{4}{3}$

6) Convert the mixed decimal  $0.5\overline{8}$  to a fraction in simplest form.



- 7) At a movie theater, adult tickets cost \$12 and child tickets cost \$8. If a family paid \$60 total for 6 tickets (mix of adult and child), which equation correctly represents the situation, where  $a$  is the number of adult tickets?

☐ A.  $12a + 8(6 - a) = 60$

☐ C.  $a + 8 = 60$

☐ B.  $12a + 8a = 60$

☐ D.  $12(6) + 8a = 60$

- 8) Solve:  $\frac{x+5}{-2} \leq 3$

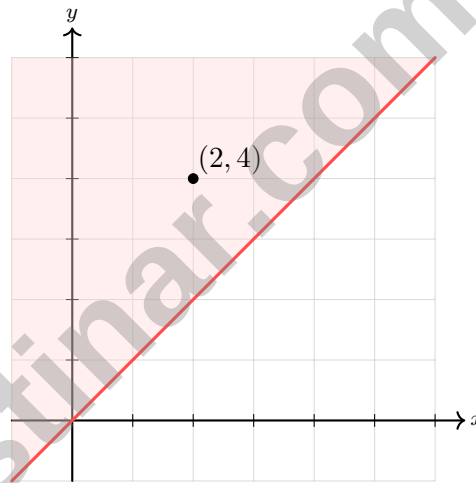
☐ A.  $x \geq -11$

☐ C.  $x \leq -11$

☐ B.  $x \leq 1$

☐ D.  $x \geq 1$

9)



The test point  $(2, 4)$  is marked in the shaded region. Which inequality does this represent?

☐ A.  $y > x$

☐ C.  $y \geq x$

☐ B.  $y < x$

☐ D.  $y \leq x$



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1) Which expression is larger:  $\sqrt{5} + \sqrt{6}$  or 4.8?

- ☐ A.  $\sqrt{5} + \sqrt{6}$  is larger  
☐ B. Cannot be determined  
☐ C. They are equal  
☐ D. 4.8 is larger

2) Convert  $0.\overline{93}$  to a fraction in simplest form.

- ☐ A.  $\frac{93}{100}$   
☐ B.  $\frac{9}{30}$   
☐ C.  $\frac{93}{99}$   
☐ D.  $\frac{84}{90} = \frac{14}{15}$



3)

Which value belongs at the red mark on the number line?

- ☐ A.  $\sqrt{9}$   
☐ B.  $\sqrt{20}$   
☐ C.  $\sqrt{16}$   
☐ D.  $\sqrt{12}$

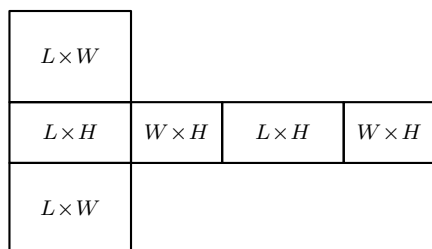
4) The sum of two people's ages is 35. In 5 years, the older person will be twice the age of the younger person. If the younger person is currently  $y$  years old, find  $y$ .

5) The radius of Jupiter is about  $7.14 \times 10^7$  m. What is this in standard form?

- ☐ A. 714,000 m  
☐ B. 7,140,000,000 m  
☐ C. 714,000,000 m  
☐ D. 71,400,000 m



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6) Net of a rectangular prism

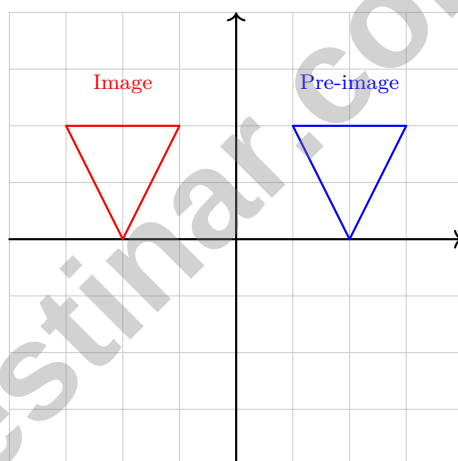
A rectangular prism has dimensions 4 cm (L)  $\times$  3 cm (W)  $\times$  2 cm (H). If we unfold it into a net, how many faces does the net show?

☐ A. 3 faces

☐ C. 6 faces

☐ B. 4 faces

☐ D. 8 faces



7)

The triangle was reflected across which line?

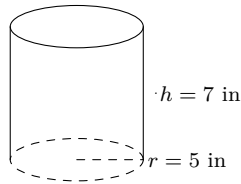
☐ A.  $y = x$

☐ C. The  $y$ -axis

☐ B.  $y = -x$

☐ D. The line  $y = 2$





1)

A cylinder with radius 5 in and height 7 in is shown. What is its volume? (Use  $\pi \approx 3.14$ .)

☐ A.  $109.9 \text{ in}^3$ ☐ C.  $549.5 \text{ in}^3$ ☐ B.  $219.8 \text{ in}^3$ ☐ D.  $1099 \text{ in}^3$ 

2) Trapezoid  $PQRS$  is similar to Trapezoid  $TUVW$  with scale factor  $\frac{3}{2}$ . If  $PQ = 8 \text{ cm}$  in trapezoid  $PQRS$ , what is the length of  $TU$  in trapezoid  $TUVW$ ?

☐ A. 12 cm☐ C. 8 cm☐ B. 5.33 cm☐ D. 10.67 cm

3) A phone plan charges based on minutes used. The table shows the cost  $C(m)$  for  $m$  minutes.

|                 |      |      |      |      |
|-----------------|------|------|------|------|
| Minutes ( $m$ ) | 100  | 200  | 300  | 400  |
| Cost ( $C(m)$ ) | \$20 | \$30 | \$40 | \$50 |

What is  $C(200)$ ?

☐ A. \$20☐ C. \$30☐ B. \$40☐ D. \$50

4) Which is a counterexample to the claim “All decimals that contain a 3 are irrational”?

☐ A.  $\sqrt{3}$ ☐ C.  $\pi \approx 3.14159 \dots$ ☐ B. 0.3 (terminating)☐ D. 0.3030030003... (non-repeating)

5) Two different lines are fit to the same scatter plot. Line 1 has residuals of  $\pm 2, \pm 1.5, \pm 2$ , while Line 2 has residuals of  $\pm 5, \pm 4, \pm 6$ . Which line is the better fit?

- ☐ A. Line 1, because it has smaller residuals overall
- ☐ B. Line 2, because it has larger residuals
- ☐ C. Both are equally good fits
- ☐ D. Neither is a good fit

6) Write  $0.\overline{4}$  as a fraction in simplest form.

- ☐ A.  $\frac{2}{5}$
- ☐ B.  $\frac{4}{10}$
- ☐ C.  $\frac{4}{99}$
- ☐ D.  $\frac{4}{9}$

7) To the nearest tenth,  $\sqrt{35} \approx ?$

- ☐ A. 5.7
- ☐ B. 6.3
- ☐ C. 6.1
- ☐ D. 5.9

8) A table shows:

|     |   |   |    |
|-----|---|---|----|
| $x$ | 0 | 3 | 6  |
| $y$ | 5 | 2 | -1 |

What is the rate of change (slope)?



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**Illinois IAR Grade 8 Practice Test Answer Keys****How to use this section with a Grade 8 student:**

1. check the answer first and circle any item that needs another look
2. retry the problem with fresh work before reading the explanation
3. write one short lesson learned from each missed or guessed item

**A strong review routine turns every correction into a sharper plan for the next Illinois IAR practice test.**

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## Practice Test Answers and Explanations

### Practice Test 1 Answers and Explanations

- 1) **Choice A is correct.** (8.F.B.4) Initial altitude is 200 cm (intercept). Altitude decreases by 5 cm per second (negative slope). Equation:  $h = -5t + 200$ .
- 2) **The correct answer is  $3.33 \times 10^5$ .** (8.EE.A.3) Divide:  $\frac{2 \times 10^{30}}{6 \times 10^{24}} = \frac{2}{6} \times 10^6 = \frac{1}{3} \times 10^6 \approx 3.33 \times 10^5$ .
- 3) **Choice B is correct.** (8.G.C.9) Cube SA =  $24 \text{ m}^2$ , rectangular prism SA =  $40 \text{ m}^2$ . Subtract the two shared faces:  $24 + 40 - 2(4) = 56 \text{ m}^2$ .
- 4) **Choice C is correct.** (8.G.A.1) A  $180^\circ$  rotation about the origin maps  $(x, y) \rightarrow (-x, -y)$ . The pre-image at  $(1, 1)$  maps to  $(-1, -1)$  in the image, confirming the rotation.
- 5) **Choice C is correct.** (8.EE.B.6) Perpendicular slopes are negative reciprocals. The negative reciprocal of  $\frac{3}{4}$  is  $-\frac{4}{3}$ .
- 6) **The correct answer is  $\frac{53}{90}$ .** (8.NS.A.1) Set  $x = 0.\overline{58} = 0.5888\dots$ . Then  $10x = 5.\overline{8}$  and  $100x = 58.\overline{8}$ . Subtracting:  $90x = 53$ , so  $x = \frac{53}{90}$ .
- 7) **Choice A is correct.** (8.EE.C.7) Total cost is adult tickets plus child tickets. If  $a$  adults, then  $(6 - a)$  children. Equation:  $12a + 8(6 - a) = 60$ .
- 8) **Choice A is correct.** (8.EE.C.8b) Multiply by  $-2$  (FLIP):  $x + 5 \geq -6$ . Subtract 5:  $x \geq -11$ .
- 9) **Choice C is correct.** (8.EE.C.8b) At  $(2, 4)$ :  $4 \geq 2$  is TRUE. The SOLID line shows  $\geq$ . Shading ABOVE the line confirms  $y \geq x$ .
- 10) **Choice B is correct.** (8.SP.A.3) Only (B) changes at a constant positive rate, matching a line with positive slope. (A) and (D) are exponential, and (C) is not a steady linear pattern.
- 11) **Choice C is correct.** (8.G.B.7) Rate per 2 weeks:  $\$15 / \$100 = 15\%$  per 2 weeks. There are  $52 \text{ weeks} / 2 = 26$  two-week periods in a year. APR:  $0.15 \times 26 = 3.9 = 390\%$ .
- 12) **Choice C is correct.** (8.EE.A.2)  $10 \times 10 = 100$ , so  $x = 10$  (taking the positive root).
- 13) **The correct answer is  $(6, 7)$ .** (8.NS.A.2)  $6^2 = 36$  and  $7^2 = 49$ . Since  $36 < 45 < 49$ , we have  $6 < \sqrt{45} < 7$ .
- 14) **Choice C is correct.** (8.EE.B.5) Substitute  $x = 7$  into  $y = 2x$ :  $y = 2(7) = 14$ . The cost is \$14.
- 15) **Choice A is correct.** (8.EE.C.8a) Parallel lines have the same slope but different  $y$ -intercepts. Both equations  $y = 2x + 1$  and  $y = 2x - 3$  have slope 2 but different intercepts (1 and  $-3$ ). Option D is the same line (infinitely many solutions).
- 16) **Choice A is correct.** (8.EE.C.7) Sum of areas:  $x^2 + 2x + 4x + 8 = x^2 + 6x + 8$ .
- 17) **Choice B is correct.** (8.F.A.1) Each input value (1, 2, 3, 4) corresponds to exactly one output value (3, 6, 9, 12). The relationship is  $y = 3x$ , making it a function.
- 18) **The correct answer is A, C.** (8.NS.A.1)  $\sqrt{169} = 13$  is rational (perfect square). The repeating decimal  $0.777\dots = \frac{7}{9}$  is rational. The other values are irrational:  $\sqrt{170}$  (non-perfect square),  $2\pi$  (irrational multiple of  $\pi$ ), and  $\sqrt{2} + 1$  (irrational plus rational is irrational).
- 19) **Choice C is correct.** (8.F.A.3) By definition, a line represents a linear function. Since the graph is a line, the relationship is linear.
- 20) **Choice C is correct.** (8.F.B.5) The graph shows a flat segment at 100% from hours 0 to 2, indicating no charge change during idle time. From hour 2 onward, the slope is negative (draining). Option D is false because the battery approaches 1.5%, not 0%.
- 21) **Choice B is correct.** (8.G.A.2) Congruent figures have equal corresponding sides. Since both octagons have 8 sides of 5 cm each, both have perimeter  $8 \times 5 = 40 \text{ cm}$ .
- 22) **Choice D is correct.** (8.G.A.3) Dilation scales all lengths by the scale factor. Perimeter:  $24 \times 0.5 = 12$ .
- 23) **Choice C is correct.** (8.G.A.5) Co-interior angles are supplementary:  $3w + w = 180 \implies 4w = 180 \implies w = 45^\circ$ .
- 24) **Choice A is correct.** (8.G.B.8) Distance =  $\sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$  units.
- 25) **Choice B is correct.** (8.G.C.9) Original:  $V = \pi r^2 h$ . New:  $V' = \pi(2r)^2(\frac{h}{2}) = \pi \times 4r^2 \times \frac{h}{2} = 2\pi r^2 h = 2V$ .
- 26) **Choice B is correct.** (8.G.B.7) Alternate interior angles formed by a transversal cutting parallel lines are congruent. So  $z = 62^\circ$ .



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## Hi, Grade 8 Math Star!

◇ You finished this practice set with real effort. Grade 8 math asks you to connect ideas, explain your thinking, and stay steady through multi-step problems. ◇

★ **Remember this:** Every page you completed helped build stronger habits: reading carefully, choosing a method, showing work, and checking whether the answer makes sense. You practiced across 3 full Grade 8 practice tests, and that repeated effort matters. ★

### What You Built

- **Focus:** You stayed with challenging questions.
- **Accuracy:** You learned to slow down when details matter.
- **Reasoning:** You practiced explaining why a method works.
- **Readiness:** You are more prepared than when you started.

**Grade 8 test-day tip:** Before test day, review the questions that made you pause. Those are the best teachers.

If you want to share something or ask a question, please email me at [jay@testinar.com](mailto:jay@testinar.com).

**Jay Daie**

Your Grade 8 Math Friend

# PRACTICE TODAY, ACHIEVE TOMORROW!

GRADE  
**8**

Give your child the edge they need with **3 full-length** Grade 8 Math practice tests that reflect real test formats and cover all key math standards. Perfect for building skills, boosting confidence, and preparing for success on test day!



## WHAT'S INSIDE?



### Standards-Aligned Practice

Questions designed to cover essential Grade 8 math standards.



### Variety of Question Types

Multiple-choice, short answer, and more to build well-rounded skills.



### Real-World Applications

Engaging problems that connect math to everyday life.



### Step-by-Step Progress

Track improvement and build confidence with every test.



### Build Skills & Boost Confidence

Strengthen understanding and feel prepared for test day.

## COVERS ALL ESSENTIAL TOPICS

- ✓ The Number System
- ✓ Expressions & Equations
- ✓ Ratios & Proportional Relationships
- ✓ Linear Equations
- ✓ Functions
- ✓ Geometry
- ✓ Measurement & Data
- ✓ Statistics & Probability
- ✓ Pythagorean Theorem
- ✓ Volume & Surface Area
- ✓ Transformations
- ✓ Inequalities
- ✓ Data Analysis & Graphing
- ✓ And More!



### 2 Extra Online Practice Tests Included!

Use these two additional online practice tests for extra review after the printed tests.

[testinar.com/math8](https://testinar.com/math8)

## PRACTICE. PREPARE. SUCCEED.



**Testinar**

More Practice. More Confidence.  
Better **Results**.