

# 3

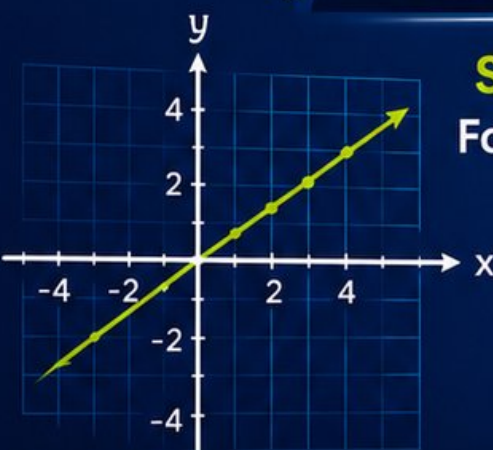
# Alaska AK STAR

## 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

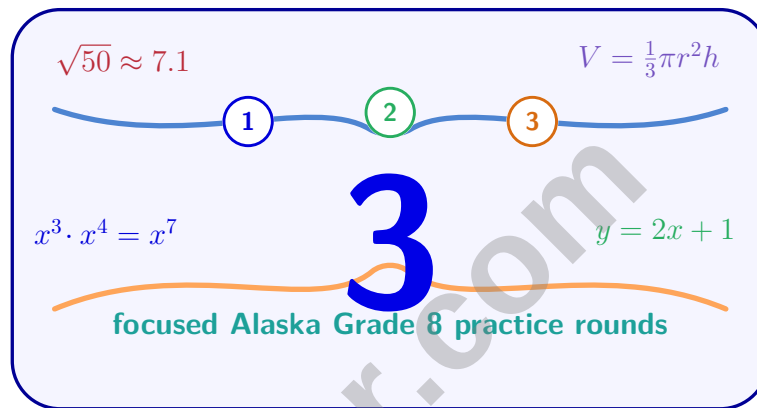
**ONLINE  
TESTS**



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

# 3 Alaska AK STAR Grade 8 Math Practice Tests

*Three AK STAR Practice Tests for Targeted Grade 8 Review*



Three complete 40-question Grade 8 AK STAR 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, Alaska Grade 8 Problem Solver!

Three focused rounds for sharper AK STAR math thinking

This book gives you three full Grade 8 AK STAR 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 Alaska 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.

**Alaska 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 AK STAR 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.                                |

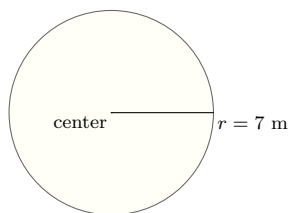
The tests are mixed on purpose. Grade 8 success means recognizing which idea is being tested even when the next question changes format.



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& answers

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1)

A sphere with radius 7 m is shown. What is its approximate volume? (Use  $\pi \approx 3.14$ .)

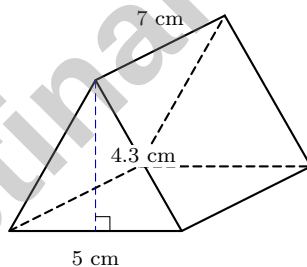
☐ A.  $615.44 \text{ m}^3$

☐ C.  $1436.03 \text{ m}^3$

☐ B.  $1230.88 \text{ m}^3$

☐ D.  $1916.8 \text{ m}^3$

2) Express 356,000 in scientific notation.



3)

A triangular prism has equilateral triangular bases with side length 5 cm (height  $\approx 4.3$  cm) and depth 7 cm. What is the approximate total surface area?

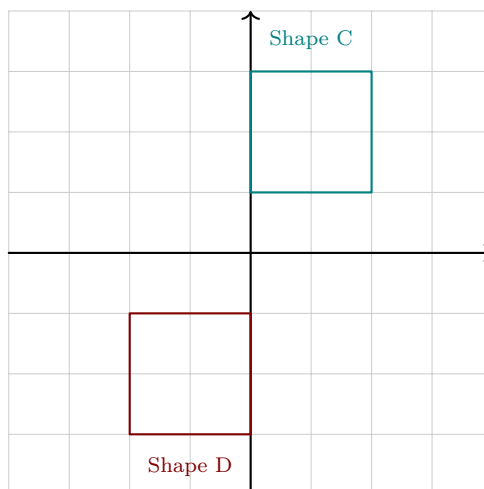
☐ A.  $21.5 \text{ cm}^2$

☐ C.  $126.5 \text{ cm}^2$

☐ B.  $43 \text{ cm}^2$

☐ D.  $172.5 \text{ cm}^2$





4)

If Shape C is rotated  $180^\circ$  about the origin, which shape results?

- ☐ A. Shape D
- ☐ B. The same shape (unchanged)
- ☐ C. A shape in Quadrant II
- ☐ D. A shape above the  $x$ -axis in Quadrant II

5) What is the  $y$ -intercept of the line  $y = 3x - 7$ ?

- ☐ A.  $-7$
- ☐ B.  $3$
- ☐ C.  $7$
- ☐ D.  $-3$

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



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7) Which equation has **no solution**?

☐ A.  $2x + 5 = 2x + 5$

☐ C.  $5x - 2 = 2x + 4$

☐ B.  $4x + 1 = x + 7$

☐ D.  $3x + 4 = 3x + 7$

8) Which value does NOT satisfy  $-3x + 4 < 7$ ?

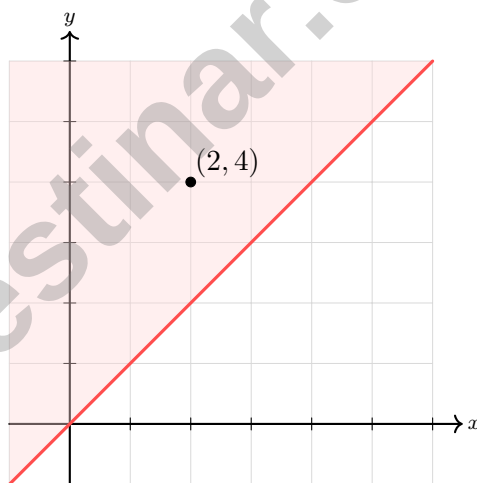
☐ A.  $x = 0$

☐ C.  $x = 2$

☐ B.  $x = 1$

☐ D.  $x = -2$

9) Estimate  $\sqrt{68}$  to the nearest tenth.



10)

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.  $y \leq x$



1) A car traveling at 60 mph leaves 1 hour before a car traveling at 75 mph. How long does the faster car take to catch the slower car?

☐ A. 2 hours

☐ C. 4 hours

☐ B. 3 hours

☐ D. 5 hours

2) Which fraction is equivalent to  $0.\overline{999}$ ?

☐ A.  $\frac{999}{1000}$

☐ C.  $\frac{1}{999}$

☐ B.  $\frac{9}{10}$

☐ D.  $\frac{999}{999} = 1$

3) Which is the best estimate of  $3 - \sqrt{2}$ ?

☐ A. 0.6

☐ C. 2.0

☐ B. 4.4

☐ D. 1.6

4) Two similar parallelograms have corresponding side lengths 10 and 15. What is the scale factor from the first to the second?

5) Multiply  $(2 \times 10^3) \times (3 \times 10^2)$ . Express in scientific notation.

☐ A.  $60 \times 10^5$

☐ C.  $5 \times 10^5$

☐ B.  $6 \times 10^6$

☐ D.  $6 \times 10^5$



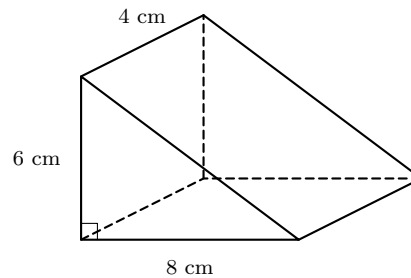
6) Which radicand gives a square root closest to 5.5?

☐ A. 25

☐ C. 33

☐ B. 28

☐ D. 30



7)

A triangular prism has a right triangular base with legs 8 cm and 6 cm. The prism extends 4 cm in depth. What is the total surface area?

☐ A. 48 cm<sup>2</sup>

☐ C. 128 cm<sup>2</sup>

☐ B. 116 cm<sup>2</sup>

☐ D. 144 cm<sup>2</sup>

8) A figure is rotated 45° clockwise about the origin. Which of the following best describes what happens to a side parallel to the  $x$ -axis?

☐ A. It remains parallel to the  $x$ -axis

☐ D. It becomes perpendicular to the  $y$ -axis

☐ B. It becomes parallel to the  $y$ -axis

☐ C. It tilts at a 45° angle below the horizontal

9) Which line is perpendicular to  $y = \frac{1}{2}x - 3$ ?

☐ A.  $y = \frac{1}{2}x + 4$

☐ C.  $y = -2x + 5$

☐ B.  $y = 2x + 1$

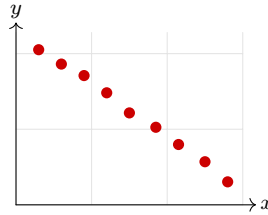
☐ D.  $y = -\frac{1}{2}x - 2$



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- 1) A recent graduate has a monthly gross income of \$3,000. She budgets: rent \$900, food \$400, transportation \$300, and savings \$200. How much is left for discretionary spending?

- ☐ A. \$200 ☐ C. \$1,800  
☐ B. \$2,500 ☐ D. \$1,200



2)

A scatter plot of monthly temperature ( $x$ ) versus monthly heating costs ( $y$ ) shows a strong negative relationship. Which statement correctly interprets this?

- ☐ A. Heating costs and temperature are unrelated ☐ C. Higher temperatures cause lower heating bills  
☐ B. Lower heating bills cause warmer weather ☐ D. As temperature increases, heating costs tend to decrease
- 3) Rectangle  $PQRS$  has length 10 m and width 6 m. Rectangle  $TUVW$  has length 5 m and width 3 m. What is the scale factor from  $PQRS$  to  $TUVW$ ?
- ☐ A. 2 ☐ C. 3  
☐ B.  $\frac{1}{2}$  ☐ D.  $\frac{1}{3}$
- 4) A chemist combines a 25% salt solution with an 80% salt solution to make 100 mL of a 50% solution. How many mL of the 25% solution are used?

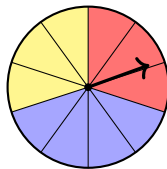


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5) If  $x$  is a whole number and  $\sqrt{x}$  is rational, then  $x$  must be:

- ☐ A. Irrational ☐ C. A perfect square  
☐ B. Odd ☐ D. Greater than 10

6) A spinner has 10 equal sections: 3 red, 4 blue, and 3 yellow. What is the probability of landing on red OR blue?



3 red, 4 blue, 3 yellow

- ☐ A.  $\frac{4}{10}$  ☐ C.  $\frac{7}{10}$   
☐ B.  $\frac{12}{10}$  ☐ D.  $\frac{3}{10}$
- 7) Two students claim different answers for  $0.\bar{9}$ . Student A says  $\frac{9}{9} = 1$ . Student B says  $\frac{9}{10}$ . Who is correct and why?
- ☐ A. Student A is correct;  $0.\bar{9} = 1$ . ☐ C. Both are incorrect; the answer is  $\frac{8}{9}$ .  
☐ B. Student B is correct;  $0.\bar{9} = 0.9$ . ☐ D. They are equal, so both are correct.
- 8) Which is the best estimate of  $\sqrt{2} \times \sqrt{3}$ ?
- ☐ A. 2.0 ☐ C. 3.0  
☐ B. 5.0 ☐ D. 2.4
- 9) Which value is in correct scientific notation form?
- ☐ A.  $12.3 \times 10^5$  ☐ C.  $1.23 \times 10^5$   
☐ B.  $0.15 \times 10^6$  ☐ D.  $123 \times 10^4$



**Alaska AK STAR 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 Alaska AK STAR practice test.**

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## Practice Test Answers and Explanations

### Practice Test 1 Answers and Explanations

- 1) **Choice C is correct.** **(8.G.9)**  $V = \frac{4}{3}\pi r^3 = \frac{4}{3} \times 3.14 \times 343 \approx 1436.03 \text{ m}^3$ .
- 2) **The correct answer is  $3.56 \times 10^5$ .** **(8.EE.3)** Move the decimal 5 places left to get 3.56; since the original number is greater than 1, the exponent is positive 5.
- 3) **Choice C is correct.** **(8.G.9)** Two equilateral triangle bases:  $2 \times \frac{1}{2}(5)(4.3) = 21.5 \text{ cm}^2$ . Three rectangular sides:  $3 \times (5 \times 7) = 105 \text{ cm}^2$ . Total  $\approx 21.5 + 105 = 126.5 \text{ cm}^2$ .
- 4) **Choice A is correct.** **(8.G.1)** A  $180^\circ$  rotation about the origin takes a point in Quadrant I to Quadrant III. Shape C's corner at  $(2, 3)$  maps to  $(-2, -3)$ , matching Shape D.
- 5) **Choice A is correct.** **(8.EE.6)** In slope-intercept form  $y = mx + b$ , the  $y$ -intercept is  $b$ . Here  $b = -7$ .
- 6) **The correct answer is  $\frac{53}{90}$ .** **(8.NS.2)** 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 D is correct.** **(8.EE.7)** A: Identity (infinitely many). B: Subtract  $3x$ :  $4 = 7$  (false, no solution). C and D: Unique solutions.
- 8) **Choice D is correct.** **(8.EE.7)** Solving:  $-3x < 3$ , so  $x > -1$ . Testing:  $x = -2$  gives  $-3(-2) + 4 = 10 \not< 7$  (false). So  $x = -2$  does not satisfy.
- 9) **The correct answer is 8.2.** **(8.NS.2)**  $8^2 = 64$  and  $9^2 = 81$ , so  $\sqrt{68}$  is between 8 and 9. A closer estimate is about 8.246, which rounds to 8.2 to the nearest tenth.
- 10) **Choice C is correct.** **(8.G.8)** At  $(2, 4)$ :  $4 \geq 2$  is TRUE. The SOLID line shows  $\geq$ . Shading ABOVE the line confirms  $y \geq x$ .
- 11) **Choice B is correct.** **(8.SP.3)** The intercept 0.8 (in units of \$10000) means when  $a = 0$ ,  $S = 0.8$ , or \$8000 baseline sales before advertising.
- 12) **Choice D is correct.** **(8.EE.1)** Quotient rule:  $\frac{y^5}{y^{-2}} = y^{5-(-2)} = y^{5+2} = y^7$ .
- 13) **Choice C is correct.** **(8.EE.2)** A cube root asks what number cubed gives 100. Since  $10^3 = 1000$ , 10 is not the cube root of 100.
- 14) **Choice D is correct.** **(8.EE.4)** Divide coefficients:  $3.6 \div 1.2 = 3$ . Subtract exponents:  $10^{6-2} = 10^4$ . Result:  $3 \times 10^4$ .
- 15) **Choice D is correct.** **(8.EE.8)** The second equation is exactly 2 times the first:  $4x - 2y = 10$  is  $2(2x - y = 5)$ . They represent the same line, so there are infinitely many solutions.
- 16) **Choice A is correct.** **(8.EE.7)** FOIL:  $(x + 2)(x + 6) = x^2 + 6x + 2x + 12 = x^2 + 8x + 12$ .
- 17) **Choice B is correct.** **(8.F.1)** Input 3 already maps to 6. Adding  $(3, 8)$  would make input 3 map to two different outputs (6 and 8), violating the function definition.
- 18) **Choice A is correct.** **(8.F.2)**  $A(20) = 2.99 + 0.50(20) = 12.99$ .  $B$  slope:  $(6 - 1)/10 = 0.5$ , so  $B(20) = 1 + 0.5(20) = 11$ . Since  $12.99 > 11$ , Plan A costs more.
- 19) **Choice C is correct.** **(8.F.3)** Absolute value functions are nonlinear. They produce a V-shaped graph, not a straight line.
- 20) **Choice C is correct.** **(8.F.5)** By the vertical line test, a function can have at most one  $y$ -intercept (at  $x = 0$ ). But it can have many  $x$ -intercepts (zeros). Options A violates the vertical line test, B is sometimes false, D is false for functions that don't cross an axis.
- 21) **Choice A is correct.** **(8.G.3)** Under dilation by scale factor  $k$ , length is multiplied by  $k$ . So  $15 \times \frac{2}{3} = 10$ .
- 22) **The correct answer is A, C.** **(8.NS.2)**  $\sqrt{169} = 13$  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).
- 23) **The correct answer is 22.0.** **(8.NS.3)** Circumference  $= \pi d \approx 3.14 \times 7 = 21.98 \approx 22.0 \text{ cm}$ .
- 24) **Choice A is correct.** **(8.G.5)** Angle 1 ( $63^\circ$ ) and angle 2 ( $95^\circ$ ) form a triangle with angle 3. The angle corresponding to angle 1 (by the parallel line property) is  $63^\circ$ . Then by triangle angle sum: angle 3  $= 180 - 63 - 95 = 22^\circ$ .
- 25) **Choice B is correct.** **(8.G.6, 8.G.7)** From  $(\sqrt{12})^2 + (\sqrt{13})^2 = c^2$ , we get  $12 + 13 = 25$ , so  $c = \sqrt{25} = 5$ .



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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.

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Better **Results**.