

# 6 North Dakota NDSA

## GRADE 8 MATH PRACTICE TESTS

Standards Aligned Problem Solving For  
Comprehensive Assessment Programs



**6** PRINTED  
TESTS



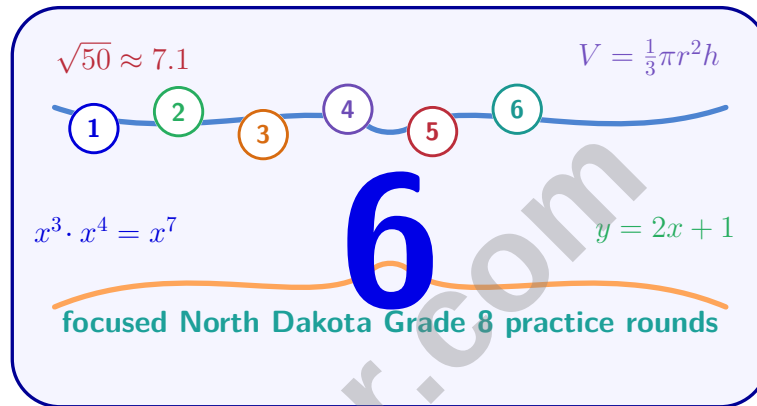
**2** ONLINE  
TESTS



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

# 6 North Dakota NDSA Grade 8 Math Practice Tests

*State-Test Grade 8 Math Prep with Review and Detailed Explanations*



Six complete 40-question Grade 8 NDSA 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, North Dakota Grade 8 Problem Solver!

Six focused rounds for sharper NDSA math thinking

This book gives you six full Grade 8 NDSA 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 North Dakota 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 six-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.

**North Dakota 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?

Six NDSA tests, 240 questions, and a complete review path

| Part         | What You Will Practice                                                                        |
|--------------|-----------------------------------------------------------------------------------------------|
| Tests 1–3    | Real numbers, exponents, scientific notation, equations, and careful reading.                 |
| Tests 4–6    | 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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For more practice  
& answers

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1) Two segments are congruent. Segment AB has length 8 cm. After both segments are rotated 45 degrees about the same point, which statement is true?

- ☐ A. The rotated AB has length  $8\sqrt{2}$  cm    ☐ D. The rotated segments are still  
☐ B. Only one segment can be rotated congruent  
☐ C. The rotated segments have different lengths

2) Which set of ordered pairs does NOT represent a function?

- ☐ A.  $\{(0, 5), (1, 6), (2, 7), (3, 8)\}$     ☐ C.  $\{(1, 3), (2, 3), (3, 3), (4, 3)\}$   
☐ B.  $\{(1, 1), (2, 4), (3, 9), (4, 16)\}$     ☐ D.  $\{(2, 4), (2, 5), (3, 6), (4, 7)\}$

3) Two trend-line slopes are 1.2 and 1.1. What is their difference?

4)

$$\begin{array}{rcl}
 x = 0.\overline{37} & & \\
 10x = ? & & 3.\overline{7} \\
 100x = ? & & 37.\overline{7}
 \end{array}$$

Using the diagram, what is  $100x - 10x$ ?

- ☐ A.  $34.\overline{0}$     ☐ C. 33  
☐ B. 37    ☐ D. 34



- 5) A jar contains 4 white tokens, 6 black tokens, and 5 red tokens. Two tokens are drawn without replacement. What is the probability that both tokens are black? Express your answer as a fraction in simplest form.

6)

| Candidate | Square |
|-----------|--------|
| 9.3       | 86.49  |
| 9.4       | 88.36  |

$\sqrt{88}$  is between 9 and 10. Is it closer to 9.3 or 9.4?

- ☐ A. 9.3                      ☐ C. Equally close  
☐ B. Cannot determine    ☐ D. 9.4
- 7) Which is the best estimate of  $\frac{\sqrt{10}}{\sqrt{2}}$ ?
- ☐ A. 1.4                      ☐ C. 2.8  
☐ B. 5.0                      ☐ D. 2.2
- 8) A store offers a warranty on a \$600 laptop for \$89. The warranty covers 2 years. Based on historical data, 1 in 10 laptops need repair costing an average of \$300. Is the warranty a good deal?
- ☐ A. Yes; expected repair cost is \$89      ☐ C. No; expected repair cost is \$30  
☐ B. Yes; warranty costs less than repairs    ☐ D. No; warranty should be free



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9) A scientist measures a particle with mass  $m = 10^{-6}$  kilograms. Rewrite this as a fraction.

☐ A.  $\frac{1}{6}$  kg

☐ B.  $-10^6$  kg

☐ C.  $10^6$  kg

☐ D.  $\frac{1}{10^6}$  kg

10) A square has a side length of 11 cm. What is its area?

☐ A.  $99 \text{ cm}^2$

☐ B.  $110 \text{ cm}^2$

☐ C.  $121 \text{ cm}^2$

☐ D.  $132 \text{ cm}^2$

11) Write 0.000284 in scientific notation.

☐ A.  $2.84 \times 10^4$

☐ B.  $2.84 \times 10^{-3}$

☐ C.  $28.4 \times 10^{-5}$

☐ D.  $2.84 \times 10^{-4}$

12) What is  $(2.5 \times 10^4) + (3 \times 10^3)$  in scientific notation?

☐ A.  $5.5 \times 10^3$

☐ B.  $0.55 \times 10^5$

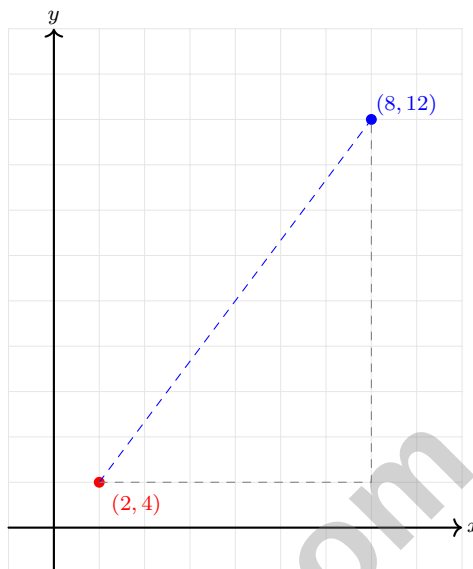
☐ C.  $5.5 \times 10^4$

☐ D.  $2.8 \times 10^4$

13) A restaurant menu has 6 appetizers, 8 main courses, and 4 desserts. If a customer orders one item from each category, how many different complete meals are possible?



- 1) Two points on a circle are at  $(2, 4)$  and  $(8, 12)$ . What is the distance between them?



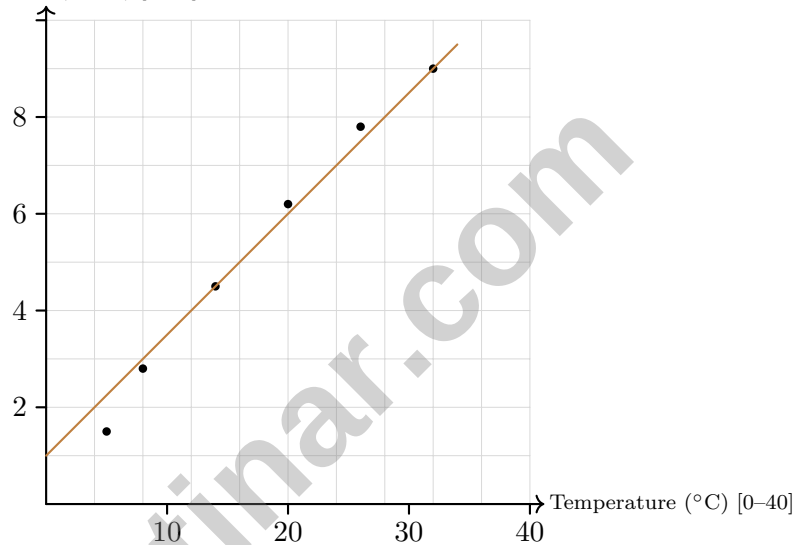
- ☐ A. 6                      ☐ C.  $\sqrt{90}$   
☐ B. 10                    ☐ D. 8
- 2) A data set has values  $\{1, 2, 3\}$  and mean  $= 2$ . After adding one more data point, the new mean is still 2. What is the new MAD?
- ☐ A.  $\frac{1}{2}$                       ☐ C.  $\frac{3}{4}$   
☐ B.  $\frac{2}{3}$                       ☐ D. 1
- 3) Two complementary angles have measures of  $x$  and  $2x + 6$ . Write and solve an equation to find both angle measures.



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- 4) A triangular pyramid has a right-triangular base with legs 9 in and 12 in, and a pyramid height of 20 in. Calculate the volume in cubic inches.

Ice Cream Sales (\$1000) [0–10]



5)

The scatter plot shows temperature versus ice cream sales. What is the approximate  $y$ -intercept (sales when temperature is  $0^{\circ}\text{C}$ )?

- ☐ A. \$1000                      ☐ C. \$2000  
☐ B. \$0                           ☐ D. \$3000



1) Simplify  $\left(\frac{x}{y}\right)^2$  where  $y \neq 0$ .

☐ A.  $\frac{2x}{2y}$

☐ B.  $\frac{x}{y^2}$

☐ C.  $\frac{x^2}{y^2}$

☐ D.  $\frac{x^2}{y}$

2) Runner  $P$ :  $d(t) = 8t$  mph. Runner  $Q$  at  $t = 0$ : 2 mi,  $t = 3$ : 27 mi. Faster?

☐ A. Runner  $P$

☐ B. Runner  $Q$

☐ C. Both same.

☐ D. Cannot be determined.

3) A right triangle has legs of  $\sqrt{18}$  and  $\sqrt{7}$ . What is the hypotenuse?

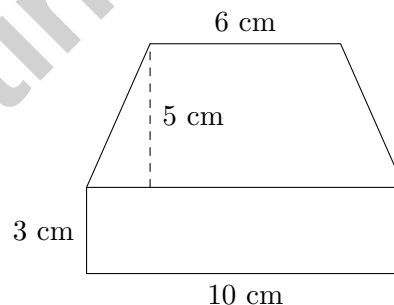
☐ A. 5

☐ B.  $\sqrt{25}$

☐ C.  $\sqrt{11}$

☐ D. 25

4) A composite figure consists of an isosceles trapezoid (parallel sides 6 cm and 10 cm, height 5 cm) with a rectangle attached below (length 10 cm, width 3 cm). What is the total area?



☐ A.  $30 \text{ cm}^2$

☐ B.  $40 \text{ cm}^2$

☐ C.  $70 \text{ cm}^2$

☐ D.  $80 \text{ cm}^2$



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5) Data set:  $\{100, 102, 104, 106, 108\}$  (mean = 104). Calculate MAD.

☐ A. 1.6

☐ C. 3

☐ B. 2

☐ D. 2.4

6) A data set has a linear relationship modeled by the line  $y = 0.5x + 10$ . Which point lies exactly on the trend line?

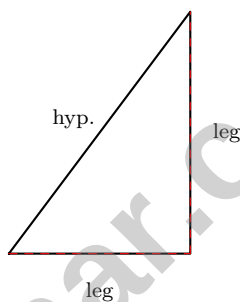
☐ A. (2, 10)

☐ C. (6, 12)

☐ B. (8, 15)

☐ D. (4, 12)

7) Which right triangle dimensions follow the Pythagorean Theorem?



☐ A. 3, 4, 5

☐ C. 2, 3, 4

☐ B. 5, 10, 12

☐ D. 1, 2, 3



**North Dakota NDSA 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 North Dakota NDSA practice test.**



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## Practice Test Answers and Explanations

### Practice Test 1 Answers and Explanations

- 1) **Choice D is correct.** **(8.GM.AV.1)** Rotation is a rigid motion that preserves lengths. If two segments are congruent before rotation, they remain congruent after rotation. Both still have their original lengths.
- 2) **Choice D is correct.** **(8.AR.F.1)** Input 2 appears with outputs 4 and 5, which violates the function definition. Options A, B, and C are all functions.
- 3) **The correct answer is 0.1.** **(8.DPS.D.2)** Compute  $1.2 - 1.1 = 0.1$ .
- 4) **Choice D is correct.** **(8.NO.NS.1)**  $100x - 10x = 37.\overline{7} - 3.\overline{7} = 34$ . The repeating parts cancel, leaving  $90x = 34$ .
- 5) **The correct answer is  $\frac{1}{7}$ .** **(8.GM.GF.6)** Total: 15 tokens.  $P(\text{black first}) = \frac{6}{15}$ ;  $P(\text{black second} \mid \text{black first}) = \frac{5}{14}$ . Product:  $\frac{6}{15} \times \frac{5}{14} = \frac{1}{7}$ .
- 6) **Choice D is correct.** **(8.NO.NS.2)**  $9.3^2 = 86.49$  and  $9.4^2 = 88.36$ . Since 88 is closer to 88.36,  $\sqrt{88} \approx 9.38 \approx 9.4$ .
- 7) **Choice D is correct.** **(8.GM.GF.2)**  $\frac{\sqrt{10}}{\sqrt{2}} = \sqrt{5} \approx 2.236$ .
- 8) **Choice C is correct.** **(8.GM.GF.6)** Expected repair cost =  $0.1 \times 300 = \$30$ . Since the warranty costs \$89, it costs more than the expected repair cost.
- 9) **Choice D is correct.** **(8.AR.F.2)** Negative exponent rule:  $10^{-6} = \frac{1}{10^6}$ .
- 10) **Choice C is correct.** **(8.AR.EE.2)** Area of a square =  $s^2 = 11^2 = 121 \text{ cm}^2$ .
- 11) **Choice D is correct.** **(8.GM.GF.3)** Move the decimal 4 places right to get 2.84; the exponent is negative 4 (because the original number is less than 1).
- 12) **Choice D is correct.** **(8.AR.EE.3)** Rewrite with common exponent:  $2.5 \times 10^4 + 0.3 \times 10^4 = (2.5 + 0.3) \times 10^4 = 2.8 \times 10^4$ .
- 13) **The correct answer is 192.** **(8.NO.NS.1)** Multiply the number of choices:  $6 \times 8 \times 4 = 192$  different complete meals.
- 14) **Choice B is correct.** **(8.AR.F.5)** From  $x = 2$  to  $x = 4$ : change is from 3 to 1, a drop of 2 over 2 units (slope = -1). From 0 to 2: rise of 3. From 4 to 6: rise of 3. The only decreasing segment is 2 to 4.
- 15) **Choice A is correct.** **(8.NO.NS.1)** Slope =  $\frac{-1/2 \text{ foot}}{1/4 \text{ hour}} = \frac{-1/2}{1/4} = -\frac{1}{2} \times \frac{4}{1} = -2$  feet per hour.
- 16) **Choice C is correct.** **(8.AR.EE.2)** Initial juice:  $0.40(300) = 120$  mL. After adding  $x$  mL pure juice: total juice =  $120 + x$ , total volume =  $300 + x$ . Setting to 60%:  $\frac{120+x}{300+x} = 0.60$ , so  $120 + x = 0.60(300 + x) = 180 + 0.60x$ , giving  $0.40x = 60$ , thus  $x = 150$  mL.
- 17) **Choice B is correct.** **(8.GM.AV.1)**  $4 \times 2.5 = 10$  in.
- 18) **Choice A is correct.** **(8.AR.F.1)** Substitute  $x = 5$ :  $f(5) = |5 - 2| = |3| = 3$ .
- 19) **The correct answer is A, C.** **(8.DPS.D.2)** A is correct: MAD is the average absolute deviation from the mean. C is correct: it restates this in slightly different language. B is incorrect: MAD is not about range. D is incorrect: MAD is the mean, not median, of deviations. E is incorrect: MAD is symmetric around the mean regardless of median position.
- 20) **Choice B is correct.** **(8.GM.AV.1)** Two triangular faces on the 5 m edges have total area  $2 \times \frac{1}{2}(5)(8) = 40 \text{ m}^2$ . Two triangular faces on the 3 m edges have total area  $2 \times \frac{1}{2}(3)(7) = 21 \text{ m}^2$ . Total lateral area is  $40 + 21 = 61 \text{ m}^2$ .
- 21) **Choice B is correct.** **(8.GM.GF.2)** The translation vector is  $(-2, 4)$ , so the distance moved is the magnitude:  $\sqrt{(-2)^2 + 4^2} = \sqrt{4 + 16} = \sqrt{20} = 2\sqrt{5}$  units.
- 22) **Choice D is correct.** **(8.AR.EE.2)** The  $y$ -intercept is where the line crosses the  $y$ -axis, at point  $(0, -1)$ .
- 23) **Choice A is correct.** **(8.AR.EE.8)** The left side equals the right side for all values of  $x$ . This is an identity.
- 24) **Choice A is correct.** **(8.AR.EE.5)** The expression  $5 - x$  means "five minus a number," and  $> 10$  means "is greater than ten."
- 25) **Choice C is correct.** **(8.AR.EE.8)** Test:  $4 \leq 2 + 1 \Rightarrow 4 \leq 3$  FALSE. So  $(2, 4)$  is NOT in the solution region.
- 26) **Choice C is correct.** **(8.GM.GF.1)** The third interior angle is  $180 - 41 - 89 = 50^\circ$ . The exterior angle is  $180 - 50 = 130^\circ$  (or sum of remote interior angles:  $41 + 89 = 130^\circ$ ).
- 27) **Choice B is correct.** **(8.GM.AV.1)** Sphere:  $V = \frac{4}{3} \times 3.14 \times 8 = 33.49 \text{ cm}^3$ . Cylinder:  $V = 3.14 \times 4 \times 8 = 100.48 \text{ cm}^3$ . Cylinder is larger.



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## Hi, Thoughtful Reader!

◇ A strong Grade 8 test taker is also a strong reader. You practiced turning words, tables, graphs, and diagrams into math decisions. ◇

★ **Remember this:** That skill grows each time you slow down enough to ask what the problem is really telling you and what it is really asking for. This version gave you 6 opportunities to rehearse test-day habits. ★

### Reader-to-Solver Skills

- **Circle the Ask:** Make the target visible.
- **Sort Information:** Separate useful facts from extra words.
- **Match Units:** Keep quantities connected.
- **Answer Fully:** Include the value and what it means.

**Grade 8 test-day tip:** After solving, reread only the final question. Make sure your answer matches it exactly.

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

**Jay Daie**

Your Reading-and-Math Helper

# PRACTICE TODAY. ACHIEVE TOMORROW.

# 6

Give your child the confidence and skills they need with **6 full-length Grade 8 Math** practice tests that reflect real test formats and cover all key math standards. Perfect for building skills, strengthening problem-solving abilities, and achieving 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.



## COVERS ALL ESSENTIAL TOPICS

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



**6 PRINTED TESTS**



**2 ONLINE TESTS**



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