

# North Dakota NDSA Grade 7 to Grade 8 Math Summer Bridge

*8-Week Review and Grade 8 Readiness with Answer Key*

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# Summer Math Bridge

## Grade 7 to Grade 8 Summer Bridge

Students revisit the Grade 7 ideas that matter most—proportional reasoning, percents, rational numbers, expressions, equations, inequalities, scale drawings, geometry, and data—then preview the Grade 8 language connected to those skills. Families and teachers get a clear summer plan without needing to build one from scratch.



### For families and teachers

Use one page per day, about 10–15 minutes. Let students try first, then use the answer explanations as quick reteaching after mistakes. Friday quizzes show which skills are ready and which need another short review.

### For students

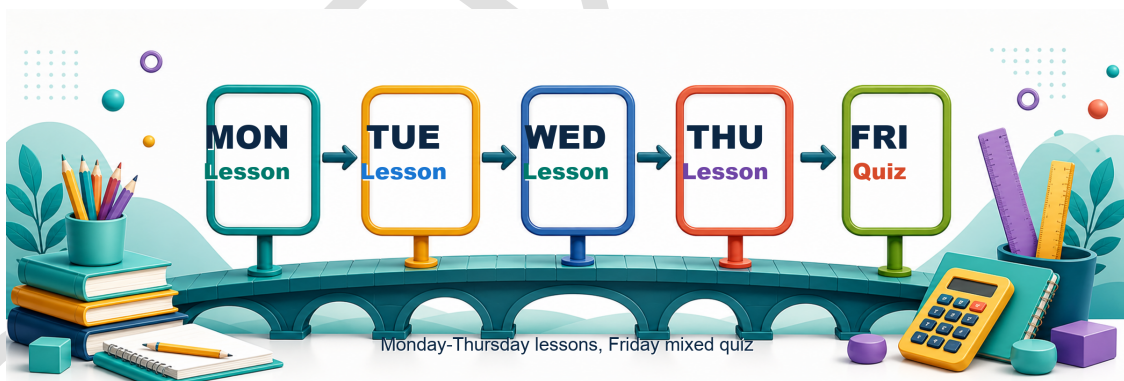
Keep your work neat, show your thinking, and fix missed problems. The goal is not to rush through the book; the goal is to start Grade 8 ready to build on what you already know.

# How to Use This Bridge Book



## The page order is the plan.

Move through the book one day at a time. Each week has four focused lesson days and one Friday quiz, so the routine stays predictable even when summer is busy.



**Lesson days** Read the short review, notice the Bridge Focus, and complete the 6 practice problems.

**Quiz day** Complete the 10-question mixed quiz without rushing. Use it to see what stuck from the week.

**Review answers** Check the answer key, then read the explanation for every missed problem. Correct the work in pencil before moving on.

**Extra support** If a skill is shaky, do one similar problem the next day before starting the new page.



# My 8-Week Bridge Tracker

Check off each lesson and write your Friday quiz score.

This bridge book belongs to: \_\_\_\_\_

Week	Focus	Mon	Tue	Wed	Thu	Friday Quiz
1	Proportional reasoning and slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
2	Percents, finance, and rational numbers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
3	Rational decimals, exponents, and scientific notation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
4	Expressions, equations, and linear equations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
5	Inequalities, slope, and linear relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
6	Functions and linear patterns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
7	Scale drawings, geometry, and Pythagorean theorem	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10
8	Surface area, volume, data, and probability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	____ / 10

## Reflection Notes

After any Friday quiz, write the question number, what you noticed, and one comment that will help you next time. Use this space for problems you missed, guessed on, or want to remember.

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***A little review each day keeps math fresh!***



# WEEK

1

## Proportional Reasoning and Slope

### This Week's Days

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## Day 1 Unit Rates and Proportional Relationships

### SKILL SNAPSHOT

**Bridge Focus:** Grade 8 slope starts with the same idea as a unit rate: compare the change in one quantity to the change in another.

A **unit rate** tells how much there is for 1 unit, such as miles per hour or dollars per pound.

- ✓ To find a unit rate, divide: amount  $\div$  number of units.
- ✓ A complex fraction like  $\frac{\frac{3}{4}}{\frac{1}{6}}$  means  $\frac{3}{4} \div \frac{1}{6}$ .
- ✓ A relationship is **proportional** when every ratio  $\frac{y}{x}$  is the same.
- ✓ In a proportional relationship, the graph is a straight line through  $(0, 0)$ .
- ✓ The constant unit rate is the multiplier that connects  $x$  and  $y$ .

Always check both the numbers and the meaning of the units.

- 1 Find the unit rate:  $\frac{\frac{3}{4} \text{ mile}}{\frac{1}{6} \text{ hour}}$ . \_\_\_\_\_

same ratio?

$x$	1	2	3
$y$	$k$	$2k$	$3k$

- 2 A recipe uses  $\frac{2}{5}$  cup of oil for  $\frac{1}{3}$  batch. How much oil is used for 1 batch?
- 3 Does the table show a proportional relationship?

$x$	2	4	6
$y$	9	18	27

- 4 Does the table show a proportional relationship?

$x$	1	3	5
$y$	4	10	16

- 5 A proportional graph passes through  $(0, 0)$  and  $(5, 15)$ . What is the unit rate and equation?
- 6 Six tickets cost \$16.50 at the same rate. How much do 10 tickets cost?



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 **Week 1 Quiz**

## Proportional Reasoning Bridge Check

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_/10

1 Which unit rate is equal to  $\frac{\frac{2}{3} \text{ mile}}{\frac{1}{4} \text{ hour}}$ ?

A.  $\frac{1}{6}$  mph

B.  $\frac{8}{3}$  mph

C.  $\frac{3}{8}$  mph

D. 6 mph

2 Does the table show a proportional relationship?

$x$	2	6	9
$y$	10	30	45

3 Four pounds of peaches cost \$11. Write the proportional equation for total cost  $y$  and pounds  $x$ .

4 True or False: A straight line that crosses the  $y$ -axis at  $(0, 2)$  can represent a proportional relationship.

True

False

5 What is 30% of 180? \_\_\_\_\_

6 42 is 70% of what number? \_\_\_\_\_

7 What percent of 150 is 24? \_\_\_\_\_

8 Store A sells 5 notebooks for \$12.50. Store B sells 8 notebooks for \$19.20. Which store has the lower unit price?

9 A proportional line contains the point  $(7, 28)$ . What point on the line has  $x = 1$ ?

10 Solve the proportion  $\frac{x}{80} = \frac{35}{100}$ .



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# WEEK

4

## Expressions and Equations

### This Week's Days

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**Day 1 Writing, Evaluating, and Simplifying Expressions**
**SKILL SNAPSHOT**

**Bridge Focus:** Clear expression work makes Grade 8 equations and functions less mysterious.

An algebraic expression uses numbers, variables, and operations to describe a quantity.

- ✓ Translate words carefully: “less than” reverses the order, as in 5 less than  $n$  is  $n - 5$ .
- ✓ To evaluate, substitute the given value for the variable.
- ✓ Follow order of operations after substitution.
- ✓ Like terms have the same variables raised to the same powers.
- ✓ Combine like terms by adding or subtracting their coefficients.

Do not combine terms unless their variable parts match exactly.



- 1 Write an expression for “5 less than twice a number  $n$ .” \_\_\_\_\_



- 2 Evaluate  $-3x + 2$  when  $x = -4$ .
- 3 Evaluate  $\frac{1}{2}a - b$  when  $a = 10$  and  $b = -3$ .
- 4 Simplify  $7m - 2m + 9$ .
- 5 Simplify  $4x^2 + 3x - x^2 + 5x$ .
- 6 A phone plan costs \$12 plus \$0.08 per text. Write an expression for  $t$  texts and find the cost for 75 texts.



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## Day 4 Grade 8 Linear Equations

### SKILL SNAPSHOT

**Bridge Focus:** This Grade 8 preview adds more algebraic structure while keeping the goal the same: keep both sides balanced.

To solve a linear equation, use inverse operations to isolate the variable. Equations may have one solution, no solution, or infinitely many solutions.

- ✓ Distribute before combining like terms.
- ✓ Move variable terms to one side and constants to the other.
- ✓ A true statement such as  $0 = 0$  means infinitely many solutions.
- ✓ A false statement such as  $0 = 5$  means no solution.
- ✓ Check one-solution answers by substituting back into the original equation.

Keep both sides balanced by doing the same operation to both sides.

1 Solve  $5x - 3 = 2x + 9$ . \_\_\_\_\_



2 Solve  $2(x - 1) = 3x + 5$ . \_\_\_\_\_



3 Solve  $4(2x + 3) = 8x + 12$ .

4 Solve  $6x + 2 = 6(x - 3)$ .

5 Solve  $\frac{1}{2}(4x - 6) = x + 3$ . \_\_\_\_\_

6 A rectangle has perimeter 50 cm. Its length is 3 more than twice its width. Find the width.



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# WEEK

7

## Geometry and Transformations

### This Week's Days

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**Day 1** Scale Drawings

**SKILL SNAPSHOT**

**Bridge Focus:** Scale factors prepare students for Grade 8 similarity, dilations, and coordinate transformations.

A scale drawing is a proportional drawing of a real object or place.

- ✓ A scale like 1 in. = 8 ft connects drawing length to actual length.
- ✓ To find an actual length, multiply drawing length by the scale amount.
- ✓ To find a drawing length, divide actual length by the scale amount.
- ✓ Changing to a scale where 1 cm represents fewer real units makes the drawing larger.
- ✓ If lengths are multiplied by  $k$ , areas are multiplied by  $k^2$ .



Keep drawing units and real units separate in your setup.

- 1 A blueprint uses 1 in. = 8 ft. A wall is 3.25 in. long on the blueprint. What is the actual length?

same ratio?

$x$	1	2	3
$y$	$k$	$2k$	$3k$

- 2 A map scale is 1 cm = 25 km. An actual distance is 150 km. What is the map distance?
- 3 A model uses a scale of 1 : 18. If the model is 9 inches long, how long is the actual object?
- 4 A drawing uses the scale 2 cm = 7 m. A path is 5 cm on the drawing. What is the actual length?
- 5 A rectangle is 4 cm by 7 cm at a scale of 1 cm = 6 m. It is redrawn at 1 cm = 3 m. What are the new drawing dimensions?
- 6 A scale drawing is enlarged by a length scale factor of 4. By what factor does the area increase?



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## Day 4 Grade 8 Preview: The Pythagorean Theorem

### SKILL SNAPSHOT

**Bridge Focus:** Right-triangle relationships connect squares, roots, distance, and geometry formulas.

In a right triangle, the legs  $a$  and  $b$  and hypotenuse  $c$  satisfy  $a^2 + b^2 = c^2$ . The hypotenuse is always the longest side.

- ✓ Use  $a^2 + b^2 = c^2$  to find a missing hypotenuse.
- ✓ Use  $c^2 - a^2 = b^2$  to find a missing leg.
- ✓ The converse checks whether three side lengths form a right triangle.
- ✓ Always put the longest side in the  $c$  position.
- ✓ Round only at the end when an answer is not exact.

The theorem works only for right triangles.



- 1 A right triangle has legs 5 and 12. Find the hypotenuse.



- 2 A right triangle has hypotenuse 17 and one leg 8. Find the other leg.
- 3 Do side lengths 7, 24, 25 form a right triangle?
- 4 A ladder is 10 ft long and its foot is 4 ft from a wall. How high does it reach? Round to the nearest tenth.
- 5 Do side lengths 6, 8, 11 form a right triangle?
- 6 A rectangular box is 3 cm by 4 cm by 12 cm. Find the space diagonal.



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## ANSWER KEY

# Answer Key & Explanations

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Use the answers to check your work, then read the explanations to learn the method.

### ✔ How to review

First compare your final answer. If it does not match, read the explanation slowly and redo the problem beside it. The goal is to understand the move that gets you from the question to the final answer.

### 📅 Week 1 Day 1: Unit Rates and Proportional Relationships

#### ✔️ Answers

1  $\frac{9}{2}$  miles per hour, or 4.5 mph

2  $\frac{6}{5}$  cups, or  $1\frac{1}{5}$  cups

3 Yes

4 No

5 Unit rate = 3; equation  $y = 3x$

6 \$27.50

#### 💡 Explanations

1 A unit rate asks for the amount in 1 hour, so divide  $\frac{3}{4}$  by  $\frac{1}{6}$ . Multiplying by the reciprocal gives  $\frac{3}{4} \times 6 = \frac{18}{4} = \frac{9}{2}$ .

2 Divide the oil by the fraction of a batch:  $\frac{2}{5} \div \frac{1}{3} = \frac{2}{5} \times 3 = \frac{6}{5}$ . This means one whole batch uses  $1\frac{1}{5}$  cups.

3 Each ratio  $\frac{y}{x}$  equals 4.5:  $\frac{9}{2} = 4.5$ ,  $\frac{18}{4} = 4.5$ , and  $\frac{27}{6} = 4.5$ . Since the ratio stays the same, the relationship is proportional.

4 For a proportional relationship,  $\frac{y}{x}$  must be constant. Here  $\frac{4}{1} = 4$  but  $\frac{10}{3} \neq 4$ , so the ratios do not match.

5 Use the nonzero point to find  $k = \frac{y}{x} = \frac{15}{5} = 3$ . A proportional equation has the form  $y = kx$ , so the equation is  $y = 3x$ .

6 First find the unit rate:  $16.50 \div 6 = 2.75$  dollars per ticket. Then multiply by 10 tickets:  $2.75 \times 10 = \$27.50$ .



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**Week 1 Day 4: Grade 8 Proportional Graphs****Answers**

1

2.5

2

1.5

3

Yes

4

A

5

30

6

False

**Explanations**

1

Divide  $y$  by  $x$  for each pair:  $5/2 = 10/4 = 15/6 = 2.5$ . The constant of proportionality is  $k = 2.5$ .

2

For a proportional relationship, the unit rate is  $y/x$ . Using  $(8, 12)$ ,  $12/8 = 1.5$ .

3

A straight line through the origin represents  $y = kx$ . The constant is  $7/3$ , so the relationship is proportional.

4

A proportional relationship has no added or subtracted constant.  $y = 4x$  has the form  $y = kx$ , so choice A is proportional.

5

The constant is  $18/6 = 3$ , so  $y = 3x$ . When  $x = 10$ ,  $y = 3(10) = 30$ .

6

A proportional line must pass through the origin and have the form  $y = kx$ . The  $+2$  shifts the line up, so it is linear but not proportional.



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 Q1: Week 1 Quiz

 Answers

- 1 B   
 2 Yes   
 3  $y = 2.75x$    
 4 False   
 5 54   
 6 60   
 7 16%   
 8 Store B  
9 (1, 4)   
 10  $x = 28$

 Explanations

- 1 Divide  $\frac{2}{3}$  by  $\frac{1}{4}$ , which means multiply by 4.  $\frac{2}{3} \times 4 = \frac{8}{3}$  miles per hour, so choice B is correct.
- 2 Each ratio  $\frac{y}{x}$  equals 5. Since the same multiplier connects every  $x$  to  $y$ , the relationship is proportional.
- 3 The unit price is  $11 \div 4 = \$2.75$  per pound. Total cost equals 2.75 times the number of pounds, so  $y = 2.75x$ .
- 4 A proportional graph must pass through the origin (0, 0). Crossing at (0, 2) means there is an output of 2 when the input is 0, so it is not proportional.
- 5 Convert 30% to 0.30 and multiply by the whole.  $0.30 \times 180 = 54$ .
- 6 The whole is unknown, so divide the part by the percent as a decimal.  $42 \div 0.70 = 60$ .
- 7 Use  $\frac{24}{150} = 0.16$ . Converting 0.16 to a percent gives 16%.
- 8 Store A costs  $12.50 \div 5 = \$2.50$  per notebook. Store B costs  $19.20 \div 8 = \$2.40$  per notebook, so Store B is lower.
- 9 The constant of proportionality is  $k = \frac{28}{7} = 4$ . The point where  $x = 1$  is  $(1, k)$ , so the point is (1, 4).
- 10 The proportion represents 35% of 80. Cross-multiply to get  $100x = 2800$ , so  $x = 28$ .



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**Week 4 Day 1: Writing, Evaluating, and Simplifying Expressions****✓ Answers**

1  $2n - 5$

2 14

3 8

4  $5m + 9$

5  $3x^2 + 8x$

6  $12 + 0.08t$ ; \$18

**💡 Explanations**

1 Twice a number is  $2n$ . "5 less than" means subtract 5 from that amount, so the expression is  $2n - 5$ .

2 Substitute  $-4$  for  $x$ :  $-3(-4) + 2$ . The product is 12, and  $12 + 2 = 14$ .

3 Substitute the values:  $\frac{1}{2}(10) - (-3)$ . This is  $5 + 3 = 8$  because subtracting a negative adds.

4 The terms  $7m$  and  $-2m$  are like terms, so combine their coefficients:  $7 - 2 = 5$ . The constant 9 stays separate.

5 Combine the  $x^2$  terms:  $4x^2 - x^2 = 3x^2$ . Then combine the  $x$  terms:  $3x + 5x = 8x$ .

6 The fixed fee is 12, and each text adds  $0.08t$ . For 75 texts,  $12 + 0.08(75) = 12 + 6 = 18$ .



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 **Week 4 Day 4: Grade 8 Linear Equations**
 **Answers**

**1**  $x = 4$

**2**  $x = -7$

**3** Infinitely many solutions

**4** No solution

**5**  $x = 6$

**6**  $\frac{22}{3}$  cm

 **Explanations**

**1** Subtract  $2x$  from both sides to get  $3x - 3 = 9$ . Add 3, then divide by 3, so  $x = 4$ .

**2** Distribute to get  $2x - 2 = 3x + 5$ . Subtract  $2x$  and then 5 to get  $-7 = x$ .

**3** Distribute the left side to get  $8x + 12 = 8x + 12$ . Since both sides are identical, every value of  $x$  works.

**4** Distribute the right side to get  $6x + 2 = 6x - 18$ . Subtract  $6x$  from both sides and get  $2 = -18$ , a false statement.

**5** Distribute  $\frac{1}{2}$  to get  $2x - 3 = x + 3$ . Subtract  $x$  and add 3, so  $x = 6$ .

**6** Let the width be  $w$ , so the length is  $2w + 3$ . Use  $2(w + 2w + 3) = 50$ , giving  $6w + 6 = 50$ , so  $w = \frac{22}{3}$  cm.

PRE



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**Week 7 Day 1: Scale Drawings****Answers**

1 26 ft

2 6 cm

3 162 inches

4 17.5 m

5 8 cm by 14 cm

6 16

**Explanations**

1

Each inch represents 8 ft, so multiply drawing length by 8.  $3.25 \times 8 = 26$  ft.

2

Divide actual distance by the amount represented by 1 cm.  $150 \div 25 = 6$ , so the map distance is 6 cm.

3

A scale of 1 : 18 means each model inch represents 18 actual inches.  $9 \times 18 = 162$  inches.

4

If 2 cm represents 7 m, then 1 cm represents 3.5 m. For 5 cm,  $5 \times 3.5 = 17.5$  m.

5

The new scale represents half as many meters per centimeter, so the drawing doubles. Multiply both dimensions by 2:  $4 \rightarrow 8$  and  $7 \rightarrow 14$ .

6

Area scales by the square of the length scale factor. Since  $4^2 = 16$ , the area becomes 16 times as large.



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 **Week 7 Day 4: Grade 8 Preview: The Pythagorean Theorem**
 **Answers**

1 13

2 15

3 Yes

4 9.2 ft

5 No

6 13 cm

 **Explanations**

1 Use  $c^2 = 5^2 + 12^2 = 25 + 144 = 169$ . Since  $\sqrt{169} = 13$ , the hypotenuse is 13.

2 Use  $b^2 = 17^2 - 8^2 = 289 - 64 = 225$ . Since  $\sqrt{225} = 15$ , the missing leg is 15.

3 The longest side is 25. Check  $7^2 + 24^2 = 49 + 576 = 625$ , and  $25^2 = 625$ , so the triangle is right.

4 The ladder is the hypotenuse, so  $h^2 + 4^2 = 10^2$ . Then  $h^2 = 84$ , and  $\sqrt{84} \approx 9.2$  ft.

5 The longest side is 11. Since  $6^2 + 8^2 = 36 + 64 = 100$  but  $11^2 = 121$ , the converse is not satisfied.

6 First find the base diagonal:  $\sqrt{3^2 + 4^2} = 5$ . Then use that with height 12:  $\sqrt{5^2 + 12^2} = 13$  cm.

PREVIEW



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