Unit 8 Student Diagnostic Answer Key

These materials, when encountered before the denoted lesson, support access to the lesson and identify potential areas where additional support may be required. Note that the content in these lesson diagnostics represents prerequisite skills and does not address the required rigor for full mastery of the on-grade level standards.

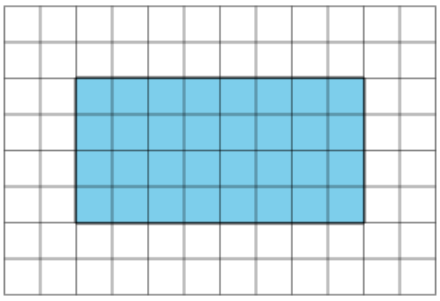
Your students may benefit from using these materials in conjunction with the Unit Overview and Readiness page (quiz and mini-lessons).

Openstax CC BY-NC

Lesson 8.1: Finding Unknown Inputs Check-in Answers

Q#	Standard
1-6	MATH.5.4(H) Represent and solve problems related to perimeter and/or area and related to volume.

For questions 1 - 6, examine the representation of a swimming pool.



The pool is represented by the shaded region, and the walkway around a pool is tiled as shown in the diagram.

1. What is the area of the (shaded) pool if each tile is 1 square foot?

Answer: 32 square feet

2. What is the area of the pool if each tile is 4 square feet?

Answer: 512 square feet

3. What is the area of the walkway and the pool when each tile is 1 square foot?

Answer: 96 square feet

4. What is the area of the walkway and the pool when each tile is 4 square feet?

Answer: 1,536 square feet

5. What is the area of the walkway ONLY when each tile is 1 square foot?

Answer: 64 square feet

6. What is the area of the walkway ONLY when each tile is 4 square feet?

Answer: 1,024 square feet

Lesson 8.2: When and Why Do We Write Quadratic Equations? Check-in Answers

Q#	Standard
1-3 6	ALG.5(A) Solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides.
4-5	ALG.2(C) Write linear equations in two variables given a table of values, a graph, and a verbal description.

For questions 1 - 3, use the following scenario.

> The expression $5.25 + 0.85x$ represents the amount a yogurt shop charges for yogurt with x ounces of toppings.

1. What does the equation $5.25 + 0.85x = 7.08$ mean in this situation?

Answer: It means the amount the yogurt shop charges is equal to $7.08.

2. What would a solution to this equation mean?

Answer: The number of ounces of toppings added to cost $7.08.

3. Use technology to graph $y = 5.25 + 0.85x$. Where can you see the solution to the equation on the graph?

Answer: The solution is the x-value of the point where the line $y = 5.25 + 0.85x$ crosses the line $y = 7.08$.

For questions 4 - 6, use the following scenario.

> Drinks cost $1.50, sandwiches cost $4.00, and there is a flat delivery fee of $5 for each delivery regardless of the number of orders.

4. Write an expression that represents the amount it costs to have x meals including a drink and a sandwich delivered to an office.

Answer: $y = 5 + 1.50x + 4x$

5. Write an equation that has a solution representing the number of drink and sandwich orders it would take to cost $80.

Answer: $1.5x + 4x + 5 = 80$ or equivalent

6. Graph your equation using technology. Where can you see the solution to the equation on the graph?

Answer: The solution is the x-value of the point where the line $y = 5 + 1.50x + 4x$ crosses the line $y = 80$.

Lesson 8.3: Solving Quadratic Equations by Reasoning Check-in Answers

Q#	Standard
1-2	ALG.6(A) Determine the domain and range of quadratic functions and represent the domain and range using inequalities.

For questions 1 - 2, use the following equation.

$$p^2 = q$$

1. Select four pairs of values that could be p and q.

   - ☑ $p = 6, q = 36$ **[Answer]**
   - ☑ $p = -6, q = 36$ **[Answer]**
   - ☐ $p = -2, q = -4$
   - ☑ $p = -10, q = 100$ **[Answer]**
   - ☑ $p = \frac{1}{2}, q = \frac{1}{4}$ **[Answer]**
   - ☐ $p = -0.2, q = 0.4$

2. List one other possible pair of values for p and q that makes the equation true.

Answer: Answers will vary, but here is a sample.

-1 and 1

Lesson 8.4: Solving Quadratic Equations with the Zero Product Property Check-in Answers

Q#	Standard
1-6	MATH.6.7(A) Generate equivalent numerical expressions using order of operations, including whole number exponents and prime factorization.

Evaluate each function for $x = 6$.

1. $f(x) = (x + 4)(x - 6)$

Answer: 0

2. $g(x) = (x - 6)(x + 6)$

Answer: 0

3. $h(x) = x^2 - 6x$

Answer: 0

4. $j(x) = 2(\frac{2}{3}x + 8)(x - 6)$

Answer: 0

5. $k(x) = 0.5x^2 - 3x$

Answer: 0

6. What do the functions in questions 1 - 6 have in common?

Answer: All of the functions evaluate to zero when $x = 6$.

Lesson 8.5: How Many Solutions? Check-in Answers

Q#	Standard
1-2	ALG.5(A) Solve linear equations in one variable, including those for which the application of the distributive property is necessary and for which variables are included on both sides.
3	ALG.8(A) Solve quadratic equations having real solutions by factoring, taking square roots, completing the square, and applying the quadratic formula.

The table below shows Clare's work to solve some equations. For each problem, circle the step at which Clare made a mistake and explain what she did incorrectly.

Answers:

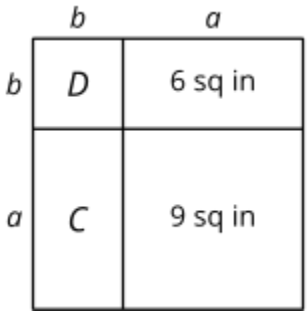
Clare's work	Explanation of her mistake
$2(x - 1) + 4 = 3x - 2$ $2x - 2 + 4 = 3x - 2$ $2x + 2 = 3x - 2$ $2x = 3x$ $-x = 0$ $x = 0$	**Answer:** After the line $2x + 2 = 3x - 2$, it looks like Clare got rid of the constants rather than either adding or subtracting 2 from each side to get $2x + 4 = 3x$ or $2x = 3x - 4$.
$3(x - 1) = 5x + 6$ $3x - 1 = 5x + 6$ $-1 = 2x + 6$ $-7 = 2x$ $-3.5 = x$	**Answer:** In the first step, Clare seems to have forgotten to distribute the 3 to the constant term in the parentheses. The second line should be $3x - 3 = 5x + 6$.

$(x - 2)(x + 3) = x + 10$ $x^2 + x - 6 = x + 10$ $x^2 - 6 = 10$ $x^2 = 16$ $x = 4$	**Answer:** Clare's work is correct until the last step in which she forgets to include $x = -4$ as a second solution.

Lesson 8.6: Rewriting Quadratic Expressions in Factored Form, Part 1 Check-in Answers

Q#	Standard
1-5	MATH.5.4(H) Represent and solve problems related to perimeter and/or area and related to volume.

For questions 1 - 5, examine the diagram below.



1. Find the length a in inches.

Answer: 3 inches

2. Find the length b in inches.

Answer: 2 inches

3. Find the area C in square inches.

Answer: 6 square inches

4. Find the area D in square inches.

Answer: 4 square inches

5. Find the area of the entire large rectangle in the figure. Show your reasoning.

Answer: 25 square inches

Lesson 8.7: Rewriting Quadratic Expressions in Factored Form, Part 2 Check-in Answers

Q#	Standard
1-7	MATH.3.5(E) Represent real-world relationships using number pairs in a table and verbal descriptions.

For each question, find a pair of integers with the given product and sum. The first question has been done for you as a model.

1. Product = 6; sum = 5

   The numbers 2 and 3 multiply to be 6 and add to be 5.

2. Product = 6; sum = 7

Answer: 1 and 6

3. Product = 4; sum = -5

Answer: -4 and -1

4. Product = -1; sum = 0

Answer: -1 and 1

5. Product = -6; sum = 1

Answer: -2 and 3

6. Product = -12; sum = -1

Answer: -4 and 3

7. Product = -12; sum = 4

Answer: -2 and 6

Lesson 8.8: Rewriting Quadratic Expressions in Factored Form, Part 3 Check-in Answers

Q#	Standard
1-3	MATH.4.4(D) Use strategies and algorithms, including the standard algorithm, to multiply up to a four-digit number by a one-digit number and to multiply a two-digit number by a two- digit number. Strategies may include mental math, partial products, and the commutative, associative, and distributive properties.

Here is a method for multiplying 97 and 103:

97 is 100 – 3

103 is 100 + 3

So, 97 • 103 = (100 – 3)(100 + 3)

=10,000 + 300 - 300 - 9

= **9991**

	100	-3
100	10,000	-300
+3	300	-9

Use this method to compute:

1. 7 • 13

Answer:

7 is 10 - 3

13 is 10 + 3

So 7 • 13 = (10 - 3)(10 + 3)

=100 + 30 - 30 - 9

= **91**

	10	**-3**
10	100	-30
3	30	-9

2. 102 • 98

Answer:

102 is 100 + 2

98 is 100 - 2

So 102 • 98 = (100 + 2)(100 - 2)

=10000 - 200 + 200 - 4

= **9,996**

	100	**-2**
100	10000	-200
2	200	-4

3. 995 • 1,005

Answer:

995 is 1,000 - 5

1,005 is 1,000 + 5

So 995 • 1,005 = (1,000 - 5)(1,000 + 5)

=1,000,000 + 500 - 500 - 25 = **999,975**

	1,000	**-5**
100	1,000,000	-500
5	500	-25

Lesson 8.9: Solving Quadratic Equations by Using Factored Form Check-in Answers

Q#	Standard
ALL	ALG.8(A) Solve quadratic equations having real solutions by factoring, taking square roots, completing the square, and applying the quadratic formula.

For each equation, check the appropriate box for any values that are solutions. (Some equations have two solutions, others only have one.)

Answers:

	-9	-7	-6	-4	0	3	4	5	6	7
$35 = x^2 - 1$	☐	☐	☑	☐	☐	☐	☐	☐	☑	☐
$(x - 5)(x + 7) = 0$	☐	☑	☐	☐	☐	☐	☐	☑	☐	☐
$0 = (7 - x) \cdot x$	☐	☐	☐	☐	☑	☐	☐	☐	☐	☑
$(x + 3)^2 = 36$	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
$x^2 + 8x + 16 = 0$	☐	☐	☐	☑	☐	☐	☐	☐	☐	☐

Lesson 8.10: Rewriting Quadratic Expressions in Factored Form, Part 4 Check-in Answers

Q#	Standard
1-6	ALG.7(A) Graph quadratic functions on the coordinate plane and use the graph to identify key attributes, if possible, including x-intercept, y-intercept, zeros, maximum value, minimum values, vertex, and the equation of the axis of symmetry.

Use technology to graph the functions, then find the zeros.

1. $f(x) = (x + 2)(x - 5)$

Answer: -2, 5

2. $g(x) = (5x - 4)(x - 3)$

Answer: 0.8, 3

3. $h(x) = x^2 + 5x + 4$

Answer: -4, -1

4. $k(x) = x^2 + 5x + 3$

Answer: -4.303, -0.697

5. $m(x) = 2x^2 - 13x - 15$

Answer: -1, 7.5

6. $n(x) = 2x^2 - 13x - 10$

Answer: -0.695, 7.195

Lesson 8.11: Writing Quadratic Equations Given Real Solutions Check-in Answers

Q#	Standard
1	ALG.10(E) Factor, if possible, trinomials with real factors in the form $ax^2 + bx + c$, including perfect square trinomials of degree two.

Draw a line that matches the expression written in factored form with a function written in standard form.

↓ Expressions in Factored Form	Functions in Standard Form ↓
1. $(2a + 5)(a + 4)$	$f(x) = 2a^2 + 13a + 20$
2. $(3a - 1)(a - 10)$	$g(x) = 16a^2 - 25$
3. $(a + 7)(5a - 2)$	$h(x) = 5a^2 + 33a - 14$
4. $(4a - 5)(4a - 5)$	$j(x) = 16a^2 - 40a + 25$
5. $(4a - 5)(4a + 5)$	$k(x) = 18a^2 + 71a + 28$
6. $(2a + 7)(9a + 4)$	$m(x) = 3a^2 - 31a + 10$

Answers:

1. $(2a + 5)(a + 4) \rightarrow f(x)$
2. $(3a - 1)(a - 10) \rightarrow m(x)$
3. $(a + 7)(5a - 2) \rightarrow h(x)$
4. $(4a - 5)(4a - 5) \rightarrow j(x)$
5. $(4a - 5)(4a + 5) \rightarrow g(x)$
6. $(2a + 7)(9a + 4) \rightarrow k(x)$

Lesson 8.12: Using Technology to Find the Quadratic Regression Check-in Answers

Q#	Standard
1-4	ALG.8(B) Write, using technology, quadratic functions that provide a reasonable fit to data to estimate solutions and make predictions for real-world problems.

For questions 1 - 4, use the given information to write a quadratic equation in standard form.

> $(y = ax^2 + bx + c)$

1. $a = 1, b = 6, c = 9$

Answer: $y = x^2 + 6x + 9$

2. $a = 4, b = 12, c = 9$

Answer: $y = 4x^2 + 12x + 9$

3. $a = -16, b = 4, c = 1$

Answer: $y = -16x^2 + 4x + 1$

4. $a = 9, b = -30, c = -25$

Answer: $y = 9x^2 - 30x - 25$