You can use the rule for the product of a sum and difference to calculate products using mental math.

Think

How can you write 64 • 56 as the product of a sum and difference?
Find the number halfway between the factors.
60 is 4 units from each factor. Write the factors in terms of 60 and 4.

Problem 5 Using Mental Math

GRIDDED RESPONSE

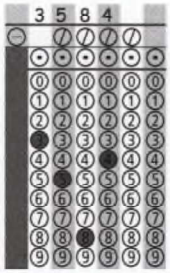
What is 64 • 56?

$64 \cdot 56 = (60 + 4)(60 - 4)$ Write as a product of a sum and a difference.

$= 60^2 - 4^2$ Use $(a + b)(a - b) = a^2 - b^2$.

$= 3600 - 16$ Simplify powers.

$= 3584$ Simplify.



Got It? **5.** What is 52 • 48? Use mental math.

Lesson Check

Do you know HOW?

Simplify each product.

1. $(c + 3)(c + 3)$
2. $(g - 4)^2$
3. $(2r - 3)(2r + 3)$
4. A square has side length $(2x + 3)$ in. What is the area of the square?

Do you UNDERSTAND? MATHEMATICAL PRACTICES

What rule would you use to find each product? Why?

5. $(3x - 1)^2$
6. $(4x - 9)(4x + 9)$
7. $(7x + 2)(7x + 2)$
8. **Reasoning** How do you know whether it is convenient to use the rule for the product of a sum and difference to mentally multiply two numbers?

Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

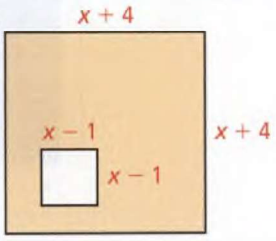
A Practice

Simplify each expression. See Problem 1.

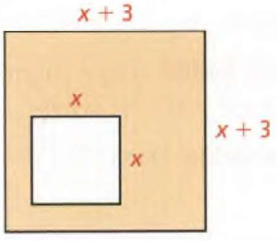
9. $(w + 5)^2$
10. $(h + 2)^2$
11. $(3s + 9)^2$
12. $(2n + 7)^2$
13. $(a - 8)^2$
14. $(k - 11)^2$
15. $(5m - 2)^2$
16. $(4x - 6)^2$

Geometry **The figures below are squares. Find an expression for the area of each shaded region. Write your answers in standard form.** See Problem 2.

17.



18.



19. Interior Design A square green rug has a blue square in the center. The side length of the blue square is x inches. The width of the green band that surrounds the blue square is 6 in. What is the area of the green band?

Mental Math Simplify each product. See Problem 3.

20. 61^2 **21.** 79^2 **22.** 48^2 **23.** 403^2 **24.** 302^2

Simplify each product. See Problem 4.

25. $(v + 6)(v - 6)$ **26.** $(b + 1)(b - 1)$ **27.** $(z - 5)(z + 5)$

28. $(x - 3)(x + 3)$ **29.** $(10 + y)(10 - y)$ **30.** $(t - 13)(t + 13)$

Mental Math Simplify each product. See Problem 5.

31. $42 \cdot 38$ **32.** $79 \cdot 81$ **33.** $63 \cdot 57$ **34.** $399 \cdot 401$ **35.** $303 \cdot 297$

B Apply

Simplify each product.

36. $(m + 3n)^2$ **37.** $(2a + b)^2$ **38.** $(4s - t)^2$ **39.** $(g - 7h)^2$

40. $(9k + 2q)^2$ **41.** $(8r - 5s)^2$ **42.** $(s + 6t^2)^2$ **43.** $(p^4 - 9q^2)^2$

44. $(4x + 7y)(4x - 7y)$ **45.** $(a - 6b)(a + 6b)$ **46.** $(2g + 9h)(2g - 9h)$

47. $(r^2 + 3s)(r^2 - 3s)$ **48.** $(2p^2 + 7q)(2p^2 - 7q)$ **49.** $(3w^3 - z^2)(3w^3 + z^2)$

50. Error Analysis Describe and correct the error made in simplifying the product.

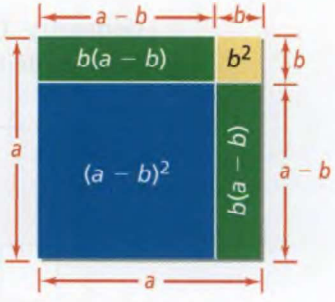
$$(3a - 7)^2 = 9a^2 - 21a + 49$$

51. Think About a Plan A company logo is a white square inside a red square. The side length of the white square is $x + 2$. The side length of the red square is three times the side length of the white square. What is the area of the red part of the logo? Write your answer in standard form.

- How can drawing a diagram help you solve the problem?
- How can you express the area of the red part of the logo as a difference of areas?

STEM **52. Construction** A square deck has a side length of $x + 5$. You are expanding the deck so that each side is four times as long as the side length of the original deck. What is the area of the new deck? Write your answer in standard form.

53. Reasoning Use the area model at the right to write a second expression for the area of the square labeled $(a - b)^2$. Then simplify the expression to derive the rule for the square of a binomial of the form $a - b$.



54. Open-Ended Give a counterexample to show that $(x + y)^2 = x^2 + y^2$ is false.

55. Reasoning Does $\left(3\frac{1}{2}\right)^2 = 9\frac{1}{4}$? Explain.