Make a list of factors for the number.

1. 42 **2.** 102 **3.** 28

1, 2, 3, 6, 7, 14, 21, 42

1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

4. 56 **5.** 60 **6.** 36

1, 2, 3, 4, 9, 12, 18, 36

c

1, 2, 3, 6, 17, 34, 51, 102

42 4, 7, 14, 28

1, 2, 4, 7, 8, 14, 28, 56

7.4 Practice A

1. $x = 0$ and $x = 5$

2. $d = 0$ and $d = -8$

3. $t = 0$ and $t = -7$

4. $x = -2$ and $x = 5$

5. $p = -3$ and $p = -\frac{1}{5}$

6. $q = -\frac{2}{3}$

7. $y = 10$

8. $t = 0, t = -4$, and $t = 5$

9. $u = 0, u = 9$, and $u = \frac{5}{2}$

10. $x = 5$ and $x = -5$

11. $x = 2$ and $x = -4$

12. $4t(t + 3)$

13. $5k^2(2k - 3)$

14. $4x^2(2x - 5)$

15. $t = 0$ and $t = \frac{1}{3}$

16. $y = 0$ and $y = -2$

17. $n = 0$ and $n = -\frac{7}{4}$

18. The second term of the polynomial was lost when factoring in the second step.

$15t^2 + 5t = 0$

$5t(3t + 1) = 0$

$5t = 0$ and $3t + 1 = 0$

19. $x = 0$ and $x = \frac{1}{4}$; times when frog jumped and landed.

7.4 Puzzle Time

HORSE THAT WAS SO SLOW DURING A RACE THAT THE JOCKEY KEPT A DIARY OF THE TRIP

Determine whether the equation represents a *linear* or *nonlinear* function. Explain.

1. $y = x^2 - 14$

2. $y = \sqrt{8} + x$

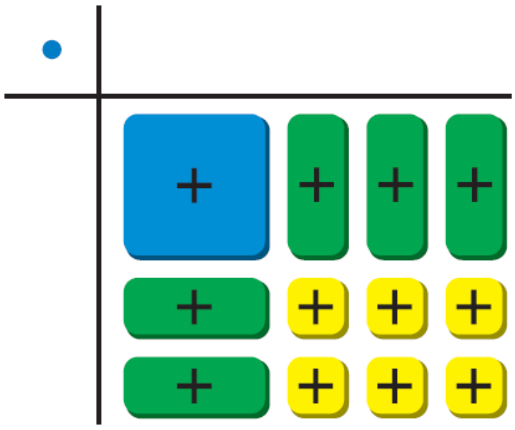
Essential Question

How can you use algebra tiles to factor the trinomial $x^2 + bx + c$ into the product of two binomials?

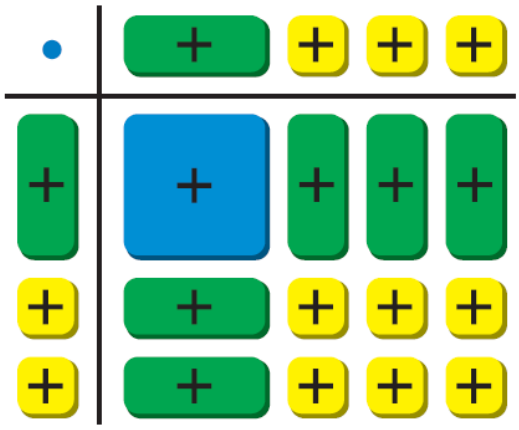
Work with a partner. Use algebra tiles to write each polynomial as the product of two binomials. Check your answer by multiplying.

Sample $x^2 + 5x + 6$

Step 1 Arrange algebra tiles that model $x^2 + 5x + 6$ into a rectangular array.



Step 2 Use additional algebra tiles to model the dimensions of the rectangle.



Step 3 Write the polynomial in factored form using the dimensions of the rectangle.

$x(x-1) - 2(x-1)$

$x^2 - x - 2x + 2$

width length

Area $= x^2 + 5x + 6 = (x + 2)(x + 3)$

a. $x^2 - 3x + 2 =$

b. $x^2 + 5x + 4 =$

factors of 2 whose sum = −3

1 2

−1 −2

$(x-1)(x-2)$

$(x-2)(x-1)$

c. $x^2 - 7x + 12 =$

1, 2, 3, 4, 6, 12

$-3 \cdot -4 = 12$

$-3 + -4 = 7$

$x^2 - 4x - 3x + 12$

$x(x-4) - 3(x-4)$

$(x-3)(x-4)$

d. $x^2 + 7x + 12 =$

	x	$+4$
x	x^2	$+4x$
$+3$	$+3x$	12

$(x+4)(x+3)$

Core Concept

Factoring $x^2 + bx + c$ When c Is Positive

Algebra $x^2 + bx + c = (x + p)(x + q)$ when $p + q = b$ and $pq = c$.

When c is positive, p and q have the same sign as b.

Examples $x^2 + 6x + 5 = (x + 1)(x + 5)$

$x^2 - 6x + 5 = (x - 1)(x - 5)$

$x^2 - 5x + 6$

$(x - 2)(x - 3)$

Factor $x^2 + 10x + 16$. $(x+2)(x+8)$

16: 1 2 4 8 16

$-1 - 2 - 4 - 8 - 16$

$x^2 + 2x + 8x + 16$

Factor the polynomial.

1. $x^2 + 7x + 6$

2. $x^2 + 9x + 8$

Factor $x^2 - 8x + 12$.

Core Concept

Factoring $x^2 + bx + c$ When c Is Negative

Algebra $x^2 + bx + c = (x + p)(x + q)$ when $p + q = b$ and $pq = c$.

When c is negative, p and q have different signs.

Example $x^2 - 4x - 5 = (x + 1)(x - 5)$

Factor $x^2 + 4x - 21$.

Factor the polynomial.

3. $w^2 - 4w + 3$

4. $n^2 - 12n + 35$

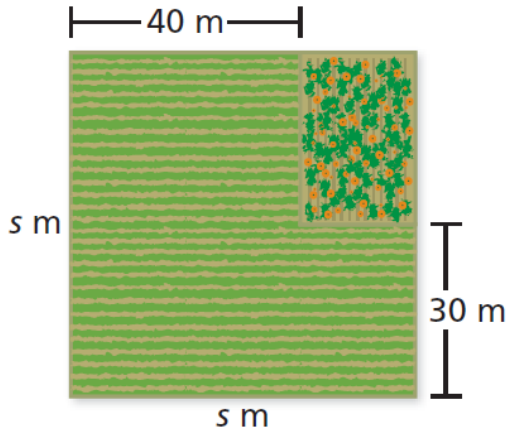
5. $x^2 - 14x + 24$

6. $x^2 + 2x - 15$

7. $y^2 + 13y - 30$

8. $v^2 - v - 42$

A farmer plants a rectangular pumpkin patch in the northeast corner of a square plot of land. The area of the pumpkin patch is 600 square meters. What is the area of the square plot of land?



9. WHAT IF? The area of the pumpkin patch is 200 square meters. What is the area of the square plot of land?

• Explain your strategy for factoring the following polynomials.

a. $x^2 - 2x - 15$

b. $x^2 + 2x - 15$

c. $x^2 + 8x + 15$

d. $x^2 - 8x + 15$