

Factoring Quadratics

Answer key

HSA.SSE.A.2

16 problems

1. Factor out the greatest common factor: $6x^2 + 9x$.

Answer $3x(2x + 3)$

The GCF of $6x^2$ and $9x$ is $3x$: $6x^2 + 9x = 3x(2x + 3)$.

2. Factor out the greatest common factor: $10y^3 - 15y^2$.

Answer $5y^2(2y - 3)$

The GCF is $5y^2$: $10y^3 - 15y^2 = 5y^2(2y - 3)$.

3. Factor: $x^2 + 7x + 12$.

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

Find two numbers with product 12 and sum 7: 3 and 4. So $x^2 + 7x + 12 = (x + 3)(x + 4)$.

4. Factor: $x^2 + 9x + 20$.

Answer $(x + 4)(x + 5)$

Product 20, sum 9: 4 and 5. So $x^2 + 9x + 20 = (x + 4)(x + 5)$.

5. Factor: $x^2 - 8x + 15$.

Answer $(x - 3)(x - 5)$

Product 15, sum -8: -3 and -5. So $x^2 - 8x + 15 = (x - 3)(x - 5)$.

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

Answer $(x + 5)(x - 3)$

Product -15, sum 2: 5 and -3. So $x^2 + 2x - 15 = (x + 5)(x - 3)$.

7. Factor: $x^2 - 3x - 10$.

Answer $(x - 5)(x + 2)$

Product -10, sum -3: -5 and 2. So $x^2 - 3x - 10 = (x - 5)(x + 2)$.

8. Factor the difference of squares: $x^2 - 49$.

Answer $(x + 7)(x - 7)$

$x^2 - 49 = x^2 - 7^2 = (x + 7)(x - 7)$.

9. Factor the difference of squares: $4x^2 - 25$.

Answer $(2x + 5)(2x - 5)$

$4x^2 - 25 = (2x)^2 - 5^2 = (2x + 5)(2x - 5)$.

10. Which of these is a correct factorization of $x^2 - 36$?

Answer B) $(x + 6)(x - 6)$

$x^2 - 36$ is a difference of squares: $(x + 6)(x - 6)$. Expanding gives $x^2 - 36$.

11. Factor completely (look for a GCF first): $2x^2 + 10x + 12$.

Answer $2(x + 2)(x + 3)$

Factor out 2: $2(x^2 + 5x + 6)$. Then $x^2 + 5x + 6 = (x + 2)(x + 3)$, so the result is $2(x + 2)(x + 3)$.

12. Factor completely: $3x^2 - 27$.

Answer $3(x + 3)(x - 3)$

Factor out 3: $3(x^2 - 9)$. Then $x^2 - 9 = (x + 3)(x - 3)$, giving $3(x + 3)(x - 3)$.

13. Factor: $2x^2 + 7x + 3$.

Answer $(2x + 1)(x + 3)$

Look for factors of $2 \cdot 3 = 6$ that sum to 7: 1 and 6. Split: $2x^2 + x + 6x + 3 = x(2x + 1) + 3(2x + 1) = (2x + 1)(x + 3)$.

14. Factor: $3x^2 - 10x - 8$.

Answer $(3x + 2)(x - 4)$

Factors of $3 \cdot (-8) = -24$ that sum to -10 : 2 and -12 . Split: $3x^2 + 2x - 12x - 8 = x(3x + 2) - 4(3x + 2) = (3x + 2)(x - 4)$.

15. A square garden of side x has a square 5 ft by 5 ft fountain removed from one corner. The remaining area is $x^2 - 25$. Factor this expression, then find the area when $x = 9$ ft.

Answer $(x + 5)(x - 5)$; 56 sq ft

Difference of squares: $x^2 - 25 = (x + 5)(x - 5)$. At $x = 9$: $(9 + 5)(9 - 5) = 14 \cdot 4 = 56$ sq ft.

16. A rectangle has area $x^2 + 11x + 24$ square units. Factor to find expressions for its length and width, and state which is longer.

Answer $(x + 3)(x + 8)$; the side $x + 8$ is longer

Product 24, sum 11: 3 and 8. So the area factors as $(x + 3)(x + 8)$; for positive x the side $x + 8$ is the longer one.