Factoring Polynomials

Recall that when using generic rectangles to multiply binomials, the product of the terms of the diagonals are equal.

For example in multiplying \((2x + 3)(x – 2)\) the product of both diagonals equals \(-12x^2\).

We can use this to go backwards, that is, factor the trinomial.

Steps

1. Place the \(x^2\) and the constant terms in opposite corners of the generic rectangle. Determine the sum and product of the two remaining corners. The sum is the \(x\)-term of the expression and the product is equal to the product of the \(x^2\) and constant terms.

2. Place the sum and product into the Diamond Problem and solve it as usual.

3. Place the solutions from the Diamond Problem into the generic rectangle and find the dimensions of the rectangle.

4. Check the diagonals and write the dimensions as a product.
Factor each polynomial completely. Show all work on your own piece of paper.

1. \( x^2 - x - 42 \)  
2. \( 4x^2 - 18 \)  
3. \( 2x^2 + 9x + 9 \)

4. \( 2x^2 + 3xy + y^2 \)  
5. \( 6x^2 - x - 15 \)  
6. \( 4x^2 - 25 \)

7. \( x^2 - 28x + 196 \)  
8. \( 7x^2 - 847 \)  
9. \( x^2 + 18x + 81 \)

10. \( x^2 + 4x - 21 \)  
11. \( 3x^2 + 21x \)  
12. \( 3x^2 - 20x - 32 \)

13. \( 9x^2 - 16 \)  
14. \( 4x^2 + 20x + 25 \)  
15. \( x^2 - 5x + 6 \)