Special Factoring Techniques

We have five factoring formulas in this section that will help with special cases.

Perfect Square Trinomials: $a^2+2ab+b^2=(a+b)^2$
$a^2-2ab+b^2=(a-b)^2$

Difference of Squares: $a^2-b^2=(a+b)(a-b)$

Sum of squares: not factorable over real numbers

Difference of Cubes: $a^3-b^3=(a-b)(a^2+ab+b^2)$

Sum of Cubes: $a^3+b^3=(a+b)(a^2-ab+b^2)$

Examples: Factor using the formulas.

1. x^2-36 $= x^2-6^2=(x+6)(x-6)$

2. $x^2+12x+36$
$x^2+2(6)(x)+6^2=(x+6)^2$

36	12
6	6

$x^2+12x+36=(x+6)(x+6)$
$=(x+6)^2$

3. $16a^2-81b^2$ $=(4a)^2-(9b)^2=(4a+9b)(4a-9b)$

4. m^2+25 (squares; sum) prime

5. $36a^2 - 60a + 25$ $= (6a - 5)^2$

$(6a)^2 - 2(6a)(5) + 5^2$

$36(25) = ?? \mid -60$

6. $x^3 + 8$ $= (x + 2)(x^2 - 2x + 4)$

$x^3 + 2^3$

7. $x^3 - 27y^3$ $= (x - 3y)(x^2 + 3xy + 9y^2)$

$x^3 - (3y)^3$

27
1 3
3 9
1 3
3 3

8. $16m^2 - 56mn + 49n^2$ $= (4m - 7n)^2$

$(4m)^2 - 2(4m)(7n) + (7n)^2$

?

Cubes
1
8 ✓
27
64
125 ✓

9. $250a^3 - 16b^3$ $= 2(5a - 2b)(25a^2 + 10ab + 4b^2)$

$5a \cdot 5a \quad 5a \cdot 2b \quad 2b \cdot 2b$

GCF $= 2(125a^3 - 8b^3)$

$(5a)^3 - (2b)^3$

10. $m^4 - 16$ $= (m^2 + 4)(m^2 - 4) = (m^2 + 4)(m + 2)(m - 2)$

$(m^2)^2 - (4)^2$

↓ Diff of Squares

$(m^2)^2 - (2)^2$