

Math 45 6.4 Special Products

1) Difference of Two Squares

- Two terms
- Subtracted
- Both terms are perfect squares

Formula: $a^2 - b^2 = (a - b)(a + b)$

Example: $49x^2y^2 - 81z^2 = (7xy - 9z)(7xy + 9z)$

Step 1: Take square root of first term to get a .

Step 2: Take square root of last term to get b .

Step 3: Substitute a and b into formula.

2) Perfect Square Trinomials

- Three terms
- Last term is added
- First and last terms are perfect squares

Formula: $a^2 - 2ab + b^2 = (a - b)^2 = (a - b)(a - b)$

Example: $\frac{x^2}{25} - \frac{6}{5}x + 9 = \left(\frac{x}{5} - 3\right)^2$

Formula: $a^2 + 2ab + b^2 = (a + b)^2 = (a + b)(a + b)$

Example: $4x^2 + 44x + 121 = (2x + 11)^2$

Step 1: Take square root of first term to get a .

Step 2: Take square root of last term to get b .

Step 3: Substitute a and b into formula.

Step 4: Check by FOIL – middle term must be correct. If middle term is not correct, trinomial is prime.

3) Difference of Two Cubes

- two terms
- Subtracted
- First and last terms are perfect cubes

Formula: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Example: $64x^3y^3 - 125z^3 = (4xy - 5z)(16x^2y^2 + 20xyz + 25z^2)$

Step 1: Take cube root of first term to get a .

Step 2: Take cube root of last term to get b . (Ignore negative.)

Step 3: Substitute a and b into formula.

4) Sum of Two Cubes

- two terms
- Added
- First and last terms are perfect cubes

Formula: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

Example: $\frac{x^6}{27} + 8y^3 = \left(\frac{x^2}{3} + 2y\right)\left(\frac{x^4}{9} - \frac{2}{3}x^2y + 4y^2\right)$

Step 1: Take cube root of first term to get a .

Step 2: Take cube root of last term to get b . (Ignore negative.)

Step 3: Substitute a and b into formula.

5) Sum of Two Squares

- two terms
- Added
- First and last terms are perfect squares

Sum of two squares is always PRIME.

Example: $36x^2 + 4$ is prime.