

Intermediate Algebra
Skill-BUILDER # AE - 10
Dividing Polynomials Using Long Division

Arrange both dividend and divisor in **descending order**. Supply any missing term by using a coefficient of zero.

Examples

1. $(x^3 + x^2 - 5) \div (3 + x)$

Solution:

Rearrange and rewrite the dividend as $x^3 + 0x^2 + x - 5$ and rewrite the divisor as $x + 3$. Apply the Divide-Multiply-Subtract-Bring down process:

$$\begin{array}{r}
 x^2 - 3x + 10 \\
 x + 3 \overline{) x^3 + 0x^2 + x - 5} \\
 \underline{-(x^3 + 3x^2)} \\
 -3x^2 + x \\
 \underline{-(-3x^2 - 9x)} \\
 10x - 5 \\
 \underline{-(10x + 30)} \\
 -35
 \end{array}$$

Thus, we get $(x^3 + x^2 - 5) \div (3 + x) = x^2 - 3x + 10 - \frac{35}{x + 3}$.

2. $(x^4 - 16y^4) \div (x - 2y)$

Solution:

Rewrite the dividend as $x^4 + 0x^3y + 0x^2y^2 + 0xy^3 - 16y^4$ (descending in x and ascending in y).

$$\begin{array}{r}
 x^3 + 2x^2y + 4xy^2 + 8y^3 \\
 x - 2y \overline{) x^4 + 0x^3y + 0x^2y^2 + 0xy^3 - 16y^4} \\
 \underline{-(x^4 - 2x^3y)} \\
 2x^3y + 0x^2y^2 \\
 \underline{-(2x^3y - 4x^2y^2)} \\
 4x^2y^2 + 0xy^3 \\
 \underline{-(4x^2y^2 - 8xy^3)} \\
 8xy^3 - 16y^4 \\
 \underline{-(8xy^3 - 16y^4)} \\
 0
 \end{array}$$

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Divide using long division.

1. $(x^3 + x^2 + x + 1) \div (x - 1)$

2. $(x - 2x^2 + x^4 + 4) \div (x + 2)$

3. $(1 - x - x^3 - x^5) \div (1 + x + x^2)$

4. $(x^3 + 81y^3) \div (x + 3y)$

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Answers

- 1.
- 2.
- 3.
- 4.

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