

Long Division of Polynomials

EXAMPLE

 Divide $2a^3 + 4a^2b + 4ab^2 + 2b^3$ by $a + b$.

$$\begin{array}{r}
 \underline{2a^2 + 2ab + 2b^2} \\
 (a+b) \overline{)2a^3 + 4a^2b + 4ab^2 + 2b^3} \\
 \underline{2a^3 + 2a^2b} \\
 0 + 2a^2b \\
 \underline{2a^2b + 2ab^2} \\
 0 + 2ab^2 \\
 \underline{2ab^2 + 2b^3} \\
 0 + 0
 \end{array}$$

Rules for Dividing Polynomials

1. Arrange dividend and divisor in order of descending powers of the same variable. If necessary, supply any missing powers by writing (0)(the missing power).
2. Divide the first term of the dividend by the first term of the divisor. The result is the first term of the quotient.
3. Multiply the entire divisor by this term of the quotient. Subtract the product from the dividend.
4. Treat this result as a new dividend and repeat steps 1–3 until the remainder is 0 or until the power of the remainder is less than the highest power of the divisor.

Directions Use long division to find the quotient.

1. $(a^2 - 8a + 16) \div (a - 4)$ _____
2. $(x^2 - x - 12) \div (x - 4)$ _____
3. $(8x^2 + 2x - 3) \div (2x - 1)$ _____
4. $(9x^2 + 30x + 25) \div (3x + 5)$ _____
5. $(4x^2 - 25) \div (2x + 5)$ _____
6. $(x^3 + x^2 + 3x + 3) \div (x + 1)$ _____
7. $(x^6 + 2x^4 - 5x^2 - 10) \div (x^2 + 2)$ _____
8. $(12x^2 + x - 10) \div (4x + 3)$ _____
9. $(2x^5 + 6x^3 + 2x^2 + 4) \div (x^2 + 3)$ _____
10. $(x^3 + y^3) \div (x + y)$ _____