

Division

Polynomial by Monomial

$$\frac{(27a^5 + 15a^3 - 3a^2) \div (3a)}{3a}$$

$$9a^4 + 5a^2 - 1a$$

$$(42x^5y^7 - 21x^7y^4 - 56x^2y^3) \div (7xy^2)$$

dividend divisor

$$(x^2 + 2x - 24) \div (x - 4) \quad (x - r)$$

constant

Synthetic Division

$$(x^2 + 2x - 24) \div (x - 4)$$

Write the terms of the dividend so the degrees are in descending order. Then just list the coefficients.

Write the constant r of the divisor $x-r$ beside the coefficients. Bring down the first coefficient.

Multiply the first coefficient by r . Write the product under the second coefficient. Then add the two terms.

$$\begin{array}{r|rrrr}
 4 & 1 & 2 & -24 & \\
 & \downarrow & 4 & 24 & \\
 \hline
 & 1 & 6 & 0 &
 \end{array}$$

Multiply the new sum by r and write the product beneath the next coefficient. Add the two terms.

$$1x + 6$$

The numbers on the bottom row are the coefficients of the quotient. The x terms are written in descending order and begin one degree lower than the dividend. The last term is the remainder. A remainder of 0 means that there is no remainder.

Synthetic Division

Remainder: The remainder is written over the binomial

$$(3x^3 + 7x^2 - 4x + 3) \div (x + 3)$$

$$\begin{array}{r|rrrr} -3 & 3 & 7 & -4 & 3 \\ & \downarrow & -9 & 6 & -6 \\ \hline & 3 & -2 & 2 & -3 & 3 \\ & & & & & \hline & & & & & 3x^2 - 2x + 2 - \frac{3}{x+3} \end{array}$$

$$(2x^3 - 3x^2 + 3x - 4) \div (x - 2)$$

$$\begin{array}{r|rrrr} 2 & 2 & -3 & 3 & -4 \\ & \downarrow & 4 & 2 & 10 \\ \hline & 2 & 1 & 5 & 6 \\ & & & & \hline & & & & 2x^2 + x + 5 + \frac{6}{x-2} \end{array}$$

Synthetic Division

Missing Terms: Write a 0 for each missing term.

$$(2x^3 + 4x - 6) \div (x + 3)$$

$$2x^3 + 0x^2 + 4x - 6$$

$$\begin{array}{r|rrrr} -3 & 2 & 0 & 4 & -6 \\ & & -6 & 18 & -66 \\ \hline & 2 & -6 & 22 & -72 \\ & & & & \frac{72}{x+3} \end{array}$$

$$(x^5 + 32) \div (x + 2)$$

$$x^5 + 0x^4 + 0x^3 + 0x^2 + 0x + 32$$

$$\begin{array}{r|rrrrrr} -2 & 1 & 0 & 0 & 0 & 0 & 32 \\ & & -2 & 4 & -8 & 16 & -32 \\ \hline & 1 & -2 & 4 & -8 & 16 & 0 \\ & & & & & & \frac{0}{x+2} \end{array}$$

$$x^4 - 2x^3 + 4x^2 - 8x + 16$$