

Chapter 1.2.5: Dividing Polynomials

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Review: Reducing Fractions

Recall: Reduce the following fraction.

$$\frac{52}{130}$$

What is the **greatest common factor** (GCF) of 52 and 130?

Rule: We know a fraction is reduced completely when the GCF of the numerator and denominator is 1.

On Your Own: Reduce $-\frac{56}{32}$. What is the GCF?

Dividing Monomials

Now we will look at some examples where dividing two monomials results in a monomial (which is not always the case!!).

Examples: Find the quotient.

- $-54x^9y^7 \div (7x^5y^3)$.
- $\frac{21a^6b^{10}}{28a^2b^2}$
- On Your Own: $\frac{4x^4y^3}{2xy}$

Dividing a Polynomial by a Monomial

Now we will learn how to divide a polynomial of two or more terms by a monomial. To divide a polynomial by a monomial, divide each term of the polynomial by the monomial, or in other words, we distribute the division over addition and subtraction.

Examples: Find the quotient.

- $(32x^5y - 16x^2y^4) \div (8x^2y)$
- $(45a^5b^6 - 27a^4b^4) \div 9a^3b^2$
- On Your Own: $\frac{20x^3+24x^2+12x}{4x}$

Dividing a Polynomial by a Binomial

We may, in certain situations, also divide a polynomial by a binomial as in the following examples.

Examples: Find the quotient.

- $(6(x - 2)(3x - 2)) \div (3(x - 2))$
- $((-4(2x - 1))(2x + 7)) \div 2(2x + 7)$

Dividing Polynomials Using Long Division

To divide a polynomial by a binomial, we follow a procedure very similar to long division of numbers. Let's try it now.

Examples: Find the quotient.

- Find the quotient and the remainder of $(x^2 + 9x + 20) \div (x + 5)$.
- Find the quotient and the remainder of $(y^4 - y^2 + 5y - 6) \div (y + 2)$.

Section Review

Try the following problems on your own!

- Find the quotient. $(12x^4 - 9x^3 + 15x^2) \div 3x^2$
- Find the quotient. $\frac{18a^5c^4c^8}{36abc}$
- Find the quotient and remainder. $\frac{2x^3-11x^2-41x+9}{x-8}$
- Find the quotient and remainder. $(6x^2 - x - 15) \div (2x + 3)$