Chapter

P

(ex.) find $8x \div (15 - 10x)^2$ when $x = 2$

$$8(2) \div (15 - 10(2))^2$$
$$16 \div (15 - 20)^2$$
$$16 \div (-5)^2$$
$$16 \div 25$$
$$.64$$

Absolute Value

(ex) $|-17| = 17$

$|211| = 211$

$|\sqrt{2} - 8| \approx 6.5857\ldots$

Exponents

simplify each ex.

(ex.) $4^2 = 16$

$-4^2 = -16$

$(-4)^2 = 16$

(ex) $5^{-2} = \frac{1}{25} = .04$

$5 \cdot 5^2 = 5^3 = 125$

ex $(2x^3y^{-2})^4 = 2^4(x^3)^4(y^{-2})^4$
$= 16x^{12}y^{-8}$ or $\frac{16x^{12}}{y^8}$

ex $(3x^{-4}y^2)(2xy^6) = 6x^{-3}y^8$ or $\frac{6y^8}{x^3}$

ex $\frac{4x^5y^7}{32x^5y^{10}} = \frac{1}{8}x^2y^{-3}$ or $\frac{x^2}{8y^3}$

Scientific Notation

ex Write in decimal notation
$6.84\times10^6 = 6,840,000$
$2.51\times10^{-3} = .00251$

ex write in scientific notation
$6,220,000 = 6.22\times10^6$
$.0000314 = 3.14\times10^{-5}$

ex Find $6\div500,000$ on calculator.
1.2 E -5 = .000012
$\searrow 1.2\times10^{-5} \nearrow$

ex $(2.1\times10^3)(1.72\times10^5) = 3.612\times10^8$
$(2.1)(1.72) = 3.612$ and $(10^3)(10^5) = 10^8$

Radicals

Assume all variables represent non-negative #s.

(ex) $\sqrt{36} = 6$

$\sqrt{20} = 2\sqrt{5} \approx 4.4721\ldots$

(ex.) $\sqrt{8x} \cdot \sqrt{2x} = \sqrt{8x \cdot 2x} = \sqrt{16x^2}$

$= 4x$

$\frac{\sqrt{216x^3}}{\sqrt{6x}} = \sqrt{\frac{216x^3}{6x}} = \sqrt{36x^2} = 6x$

$\sqrt{2} + \sqrt{x}$ does not simplify.

$\sqrt{2} + \sqrt{2} = 2\sqrt{2}$

$\sqrt{4x} + \sqrt{4x} = 2\sqrt{4x} = 4\sqrt{x}$

$\sqrt{4x} - 8\sqrt{x} = 2\sqrt{x} - 8\sqrt{x} = -6\sqrt{x}$

(ex) $\sqrt[3]{8} = 2$

$5\sqrt[4]{x} - 2\sqrt[4]{x} = 3\sqrt[4]{x}$

(ex) $25^{1/2} = 5$

$\sqrt{25}$

$27^{-1/3} = \frac{1}{3}$

$\frac{1}{27^{1/3}} = \frac{1}{\sqrt[3]{27}}$

Polynomials

ex. $(8x^4 - 3x^3 + 8x - 10) - (4x^3 - 2x^2 + x - 3) =$
$8x^4 - 7x^3 + 2x^2 + 7x - 7$

$(x+2)(3x^2+x+1) = 3x^3 + x^2 + x + 6x^2 + 2x + 2$
$= 3x^3 + 7x^2 + 3x + 2$

Factoring

$(x+2)(x+1) = x^2 + 3x + 2$

ex. $3x^4 + 9x^3 + 6x^2 = 3x^2(x^2 + 3x + 2)$
$= 3x^2(x+2)(x+1)$

Rational Expressions

Simplify

ex. $\frac{x^2-1}{5x+5} = \frac{(x+1)(x-1)}{5(x+1)} = \frac{1}{5}(x-1)$ for $x \neq -1$

ex. $\frac{x+1}{x^2+3x-4} \cdot \frac{2x+8}{x-3} = \frac{(x+1)2(x+4)}{(x-1)(x+4)(x-3)} = \frac{2(x+1)}{(x-1)(x-3)}$

$\frac{x+1}{(x-1)(x+4)} \div \frac{2(x+4)}{x-3} = \frac{(x+1)(x-3)}{2(x-1)(x+4)^2}$

$\frac{3x}{2x+1} - \frac{x}{x-1} = \frac{3x(x-1)}{(2x+1)(x-1)} - \frac{x(2x+1)}{(2x+1)(x-1)} = \frac{3x^2-3x-(2x^2+x)}{(2x+1)(x-1)} = \frac{3x^2-3x-2x^2-x}{(2x+1)(x-1)}$

$= \frac{x^2-4x}{(2x+1)(x-1)} = \frac{x(x-4)}{(2x+1)(x-1)}$

Complex Rational Expressions

(ex) Simplify $\dfrac{\frac{1}{x}-\frac{1}{3}}{\frac{1}{x+2}+5}$

$$\frac{\frac{1}{x}-\frac{1}{3}}{\frac{1}{x+2}+5}\cdot\frac{3x(x+2)}{3x(x+2)}=\frac{\frac{1}{x}[3x(x+2)]-\frac{1}{3}[3x(x+2)]}{\frac{1}{x+2}[3x(x+2)]+5[3x(x+2)]}$$

$$=\frac{3(x+2)-x(x+2)}{3x+15x(x+2)}$$

$$=\frac{3x+6-x^2-2x}{3x+15x^2+30x}=\frac{-x^2+x+6}{15x^2+33x}$$

$$=\frac{-(x-3)(x+2)}{3x(5x+11)}$$