

INTERMEDIATE ALGEBRA

GPS # 25 6.2 MULTIPLICATION AND DIVISION OF RATIONAL EXPRESSIONS

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Useful Guidelines: [$a, b, c,$ and d are nonzero real number.]

* Simplifying Rational Expressions: $\frac{a \cdot c}{b \cdot c} = \frac{a}{b}$. Example: $\frac{3b(c-3)}{5(c-3)} = \frac{3b}{5}$

* Multiplying Rational Expressions: $\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$. Example: $\frac{(b+3)}{(a+2)} \cdot \frac{(a+7)}{(b+1)} = \frac{(b+3)(a+7)}{(a+2)(b+1)}$

* Dividing Rational Expressions: $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c}$. Example: $\frac{3a}{5b} \div \frac{(a+2)}{(b+3)} = \frac{3a(b+3)}{5b(a+2)}$

* Writing a Rational Expression in Lowest Terms: Factor both numerator and denominator to find their Greatest Common Factor and apply the Fundamental Property.

no GCF Info!

1. Write each rational expression in lowest terms.

a) $\frac{33b^3}{3b} = \frac{3 \cancel{3} b^{\cancel{3} 2}}{\cancel{3} b^{\cancel{1} 1}} = \boxed{11b^2}$

b) $\frac{45x^2y^3}{5xy} = \frac{5 \cancel{9} x^{\cancel{2} 1} y^{\cancel{3} 2}}{\cancel{5} x^{\cancel{1} 0} y^{\cancel{1} 1}} = \boxed{9xy^2}$

c) $\frac{9y-3}{15y-5} = \frac{3(3y-1)}{5(3y-1)} = \boxed{\frac{3}{5}}$

d) $\frac{k-4}{k^2-16} = \frac{\cancel{k-4}}{(k-\cancel{4})(k+\cancel{4})} = \boxed{\frac{1}{k+4}}$

2) Multiply and divide the following as indicated:

a) $\frac{5k^6}{2m^5} \cdot \frac{2m^2}{k^4} = \frac{5 \cdot \cancel{2} k^{\cancel{6} 2}}{\cancel{2} m^{\cancel{5} 3}} \cdot \frac{m^{\cancel{2} 2}}{k^{\cancel{4} 0}} = \frac{5k^2}{m^3}$

b) $\frac{(x-2)(x+3)}{(x+8)(x+1)} \cdot \frac{(x+1)(x-3)}{(x-2)(x-3)} = \frac{\cancel{x-2} \cancel{x+1} (x+3)}{\cancel{x+1} \cancel{x-2} (x+8)} = \frac{x+3}{x+8}$

c) $\frac{(x-7)(x-3)}{(x+2)(x-1)} \div \frac{(x+1)(x-3)}{(x+2)(x-1)} = \frac{(x-7) \cancel{(x-3)}}{\cancel{(x+2)} \cancel{(x-1)}} \cdot \frac{\cancel{(x+2)} \cancel{(x-1)}}{(x+1) \cancel{(x-3)}} = \boxed{\frac{x-7}{x+1}}$

d) $\frac{y^2-1}{3y^2-5y-2} \div \frac{y^2+y-2}{3y^2+7y+2} = \frac{(y-1) \cancel{(y+1)}}{\cancel{(3y+1)} (y-2)} \cdot \frac{\cancel{(3y+1)} (y+2)}{\cancel{(y+2)} (y+1)} = \boxed{\frac{y-1}{y-2}}$

e) $\frac{x+3}{x^7-x} \div \frac{x^2-9}{x^5} = \frac{(x+3)}{x(x^6-1)} \cdot \frac{x^5}{(x-3)(x+3)} = \frac{\cancel{x+3} x^{\cancel{5} 4}}{\cancel{x} (x^6-1) \cancel{(x+3)}} = \frac{x^4}{(x^6-1)(x-3)}$

f) $\frac{3k^2+5k-12}{3k^2-k-4} \div \frac{7k^2+16k-15}{k^2+4k+3} = \frac{(3k-4) \cancel{(k+3)}}{\cancel{(3k-4)} (k+1)} \cdot \frac{\cancel{(k+3)} (k+1)}{(7k-5) \cancel{(k+3)}} = \boxed{\frac{k+1}{7k-5}}$