9-1 Multiplying and Dividing Rational Expressions

Objective: Simplify rational expressions and complex fractions.

Simplify: **3 steps**: **1) factor**, **2) cancel**, and **3) rewrite**.

Ex 1) $\dfrac{2x^2 - 10x}{(x-5)(x^2-1)} = \dfrac{(2x)(x-5)}{(x-5)(x+1)(x-1)} = \dfrac{2x}{(x+1)(x-1)}$ or $\dfrac{2x}{x^2-1}$

Ex 2) $\dfrac{p^2 + 2p - 3}{p^2 - 2p - 15} = \dfrac{(p+3)(p-1)}{(p+3)(p-5)} = \dfrac{p-1}{p-5}$

Ex 3) $\dfrac{p^2w - p^2}{p^3 - p^3w} = \dfrac{p^2(w-1)}{p^3(1-w)} = \dfrac{p^2 \cdot -1(-1+w)}{p^3(1-w)} = -\dfrac{1}{p}$

Ex 4) $\dfrac{8x}{21y^3} \cdot \dfrac{7y^2}{16x^3} = \dfrac{1}{6x^2y}$

$3 \cdot y \quad 2 \cdot x^2$

Remember

$\dfrac{2}{3} \div \dfrac{4}{9} = \dfrac{2}{3} \cdot \dfrac{9}{4}$

Ex 5) $\dfrac{10pt^2}{3c^2d} \div \dfrac{5pt}{6c^2d^2} = \dfrac{10pt^2}{3c^2d} \cdot \dfrac{6c^2d^2}{5pt} = \dfrac{4td}{1} = \boxed{4dt}$

Ex 6) $\dfrac{k-3}{k+1} \div \dfrac{k^2 - 4k + 3}{1 - k^2}$

$\dfrac{k-3}{k+1} \cdot \dfrac{(1+k)(1-k)}{(k-3)(k-1)} = \dfrac{-1(-1+k)}{} = \boxed{-1}$

Ex 7) $\dfrac{2d + 6}{d^2 + d - 2} \div \dfrac{d + 3}{d^2 + 3d + 2}$ $= \dfrac{2(d+3)}{(d+2)(d-1)} \cdot \dfrac{(d+2)(d+1)}{d+3}$

$= \boxed{\dfrac{2(d+1)}{d-1}}$

Ex 8) $\dfrac{\dfrac{x^2}{9x^2 - 4y^2}}{\dfrac{x^3}{2y - 3x}}$ $= \dfrac{x^2}{9x^2 - 4y^2} \cdot \dfrac{2y - 3x}{x^3}$ $= \dfrac{-1}{X(3x+2y)}$

$(3x + 2y)(3x - 2y)$

Ex 9) $\dfrac{\dfrac{r^2}{r^2 - 25s^2}}{\dfrac{r}{5s - r}}$ $= \dfrac{r^2}{r^2 - 25s^2} \cdot \dfrac{5s - r}{r}$ $= \dfrac{-r}{r + 5s}$

$(r + 5s)(r - 5s)$