Simplifying Rational Expressions

Step 1: Factor numerator and denominator completely.

Step 2: Cancel common factors.

Directions: Simplify each rational expression.

1. $\frac{\cancel{18}^{3}x^4}{\cancel{60}_{10}x^6} = \boxed{\frac{3}{10x^2}}$

2. $\frac{3x^4y}{xy-y} = \frac{3x^4\cancel{y}}{\cancel{y}(x-1)} = \boxed{\frac{3x^4}{x-1}}$

$\frac{xy}{y} - \frac{y}{y}$ GCF = y

$y(x-1)$

3. $\frac{-5x^2-15}{4x^2+12} = \frac{-5\cancel{(x^2+3)}}{4\cancel{(x^2+3)}} = \boxed{\frac{-5}{4}}$

$\frac{-5x^2}{-5} - \frac{15}{-5}$ GCF = −5

$-5(x^2+3)$

$\frac{4x^2}{4} + \frac{12}{4}$ GCF = 4

$4(x^2+3)$

4. $\frac{24-6x}{x^3-4x^2} = \frac{6\cancel{(4-x)}^{-1}}{x^2\cancel{(x-4)}} = \boxed{\frac{-6}{x^2}}$

$\frac{24}{6} - \frac{6x}{6}$ GCF = 6

$6(4-x)$

$\frac{x^3}{x^2} - \frac{4x^2}{x^2}$ GCF = x^2

$x^2(x-4)$

5. $\frac{2x^2-72}{3x+18} = \frac{2\cancel{(x+6)}(x-6)}{3\cancel{(x+6)}} = \boxed{\frac{2(x-6)}{3}}$

$\frac{2x^2}{2} - \frac{72}{2}$ GCF=2

$2(x^2-36) = 2(x+6)(x-6)$

$x \cdot x$ $6 \cdot 6$

$\frac{3x}{3} + \frac{18}{3}$ GCF=3

$3(x+6)$

6. $\frac{x^2+2x-35}{x^2+19x+84} = \frac{(x-5)\cancel{(x+7)}}{\cancel{(x+7)}(x+12)} = \boxed{\frac{x-5}{x+12}}$

$x^2+2x-35$

$1 \cdot 35$

$\boxed{5 \cdot 7}$

$(x-5)(x+7)$

$x^2+19x+84 = (x+7)(x+12)$

$1 \cdot 84$

$2 \cdot 42$

$3 \cdot 28$

$4 \cdot 21$

$6 \cdot 14$

$\boxed{7 \cdot 12}$

7. $\dfrac{30-11x+x^2}{x^2-x-30} = \dfrac{\cancel{(x-6)}(x-5)}{(x+5)\cancel{(x-6)}} = \boxed{\dfrac{x-5}{x+5}}$

$30-11x+x^2$

$x^2-11x+30$

$1\cdot 30$
$2\cdot 15$
$3\cdot 10$
$\boxed{5\cdot 6}$

$(x-6)(x-5)$

x^2-x-30

$1\cdot 30$
$2\cdot 15$
$3\cdot 10$
$\boxed{5\cdot 6}$

$(x+5)(x-6)$

8. $\dfrac{3x^3+24x^2+4x+32}{x^3+512} = \dfrac{\cancel{(x+8)}(3x^2+4)}{\cancel{(x+8)}(x^2-8x+64)} = \boxed{\dfrac{3x^2+4}{x^2-8x+64}}$

$\dfrac{3x^3}{3x^2}+\dfrac{24x^2}{3x^2}+\dfrac{4x}{4}+\dfrac{32}{4}$

GCF $=3x^2$ GCF $=4$

$3x^2\dfrac{\cancel{(x+8)}}{\cancel{x+8}}+4\dfrac{\cancel{(x+8)}}{\cancel{x+8}}$

GCF $= x+8$

$(x+8)(3x^2+4)$

x^3+512

$x\ x\ x$ $8\ 8\ 8$

$A=x$ $B=8$

$(A+B)(A^2-AB+B^2)$

$(x+8)(x^2-8x+64)$