

Simplifying Rational Expression

$$\frac{x^2 + 3x - 4}{x^2 - 1}$$

Num
 $\frac{-4}{-1 \times 4}$
 $\frac{3}{3}$

How to do it...

$$\frac{\cancel{(x-1)}(x+4)}{\cancel{(x+1)}(x-1)}$$

Den
 $(x+1)(x-1)$

$$\frac{x+4}{x+1}$$

How NOT to do it...

$$\frac{x^2 + 3x - 4}{x^2 - 1} \neq \frac{3x+4}{x^2-1}$$

When simplifying, we can only cancel like factors - not terms!

Factors cancel when they are the same in the numerator and the denominator.

Examples:

1. $\frac{p-2}{5p^2-7p-6}$

$\frac{-30}{-10 \times 3}$
 $\frac{-7}{-7}$

5p	5p ²	10p
3	3p	-6

$$\frac{p-2}{(p-2)(5p+3)}$$

$$\frac{1}{5p+3}$$

Num: 2

$$\frac{-4}{-1 \times 4} \quad \frac{2v}{-1 \times -2v} \quad \frac{4v}{-1 \times -4v}$$

$$(2v-1)(v+2)$$

2. $\frac{v^2+3v-2}{3v^2+3v-6}$

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

$$= \frac{(2v-1)}{3(v-1)}$$

Den:

$$\frac{1}{3v^2+3v-6}$$

$$3(v^2+v-2)$$

$$3(v+2)(v-1)$$

Simplifying Rational Expressions - CW

Simplify each expression.

1) $\frac{20m^2}{12m-4}$

2) $\frac{4x^2-6x}{6x} = \frac{2x(2x-3)}{6x}$
 $= \frac{2x-3}{6}$

3) $\frac{p-2}{5p^2-7p-6} = \frac{\cancel{(p-2)}}{(5p+3)\cancel{(p-2)}}$
 $= \frac{1}{5p+3}$

4) $\frac{m-2}{3m^2-8m+4} = \frac{\cancel{m-2}}{(3m-1)\cancel{(m-2)}}$
 $= \frac{1}{3m-1}$

5) $\frac{10n^2+5n}{25n} = \frac{5n(2n+1)}{25n}$
 $= \frac{\cancel{2n+1}}{5}$

6) $\frac{2v^2+3v-2}{3v^2+3v-6} = \frac{(2v-1)\cancel{(v+2)}}{3(v-1)\cancel{(v+2)}}$
 $= \frac{2v-1}{3v-3} = \frac{2v-1}{3(v-1)}$

7) $\frac{4x^2-8x}{5x-10} = \frac{4x\cancel{(x-2)}}{5\cancel{(x-2)}}$
 $= \frac{4x}{5}$

8) $\frac{3v^2-15v}{3v^2-20v+25} = \frac{3v\cancel{(v-5)}}{(3v-5)\cancel{(v-5)}}$
 $= \frac{3v}{3v-5}$

9) $\frac{5r-5}{5r^2-5r} = \frac{5\cancel{(r-1)}}{5r\cancel{(r-1)}}$
 $= \frac{1}{r}$

10) $\frac{15n-5}{10n+10} = \frac{5(3n-1)}{10(n+1)}$
 $= \frac{(3n-1)}{2(n+1)}$

Simplifying Rational Expressions - HW

Date _____

Period _____

Simplify each expression.

$$1) \frac{x-3}{5x^2-15x} \quad \frac{\cancel{x-3}}{5x(\cancel{x-3})} = \boxed{\frac{1}{5x}}$$

$$2) \frac{2v^2+11v+5}{v+5} \quad \frac{(2v+1)\cancel{(v+5)}}{\cancel{v+5}} = \boxed{2v+1}$$

$$3) \frac{p-3}{5p^2-16p+3} \quad \frac{\cancel{p-3}}{(5p-1)\cancel{(p-3)}} = \boxed{\frac{1}{5p-1}}$$

$$4) \frac{5v^2-25v}{v-5} \quad \frac{5v(\cancel{v-5})}{\cancel{v-5}} = \boxed{5v}$$

$$5) \frac{n+4}{2n+8} \quad \frac{\cancel{n+4}}{2(\cancel{n+4})} = \boxed{\frac{1}{2}}$$

$\frac{-4}{-4} = 1$

$$6) \frac{3n^2-9n-12}{2n^2-6n-8} \quad \frac{3(\cancel{n^2-3n-4})}{2(\cancel{n^2-3n-4})} = \frac{3(\cancel{n-4})(\cancel{n+1})}{2(\cancel{n-4})(\cancel{n+1})} = \boxed{\frac{3}{2}}$$

$$7) \frac{3r^2+4r-4}{3r^2+9r+6} \quad \frac{(3r-2)\cancel{(r+2)}}{(3r+3)\cancel{(r+2)}} = \boxed{\frac{3r-2}{3r+3}}$$

$$8) \frac{5n^2-9n-2}{3n^2-8n+4} \quad \frac{(5n+1)\cancel{(n-2)}}{(3n-2)\cancel{(n-2)}} = \boxed{\frac{5n+1}{3n-2}}$$

$$9) \frac{2x^2+9x+10}{4x+8} \quad \frac{(2x+5)\cancel{(x+2)}}{4(\cancel{x+2})} = \boxed{\frac{2x+5}{4}}$$

$$10) \frac{6p+4}{10p-2} \quad \frac{2(3p+2)}{2(5p-1)} = \boxed{\frac{3p+2}{5p-1}}$$