The 4 Operations on Algebraic Fractions

$+, -, \times, \div$

BEDMAS

Recall:

Factoring: Rewriting an expression as a product of its factors.

$$\frac{4}{6} = \frac{2 \cdot 2}{2 \cdot 3} = \frac{2}{3}$$

"simplifying"

$$\frac{2 \cdot 2}{2 + 3}$$ — wrong

Unit 1: Simplifying Algebraic Fractions

p 1.3
Ex 1

$$\frac{4x}{8x^2}$$

(1) FACTOR!!

(2) Cancel out what is identical (only when there's one term on top, one term on the bottom)

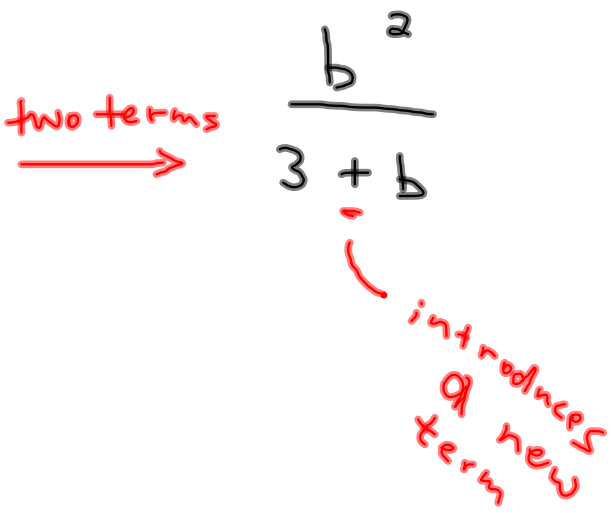
$$\frac{4x}{4 \cdot 2 \cdot x \cdot x} = \frac{1}{2x}$$

$$\frac{4x}{8x^2} = \frac{1x^1}{2x^2} = \frac{1x^{1-2}}{2} = \frac{1x^{-1}}{2} = \frac{1}{2x}$$

Simplify :

$$\frac{42ab^2c^3}{3a^2b} = \frac{3 \cdot 14 \cdot a \cdot b \cdot b \cdot c^3}{3 \cdot a \cdot a \cdot b}$$

$$= \frac{14bc^3}{a}$$


two terms
introduces a new term

$$\frac{(x+1)}{(x+1)+1}$$

$$\frac{(x+1)}{(x+1)+(x+1)} = \frac{x+1}{x+1+x+1}$$

$$= \frac{x+1}{2x+2}$$

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

$$= \frac{1}{2}$$

Recall: Factoring

- Greatest Common Factor
- Grouping
- Trinomial
- difference of squares

$\underbrace{x^2 + 2x}_{\text{GCF}} + \underbrace{4x + 6}_{\text{GCF}}$

$(x^2 - 4)$

(1) $\dfrac{2m+8}{}$

(2) m^2+6m+8

8: 8, 1

4, 2

-4, -2

-8, -1

(1) $\dfrac{2m}{2} + \dfrac{8}{2} \quad 4$

$2(m+4)$

gcf: 2

Divide

Product

(2) m^2+6m+8

$m^2+4m+2m+8$

$m(m+4)+2(m+4)$

$(m+4)(m+2)$

$$\frac{2(m+4)}{(m+4)(m+2)} = \frac{2}{(m+2)}$$

Simplify:

$$\frac{p^2 - 4}{2p^2 + 7p + 6}$$

$2 \times 6 = 12$

12: 12,1 / 6,2 / 4,3

$-4, -3$

$-6, -2$

$-12, -1$

$2p^2 + 4p + 3p + 6$

$2p(p+2) + 3(p+2)$

gcf: $2p$

2: Divide

3: Product

gcf 3

Divide

$(p+2)(2p+3)$

gcf: $(p+2)$

Divide

Product

② $p^2 - 4 = (p-2)(p+2)$

$\sqrt{p^2} = p$

$\sqrt{4} = 2$

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

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

(1) $\frac{2x-14}{}$

(2) $3x-21+bx-7b$

(1) $\frac{2x}{2}-\frac{14}{2}$

gcf: 2

$2(x-7)$

Factors

2: (2), 1

-2, -1

14: (2), 7

14, 1

Divide each term by gcf

Product of what remains w/ gcf

$\frac{2(x-7)}{(x-7)(3+b)}$

$\frac{2}{3+b}$

$3x-21+bx-7b$

$\frac{3x}{3}-\frac{21}{3}+\frac{bx}{b}-\frac{7b}{b}$

gcf: 3

$3(x-7)+b(x-7)$ gcf b

$(x-7)(3+b)$

$\frac{y^2-1}{y-y^2}$

① $\dfrac{y^2-1}{y-y^2}$ ②

① $y^2-1=(y+1)(y-1)$

$\sqrt{y^2}=y$

$\sqrt{1}=1$

② $y-y^2$

$\frac{y}{y}$ $\frac{y^2}{y}$

"y factored out"

y y

$y(1-y)$

$\frac{1}{-1}$ $\frac{y}{-1}$

"-1 factored out"

-1

$-1y(-1+y)$

$\dfrac{(y+1)(y-1)}{y(1-y)}$ ← strategy: FACTOR OUT a "-1"

$=\dfrac{(y+1)(y-1)}{-y(-1+y)}=\dfrac{(y+1)(y-1)}{-y(y-1)}$

$=\dfrac{(y+1)}{-y}$