Unit 7: Simplifying Algebraic Fractions

Recall:

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

$$\frac{4}{16} = \frac{\cancel{4} \cdot 1}{\cancel{4} \cdot 4} = \frac{1}{4}$$

B
E
D
M
D
S

$$\frac{4}{16} = \frac{\cancel{2} \cdot 2}{\cancel{2} \cdot 8} = \frac{2}{8} = \frac{\cancel{2} \cdot 1}{\cancel{2} \cdot 4} = \frac{1}{4}$$

Steps for simplifying algebraic fractions

Step 1

FACTOR the numerator and denominator independently

Step 2: Only when you have one term in the top and one term in the bottom, cancel out what's identical

Simplify:

ex.

1 $\dfrac{x^2 + x}{2x}$
2

gcf x

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

$x(x+1)$

2 $2x$

$\dfrac{\cancel{x}(x+1)}{2\cancel{x}}$

$\dfrac{x+1}{2}$

Simplify :

e.x.

① $\dfrac{x^2 + 2x}{2x}$ ②

① $\dfrac{x^2}{x} + \dfrac{2x}{x}$

$x(x+2)$

① gcf: x
② Brackets
③ Divide

$\dfrac{\cancel{x}(x+2)}{2\cancel{x}}$ ← so right, cuz there's one term in the numerator

$\dfrac{x+\cancel{2}}{\cancel{2}}$ ← so wrong cause there's 2 terms in the numerator

$\dfrac{x+2}{2}$ → final answer :) has a tired

Simplify:

① $\dfrac{5m+10}{}$

② m^2+m-2

$$\frac{5(\cancel{m+2})}{(\cancel{m+2})(m-1)}$$

→ final answer $\dfrac{5}{m-1}$

① $5m + 10$ gcf 5

$\frac{5m}{5}$ $\frac{10}{5}$

$5(m+2)$

B

D

② m^2+m-2

$\boxed{1 \times -2 = -2}$

-2

-2 1

2 -1

$m^2+2m-m-2$

$m(m+2)-1(m+2)$

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

gcf m+2

B

D

$(m+2)(m-1)$

Simplify

1) ① $\dfrac{p^2 - 6p + 5}{p^2 - 25}$ ②

① $p^2 - 6p + 5$

$1 \times 5 = 5$

5

1 5

-5 -1

$p^2 - 5p - 1p + 5$

$p(p-5) - 1(p-5)$

$(p-5)$ $p-5$

$(p-5)(p-1)$

② $p^2 - 25$

$\sqrt{p^2} = p$

$\sqrt{25} = 5$

$(p+5)(p-5)$

Put back in fraction

$$\frac{\cancel{(p-5)}(p-1)}{(p+5)\cancel{(p-5)}}$$

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

2) ① $\dfrac{6n - n^2}{}$

② $n^3 - 5n^2 - 6n$

$$\frac{\cancel{n}(6-n)}{\cancel{n}(n-6)(n+1)}$$

Nota Bene: Your brackets that you're canceling out need to be identical. If your signs are different, the strategy is to factor out a negative one.

ex. $\dfrac{(6-n)}{(n-6)(n+1)}$ 1) gcf -1 2) B 3) D

① $\dfrac{6n}{n} - \dfrac{n^2}{n}$ 1) gcf n

$n(6-n)$ 2) Bracket

3) D

$ax^2 + bx + c$

② $n^3 - 5n^2 - 6n$ 1) n 2) B 3) D

$n(\underbrace{n^2 - 5n - 6}_{1 \times -6 = -6})$

$n(n^2 - 6n + n - 6)$

$n(n(n-6) + 1(n-6))$

$n(n-6)(n+1)$

-6	
-6	1
-3	2
-2	3
-1	6

$$\frac{-1(-6+n)}{(n-6)(n+1)} = \frac{-1(\cancel{n-6})}{(\cancel{n-6})(n+1)} = \frac{-1}{n+1}$$

Simplify!

$$\frac{\text{① } 3c - c^2}{\text{② } c^2 - 9}$$

$$\frac{c(3-c)}{(c+3)(c-3)}$$

gcf = -1

B

D

$$\frac{c(-1)(-3+c)}{(c+3)(c-3)}$$

$$\frac{-c}{c+3}$$

① $3c - c^2$

gcf: c

$c(3-c)$

B

D

② $c^2 - 9$

$\sqrt{c^2} = c$

$(c+3)(c-3)$

$\sqrt{9} = 3$

Unit 8: Multiplying and Dividing Algebraic Fractions

Recall: multiplying Fraction

e.x

$$\frac{2}{3} \times \frac{3}{4} = \frac{6}{12}$$

$$= \frac{\cancel{6} \cdot 1}{\cancel{6} \cdot 2}$$

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

Recall: Dividing Fractions

flip 2nd fraction! Change to time sign.

$$\frac{2}{3} \div \frac{3}{4} = \frac{2}{3} \times \frac{4}{3}$$

$$= \frac{8}{9}$$

Perform the following operation!

ex. ① $\frac{8}{②\ x^2-36} \times \frac{③\ 4x+24}{④\ 4x+4}$

② x^2-36 $\sqrt{x^2}=x$

$(x+6)(x-6)$ $\sqrt{36}=6$

③ $\frac{4x}{4}+\frac{24}{4}$ 1) gcf : 4

$4(x+6)$ 2) B

3) D

④ $\frac{4x}{4}+\frac{4}{4}$ 1) gcf 4

2) B

$4(x+1)$ 3) D

$$\frac{8}{(x+6)(x-6)} \times \frac{\cancel{4}(x+6)}{\cancel{4}(x+1)}$$

$$\frac{8(\cancel{x+6})}{(\cancel{x+6})(x-6)(x+1)}$$

$$\frac{8}{(x-6)(x+1)}$$

Steps for multiplying alg fractions

Step ① : FACTOR

Step ② : Put answer back into fraction, and simplify if possible.

Step ③ : "Multiply" the tops, "multiply" the bottoms, won't undoing the fractoring

Step ④ : Simplify

$$\frac{x^2+2x-8}{x^2-9} \times \frac{x^2+4x+3}{x^2-6x+8}$$

$$\frac{(x+4)(x-2)}{(x-3)(x+3)} \times \frac{(x+3)(x+1)}{(x-4)(x-2)}$$

e.x.

$$\frac{64p^2-1}{x^2-4} \div \frac{8p-1}{(x-2)^2}$$

$$\frac{(8p+1)(8p-1)}{(x-2)(x+2)} \div \frac{8p-1}{(x-2)(x-2)}$$

$$\frac{(8p+1)(8p-1)}{(x-2)(x+2)} \times \frac{(x-2)(x-2)}{8p-1}$$

$$\frac{(8p+1)\cancel{(8p-1)}\cancel{(x-2)}(x-2)}{\cancel{(x-2)}(x+2)\cancel{(8p-1)}}$$

$$\frac{(8p+1)(x-2)}{(x+2)}$$

Steps for dividing alg fractions

Step ①: FACTOR

Step ②: Simplify if possible

Step ③: Flip the 2nd fraction and change sign to multiplication

Step ④: Proceed w multiplying wout undoing the factoring and simplify

$$\frac{x^2 - 6x + 5}{x^2 + x - 2} \div (x - 5)$$