Unit 1 : Simplifying Algebraic Fraction

Reduce the following alg. fraction to its lowest terms.

1. FACTOR
2. SIMPLIFY
3. DO OPERATION
4. FACTOR
5. SIMPLIFY

ex. $\dfrac{b^2}{3b + b^2}$ wrong

DON'T CANCEL OUT! you CAN ONLY CANCEL WHEN THERE'S ONE TERM ON THE TOP, one term on the bottom

① $\dfrac{b^2}{3b + b^2}$

① $\dfrac{3b}{b} + \dfrac{b^2}{b}$

def: b
Division
Product

$b(3+b)$

$\dfrac{b^2}{b(3+b)} = \dfrac{b}{3+b}$

$\dfrac{b \cdot b}{b(3+b)} = \dfrac{b}{b}\dfrac{b}{(3+b)}$

$= 1 \cdot \dfrac{b}{(3+b)}$

Common mistake on the exam

ex. ① $\frac{b+2}{b^2+4}$

② b^2+4

N.B. NOT a difference of squares!
It's NOT Factorable.

① $(b + 2)$

② $(b^2z - 4)$

② $b^2z - 4$

$\sqrt{b^2z}$

$= \sqrt{b^2}\sqrt{z}$

$= b$

$(bz - 2)(bz + 2)$

Not FACTORABLE Because z is not a square

① $15a^2 - 13ab + 2b^2$

② $9a^2 - 4b^2$

Make sure the signs are correct

wrong: $-15 \quad 2$

$10 \quad -3$

$-2 \quad -15$

$-1 \quad -30$

30

$1 \quad 30$

$2 \quad 15$

$3 \quad 10$

② $9x^2 - 4y^2$

$\sqrt{9x^2} = \sqrt{9}\sqrt{x^2}$

$= 3x$

$\sqrt{4y^2} = \sqrt{4}\sqrt{y^2}$

$= 2y$

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

① $15a^2 - 13ab + 2b^2$

$15a^2 - 15ab + 2ab + 2b^2$

$15a(a - b) + 2b(a - b)$

$(15a + 2b)(a - b)$

When you pick the wrong factors you'll notice something wrong. ex

Don't force it! Find your mistake above.

Reduce - -

① $\dfrac{36a^2 - 9b^4}{(2a - b^2)}$

②

① $36a^2 - 9b^4$

$\sqrt{36a^2} = 6a$

$\sqrt{9b^4} = 3b^2$

$(6a + 3b^2)(6a - 3b^2)$ ← Attenzione: there's more factoring to be done.

gcf: 3 gcf: 3

Factor one bracket at a time

$3(2a + b^2)\,3(2a - b^2)$

$3 \cdot 3(2a + b^2)(2a - b^2)$

$9(2a + b^2)(2a - b^2)$

$$\frac{9(2a + b^2)(2a - b^2)}{(2a - b^2)}$$

$= 9(2a + b^2)$

Unit 2: Product and Quotient of Algebraic Fractions

Remember the five general steps!

Express the product of the following 2 alg fractions in lowest terms (x)

① $\frac{8}{}$ ② $\frac{}{x^2 - 36}$ × ③ $\frac{(x+6)}{}$ ④ $\frac{}{8(x+1)}$ ← ideally, don't unfactor this.

② $x^2 - 36$

$\sqrt{x^4} = x$

$\sqrt{36} = 6$

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

times the tops

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

times the bottoms

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

don't forget #'s as well

for multiplying and dividing, don't unfactor things.

$$\frac{5a^2}{b^2+36} \quad \frac{0}{0} \quad \frac{5}{1}$$

To divide fractions, flip 2nd fraction and change sign to multiplication.

$$\frac{5a^2}{(b^2+36)} \times \frac{1}{5}$$

$$\frac{\cancel{5}a^2}{\cancel{5}(b^2+36)}$$

$$\frac{a^2}{b^2+36}$$

$$\frac{5a^2}{b^2-36} \div \frac{25a-25ab}{b^2-7b+6}$$

① b^2-36 $(b-6)(b+6)$ | ② $25a-25ab$ $25a(1-b)$ | ③ b^2-7b+6 $(b-6)(b-1)$

$$\frac{5a^2}{(b-6)(b+6)} \div \frac{25a(1-b)}{(b-6)(b-1)}$$

employ the strategy of factoring out a negative one (It will make the bracket identical)

$$\frac{5a^2}{(b-6)(b+6)} \div \frac{25a(-1)(-1+b)}{(b-6)(b-1)}$$

$$\frac{5a^2}{(b-6)(b+6)} \times \frac{(b-6)}{-25a}$$

$$\frac{5a^2(b-6)}{-25a(b-6)(b+6)}$$

$$\frac{a}{-5(b+6)} = -\frac{a}{5(b+6)} = \frac{-a}{5(b+6)}$$

Unit 4: Adding and Subtracting Algebraic Fractions

5 general steps apply!

$$\frac{1}{\text{①}\ a^2+4a+3} + \frac{\text{②}\ 2a+4}{\text{③}\ a^2+3a+2}$$

① a^2+4a+3

3
3,1

$(a+3)(a+1)$

② $2(a+2)$

③ a^2+3a+2

$(a+1)(a+2)$

$$\frac{1}{(a+3)(a+1)} + \frac{2(a+2)}{(a+1)(a+2)}$$

$$\frac{1}{(a+3)(a+1)} + \frac{2(a+3)}{(a+1)(a+3)}$$

so →

so wrong. There are 2 terms.

$$\frac{1+2(a+3)}{(a+3)(a+1)}$$

$$\frac{1+2(a+3)}{(a+3)(a+1)}$$

$$\frac{1+2a+6}{(a+3)(a+1)}$$

$$\frac{2a+7}{(a+3)(a+1)}.$$

Steps for adding fractions

step ①: Get the same LCD by multiplying one denominator by the bracket its missing

step ②: Keep LCD as is and add the tops. (evaluate brackets and adding like terms)

$$\frac{m^2-9}{m^2+4m+3}+\frac{2}{m^2+2m+1}$$

① ② ③

① m^2-9

$(m+3)(m-3)$

② m^2+4m+3

$(m+3)(m+1)$

③ m^2+2m+1

$(m+1)(m+1)$

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

LCD: $(m+1)(m+1)$

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

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

$$=\frac{m^2-2m-1}{(m+1)(m+1)}$$

not factorable

-1

$-1 \quad 1$

$$\frac{-3a}{-a^3+2a^2+8a} + \frac{2a}{a^3-4a}$$