8.4 : Multiplying Rational Functions

Opener! factor :

ⓐ $x^2+2x-35$

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

ⓑ $3x^2+30x+75$

$3(x^2+10x+25)$

$3(x+5)(x+5)$

ⓒ $-8x^2+2$

$-2(4x^2-1)$

$-2(2x+1)(2x-1)$

Discuss with your partner! which method of simplifying is correct? WHY?

1 ⓐ $\frac{2+8}{4}=\frac{10}{4}=\frac{5}{2}$ OR ~~ⓑ~~ $\frac{2+8}{4}=4$

2 ⓐ $\frac{2\cdot 8}{4}=\frac{16}{4}=4$ OR ⓑ $\frac{2\cdot 8}{4}=4$

Simplifying a rational expression!

① $\frac{x^2-2x-15}{x^2-9}=\frac{(x-5)(x+3)}{(x-3)(x+3)}=\boxed{\frac{x-5}{x-3}}$

② $\frac{40x+20}{10x+30}=\frac{20(2x+1)}{10(x+3)}=\frac{2(2x+1)}{x+3}=\boxed{\frac{4x+2}{x+3}}$

③ $\frac{x^2-2x-3}{x^2-x-6}=\frac{(x+1)(x-3)}{(x-3)(x+2)}=\boxed{\frac{x+1}{x+2}}$

Multiplying Rational Expressions

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④ $\frac{5x^2}{2xy^2} \cdot \frac{6xy^3}{10y} = \frac{30x^3y^3}{20xy^3} = \boxed{\frac{3x^2}{2}}$

⑤ $\frac{8x^3y}{2xy^2} \cdot \frac{7x^4y^3}{4y} = \frac{56x^7y^4}{8xy^3} = \boxed{7x^6y}$

⑥ $\frac{3x-3x^2}{x^2+4x-5} \cdot \frac{x^2+x-20}{3x} = \frac{3x(1-x)}{(x-1)(x+5)} \cdot \frac{(x+5)(x-4)}{3x}$

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

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

$-(x-4)$

$\boxed{-x+4}$

⑦ $\frac{7x}{2x-10} \cdot \frac{x^2-11x+30}{x^2-6x} =$

$\frac{7x}{2(x-5)} \cdot \frac{(x-5)(x-6)}{x(x-6)} = \boxed{\frac{7}{2}}$