

Rational Expressions and Functions: Multiplying and Dividing

Writing rational expressions in lowest terms (Simplify)

- ① Factor the numerator and denominator to find their GCF, the greatest common factor.
- ② Write in lowest terms.

Ex) Simplify

$$\frac{8k}{16} = \frac{1}{2}k = \frac{k}{2}$$

Ex) Simplify

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

$$\text{Ex) Simplify } \frac{y^2 - 4}{2y + 4} = \frac{\cancel{(y+2)}(y-2)}{2\cancel{(y+2)}} \\ = \boxed{\frac{y-2}{2}}$$

$$\text{Ex) Simplify } \frac{y^2 + 2y - 3}{y^2 - 3y + 2} = \frac{\cancel{(y+3)}\cancel{(y-1)}}{\cancel{(y-1)}(y-2)}$$

* "Cross out" common terms.

$$= \boxed{\frac{y+3}{y-2}}$$

$$\text{Ex) Simplify } \frac{3y+9}{y^2-9} = \frac{3\cancel{(y+3)}}{(y-3)\cancel{(y+3)}}$$

$$= \boxed{\frac{3}{y-3}}$$

Ex) Simplify (Multiply)

$$\frac{5p-5}{p} \cdot \frac{3p^2}{10p-10} =$$

$$\frac{5(p-1)}{p} \cdot \frac{3p^2}{10(p-1)} =$$

$$\frac{\cancel{5(p-1)}}{\cancel{10(p-1)}} \cdot \frac{3p^{\cancel{2}}}{p} = \frac{1}{2} \cdot 3p$$
$$= \frac{3p}{2}$$

Ex) Multiply

$$\frac{2r+4}{5r} \cdot \frac{3r}{5r+10} =$$

$$\frac{\cancel{2(r+2)}}{5r} \cdot \frac{3r}{\cancel{5(r+2)}} =$$

$$\frac{\cancel{2(r+2)}}{\cancel{5(r+2)}} \cdot \frac{\cancel{3r}}{\cancel{5r}} = \boxed{\frac{6}{25}}$$