

# Multiplication and division of rational expressions

$$\frac{P}{Q} \cdot \frac{S}{T} = \frac{P \cdot S}{Q \cdot T}$$

$$\frac{\frac{P}{Q}}{\frac{S}{T}} = \frac{P}{Q} \cdot \frac{T}{S} = \frac{P \cdot T}{Q \cdot S}$$

Ex:

$$\frac{\frac{3}{x^2 + x - 30}}{\frac{4}{x^2 - 7x + 10}} = \frac{3}{x^2 + x - 30} \cdot \frac{x^2 - 7x + 10}{4}$$

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

$$= \frac{3(x-2)}{4(x+6)}$$

\*  $x^2 + x - 30 = 0$

$$\Delta = 1^2 - 4(-30) = 121 = 11^2$$

$$\begin{cases} x_1 = \frac{-1 + 11}{2} = \frac{10}{2} = 5 \\ x_2 = \frac{-1 - 11}{2} = \frac{-12}{2} = -6 \end{cases}$$

\*  $x^2 - 7x + 10 = 0$

$$\Delta = (-7)^2 - 4(1)(10) = 49 - 40 = 9$$

$$\begin{cases} x_1 = \frac{7 + 3}{2} = \frac{10}{2} = 5 \\ x_2 = \frac{7 - 3}{2} = \frac{4}{2} = 2 \end{cases}$$

Ex:

$$\frac{x^2 + 6x + 9}{x^2 - 9} \cdot \frac{x+3}{2x+6} = \frac{\cancel{(x+3)}^2 \cdot \cancel{(x+3)}}{\cancel{(x+3)}(x-3) \cdot 2\cancel{(x+3)}} = \frac{x+3}{2(x-3)}$$

Ex:

$$\frac{x^2 + x - 30}{x^2 + 6x + 9} \cdot \frac{x^2 - 9}{x^2 - 7x + 10} = \frac{\cancel{(x-5)}(x+6)(x-3)\cancel{(x+3)}}{\cancel{(x+3)}^2 \cdot \cancel{(x-5)}(x-2)} = \frac{(x+6)(x-3)}{(x+3)(x-2)}$$