

# COMPOSITION OF FUNCTIONS

Find  $f(x) = x - 4$   $g(x) = \frac{5x}{x+3}$   $x \neq -3$

+ its domain

$$(f+g)(x) = \frac{x-4}{x+3} + \frac{5x}{x+3}$$

$$= \frac{x^2 - x - 12 + 5x}{x+3}$$

$$= \frac{x^2 + 4x - 12}{x+3}$$

+, -, \*, ÷, f ∘ g

When combining functions, you must consider the domains of the original function as well as the domains of the new functions

$$x \neq -3$$

$$f(x) = \frac{x-4}{5x} \quad g(x) = \frac{5x}{x+3} \quad x \neq -3$$

Find  $\left(\frac{f}{g}\right)(x)$  & its domain.

$$= \frac{\frac{x-4}{5x}}{\frac{5x}{x+3}} = x-4 \cdot \frac{x+3}{5x} = \frac{x^2 - x - 12}{5x} \quad x \neq -3, 0$$

$$(g \circ f)(x) = \frac{5(x-4)}{x-4+3} = \frac{5x-20}{x-1} \quad x \neq 1, -3$$

$g[f(x)]$

$$p(x) = \sqrt{x^2 - 4} \quad w(x) = \sqrt{x+5}$$



$$(p \circ w)(x) = \sqrt{(\sqrt{x+5})^2 - 4}$$

$$= \sqrt{x+5-4}$$

$$= \sqrt{x+1}$$



$$(p \circ w)(x) = \sqrt{x+1}$$

$$[2, \infty)$$

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$$(f \circ g)(x) = (x^2 + 2x - 4)^5$$

$$f(x) = x^5$$

$$g(x) = x^2 + 2x - 4$$

$$f(x) = (x - 4)^5$$

$$g(x) = x^2 + 2x$$