

NAME: _____ Score _____/10

1. Suppose f and g are functions whose rules are $f(x) = \frac{x}{x+2}$ and $g(x) = \frac{x+5}{x}$.

a) Calculate $f \circ g(3)$. Show all the steps. Simplify your answer completely.

$$f \circ g(3) = f(g(3)) = f\left(\frac{3+5}{3}\right) = f\left(\frac{8}{3}\right) = \frac{\frac{8}{3}}{\frac{8}{3}+2} = \frac{\frac{8}{3}}{\frac{8}{3}+\frac{6}{3}} = \frac{\frac{8}{3}}{\frac{14}{3}} = \left(\frac{8}{3}\right)\left(\frac{3}{14}\right) = \frac{8}{14} = \frac{4}{7}$$

b) Determine the rule for $f \circ g$. Show all the steps and simplify the rule as much as possible.

$$f \circ g(x) = f(g(x)) = f\left(\frac{x+5}{x}\right) = \frac{\frac{x+5}{x}}{\frac{x+5}{x}+2} = \frac{\frac{x+5}{x}}{\frac{x+5}{x}+\frac{2x}{x}} = \frac{\frac{x+5}{x}}{\frac{3x+5}{x}} = \left(\frac{x+5}{x}\right)\left(\frac{x}{3x+5}\right) = \frac{x+5}{3x+5}$$