

$$(g \circ g)(x) = g\left(\frac{x}{x+2}\right) = \frac{\frac{x}{x+2}}{\frac{x}{x+2} + 2} = \frac{x}{x+2(x+2)} = \frac{x}{3x+4}. \quad (g \circ g)(x) \text{ is defined whenever}$$

both  $g(x)$  and  $g(g(x))$  are defined; that is whenever  $x \neq -2$  and  $x \neq -\frac{4}{3}$ . So the domain is  $\{x \mid x \neq -2, -\frac{4}{3}\}$ .

$$42. \quad (g \circ h)(x) = g(x^2 + 2) = (x^2 + 2)^3 = x^6 + 6x^4 + 12x^2 + 8.$$

$$(f \circ g \circ h)(x) = f(x^6 + 6x^4 + 12x^2 + 8) = \frac{1}{x^6 + 6x^4 + 12x^2 + 8}.$$

$$44. \quad (g \circ h)(x) = g(\sqrt[3]{x}) = \frac{\sqrt[3]{x}}{\sqrt[3]{x} - 1}. \quad (f \circ g \circ h)(x) = f\left(\frac{\sqrt[3]{x}}{\sqrt[3]{x} - 1}\right) = \sqrt{\frac{\sqrt[3]{x}}{\sqrt[3]{x} - 1}}$$