

6.2 Complex Fractions and Rationalizing

PRACTICE

Directions: Simplify each fraction.

$$1) \frac{\left(\frac{3}{16} + \frac{m^2}{16}\right) \cdot 16}{9 \cdot 16} = \frac{\frac{3 \cdot 16}{16} + \frac{m^2 \cdot 16}{16}}{144}$$

$$= \frac{3 + m^2}{144}$$

$$= \frac{m^2 + 3}{144}$$

$$2) \frac{\frac{1}{x} \cdot (x+4) \cdot 25 \cdot x}{\left(\frac{5x}{x+4} + \frac{x+4}{25}\right) (x+4) \cdot 25 \cdot x}$$

$$= \frac{\frac{1}{x} \cdot (x+4) \cdot (25) \cdot (x)}{(x+4) \cdot (25) \cdot (x) \cdot \frac{5x}{x+4} + \frac{x+4}{25} \cdot (x+4) \cdot (25) \cdot (x)}$$

$$= \frac{25x + 100}{125x^2 + x(x^2 + 8x + 16)}$$

$$= \frac{25x + 100}{125x^2 + x^3 + 8x^2 + 16x}$$

$$= \frac{25x + 100}{x^3 + 133x^2 + 16x}$$

$$3) \frac{\left(\frac{2 - \frac{x}{x+1}}{\frac{3}{x+1} + 3}\right) \cdot (x+1)}{(x+1)} = \frac{2(x+1) - \frac{x}{x+1} \cdot (x+1)}{\frac{3}{x+1} \cdot (x+1) + 3(x+1)}$$

$$= \frac{2x+2 - x}{3 + 3x+3}$$

$$= \frac{x+2}{3x+6}$$

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

$$= \frac{1}{3}$$

$$4) \frac{\left(\frac{25}{4} + \frac{w}{8}\right) (8)(5)(w^2)}{\left(\frac{16}{5} + \frac{5}{w^2}\right) (8)(5)(w^2)} = \frac{\frac{25}{4} \cdot (8)(5)(w^2)}{\frac{16}{5} \cdot (8)(5)(w^2) + \frac{5}{w^2} \cdot (8)(5)(w^2)}$$

$$= \frac{250w^2 + 5w^3}{128w^2 + 200}$$

$$5) \frac{\left(\frac{2}{x+5} - \frac{x^2}{x+5}\right) (x+5)x^2}{\left(\frac{3}{x} + \frac{x+5}{x^2}\right) (x+5)x^2} = \frac{\frac{2(x+5)x^2}{x+5} - \frac{x^2(x+5)x^2}{x+5}}{\frac{(x+5)(x+5)x^2}{x} + \frac{(x+5)(x+5)x^2}{x^2}}$$

$$= \frac{2x^2 - x^4}{x(x^2 + 10x + 25) + x^2 + 10x + 25}$$

$$= \frac{-x^4 + 2x^2}{x^3 + 10x^2 + 25x + x^2 + 10x + 25}$$

$$= \frac{-x^4 + 2x^2}{x^3 + 11x^2 + 35x + 25}$$

$$6) \frac{\left(\frac{g}{g+2} + 1\right) (g+2)(g-2)}{\left(\frac{g}{g-2} - 1\right) (g+2)(g-2)}$$

$$= \frac{\frac{g}{g+2} \cdot (g+2)(g-2) + 1 \cdot (g+2)(g-2)}{\frac{g}{g-2} \cdot (g+2)(g-2) - 1 \cdot (g+2)(g-2)}$$

$$= \frac{g^2 - 2g + g^2 - 4}{g^2 + 2g + (-g^2 + 4)}$$

$$= \frac{2g^2 - 2g - 4}{2g + 4}$$

$$= \frac{2(g^2 - g - 2)}{2(g+2)}$$

$$= \frac{g^2 - g - 2}{g+2}$$

$$7) \frac{\left(\frac{9}{x-2} - \frac{3}{4}\right) (x+5)4(x-2)}{\left(\frac{3}{x+5} - \frac{x-2}{x+5}\right) (x+5)4(x-2)} = \frac{\frac{9(x+5)4(x-2)}{x-2} - \frac{3(x+5)4(x-2)}{4}}{\frac{3(x+5)4(x-2)}{x+5} - \frac{(x-2)4(x-2)}{x+5}}$$

$$= \frac{36x + 180 - 3(x^2 + 3x - 10)}{12x - 24 - 4(x^2 - 4x + 4)}$$

$$= \frac{36x + 180 - 3x^2 - 9x + 30}{12x - 24 - 4x^2 + 16x - 16}$$

$$= \frac{-3x^2 + 27x + 210}{-4x^2 + 28x - 40}$$

Directions: Rationalize each fraction.

$$\begin{aligned} 8) & \frac{4}{(\sqrt{x+1}-10)} \frac{(\sqrt{x+1}+10)}{(\sqrt{x+1}+10)} \\ & = \frac{4(\sqrt{x+1}+10)}{x+1-100} \\ & = \frac{4(\sqrt{x+1}+10)}{x-99} \end{aligned}$$

$$\begin{aligned} 9) & \frac{(5x+2)}{(4-\sqrt{2x})} \frac{(4+\sqrt{2x})}{(4+\sqrt{2x})} \\ & = \frac{(5x+2)(4+\sqrt{2x})}{16-2x} \end{aligned}$$

$$\begin{aligned} 10) & \frac{(x+2)}{(\sqrt{x}+\sqrt{x-4})} \frac{(\sqrt{x}-\sqrt{x-4})}{(\sqrt{x}-\sqrt{x-4})} \\ & = \frac{(x+2)(\sqrt{x}-\sqrt{x-4})}{x-(x-4)} \\ & = \frac{(x+2)(\sqrt{x}-\sqrt{x-4})}{4} \end{aligned}$$

$$\begin{aligned} 11) & \frac{(m-5)}{(\sqrt{m+4}-\sqrt{2m})} \frac{(\sqrt{m+4}+\sqrt{2m})}{(\sqrt{m+4}+\sqrt{2m})} \\ & = \frac{(m-5)(\sqrt{m+4}+\sqrt{2m})}{m+4-2m} \\ & = \frac{(m-5)(\sqrt{m+4}+\sqrt{2m})}{-m+4} \end{aligned}$$

$$\begin{aligned} 12) & \frac{(6-y)}{(\sqrt{4-y}+\sqrt{y+4})} \frac{(\sqrt{4-y}-\sqrt{y+4})}{(\sqrt{4-y}-\sqrt{y+4})} \\ & = \frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{4-y+(y+4)} \\ & = \frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{-2y} \end{aligned}$$