

6.2 Complex Fractions and Rationalizing

PRACTICE

Directions: Simplify each fraction.

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

$$2) \frac{\frac{1}{5x} \cdot \frac{x}{x+4}}{\frac{x}{x+4} + \frac{x+4}{25}} \stackrel{(x)(25)(x+4)}{\stackrel{(x)(25)(x+4)}}{=} \frac{1(25)(x+4)}{5x(x)(25) + (x+4)(x+4)(x)} = \frac{25x+100}{125x^2 + (x^2+8x+16)x}$$

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

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

$$3) \frac{2 - \frac{x}{x+1}}{\frac{3}{x+1} + 3} \stackrel{(x+1)}{\stackrel{(x+1)}}{=} \frac{2(x+1) - x}{3 + 3(x+1)}$$

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

$$= \frac{x+2}{3(x+2)} = \frac{1}{3}$$

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

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

$$5) \frac{\frac{2}{x+5} - \frac{x^2}{x+5}}{\frac{x}{x+5} + \frac{x^2}{x+5}} \stackrel{(x+5)(x^2)}{\stackrel{(x+5)(x^2)}}{=} \frac{2(x^2) - x^2(x^2)}{(x+5)(x)(x+5) + (x+5)(x^2)}$$

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

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

$$6) \frac{\frac{g}{g+2} + 1}{\frac{g}{g-2} - 1} \stackrel{(g+2)(g-2)}{\stackrel{(g+2)(g-2)}}{=} \frac{g(g-2) + 1(g+2)(g-2)}{g(g+2) - 1(g+2)(g-2)}$$

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

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

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

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

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

$$= \frac{36x+180 - [3x^2+9x-30]}{12x-24 - [4x^2-16x+16]} = \frac{-3x^2+27x+210}{-4x^2+28x-40} = \frac{-(3x^2-27x-210)}{-(4x^2-28x+40)} = \frac{3x^2-27x-210}{4x^2-28x+40}$$

Directions: Rationalize each fraction.

$$8) \frac{4}{\sqrt{x+1}-10} \frac{(\sqrt{x+1}+10)}{(\sqrt{x+1}+10)} = \frac{4(\sqrt{x+1}+10)}{(\sqrt{x+1})^2 + 10\sqrt{x+1} - 10\sqrt{x+1} - 100}$$

$$= \frac{4(\sqrt{x+1}+10)}{x+1-100} = \boxed{\frac{4(\sqrt{x+1}+10)}{x-99}}$$

$$9) \frac{5x+2}{4-\sqrt{2x}} \frac{(4+\sqrt{2x})}{(4+\sqrt{2x})} = \frac{(5x+2)(4+\sqrt{2x})}{16+4\sqrt{2x}-4\sqrt{2x}-(\sqrt{2x})^2}$$

$$= \boxed{\frac{(5x+2)(4+\sqrt{2x})}{16-2x}}$$

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

$$= \frac{(x+2)(\sqrt{x}-\sqrt{x-4})}{x-(x-4)} = \boxed{\frac{(x+2)(\sqrt{x}-\sqrt{x-4})}{4}}$$

$$11) \frac{m-5}{\sqrt{m+4}-\sqrt{2m}} \frac{(\sqrt{m+4}+\sqrt{2m})}{(\sqrt{m+4}+\sqrt{2m})} = \frac{(m-5)(\sqrt{m+4}+\sqrt{2m})}{(\sqrt{m+4})^2 - (\sqrt{2m})^2}$$

$$\frac{(m-5)(\sqrt{m+4}+\sqrt{2m})}{m+4-2m} = \boxed{\frac{(m-5)(\sqrt{m+4}+\sqrt{2m})}{4-m}}$$

$$12) \frac{6-y}{\sqrt{4-y}+\sqrt{y+4}} \frac{(\sqrt{4-y}-\sqrt{y+4})}{(\sqrt{4-y}-\sqrt{y+4})} = \frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{(\sqrt{4-y})^2 - (\sqrt{y+4})^2} = \frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{4-y-(y+4)}$$

$$\frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{-2y} = \boxed{-\frac{(6-y)(\sqrt{4-y}-\sqrt{y+4})}{2y}}$$