

Math 80 Worksheet #7 Solutions

1. Section 6.1: Rational Expressions

Write each rational expression in lowest terms.

$$(a) \frac{6x-18}{9x-27} \Rightarrow \frac{6x-18}{9x-27} = \frac{6(x-3)}{9(x-3)} = \frac{6}{9} = \frac{2}{3}$$

$$(b) \frac{y^2-4}{y+2} \Rightarrow \frac{y^2-4}{y+2} = \frac{(y+2)(y-2)}{y+2} = y-2$$

$$(c) \frac{5-a}{a-5} \Rightarrow \frac{5-a}{a-5} = \frac{-(-5+a)}{a-5} = \frac{-(a-5)}{a-5} = -1$$

$$(d) \frac{4m^2-4m}{2-2m} \Rightarrow \frac{4m^2-4m}{2-2m} = \frac{4m(m-1)}{2(1-m)} = \frac{-4m(-m+1)}{2(1-m)} = \frac{-4m(1-m)}{2(1-m)} = -2m$$

2. Section 6.2: Multiplying and Dividing Rational Expressions

$$(a) \frac{2(x+1)}{3x^2} \cdot \frac{6x}{2(x+1)} \Rightarrow \frac{2(x+1)}{3x^2} \cdot \frac{6x}{2(x+1)} = \frac{12x(x+1)}{6x^2(x+1)} = \frac{2}{x}$$

$$(b) \frac{4a+16}{10} \cdot \frac{18}{3(a+4)} \Rightarrow \frac{4a+16}{10} \cdot \frac{18}{3(a+4)} = \frac{4(a+4)}{10} \cdot \frac{18}{3(a+4)} \\ = \frac{72(a+4)}{30(a+4)} = \frac{36}{15}$$

$$(c) \frac{8p^2q}{3} \div \frac{4pq^2}{2} \Rightarrow \frac{8p^2q}{3} \div \frac{4pq^2}{2} = \frac{8p^2q}{3} \cdot \frac{2}{4pq^2} = \frac{16p^2q}{12pq^2} = \frac{4p}{3q}$$

$$(d) \frac{m^2-16}{3m} \div \frac{2m+8}{m^2} \Rightarrow \frac{m^2-16}{3m} \div \frac{2m+8}{m^2} = \frac{m^2-16}{3m} \cdot \frac{m^2}{2m+8} \\ = \frac{(m+4)(m-4)}{3m} \cdot \frac{m^2}{2(m+4)} \\ = \frac{m^2(m+4)(m-4)}{6m(m+4)} = \frac{m(m-4)}{6}$$

3. Section 6.3: Least Common Denominator

Find the LCD of each pair.

$$(a) \frac{5}{x^2}, \frac{2}{3x^5} \quad \text{LCD} = 3x^5$$

$$(b) \frac{2}{5y}, \frac{-3}{5y+5} \quad \text{LCD} = 5y(y+1)$$

$$\text{Factor the denominators} \Rightarrow 5y \text{ and } 5y+5 = 5(y+1)$$

$$(c) \frac{2k}{k-9}, \frac{3}{9-k} \quad \text{LCD} = k - 9 \text{ or } 9 - k$$

$$(d) \frac{2m}{m^2-9}, \frac{4}{m-3} \quad \text{LCD} = (m+3)(m-3)$$

Factor the denominators $\Rightarrow m^2 - 9 = (m+3)(m-3)$ and $m - 3$

4. Section 6.4: Adding & Subtracting Rational Expressions

$$(a) \frac{2}{x^2} + \frac{x-1}{x^2} \Rightarrow \frac{2}{x^2} + \frac{x-1}{x^2} = \frac{2+x-1}{x^2} = \frac{x+1}{x^2}$$

$$(b) \frac{5}{x^2} + \frac{2}{3x^5} \Rightarrow \frac{5}{x^2} + \frac{2}{3x^5} = \frac{15x^3}{3x^5} + \frac{2}{3x^5} = \frac{15x^3+2}{3x^5}$$

(Using the LCD from 3(a).)

$$(c) \frac{2}{5y} - \frac{3}{5y+5} \Rightarrow \frac{2}{5y} - \frac{3}{5y+5} = \frac{2(y+1)}{5y(y+1)} - \frac{3y}{5y(y+1)}$$

$$= \frac{2y+2}{5y(y+1)} - \frac{3y}{5y(y+1)}$$

$$= \frac{2y+2-3y}{5y(y+1)}$$

$$= \frac{2-y}{5y(y+1)}$$

(Using the LCD from 3(b).)

$$(d) \frac{2k}{k-9} + \frac{3}{9-k} \Rightarrow \frac{2k}{k-9} + \frac{3}{9-k} = \frac{2k}{k-9} + \frac{-3}{k-9} = \frac{2k-3}{k-9}$$

$$\text{OR } \frac{2k}{k-9} + \frac{3}{9-k} = \frac{-2k}{9-k} + \frac{3}{9-k} = \frac{-2k+3}{9-k}$$

(Using the LCDs from 3(b).)

$$(e) \frac{2m}{m^2-9} - \frac{4}{m-3} \Rightarrow \frac{2m}{m^2-9} - \frac{4}{m-3} = \frac{2m}{(m+3)(m-3)} - \frac{4(m+3)}{(m+3)(m-3)}$$

$$= \frac{2m}{(m+3)(m-3)} - \frac{4m+12}{(m+3)(m-3)}$$

$$= \frac{2m-(4m+12)}{(m+3)(m-3)}$$

$$= \frac{2m-4m-12}{(m+3)(m-3)}$$

$$= \frac{-2m-12}{(m+3)(m-3)} = \frac{-2(m+6)}{(m+3)(m-3)}$$