

# Chapter 11 Test Review

Name: KEY

## Section 11.1: Proportions

Solve the proportions using cross multiplication.

1.)  $\frac{x}{4} \propto \frac{7}{2}$

$$2x = 28$$

$$\boxed{x = 14}$$

2.)  $\frac{5x}{10} \propto \frac{4}{2}$

$$10x = 40$$

$$\boxed{x = 4}$$

3.)  $\frac{7}{10} \propto \frac{9+x}{x}$

$$10(9+x) = 7x$$

$$90 + 10x = 7x$$

$$90 = -3x$$

$$\boxed{x = -30}$$

4.)  $\frac{x}{-3} \propto \frac{7}{x-10}$

$$x(x-10) = -21$$

$$x^2 - 10x = -21$$

$$x^2 - 10x + 21 = 0$$

$$(x-7)(x-3) = 0$$

$$\boxed{x = 7}$$

$$\boxed{x = 3}$$

## Section 11.3: Simplifying Rational Expressions

Simplify the expression if possible.

5.)  $\frac{8x}{40}$

$$\frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot x}{5 \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2}}$$

$$\boxed{\frac{x}{5}}$$

6.)  $\frac{16x^6}{4x^4}$

$$\frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}{\cancel{2} \cdot \cancel{2} \cdot x \cdot x \cdot x \cdot x}$$

$$\boxed{4x^2}$$

7.)  $\frac{2x^2+x}{4x}$

$$\frac{\cancel{x} (2x+1)}{2 \cdot \cancel{2} \cdot \cancel{x}}$$

$$\boxed{\frac{2x+1}{4}}$$

8.)  $\frac{x+7}{7}$

already simplified

$$9.) \frac{x^2 - x - 6}{x^2 - 4}$$

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

$$\boxed{\frac{x-3}{x-2}}$$

$$1 \cdot -6 = -6$$

$$\quad \quad \quad \wedge$$

$$\quad \quad \quad -3+2 = -1$$

$$x^2 - 3x + 2x - 6$$

$$x(x-3) + 2(x-3)$$

$$(x-3)(x+2)$$

$$10.) \frac{x^2 + 9x + 14}{x^2 - 49}$$

$$\frac{(x+2)(x+7)}{(x+7)(x-7)}$$

$$\boxed{\frac{x+2}{x-7}}$$

$$1 \cdot 14 = 14$$

$$\quad \quad \quad \wedge$$

$$\quad \quad \quad 2+7 = 9$$

$$x^2 + 2x + 7x + 14$$

$$x(x+2) + 7(x+2)$$

$$(x+2)(x+7)$$

### Section 11.4: Multiplying and Dividing Rational Expressions

Multiply or divide. Simplify the expression.

$$11.) \frac{16x}{2} \cdot \frac{3}{4x}$$

$$\frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot x}{2} \cdot \frac{3}{2 \cdot 2 \cdot x}$$

$$\frac{3 \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{x}}{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot \cancel{x}}$$

$$\boxed{6}$$

$$12.) \frac{3x+6}{2x} \cdot \frac{10x^2}{x^2-4}$$

$$\frac{3(x+2)}{2 \cdot x} \cdot \frac{5 \cdot 2 \cdot x \cdot x}{(x+2)(x-2)}$$

$$\frac{5 \cdot 3 \cdot \cancel{2} \cdot x \cdot \cancel{x} \cdot (x+2)}{\cancel{2} \cdot \cancel{x} \cdot (x+2)(x-2)}$$

$$\boxed{\frac{15x}{x-2}}$$

$$13.) \frac{x^2}{x-1} \div \frac{x}{x^2+x-2}$$

$$\frac{x^2}{x-1} \cdot \frac{x^2+x-2}{x}$$

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

$$\frac{x \cdot \cancel{x} \cdot (x+2) \cdot \cancel{(x-1)}}{\cancel{x} \cdot \cancel{(x-1)}}$$

$$1 \cdot -2 = -2$$

$$\quad \quad \quad \wedge$$

$$\quad \quad \quad 2 + -1 = 1$$

$$x^2 + 2x - 1x - 2$$

$$x(x+2) - 1(x+2)$$

$$(x+2)(x-1)$$

$$\boxed{x(x+2)}$$

$$14.) \frac{36}{x+5} \div \frac{12}{x^2-25}$$

$$\frac{36}{x+5} \cdot \frac{x^2-25}{12}$$

$$\frac{3 \cdot 3 \cdot 2 \cdot 2}{x+5} \cdot \frac{(x+5)(x-5)}{3 \cdot 2 \cdot 2}$$

$$\frac{3 \cdot \cancel{3} \cdot \cancel{2} \cdot \cancel{2} \cdot (x+5)(x-5)}{\cancel{3} \cdot \cancel{2} \cdot \cancel{2} \cdot (x+5)}$$

$$\boxed{3(x-5)}$$

### Section 11.5: Adding and Subtracting with Like Denominators

Add or subtract. Simplify the expression.

$$15.) \frac{9}{2x} - \frac{5}{2x}$$

$$\frac{4}{2x}$$

$$\frac{\cancel{2} \cdot 2}{\cancel{2} \cdot x}$$

$$\boxed{\frac{2}{x}}$$

$$16.) \frac{x^2-2}{x^2-25} + \frac{4x-3}{x^2-25}$$

$$\frac{x^2+4x-5}{x^2-25}$$

$$\frac{(x+5)(x-1)}{(x+5)(x-5)}$$

$$\boxed{\frac{x-1}{x-5}}$$

$$1 \cdot -5 = -5$$

$$\quad \quad \quad \wedge$$

$$\quad \quad \quad 5 + -1 = 4$$

$$x^2 + 5x - 1x - 5$$

$$x(x+5) - 1(x+5)$$

$$(x+5)(x-1)$$

$$17.) \frac{x+7}{x+5} + \frac{4x+3}{x+5}$$

$$\boxed{\frac{5x+10}{x+5}}$$

$$\frac{5(x+2)}{x+5}$$

$$18.) \frac{2x+4}{5x+4} - \frac{x+1}{5x+4}$$

$$\boxed{\frac{x+3}{5x+4}}$$

**Section 11.6: Adding and Subtracting with Unlike Denominators**

Add or subtract. Simplify the expression.

$$19.) \frac{2}{2x} - \frac{x-1}{3x^2}$$

$$\text{LCD: } 3 \cdot x \cdot x \cdot 2 = 6x^2$$

$$\frac{2}{2x} = \frac{3x}{3x} \cdot \frac{3x}{3x} = \frac{6x}{6x^2}$$

$$\frac{x-1}{3x^2} = \frac{2}{2} \cdot \frac{x-1}{3x^2} = \frac{2x-2}{6x^2}$$

$$\frac{6x}{6x^2} - \frac{2x-2}{6x^2}$$

$$\frac{4x+2}{6x^2}$$

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

$$\boxed{\frac{2x+1}{3x^2}}$$

$$21.) \frac{2x}{3} - \frac{x+1}{5}$$

$$\text{LCD: } 15$$

$$\frac{2x}{3} = \frac{5}{5} \cdot \frac{2x}{3} = \frac{10x}{15}$$

$$\frac{x+1}{5} = \frac{3}{3} \cdot \frac{x+1}{5} = \frac{3x+3}{15}$$

$$\frac{10x}{15} - \frac{3x+3}{15}$$

$$\boxed{\frac{7x-3}{15}}$$

$$\frac{(7x-3)}{5 \cdot 3}$$

$$20.) \frac{2x+3}{4} + \frac{x+1}{2}$$

$$\text{LCD: } 4$$

$$\frac{x+1}{2} = \frac{2}{2} \cdot \frac{x+1}{2} = \frac{2x+2}{4}$$

$$\frac{2x+3}{4} + \frac{2x+2}{4}$$

$$\boxed{\frac{4x+5}{4}}$$

$$\frac{(4x+5)}{2 \cdot 2}$$

$$22.) \frac{4}{x} + \frac{x-5}{x^2}$$

$$\text{LCD: } x \cdot x = x^2$$

$$\frac{4}{x} = \frac{x}{x} \cdot \frac{4}{x} = \frac{4x}{x^2}$$

$$\frac{4x}{x^2} + \frac{x-5}{x^2}$$

$$\boxed{\frac{5x-5}{x^2}}$$

$$\frac{5(x-1)}{x \cdot x}$$