are polynomials, such that  $n \neq 0$ ,  $p \neq 0$ , and  $q \neq 0$ , then

 $\frac{m}{n} \div \frac{p}{q} = \frac{m}{n} \cdot \frac{q}{p} = \frac{mq}{np}$ 

2. Cancel the common factors.

3. Multiply the remaining factors.

How to Divide Rational Algebraic Expressions: 1. Copy the dividend.

2. Change the operation to multiplication. 3. Find the reciprocal of the divisor.

4. Proceed to multiplication.

**Practice Exercises 1.4.1** 

A. Find the product of the following rational algebraic expressions.

 $10uv^2 6x^2v^2$  $\frac{1}{3xy^2} \cdot \frac{3xy^2}{5u^2v^2}$ 

2.  $\frac{a^2 - b^2}{a^2}$ .  $a^2$  $\frac{2ab}{2ab} \cdot \frac{a-b}{a-b}$ 

 $x^2 - 3x$   $x^2 - 4$  $\overline{x^2 + 3x - 10} \cdot \overline{x^2 - x - 6}$ 

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

5.  $\frac{a^2-2ab+b^2}{a^2-2ab+b^2} \cdot \frac{a-1}{a-1}$  $a^2-1$  a-b

Lesson 1.4.1: Multiplication and Division of Rational

**Algebraic Expressions** 

Multiplying Rational Algebraic Expressions: If m, n, p, and q

 $\frac{m}{n} \cdot \frac{p}{q} = \frac{mp}{nq}$ 

1. Factor the numerator and denominator completely.

**Dividing Rational Algebraic Expressions:** If m, n, p, and q

are polynomials, such that  $n \neq 0$ ,  $p \neq 0$ , and  $q \neq 0$ , then  $\frac{m}{n} \div \frac{p}{q} = \frac{m}{n} \cdot \frac{q}{p} = \frac{mq}{np}$ 

A. Find the product of the following rational algebraic

are polynomials, such that  $n \neq 0$  and  $q \neq 0$ , then

How to Multiply Rational Algebraic Expressions:

How to Divide Rational Algebraic Expressions:

2. Change the operation to multiplication.

3. Find the reciprocal of the divisor. 4. Proceed to multiplication.

2. Cancel the common factors.

3. Multiply the remaining factors.

1. Copy the dividend.

Practice Exercises 1.4.1

 $\frac{10uv^2}{3xy^2} \cdot \frac{6x^2y^2}{5u^2v^2}$ 

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

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

5.  $\frac{a^2-2ab+b^2}{a^2-2ab+b^2} \cdot \frac{a-1}{a^2-2ab+b^2}$ 

 $a^2 - 1$ 

a-b

Lesson 1.4.1: Multiplication and Division of Rational

**Algebraic Expressions** 

Multiplying Rational Algebraic Expressions: If m, n, p, and q

 $\frac{m}{n} \cdot \frac{p}{q} = \frac{mp}{nq}$ 

1. Factor the numerator and denominator completely.

**Dividing Rational Algebraic Expressions:** If m, n, p, and q

are polynomials, such that  $n \neq 0$  and  $q \neq 0$ , then

How to Multiply Rational Algebraic Expressions:

 $2. \ \frac{a^2 - b^2}{2ab} \cdot \frac{a^2}{a - b^2}$ 

expressions.

B. Find the quotient of the following rational algebraic expressions.

 $\frac{81xz^{3}}{36y} \div \frac{27x^{2}z^{2}}{12xy} \\
\frac{2a+2b}{a^{2}+ab} \div \frac{4}{a} \\
\frac{16x^{2}-9}{4} \div \frac{1}{3} \div \frac{1}{3}$ 

 $\frac{16x^{2}-9}{6-5x-4x^{2}} \div \frac{16x^{2}+24x+9}{4x^{2}+11x+6}$   $\frac{x^{2}+2x+1}{x^{2}+4x+3} \div \frac{x^{2}-1}{x^{2}+2x+1}$   $\frac{x-1}{x+1} \div \frac{1-x}{x^{2}+2x+1}$ 

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

## Activity 1.4.1

A. Find the product of the following rational algebraic expressions.

1.  $\frac{12mn^2}{6xy^2} \cdot \frac{9x^2y^2}{4m^2n^2}$ 

 $2. \ \frac{x^2 - y^2}{2xy} \cdot \frac{y^2}{x + y}$ 

3.  $\frac{x^2 - 2x}{x^2 - 3x - 10} \cdot \frac{x^2 - 4x - 5}{x^2 - 4}$ 

 $\frac{x^2+4x+4}{x^2+3x+2} \cdot \frac{x^2-1}{x^2-4}$ 

5.  $\frac{a^2 + 2ab + b^2}{a^2 - b^2} \cdot \frac{a - b}{a + b}$ 

B. Find the quotient of the following rational algebraic expressions.

1.  $\frac{14x^{2}}{20y^{2}} \div \frac{56x^{2}}{y}$ 2.  $\frac{4a - 4b}{30a^{2}} \div \frac{a - b}{9a}$ 

 $\frac{a^2}{a^2} \div \frac{9a}{9a}$  $\frac{x^{2}+4x+4}{x^{2}+4x+4} \div \frac{x^{2}-x-2}{x^{2}+3x+2}$ 

4.  $\frac{x^2 + 4x + 4}{x^2 - 2x - 3} \div \frac{x^2 - 4}{x^2 + 2x}$ 5.  $\frac{x^2 - 4}{x^2 + 2x} \div \frac{x^2 + x - 6}{2x + 4}$ 

B. Find the quotient of the following rational algebraic expressions.

1.  $\frac{81xz^3}{36y} \div \frac{27x^2z^2}{12xy}$ 2.  $\frac{2\alpha + 2b}{\alpha^2 + ab} \div \frac{4}{\alpha}$ 

 $\frac{16x^{2}-9}{6-5x-4x^{2}} \div \frac{16x^{2}+24x+9}{4x^{2}+11x+6}$   $\frac{x^{2}+2x+1}{x^{2}+4x+3} \div \frac{x^{2}-1}{x^{2}+2x+1}$   $\frac{x-1}{x+1} \div \frac{1-x}{2}$ 

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

## Activity 1.4.1

A. Find the product of the following rational algebraic expressions.

1.  $\frac{12mn^2}{2}$   $9x^2y^2$  $\frac{6xy^2}{6xy^2} \cdot \frac{9x^2y^2}{4m^2n^2}$ 

 $2. \ \frac{x^2 - y^2}{2xy} \cdot \frac{y^2}{x + y}$ 

 $\frac{x^2 - 2x}{x^2 - 3x - 10} \cdot \frac{x^2 - 4x - 5}{x^2 - 4}$ 

 $x^2 + 4x + 4$   $x^2 - 1$  $\overline{x^2+3x+2} \cdot \overline{x^2-4}$ 

5.  $\frac{a^2+2ab+b^2}{a^2-b^2}\cdot\frac{a-b}{a+b}$  B. Find the quotient of the following rational algebraic expressions.

1.  $\frac{14x^2}{20y^2} \div \frac{56x^2}{y}$ 

 $\frac{4a-4b}{30-2}$   $\div \frac{a-b}{9a}$ 

2.  $\frac{30a^2}{30a^2} \div \frac{9a}{9a}$ 3.  $\frac{x^2-4}{x^2+4x+4} \div \frac{x^2-x-2}{x^2+3x+2}$ 

 $\overline{x^2+2x}$