

Skills that will be used in Chapter 9:

Simplify without a calculator. Leave your answer as an improper fraction in reduce form.

$$\frac{24}{18} \cdot \frac{27}{16}$$

cross cancel leads to

$$\frac{\overset{3}{\cancel{24}}}{\underset{2}{\cancel{18}}} \cdot \frac{\overset{3}{\cancel{27}}}{\underset{2}{\cancel{16}}} = \boxed{\frac{9}{4}}$$

Simplify without a calculator. Leave your answer as an improper fraction in reduce form.

$$\frac{30}{25} \div \frac{42}{45}$$

$$= \frac{6}{5} \div \frac{14}{15} = \frac{\overset{3}{\cancel{6}}}{5} \cdot \frac{\overset{3}{\cancel{15}}}{\underset{7}{\cancel{14}}} = \boxed{\frac{9}{7}}$$

Simplify without a calculator. Leave your answer as an improper fraction in reduce form.

$$\frac{\frac{15}{24}}{\frac{50}{21}}$$

$$\frac{15}{24} \div \frac{50}{21} = \frac{15}{24} \cdot \frac{21}{50}$$

$$\frac{\overset{3}{\cancel{15}}}{\underset{8}{\cancel{24}}} \cdot \frac{\underset{10}{\cancel{21}}}{50} = \frac{21}{80}$$

(/)

Simplify without a calculator. Leave your answer as an improper fraction in reduce form.

$$\frac{33}{9} \div \frac{9}{22}$$

$$33 \div \frac{9}{22} = \frac{\overset{11}{\cancel{33}}}{1} \cdot \frac{22}{\underset{3}{\cancel{9}}}$$

$$= \boxed{\frac{242}{3}}$$

Simplify without a calculator. Leave your answer as an improper fraction in reduce form.

$$\frac{\frac{27}{4}}{24} = \frac{27}{4} \div 24 = \frac{27}{4} \cdot \frac{1}{24} = \frac{9}{32}$$

### Rational Expressions:

The ratio of two polynomials.

A rational expression is in its simplest form when:

The denominator and numerator have no common factors.

This is NOT a Rational Function, why?

$$\frac{\sqrt{x^2 - 5x + 3}}{2x - 9}$$

Since the numerator has a variable under the radical the numerator is NOT a Polynomial.

### Sec 9-4 Simplifying Rational Expressions

- Factor all numerators and denominators
- Cancel factors common to the numerator and denominator
- Restrictions are any values that make the denominator zero at any point (beginning or end)

Simplify. State restrictions on the variable.

$$1. \quad \frac{9x^2y^8}{12x^5y^3} = \frac{3y^5}{4x^3}$$

$x \neq 0,$   
 $y \neq 0$

Simplify. State restrictions on the variable.

$$2. \quad \frac{x^2 - 25}{x^2 - x - 20} = \frac{(x+5)(\cancel{x-5})}{(\cancel{x-5})(x+4)}$$

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

$x \neq 5, -4$

3. Simplify. State restrictions on the variable.

$$\frac{2x^4 - 18x^2}{8x^3 + 20x^2 - 48x} = \frac{2x^2(x^2 - 9)}{4x(2x^2 + 5x - 12)}$$

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

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

$x \neq 0, -4, \frac{3}{2}$

#### Sec 9-4 Simplifying the Product or Quotient of Rational Expressions

- Factor all numerators and denominators.
- If multiplying rational expressions you can simplify within the same fraction and/or cross cancel and finally multiply and write as a single fraction.
- Instead of dividing, multiply by the reciprocal then simplify. Write answer as a single fraction.
- State restrictions on the variable.