

Chapter 6 Review

6.1 Rational Expressions, pages 229-240

1. Simplify the following rational expressions. State any non-permissible values of the variable(s).

$$a) \frac{x^2 - 10x + 25}{x^2 - 11x + 30} = \frac{(x-5)(\cancel{x-5})}{(x-6)(\cancel{x-5})}$$

$$= \boxed{\frac{x-5}{x-6}}$$

$$x \neq 5, 6$$

$$b) \frac{3x^2 + 15x + 12}{3x^2 + 12x} = \frac{\cancel{3}(x^2 + 5x + 4)}{\cancel{3}x(x+4)}$$

$$= \frac{(x+1)(\cancel{x+4})}{x(\cancel{x+4})} = \boxed{\frac{x+1}{x}}$$

$$x \neq 0, -4$$

2. Can the expression $\frac{-x+7}{(x-7)(x+7)}$ be simplified further? Explain.

$$\text{Yes: } -x+7 = -1(x-7), \text{ so } \frac{-x+7}{(x-7)(x+7)} = \frac{-(x-7)}{(x-7)(x+7)} = \boxed{\frac{-1}{x+7}}$$

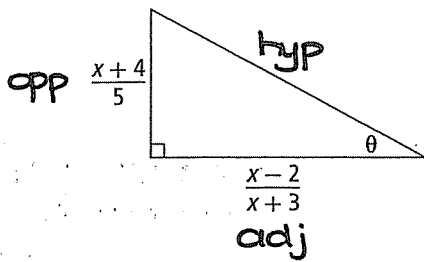
6.2 Multiplying and Dividing Rational Expressions, pages 241-251

3. Determine the product. Express your answer in simplest form. State the non-permissible values.

$$\frac{10x^2 - 5x}{x^2 - x - 42} \times \frac{x^2 - 11x + 28}{60x - 15x^2} = \frac{\cancel{5}x(2x-1)}{(x-7)(x+6)} \times \frac{(x-7)(x-4)}{\cancel{15}x(-4+x)}$$

$$= \boxed{\frac{2x-1}{-3(x+6)}} \quad x \neq 7, -6, 0, 4$$

4. Write an expression for $\tan \theta$ based on the information in the diagram below. Simplify the expression and state any non-permissible values.



$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{x+4}{5} \div \frac{x-2}{x+3}$$

$$= \frac{x+4}{5} \times \frac{x+3}{x-2}$$

$$= \boxed{\frac{x^2 + 7x + 12}{5x - 10}}, x \neq -3, 2$$

6.3 Adding and Subtracting Rational Expressions, pages 252–262

5. Determine the least common denominator (LCD) for the following set of rational expressions. Leave your answer in factored form.

$$\frac{x+7}{4x}, \frac{8x}{x^2-36}, \frac{1}{x^2+6x}$$

$$4x, (x+6)(x-6), x(x+6)$$

$$\text{LCD} \Rightarrow \boxed{4x(x+6)(x-6)}$$

6. Determine each difference. Express each answer in simplest form. State the non-permissible values of the variable.

$$\begin{aligned} \text{a) } \frac{2x^2 - 7x}{x^2 - 100} - \frac{x^2 - 2x + 10}{x^2 - 100} &= \frac{2x^2 - 7x - x^2 + 2x - 10}{(x+10)(x-10)} \\ &= \frac{x^2 - 5x - 10}{(x+10)(x-10)}, \quad x \neq \pm 10 \end{aligned}$$

10 1
5 2

$$\begin{aligned} \text{b) } \frac{2x-3}{x^2+5x} - \frac{x+9}{x^2+4x-5} &= \frac{(2x-3)}{x(x+5)} - \frac{(x+9)}{(x+5)(x-1)} \\ &= \frac{(2x-3)(x-1) - (x+9)(x)}{x(x+5)(x-1)} \\ &= \frac{(2x^2 - 2x - 3x + 3) - (x^2 + 9x)}{x(x+5)(x-1)} \\ &= \frac{x^2 - 14x + 3}{x(x+5)(x-1)}, \quad x \neq 0, -5, 1 \end{aligned}$$

6.4 Rational Equations, pages 263–273

7. Emily can shovel the driveway in 25 min. It takes her younger brother Steve 40 min. If they work together to shovel the driveway, how quickly will they finish?

	Time to Shovel (min)	Fraction of Work Done in 1 min	Fraction of Work Done in t min
Emily	25	$\frac{1}{25}$	$\frac{t}{25}$
Steve	40	$\frac{1}{40}$	$\frac{t}{40}$
Together	t	$\frac{1}{t}$	$\frac{t}{t} = 1$

$$\frac{t}{25} + \frac{t}{40} = 1$$

$$40t + 25t = 1000$$

$$65t = 1000$$

$$t = 15.3846$$

$$t = 15.4 \text{ mins}$$

Chapter 6 Skills Organizer

Make note of some of the key details and things to remember about the processes you have learned in this unit. Use your class notes, textbook, or questions from this workbook to help you choose examples (or create your own). Some information is provided below to help you get started.

Process	Example	Things to Remember
Simplifying rational expressions		<ul style="list-style-type: none"> - cancel entire factors only - binomial factors in brackets - watch for opposites $(a - b) = -1(b - a)$
Determining non-permissible values		
Multiplying rational expressions		
Dividing rational expressions		
Finding a common denominator for rational expressions		
Adding rational expressions		
Subtracting rational expressions		
Solving rational equations		
Solving word problems with rational equations		