

MAT3792

Unit Assignment

FOR ADLC USE ONLY	
Assigned to	_____
Marked by	_____
Date received	_____

	Marks Earned	Total Marks	Percent
Unit 4 Assignment		54	

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MAT3792

Mathematics 30-2

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Assignment Booklet Package

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Unit 4: Rational Expressions and Equations

Unit Assignment

Read the course material and complete the practice questions in the Unit 4 Rational Expressions and Equations Guide for Learning Booklet before working on this Unit Assignment. The following chart shows you which lesson to review if you're having difficulty with the questions in this assignment booklet.

Unit Assignment Questions	Lesson
1, 2, 3, 4	4A
5, 6, 7	4B
8	4C
9, 10, 11, 12, 13	4D
14	*Logic and Reasoning

*Contact your teacher if you need help with Logic and Reasoning.

For full marks, show all calculations, steps, and/or explain your answers.

Total Marks: 54

- Two students were asked to determine the non-permissible value(s) for the rational expression.

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

Student A says that the non-permissible value is 0 and Student B says that the non-permissible values are 0 and $\frac{5}{2}$.

Which student is correct? Explain your answer. (2 marks)

2. Match the rational expression in the left column with the non-permissible value(s) in the middle column. Record your answer in the right column. (4 marks – 0.5 marks each)

<u>Rational Expression</u>	<u>Non-Permissible Value(s)</u>	<u>Matching</u>
a. $\frac{4x^2}{8x}$	i. $x \neq 2, -2$	a. _____
b. $\frac{x-2}{x+1}$	ii. $x \neq -1, 0$	b. _____.
c. $\frac{x+1}{1-x}$	iii. $x \neq -1$	c. _____
d. $\frac{3x+2}{2x-4}$	iv. $x \neq 0, 2$	d. _____
e. $\frac{2x-3}{x^2-4}$	v. $x \neq 2$	e. _____
f. $\frac{2x-1}{2x^2-4x}$	vi. $x \neq -1, 0, 3$	f. _____
g. $\frac{x-1}{x+1} \cdot \frac{x+3}{2x}$	vii. $x \neq 0$	g. _____
h. $\frac{x+3}{x+1} \div \frac{x-3}{2x}$	viii. $x \neq 1$	h. _____

3. Simplify. State the non-permissible value(s).

a. $\frac{12a^3b^2c^4}{16a^5b}$ (2 marks)

b. $\frac{2x+12}{(x+6)(2x+1)}$ (2 marks)

c. $\frac{2m+6}{2m^2-18}$ (2 marks)

d. $\frac{14-2n}{n^2-7n}$ (2 marks)

4. A student made an error while trying to simplify the following rational expression, as shown below.

$$\frac{30x^2 + 5x}{15x^2}$$

$$\frac{\cancel{30}x^{\cancel{2}} + 5x}{\cancel{15}x^{\cancel{2}}}, x \neq 0$$

$$2 + 5x, x \neq 0$$

- a. Identify and explain the student's error. (1 mark)

- b. Correctly complete the simplification. (1 mark)

5. Consider the following table:

Possibilities for a	Possibilities for b	Possibilities for c	Possibilities for d
$x^2 - 4$	$x^2 - 4$	$2x + 4$	$2x + 4$
$2x^2 - 8$	$2x^2 - 8$	$2x - 4$	$2x - 4$
$x^2 - 25$	$x^2 - 25$	$2x + 10$	$2x + 10$
$2x^2 - 50$	$2x^2 - 50$	$2x - 10$	$2x - 10$

Select one expression from each column in the chart so that $\frac{a}{b} \cdot \frac{c}{d}$ can be simplified to $\frac{x+2}{x-5}$.

Show work to demonstrate the simplification. (2 marks)

6. Find the product of each of the following. State the non-permissible value(s).

a. $\frac{7x^2y^5}{x^3} \cdot \frac{2xy^2}{21y}$ (2 marks)

b. $\frac{x-4}{5x^2-80} \cdot \frac{10x}{x+1}$ (2 marks)

7. Find the quotient of each of the following. State the non-permissible value(s).

a. $\frac{2x}{6x+6} \div \frac{x+4}{3+3x}$ (2 marks)

b. $\frac{9-x^2}{8x} \div \frac{x-3}{8x}$ (2 marks)

8. Simplify. State the non-permissible value(s).

a. $\frac{4}{5a^2} + \frac{2}{6a}$ (2 marks)

b. $\frac{3x-3}{x^2-1} - \frac{5}{x+1}$ (2 marks)

9. Algebraically solve and verify each rational equation. State the non-permissible value(s).
(6 marks)

Equation	Solve (2 marks each)	Verify (1 mark each)
a. $\frac{3}{x-1} = \frac{5}{2x-1}$		
b. $\frac{x-1}{x+3} = \frac{5x+20}{x^2-16}$		

10. Consider each scenario:

- a. A high-speed passenger train in Europe completes an 800 km trip in 3 hours. The train travels the first 600 km at an average speed that was 100 km/h faster than the last 200 km of the trip. If x represents the average speed of the train on the second part of the trip, then an equation to represent this situation is:

$$\frac{600}{x+100} + \frac{200}{x} = 3$$

Identify all restrictions on the variable x in this context. (2 marks)

- b. Kailey is making earrings to sell at a local market. She spends \$80 on supplies and decides to keep 4 pairs of earrings to give to her friends. Kailey sells the rest of the earrings she made for \$175, making a profit of \$9 per pair of earrings.

If n represents the number of pairs of earrings Kailey made, then an equation that represents this information is:

$$9 = \frac{175}{n-4} - \frac{80}{n}$$

Identify all restrictions on the variable n in this context. (2 marks)

11. Alex and Jamie work for a landscape company during the spring and summer. When Alex works alone, it takes him 5 hours to complete a spring clean-up in a yard. When Alex and Jamie work together, it takes them 3 hours to complete a yard.
- Define a variable to represent the time it takes Jamie to complete a yard alone. (1 mark)
 - Write an equation to represent the time it takes Alex and Jamie to complete a yard together. (1 mark)
 - Solve the equation to determine the time it takes Jamie to complete a yard alone. (2 marks)
12. At the end of Art class, the students must clean up their work stations. When working together, Nicki and James can clean their work station in 12 minutes. When they clean the work station independently, it takes James 10 minutes longer than Nicki. Write and solve an equation to determine the length of time that it takes each of them to the work station on their own. (4 marks)

13. Amber has entered a cross country running series. Each race in the series has a time limit by which runners must complete the course in order to qualify for the next race.

The first race is 9 km long and must be completed in 50 minutes.

After Amber runs the first 5 km, her coach informs her she must increase her speed by 2 km/h for the last 4 km in order to finish the race in 50 minutes.

- a. Complete the following chart. (3 marks)

	Distance (km)	Speed (km/h)	Time (h)
First 5 km Section			
Last 4 km Section			

- b. Write and solve a rational equation to determine the speed at which Amber needs to run the last 4 km of the race. Convert time in minutes to time in hours. (2 marks)

14. Patterns and Games: Continue the Pattern

The following Diagrams form a pattern.

Original Diagram



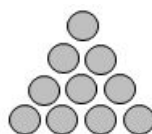
Diagram 1



Diagram 2



Diagram 3



Calculate the total number of **new** circles created in Diagram 5. (1 mark)

End of Assignment

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