

**Unit 4: Rational Expressions and Equations Assignment****Total: _____/38 marks**

Multiple Choice*Identify the choice that best completes the statement or answers the question.*

1. Identify the rational expression that is equivalent to $\frac{2-x}{3x}$

A. $\frac{4-2x}{3x}$

B. $\frac{4-2x}{6x}$

C. $\frac{2-2x}{6x}$

D. $6x-3x^2$

2. Identify the rational expression that is equivalent to $\frac{4x}{x+5}$

A. $\frac{x}{x+5}$

B. $\frac{4x^2}{x+5x^2}$

C. $\frac{2x}{0.5x+2.5}$

D. $\frac{4x(x+5)}{x+5}$

3. Identify the rational expression that is equivalent to $\frac{9-3x}{12x^2+x}$

A. $\frac{3-x}{6x^2+2x}$

B. $\frac{3x-x^2}{4x^3+0.3x^2}$

C. $\frac{9x-3x^2}{12x^3+x}$

D. $\frac{6(3-x)}{2x(12x+1)}$

4. Determine the non-permissible value(s) for $\frac{2-x}{3x}$.

A. $x \neq 2$

B. $x > 0, x \neq 2$

C. $x \neq 0$

D. $x \geq 0$

5. Determine the non-permissible value(s) for $\frac{2x+8x^2}{4x-2}$.

A. $x \neq 0$

B. $x \neq \frac{1}{2}$

C. $x \neq -\frac{1}{2}$

D. $x \neq \pm \frac{1}{2}$

6. Which rational expression is simplified?

i) $\frac{2x}{6x+4x^3}$

ii) $\frac{10x}{7x^2+1}$

iii) $\frac{5+15x^2}{10x}$

A. i) and ii)

B. ii)

C. i) and iii)

D. i)

7. Simplify $\frac{-21k}{14k^3}$.

A. $\frac{-3}{2k^2}, k \neq 0$

B. $\frac{-3k}{2k^2}, k \neq 0$

C. $\frac{-7}{k^2}, k \neq 0$

D. $\frac{-21}{14k^2}, k \neq 0$

8. Simplify $\frac{16h^2 - 40h}{24h^3}$.

A. $\frac{h-5}{3h^2}, h \neq 0$

B. $\frac{2h-5}{3h^2}, h \neq 0$

C. $\frac{2h-10}{6h^2}, h \neq 0$

D. $\frac{2h-5}{3h}, h \neq 0$

9. Simplify $\frac{6a+54a^2}{18-24a}$.

A. $\frac{1+9a}{3-4a}, a \neq \frac{3}{4}$

B. $\frac{2a+27a^2}{9-12a}, a \neq \frac{3}{4}$

C. $\frac{3a+18a^2}{6-8a}, a \neq \frac{3}{4}$

D. $\frac{a+9a^2}{3-4a}, a \neq \frac{3}{4}$

10. Simplify $\frac{3n-1}{n+5} \cdot \frac{2n}{6n-2}$.

A. $\frac{n}{(n+5)(3n-1)}, n \neq -5, \frac{1}{3}$

B. $\frac{2n}{3n-1}, n \neq -5, \frac{1}{3}$

C. $\frac{2n}{n+5}, n \neq -5, \frac{1}{3}$

D. $\frac{n}{n+5}, n \neq -5, \frac{1}{3}$

11. Simplify $\frac{6d+3}{3d} \div \frac{2d+1}{4}$.

A. $\frac{1}{2d}, d \neq 0, \frac{-1}{2}$

B. $\frac{4}{3d}, d \neq 0, \frac{-1}{2}$

C. $\frac{3}{d+1}, d \neq 0, \frac{-1}{2}$

D. $\frac{4}{d}, d \neq 0, \frac{-1}{2}$

12. Determine the lowest common denominator for the pair $\frac{a}{3a+2}$ and $\frac{80}{3a^2}$.

A. $9a^3 + 6a^2$

B. $3a^3 + 2a^2$

C. $6a^3$

D. $3a^2$

13. Simplify $\frac{2m}{12m^2} + \frac{m}{2}$.

A. $\frac{1+3m^2}{6m}, m \neq 0$

B. $\frac{m}{12m^2}, m \neq 0$

C. $\frac{1+6m^2}{12m}, m \neq 0$

D. $\frac{4m^2}{24m^2}, m \neq 0$

14. Simplify $\frac{1}{p^2-4} + p$.

A. $\frac{p}{p^2-4}, p \neq \pm 2$

B. $\frac{p^2+p-4}{p^2-4}, p \neq \pm 2$

C. $\frac{1+p}{p^2-4}, p \neq \pm 2$

D. $\frac{1+p^3-4p}{p^2-4}, p \neq \pm 2$

15. Simplify $\frac{y}{y+5} - \frac{y-5}{y^2-25}$.

A. $\frac{y-1}{y+5}, y \neq \pm 5$

B. $\frac{y+1}{y+5}, y \neq \pm 5$

C. $\frac{y-1}{y^2-5}, y \neq \pm 5$

D. $\frac{y+1}{y^2+5}, y \neq \pm 5$

16. Solve the following equation for x.

$$\frac{2}{x} + \frac{1}{x+1} = \frac{7}{2x+2}$$

A. $x = 2$

B. $x = 3$

C. $x = 4$

D. $x = 5$

17. Solve the following equation for x.

$$\frac{3x}{x+1} = 2$$

A. $x = 2$

B. $x = 3$

C. $x = 4$

D. $x = 5$

Written Response

To obtain full marks, you must show all of your work algebraically.

1. Simplify the following rational expressions. State the non-permissible values. **(2 marks each)**

a. $\frac{21c^2(c-5)}{7c(1+2c)} \cdot \frac{9(2c+1)}{3c}$

b. $\frac{6(5-3d)}{2d+6} \div \frac{12d(3d-5)}{d+3}$

Non-permissible Values:

Non-permissible Values:

c. $\frac{4-d}{2d-8} + \frac{3}{2d^2}$

Non-permissible Values:

d. $\frac{2a}{3-a} - \frac{1}{5(a+2)}$

Non-permissible Values:

2. In question 1 of the written response you added, subtracted, multiplied and divided rational expressions. How is this similar to performing the same operations of rational numbers? **(2 marks)**

3. Use the following rational equation to answer the next two questions.

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

a. Why are 1 and -1 non-permissible values of the equation? **(1 mark)**

b. Solve the equation. **(2 marks)**

4. Write a rational expression with a variable of x and with restriction $x \neq \frac{2}{3}$. **(1 mark)**

5. Brian tried to determine the non-permissible values for an expression, as shown below.

$\frac{2t - 6t^3}{8t - 14t^2}$	To determine the non-permissible values, I looked for the values that make the denominator equal to zero.
Denominator: $8t - 14t^2 = 0$ $2t(4 - 7t) = 0$	I set the denominator equal to 0 and factored the expression on the left.
$2t = 0$ or $4 - 7t = 0$ $t = 0$ $4 = -7t$ $t = -\frac{4}{7}$	I set both factors equal to zero. I solved each equation separately.
$\frac{2t - 6t^3}{8t - 14t^2}, t \neq 0, t \neq -\frac{4}{7}$	$t = 0$ and $t = -\frac{4}{7}$ are non-permissible values of the variable in the rational expression.

Identify Brian's error, and correct his solution. (2 marks)

6. When they work together, Samir and Lorraine can deliver flyers to all the homes in their neighbourhood in 24 min. When Lorraine works alone, she needs 14 min longer to deliver the flyers than Samir when he works alone.

Let y represent the time that Samir takes to deliver the flyers on his own. Write a rational equation to solve for y . (You do not need to solve it) (1 mark)

7. Two rectangles have the same width. The smaller rectangle has an area of 20cm^2 and a length l centimeters. The larger rectangle has an area of 30cm^2 and a length $(l + 5)$ centimeters.

a. Explain why the equation $\frac{30}{l+5} = \frac{20}{l}$ can be used to represent the information. **(1 mark)**

b. Solve the equation $\frac{30}{l+5} = \frac{20}{l}$ to find the length of each rectangle. **(2 marks)**

c. What is the width of each rectangle? **(1 mark)**
