

Math 30-2 Rational Expression Lesson 4 Practice Questions [Solutions at the end]

1. Which of the following expressions is equivalent to $\frac{1}{x+4} - \frac{3}{x}$,

where $x \neq -4, 0$?

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

B) $\frac{-2(x+6)}{x(x+4)}$

C) $\frac{-4x+4}{x(x+4)}$

D) $\frac{-4x+12}{x(x+4)}$

2. When $\frac{3x}{2x+10} + \frac{x-7}{8x+40}$, $x \neq -5$, is simplified, the numerator is $13x - 7$ and the denominator is

A) $16(x+5)$

B) $16(x+5)^2$

C) $8(x+5)$

D) $8(x+5)^2$

Use the following information to answer the next question.

The simplified sum of $\frac{x-1}{2x} + \frac{2}{3}$, $x \neq 0$ can be written in the form

$$\frac{Ax - B}{Cx}$$

where A, B, and C represent single-digit numbers.

3. The values of A, B, and C are, respectively, ____, ____, and ____.

4. The simplified result of $\frac{2}{x-6} - \frac{5}{x+K}$ is $\frac{-3x+32}{(x-6)(x+K)}$. The value of K is ____.

Use the following information to answer the next question.

Analyze the student's work as he was asked to simplify $\frac{2x}{9x^2 - 1} + \frac{5x}{3x^2 + x}$

| | |
|--------|--|
| Step 1 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5x}{x(3x+1)}$ |
| Step 2 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5}{(3x+1)}$ |
| Step 3 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5(3x-1)}{(3x+1)(3x-1)}$ |
| Step 4 | $\frac{17x-1}{(3x+1)(3x-1)}, x \neq \pm \frac{1}{3}$ |

5. Identify and correct any error(s).

6. The least common denominator of $\frac{y+3}{8y^2+6y} + \frac{7y}{20y^2+15y}$ is

- A) $10y^2(4y+3)$ B) $5y(4y+3)^2$ C) $10y(4y+3)$ D) $5y^2(4y+3)^2$

7. Simplify $\frac{4c+3}{c(c-6)} + \frac{3c+9}{c(6-c)}$. State restrictions on the variable.

Use the following information to answer the next question.

Consider the following:

$$\frac{x^2 - 7x}{x^2 - 1} + \frac{x^2 - x}{x + 1} = \frac{x(x - W)(x + M)}{(x + K)(x - K)}$$

8. The values of W and M are, respectively,

A) 3 and 2

B) 2 and 3

C) 1 and 6

D) 6 and 1

9. Yvonne invested \$3000 in shares of a stock on Tuesday and another \$3000 in shares of the same stock on Wednesday. On Wednesday, the price of the stock was \$0.15 lower than on Tuesday. Write a rational expression for the difference in the number of shares that Yvonne purchased on Tuesday and Wednesday.

10. The expression $\frac{AD + CB}{BD}$ is equivalent to

A) $\frac{A}{B} + \frac{C}{D}$, $D \neq 0$

B) $\frac{C}{B} + \frac{A}{D}$, $B, D \neq 0$

C) $\frac{C}{B} + \frac{A}{D}$, $D \neq 0$

D) $\frac{A}{B} + \frac{C}{D}$, $B, D \neq 0$

Math 30-2 Rational Expression Lesson 4 Practice Questions **Solutions**

1. Which of the following expressions is equivalent to $\frac{1}{x+4} - \frac{3}{x}$,

where $x \neq -4, 0$?

- A) $\frac{-2x+4}{x(x+4)}$ B) $\frac{-2(x+6)}{x(x+4)}$ C) $\frac{-4x+4}{x(x+4)}$ D) $\frac{-4x+12}{x(x+4)}$

Solution

When adding or subtracting rational expressions, a common denominator is required. The LCD consists of all unique factors; in this case the LCD is $x(x+4)$.

Re-write as equivalent expressions.

$$\begin{aligned} & \left(\frac{1}{(x+4)} \right) \left(\frac{x}{x} \right) - \left(\frac{3}{x} \right) \left(\frac{(x+4)}{(x+4)} \right) \\ = & \left(\frac{x}{x(x+4)} \right) - \left(\frac{3(x+4)}{x(x+4)} \right) \\ = & \frac{x-3x-12}{x(x+4)} \\ = & \frac{-2x-12}{x(x+4)} \\ = & \frac{-2(x+6)}{x(x+4)} \end{aligned}$$

The correct answer is B.

2. When $\frac{3x}{2x+10} + \frac{x-7}{8x+40}$, $x \neq -5$, is simplified, the numerator is $13x - 7$ and the denominator is
- A) $16(x+5)$ B) $16(x+5)^2$ C) $8(x+5)$ D) $8(x+5)^2$

Solution

Factor the denominators.

$$\frac{3x}{2(x+5)} + \frac{x-7}{8(x+5)}$$

The least common denominator is $8(x+5)$. Since the second term already has the LCD as its denominator, re-write the first term as an equivalent expression with this denominator.

$$\begin{aligned} & \frac{(4)(3x)}{(4)(2)(x+5)} + \frac{x-7}{8(x+5)} \\ = & \frac{12x+x-7}{8(x+5)} \\ = & \frac{13x-7}{8(x+5)} \end{aligned}$$

Use the following information to answer the next question.

The simplified sum of $\frac{x-1}{2x} + \frac{2}{3}$, $x \neq 0$ can be written in the form

$$\frac{Ax - B}{Cx}$$

where A , B , and C represent single-digit numbers.

3. The values of A , B , and C are, respectively, 7, 3, and 6.

Solution

The common denominator is $(2x)(3)$. Re-write each term with a common denominator of $6x$.

$$\begin{aligned} & \frac{(x-1)(3)}{(2x)(3)} + \frac{(2)(2x)}{(3)(2x)} \\ = & \frac{3x-3+4x}{6x}, \text{ which is equal to } \frac{7x-3}{6x} \end{aligned}$$

The value of A is 7, the value of B is 3 and the value of C is 6.

4. The simplified result of $\frac{2}{x-6} - \frac{5}{x+K}$ is $\frac{-3x+32}{(x-6)(x+K)}$. The value of K is 1.

Solution

The LCD is $(x-6)(x+K)$. Express each term with the same denominator.

$$\begin{aligned} & \frac{2(x+K)}{(x-6)(x+K)} - \frac{5(x-6)}{(x+K)(x-6)} \\ = & \frac{2x+2K-5x+30}{(x+K)(x-6)} \\ = & \frac{2K-3x+30}{(x+K)(x-6)} \end{aligned}$$

Set the numerator equal to the numerator of the simplified result.

$$2K - 3x + 30 = -3x + 32$$

$$2K + 30 = 32$$

$$2K = 2$$

$$K = 1.$$

Use the following information to answer the next question.

| | |
|--|--|
| Analyze the student's work as he was asked to simplify $\frac{2x}{9x^2 - 1} + \frac{5x}{3x^2 + x}$ | |
| Step 1 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5x}{x(3x+1)}$ |
| Step 2 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5}{(3x+1)}$ |
| Step 3 | $\frac{2x}{(3x+1)(3x-1)} + \frac{5(3x-1)}{(3x+1)(3x-1)}$ |
| Step 4 | $\frac{17x-1}{(3x+1)(3x-1)}, x \neq \pm \frac{1}{3}$ |

5. Identify and correct any error(s).

Solution

In step 4 the numerator should be $17x - 5$. When multiplying the binomial $(3x - 1)$ by 5, the student forgot to multiply (5) by (-1).

In step 4, the non-permissible values are listed as $\pm \frac{1}{3}$. There should also be a non-permissible value of 0 because of 'x' in the denominator from step 1. The student incorrectly stated the NPV's at the final simplification step, rather than before simplification begins.

6. The least common denominator of $\frac{y+3}{8y^2+6y} + \frac{7y}{20y^2+15y}$ is

- A) $10y^2(4y + 3)$ B) $5y(4y + 3)^2$ C) $10y(4y + 3)$ D) $5y^2(4y + 3)^2$

Solution

Factor.

$$\frac{y+3}{2y(4y+3)} + \frac{7y}{5y(4y+3)}$$

The LCD includes the product of all common and unique factors.

The LCD is $10y(4y + 3)$.

7. Simplify $\frac{4c+3}{c(c-6)} + \frac{3c+9}{c(6-c)}$. State restrictions on the variable

Solution

Since the binomials in the denominator, $(c - 6)$ and $(6 - c)$, are similar, the strategy of factoring a (-1) from one of the binomials is the first step.

$$\frac{4c+3}{c(c-6)} + \frac{3c+9}{-c(c-6)}$$

Re-write the expression as

$$\frac{4c+3}{c(c-6)} - \frac{(3c+9)}{c(c-6)}$$

The restrictions are $c \neq 0, 6$.

$$= \frac{4c+3-3c-9}{c(c-6)}$$

$$= \frac{(c-6)}{c(c-6)}$$

The final simplification is $\frac{1}{c}$, $c \neq 0, 6$.

Use the following information to answer the next question.

Consider the following:

$$\frac{x^2 - 7x}{x^2 - 1} + \frac{x^2 - x}{x + 1} = \frac{x(x - W)(x + M)}{(x + K)(x - K)}$$

8. The values of W and M are, respectively,

A) 3 and 2

B) 2 and 3

C) 1 and 6

D) 6 and 1

Solution

Factor the denominators and determine the LCD.

$$\frac{x^2 - 7x}{(x + 1)(x - 1)} + \frac{x^2 - x}{x + 1}. \text{ The LCD is } (x + 1)(x - 1).$$

Re-write the second term as an equivalent expression with the common denominator.

$$\frac{x^2 - 7x}{(x + 1)(x - 1)} + \frac{(x^2 - x)(x - 1)}{(x + 1)(x - 1)}$$

Multiply the two binomials in the numerator of the second term.

$$\frac{x^2 - 7x}{(x + 1)(x - 1)} + \frac{x^3 - x^2 - x^2 + x}{(x + 1)(x - 1)}$$

Simplify the numerators.

$$\frac{x^3 - x^2 - 6x}{(x + 1)(x - 1)}, \text{ which is equal to } \frac{x(x^2 - x - 6)}{(x + 1)(x - 1)}$$

Factor the numerator using the sum/product method. Find two numbers that multiply to -6 and add to -1 .

$$\frac{x(x - 3)(x + 2)}{(x + 1)(x - 1)}$$

The values of W and M are 3 and 2.

- 9) Yvonne invested \$3000 in shares of a stock on Tuesday and another \$3000 in shares of the same stock on Wednesday. On Wednesday, the price of the stock was \$0.15 lower than on Tuesday. Write a rational expression for the difference in the number of shares that Yvonne purchased on Tuesday and Wednesday.

Solution

$$\frac{3000}{p-0.15} - \frac{3000}{p}$$

$$\frac{3000(p)}{(p-0.15)(p)} - \frac{3000(p-0.15)}{(p)(p-0.15)}$$

$$\frac{450}{p(p-0.15)}$$

10. The expression $\frac{AD+CB}{BD}$ is equivalent to

A) $\frac{A}{B} + \frac{C}{D}$, $D \neq 0$

B) $\frac{C}{B} + \frac{A}{D}$, $B, D \neq 0$

C) $\frac{C}{B} + \frac{A}{D}$, $D \neq 0$

D) $\frac{A}{B} + \frac{C}{D}$, $B, D \neq 0$

Solution

The correct answer is $\frac{A}{B} + \frac{C}{D}$, $B, D \neq 0$.