

LESSON

7

Clearing Fractions

LEARNING OBJECTIVES

- Today I am: watching a YouTube video on clearing fractions.
- So that I can: explore another way to solve equations with fractions.
- I'll know I have it when I can: identify errors in someone else's work.

1. Watch the YouTube video, *Clearing Fractions in Equations*, by Front Porch Math at https://www.youtube.com/watch?v=_gNs-N9dEJE.

2. Answer the questions below as you watch the video.

A. What is another way people describe the process of clearing fractions?

B. What property is used to clear the denominator of the fraction?

C. What do you do when the denominators of the fractions are **not** the same?

D. You saw the equation $\frac{x}{3} - 5 = \frac{x}{4} - 2x$ solved in two ways—one with finding a common denominator and the other with clearing fractions. Which method do you like best based on this one example?

LCM
3, 4 = 12

$$12 \left(\frac{x}{3} - 5 \right) = \left(\frac{x}{4} - 2x \right) 12$$

$$4x - 60 = 3x - 24x$$

$$4x - 60 = -21x$$

$$\begin{array}{r}
 -4x \\
 -60 = -25x \\
 \frac{-60}{-25} = x \\
 \frac{12}{5} = x
 \end{array}
 \qquad
 \frac{60 \div 5}{25 \div 5} = \frac{12}{5}$$

Clearing Fractions

In each exercise in Lesson 6, we had a **rational expression** (fraction) on one side of the equal sign. We were able to “undo” the fraction by multiplying by the denominator on both sides of the equation. Let’s look at some equations that have more than one rational expression.

3. A. For the equation below, what is the least common denominator (LCD)?

Which number is a multiple of both 6 and 8?

$$LCM(6, 8) = 24$$

- B. Multiply this number on both sides of the equation and solve for x.

$$24 \left(\frac{x}{6} \right) = \left(\frac{x+1}{8} \right) 24^3$$

$$4x = (x+1) \cdot 3$$

$$4x = 3x + 3$$

$$-3x \quad -3x$$

$$x = 3$$

You will have to distribute on the right side of the equation.

- C. Check your solution.

$$\frac{3}{6} \stackrel{?}{=} \frac{3+1}{8}$$

$$\frac{1}{2} = \frac{4}{8} \quad \checkmark$$

4. Solve $\frac{x+4}{2} = \frac{-2x+7}{6}$ Does your answer make sense?

$$6(x+4) = (-2x+7) \cdot 2$$

$$6x+24 = -4x+14$$

$$+4x \quad +4x$$

$$10x+24 = 14$$

$$10x = -10$$

$$x = -1$$

5. You’ll do the same procedure with this equation: $\frac{x}{5} + \frac{x}{10} = \frac{x+2}{5}$. Check that your solution is correct.

$$10 \left(\frac{x}{5} + \frac{x}{10} \right) = \left(\frac{x+2}{5} \right) 10^2$$

$$2x + x = (x+2) \cdot 2$$

$$3x = 2x + 4$$

$$x = 4$$

Where Is the Error?

Identify the error in each problem below. Then determine the correct solution.

6. $8\left(\frac{x}{4} + \frac{x}{8}\right) = \left(\frac{3}{8}\right) 8 \rightarrow 2x + x = 3$
 $3x = 3$
 $x = 1$

$\frac{2x}{8} = \frac{3}{8}$

$2x = 3$

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

7. $10\left(\frac{2x}{5} + \frac{x}{2}\right) = \left(\frac{9}{5}\right) 10 \rightarrow 4x + 5x = 18$
 $9x = 18$
 $x = 2$

$\frac{3x}{7} = \frac{9}{5}$

$3x = \frac{63}{5}$

$x = \frac{21}{5}$

8. $-\frac{x}{2} + 1 = 7$

$-\frac{x}{2} = 6 \rightarrow -\frac{x}{2} = 6$

$-x = 3$

$x = -3$

$-\frac{x}{2} = 6 \rightarrow -x = 12$
 $x = -12$

9. $\frac{2x - 2}{4} - \frac{x}{4} = 1$

$2x - 2 - x = 4 \rightarrow x - 2 = 4$
 $x = 6$

$3x - 2 = 4$

$3x = 6$

$x = 2$

Lesson Summary

To solve equations:

Use the **commutative, associative, distributive properties**

AND

Use the **properties of equality**

(adding, subtracting, multiplying by non-zeros, dividing by non-zeros)

When faced with rational expressions in your equation, think about **clearing the fractions** by multiplying both sides by the Least Common Denominator.

NAME: _____ PERIOD: _____ DATE: _____

Homework Problem Set

Determine the value of the variable in each equation.

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

2. $\frac{1}{4}y - 1 = 4$

3. $b + \frac{1}{3} = \frac{2}{3}$

4. $\frac{x}{3} = 8$

5. $\frac{w}{5} = -2$

6. $c - \frac{1}{4} = \frac{3}{4}$

7. $\frac{m}{4} = -3$

8. $\frac{-2r}{7} = 6$

9. $-5 = \frac{-x}{6}$

10. $-\frac{5}{6}p = \frac{3}{4}$

11. $\frac{3n}{4} = \frac{-1}{2}$

12. $2y - \frac{3}{5} = \frac{1}{2}$

13. $\frac{1}{4}x + x = -3 + \frac{1}{2}x$

14. $\frac{1}{3} + 2m = m - \frac{3}{2}$

15. $b + \frac{2}{3} = \frac{1}{4}b - 1$

16. $\frac{2}{5}(w - 2) = -3$

17. $\frac{3}{4}(2m + 1) = 2$

18. $\frac{2}{3}(3p + 1) = 5$

19. $\frac{x}{10} + \frac{3x}{5} = \frac{7}{2}$

20. $12 - \frac{4m}{3} = \frac{m}{6}$

21. $\frac{4y}{9} - \frac{2y}{3} = 10$

22. $\frac{y + 3}{5} - \frac{3y}{10} = 7$

23. $\frac{x - 4}{4} - \frac{x}{3} = 6$

24. $\frac{b + 5}{3} + 4 = -16$

REVIEW—Lowest Common Denominator (LCD)**Determine the LCD of each set of functions.**

25. $\frac{1}{3}, \frac{1}{6}, \frac{1}{9}$

LCD = _____

26. $\frac{1}{2}, \frac{1}{4}, \frac{3}{8}$

LCD = _____

27. $\frac{2}{5}, \frac{1}{3}$

LCD = _____

28. $\frac{2}{5}, \frac{1}{3}, \frac{2}{3}$

LCD = _____

29. $\frac{2}{5}, \frac{1}{3}, \frac{5}{2}$

LCD = _____

30. $\frac{7}{8}, \frac{3}{16}, \frac{4}{32}$

LCD = _____

31. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$

LCD = _____

32. $5, \frac{6}{7}$

LCD = _____

33. $\frac{10}{11}, \frac{19}{22}, \frac{1}{2}$

LCD = _____

34. $\frac{5}{6}, \frac{7}{8}, \frac{9}{10}$

LCD = _____

Spiral REVIEW—Solving Equations**Determine the value of the variable in each equation. Check your solutions.**

35. $2(2 - 3x) = 3(3 + x) + 4$

36. $5(m + 1) + 6 = 3(4 + m) + (2m - 1)$

37. $14 - (6 - 3c) = 4c - c$

38. $3y - 2(y - 19) = 9y - 3(9 - y)$

39. $3(3h - 1) = 4(h + 3)$

40. $(5t + 9) - (3t - 13) = 2(11 + 2t)$

41. $1 - 2t = 2(1 - t)$

42. $5(3 - m) = 15m + 15$

43. $-9x + 12x = 3(2 - x)$

44. $10(0.2 + 0.4c) = 10c + 0.2 - 6c$