

3.7: Solving Polynomial Equations with Fractional Coefficients (Day 2)

Warm Up

$$3(6 + x) - 5 = 65 - x$$

$$\frac{5m - 2}{2} = \frac{(m + 2)}{3}$$

Example

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

Steps

1) Multiply EACH term by the LOWEST COMMON DENOMINATOR.

2) Expand each term (watch out for negative signs – treat each term as though in brackets).

3) Simplify each side, then isolate the variable.

Examples

1. Find the value of the variable:

a)
$$\frac{q}{8} - 3 = -\frac{q}{4}$$

b)
$$\frac{p}{5} + \frac{p-2}{3} = 6$$

c)
$$\frac{2y-1}{2} - \frac{3y-2}{5} = \frac{3}{2}$$

d)
$$\frac{1}{3}(6x-4) - \frac{3}{7}(x+3) = \frac{2}{3}$$

Activity 1: Equation Puzzle (page 1)

$$\frac{x}{3} + \frac{x}{4} = \frac{x}{8} + \frac{11}{2}$$

$$24\left(\frac{x}{3}\right) + 24\left(\frac{x}{4}\right) = 24\left(\frac{x}{8}\right) + 24\left(\frac{11}{2}\right)$$

$$8(x) + 6(x) = 3(x) + 12(11)$$

$$14x = 3x + 132$$

$$14x - 3x = 132$$

$$11x = 132$$

$$x = \frac{132}{11}$$

$$x = 12$$

$$\frac{x}{3} + \frac{x}{4} = \frac{x}{8} + \frac{11}{2}$$

$$24\left(\frac{x}{3}\right) + 24\left(\frac{x}{4}\right) = 24\left(\frac{x}{8}\right) + 24\left(\frac{11}{2}\right)$$

$$8(x) + 6(x) = 3(x) + 12(11)$$

$$14x = 3x + 132$$

$$14x - 3x = 132$$

$$11x = 132$$

$$x = \frac{132}{11}$$

$$x = 12$$

Activity 1: Equation Puzzle (page 2)

$$\frac{x+9}{4} + \frac{x+1}{2} = \frac{x-11}{5}$$

$$20\left(\frac{x+9}{4}\right) + 20\left(\frac{x+1}{2}\right) = 20\left(\frac{x-11}{5}\right)$$

$$5(x+9) + 10(x+1) = 4(x-11)$$

$$5x + 45 + 10x + 10 = 4x - 44$$

$$15x + 55 = 4x - 44$$

$$15x - 4x = -44 - 55$$

$$11x = -99$$

$$x = \frac{-99}{11}$$

$$x = -9$$

$$\frac{x+9}{4} + \frac{x+1}{2} = \frac{x-11}{5}$$

$$20\left(\frac{x+9}{4}\right) + 20\left(\frac{x+1}{2}\right) = 20\left(\frac{x-11}{5}\right)$$

$$5(x+9) + 10(x+1) = 4(x-11)$$

$$5x + 45 + 10x + 10 = 4x - 44$$

$$15x + 55 = 4x - 44$$

$$15x - 4x = -44 - 55$$

$$11x = -99$$

$$x = \frac{-99}{11}$$

$$x = -9$$

Activity 2: Find the Error

Identify the error in each solution then determine the correct value of x.

Error #1

$$1 \quad 6 - \frac{4(x-3)}{3} = \frac{x-2}{2}$$

$$2 \quad 6 - \left(\frac{4x-12}{3} \right) = \frac{x-2}{2}$$

$$3 \quad 6 - 6 \left(\frac{4x-12}{3} \right) = 6 \left(\frac{x-2}{2} \right)$$

$$4 \quad 6 - 2(4x-12) = 3(x-2)$$

$$5 \quad 6 - 8x + 24 = 3x - 6$$

$$6 \quad -8x + 30 = 3x - 6$$

$$7 \quad -11x = -36$$

$$8 \quad x = \frac{36}{11}$$

Error #2

$$1 \quad 6 - \frac{4(x-3)}{3} = \frac{x-2}{2}$$

$$2 \quad 6 - \left(\frac{4x-12}{3} \right) = \frac{x-2}{2}$$

$$3 \quad 6(6) - 6 \left(\frac{4x-12}{3} \right) = 6 \left(\frac{x-2}{2} \right)$$

$$4 \quad 6(6) - 2(4x-12) = 3(x-2)$$

$$5 \quad 36 - 8x - 24 = 3x - 6$$

$$6 \quad -8x + 12 = 3x - 6$$

$$7 \quad -11x = -18$$

$$8 \quad x = \frac{18}{11}$$