



Checkpoint 7

Problem 7-115

Solving Equations with Fractions (Fraction Busters)

Answers to problem 7-115: a: $x = \frac{15}{4} = 3\frac{3}{4}$, b: $x \approx \$1.74$, c: $x = -5$, d: (12, 16)

Equations are often easier to solve if there are no fractions. To eliminate fractions from an equation, multiply both sides of the equation by the common denominator.

Example 1: Solve $\frac{1}{2}x + \frac{2}{3} = \frac{3}{4}$

Solution: Start by multiplying both sides of the equation by 12 (the common denominator.) Simplify and then solve as usual.

$$\begin{aligned} 12\left(\frac{1}{2}x + \frac{2}{3}\right) &= 12\left(\frac{3}{4}\right) \\ 6x + 8 &= 9 \\ 6x &= 1 \\ x &= \frac{1}{6} \end{aligned}$$

Example 2: Solve $1.1x + 0.35x = 29$

Solution: Two decimal places means that the common denominator is 100. Multiply both sides by 100 and solve as usual.

$$\begin{aligned} 100(1.1x + 0.35x) &= 100(29) \\ 110x + 35x &= 2900 \\ 145x &= 2900 \\ x &= 20 \end{aligned}$$

Now we can go back and solve the original problems.

a. $\frac{1}{5}x + \frac{1}{3}x = 2$

$$\begin{aligned} 15\left(\frac{1}{5}x + \frac{1}{3}x\right) &= 15(2) \\ 3x + 5x &= 30 \\ 8x &= 30 \\ x &= \frac{30}{8} = \frac{15}{4} = 3\frac{3}{4} \end{aligned}$$

b. $x + 0.15x = \$2$

$$\begin{aligned} 100(x + 0.15x) &= 100(\$2) \\ 100x + 15x &= \$200 \\ 115x &= \$200 \\ x &\approx \$1.74 \end{aligned}$$

c. $\frac{x+2}{3} = \frac{x-2}{7}$

$$\begin{aligned} 21\left(\frac{x+2}{3}\right) &= 21\left(\frac{x-2}{7}\right) \\ 7(x+2) &= 3(x-2) \\ 7x+14 &= 3x-6 \\ 4x &= -20 \\ x &= -5 \end{aligned}$$

d. $y = \frac{2}{3}x + 8$

$$\begin{aligned} y &= \frac{1}{2}x + 10 \\ \frac{2}{3}x + 8 &= \frac{1}{2}x + 10 \\ 6\left(\frac{2}{3}x + 8\right) &= 6\left(\frac{1}{2}x + 10\right) \\ 4x + 48 &= 3x + 60 \\ x &= 12 \\ y &= \frac{2}{3}(12) + 8 = 16 \\ &(12, 16) \end{aligned}$$

Day 9

Here are some more to try. Solve each equation or system of equations.

Solve these

*Justify!
Show work!*

1. $\frac{1}{6}x + \frac{2}{3}x = 5$

2. $y = 32x + 16$
 $y = 80x + 4$

3. $\frac{6}{15} = \frac{x-2}{40}$

4. $y = \frac{x}{3}$
 $y = \frac{4}{3}x - 9$

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

6. $\frac{x}{4} - 3 = \frac{x+4}{6} - 2$

7. $\frac{x}{10} + \frac{5}{12} = 3x - 1$

8. $\frac{2x-2}{6} - \frac{1}{2} = \frac{x}{2} - 2$

9. $0.2x + x = 30$

10. $y = \frac{x}{6} + \frac{1}{4}$
 $y = x - \frac{9}{4}$

11. $y = -3x + 2$
 $y = -\frac{15}{4}x + 3$

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

13. $\frac{x}{2} + \frac{4x}{3} = 2x - 1.5$

14. $\frac{x+1}{4x} = \frac{5}{16}$

15. $y = \frac{1}{3}x + 8$
 $y = -\frac{1}{2}x - 2$

16. $y = 7x + 2$
 $y = 2x - 10\frac{1}{2}$

17. $y = \frac{x}{2} - 1$
 $y = \frac{x+3}{12}$

18. $y = \frac{3}{2}x - 10$
 $y = \frac{x}{3} - \frac{x}{2}$

19. $\frac{x-1}{4} = \frac{7}{8}$

20. $\frac{2}{3}x = x - \frac{10}{3}$

Answers

1. $x = 6$
2. $x = \frac{1}{4}, y = 24$
3. $x = 18$
4. $x = 9, y = 3$
5. $x = 24$
6. $x = 20$
7. $x = \frac{60}{149}$
8. $x = 7$
9. $x = 25$
10. $x = 3, y = \frac{3}{4}$
11. $x = \frac{4}{3}, y = -2$
12. $x = 3\frac{1}{3}$
13. $x = 9$
14. $x = 4$
15. $x = -12, y = 4$
16. $x = -2\frac{1}{2}, y = -15\frac{1}{2}$
17. $x = 3, y = \frac{1}{2}$
18. $x = 6, y = -1$
19. $x = 4.5$
20. $x = 10$

Answers to
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Solution:
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Example 3
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Solution:
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Checkpoints

