

2.4 Solving Equations with Fractions

Solutions

Solve each equation.	
<p>1. $\frac{6}{1} \cdot \left(\frac{2}{3}x + \frac{1}{2}\right) = \frac{5}{6} \cdot \frac{6}{1}$</p> $\frac{6}{1} \cdot \frac{2}{3}x + \frac{6}{1} \cdot \frac{1}{2} = \frac{5}{6} \cdot \frac{6}{1}$ $4x + 3 = 5$ $\underline{-3} \quad \underline{-3}$ $4x = 2$ $\frac{4x}{4} = \frac{2}{4}$ $x = \frac{1}{2}$ <div style="border: 1px solid red; padding: 5px; display: inline-block; margin-left: 100px;"> $\left\{\frac{1}{2}\right\}$ </div>	<p>2. $\frac{3}{8} + \frac{1}{2}x = -\frac{1}{4}$</p>
<p>3. $\frac{6}{1} \cdot \left(\frac{5}{6}y - \frac{2}{3}\right) = \left(\frac{1}{2}y - 1\right) \cdot \frac{6}{1}$</p> $\frac{6}{1} \cdot \frac{5}{6}y - \frac{6}{1} \cdot \frac{2}{3} = \frac{6}{1} \cdot \frac{1}{2}y - \frac{6}{1} \cdot 1$ $5y - 4 = 3y - 6$ $\underline{-3y} \quad \underline{-3y}$ $2y - 4 = -6$ $\underline{+4} \quad \underline{+4}$ $2y = -2$ $\frac{2y}{2} = \frac{-2}{2}$ $y = -1$ <div style="border: 1px solid red; padding: 5px; display: inline-block; margin-left: 100px;"> $\{-1\}$ </div>	<p>4. $\frac{2}{5}x + 3 = \frac{1}{2}x - \frac{9}{10}$</p>
<p>5. $\frac{10}{1} \cdot \left(-\frac{3}{10}x + 1\right) = \left(\frac{1}{10}x - \frac{7}{10}\right) \cdot \frac{10}{1}$</p> $\frac{10}{1} \cdot -\frac{3}{10}x + \frac{10}{1} \cdot 1 = \frac{10}{1} \cdot \frac{1}{10}x - \frac{10}{1} \cdot \frac{7}{10}$ $-3x + 10 = x - 7$ $\underline{+3x} \quad \underline{+3x}$ $10 = 4x - 7$ $\underline{+7} \quad \underline{+7}$ $17 = 4x$ $\frac{17}{4} = \frac{4x}{4}$ $x = \frac{17}{4}$ <div style="border: 1px solid red; padding: 5px; display: inline-block; margin-left: 100px;"> $\left\{\frac{17}{4}\right\}$ </div>	<p>6. $\frac{3}{5} + \frac{2}{5}x = 1$</p>
<p>Answers: 1. $\left\{\frac{1}{2}\right\}$; 3. $\{-1\}$; 5. $\left\{\frac{17}{4}\right\}$</p>	

Solve.

7.
$$\frac{6}{1} \cdot \left(-\frac{3}{2} + x\right) = \left(-\frac{5}{3} - \frac{1}{6}x\right) \cdot \frac{6}{1}$$
$$\frac{6}{1} \cdot -\frac{3}{2} + \frac{6}{1} \cdot x = \frac{6}{1} \cdot -\frac{5}{3} - \frac{6}{1} \cdot \frac{1}{6}x$$
$$\begin{array}{r} -9 + 6x = -10 - x \\ \quad \quad \quad \underline{+x} \quad \quad \quad \underline{+x} \\ -9 + 7x = -10 \\ \quad \quad \quad \underline{+9} \quad \quad \quad \underline{+9} \\ 7x = -1 \\ \frac{7x}{7} = \frac{-1}{7} \\ x = -\frac{1}{7} \end{array}$$

$\left\{-\frac{1}{7}\right\}$

8.
$$\frac{5}{9}a + \frac{1}{2} = a - \frac{5}{6}$$

9.
$$\frac{3}{4} \left(2p + \frac{1}{3}\right) = 2p - 4 \left(\frac{1}{3}p - 1\right)$$
$$\frac{3}{4} \cdot 2p + \frac{3}{4} \cdot \frac{1}{3} = 2p - 4 \cdot \frac{1}{3}p + 4 \cdot 1$$
$$\frac{3}{2}p + \frac{1}{4} = 2p - \frac{4}{3}p + 4$$
$$\frac{12}{1} \cdot \left(\frac{3}{2}p + \frac{1}{4}\right) = \frac{12}{1} \cdot \left(2p - \frac{4}{3}p + 4\right)$$
$$\frac{12}{1} \cdot \frac{3}{2}p + \frac{12}{1} \cdot \frac{1}{4} = \frac{12}{1} \cdot 2p - \frac{12}{1} \cdot \frac{4}{3}p + \frac{12}{1} \cdot 4$$
$$\begin{array}{r} 18p + 3 = 24p - 16p + 48 \\ 18p + 3 = 8p + 48 \\ \underline{-8p} \quad \underline{-8p} \\ 10p + 3 = 48 \\ \quad \quad \quad \underline{-3} \quad \underline{-3} \\ 10p = 45 \\ \frac{10p}{10} = \frac{45}{10} \\ p = \frac{9}{2} \end{array}$$

$\left\{\frac{9}{2}\right\}$

10.
$$2 \left(\frac{3}{5}x - \frac{1}{4}\right) + \frac{7}{10} = \frac{1}{20}x + \frac{1}{5}$$

Answers: 7. $\left\{-\frac{1}{7}\right\}$; 9. $\left\{\frac{9}{2}\right\}$

Solve.

$$11. \quad \frac{6}{1} \cdot \frac{4x-1}{3} = \frac{x+5}{2} \cdot \frac{6}{1}$$

$$2(4x-1) = 3(x+5)$$

$$8x-2 = 3x+15$$

$$\underline{-3x} \quad \underline{-3x}$$

$$5x-2 = 15$$

$$\underline{+2} \quad \underline{+2}$$

$$5x = 17$$

$$\frac{5x}{5} = \frac{17}{5}$$

$$x = \frac{17}{5}$$

$$\left\{ \frac{17}{5} \right\}$$

$$12. \quad \frac{2x-1}{3} = \frac{x+4}{2}$$

$$13. \quad \frac{8}{1} \cdot \left(\frac{3x-1}{4} + 1 \right) = \frac{x-2}{8} \cdot \frac{8}{1}$$

$$\frac{8}{1} \cdot \frac{3x-1}{4} + \frac{8}{1} \cdot 1 = \frac{x-2}{8} \cdot \frac{8}{1}$$

$$2(3x-1) + 8 = x-2$$

$$6x-2+8 = x-2$$

$$6x+6 = x-2$$

$$\underline{-x} \quad \underline{-x}$$

$$5x+6 = -2$$

$$\underline{-6} \quad \underline{-6}$$

$$5x = -8$$

$$\frac{5x}{5} = \frac{-8}{5}$$

$$x = -\frac{8}{5}$$

$$\left\{ -\frac{8}{5} \right\}$$

$$14. \quad \frac{x+2}{5} = \frac{x}{2} + \frac{3x+1}{10}$$

Answers: 11. $\frac{17}{5}$; 13. $-\frac{8}{5}$

Solve.

15. $10 \cdot (-2.9 - 3.2x) = 5.1 \cdot 10$

$$10 \cdot -2.9 - 10 \cdot 3.2x = 5.1 \cdot 10$$

$$\begin{array}{r} -29 - 32x = 51 \\ +29 \quad \quad +29 \end{array}$$

$$-32x = 80$$

$$\frac{-32x}{-32} = \frac{80}{-32}$$

$$\boxed{x = -2.5}$$
$$\boxed{\{-2.5\}}$$

16. $1.2 + 2.5x = 2.4$

17. $2.5 - 2.6x = -6(0.3x)$

$$2.5 - 2.6x = -1.8x$$

$$10(2.5 - 2.6x) = 10(-1.8x)$$

$$10 \cdot 2.5 - 10 \cdot 2.6x = 10(-1.8x)$$

$$\begin{array}{r} 25 - 26x = -18x \\ +26x \quad \quad +26x \end{array}$$

$$25 = 8x$$

$$\frac{25}{8} = \frac{8x}{8}$$

$$x = 3.125$$

$$\boxed{\{3.125\}}$$

18. $4.72 - (2.5x - 1.3) = 6.02$

Answers: 15. -2.5; 17. 3.125

Solve.

19.
$$-1.4 - 2.3x = 3 \quad \begin{array}{l} -2.3x \\ +2.3x \end{array}$$

$$-1.4 = 3$$

False

Solution set: \emptyset

20.
$$1.5x = 1.5x + 2.4$$

21.
$$x - 3 = 5x - 4(x + 1) + 1$$
$$x - 3 = 5x + -4(x + 1) + 1$$
$$x - 3 = 5x + -4x + -4 + 1$$
$$x - 3 = x + -3$$

$$\begin{array}{l} -x \quad -x \\ -3 = -3 \end{array}$$

True

Solution set: $\{x \in \mathbb{R}\}$

22.
$$x - 4(x - 1) + 1 = -3x + 5$$

Answers: 19. \emptyset ; 21. $\{x \in \mathbb{R}\}$