

Solving Equations

Emphasis on Linear Equations with Variables on Both Sides

Solve each of the following.

<p>1. $24 - 3m = 5m$</p> $\begin{array}{r} 24 - 3m = 5m \\ +3m \quad +3m \\ \hline 24 = 8m \\ \frac{24}{8} = \frac{8m}{8} \\ \boxed{3 = m} \quad \text{OR} \quad \boxed{m = 3} \end{array}$	<p>2. $20 + c = 4c - 7$</p> $\begin{array}{r} 20 + c = 4c - 7 \\ -c \quad -c \\ \hline 20 = 3c - 7 \\ +7 \quad +7 \\ \hline 27 = 3c \\ \frac{27}{3} = \frac{3c}{3} \\ \boxed{c = 9} \end{array}$
<p>3. $9 - 3k = 17 - 2k$</p> $\begin{array}{r} 9 - 3k = 17 - 2k \\ +3k \quad +3k \\ \hline 9 = 17 + k \\ -17 \quad -17 \\ \hline -8 = k \\ \boxed{-8 = k} \quad \text{OR} \quad \boxed{k = -8} \end{array}$	<p>4. $5z - 2 = 2(3z - 4)$</p> $\begin{array}{r} 5z - 2 = 2(3z - 4) \\ 5z - 2 = 6z - 8 \\ -5z \quad -5z \\ \hline -2 = z - 8 \\ +8 \quad +8 \\ \hline 6 = z \\ \boxed{6 = z} \quad \text{OR} \quad \boxed{z = 6} \end{array}$
<p>5. $3 - 4a = 5(a - 3)$</p> $\begin{array}{r} 3 - 4a = 5(a - 3) \\ 3 - 4a = 5a - 15 \\ +4a \quad +4a \\ \hline 3 = 9a - 15 \\ +15 \quad +15 \\ \hline 18 = 9a \\ \frac{18}{9} = \frac{9a}{9} \\ \boxed{a = 2} \end{array}$	<p>6. $8y - 6 = \frac{2}{3}(6y + 15)$</p> $\begin{array}{r} 8y - 6 = \frac{2}{3}(6y + 15) \\ 8y - 6 = 4y + 10 \\ -4y \quad -4y \\ \hline 4y - 6 = 10 \\ +6 \quad +6 \\ \hline 4y = 16 \\ \frac{4y}{4} = \frac{16}{4} \\ \boxed{y = 4} \end{array}$
<p>7. $78 + 6x = 2(67 - 4x)$</p> $\begin{array}{r} 78 + 6x = 2(67 - 4x) \\ 78 + 6x = 134 - 8x \\ +8x \quad +8x \\ \hline 78 + 14x = 134 \\ -78 \quad -78 \\ \hline 14x = 56 \\ \frac{14x}{14} = \frac{56}{14} \\ \boxed{x = 4} \end{array}$	<p>8. $13 + 5x = 2x - 8$</p> $\begin{array}{r} 13 + 5x = 2x - 8 \\ -2x \quad -2x \\ \hline 13 + 3x = -8 \\ -13 \quad -13 \\ \hline 3x = -21 \\ \frac{3x}{3} = \frac{-21}{3} \\ \boxed{x = -7} \end{array}$
<p>9. $4x - 5 = \frac{1}{5}(5x + 20)$</p> $\begin{array}{r} 4x - 5 = \frac{1}{5}(5x + 20) \\ 4x - 5 = x + 4 \\ -x \quad -x \\ \hline 3x - 5 = 4 \\ +5 \quad +5 \\ \hline 3x = 9 \\ \frac{3x}{3} = \frac{9}{3} \\ \boxed{x = 3} \end{array}$	<p>10. $9x - 5 = \frac{1}{4}(16x + 60)$</p> $\begin{array}{r} 9x - 5 = \frac{1}{4}(16x + 60) \\ 9x - 5 = 4x + 15 \\ -4x \quad -4x \\ \hline 5x - 5 = 15 \\ +5 \quad +5 \\ \hline 5x = 20 \\ \frac{5x}{5} = \frac{20}{5} \\ \boxed{x = 4} \end{array}$

$$11. 9z + 12 = 9(z + 3)$$

$$\begin{array}{r} 9z + 12 = 9z + 27 \\ -9z \quad -9z \\ \hline 12 = 27 \end{array}$$

False Statement = No Solution

$$12. 3(2a + 2) = 2(3a + 3)$$

$$\begin{array}{r} 6a + 6 = 6a + 6 \\ -6a \quad -6a \\ \hline 6 = 6 \end{array}$$

True Statement = All Real #s

$$13. 8t + 5 = 6t + 1$$

$$\begin{array}{r} 8t + 5 = 6t + 1 \\ -6t \quad -6t \\ \hline 2t + 5 = 1 \\ -5 \quad -5 \\ \hline 2t = -4 \end{array}$$

$$\frac{2t}{2} = \frac{-4}{2}$$

$t = -2$

$$14. k + 1 = 3k - 1$$

$$\begin{array}{r} k + 1 = 3k - 1 \\ -k \quad -k \\ \hline 1 = 2k - 1 \\ +1 \quad +1 \\ \hline 2 = 2k \end{array}$$

$$\frac{2}{2} = \frac{2k}{2}$$

$k = 1$

$$15. 8c + 5 = 4c - 11$$

$$\begin{array}{r} 8c + 5 = 4c - 11 \\ -4c \quad -4c \\ \hline 4c + 5 = -11 \\ -5 \quad -5 \\ \hline 4c = -16 \end{array}$$

$$\frac{4c}{4} = \frac{-16}{4}$$

$c = -4$

$$16. 8 + 4m = 9m - 7$$

$$\begin{array}{r} 8 + 4m = 9m - 7 \\ -4m \quad -4m \\ \hline 8 = 5m - 7 \\ +7 \quad +7 \\ \hline 15 = 5m \end{array}$$

$$\frac{15}{5} = \frac{5m}{5}$$

$m = 3$

$$17. 40 + 14j = 2(-4j - 13)$$

$$\begin{array}{r} 40 + 14j = -8j - 26 \\ +8j \quad +8j \\ \hline 40 + 22j = -26 \end{array}$$

$$\begin{array}{r} 40 + 22j = -26 \\ -40 \quad -40 \\ \hline 22j = -66 \end{array}$$

$$\frac{22j}{22} = \frac{-66}{22}$$

$j = -3$

$$18. w + 3 = w + 6$$

$$\begin{array}{r} w + 3 = w + 6 \\ -w \quad -w \\ \hline 3 = 6 \end{array}$$

False Statement = No Solution

$$19. 2(3g + 2) = 0.5(12g + 8)$$

$$\begin{array}{r} 6g + 4 = 6g + 4 \\ -6g \quad -6g \\ \hline 4 = 4 \end{array}$$

$$4 = 4$$

True Statement = All Real #s

$$20. 22x + 70 = 17x - 95$$

$$\begin{array}{r} 22x + 70 = 17x - 95 \\ -17x \quad -17x \\ \hline 5x + 70 = -95 \\ -70 \quad -70 \\ \hline 5x = -165 \end{array}$$

$$\frac{5x}{5} = \frac{-165}{5}$$

$x = -33$