Solving Systems of Linear Equations by the Substitution Method

Total points = 61

1.
$$2x - y = 2$$
 \checkmark
 $-1[-y = -2x + 2]$ \checkmark
 $y = 2x - 2$ \checkmark
 $6x + 5y = 2$ \checkmark
 $6x + 5(2x - 2) = 2$ \checkmark
 $6x + 10x - 10 = 2$ \checkmark
 $16x = 2 + 10$ \checkmark
 $16x = \frac{12}{16}$ \checkmark
 $x = \frac{3}{4}$ \checkmark
 $2x - y = 2$ \checkmark
 $2\left(\frac{3}{4}\right) - y = 2$ \checkmark
 $\frac{3}{2} - y = 2$ \checkmark

$$\therefore \mathsf{Solution} = \boxed{\mathsf{None}} \checkmark$$

4.
$$x+y=11$$

 $x=-y+11$
 $3x-y=5$
 $3(-y+11)-y=5$
 $-3y+33-y=5$
 $-4y=5-33$
 $-4y=-28$
 $-4=-4$
 $y=7$
 $\sqrt{-2}$

$$2x - y = 2 \checkmark$$

$$2\left(\frac{3}{4}\right) - y = 2 \checkmark$$

$$\frac{3}{2} - y = 2 \checkmark$$

$$-y = -\frac{3}{2} + 2 \checkmark$$

$$x + y = 11 \checkmark$$

$$x + 7 = 11 \checkmark$$

$$x = 11 - 7 \checkmark$$

$$x = 4 \checkmark$$

Solution =
$$\boxed{(4,7)}$$

5. $3x + 2y = 9$
 $\frac{2y}{2} = -\frac{3x}{2} + \frac{9}{2}$

$$\begin{vmatrix}
-1 & -y & = \frac{1}{2} \\
y & = -\frac{1}{2}
\end{vmatrix}$$

$$\therefore \text{ Solution } = \begin{bmatrix} \left(\frac{3}{4}, -\frac{1}{2}\right) \\
\frac{3x + 2y = 9}{2} \\
\frac{2y}{2} & = -\frac{3x}{2} + \frac{9}{2}
\end{vmatrix}$$

$$\begin{vmatrix}
y & -\frac{3x}{2} + \frac{9}{2} \\
y & = -\frac{3x}{2} + \frac{9}{2}
\end{vmatrix}$$

$$\begin{vmatrix}
x & -3y & = 1
\end{vmatrix}$$

$$3x = 4y - 3 \checkmark$$

2.
$$x - 3y = 1$$
 \checkmark $3x = 3y + 1$ \checkmark $3x = -2x + 6y = 5$ \checkmark $-2(3y + 1) + 6y = 5$ \checkmark $-6y - 2 + 6y = 5$ \checkmark $0 = 5 + 2$ \checkmark $0 = 7$ \checkmark $x = -2x + 6y = 5$ \checkmark $x = -2x + 6y = 5$

$$3x = 4y - 3 \checkmark$$

$$3x = 4\left(-\frac{3x}{2} + \frac{9}{2}\right) - 3 \checkmark$$

$$3x = -6x + 18 - 3 \checkmark$$

$$3x + 6x = 15 \checkmark$$

$$\frac{9x}{9} = \frac{15}{9} \checkmark$$

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

$$3x = 4y - 3 \checkmark$$

Solution = None
$$\checkmark$$
3. $x - 3y = 1 \checkmark$
 $[x = 3y + 1] \checkmark$

$$3x = 4y - 3 \checkmark$$

$$3\left(\frac{5}{3}\right) = 4y - 3 \checkmark$$

$$5 = 4y - 3 \checkmark$$

$$5 + 3 = 4y \checkmark$$

$$\frac{8}{4} = \frac{4y}{4} \checkmark$$

$$y = 2$$

$$\begin{array}{l}
-2x + 6y = -2 \checkmark \\
-2(3y + 1) + 6y = -2 \checkmark \\
-6y - 2 + 6y = -2 \checkmark \\
0 = -2 + 2 \checkmark \\
\hline
0 = 0
\end{array}$$

$$\therefore \mathsf{Solution} = \boxed{\left(\frac{5}{3}, 2\right)} \checkmark$$

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 $Total\ points = 61$

$$\begin{array}{c|c}
-1[-y = -2x + 2] \checkmark \\
y = 2x - 2] \checkmark \\
6x + 5y = 2 \checkmark \\
6x + 5(2x - 2) = 2 \checkmark \\
6x + 10x - 10 = 2 \checkmark \\
16x = 2 + 10 \checkmark \\
\frac{16x}{16} = \frac{12}{16} \checkmark \\
x = \frac{3}{4} \checkmark
\end{array}$$

1. 2x - y = 2

$$\therefore \text{ Solution} = \boxed{\text{None}} \checkmark$$
4. $x + y = 11 \checkmark$
 $\boxed{x = -y + 11} \checkmark$

$$3x - y = 5 \checkmark$$

$$3(-y + 11) - y = 5 \checkmark$$

$$-3y + 33 - y = 5 \checkmark$$

$$-4y = 5 - 33 \checkmark$$

$$\frac{-4y}{-4} = \frac{-28}{-4} \checkmark$$

$$y = 7 \checkmark$$

$$2x - y = 2 \checkmark$$

$$2\left(\frac{3}{4}\right) - y = 2 \checkmark$$

$$x + y = 11 \checkmark$$

$$x + 7 = 11 \checkmark$$

$$-y = -\frac{3}{2} + 2 \checkmark$$

$$x = 4 \checkmark$$

$$x+7=11 \checkmark$$

$$x=11-7 \checkmark$$

$$x=4 \checkmark$$

$$\therefore \text{ Solution} = \boxed{(4,7)} \checkmark$$

$$\begin{array}{c}
-1\left[-y=\frac{1}{2}\right] \checkmark & \therefore \text{ Solution} = \boxed{(4)} \\
y=-\frac{1}{2} \checkmark & \frac{2y}{2}=-\frac{3x}{2}+\frac{9}{2} \checkmark \\
\therefore \text{ Solution} = \boxed{\left(\frac{3}{4},-\frac{1}{2}\right)} \checkmark & y=-\frac{3x}{2}+\frac{9}{2} \checkmark
\end{array}$$

Solution =
$$\left(\frac{3}{4}, -\frac{1}{2}\right)$$

2. $x - 3y = 1$
 $x = 3y + 1$

$$\frac{2}{2} = -\frac{2}{2} + \frac{1}{2}$$

$$y = -\frac{3x}{2} + \frac{9}{2}$$

$$3x = 4y - 3$$

$$3x = 4\left(-\frac{3x}{2} + \frac{9}{2}\right)$$

$$\begin{array}{c|c}
(x - 3y + 1) \\
-2x + 6y = 5 \checkmark \\
-2(3y + 1) + 6y = 5 \checkmark \\
-6y - 2 + 6y = 5 \checkmark \\
0 = 5 + 2 \checkmark \\
\hline
0 = 7 \checkmark$$

$$3x = 4y - 3 \checkmark$$

$$3x = 4\left(-\frac{3x}{2} + \frac{9}{2}\right) - 3 \checkmark$$

$$3x = -6x + 18 - 3 \checkmark$$

$$3x + 6x = 15 \checkmark$$

$$\frac{3x + 6x = 15}{9} = \frac{15}{9} \checkmark$$

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

3.
$$x - 3y = 1 \checkmark$$
$$x = 3y + 1 \checkmark$$
$$-2x + 6y = -2 \checkmark$$

$$\begin{array}{c|c} x = 3y + 1 \\ \hline -2x + 6y = -2 \checkmark \\ -2(3y + 1) + 6y = -2 \checkmark \\ -6y - 2 + 6y = -2 \checkmark \\ \hline 0 = -2 + 2 \checkmark \\ \hline \hline 0 = 0 \\ \hline \end{array}$$

$$3x = 4y - 3 \checkmark$$

$$3\left(\frac{5}{3}\right) = 4y - 3 \checkmark$$

$$5 = 4y - 3 \checkmark$$

$$5 + 3 = 4y \checkmark$$

$$\frac{8}{4} = \frac{4y}{4} \checkmark$$

$$y = 2 \checkmark$$

$$\therefore \mathsf{Solution} = \boxed{\left(\frac{5}{3}, 2\right)} \checkmark$$

Solving Systems of Linear Equations by the Substitution Method

1. 2x - y = 2 \checkmark -1[-y = -2x + 2] \checkmark y = 2x - 2 \checkmark

6x + 5y = 2 6x + 5(2x - 2) = 2 6x + 10x - 10 = 2

 $\begin{array}{c}
16x = 2 + 10 \checkmark \\
16x = \frac{12}{16} = \frac{12}{16} \checkmark \\
\boxed{x = \frac{3}{4}}
\checkmark$

 $2x - y = 2 \checkmark$ $2\left(\frac{3}{4}\right) - y = 2 \checkmark$

-y=2

 $-y = -\frac{3}{2}$ $-1\left[-y=\frac{1}{2}\right]$

2. x - 3y = 1x = 3y + 1

0 = **7** ✓

3. x - 3y = 1

0=0

x=3y+1

-2x + 6y = -2

 $-2(3y+1)+6y = -2 \checkmark$ $-6y-2+6y = -2 \checkmark$ $0 = -2+2 \checkmark$

 $-\frac{3}{4} + 2$

 $\therefore \mathsf{Solution} = \boxed{\left(\frac{3}{4}, -\frac{3}{4}\right)}$

 $-2x+6y=5 \checkmark$

 $-2(3y+1)+6y=5 \checkmark$ $-6y-2+6y=5 \checkmark$ $0=5+2 \checkmark$

 \therefore Solution = None

Total points = 61

4. x + y = 11x = -y + 11

-4

3x - y = 5

 $x + y = 11 \checkmark$ $x + 7 = 11 \checkmark$

 $x = 11 - 7 \checkmark$

5. 3x + 2y = 9 $\frac{2y}{2} = -\frac{3x}{2} + \frac{9}{2}$ $y = -\frac{3x}{2} + \frac{9}{2}$

 $3x = -0x + 18 - 3x + 6x = 15 \checkmark$ $\frac{9x}{9} = \frac{15}{9} \checkmark$ $x = \frac{5}{3} \checkmark$

3x = 4y - 3

 $5 + 3 = 4y \checkmark$ $5 + 3 = 4y \checkmark$ $\frac{8}{4} = \frac{4y}{4} \checkmark$ $y = 2 \checkmark$

 $3\left(\frac{5}{3}\right) = 4y - 3 \checkmark$ $5 = 4y - 3 \checkmark$

 \therefore Solution = $\left| \left(\frac{5}{3}, 2 \right) \right| \checkmark$

x = 4

 \therefore Solution = None

3(-y+11)-y=5

-4

 \therefore Solution = (4,7)

3x = 4y - 3 $3x = 4\left(-\frac{3x}{2} + \frac{9}{2}\right) - 3$ 3x = -6x + 18 - 3

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-3y + 33 - y = 5 $\frac{-4y = 5 - 33}{-4y} = \frac{-28}{4}$

Solving Systems of Linear Equations by the Substitution Method Total points = 61

1. 2x - y = 2 \checkmark $-1[-y = -2x + 2] \checkmark$ $y = 2x - 2 \checkmark$

$$\begin{bmatrix} -y = -2x + 2 \end{bmatrix} \checkmark \qquad \therefore \text{ Solution} = \boxed{\text{None}} \checkmark
 = 2x - 2 \boxed{} \checkmark \qquad 4. \quad x + y = 11 \checkmark
 = -y + 11 \boxed{} \checkmark$$

$$y = 2x - 2$$

$$6x + 5y = 2$$

$$6x + 5(2x - 2) = 2$$

$$6x + 10x - 10 = 2$$

$$6x + 10x - 10 = 2$$

$$16x = 2 + 10$$

$$16x = \frac{12}{16}$$

$$16x = \frac{12}{16}$$

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

$$16x + 10x - 10 = 2$$

$$16x = 2 + 10 \checkmark$$

$$16x = \frac{12}{16} \checkmark$$

$$x = \frac{3}{4} \checkmark$$

$$2x - y = 2 \checkmark$$

$$2\left(\frac{3}{4}\right) - y = 2 \checkmark$$

$$-y = -\frac{3}{2} + 2 \checkmark$$

$$-y = -\frac{3}{2} + 2 \checkmark$$

$$3x - y = 5 \checkmark$$

$$3(-y + 11) - y = 5 \checkmark$$

$$3(-y + 11) - y = 5 \checkmark$$

$$3(-y + 11) - y = 5 \checkmark$$

$$-3y + 33 - y = 5 \checkmark$$

$$-4y = 5 - 33 \checkmark$$

$$-4y = -28 \checkmark$$

$$y = 7 \checkmark$$

$$y = 7 \checkmark$$

$$y = 7 \checkmark$$

$$x + y = 11 \checkmark$$

$$x + 7 = 11 \checkmark$$

$$x + 7 = 11 \checkmark$$

$$x = 4 \checkmark$$

$$\frac{3}{2} - y = 2 \checkmark$$

$$-y = -\frac{3}{2} + 2 \checkmark$$

$$-1 \left[-y = \frac{1}{2} \right] \checkmark$$

$$y = -\frac{1}{2} \checkmark$$

$$\therefore \text{ Solution } = \boxed{\left(\frac{3}{4}, \cdots \right)}$$

$$\therefore \text{ Solution} = \boxed{(4,7)} \checkmark$$
5. $3x + 2y = 9 \checkmark$

$$\frac{2y}{2} = -\frac{3x}{2} + \frac{9}{2} \checkmark$$

$$\boxed{y = -\frac{3x}{2} + \frac{9}{2}} \checkmark$$

 $\therefore \mathsf{Solution} = \boxed{\left(\frac{3}{4}, -\frac{1}{2}\right)}$ 2. $x - 3y = 1 \checkmark$ $x = 3y + 1 \checkmark$

$$\begin{vmatrix} y = -\frac{1}{2} + \frac{1}{2} \end{vmatrix} \checkmark$$

$$3x = 4y - 3 \checkmark$$

$$3x = 4\left(-\frac{3x}{2} + \frac{9}{2}\right) - 3 \checkmark$$

$$3x = -6x + 18 - 3 \checkmark$$

$$3x + 6x = 15 \checkmark$$

$$\frac{9x}{9} = \frac{15}{9} \checkmark$$

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

-2x + 6y = 5 \checkmark -2(3y+1)+6y=5 \checkmark $-6y-2+6y=5 \checkmark$ $0=5+2 \checkmark$ $0=7 \checkmark$ \therefore Solution = None

$$3x = 4y - 3 \checkmark$$

$$3\left(\frac{5}{3}\right) = 4y - 3 \checkmark$$

$$5 = 4y - 3 \checkmark$$

$$5 = 4y - 3 \checkmark$$

$$5 + 3 = 4y \checkmark$$

$$\frac{8}{4} = \frac{4y}{4} \checkmark$$

$$y = 2 \checkmark$$

3. x - 3y = 1x=3y+1 $-2x+6y=-2\checkmark$ $-2(3y+1)+6y = -2 \checkmark$ $-6y-2+6y = -2 \checkmark$ $0 = -2+2 \checkmark$ 0 = 0

$$y = 2$$

$$\therefore \text{ Solution} = \left[\left(\frac{5}{3}, 2 \right) \right] \checkmark$$