

Math Sheet

Name _____ Score _____ / 10 Teacher _____ Date _____

Solving Systems Algebraically

Solve each system with the stated method. Show exact work. Use substitution.

1. 1 $y = \frac{9}{2}x + 1$
 2 $x = -2$

Solution: _____

6. 1 $x - 2y = -5$
 2 $y = -x$

Solution: _____

2. 1 $4x - 5y = -9$
 2 $x = -9$

Solution: _____

7. 1 $y = -\frac{11}{3}x + 7$
 2 $x = -7$

Solution: _____

3. 1 $y = -\frac{3}{2}x - 10$
 2 $y = 4x - 12$

Solution: _____

8. 1 $2x + 6y = -13$
 2 $4x - 5y = -2$

Solution: _____

4. 1 $4x + 10y = 5$
 2 $3x + 10y = -4$

Solution: _____

9. 1 $3x + 6y = -17$
 2 $7x - y = 10$

Solution: _____

5. 1 $y = -\frac{13}{5}x - 11$
 2 $y = -\frac{1}{2}x - 10$

Solution: _____

10. 1 $6x + 4y = 9$
 2 $y = \frac{5}{3}x$

Solution: _____

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Answer key

Solve each system with the stated method. Show exact work. Use substitution.

1. 1 $y = \frac{9}{2}x + 1$

2 $x = -2$

Substitution

Isolate a variable

$$x = -2$$

Substitute into the other equation

$$9 \times (-2) - 2y = -2$$

Solve the one-variable equation

$$-2y - 18 = -2$$

Solve the one-variable equation

$$y = -8$$

Back-substitute

$$x = 0 \times (-8) - 2 = -2$$

Solution

$$(-2, -8)$$

Check both original equations

$$9 \times (-2) - 2 \times (-8) = -2$$

$$(-2) = -2$$

2. 1 $4x - 5y = -9$

2 $x = -9$

Substitution

Isolate a variable

$$x = -9$$

Substitute into the other equation

$$4 \times (-9) - 5y = -9$$

Solve the one-variable equation

$$-5y - 36 = -9$$

Solve the one-variable equation

$$y = -\frac{27}{5}$$

Back-substitute

$$x = 0 \times \left(-\frac{27}{5}\right) - 9 = -9$$

Solution

$$(-9, -\frac{27}{5})$$

Check both original equations

$$4 \times (-9) - 5 \times \left(-\frac{27}{5}\right) = -9$$

$$(-9) = -9$$

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Answer key

Solve each system with the stated method. Show exact work. Use substitution.

3. 1 $y = -\frac{3}{2}x - 10$

2 $y = 4x - 12$

Substitution

Isolate a variable

$$y = 4x - 12$$

Substitute into the other equation

$$3x + 2 \times (4x - 12) = -20$$

Solve the one-variable equation

$$11x - 24 = -20$$

Solve the one-variable equation

$$x = \frac{4}{11}$$

Back-substitute

$$y = 4 \times \left(\frac{4}{11}\right) - 12 = -\frac{116}{11}$$

Solution

$$\left(\frac{4}{11}, -\frac{116}{11}\right)$$

Check both original equations

$$3 \times \left(\frac{4}{11}\right) + 2 \times \left(-\frac{116}{11}\right) = -20$$

$$4 \times \left(\frac{4}{11}\right) - \left(-\frac{116}{11}\right) = 12$$

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Solve each system with the stated method. Show exact work. Use substitution.

4. 1 $4x + 10y = 5$
 2 $3x + 10y = -4$

Substitution

Isolate a variable

$$x = -\frac{10}{3}y - \frac{4}{3}$$

Substitute into the other equation

$$4 \times \left(-\frac{10}{3}y - \frac{4}{3}\right) + 10y = 5$$

Solve the one-variable equation

$$-\frac{10}{3}y - \frac{16}{3} = 5$$

Solve the one-variable equation

$$y = -\frac{31}{10}$$

Back-substitute

$$x = -\frac{10}{3} \times \left(-\frac{31}{10}\right) - \frac{4}{3} = 9$$

Solution

$$\left(9, -\frac{31}{10}\right)$$

Check both original equations

$$4 \times (9) + 10 \times \left(-\frac{31}{10}\right) = 5$$

$$3 \times (9) + 10 \times \left(-\frac{31}{10}\right) = -4$$

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Solve each system with the stated method. Show exact work. Use substitution.

5. 1 $y = -\frac{13}{5}x - 11$

2 $y = -\frac{1}{2}x - 10$

Substitution

Isolate a variable

$$x = -2y - 20$$

Substitute into the other equation

$$13 \times (-2y - 20) + 5y = -55$$

Solve the one-variable equation

$$-21y - 260 = -55$$

Solve the one-variable equation

$$y = -\frac{205}{21}$$

Back-substitute

$$x = -2 \times \left(-\frac{205}{21}\right) - 20 = -\frac{10}{21}$$

Solution

$$\left(-\frac{10}{21}, -\frac{205}{21}\right)$$

Check both original equations

$$13 \times \left(-\frac{10}{21}\right) + 5 \times \left(-\frac{205}{21}\right) = -55$$

$$\left(-\frac{10}{21}\right) + 2 \times \left(-\frac{205}{21}\right) = -20$$

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Solve each system with the stated method. Show exact work. Use substitution.

6. 1 $x - 2y = -5$

2 $y = -x$

Substitution

Isolate a variable

$$x = 2y - 5$$

Substitute into the other equation

$$(2y - 5) + y = 0$$

Solve the one-variable equation

$$3y - 5 = 0$$

Solve the one-variable equation

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

Back-substitute

$$x = 2 \times \left(\frac{5}{3}\right) - 5 = -\frac{5}{3}$$

Solution

$$\left(-\frac{5}{3}, \frac{5}{3}\right)$$

Check both original equations

$$\left(-\frac{5}{3}\right) - 2 \times \left(\frac{5}{3}\right) = -5$$

$$\left(-\frac{5}{3}\right) + \left(\frac{5}{3}\right) = 0$$

7. 1 $y = -\frac{11}{3}x + 7$

2 $x = -7$

Substitution

Isolate a variable

$$x = -7$$

Substitute into the other equation

$$11 \times (-7) + 3y = 21$$

Solve the one-variable equation

$$3y - 77 = 21$$

Solve the one-variable equation

$$y = \frac{98}{3}$$

Back-substitute

$$x = 0 \times \left(\frac{98}{3}\right) - 7 = -7$$

Solution

$$\left(-7, \frac{98}{3}\right)$$

Check both original equations

$$11 \times (-7) + 3 \times \left(\frac{98}{3}\right) = 21$$

$$(-7) = -7$$

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Solve each system with the stated method. Show exact work. Use substitution.

8.
$$\begin{array}{l} 1 \quad 2x + 6y = -13 \\ 2 \quad 4x - 5y = -2 \end{array}$$

Substitution

Isolate a variable

$$x = -3y - \frac{13}{2}$$

Substitute into the other equation

$$4 \times \left(-3y - \frac{13}{2} \right) - 5y = -2$$

Solve the one-variable equation

$$-17y - 26 = -2$$

Solve the one-variable equation

$$y = -\frac{24}{17}$$

Back-substitute

$$x = -3 \times \left(-\frac{24}{17} \right) - \frac{13}{2} = -\frac{77}{34}$$

Solution

$$\left(-\frac{77}{34}, -\frac{24}{17} \right)$$

Check both original equations

$$2 \times \left(-\frac{77}{34} \right) + 6 \times \left(-\frac{24}{17} \right) = -13$$

$$4 \times \left(-\frac{77}{34} \right) - 5 \times \left(-\frac{24}{17} \right) = -2$$

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Solve each system with the stated method. Show exact work. Use substitution.

9.
$$\begin{array}{l} 1 \quad 3x + 6y = -17 \\ 2 \quad 7x - y = 10 \end{array}$$

Substitution

Isolate a variable

$$y = 7x - 10$$

Substitute into the other equation

$$3x + 6 \times (7x - 10) = -17$$

Solve the one-variable equation

$$45x - 60 = -17$$

Solve the one-variable equation

$$x = \frac{43}{45}$$

Back-substitute

$$y = 7 \times \left(\frac{43}{45}\right) - 10 = -\frac{149}{45}$$

Solution

$$\left(\frac{43}{45}, -\frac{149}{45}\right)$$

Check both original equations

$$3 \times \left(\frac{43}{45}\right) + 6 \times \left(-\frac{149}{45}\right) = -17$$

$$7 \times \left(\frac{43}{45}\right) - \left(-\frac{149}{45}\right) = 10$$

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10. 1 $6x + 4y = 9$

2 $y = \frac{5}{3}x$

Substitution

Isolate a variable

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

Substitute into the other equation

$$6x + 4 \times \left(\frac{5}{3}x \right) = 9$$

Solve the one-variable equation

$$\frac{38}{3}x = 9$$

Solve the one-variable equation

$$x = \frac{27}{38}$$

Back-substitute

$$y = \frac{5}{3} \times \left(\frac{27}{38} \right) = \frac{45}{38}$$

Solution

$$\left(\frac{27}{38}, \frac{45}{38} \right)$$

Check both original equations

$$6 \times \left(\frac{27}{38} \right) + 4 \times \left(\frac{45}{38} \right) = 9$$

$$5 \times \left(\frac{27}{38} \right) - 3 \times \left(\frac{45}{38} \right) = 0$$