**Unit 4: Systems of Linear Equations**

**Learning Target 2 Solve Systems of Equations with Substitution**



**Solve the system *y* = *x* – 10 and *y* = –12 algebraically.**

Since *y* = *x* − 10 and *y* = −12, substitute −12 in for *y* in the first equation and solve for *x*.

*y* = *x* − 10 Write the equation.

−12 = *x* − 10 Replace *y* with −12.

−12 + 10 = *x* − 10 + 10 Addition Property of Equality

−2 = *x* Simplify.

Since *y* = −12, the solution to the system is the point (−2, −12).



**The cost of 8 muffins and 2 quarts of milk is $18. The cost of 3 muffins   
and 1 quart of milk is $7.50. How much does 1 muffin and 1 quart of   
milk cost? Write and solve a system of equations. Use a bar diagram if needed. Interpret the solution.**

Let *x =* the cost for 1 muffin and *y* = the cost for 1 quart of milk.

8*x* + 2*y* = 18 8 muffins and 2 quarts of milk cost $18.

3*x* + *y* = 7.5 3 muffins and 1 quart of milk cost $7.50.

Solve for *y* in the second equation.

3*x* + *y* = 7.5 Write the equation.

3*x* − 3*x* + *y* = 7.5 − 3*x* Subtraction Property of Equality

*y* = 7.5 − 3*x* Simplify.

Since 8*x* + 2*y* = 18 and *y* = 7.5  3*x*, substitute 7.5  3*x* in for *y* in the first equation and solve for *x*.

8*x* + 2*y* = 18 Write the equation.

8*x* + 2(7.5  3*x*) = 18 Replace *y* with 7.5  3*x*.`

8*x* + 15  6*x* = 18 Distributive Property

2*x* + 15 = 18 Simplify.

2*x* = 3 Addition Property of Equality

*x* = 1.5 Division Property of Equality

Since *x* = 1.5, substitute 1.5 for *x* in the equation *y* = 7.5  3*x*.

*y* = 7.5  3*x* Write the equation.

*y* = 7.5 – 3(1.5) Replace *x* with 1.5.

*y* = 3 Simplify.

The solution is (1.5, 3). This means that one muffin costs $1.50 and one quart of milk costs $3.