

Solving Systems of Linear Equations Three Ways

Grade 9 – Algebra 1 math · Worksheet · Standards: A-REI.C.5, A-REI.C.6, A-REI.D.11, A-CED.A.3

Name: _____ Date: _____ Class: _____

These problems train solving systems of linear equations by graphing, substitution and elimination (A-REI.C.5, A-REI.C.6 and A-REI.D.11), and deciding when there is one, none or infinitely many solutions. The last six problems model real situations as systems (A-CED.A.3): tickets, mixtures, plans, boats, coins and a garden. Check every ordered pair in both equations.

Standards: A-REI.C.5, A-REI.C.6, A-REI.D.11, A-CED.A.3 · **Level:** Grade 9 Algebra 1

Problem 1 Check a solution (easy)

Is $(3, 1)$ a solution of the system $x + y = 4$ and $2x - y = 5$?

Problem 2 Check a failing pair (easy)

Is $(2, -1)$ a solution of $y = 3x - 7$ and $x + 2y = 1$?

Problem 3 Substitution with $y = 2x$ (easy)

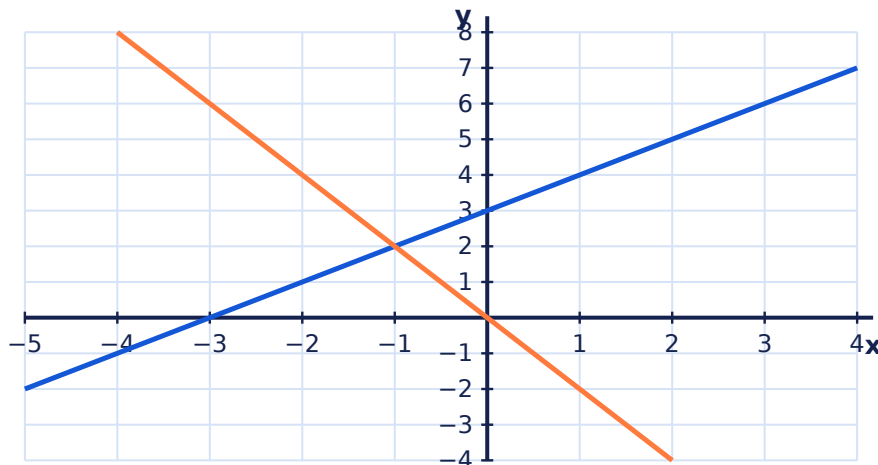
Solve by substitution: $y = 3x$ and $x + y = 28$.

Problem 4 Substitution with $x = y + 4$ (easy)

Solve by substitution: $x = y + 4$ and $2x + y = 17$.

Problem 5 Read the graph (easy)

Two lines are drawn below. State the coordinates of the point they share.



Problem 6 Elimination by adding (medium)

Solve by elimination: $x + y = 15$ and $x - y = 5$.

Problem 7 Elimination with opposite terms (medium)

Solve by elimination: $7x + 3y = 27$ and $4x - 3y = 6$.

Problem 8 Scale one equation (medium)

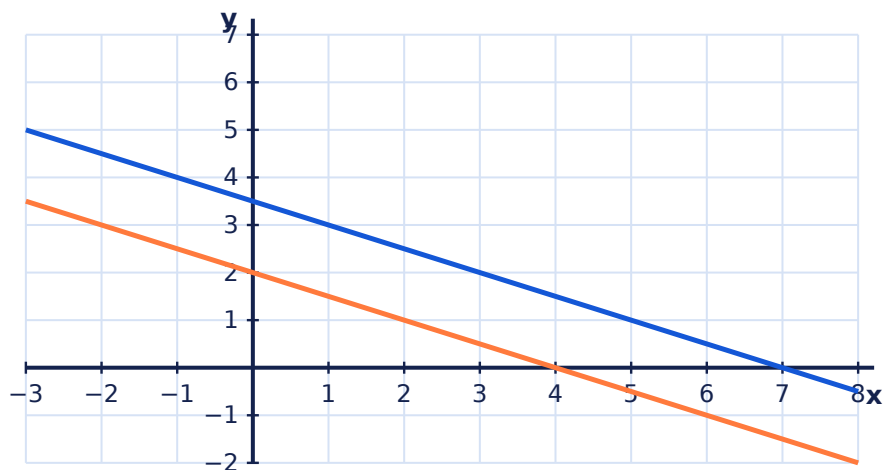
Solve: $2x + 5y = 26$ and $3x - y = 5$.

Problem 9 Scale both equations (medium)

Solve: $4x + 3y = 25$ and $3x - 2y = 6$.

Problem 10 No solution (medium)

Solve $2x + 4y = 14$ and $2x + 4y = 8$, and explain the result with the graph.



The lines $2x + 4y = 14$ and $2x + 4y = 8$.

Problem 11 Infinitely many solutions (medium)

Solve $10x - 4y = 14$ and $5x - 2y = 7$.

Problem 12 Why elimination works (medium)

Replace the second equation of $x + y = 9$, $2x + 5y = 33$ by (second) $- 2 \cdot$ (first). Show that the new system has the same solution.

Problem 13 Solve by graphing (medium)

Solve by graphing $y = 2x - 1$ and $y = -x + 8$.

Problem 14 Two functions equal (medium)

Find the value of x where $f(x) = 4x - 7$ equals $g(x) = -x + 13$, and the common output.

Problem 15 Ticket sales (hard)

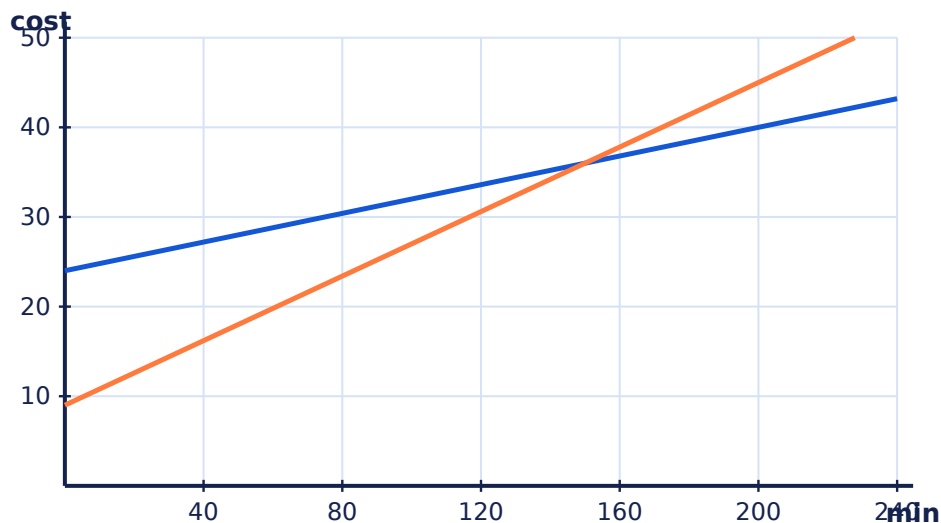
A school play sold 480 tickets. Adult tickets cost \$12 and student tickets cost \$7. The total was \$4,530. How many of each kind were sold?

Problem 16 Coffee mixture (hard)

A shop mixes \$8-per-pound beans with \$14-per-pound beans to make 10 pounds that cost \$10.40 per pound. How many pounds of each?

Problem 17 Phone plans (hard)

Plan A costs \$24 plus \$0.08 per minute. Plan B costs \$9 plus \$0.18 per minute. At what usage are the two bills equal, and what is that bill? Use the graph.



Plan A (blue) and Plan B (orange).

Problem 18 Kayak and river (hard)

A kayaker paddles 18 miles with the river current in 2 hours, then 18 miles back against it in 3 hours. How fast does the kayaker paddle in still water, and how fast does the river flow?

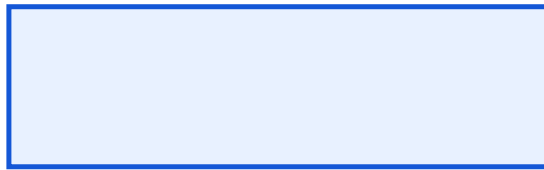
Problem 19 Nickels and dimes (hard)

A jar has 35 coins, all nickels and dimes, worth \$2.80. How many of each coin?

Problem 20 Garden dimensions (hard)

The length of a rectangular garden is 3 feet more than twice its width, and its perimeter is 66 feet. Find both dimensions.

w



$$l = 2w + 3$$

A rectangular garden.