

Graphing Inequalities and Systems with Shaded Regions

Grade 9 – Algebra 1 math · Worksheet · Standards: A-REI.D.12, A-CED.A.3

Name: _____ Date: _____ Class: _____

These problems train graphing linear inequalities with solid or dashed boundaries, shading the correct half-plane and checking points (A-REI.D.12). Middle problems graph systems and read systems from pictures. The last six problems turn real limits into constraints and test feasible points (A-CED.A.3): budgets, shipping, food plans and earnings.

Standards: A-REI.D.12, A-CED.A.3 · **Level:** Grade 9 Algebra 1

Problem 1 Test two points (easy)

Decide whether each point is a solution of $y \geq 2x + 1$: (3, 9) and (1, 2).

Problem 2 Solid or dashed (easy)

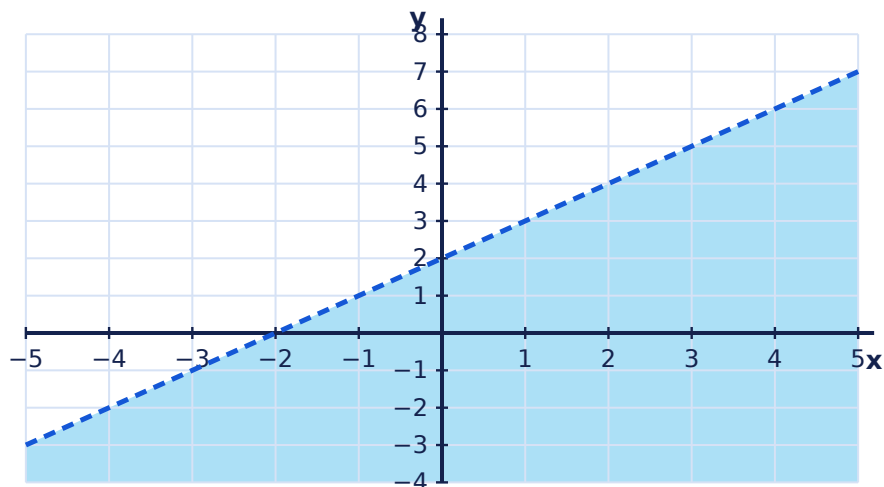
Tell whether the boundary line is solid or dashed. (a) $y < 7x - 9$ (b) $y \geq -5x + 11$ (c) $x \leq 13$.

Problem 3 Which side to shade (easy)

For $y > -6x + 14$, test the origin and say which side of the boundary to shade.

Problem 4 Write from a graph (easy)

Write the inequality graphed below.



The shaded region of an inequality.

Problem 5 Check a point in a system (easy)

Is $(-2, 3)$ a solution of the system $y < x + 6$ and $y \geq -x$?

Problem 6 Graph a solid half-plane (medium)

Graph $y \leq -\frac{1}{2}x + 3$.

Problem 7 Graph from standard form (medium)

Graph $3x + 2y > 12$.

Problem 8 Vertical and horizontal boundaries (medium)

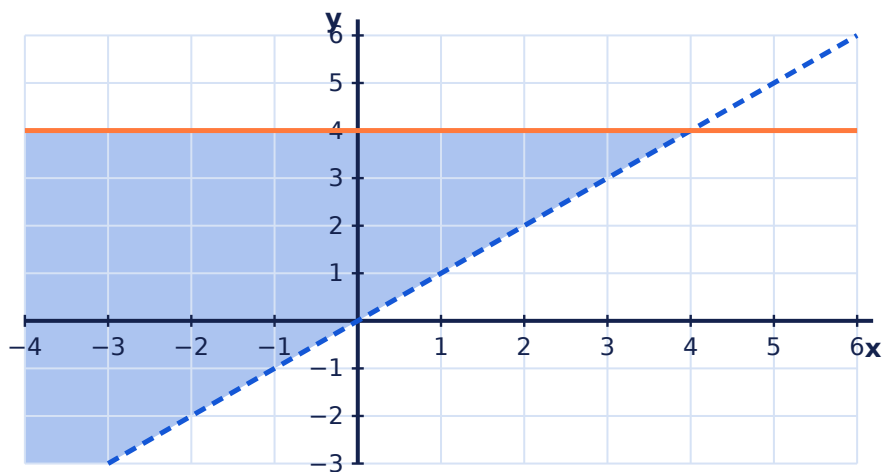
Graph the system $x < -1$ and $y \geq 2$.

Problem 9 Solve for y first (medium)

Rewrite $4x - 2y \leq 10$ so that y is alone, then describe the graph.

Problem 10 Write a system from a graph (medium)

Write the system of inequalities whose solution is the shaded region.



The shaded region of a system.

Problem 11 Graph a system (medium)

Graph the system $y \geq x - 2$ and $y < -x + 4$, and say whether $(0, 0)$ is a solution.

Problem 12 Test several points (medium)

Which of $(4, 1)$, $(5, 3)$, $(3, -2)$ and $(6, 0)$ satisfy both $2x + y \leq 10$ and $x - y > 1$?

Problem 13 Triangle region (medium)

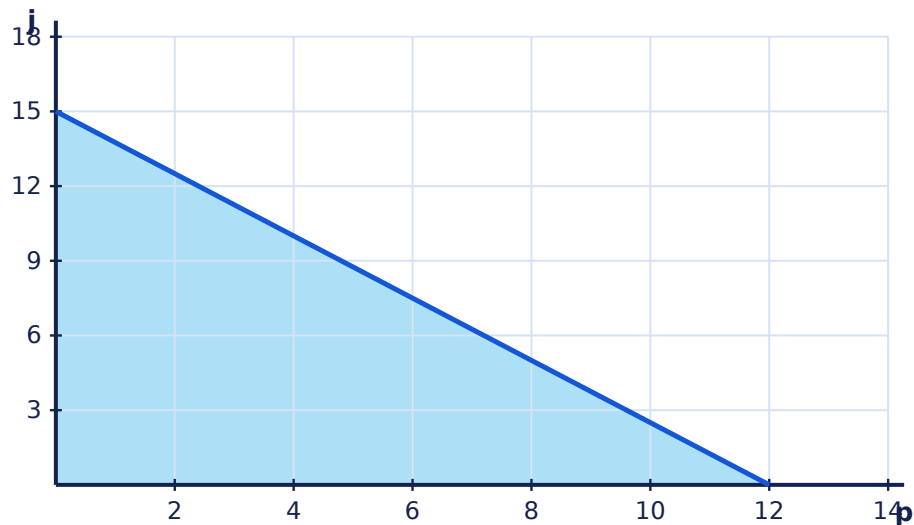
Graph the system $x \geq 0$, $y \geq 0$ and $x + y \leq 9$, and list the corner points.

Problem 14 No overlap (medium)

Explain why $y \geq 8x + 3$ and $y \leq 8x - 7$ has no solution.

Problem 15 Snack cart budget (hard)

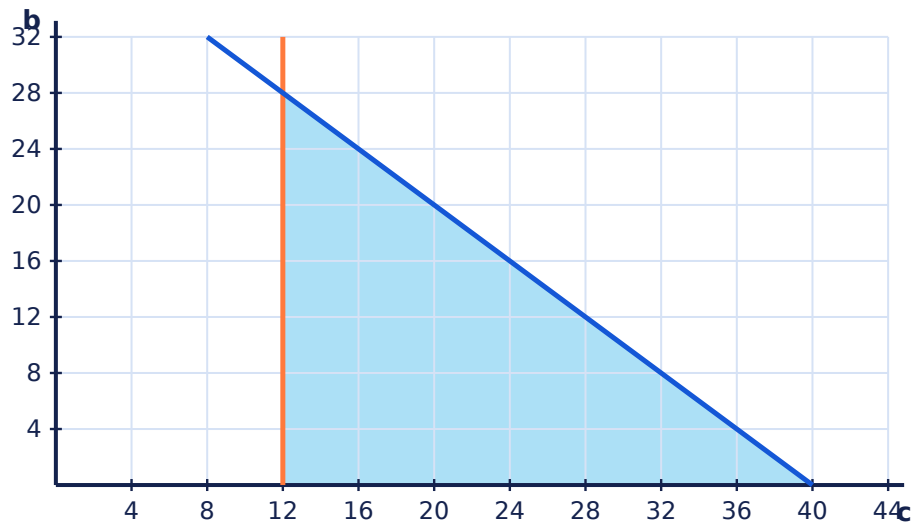
A cart sells pretzels at \$2.50 and juices at \$2.00. A club spends at most \$30. Write an inequality, then test (6, 7), (8, 5) and (9, 6), where the first number is the pretzels. Use the graph.



Spending at most \$30: pretzels (p) and juices (j).

Problem 16 Bake sale constraints (hard)

A bake sale will have at most 40 items, with at least 12 cupcakes. Let c be cupcakes and b brownies. Write the constraints, find the corner points of the feasible region and decide whether (15, 20) and (10, 25) are feasible.



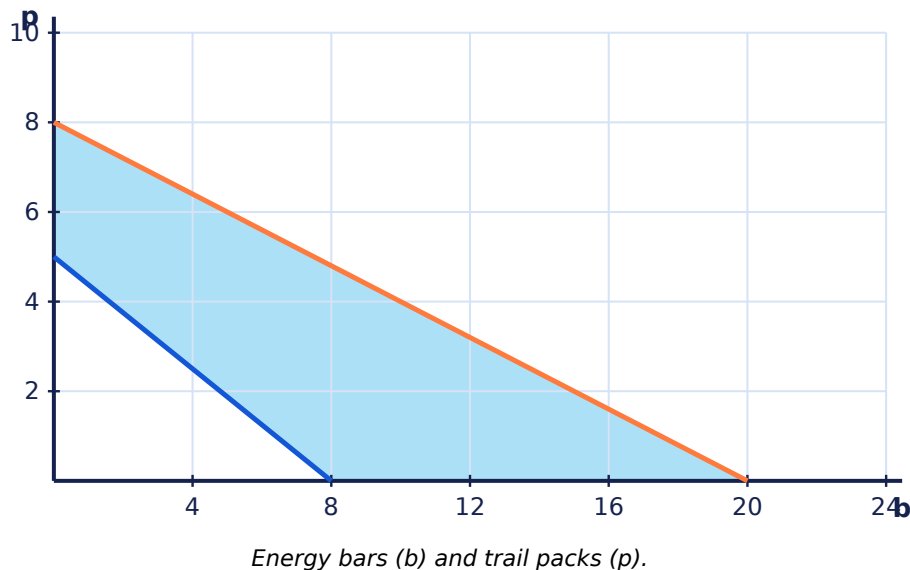
Cupcakes (c) and brownies (b).

Problem 17 Shipping limits (hard)

A shipment of robotics kits (3 pounds each) and sensors (0.5 pound each) can weigh at most 30 pounds, and it needs at least 2 kits. Write the constraints. Is (5, 20) allowed? Is (9, 10)? How many sensors fit with 2 kits?

Problem 18 Hiking food plan (hard)

A hiker needs at least 2,000 calories from energy bars (250 calories, 2 oz) and trail packs (400 calories, 5 oz) and can carry at most 40 oz of food. Write a system. Test (4, 3), (2, 2) and (10, 4), where the first number is the bars.

**Problem 19 Weekly earnings plan** (hard)

Ava earns \$12 per hour babysitting and \$15 per hour tutoring. She wants to earn at least \$240 a week and work at most 20 hours. Write a system, and decide which of (10, 8), (15, 3), (4, 12) and (5, 15) are feasible (babysitting hours first).

Problem 20 Shirts and hats (hard)

A club sells shirts at \$15 and hats at \$9. It wants revenue of at least \$360 but can stock at most 30 items in total. Write the system, find where the two boundary lines meet and decide whether 20 shirts and 8 hats work.