

Graphing Inequalities and Systems with Shaded Regions

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

Use this answer key to score the test. Award credit for a correct boundary even if the shading is reversed, and accept any valid feasible point where a question asks for an example.

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

Question 1 Test points (2 points)

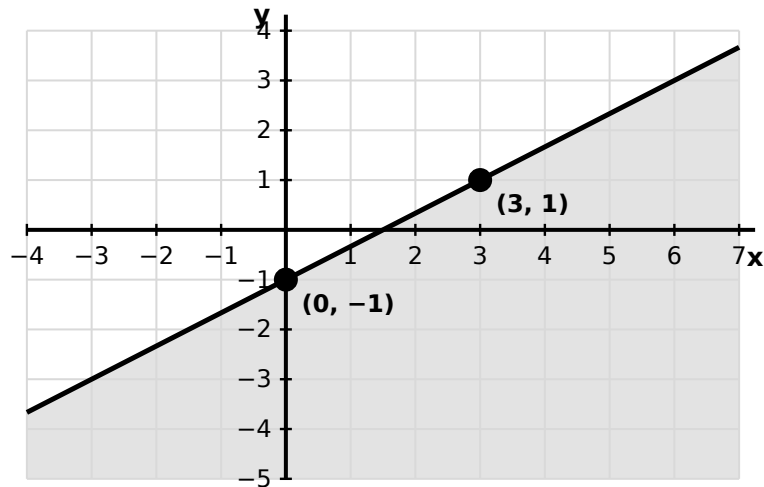
(a) $7 < 3(4) - 4 = 8$ is true: **solution**.

(b) $2 < 3(2) - 4 = 2$ is false (equal): **not a solution**.

Scoring: 1 point per part.

Question 2 Graph an inequality (2 points)

The boundary has y-intercept -1 and slope $2/3$, so it passes through $(0, -1)$ and $(3, 1)$. It is solid. Test $(0, 0)$: $0 \leq -1$ is false, so shade below the line (away from the origin).



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

Scoring: 1 point for a correct solid boundary, 1 point for the correct shading.

Question 3 Write the inequality (2 points)

The line passes through (0, 3) and (3, 0), so $y = -x + 3$. It is solid and the shading is above: $y \geq -x + 3$.

$$y \geq -x + 3$$

Scoring: 1 point for the boundary, 1 point for the symbol.

Question 4 Solve for y (3 points)

(a) $-3y > -6x + 9$. Divide by -3 and reverse: $y < 2x - 3$.

(b) Strict inequality: dashed.

(c) $0 < 2(0) - 3 = -3$ is false, so (0, 0) is not in the solution set.

$$y < 2x - 3; \text{dashed; no}$$

Scoring: 1 point per part.

Question 5 Read a system (3 points)

(a) The solid line is $y = x - 1$ with shading above: $y \geq x - 1$. The dashed line is $y = -x + 5$ with shading below: $y < -x + 5$.

(b) $2.5 \geq 0.5 - 1 = -0.5$ is true, and $2.5 < -0.5 + 5 = 4.5$ is true.

$$y \geq x - 1 \text{ and } y < -x + 5$$

Scoring: (a) 1 point per inequality including the correct symbol; (b) 1 point.

Question 6 Choir trip (3 points)

(a) $a + s \leq 50$ and $20a + 12s \leq 800$.

(b) (30, 20): $50 \leq 50$ is true, but $600 + 240 = 840 > 800$: **not feasible**.

(c) (25, 25): $50 \leq 50$ and $500 + 300 = 800 \leq 800$: **feasible**.

Scoring: 1 point per part.

Question 7 Jewelry table (3 points)

(a) $b + n \geq 10$, $n \leq 6$, $b \geq 0$, $n \geq 0$.

(b) (4, 6): $10 \geq 10$ and $6 \leq 6$, feasible. (3, 6): $9 < 10$, no. (5, 4): $9 < 10$, no.

(c) For example (10, 0) or (8, 3).

Only (4, 6)

Scoring: 1 point per part; accept any valid extra point.

Question 8 No solution (2 points)

The lines are parallel (slope 4). The solution would need y above the upper line $y = 4x + 9$ and below the lower line $y = 4x - 2$, which is impossible. Algebraically it needs $4x + 9 < y < 4x - 2$, so $9 < -2$, which is false.

No solution

Scoring: 1 point for noting the parallel lines or the contradiction, 1 point for the clear explanation.