

# Systems of Linear Inequalities

PERT Math • Section 6.5

Name: \_\_\_\_\_

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## Quick Review and Helpful Hints

A system asks for values that satisfy every relationship at the same time. The solution may be one point, no point, or infinitely many points, depending on how the graphs or equations meet.

▶ **Example:** Solve  $y = x + 4$  and  $y = 10$ .

**Work:** Substitute 10 for  $y$ :  $10 = x + 4$ , so  $x = 6$ . The solution is the point where both equations agree.

★ **Answer:** (6, 10)

## ◆ Practice Problems

Solve each problem. Show enough work that another student could follow your thinking.

- |  |  |
|--|--|
| 1. Does (0, 0) satisfy $y > x + 2$ ? _____               | 6. Does (2, 1) satisfy both $y < x + 1$ and $y \geq -x + 2$ ? _____            |
| 2. Does (3, 5) satisfy $y \leq 2x$ ? _____               | 7. Does (4, 0) satisfy $x + y \leq 3$ ? _____                                  |
| 3. Boundary for $y < -x + 4$ : solid or dashed? _____    | 8. Graphically, what is the solution to a system of linear inequalities? _____ |
| 4. Boundary for $y \geq 3x - 1$ : solid or dashed? _____ | 9. Test (0, 0) in $2x + y \leq 6$ . _____                                      |
| 5. Which side is shaded for $y \leq x - 5$ ? _____       | 10. Test (5, 2) in $x - 2y > 0$ . _____  |

## ◆ Word Problems

11. A club can spend at most \$100 on shirts  $s$  and hats  $h$ : shirts cost \$8, hats \$5. Write the inequality. \_\_\_\_\_
12. A theater needs at least 60 total seats from rows  $r$  and balcony seats  $b$ . Write the inequality. \_\_\_\_\_



## Answer Keys

- |                   |                                  |
|-------------------|----------------------------------|
| 1. No             | 7. No                            |
| 2. Yes            | 8. The overlapping shaded region |
| 3. Dashed         | 9. True                          |
| 4. Solid          | 10. True                         |
| 5. Below the line | 11. $8s + 5h \leq 100$           |
| 6. Yes            | 12. $r + b \geq 60$              |

### Step-by-Step Explanations

- Drop the point in: it claims  $0 > 2$ , which just isn't true — so the origin sits outside.
- Plug it in and you get  $5 \leq 6$  — true, so this point belongs to the solution.
- A strict  $<$  leaves the line itself out, so draw it dashed to show those points don't count.
- The little line under  $\geq$  means equal is allowed, so the boundary is part of the answer — draw it solid.
- You want  $y$  no bigger than the line, and smaller  $y$ -values live underneath — so shade down there.
- Test it in each:  $1 < 3$  checks out and  $1 \geq 0$  does too, so the point clears both rules.
- Adding gives  $4 + 0 = 4$ , but 4 is bigger than 3 — so this point misses the region.
- Each inequality shades its own zone; the answer is where those shadings stack up together.
- The origin makes the left side 0, and  $0 \leq 6$  holds easily — so it's a winner.
- Work it out:  $5 - 2(2) = 1$ , and  $1 > 0$  is true — the point satisfies the inequality.
- Each item costs price times count, and at most \$100 caps the total — so the sum stays  $\leq 100$ .
- At least sets a floor, not a ceiling: the seats together have to reach 60 or climb past it.



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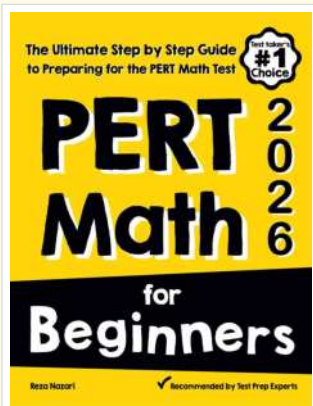
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