Linear equations and inequalities practice test 1

16 questions | 40 marks | 55 minutes

Solve and interpret linear equations, simultaneous equations and inequalities.

Equivalent correct methods earn the corresponding marks.

1. Solve $3x + 5 = 17$. [2 marks]

$3x = 12$, hence $x = 4$.

Answer: $x = 4$

2. Solve $5x - 4 = 2x + 11$. [2 marks]

$3x = 15$.

Answer: $x = 5$

3. Solve $2(3x - 1) = 4x + 10$. [2 marks]

$6x - 2 = 4x + 10$ gives $2x = 12$.

Answer: $x = 6$

4. Solve $\frac{x+2}{3} = 4$. [2 marks]

$x + 2 = 12$.

Answer: $x = 10$

5. Solve $x + y = 10$ and $x - y = 4$. [2 marks]

Add to get $2x = 14$; then $y = 3$.

Answer: $(7, 3)$

6. Solve $y = 2x$ and $y = x + 3$. [2 marks]

$2x = x + 3$ gives $x = 3$.

Answer: $(3, 6)$

7. Solve $2x + y = -1$ and $x + 2y = 7$. [3 marks]

Double the first equation: $4x + 2y = -2$.

Subtract the second equation: $3x = -9$, so $x = -3$.

Substitute into $2x + y = -1$: $-6 + y = -1$, so $y = 5$.

Check: $2(-3) + 5 = -1$ and $-3 + 2(5) = 7$.

Answer: $(-3, 5)$

8. Classify the solution set of $2x - y = 5$ and $4x - 2y = 10$. [2 marks]

The second is twice the first.

Answer: Infinitely many points on $2x - y = 5$.

9. Explain why $y = 3x + 1$ and $y = 3x + 4$ have no simultaneous solution. [2 marks]

Their gradients are equal and their intercepts differ.

Answer: They are parallel distinct lines.

10. Solve $4x - 3 \leq 13$. [2 marks]

$4x \leq 16$.

Answer: $x \leq 4$

11. Solve $-2x + 7 > 15$. [3 marks]

$-2x > 8$; division by -2 reverses the symbol.

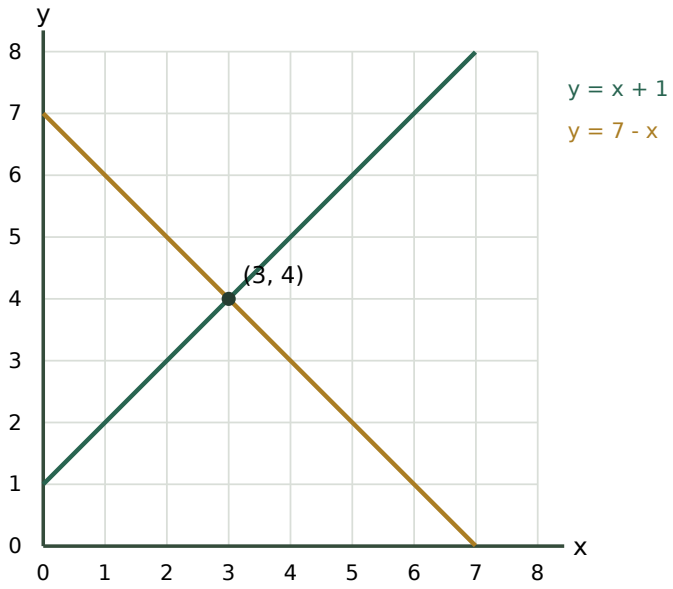
Answer: $x < -4$

12. Solve $3(x - 1) \geq x + 5$. [2 marks]

$3x - 3 \geq x + 5$, hence $2x \geq 8$.

Answer: $x \geq 4$

13. On the grid, draw $y = x + 1$ and $y = 7 - x$. State their intersection. [3 marks]



$x + 1 = 7 - x$ gives $x = 3, y = 4$.

Answer: $(3, 4)$

14. For $y < 2x + 3$, state the boundary style and determine whether $(0, 0)$ is allowed. [3 marks]

The inequality is strict, and $0 < 3$ is true.

Answer: Dashed boundary; $(0, 0)$ is allowed.

15. Consider $x \geq 0$, $y \geq 0$, $x + y \leq 5$. [4 marks]

(a) List the vertices of the feasible region. [2 marks]

Use the origin and the intercepts of $x + y = 5$.

Answer: $(0, 0), (5, 0), (0, 5)$.

(b) Is $(3, 3)$ feasible? Explain. [2 marks]

Both coordinates are nonnegative, but $3 + 3 = 6 > 5$.

Answer: No.

16. A factory makes packages A and B. Each A uses 3 red parts and 2 blue parts; each B uses 1 red part and 3 blue parts. Exact totals are 20 red and 18 blue parts. Find the package counts and check them. [4 marks]

Let a and b be the package counts. Then $3a + b = 20$ and $2a + 3b = 18$.

From the first equation, $b = 20 - 3a$. Substitute: $2a + 3(20 - 3a) = 18$.

This gives $-7a = -42$, so $a = 6$ and $b = 2$.

Check red: $3(6) + 2 = 20$; blue: $2(6) + 3(2) = 18$.

Answer: 6 A and 2 B.