Linear equations and inequalities practice test 2

16 questions | 40 marks | 55 minutes

Solve and interpret linear equations, simultaneous equations and inequalities.

Equivalent correct methods earn the corresponding marks.

1. Solve $7x - 9 = 19$. [2 marks]

$7x = 28$, hence $x = 4$.

Answer: $x = 4$

2. Solve $4(x + 2) = 2x + 22$. [2 marks]

$4x + 8 = 2x + 22$ gives $2x = 14$.

Answer: $x = 7$

3. Solve $\frac{x}{2} + \frac{1}{3} = \frac{11}{6}$. [3 marks]

Multiply by 6: $3x + 2 = 11$.

Answer: $x = 3$

4. Check whether $x = -2$ solves $3(x - 1) = 2x - 5$. [2 marks]

Both sides equal -9.

Answer: Yes.

5. Solve $y = 4x - 3$ and $y = x + 6$. [2 marks]

$4x - 3 = x + 6$ gives $x = 3$.

Answer: $(3, 9)$

6. Solve $3x + y = 14$ and $x - y = 2$. [2 marks]

Add to get $4x = 16$.

Answer: $(4, 2)$

7. Solve $2x + 3y = 7$ and $3x - 2y = 2$. Give exact values. [3 marks]

Multiply the first equation by 2: $4x + 6y = 14$.

Multiply the second equation by 3: $9x - 6y = 6$.

Add to get $13x = 20$, so $x = \frac{20}{13}$.

Substitute into $2x + 3y = 7$: $3y = \frac{51}{13}$, so $y = \frac{17}{13}$.

Check: $\frac{40 + 51}{13} = 7$ and $\frac{60 - 34}{13} = 2$.

Answer: $(x, y) = (\frac{20}{13}, \frac{17}{13})$.

8. Classify $x + 2y = 8$ and $2x + 4y = 11$. [2 marks]

Twice the first has right side 16, which contradicts 11.

Answer: No solution.

9. Find k so that $y = -2x + k$ and $2x + y = 7$ describe the same line. [2 marks]

The second is $y = -2x + 7$.

Answer: $k = 7$

10. Solve $5 - 3x \geq 14$. [2 marks]

$-3x \geq 9$; divide by a negative.

Answer: $x \leq -3$

11. Solve $2(x+4) < 5x - 1$. [2 marks]

$2x + 8 < 5x - 1$ gives $9 < 3x$.

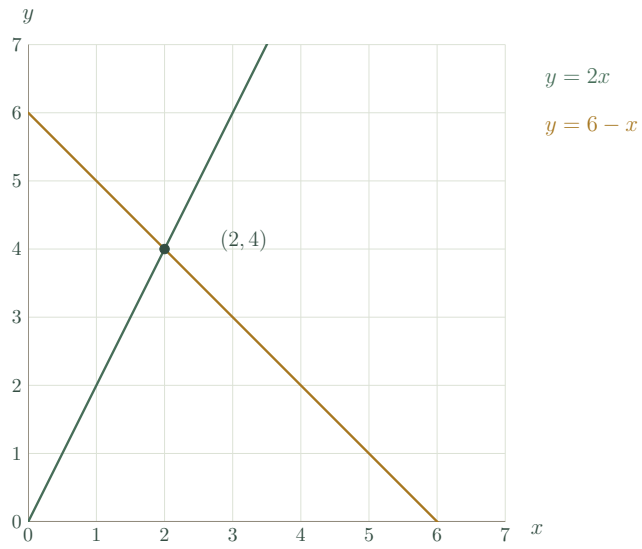
Answer: $x > 3$

12. Solve $-\frac{x+1}{2} \leq 3$. [3 marks]

Multiply by -2: $x + 1 \geq -6$.

Answer: $x \geq -7$

13. Draw $y = 2x$ and $y = 6 - x$ on the supplied grid and state their intersection. [3 marks]



$2x = 6 - x$, hence $x = 2, y = 4$.

Answer: $(2, 4)$

14. Describe the region $y \geq x + 2$. Is the boundary included? [2 marks]

Equality is included.

Answer: On or above the solid line $y = x + 2$; yes.

15. Consider $x \geq 0$, $y \geq 0$, $2x + y \leq 6$. [4 marks]

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

Use the origin and the intercepts of the sloping boundary.

Answer: $(0, 0), (3, 0), (0, 6)$.

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

$2(2) + 2 = 6$ and both coordinates are nonnegative.

Answer: Yes, on the boundary.

16. There are 22 vehicles, each a car with four wheels or a motorbike with two wheels. There are 68 wheels. Find each count. [4 marks]

$c + m = 22$, $4c + 2m = 68$.

Subtract twice the first: $2c = 24$; then $m = 10$.

Answer: 12 cars and 10 motorbikes.