

Systems of Linear Equations: math test solutions, Grade 9 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Checking pairs

/ 2 pts

$(4, -2)$: $3(4) + 2(-2) = 8$ and $4 - 3(-2) = 10$, both true, so it is a solution. (1 pt)

$(1, 5)$: $3(1) + 2(5) = 13 \neq 8$, so it is not a solution. (1 pt)

2 Solve by graphing

/ 3 pts

Table: $y = x - 2$ gives -2, -1, 0, 1, 2; $y = -2x + 7$ gives 7, 5, 3, 1, -1. (1 pt)

The lines cross at $(3, 1)$, the only x where both rows are equal. (1 pt)

Check: $3 - 2 = 1$ and $-2(3) + 7 = 1$. The solution is $(3, 1)$. (1 pt)

3 Substitution

/ 3 pts

Substitute: $5x + 2(-2x + 1) = 1$. (1 pt)

So $5x - 4x + 2 = 1$, which gives $x = -1$. (1 pt)

Then $y = -2(-1) + 1 = 3$. Check: $5(-1) + 2(3) = 1$. The solution is $(-1, 3)$. (1 pt)

4 Elimination

/ 3 pts

Multiply the first equation by 3 and the second by 2: $12x + 15y = 36$ and $12x - 14y = -80$. (1 pt)

Subtract: $29y = 116$, so $y = 4$. (1 pt)

Then $4x + 20 = 12$, so $x = -2$. Check: $6(-2) - 7(4) = -40$. The solution is $(-2, 4)$. (1 pt)

5 How many solutions?

/ 2 pts

(a) The second equation gives $-2y = -6x + 4$, so $y = 3x - 2$: same line, **infinitely many solutions**. (1 pt)

(b) The second equation gives $y = -x + 5$: slope -1 like the first line but intercept 5 instead of 1. The lines are parallel, so there is **no solution**. (1 pt)

6 Bike rental

/ 4 pts

(a) Shop A: $c = 15 + 4h$. Shop B: $c = 9 + 6h$. (1 pt)

(b) Set them equal: $15 + 4h = 9 + 6h$, so $6 = 2h$ and $h = 3$. Then $c = 15 + 4(3) = 27$. After 3 hours both shops charge 27 dollars. (2 pts)

(c) For $h = 5$: shop A costs $15 + 20 = 35$ dollars and shop B costs $9 + 30 = 39$ dollars. Shop A is cheaper. (1 pt)

7 Inequalities

/ 3 pts

- (a) The line $x + y = 6$ is solid (because of $\leq$); the line $y = 2x - 3$ is dashed (because of $>$). (1 pt)
- (b) $(1, 1)$: $1 + 1 = 2 \leq 6$ and $1 > 2(1) - 3 = -1$, both true, so it is a solution. $(3, 2)$: $5 \leq 6$ is true but $2 > 3$ is false, so it is not a solution. (1 pt)
- (c) Solve $x + (2x - 3) = 6$: $3x = 9$, so $x = 3$ and $y = 3$. The lines meet at $(3, 3)$. (1 pt)



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