One System, Three Methods

Solve a system by table, graph, algebra, and inspection

Name: _____ Date: _____

Part 1 - Table and graph

System A

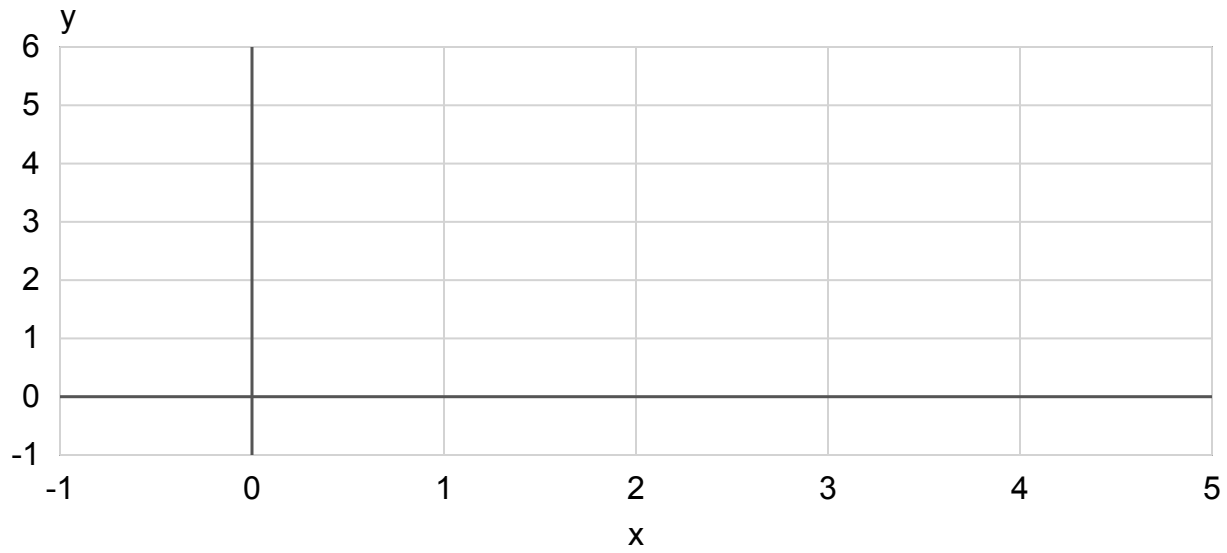
y = x + 1

y = -x + 5

1. Complete the table. For each x-value, find both y-values.

x	y = x + 1	y = -x + 5
0		
1		
2		
3		
4		

2. Plot the points from your table. Draw both lines. Label each line with its equation. Circle their intersection.



3. The solution to System A is (____, ____).

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Part 2 - Algebra and inspection

System A again

y = x + 1

y = -x + 5

4. Solve System A algebraically. Since both expressions equal y, set them equal. Show your work, then write the ordered-pair solution.

5. Solve this system by inspection. Explain what you notice about the two equations.

y = 3x - 4

2y = 6x - 8

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Answer key and teaching notes

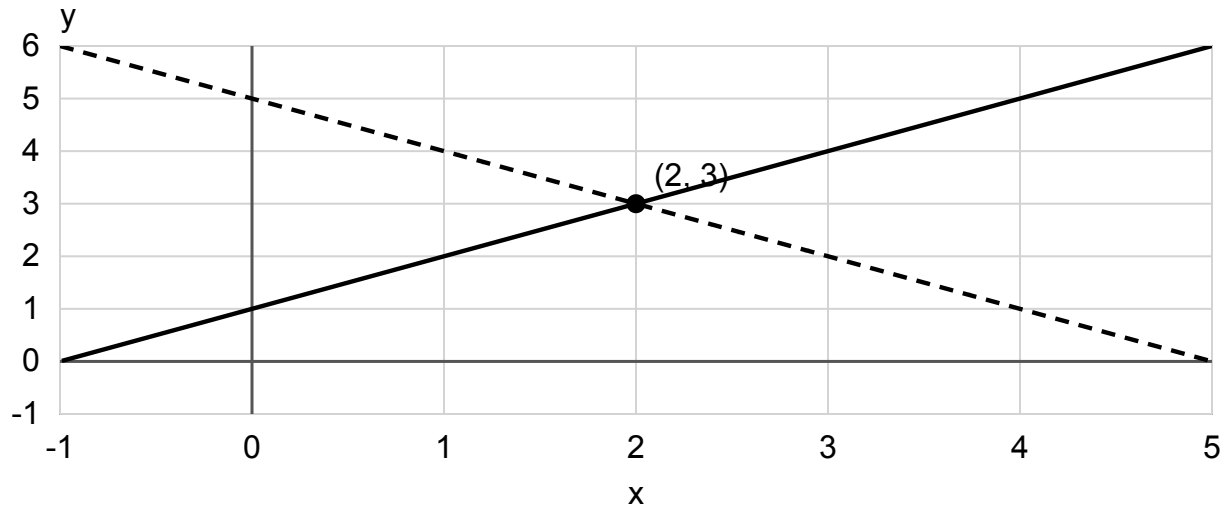
Materials and setup: Print and supply all student pages, keeping teacher-key pages separate. Provide pencils, rulers, and a large shared coordinate grid or projected grid. Students need no calculator. Before students begin, make sure the grid window shown includes x-values 0 through 4 and y-values 0 through 5.

Teacher script: “Today, one pair of lines will be solved three ways. A solution must make both equations true. On a graph, it is the point where the lines meet. In a table, look for the same ordered pair. In algebra, use the fact that both expressions equal y. Then compare your answers.” For Part 2 say: “Inspection means looking for a relationship before doing extra computation.”

Observe: While students work, check that they calculate both table rows for each x, plot ordered pairs as (x, y), extend straight lines through their points, and use a graph window containing the intersection. Ask: “Which row gives the same y-value?” and “Why may these two y-expressions be set equal?” Do not provide the intersection until students have used their own evidence.

1. Table: For y = x + 1, y-values are 1, 2, 3, 4, 5. For y = -x + 5, y-values are 5, 4, 3, 2, 1. At x = 2, both have y = 3.

2-3. Graph and solution: Plot both sets of table points and draw the lines. The solid line is y = x + 1. The dashed line is y = -x + 5. They intersect at (2, 3). Accept a graph with accurately plotted points and lines that visibly cross at (2, 3).



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Answer key and teaching notes (continued)

4. Algebra: x + 1 = -x + 5; 2x + 1 = 5; 2x = 4; x = 2. Substitute: y = 2 + 1 = 3. Solution: (2, 3). Equivalent correct substitution work is acceptable.

5. Inspection: Infinitely many solutions. Multiplying y = 3x - 4 by 2 gives 2y = 6x - 8, exactly the second equation. Both equations describe the same line. Accept “same line” with an explanation that one equation is a multiple of the other.

Source credit: New York Next Generation Mathematics Learning Standards, NY-8.EE.8.b. Benchmark focus: solve systems of two linear equations in two variables with integer coefficients graphically, numerically using a table, algebraically, and in simple cases by inspection. https://lessonmakerpro.com/standards/ny-nextgen-math/ny-8-ee-8-b