GRADE 7 ACCELERATED · UNIT 11 · LESSON 7

Solving Systems by Graphing

MA.8.AR.4.3

I can solve a system of two equations by graphing both lines and reading where they cross.

Warm-Up

1. Is $(1, 5)$ a solution of $y = 2x + 3$ and $y = x + 4$?
2. Solve: $0.5(6x + 4) = x + 8$
3. A right triangle has legs 9 and 12. Find the hypotenuse.
4. $y = 2x - 1$. Find y when $x = 0, 1$ and 2.

Warm-Up

1. Is $(1, 5)$ a solution of $y = 2x + 3$ and $y = x + 4$? **Yes**
2. Solve: $0.5(6x + 4) = x + 8$ **$x = 3$**
3. A right triangle has legs 9 and 12. Find the hypotenuse. **15**
4. $y = 2x - 1$. Find y when $x = 0, 1$ and 2. **$-1, 1, 3$**

Vocabulary

table of values

x-values you choose and the y each one gives: $x = 0$ first, then two more

solve by graphing

graph both equations on one grid; the point of intersection — where the lines intersect — is the solution

coefficient of x

the number that multiplies x: 3 in $y = 3x - 1$, -1 in $y = -x + 4$, 0 in $y = 4$

parallel lines

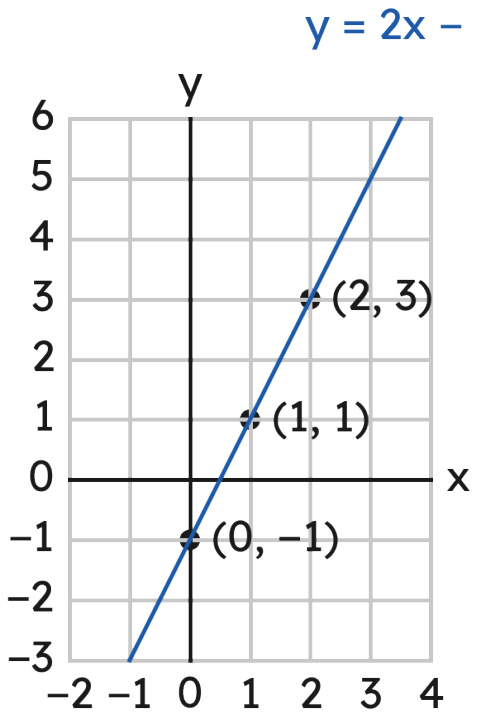
the same coefficient of x and different numbers added: the same steepness in the same direction, never meeting

Notes

I. A line from a table

y = 2x − 1

x	0	1	2
y	−1	1	3



Three points in a row: the third is the check. Draw the line past them.

Notes

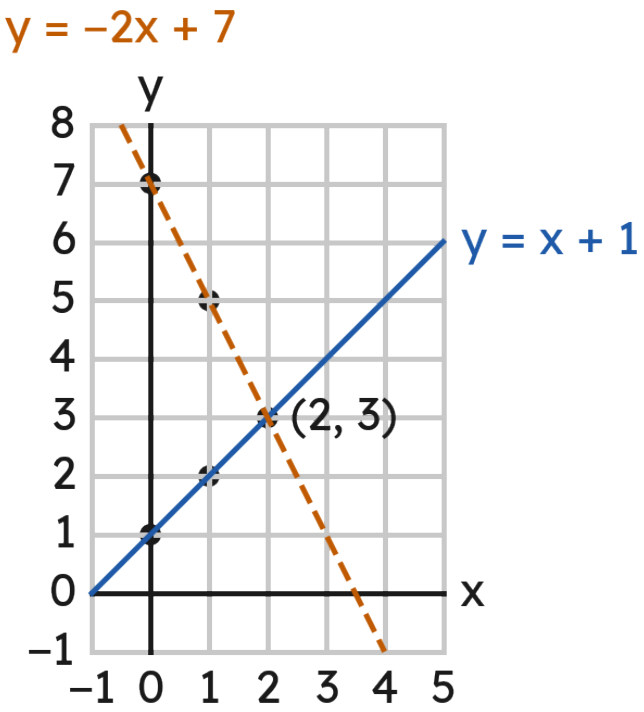
II. Solve by graphing

$y = x + 1$

x	0	1	2
y	1	2	3

$y = -2x + 7$

x	0	1	2
y	7	5	3



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

Notes

III. Not one crossing; and the check without a graph

Parallel, none — same coefficient of x, different numbers added

One line, infinitely many — one equation written two ways

$$x + 1 = -2x + 7$$

$$3x + 1 = 7$$

$$3x = 6$$

$$x = 2$$

Example 1

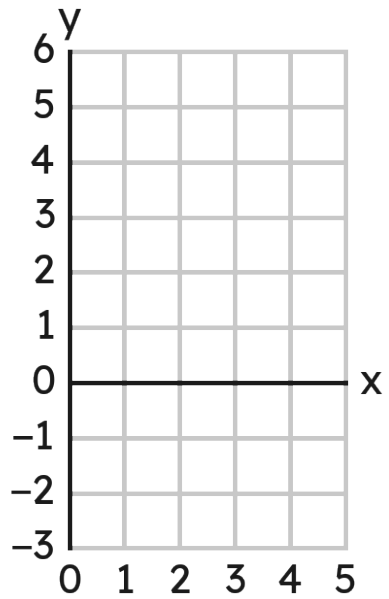
$$y = 2x - 3 \quad \text{and} \quad y = -x + 6$$

$y = 2x - 3$

x	0	1	2
y			

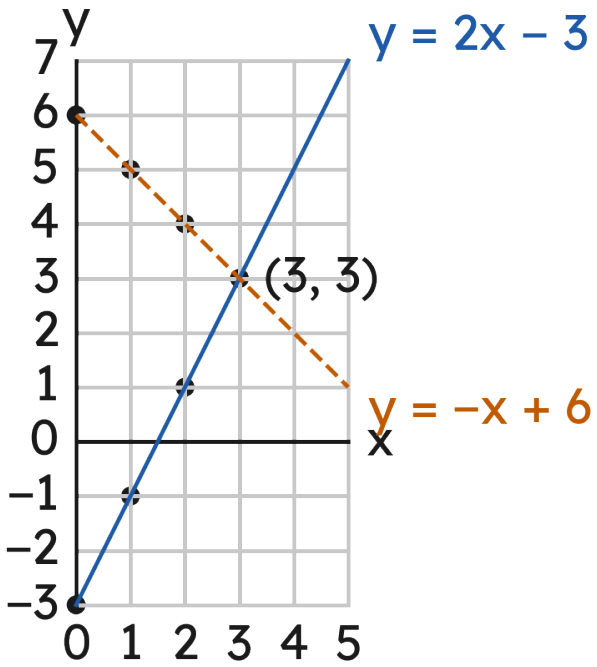
$y = -x + 6$

x	0	1	2
y			



Solve the system by graphing.

Example 1



$y = 2x - 3$: $-3, \ -1, \ 1$

$y = -x + 6$: $6, \ 5, \ 4$

$(3, 3)$: $2(3) - 3 = 3$

$-3 + 6 = 3$

Answer: (3, 3)

Your Turn

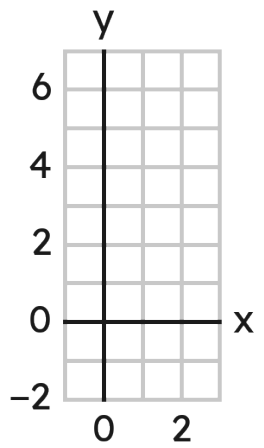
Where do $y = x - 2$ and $y = -3x + 6$ cross?

$y = x - 2$

x	0	1	2
y	−2	−1	0

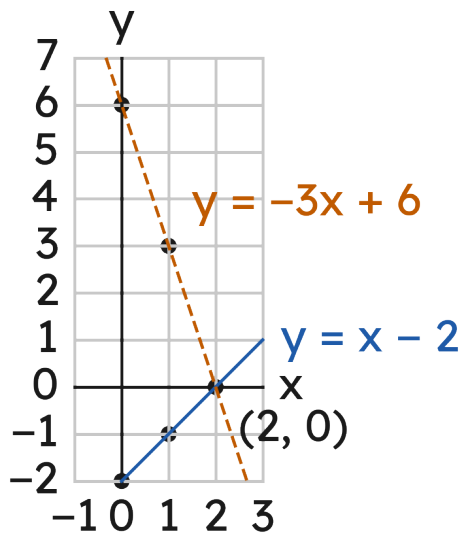
$y = -3x + 6$

x	0	1	2
y	6	3	0



Your Turn

Where do $y = x - 2$ and $y = -3x + 6$ cross?



at $x = 2$: $2 - 2 = 0$ and $-3(2) + 6 = 0$

the lines cross at $(2, 0)$

Answer: (2, 0)

Example 2

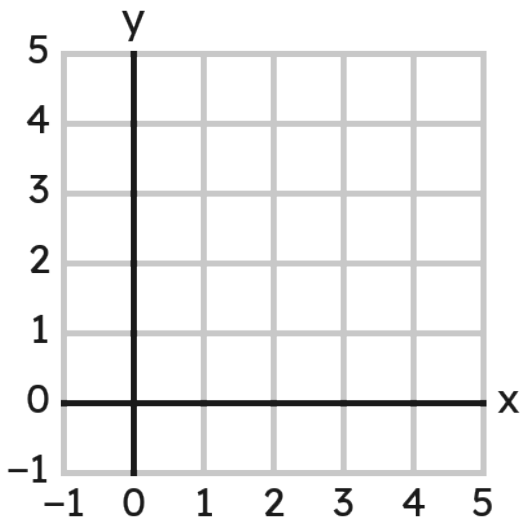
$$y = \frac{1}{2}x + 1 \quad \text{and} \quad y = -x + 4$$

$y = \frac{1}{2}x + 1$

x	0	2	4
y			

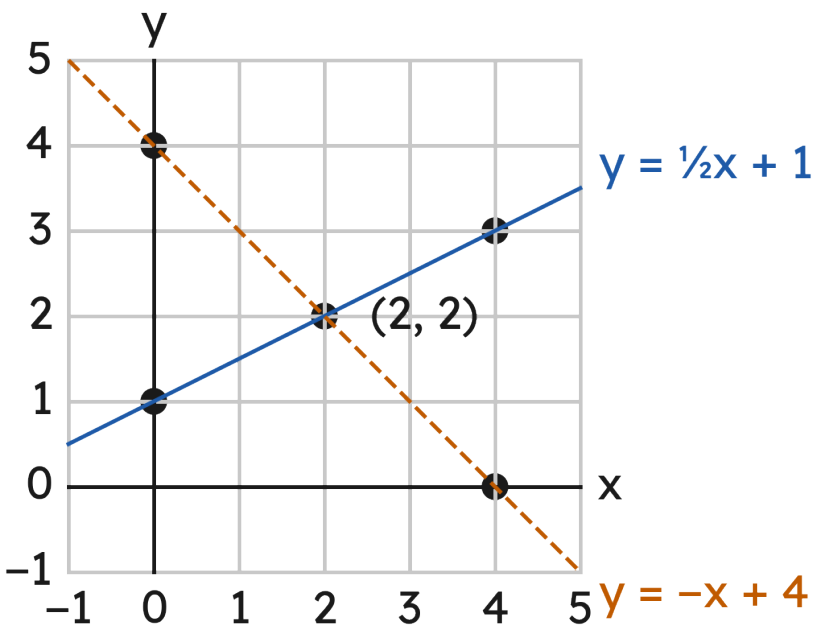
$y = -x + 4$

x	0	2	4
y			



Solve the system by graphing.

Example 2



$y = \frac{1}{2}x + 1$: 1, 2, 3

$y = -x + 4$: 4, 2, 0

(2, 2): $\frac{1}{2}(2) + 1 = 2$

$-2 + 4 = 2$

Answer: (2, 2)

Your Turn

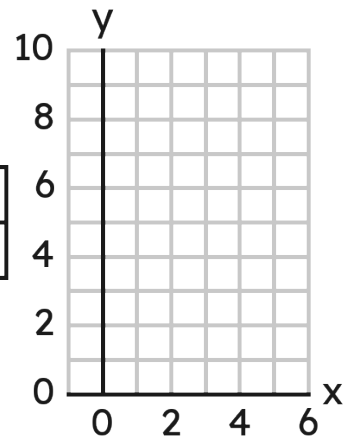
Where do $y = \frac{1}{2}x + 3$ and $y = -x + 9$ cross?

$y = \frac{1}{2}x + 3$

x	0	2	4
y	3	4	5

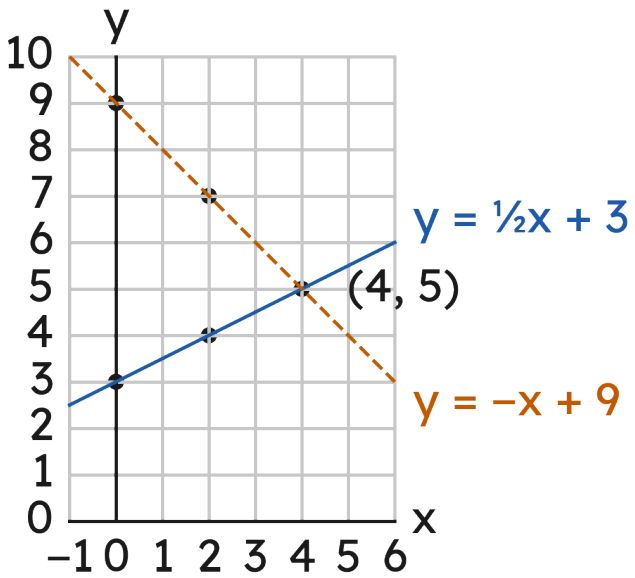
$y = -x + 9$

x	0	2	4
y	9	7	5



Your Turn

Where do $y = \frac{1}{2}x + 3$ and $y = -x + 9$ cross?

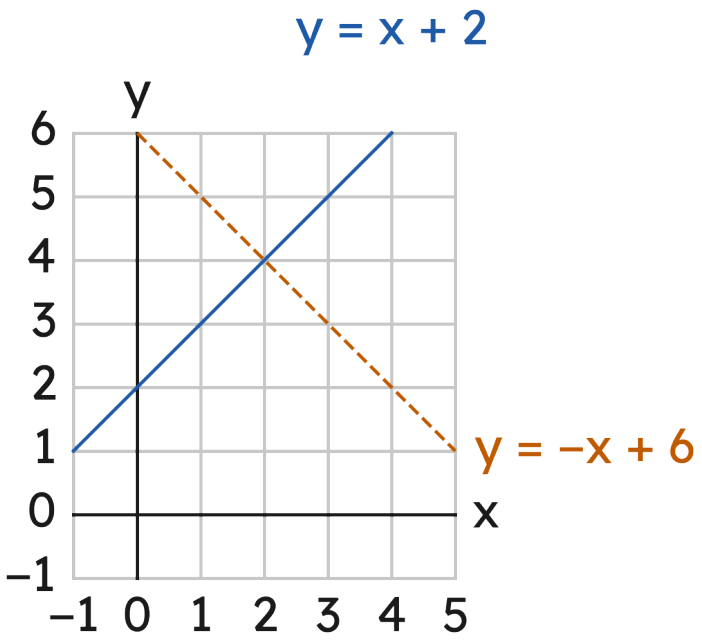


at $x = 4$: $\frac{1}{2}(4) + 3 = 5$ and $-4 + 9 = 5$

Answer: (4, 5)

Whiteboards · Question 1 of 9

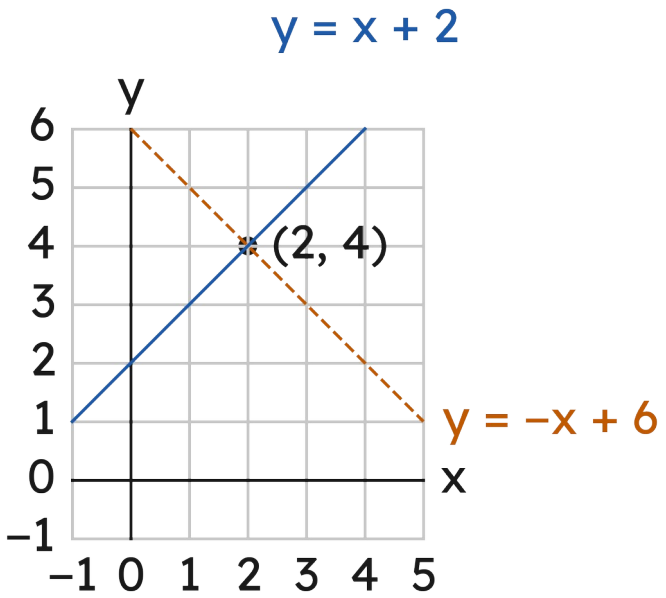
The system is graphed. What is its solution?



Answer it.

Whiteboards · Question 1 of 9

The system is graphed. What is its solution?



the lines cross at (2, 4)

$2 + 2 = 4$ and $-2 + 6 = 4$

Answer: (2, 4)

Whiteboards · Question 2 of 9

The tables are for one system. What is its solution?

$y = 3x - 5$

x	0	1	2	3	4
y	−5	−2	1	4	7

$y = x + 1$

x	0	1	2	3	4
y	1	2	3	4	5

Answer it.

Whiteboards · Question 2 of 9

The tables are for one system. What is its solution?

$y = 3x - 5$

x	0	1	2	3	4
y	−5	−2	1	4	7

$y = x + 1$

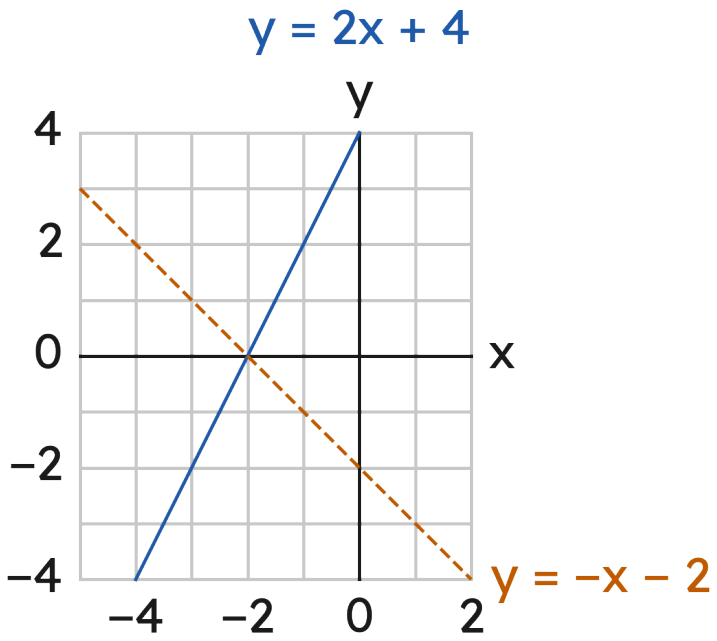
x	0	1	2	3	4
y	1	2	3	4	5

at $x = 3$: $3(3) - 5 = 4$ and $3 + 1 = 4$

Answer: (3, 4)

Whiteboards · Question 3 of 9

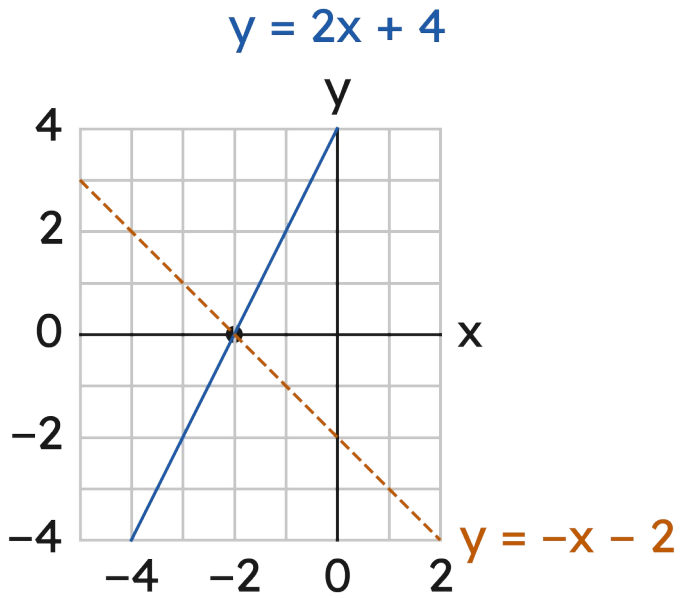
The system is graphed. What is its solution?



Answer it.

Whiteboards · Question 3 of 9

The system is graphed. What is its solution?



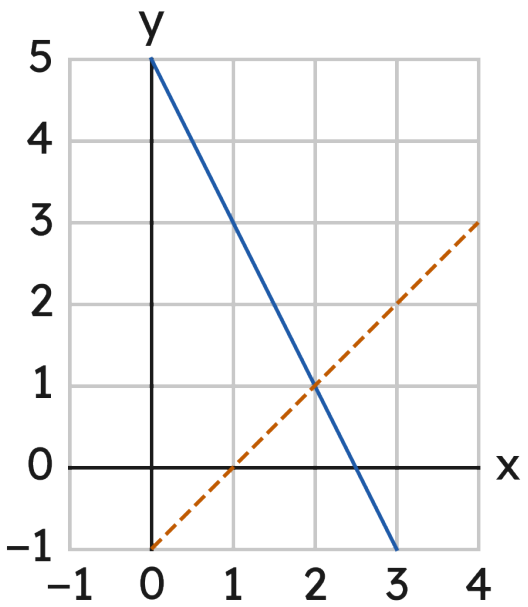
the lines cross at $(-2, 0)$

$2(-2) + 4 = 0$ and $-(-2) - 2 = 0$

Answer: (−2, 0)

Whiteboards · Question 4 of 9

$y = -2x + 5$ **and** $y = x - 1$ **are graphed. Which is the solution?**



A. (0, 5)

B. (1, 2)

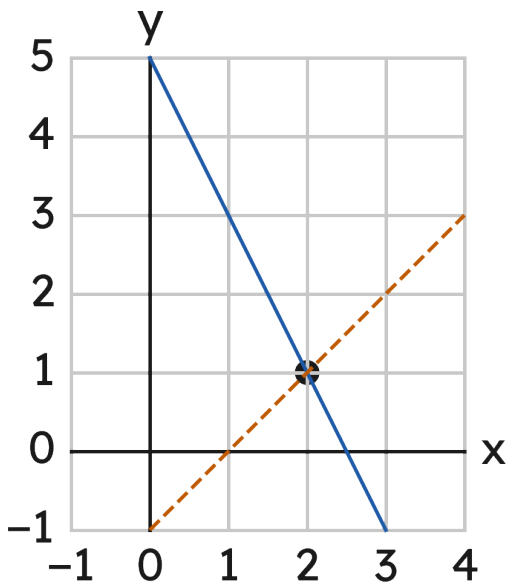
C. (2, 1)

D. (1, 0)

Answer it.

Whiteboards · Question 4 of 9

$y = -2x + 5$ **and** $y = x - 1$ **are graphed. Which is the solution?**



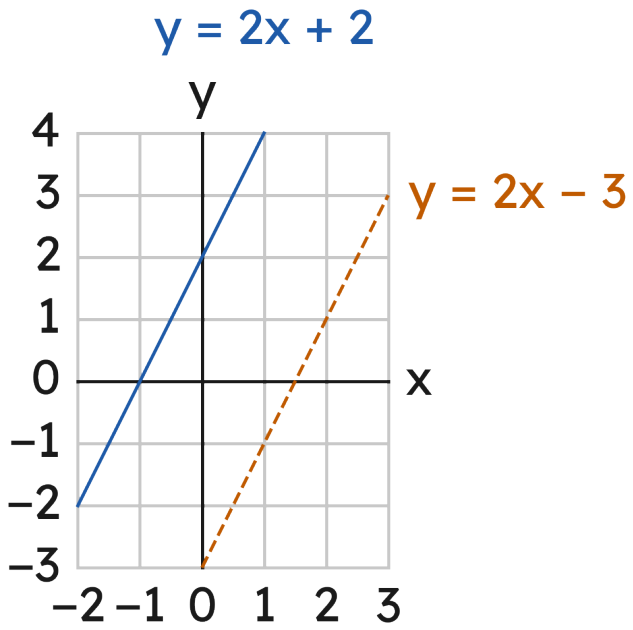
the lines cross at (2, 1)

$-2(2) + 5 = 1$ and $2 - 1 = 1$

Answer: C — (2, 1)

Whiteboards · Question 5 of 9

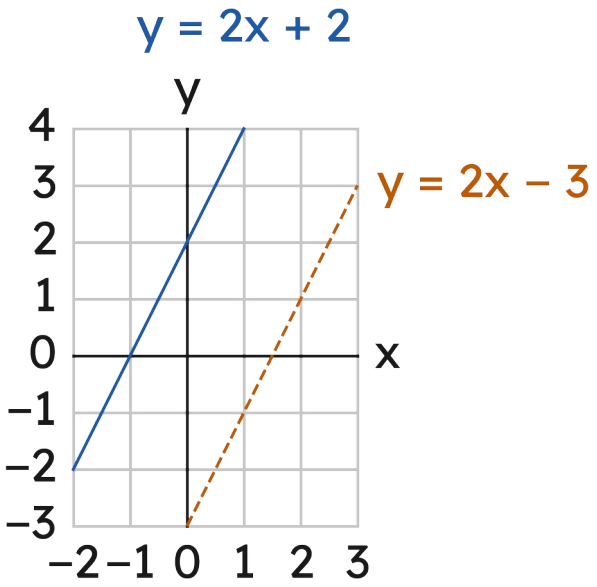
The system is graphed. Solve the system.



Answer it.

Whiteboards · Question 5 of 9

The system is graphed. Solve the system.



$2x + 2$ and $2x - 3$: 2 multiplies x in both

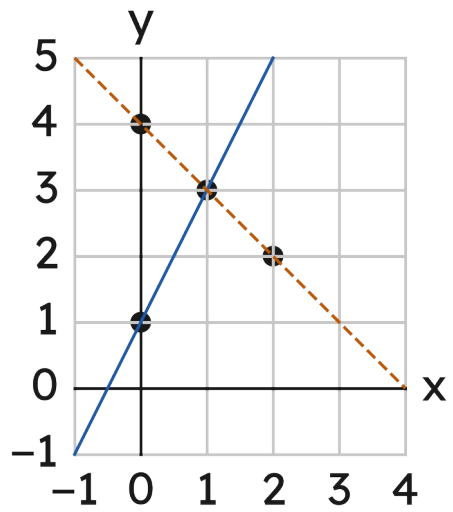
parallel: they never meet

Answer: No solution — the lines are parallel.

Whiteboards · Question 6 of 9

Four points on the lines are marked.

Which system is graphed?



A. $y = 2x + 1$ and $y = -x + 4$

B. $y = x + 2$ and $y = 4x - 1$

C. $y = x + 2$ and $y = -x + 4$

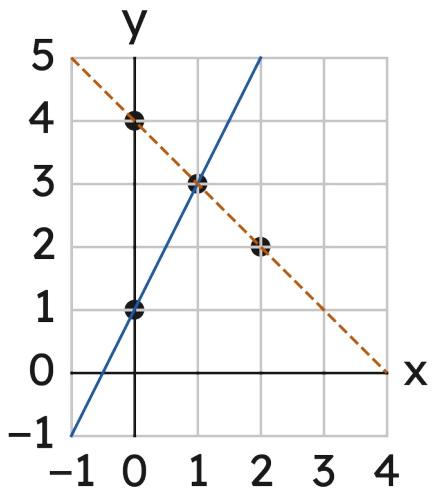
D. $y = 2x + 1$ and $y = x + 4$

Answer it.

Whiteboards · Question 6 of 9

Four points on the lines are marked.

Which system is graphed?



first line: $2(0) + 1 = 1$ and $2(1) + 1 = 3$

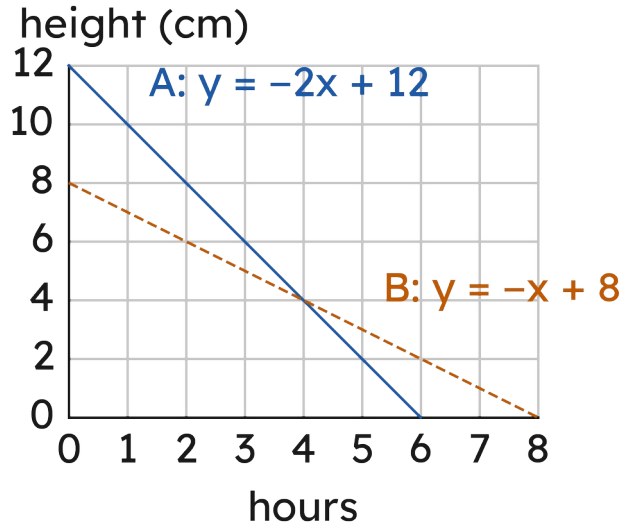
second line: $-(0) + 4 = 4$ and $-2 + 4 = 2$

Answer: A — $y = 2x + 1$ and $y = -x + 4$

Whiteboards · Question 7 of 9

Candle A cost $3. The graph shows both candles' heights.

When are the two candles the same height?

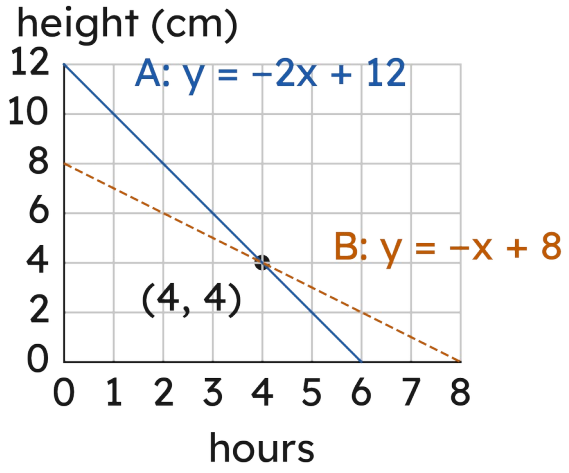


Answer it.

Whiteboards · Question 7 of 9

Candle A cost $3. The graph shows both candles' heights.

When are the two candles the same height?



A: $-2(4) + 12 = 4$

B: $-4 + 8 = 4$

Answer: After 4 hours, both are 4 cm tall.

Whiteboards · Question 8 of 9

$(2, 5)$ is the solution of $y = 2x + 1$ and $y = -x + \square$.

What number goes in the box?

Answer it.

Whiteboards · Question 8 of 9

$(2, 5)$ is the solution of $y = 2x + 1$ and $y = -x + \square$.

What number goes in the box?

$$2(2) + 1 = 5$$

$$-2 + 7 = 5$$

Answer: 7

Whiteboards · Question 9 of 9

Tia graphed $y = 3x - 2$ and $y = 3x + 1$. She says the lines must cross somewhere off her grid.

Is Tia right? Explain.

Write your answer in sentences.

Whiteboards · Question 9 of 9

Tia graphed $y = 3x - 2$ and $y = 3x + 1$. She says the lines must cross somewhere off her grid.

Is Tia right? Explain.

3 multiplies x in both: each line climbs 3 for every 1 across

at $x = 0$: -2 and 1; at $x = 10$: 28 and 31

always 3 apart: parallel, no solution

Answer: No: the lines are parallel — no solution.

Independent Set

1. Solve by graphing: $y = x + 3$ and $y = -2x + 6$
2. Solve by graphing: $y = x - 1$ and $y = -2x - 4$. Use $x = -2, -1$ and 0.
3. Solve by graphing: $y = \frac{1}{2}x - 1$ and $y = -x + 5$
4. Solve by graphing: $y = -x + 4$ and $y = -x - 1$
5. Solve by graphing: $y = 2x - 5$ and $y = -5 + 2x$
6. The tables are for $y = 4x - 6$ and $y = x + 3$. What is the solution of the system?

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 67. Due by the Unit 11 test.

Today's skills — all required

Solve a system of equations by graphing — C8X
Write a system of equations given a graph — TS7