

# Line Crossing Lab

Use graphs to estimate solutions and inspection for simple cases.

**GRADE 8 • 8.FGR.7.3**

**8.FGR.7.3** "Approximate solutions of two linear equations in two variables by graphing the equations and solving simple cases by inspection"

NAME \_\_\_\_\_

DATE \_\_\_\_\_

## REASON WITH THE MODEL

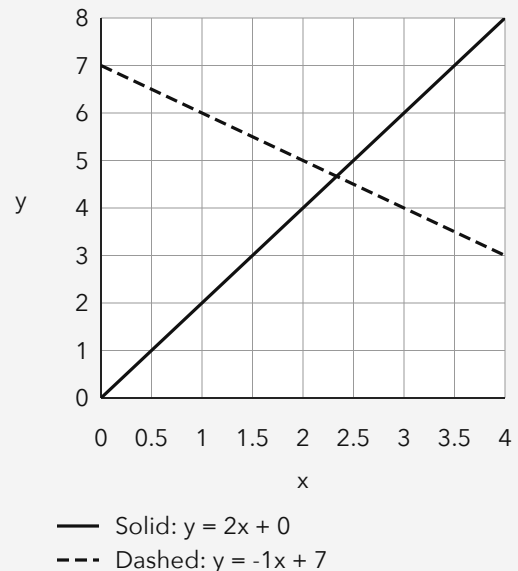
Draw each line using at least two points. Read the crossing between grid lines when needed; an estimate need not be exact. These grids have labeled scales. For graph estimates here, round coordinates to the nearest tenth. A vertical or horizontal equation can make inspection quicker.

## WORKED EXAMPLE

Estimate the solution of  $y = 2x$  and  $y = -x + 7$  from the graph.

1. The lines cross between  $x = 2$  and  $x = 2.5$ .
2. Read the crossing near  $x = 2.3$  and  $y = 4.7$ .

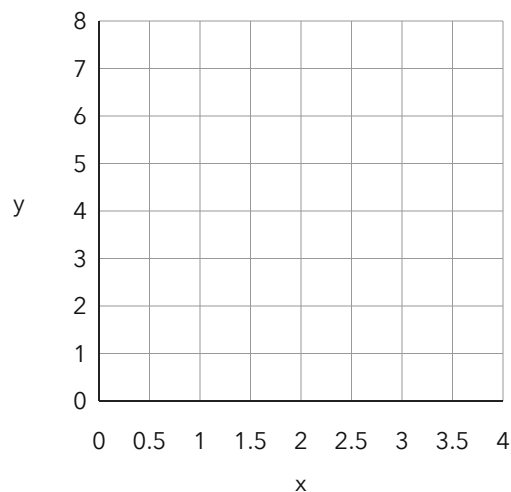
**Answer: Approximately (2.3, 4.7).**



**PRACTICE** 4 problems

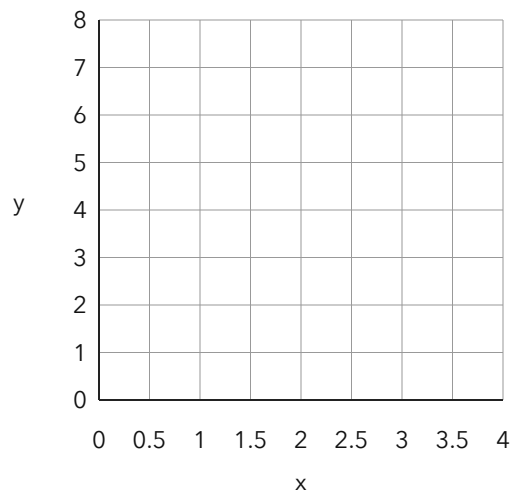
- 1** Graph  $y = x + 1$  and  $y = -2x + 8$ . Use at least two points for each line. Read and record an approximate intersection to the nearest tenth.

**ANSWER** \_\_\_\_\_  
\_\_\_\_\_



- 2** Graph  $y = 2x + 1$  and  $y = -x + 6$ . Use at least two points per line and estimate the crossing to the nearest tenth.

**ANSWER** \_\_\_\_\_  
\_\_\_\_\_



- 3** Solve by inspection:  $x = 3$  and  $y = 2x - 1$ . Explain how the first equation helps.

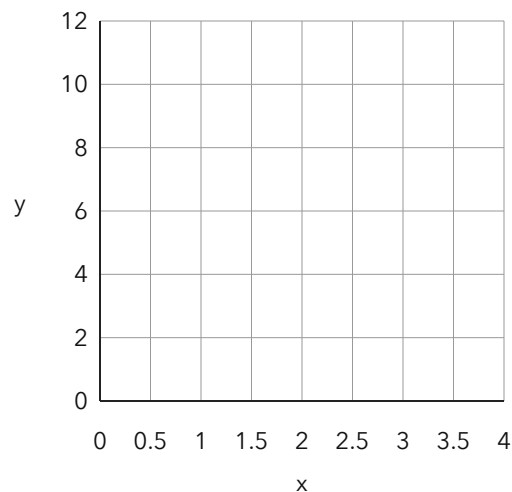
**ANSWER** \_\_\_\_\_  
\_\_\_\_\_

- 4** Solve by inspection:  $y = 4$  and  $x + y = 7$ . Explain how the second coordinate helps.

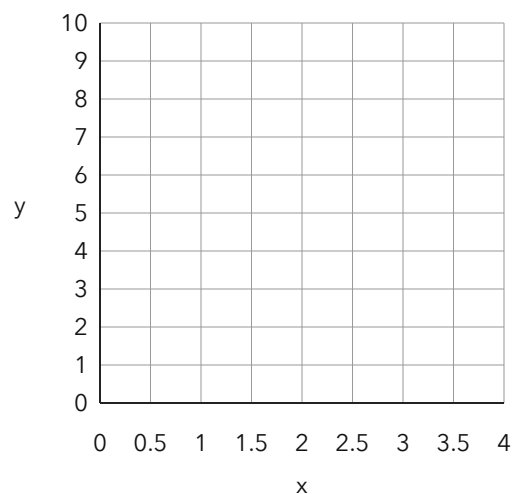
**ANSWER** \_\_\_\_\_  
\_\_\_\_\_

**APPLY IT** Show your work

- 1** For the first 4 minutes, Tank A has  $y = x + 2$  liters and Tank B has  $y = 3x$  liters. Graph both and estimate when their amounts agree and what that amount is.

**REASONING AND ANSWER**

- 2** During  $0 \leq x \leq 4$  hours, two laboratory samples have temperature differences  $y = 2x + 1$  and  $y = -x + 8$  degrees above a reference. Graph both. Estimate the time and temperature difference when they agree.

**REASONING AND ANSWER**

## CHALLENGE

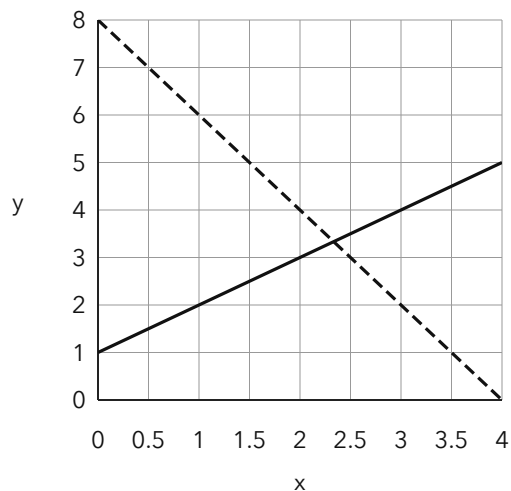
One step up

A graph estimate is  $(2.3, 6.8)$  for  $y = 3x$  and  $y = -x + 9$ . Substituting gives 6.9 for the first line and 6.7 for the second. Must the graph estimate be discarded? Explain.

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WORK SPACE AND ANSWER

## PRACTICE 1

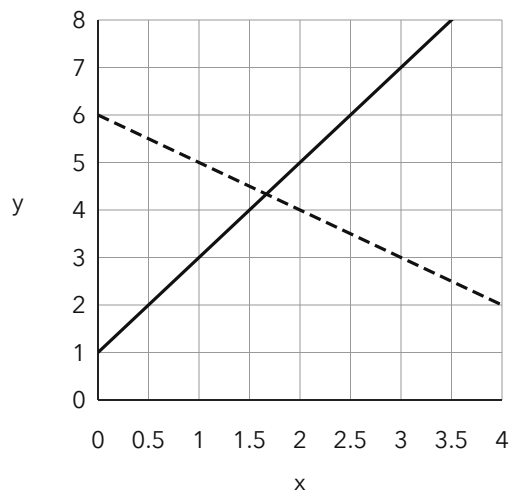
Approximately (2.3, 3.3). Sample plotting pairs: (0, 1), (3, 4) and (0, 8), (4, 0).



— Solid:  $y = 1x + 1$   
- - - Dashed:  $y = -2x + 8$

## PRACTICE 2

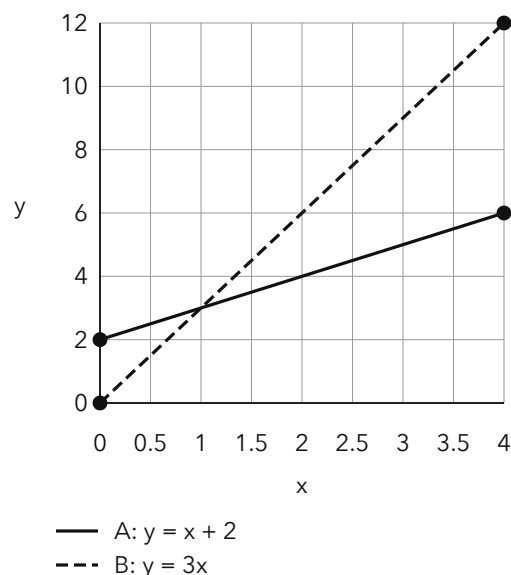
Approximately (1.7, 4.3). Plot (0, 1), (2, 5) and (0, 6), (4, 2).



— Solid:  $y = 2x + 1$   
- - - Dashed:  $y = -1x + 6$

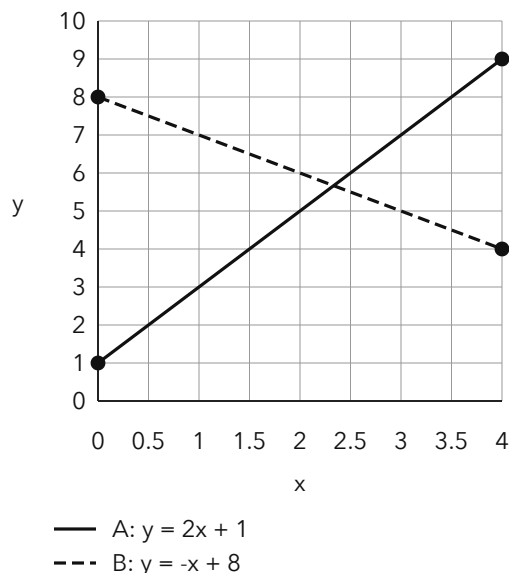
### APPLY IT 1

**(1.0, 3.0): about 1 minute and 3 liters (here the intersection is exact).** Plot (0, 2), (4, 6) for A; (0, 0), (4, 12) for B. Read the shared point.



### APPLY IT 2

**Approximately (2.3, 5.7): 2.3 hours and 5.7 degrees above the reference.** Plot (0, 1), (4, 9) and (0, 8), (4, 4). Read between ticks; the exact crossing is  $(7/3, 17/3)$ .



### PRACTICE 3

**(3, 5).** The first equation already gives  $x = 3$ ; then  $y = 2(3) - 1 = 5$ .

### PRACTICE 4

**(3, 4).** Since  $y = 4$ ,  $x + 4 = 7$ , so  $x = 3$ .

### CHALLENGE

**No. Rounding a graph reading can create a small mismatch. The exact pair is  $(9/4, 27/4)$ , or (2.25, 6.75), which rounds to (2.3, 6.8). The estimate is reasonable but should not be labeled exact.**

Accept graph readings within about 0.2 of each exact coordinate when the two lines are correctly drawn. Exact pairs: Practice 1  $(7/3, 10/3)$ , Practice 2  $(5/3, 13/3)$ , Apply It 1  $(1, 3)$ , Apply It 2  $(7/3, 17/3)$ . Inspection answers should be exact. Models in contexts stop at the stated time endpoints.