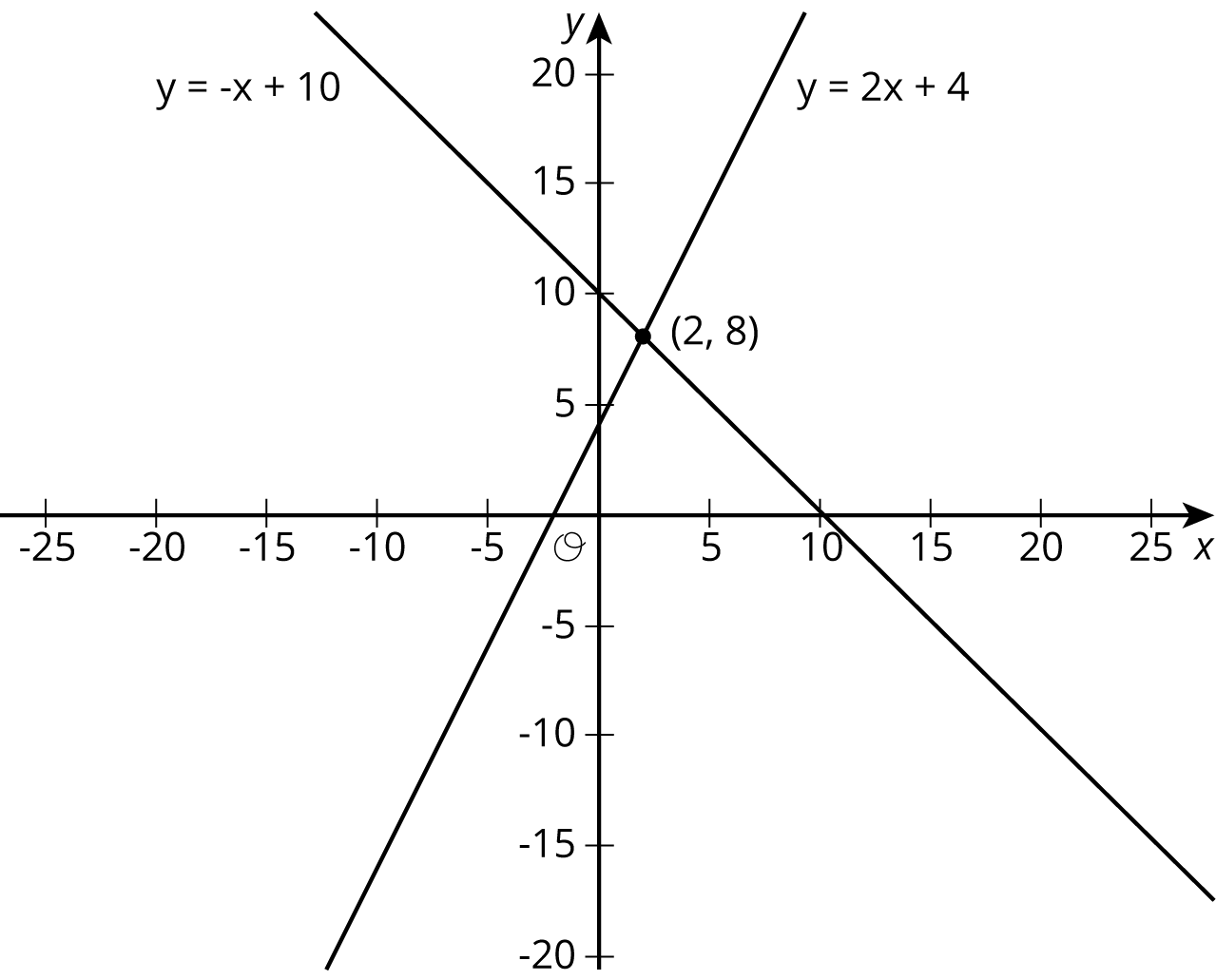
## Lesson 13: Solving Systems of Equations

### 13.1: True or False: Two Lines

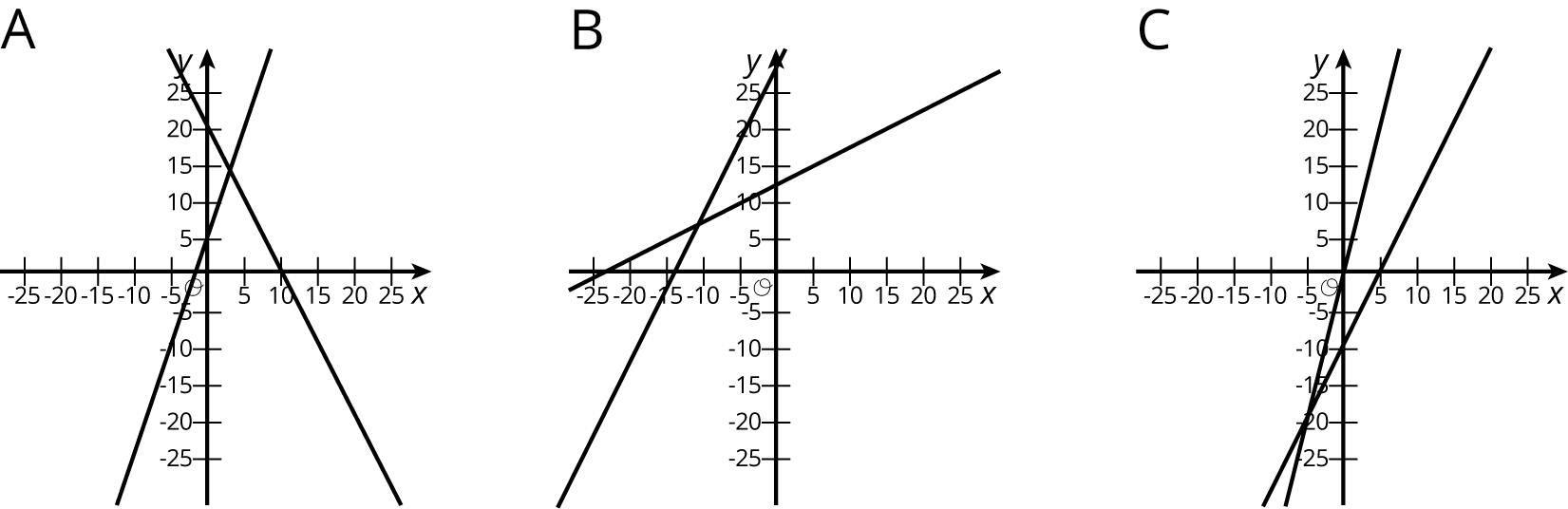


Use the lines to decide whether each statement is true or false. Be prepared to explain your reasoning using the lines.

1. A solution to is 2.
2. A solution to is 8.
3. A solution to is 8.
4. A solution to is 2.
5. There are no values of and that make and true at the same time.

### 13.2: Matching Graphs to Systems

Here are three **systems of equations** graphed on a coordinate plane:



1. Match each figure to one of the systems of equations shown here.
2. Find the solution to each system and check that your solution is reasonable based on the graph.

### 13.3: Different Types of Systems

Your teacher will give you a page with some systems of equations.

1. Graph each system of equations carefully on the provided coordinate plane.
2. Describe what the graph of a system of equations looks like when it has . . .
   1. 1 solution
   2. 0 solutions
   3. infinitely many solutions

#### Are you ready for more?

The graphs of the equations and intersect at . Find and . Show or explain your reasoning.

### Lesson 13 Summary

Sometimes it is easier to solve a system of equations without having to graph the equations and look for an intersection point. In general, whenever we are solving a system of equations written as

we know that we are looking for a pair of values  that makes both equations true. In particular, we know that the value for will be the same in both equations. That means that

For example, look at this system of equations:

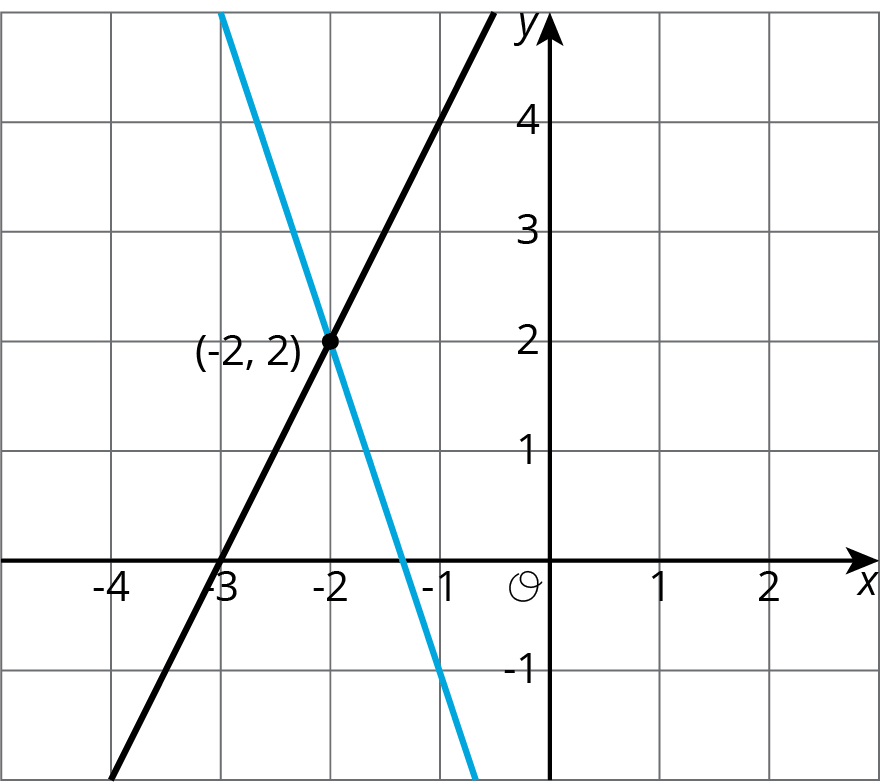
Since the  value of the solution is the same in both equations, then we know

We can solve this equation for :

But this is only half of what we are looking for: we know the value for , but we need the corresponding value for . Since both equations have the same value, we can use either equation to find the -value:

Or

In both cases, we find that . So the solution to the system is . We can verify this by graphing both equations in the coordinate plane.



In general, a system of linear equations can have:

* No solutions. In this case, the lines that correspond to each equation never intersect.
* Exactly one solution. The lines that correspond to each equation intersect in exactly one point.
* An infinite number of solutions. The graphs of the two equations are the same line!



© CC BY Open Up Resources. Adaptations CC BY IM.