

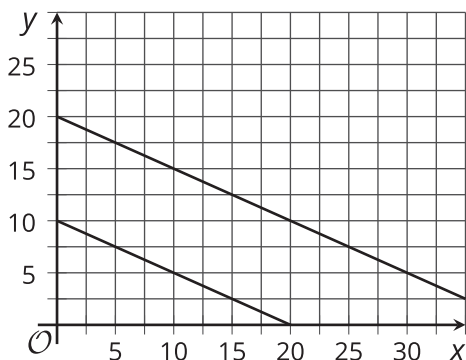
# Equations of All Kinds of Lines

Let's write equations for vertical and horizontal lines.

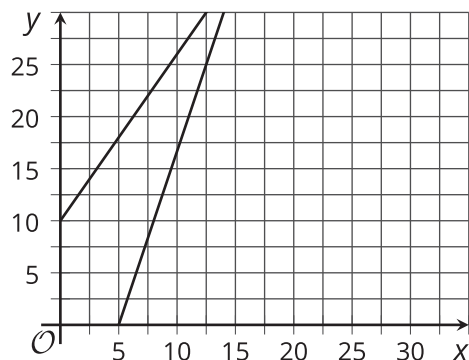
## 10.1 Which Three Go Together: Pairs of Lines

Which three go together? Why do they go together?

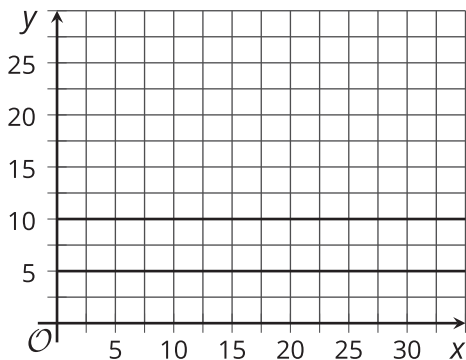
**A**



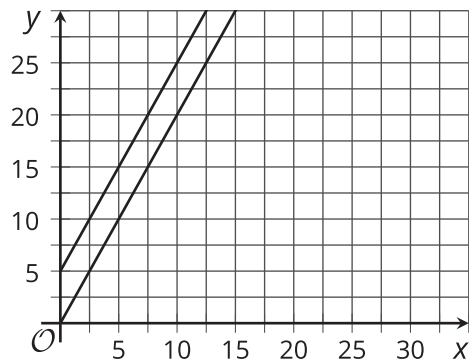
**B**



**C**

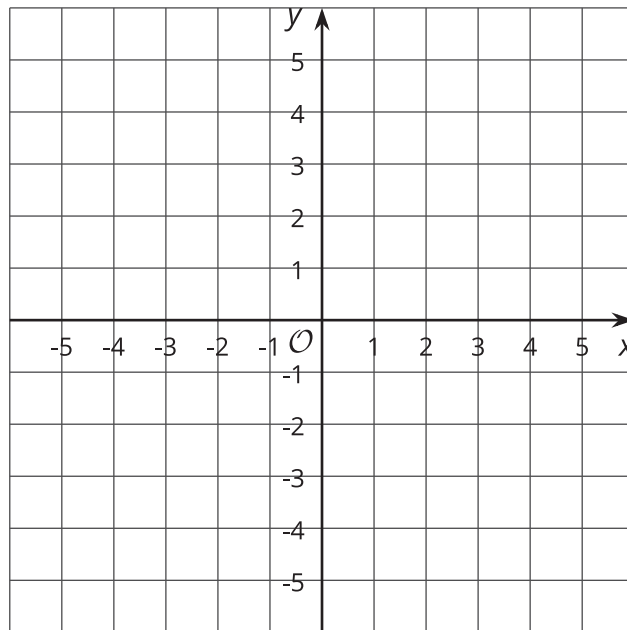


**D**



## 10.2

## All the Same



1. Plot at least 10 points whose  $y$ -coordinate is  $-4$ . What do you notice about them?
2. Which equation makes the most sense to represent all of the points with  $y$ -coordinate  $-4$ ?  
Explain how you know.  
 $x = -4$                        $y = -4x$                        $y = -4$                        $x + y = -4$
3. Plot at least 10 points whose  $x$ -coordinate is  $3$ . What do you notice about them?
4. Which equation makes the most sense to represent all of the points with  $x$ -coordinate  $3$ ?  
Explain how you know.  
 $x = 3$                        $y = 3x$                        $y = 3$                        $x + y = 3$
5. Graph the equation  $x = -2$ .
6. Graph the equation  $y = 5$ .



### Are you ready for more?

1. Draw the rectangle with vertices  $(2, 1)$ ,  $(5, 1)$ ,  $(5, 3)$ , and  $(2, 3)$ .
2. For each of the four sides of the rectangle, write an equation for a line containing the side.
3. A rectangle has sides on the graphs of  $x = -1$ ,  $x = 3$ ,  $y = -1$ ,  $y = 1$ . Find the coordinates of each vertex.

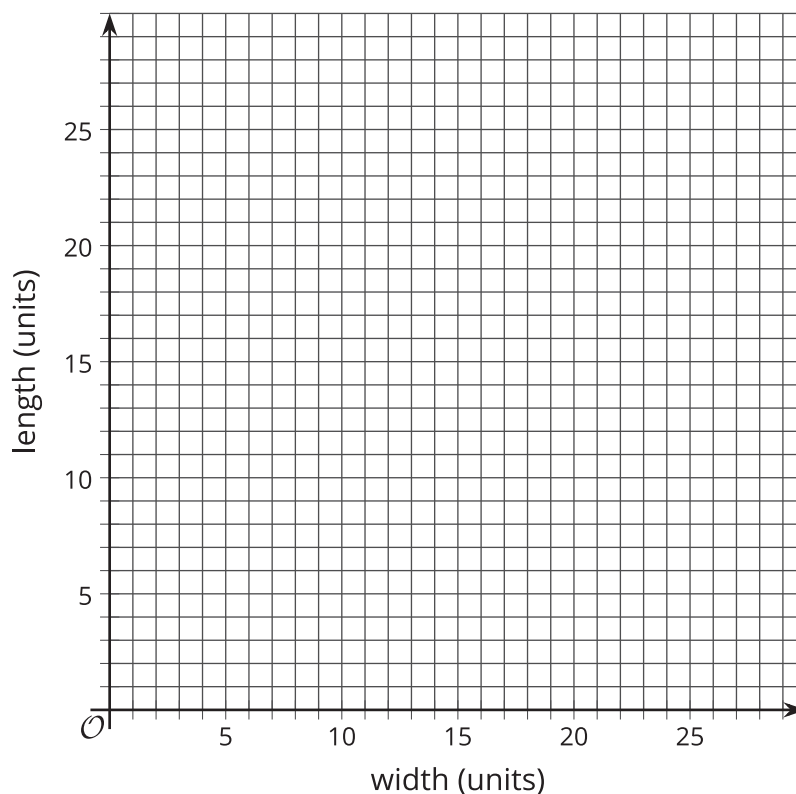


## 10.3 Same Perimeter

- There are many possible rectangles whose perimeter is 50 units. Complete the table with lengths,  $\ell$ , and widths,  $w$ , of at least 10 such rectangles.

|        |  |  |  |  |  |  |  |  |  |  |
|--------|--|--|--|--|--|--|--|--|--|--|
| $w$    |  |  |  |  |  |  |  |  |  |  |
| $\ell$ |  |  |  |  |  |  |  |  |  |  |

- On the graph, plot the length and width of rectangles whose perimeter is 50 units using the values from your table. Using a straightedge, draw the line that passes through these points.

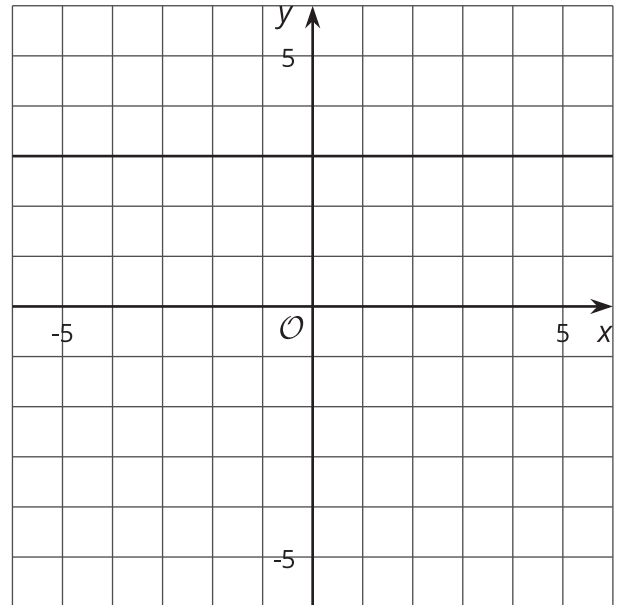


- What is the slope of this line? What does the slope mean in this situation?
- Write an equation for this line.

## Lesson 10 Summary

Horizontal lines in the coordinate plane represent situations where the  $y$ -value doesn't change at all while the  $x$ -value changes.

The horizontal line that goes through the point  $(0, 3)$  can be described by saying that "for all points on the line, the  $y$ -value is always 3." Since horizontal lines are neither increasing or decreasing, they have a slope of 0, and so an equation for this horizontal line is  $y = 0x + 3$ , or just  $y = 3$ .



Vertical lines in the coordinate plane represent situations where the  $x$ -value doesn't change at all while the  $y$ -value changes.

The vertical line that goes through the point  $(-2, 0)$  can be described by saying that "for all points on the line, the  $x$ -value is always -2." An equation that says the same thing is  $x = -2$ .

