Lesson 21: Vectors and the Equation of a Line

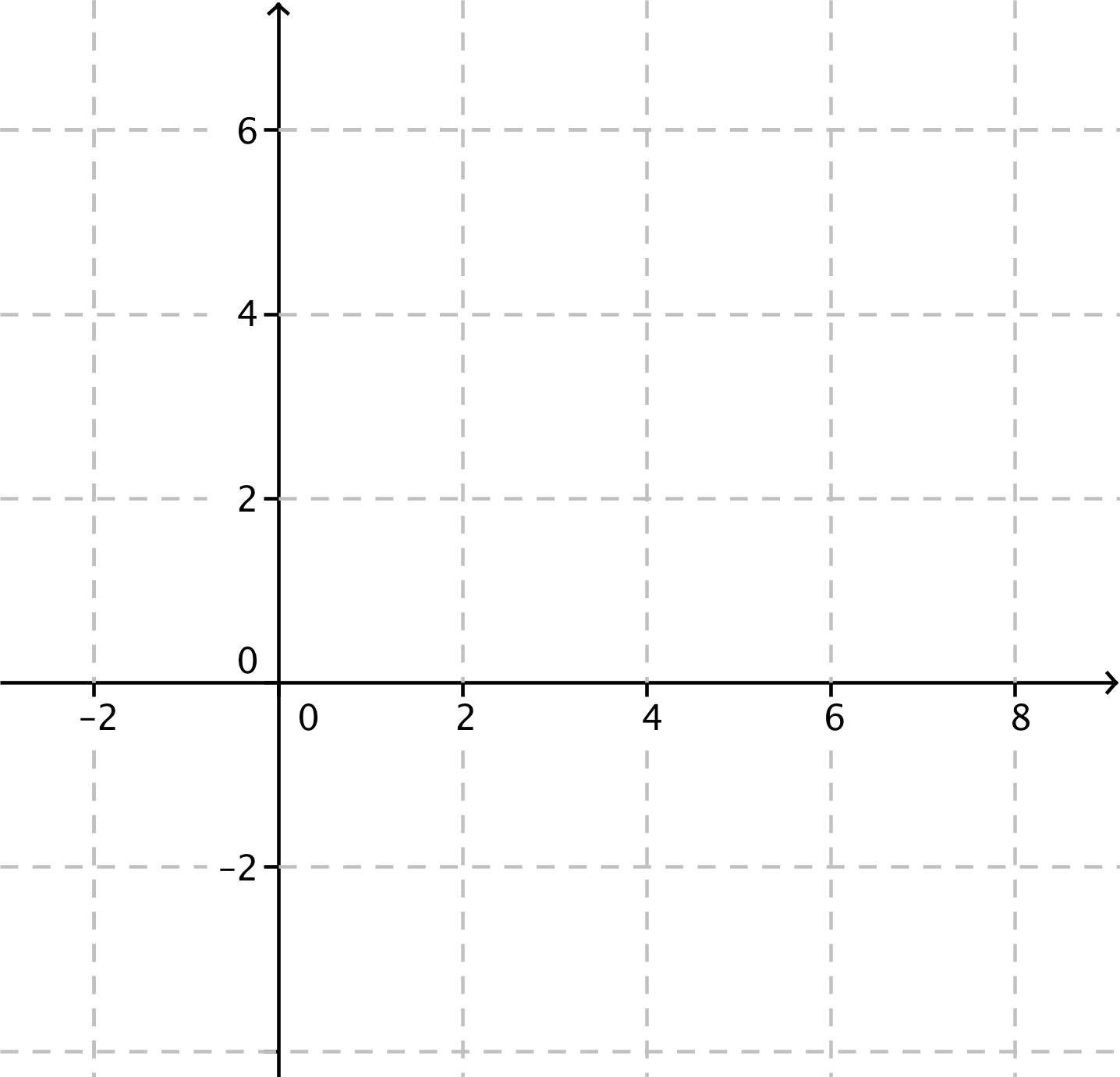
Classwork

Opening Exercise

* 1. Find three different ways to write the equation that represents the line in the plane that passes through points and .
  2. Graph the line through point with slope

Exercises

1. Consider the line in the plane given by the equation
   1. Sketch a graph of line on the axes provided.



* 1. Find a point on line and the slope of line .
  2. Write a vector equation for line using the information you found in part (b).
  3. Write parametric equations for line .
  4. Verify algebraically that your parametric equations produce points on line

1. Olivia wrote parametric equations and . Are her equations correct? What did she do differently from you?
2. Convert the parametric equations and into slope-intercept form.
3. Find parametric equations to represent the line that passes through point and has direction vector
4. Find a vector form of the equation of the line given by the parametric equations

Lesson Summary

Lines in the plane and lines in space can be described by either a vector equation or a set of parametric equations.

* Let be a line in the plane that contains point and has direction vector . If the slope of line is defined, then .

A vector form of the equation that represents line is

Parametric equations that represent line are

* Let be a line in space that contains point and has direction vector .

A vector form of the equation that represents line is

Parametric equations that represent line are

Problem Set

1. Find three points on the line in the plane with parametric equations and .
2. Find vector and parametric equations to represent the line in the plane with the given equation.
3. Find vector and parametric equations to represent the following lines in the plane.
   1. the -axis
   2. the -axis
   3. the horizontal line with equation
   4. the vertical line with equation
   5. the horizontal line with equation , for a real number
   6. the vertical line with equation , for a real number
4. Find the point-slope form of the line in the plane with the given parametric equations.
   1. ,
   2. ,
   3. ,
   4. ,
5. Find vector and parametric equations for the line in the plane through point in the direction of vector .
   1. ,
   2. ,
   3. ,
6. Determine if the point is on the line represented by the given parametric equations.
   1. and
   2. , and
   3. , and
   4. , and
7. Find three points on the line in space with parametric equations , , and .
8. Find vector and parametric equations to represent the following lines in space.
   1. the -axis
   2. the -axis
   3. the -axis
9. Convert the equation given in vector form to a set of parametric equations for the line
10. Find vector and parametric equations for the line in space through point in the direction of vector .
    1. ,
    2. ,
    3. ,
11. Determine if the point is on the line represented by the given parametric equations.
    1. , , and
    2. , , and
    3. , , and