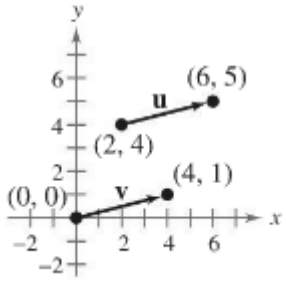
Vocabulary: Fill in the blanks.

1. A _____ _____ _____ can be used to represent a quantity that involves both magnitude and direction.
2. The directed line segment $\overrightarrow{PQ}$ has _____ point P and _____ point Q.
3. The _____ of the directed line segment $\overrightarrow{PQ}$ is denoted by $\|\overrightarrow{PQ}\|$.
4. The set of all directed line segments that are equivalent to a given directed line segment $\overrightarrow{PQ}$ is a _____ $\mathbf{v}$ in the plane.
5. In order to show that two vectors are equivalent, you must show that they have the same _____ and the same _____ .
6. The directed line segment whose initial point is the origin is said to be in _____ _____ .
7. A vector that has a magnitude of 1 is called a _____ _____ .
8. The two basic vector operations are scalar _____ and vector _____ .
9. The vector $\mathbf{u} + \mathbf{v}$ is called the _____ of vector addition.
10. The vector sum $v_1\mathbf{i} + v_2\mathbf{j}$ is called a _____ _____ of the vectors $\mathbf{i}$ and $\mathbf{j}$, and the scalars v_1 and v_2 are called the _____ and _____ components of $\mathbf{v}$, respectively.

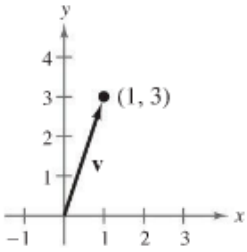
In Exercises 11 and 12, show that u and v are equivalent.

11.

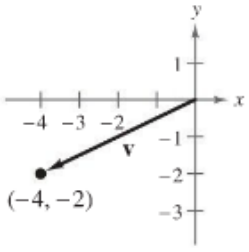


Finding the Component Form of a Vector **In Exercises 13–24, find the component form and magnitude of the vector v.**

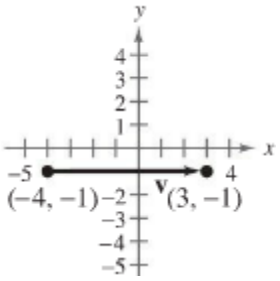
13.



14.

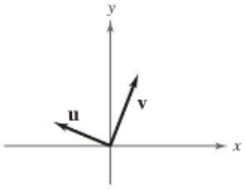


18.



20. $(-2, 7)$ $(5, -17)$

Sketching the Graph of a Vector **In Exercises 25–30, use the figure to sketch a graph of the specified vector. To print an enlarged copy of the graph, go to *MathGraphs.com*.**



25. $-\mathbf{v}$
26. $5\mathbf{v}$
27. $\mathbf{u} + \mathbf{v}$
28. $\mathbf{u} + 2\mathbf{v}$
29. $\mathbf{u} - \mathbf{v}$

Vector Operations **In Exercises 31–38, find (a) $\mathbf{u} + \mathbf{v}$, (b) $\mathbf{u} - \mathbf{v}$, and (c) $2\mathbf{u} - 3\mathbf{v}$. Then sketch each resultant vector.**

31. $\mathbf{u} = \langle 2, 1 \rangle$, $\mathbf{v} = \langle 1, 3 \rangle$
35. $\mathbf{u} = \mathbf{i} + \mathbf{j}$, $\mathbf{v} = 2\mathbf{i} - 3\mathbf{j}$

Finding a Unit Vector **In Exercises 39–48, find a unit vector in the direction of the given vector. Verify that the result has a magnitude of 1.**

39. $\mathbf{u} = \langle 3, 0 \rangle$
41. $\mathbf{v} = \langle -2, 2 \rangle$
44. $\mathbf{v} = 6\mathbf{i} - 2\mathbf{j}$