In Exercises 1–4, prove that $\overrightarrow{RS}$ and $\overrightarrow{PQ}$ are equivalent by showing that they represent the same vector.

4. $R = (-2, -1)$, $S = (2, 4)$, $P = (-3, -1)$, and $Q = (1, 4)$

In Exercises 5–12, let $P = (-2, 2)$, $Q = (3, 4)$, $R = (-2, 5)$, and $S = (2, -8)$. Find the component form and magnitude of the vector.

6. $\overrightarrow{RS}$

11. $3\overrightarrow{QR} + \overrightarrow{PS}$

12. $\overrightarrow{PS} - 3\overrightarrow{PQ}$

In Exercises 13–20, let $\mathbf{u} = \langle -1, 3 \rangle$, $\mathbf{v} = \langle 2, 4 \rangle$, and $\mathbf{w} = \langle 2, -5 \rangle$. Find the component form of the vector.

13. $\mathbf{u} + \mathbf{v}$

18. $2\mathbf{u} - 4\mathbf{v}$

19. $-2\mathbf{u} - 3\mathbf{v}$

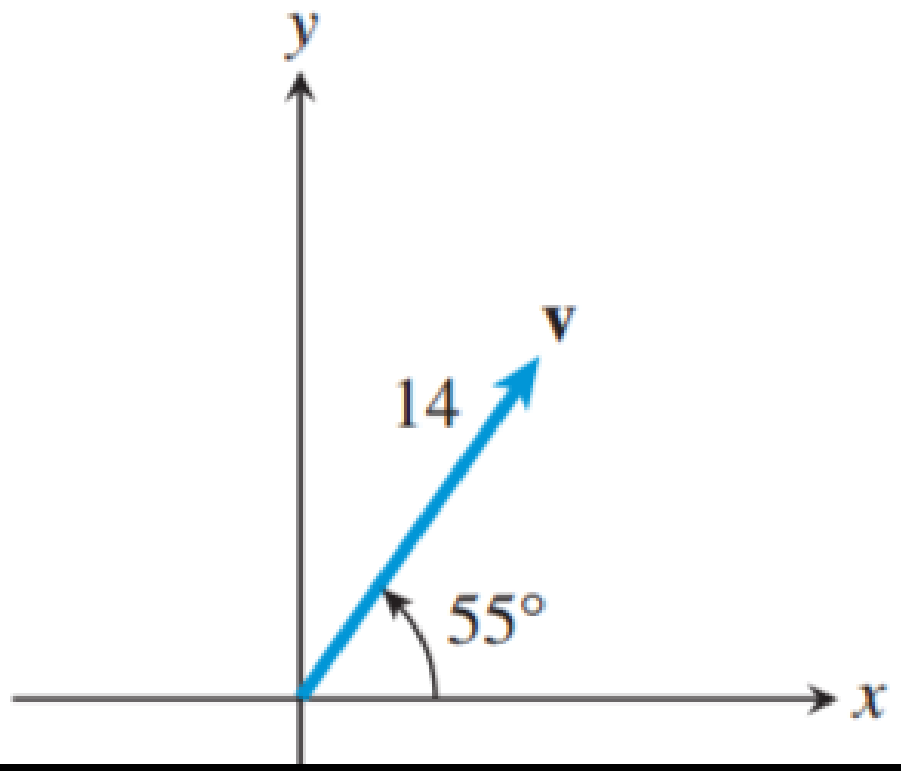
In Exercises 21–24, find a unit vector in the direction of the given vector.

21. $\mathbf{u} = \langle -2, 4 \rangle$

27. $\mathbf{u} = \langle -4, -5 \rangle$

In Exercises 29–32, find the component form of the vector **v**.

30.



In Exercises 33–38, find the magnitude and direction angle of the vector.

34. $\langle -1, 2 \rangle$

35. $3\mathbf{i} - 4\mathbf{j}$

41. Navigation An airplane is flying on a bearing of 335° at 530 mph. Find the component form of the velocity of the airplane.

43. Flight Engineering An airplane is flying on a compass heading (bearing) of 340° at 325 mph. A wind is blowing with the bearing 320° at 40 mph.

(a) Find the component form of the velocity of the airplane.

(b) Find the actual ground speed and direction of the plane.

48. Combining Forces Juana and Diego Gonzales, ages six and four respectively, own a strong and stubborn puppy named Corporal. It is so hard to take Corporal for a walk that they devise a scheme to use two leashes. If Juana and Diego pull with forces of 23 lb and 27 lb at the angles shown in the figure, how hard is Corporal pulling if the puppy holds the children at a standstill? about 47.95 lb