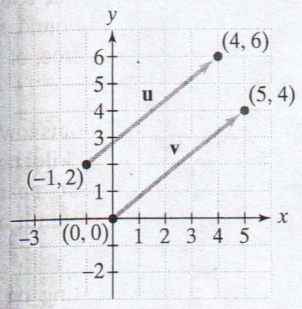
Exercise Set 7.6

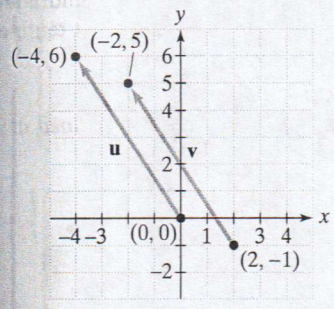
Practice Exercises

In Exercises 1–4, **u** *and* **v** *have the same direction. In each exercise:* **a.** *Find* $\|\mathbf{u}\|$. **b.** *Find* $\|\mathbf{v}\|$. **c.** *Is* $\mathbf{u} = \mathbf{v}$? *Explain.*

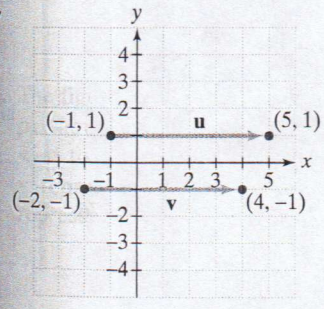
1.



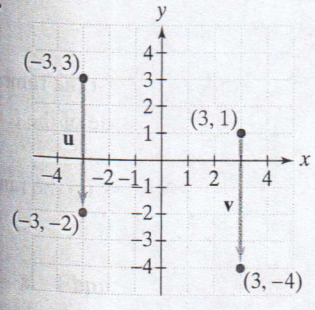
2.



3.



4.



In Exercises 5–12, sketch each vector as a position vector and find its magnitude.

5. $\mathbf{v} = 3\mathbf{i} + \mathbf{j}$

6. $\mathbf{v} = 2\mathbf{i} + 3\mathbf{j}$

7. $\mathbf{v} = \mathbf{i} - \mathbf{j}$

8. $\mathbf{v} = -\mathbf{i} - \mathbf{j}$

9. $\mathbf{v} = -6\mathbf{i} - 2\mathbf{j}$

10. $\mathbf{v} = 5\mathbf{i} - 2\mathbf{j}$

11. $\mathbf{v} = -4\mathbf{i}$

12. $\mathbf{v} = -5\mathbf{j}$

In Exercises 13–20, let **v** *be the vector from initial point* P_1 *to terminal point* P_2. *Write* **v** *in terms of* **i** *and* **j**.

13. $P_1 = (-4, -4), P_2 = (6, 2)$

14. $P_1 = (2, -5), P_2 = (-6, 6)$

15. $P_1 = (-8, 6), P_2 = (-2, 3)$

16. $P_1 = (-7, -4), P_2 = (0, -2)$

17. $P_1 = (-1, 7), P_2 = (-7, -7)$

18. $P_1 = (-1, 6), P_2 = (7, -5)$

19. $P_1 = (-3, 4), P_2 = (6, 4)$

20. $P_1 = (4, -5), P_2 = (4, 3)$

In Exercises 21–38, let

$$\mathbf{u} = 2\mathbf{i} - 5\mathbf{j}, \mathbf{v} = -3\mathbf{i} + 7\mathbf{j}, \text{ and } \mathbf{w} = -\mathbf{i} - 6\mathbf{j}.$$

Find each specified vector or scalar.

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

22. $\mathbf{v} + \mathbf{w}$

23. $\mathbf{u} - \mathbf{v}$

24. $\mathbf{v} - \mathbf{w}$

25. $\mathbf{v} - \mathbf{u}$

26. $\mathbf{w} - \mathbf{v}$

27. $5\mathbf{v}$

28. $6\mathbf{v}$

29. $-4\mathbf{w}$

30. $-7\mathbf{w}$

31. $3\mathbf{w} + 2\mathbf{v}$

32. $3\mathbf{u} + 4\mathbf{v}$

33. $3\mathbf{v} - 4\mathbf{w}$

34. $4\mathbf{w} - 3\mathbf{v}$

35. $\|2\mathbf{u}\|$

36. $\|-2\mathbf{u}\|$

37. $\|\mathbf{w} - \mathbf{u}\|$

38. $\|\mathbf{u} - \mathbf{w}\|$

In Exercises 39–46, find the unit vector that has the same direction as the vector **v**.

39. $\mathbf{v} = 6\mathbf{i}$

40. $\mathbf{v} = -5\mathbf{j}$

41. $\mathbf{v} = 3\mathbf{i} - 4\mathbf{j}$

42. $\mathbf{v} = 8\mathbf{i} - 6\mathbf{j}$

43. $\mathbf{v} = 3\mathbf{i} - 2\mathbf{j}$

44. $\mathbf{v} = 4\mathbf{i} - 2\mathbf{j}$

45. $\mathbf{v} = \mathbf{i} + \mathbf{j}$

46. $\mathbf{v} = \mathbf{i} - \mathbf{j}$

In Exercises 47–52, write the vector **v** *in terms of* **i** *and* **j** *whose magnitude* $\|\mathbf{v}\|$ *and direction angle* θ *are given.*

47. $\|\mathbf{v}\| = 6, \theta = 30°$

48. $\|\mathbf{v}\| = 8, \theta = 45°$

49. $\|\mathbf{v}\| = 12, \theta = 225°$

50. $\|\mathbf{v}\| = 10, \theta = 330°$

51. $\|\mathbf{v}\| = \frac{1}{2}, \theta = 113°$

52. $\|\mathbf{v}\| = \frac{1}{4}, \theta = 200°$

Practice Plus

In Exercises 53–56, let

$$\mathbf{u} = -2\mathbf{i} + 3\mathbf{j}, \mathbf{v} = 6\mathbf{i} - \mathbf{j}, \mathbf{w} = -3\mathbf{i}.$$

Find each specified vector or scalar.

53. $4\mathbf{u} - (2\mathbf{v} - \mathbf{w})$

54. $3\mathbf{u} - (4\mathbf{v} - \mathbf{w})$

55. $\|\mathbf{u} + \mathbf{v}\|^2 - \|\mathbf{u} - \mathbf{v}\|^2$

56. $\|\mathbf{v} + \mathbf{w}\|^2 - \|\mathbf{v} - \mathbf{w}\|^2$