

In exercises #1 - 4, let  $\mathbf{u} = \overrightarrow{RS}$ , and  $\mathbf{v} = \overrightarrow{OP}$ . Does  $\mathbf{u} = \mathbf{v}$ ? Why or why not?

1)  $R = (-4, 7), S = (-1, 5), O = (0, 0), P = (3, -2)$

2)  $R = (7, -3), S = (4, -5), O = (2, 1), P = (-3, -2)$

3)  $R = (2, 1), S = (0, -1), O = (1, 4), P = (-1, 2)$

4)  $R = (-2, -1), S = (2, 4), O = (-3, -1), P = (1, 4)$

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

5)  $\overrightarrow{PQ}$

6)  $\overrightarrow{RS}$

7)  $\overrightarrow{QR}$

8)  $\overrightarrow{PS}$

9)  $\overrightarrow{QS}$

10)  $\overrightarrow{PR}$

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

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

In Exercises #13 - 16, find  $\|\mathbf{v}\|$ .

13)  $\mathbf{v} = \langle 3, -4 \rangle$

14)  $\mathbf{v} = \langle -5, 12 \rangle$

15)  $\mathbf{v} = \langle 1, -1 \rangle$

16)  $\mathbf{v} = \langle -2, 3 \rangle$

In Exercises #17 - 28, find the direction of the vector.

17)  $\mathbf{v} = \langle 3, -4 \rangle$

18)  $\mathbf{v} = \langle -5, 12 \rangle$

19)  $\mathbf{v} = \langle 1, -1 \rangle$

20)  $\mathbf{v} = \langle -2, 3 \rangle$

21)  $\mathbf{v} = \langle 1, 3 \rangle$

22)  $\mathbf{v} = \langle -2, -5 \rangle$

23)  $\mathbf{v} = \langle -3, -1 \rangle$

24)  $\mathbf{v} = \langle 4, 5 \rangle$

25)  $\mathbf{v} = \langle 3, -3 \rangle$

26)  $\mathbf{v} = \langle -4, -2 \rangle$

27)  $\mathbf{v} = \langle -3, 5 \rangle$

28)  $\mathbf{v} = \langle 2, -6 \rangle$

In #29-31, find the position vector if the initial point is P and the terminal point is Q.

29)  $P = (3, 2); Q = (5, 6)$

30)  $P = (-2, -1); Q = (6, -2)$

31)  $P = (-1, 4); Q = (6, 2)$

In #32-43, let  $\mathbf{u} = \langle 2, 5 \rangle$ ,  $\mathbf{v} = \langle -3, 7 \rangle$ , and  $\mathbf{w} = \langle -1, -6 \rangle$ . Perform the operations and give the resulting position vector.

32)  $\mathbf{u} + \mathbf{v}$

33)  $\mathbf{v} + \mathbf{w}$

34)  $\mathbf{u} - \mathbf{v}$

35)  $\mathbf{v} - \mathbf{w}$

36)  $5\mathbf{v}$

37)  $6\mathbf{v}$

38)  $-4\mathbf{w}$

39)  $3\mathbf{u} + 4\mathbf{v}$

40)  $\|2\mathbf{u}\|$

41)  $\|\mathbf{w} - \mathbf{u}\|$

42)  $\|\mathbf{u} - \mathbf{w}\|$

43)  $\|-\mathbf{v}\|$

In #44-48, find the component form of the vector  $\mathbf{v}$  whose magnitude and direction angle  $\theta$  are given.

44)  $\|\mathbf{v}\| = 4, \theta = 0^\circ$

45)  $\|\mathbf{v}\| = 5, \theta = 30^\circ$

46)  $\|\mathbf{v}\| = 10, \theta = 225^\circ$

47)  $\|\mathbf{v}\| = 20, \theta = 120^\circ$

48)  $\|\mathbf{v}\| = 8, \theta = 160^\circ$

In #49-52, find the component form and magnitude of the vector  $\overline{PQ}$ .

49)  $P = (2, 3), Q = (5, 9)$

50)  $P = (-3, 5), Q = (7, -11)$

51)  $P = (-7, 0), Q = (-4, -5)$

52)  $P = (30, 12), Q = (25, 5)$

In #53-55, find a vector equivalent to the vector  $\overline{PQ}$  with its initial point at the origin.

53)  $P = (1, 5), Q = (7, 11)$

54)  $P = (2, 7), Q = (-2, 9)$

55)  $P = (-4, -8), Q = (-10, 2)$