

Vectors: Magnitude, Direction and Unit Vectors

Date _____ Period _____

Write each vector in component form.

1) \overrightarrow{PQ} where $P = (4, 1)$ $Q = (3, -6)$

2) \overrightarrow{AB} where $A = (-6, 4)$ $B = (4, -2)$

3) $|\mathbf{a}| = 29, 120^\circ$

4) $|\mathbf{p}| = 30, 60^\circ$

5) $|\mathbf{p}| = 44, 62^\circ$

6) \overrightarrow{RS} where $R = (-4, -5)$ $S = (0, 6)$

Express the resultant vector as a linear combination of unit vectors \mathbf{i} and \mathbf{j} . Complete odd problems.

7) $\mathbf{f} = -9\mathbf{i} + 40\mathbf{j}$
Find: $-9\mathbf{f}$

8) $\mathbf{f} = \mathbf{i} - \mathbf{j}$
 $\mathbf{g} = 12\mathbf{i} + 3\mathbf{j}$
Find: $-4\mathbf{f} - 10\mathbf{g}$

9) $\mathbf{u} = -9\mathbf{i} + 4\mathbf{j}$
Find: $-5\mathbf{u}$

10) $\mathbf{u} = 5\mathbf{i} + 7\mathbf{j}$
 $\mathbf{v} = -2\mathbf{i} - 11\mathbf{j}$
Find: $-5\mathbf{u} + 2\mathbf{v}$

Find the magnitude and direction angle for each vector. Complete even.

11) $43\mathbf{i} - 46\mathbf{j}$

12) $2\mathbf{i} + 45\mathbf{j}$

13) $\mathbf{r} = \langle -12, 35 \rangle$

14) \overrightarrow{RS} where $R = (3, -1)$ $S = (5, -6)$

Find the unit vector. Complete all.

15) $\mathbf{u} = \langle -10, -1 \rangle$
Unit vector in the opposite direction of \mathbf{u}

16) $\mathbf{u} = \langle -12, -3 \rangle$
Unit vector in the direction of \mathbf{u}

17) $\mathbf{u} = \langle 8, -1 \rangle$
Unit vector in the direction of \mathbf{u}

Find the magnitude and direction angle of the resultant vector. Complete even problems.

18) $\mathbf{f} = \langle 5, -5 \rangle$
 $\mathbf{v} = \langle 2, -1 \rangle$
Find: $8\mathbf{f} - 9\mathbf{v}$

19) $\mathbf{a} = \langle -2, 12 \rangle$
 $\mathbf{g} = \langle 11, -4 \rangle$
Find: $-4\mathbf{a} - 10\mathbf{g}$

20) $\mathbf{f} = \langle -11, -4 \rangle$
 $\mathbf{v} = \langle -6, -7 \rangle$
Find: $3\mathbf{f} + 5\mathbf{v}$

21) $\mathbf{u} = 9\mathbf{i} - 2\mathbf{j}$
 $\mathbf{g} = 11\mathbf{i} + 2\mathbf{j}$
Find: $-10\mathbf{u} - 2\mathbf{g}$

22) $\mathbf{u} = -3\mathbf{i} + 12\mathbf{j}$
 $\mathbf{b} = 9\mathbf{i} + 8\mathbf{j}$
Find: $9\mathbf{u} - 6\mathbf{b}$

23) $\mathbf{u} = -11\mathbf{i} - 7\mathbf{j}$
 $\mathbf{g} = 10\mathbf{i} - 8\mathbf{j}$
Find: $\mathbf{u} - 10\mathbf{g}$

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1) \overrightarrow{PQ} where $P = (4, 1)$ $Q = (3, -6)$

$\langle -1, -7 \rangle$

2) \overrightarrow{AB} where $A = (-6, 4)$ $B = (4, -2)$

$\langle 10, -6 \rangle$

3) $|\mathbf{a}| = 29, 120^\circ$

$\langle -14.5, 25.11 \rangle$

4) $|\mathbf{p}| = 30, 60^\circ$

$\langle 15, 15\sqrt{3} \rangle$

5) $|\mathbf{p}| = 44, 62^\circ$

$\langle 20.66, 38.85 \rangle$

6) \overrightarrow{RS} where $R = (-4, -5)$ $S = (0, 6)$

$\langle 4, 11 \rangle$

Express the resultant vector as a linear combination of unit vectors \mathbf{i} and \mathbf{j} . Complete odd problems.

7) $\mathbf{f} = -9\mathbf{i} + 40\mathbf{j}$

Find: $-9\mathbf{f}$

$81\mathbf{i} - 360\mathbf{j}$

8) $\mathbf{f} = \mathbf{i} - \mathbf{j}$

$\mathbf{g} = 12\mathbf{i} + 3\mathbf{j}$

Find: $-4\mathbf{f} - 10\mathbf{g}$

$-124\mathbf{i} - 26\mathbf{j}$

9) $\mathbf{u} = -9\mathbf{i} + 4\mathbf{j}$

Find: $-5\mathbf{u}$

$45\mathbf{i} - 20\mathbf{j}$

10) $\mathbf{u} = 5\mathbf{i} + 7\mathbf{j}$

$\mathbf{v} = -2\mathbf{i} - 11\mathbf{j}$

Find: $-5\mathbf{u} + 2\mathbf{v}$

$-29\mathbf{i} - 57\mathbf{j}$

Find the magnitude and direction angle for each vector. Complete even.

11) $43\mathbf{i} - 46\mathbf{j}$

$\sqrt{3965} \approx 62.968$
 313.07°

12) $2\mathbf{i} + 45\mathbf{j}$

$\sqrt{2029} \approx 45.044$
 87.46°

13) $\mathbf{r} = \langle -12, 35 \rangle$

37
 108.92°

14) \overrightarrow{RS} where $R = (3, -1)$ $S = (5, -6)$

$\sqrt{29} \approx 5.385$
 291.8°

Find the unit vector. Complete all.

- 15) $\mathbf{u} = \langle -10, -1 \rangle$
Unit vector in the opposite direction of \mathbf{u}

$$\left\langle \frac{10\sqrt{101}}{101}, \frac{\sqrt{101}}{101} \right\rangle$$

- 16) $\mathbf{u} = \langle -12, -3 \rangle$
Unit vector in the direction of \mathbf{u}

$$\left\langle -\frac{4\sqrt{17}}{17}, -\frac{\sqrt{17}}{17} \right\rangle$$

- 17) $\mathbf{u} = \langle 8, -1 \rangle$
Unit vector in the direction of \mathbf{u}

$$\left\langle \frac{8\sqrt{65}}{65}, -\frac{\sqrt{65}}{65} \right\rangle$$

Find the magnitude and direction angle of the resultant vector. Complete even problems.

- 18) $\mathbf{f} = \langle 5, -5 \rangle$
 $\mathbf{v} = \langle 2, -1 \rangle$
Find: $8\mathbf{f} - 9\mathbf{v}$

$$17\sqrt{5} \approx 38.013; 305.36^\circ$$

- 19) $\mathbf{a} = \langle -2, 12 \rangle$
 $\mathbf{g} = \langle 11, -4 \rangle$
Find: $-4\mathbf{a} - 10\mathbf{g}$

$$2\sqrt{2617} \approx 102.313; 184.48^\circ$$

- 20) $\mathbf{f} = \langle -11, -4 \rangle$
 $\mathbf{v} = \langle -6, -7 \rangle$
Find: $3\mathbf{f} + 5\mathbf{v}$

$$\sqrt{6178} \approx 78.6; 216.72^\circ$$

- 21) $\mathbf{u} = 9\mathbf{i} - 2\mathbf{j}$
 $\mathbf{g} = 11\mathbf{i} + 2\mathbf{j}$
Find: $-10\mathbf{u} - 2\mathbf{g}$

$$80\sqrt{2} \approx 113.137; 171.87^\circ$$

- 22) $\mathbf{u} = -3\mathbf{i} + 12\mathbf{j}$
 $\mathbf{b} = 9\mathbf{i} + 8\mathbf{j}$
Find: $9\mathbf{u} - 6\mathbf{b}$

$$3\sqrt{1129} \approx 100.802; 143.47^\circ$$

- 23) $\mathbf{u} = -11\mathbf{i} - 7\mathbf{j}$
 $\mathbf{g} = 10\mathbf{i} - 8\mathbf{j}$
Find: $\mathbf{u} - 10\mathbf{g}$

$$5\sqrt{706} \approx 132.853; 146.67^\circ$$