

Introduction to Vectors Assignment

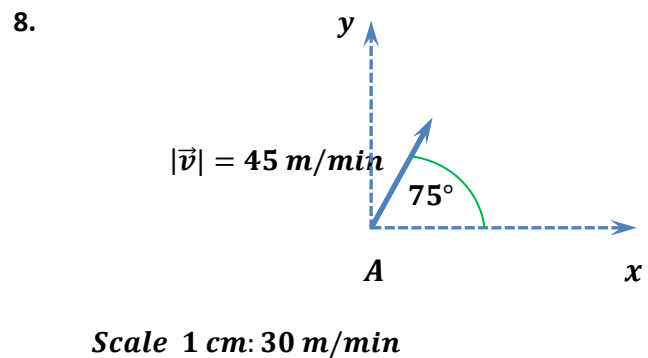
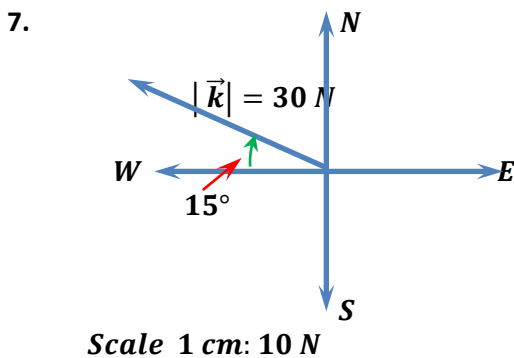
State whether each quantity described is a vector quantity or a scalar quantity.

1. a weight of 50 N .
2. a rabbit running 20 meters per second due east.
3. a baseball thrown with a speed of 70 miles per hour.
4. a ball thrown straight up at a velocity of 30 feet per second.

Use a ruler and a protractor to draw an arrow diagram for each quantity described. Include a scale on each diagram.

5. $h \rightarrow 5\text{ ft/min}$. at 125° to the horizontal.
6. $n \rightarrow 30\text{ m/s}$ at a bearing of $S\ 35^\circ W$

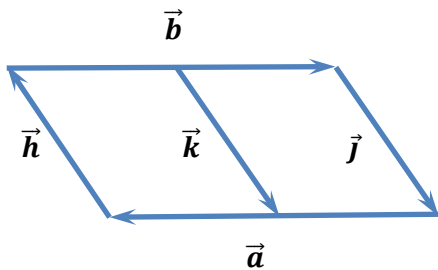
Describe each vector in words.



Introduction to Vectors Assignment

Name the entire equivalent, parallel and opposite vectors in each diagram.

9.

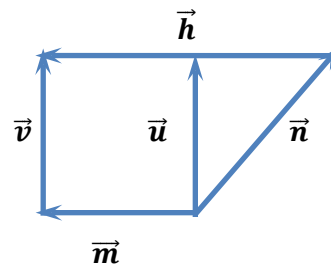


Equivalent vectors

Parallel vectors

Opposite vectors

10.



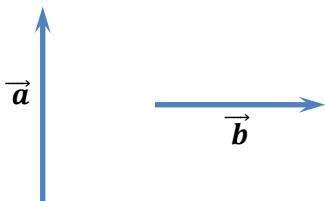
Equivalent vectors

Parallel vectors

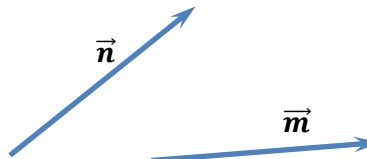
Opposite vectors

Find the resultant of each pair of vectors using either the triangle or parallelogram method.

11. $\vec{a} + \vec{b} = ?$



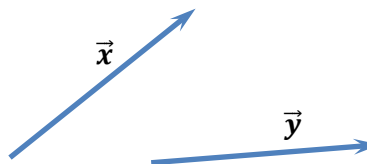
12. $\vec{n} + \vec{m} = ?$



13. $\vec{u} - \vec{v} = ?$



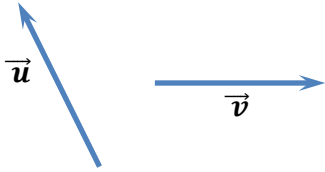
14. $\vec{x} - \vec{y} = ?$



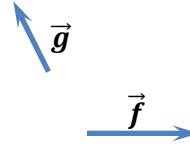
Introduction to Vectors Assignment

Use the set of vectors to draw a vector diagram of each expression.

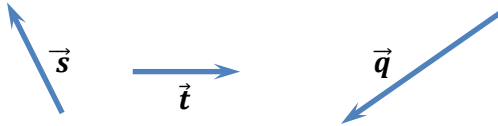
15. $\vec{u} - 2\vec{v} = ?$



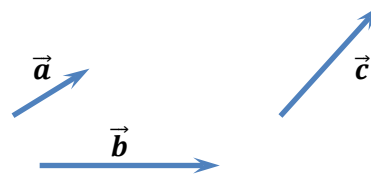
16. $2\vec{g} + 3\vec{f} = ?$



17. $\vec{s} - 2\vec{t} + \vec{q} = ?$

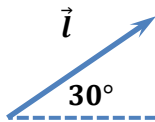


18. $2\vec{a} + \frac{1}{2}\vec{b} - \vec{c} = ?$



Find the magnitude of the horizontal and vertical components of each vector.

19. $|\vec{l}| = 20$



Name: _____ Period: _____ Date: _____

Introduction to Vectors Assignment

20. A plane's destination is 3 km east and 4 km north. Draw the resultant for this set of rectangular components. Then, calculate the magnitude and direction, relative to the horizontal vector, of the resultant.

Introduction to Vectors Assignment

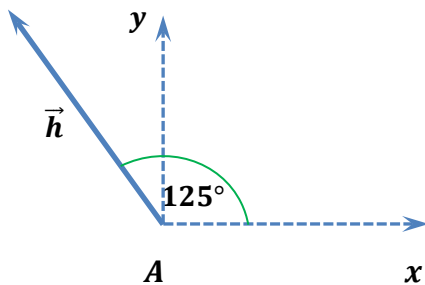
ANSWERS

State whether each quantity described is a vector quantity or a scalar quantity.

- | | |
|---|--|
| 1. a weight of 50 N . | This quantity has a magnitude of 50 N , but no direction is given.
This is a scalar quantity. |
| 2. a rabbit running 20 meters per second due east. | This quantity has a magnitude of 20 meters per second and a direction of due east.
This is a vector quantity. |
| 3. a baseball thrown with a speed of 70 miles per hour. | This quantity has a magnitude of 70 miles per hour, but no direction is given.
This is a scalar quantity. |
| 4. a ball thrown straight up at a velocity of 30 feet per second. | This quantity has a magnitude of 30 feet per second and a direction of straight up.
This is a vector quantity. |

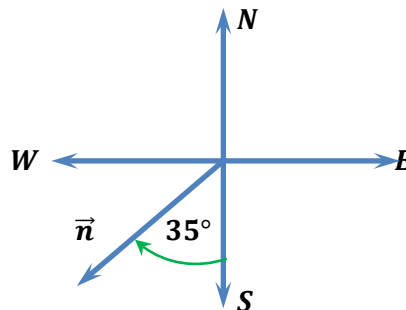
Use a ruler and a protractor to draw an arrow diagram for each quantity described. Include a scale on each diagram.

5. $h \rightarrow 5\text{ ft/min}$. at 125° to the horizontal.



Scale 1 cm: 1 ft/min

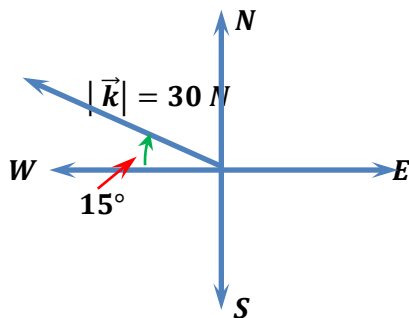
6. $n \rightarrow 30\text{ m/s}$ at a bearing of $S\ 35^\circ W$



Scale 1 cm: 10 m/s

Describe each vector in words.

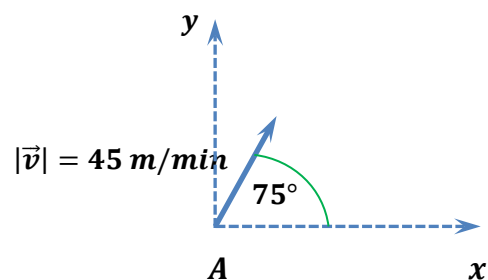
- 7.



Scale 1 cm: 10 N

$\vec{k} \rightarrow 30\text{ N}$ at a bearing of $W\ 15^\circ N$

- 8.

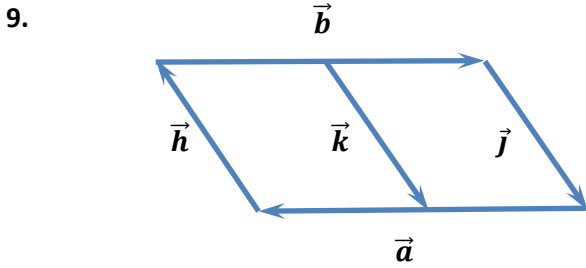


Scale 1 cm: 30 m/min

$\vec{v} \rightarrow 45\text{ m/min}$ at 75° to the horizontal.

Introduction to Vectors Assignment

Name the entire equivalent, parallel and opposite vectors in each diagram.



Equivalent vectors

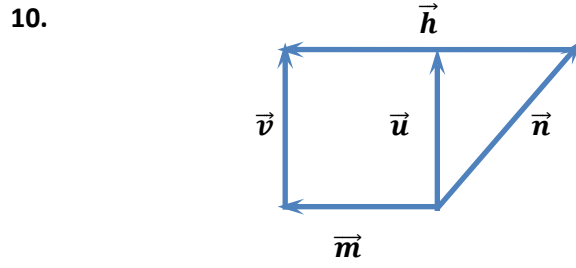
\vec{k} and \vec{j}

Parallel vectors

\vec{a} and \vec{b} \vec{k} and \vec{j} \vec{h} and \vec{k} \vec{h} and \vec{j}

Opposite vectors

\vec{a} and \vec{b} \vec{h} and \vec{k} \vec{h} and \vec{j}



Equivalent vectors

\vec{v} and \vec{u}

Parallel vectors

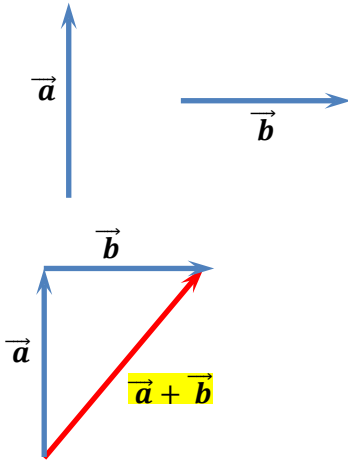
\vec{h} and \vec{m} \vec{v} and \vec{u}

Opposite vectors

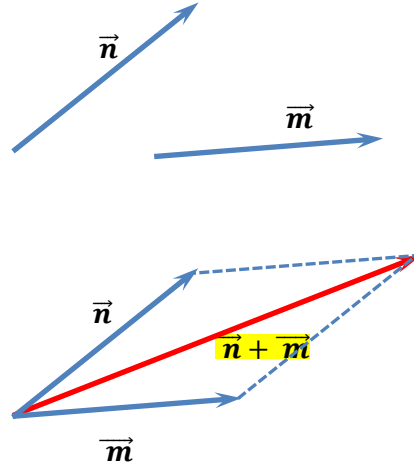
No

Find the resultant of each pair of vectors using either the triangle or parallelogram method.

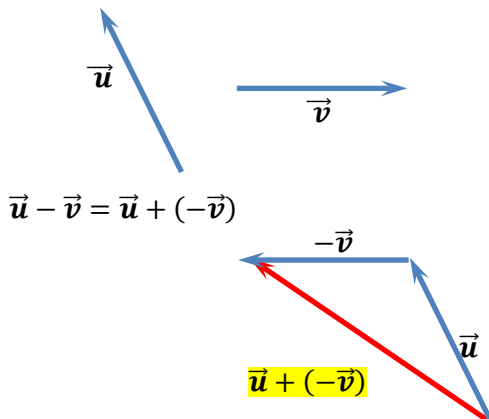
11. $\vec{a} + \vec{b} = ?$



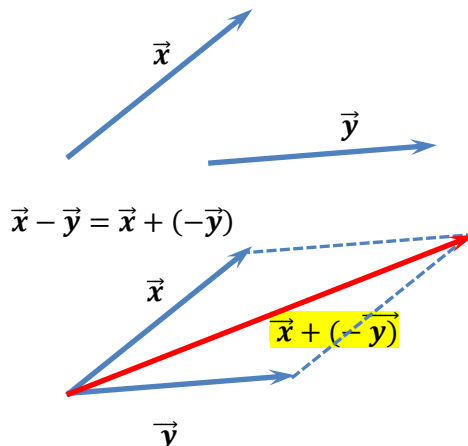
12. $\vec{n} + \vec{m} = ?$



13. $\vec{u} - \vec{v} = ?$



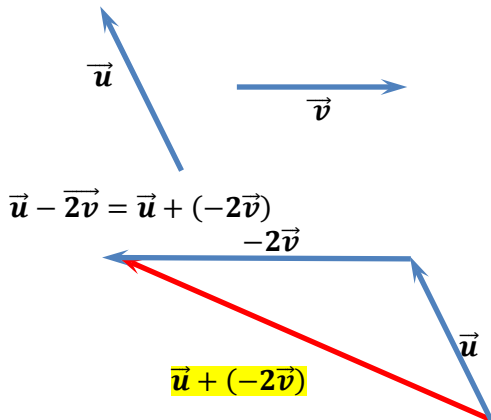
14. $\vec{x} - \vec{y} = ?$



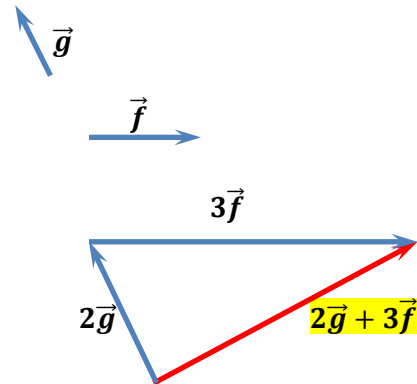
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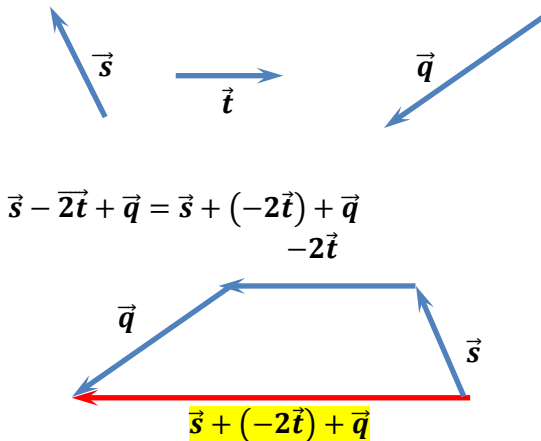
15. $\vec{u} - 2\vec{v} = ?$



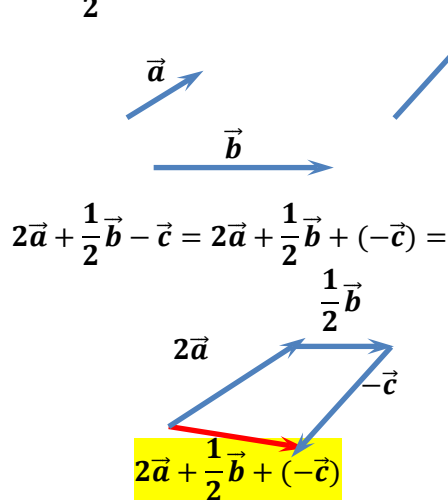
16. $2\vec{g} + 3\vec{f} = ?$



17. $\vec{s} - 2\vec{t} + \vec{q} = ?$

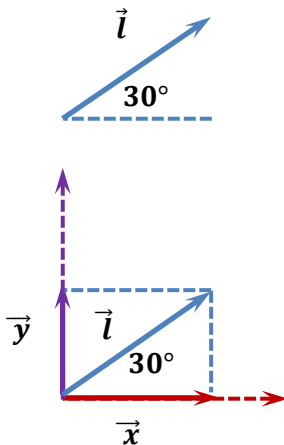


18. $2\vec{a} + \frac{1}{2}\vec{b} - \vec{c} = ?$



Find the magnitude of the horizontal and vertical components of each vector.

19. $|\vec{l}| = 20$



$\cos 30^\circ = \frac{|\vec{x}|}{|\vec{l}|}$

$\sin 30^\circ = \frac{|\vec{y}|}{|\vec{l}|}$

$|\vec{x}| = |\vec{l}| * \cos 30^\circ$

$|\vec{y}| = |\vec{l}| * \sin 30^\circ$

$|\vec{x}| = 20 * \frac{\sqrt{3}}{2}$

$|\vec{y}| = 20 * \frac{1}{2}$

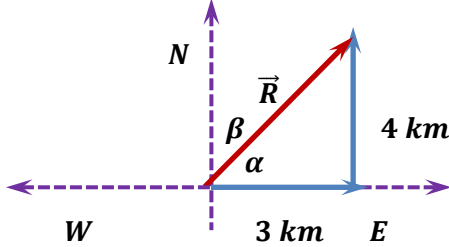
$|\vec{x}| = 10\sqrt{3}$

$|\vec{y}| = 10$

Introduction to Vectors Assignment

20. A plane's destination is 3 km east and 4 km north.

Draw the resultant for this set of rectangular components. Then, calculate the magnitude and direction, relative to the horizontal vector, of the resultant.



$$|\vec{R}|^2 = 3^2 + 4^2$$

$$|\vec{R}|^2 = 9 + 16$$

$$|\vec{R}|^2 = 25$$

$$|\vec{R}| = \sqrt{25}$$

$$|\vec{R}| = 5$$

$$\alpha = \tan^{-1}\left(\frac{4}{3}\right)$$

$$\alpha = \tan^{-1}(1.33)$$

$$\alpha \approx 53.4^\circ$$

$$\beta = 90^\circ - 53.4^\circ$$

$$\beta = 36.6^\circ$$

The resultant displacement is 5 km at a bearing of about 36.6°.