

Lesson 1.2 Quiz Scalars and Vectors

Fill in the blanks.

1. A vector quantity consists of a magnitude and direction.
2. Magnitude consists of a number and a unit.
3. Time is an example of a scalar quantity.
4. Vectors that are equal in magnitude and direction are called equivalent vectors.
5. Non-Collinear vectors are vectors that exist in more than one dimension.

Multiple Choice – Select the best answer.

1. The sum of two or more vectors is called the
 - a) perpendicular vector
 - b) collinear vector
 - c) resultant vector
 - d) cartesian plane
2. The sum of 7 m [W], 15 m [E] and 12 m [W] is
 - a) 34 m [W]
 - b) 10 m [E]
 - c) 4 m [W]
 - d) 12 m [E]
3. The sum of 120 g and 3.7 kg is
 - a) 3820 g
 - b) 37120 g
 - c) 157 g
 - d) 123.7 g
4. The y-component for 16 m [S18°E] would be
 - a) 4.9 m
 - b) 15.2 m
 - c) -4.9 m
 - d) -15.2 m

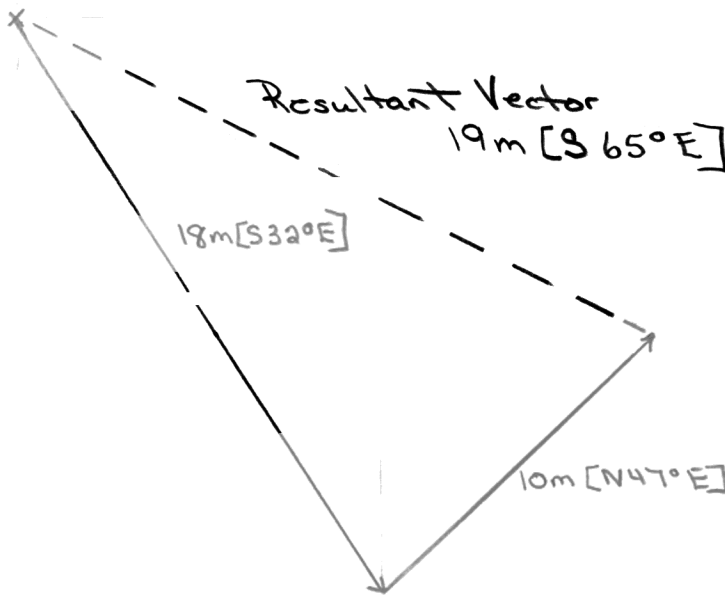
5. The x-component for 12 cm [N 27°W] would be

- a) -10.7 cm
- b) 11.9 cm
- c) -5.4 cm**
- d) -8.5 cm

Problems

1. Determine graphically, the resultant vector for 18 m [S 32°E] and 10 m [N 47°E].

2 cm = 1 m



2. Determine the resultant vector for 30 km [N 12°E] and 43 km [S 37°W] using the vector component method.

Step 1:

$\vec{F}_1 = 30 \text{ km [N } 12^\circ \text{ E]}$
 $\theta = 90^\circ - 12^\circ = 78^\circ$

$\vec{F}_2 = 43 \text{ km [S } 37^\circ \text{ W]}$
 $\theta = 270^\circ - 37^\circ = 233^\circ$

Step 2:

$\vec{F}_x = F \cos \theta$
 $\vec{F}_{x1} = 30 \cos 78^\circ = 6.24$
 $\vec{F}_{x2} = 43 \cos 233^\circ = -25.88$

$\vec{F}_y = F \sin \theta$
 $\vec{F}_{y1} = 30 \sin 78^\circ = 29.34$
 $\vec{F}_{y2} = 43 \sin 233^\circ = -34.34$

Step 3:

$\Sigma \vec{F}_x = \vec{F}_{x1} + \vec{F}_{x2}$
 $= 6.24 - 25.88$
 $= -19.64$
 $\Sigma \vec{F}_y = \vec{F}_{y1} + \vec{F}_{y2}$
 $= 29.34 - 34.34$
 $= -5$

Step 4:

$\vec{F}_R = \sqrt{(\Sigma F_x)^2 + (\Sigma F_y)^2}$
 $= \sqrt{(-19.64)^2 + (-5)^2}$
 $= 20.27$

Step 5:

$\theta_R = \tan^{-1} \left[\frac{\Sigma \vec{F}_y}{\Sigma \vec{F}_x} \right]$
 $= \tan^{-1} \left[\frac{-5}{-19.64} \right] = 14.3^\circ$

Step 6: Since $\Sigma \vec{F}_x$ and $\Sigma \vec{F}_y$ are negative θ is in quadrant III
 $90 - 14.3 = 75.7^\circ$
 Resultant $\vec{F}_R = 20.27 \text{ km [S } 76^\circ \text{ W]}$