10-3 Additional Practice

Vectors

Write each vector in component form. Identify its magnitude and direction.

1. initial point (4, 6); terminal point (–2, 3) $\langle -6, -3 \rangle$, about 6.7, about 206.6°
2. initial point (–5, 8); terminal point (4, –1) $\langle 9, -9 \rangle$, about 12.7, –45°

Add each vector pair.

3. $\overrightarrow{MN} = \langle 10, 5 \rangle$ and $\overrightarrow{NO} = \langle -2, 5 \rangle$ $\langle 8, 10 \rangle$
4. $\overrightarrow{MN} = \langle -3, 7 \rangle$ and $\overrightarrow{NO} = \langle -1, -2 \rangle$ $\langle -4, 5 \rangle$

Find the components, magnitude, and direction of $\vec{s} - \vec{t}$ for each given vector pair. Round to the nearest hundredth.

5. $\vec{s} = \langle 2, -6 \rangle$, $\vec{t} = \langle -1, 4 \rangle$ $\langle 3, -10 \rangle$, 10.44, –73.30°
6. $\vec{s} = \langle 4, 7 \rangle$, $\vec{t} = \langle 0, -1 \rangle$ $\langle 4, 8 \rangle$, 8.94, 63.43°

Multiply each vector by the given scalar. Find the components, magnitude, and direction. Round to the nearest hundredth.

7. $\vec{t} = \langle 2, 3 \rangle$ scalar = 8 $\langle 16, 24 \rangle$, 28.84, 56.31°
8. $\vec{t} = \langle -4, 8 \rangle$ scalar = 6 $\langle -24, 48 \rangle$, 53.67, 116.57°
9. Reflect $\overrightarrow{EF} = \langle 5, 3 \rangle$ across the x-axis using a matrix.

$$T \cdot \overrightarrow{EF} = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} 5 \\ 3 \end{bmatrix} = \begin{bmatrix} 5 + 0 \\ 0 + (-3) \end{bmatrix} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$$

10. Reflect $\overrightarrow{GH} = \langle 2, 1 \rangle$ across the y-axis using matrices.

$$T \cdot \overrightarrow{GH} = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} -2 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 + 0 \\ 0 + 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

11. Emelia is paddling a kayak in the ocean at 5 mph headed 20° north of west. The current of the ocean is 3 mph at a direction that is 20° east of south. What are the magnitude and direction of the path of her kayak as she paddles across the ocean? 3.83 mph; 196.8° or 16.8° south of west
12. Describe how the magnitude and the direction of $\vec{t} = \langle x, y \rangle$ is affected when $\vec{t}$ is multiplied by a scalar of z. a scalar of $-z$?

The magnitude for $z \cdot \vec{t}$ increases by a factor of z, while the direction remains the same. The magnitude of $-z \cdot \vec{t}$ increases by a factor of $|-z|$, or z. The direction of $-z \cdot \vec{t}$ would be the direction of $\vec{t} + 180°$.