Copy the vectors in the figure and use them to draw the following vectors.

(a) \( \mathbf{u} + \mathbf{v} \)

(b) \( \mathbf{u} + \mathbf{w} \)
(c) $v + w$

(d) $u - v$

(e) $v + u + w$
2. Question Details

Find a vector \( \mathbf{a} \) with representation given by the directed line segment \( \overrightarrow{AB} \).

\[ A(-3, 1), \quad B(1, 5) \]

Draw \( \overrightarrow{AB} \) and the equivalent representation starting at the origin.
3. Question Details

Find a vector \( \mathbf{a} \) with representation given by the directed line segment \( \overrightarrow{AB} \).

\[ A(2, 0, -4), \quad B(2, 4, 2) \]

Draw \( \overrightarrow{AB} \) and the equivalent representation starting at the origin.

4. Question Details

Find the sum of the given vectors.

\[ \mathbf{a} = \langle 3, -4 \rangle, \quad \mathbf{b} = \langle -2, 9 \rangle \]

\[ \mathbf{a} + \mathbf{b} = \]

Illustrate geometrically.
Find the sum of the given vectors.

\[ \mathbf{a} = (4, 0, 4), \quad \mathbf{b} = (0, 8, 0) \]

\[ \mathbf{a} + \mathbf{b} = \]
Illustrate geometrically.
6. Question Details

Find $\mathbf{a} + \mathbf{b}$, $2\mathbf{a} + 3\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a} - \mathbf{b}|$.

$\mathbf{a} = (5, -12), \quad \mathbf{b} = (-3, -6)$

$a + b = 

2a + 3b = 

|a| = 

|a - b| = 

7. Question Details

Find $\mathbf{a} + \mathbf{b}$, $2\mathbf{a} + 3\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a} - \mathbf{b}|$.

$\mathbf{a} = i + 2j - 4k, \quad \mathbf{b} = -5i - j + 6k$

$a + b = 

2a + 3b = 

|a| = 

|a - b| = 

8. Question Details

Find a unit vector that has the same direction as the given vector.

$-3i + 7j$

9. Question Details

Find a unit vector that has the same direction as the given vector.

$8i - j + 4k$

10. Question Details

Find a vector that has the same direction as $(-4, 4, 6)$ but has length 6.
11. Question Details

If \( \mathbf{v} \) lies in the first quadrant and makes an angle \( \pi/3 \) with the positive \( x \)-axis and \( |\mathbf{v}| = 6 \), find \( \mathbf{v} \) in component form.

\[ \mathbf{v} = \]

12. Question Details

(a) Find the unit vectors that are parallel to the tangent line to the curve \( y = 2 \sin x \) at the point \( (\pi/6, 1) \). (Enter your answer as a comma-separated list of vectors.)

(b) Find the unit vectors that are perpendicular to the tangent line.

(c) Sketch the curve \( y = 2 \sin x \) and the vectors in parts (a) and (b), all starting at \( (\pi/6, 1) \).
If \( \mathbf{r} = (x, y, z) \) and \( \mathbf{r}_0 = (x_0, y_0, z_0) \), describe the set of all points \((x, y, z)\) such that \( |\mathbf{r} - \mathbf{r}_0| = 9\).

The set of points is a

- sphere with radius 81 and center \((x_0, y_0, z_0)\)
- circular cylinder with radius 9, height \(|z_0|\), and axis the z-axis
- circular cylinder with radius \(\sqrt{x_0^2 + y_0^2 + z_0^2}\), height 9, and axis the z-axis
- sphere with radius \(\sqrt{x_0^2 + y_0^2 + z_0^2}\) and center \((0, 0, 9)\)
- sphere with radius 9 and center \((x_0, y_0, z_0)\)