1 8.48

Specification: ADD IMAGE

Requirements: Which statements about the graphic are true, and which are false?

1.1 2)

$$\vec{EH} = \vec{DA} \tag{1}$$

Answer: The vectors are not the same because their orientation is different.

1.2 4)

$$\vec{AC} = \vec{EG} \tag{2}$$

Answer: The vectors are the same because they have the same orientation, magnitude, and direction.

1.3 6)

$$\vec{BC} = \vec{FG} \tag{3}$$

Answer: The vectors are the same because they have the same orientation, magnitude, and direction.

2 8.50

2.1 c)

Specification:
$$A(15|-4|12); B(2|8|11); k = 2; s = 34 \tag{4}$$

2.1.1 1)

Requirements: Calculate the vector $\vec{AB}$ and determine its length.

Exercise:

$$\vec{AB} = \vec{OB} - \vec{OA} \tag{5}$$

$$\vec{AB} = \begin{pmatrix} 2 \\ 8 \\ 11 \end{pmatrix} - \begin{pmatrix} 15 \\ -4 \\ 12 \end{pmatrix} \tag{6}$$

$$\vec{AB} = \begin{pmatrix} -13 \\ 12 \\ -1 \end{pmatrix} \tag{7}$$

$$|\vec{AB}| = \sqrt{(-13)^2 + 12^2 + (-1)^2} \tag{8}$$

$$|\vec{AB}| = 17.7200451467 \tag{9}$$

Answer: The vector be has the direction $\begin{pmatrix} -13 \\ 12 \\ -1 \end{pmatrix}$ and the length 17.7200451467.

2.1.2 2)

Requirements: Multiply the vector by the factor k.

Exercise:

$$k\vec{AB} = 2 * \begin{pmatrix} -13 \\ 12 \\ -1 \end{pmatrix} \tag{10}$$

$$k\vec{AB} = \begin{pmatrix} -26 \\ 24 \\ -2 \end{pmatrix} \tag{11}$$

Answer: Multiplying the vector $\vec{AB}$ by the factor k gives the vector $\begin{pmatrix} -26 \\ 24 \\ -2 \end{pmatrix}$.

2.1.3 3)

Requirements: Calculate that vector which has the same direction as $\vec{AB}$, but is s units long.

Exercise:

$$\vec{AB}_s = \frac{s}{|\vec{AB}|}\vec{AB} \tag{12}$$

$$\vec{AB}_s = \frac{34}{17.7200451467} * \begin{pmatrix} -13 \\ 12 \\ -1 \end{pmatrix} \tag{13}$$

$$\vec{AB}_s = \begin{pmatrix} -24.9435030408 \\ 23.0247720377 \\ -1.91873100314 \end{pmatrix} \tag{14}$$

Answer: The vector $\vec{AB}_s$ has the value $\begin{pmatrix} -24.9435030408 \\ 23.0247720377 \\ -1.91873100314 \end{pmatrix}$.

3   8.51

Specification:

$$\vec{a} = \begin{pmatrix} 11 \\ -5 \\ -7 \end{pmatrix}, \vec{b} = \begin{pmatrix} 27 \\ -5 \\ 45 \end{pmatrix} \tag{15}$$

3.1   b)

Requirements: Calculate the angle between vectors $\vec{a}$ and $\vec{b}$.

Exercise:

$$\cos(\alpha) = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}| * |\vec{b}|} \tag{16}$$

$$\alpha = \arccos(\frac{7}{736.141970003}) \tag{17}$$

$$\alpha = 89.45516° \tag{18}$$

Answer: The angle between $\vec{a}$ and $\vec{b}$ is $89.45516°$.

4   8.57

Specification:

$$A(11|3|-10), B(-4|5|-4), C(-1|14|5) \tag{19}$$

ADD IMAGE

4.1   a)

Requirements: Calculate the missing coordinates of the parallelogram $ABCD$.

$$\vec{AD} = \vec{BC} \tag{20}$$

$$\vec{BC} = \begin{pmatrix} -1 \\ 14 \\ 5 \end{pmatrix} - \begin{pmatrix} -4 \\ 5 \\ -4 \end{pmatrix} \tag{21}$$

$$\vec{BC} = \begin{pmatrix} 3 \\ 9 \\ 9 \end{pmatrix} \tag{22}$$

$$\vec{OD} = \vec{OA} + \vec{BC} \tag{23}$$

$$\vec{OD} = \begin{pmatrix} 11 \\ 3 \\ -10 \end{pmatrix} + \begin{pmatrix} 3 \\ 9 \\ 9 \end{pmatrix} \tag{24}$$

$$\vec{OD} = \begin{pmatrix} 14 \\ 12 \\ -1 \end{pmatrix} \tag{25}$$

Answer: The point D has the coordinates $(14|12|-1)$.