Question:

What is the difference between a ***scalar*** and ***vector***?

Answer:

A scalar is a type of physical quantity that can be completely described using magnitude only, while a vector quantity is a type of physical quantity that incorporates both magnitude and direction.

Question:

Which of the following statements concerning vectors is correct?

- **I. Adding a series of vectors in any order will not change their resultant.**
- **II. Moving vectors parallel to themselves changes their direction, but their magnitudes stay the same.**
- **III. Multiplying a vector by a scalar only changes the vector's magnitude.**

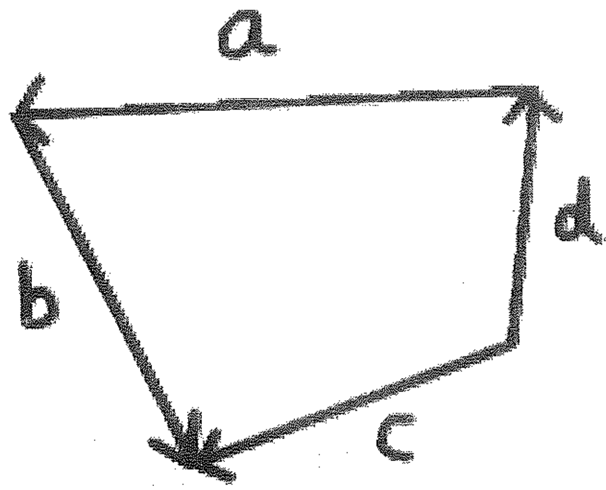
- **a.** I only
- **b.** II only
- **c.** I and II
- **d.** II and III
- **e.** I, II and III

Answer:

a.

Question:

Which vector in the figure below represents a ***resultant*** vector?



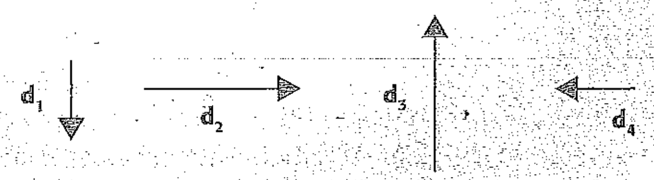
e. **None of the above**

Answer:

c.

Question:

Consider the following displacement vectors shown below.



Which vector below represents the:

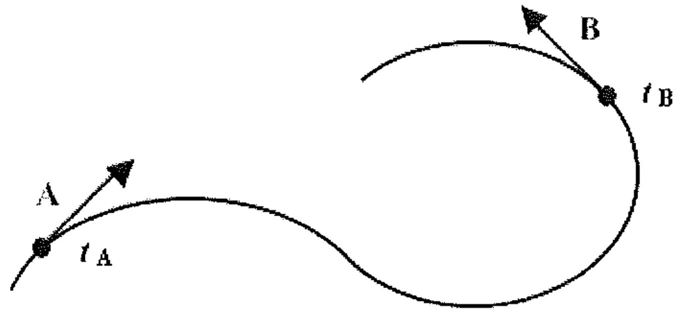
(1) vector difference $\mathbf{d_2} - \mathbf{d_1}$, (2) vector difference $\mathbf{d_3} - \mathbf{d_2}$, and (3) vector resultant $\mathbf{d_4} + \mathbf{d_2}$?

e. None of the above

Answer:

(1) **d**
(2) **c**
(3) a

Question:



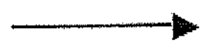
An object travels along a path shown above, with changing velocity as indicated by vectors **A** and **B**. Which vector best represents the net acceleration of the object from time t_A to t_B?

a. 

b. 

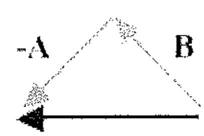
c. 

d. 

e. 

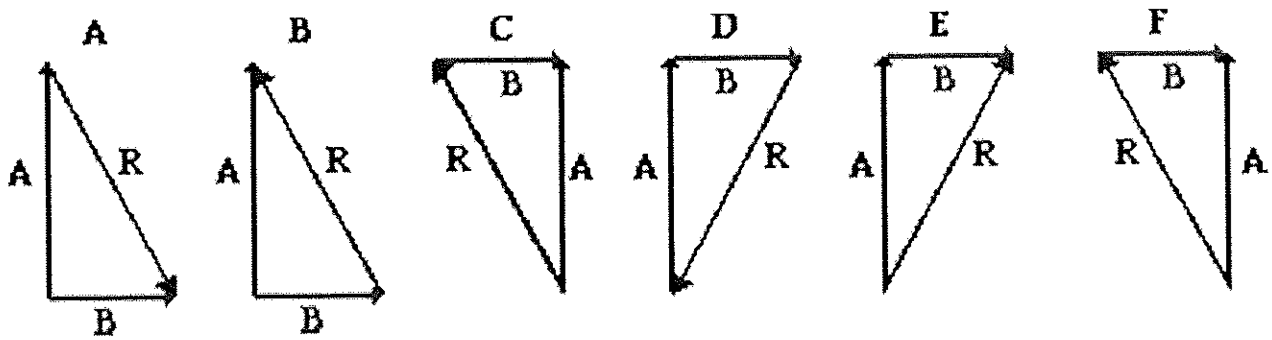
Answer:

The correct answer is *d*. The direction of acceleration is the same as the direction of the change in velocity, according to $a = \frac{v_f - v_i}{t}$. Because $\Delta \mathbf{v} = \mathbf{v_f} - \mathbf{v_i}$, we can determine Δv graphically by adding $\mathbf{v_f}$ to the negative of $\mathbf{v_i}$, or B+(-A). Placing the B vector "tip-to-tail" with the –A vector gives a direction for $\Delta \mathbf{v}$ (and therefore, **a**) to the left.



Question

Use the following to answer questions 1 and 2.



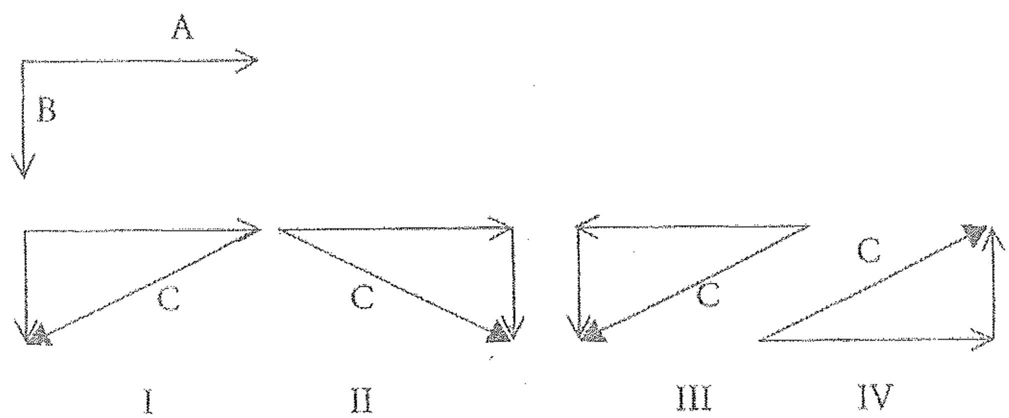
1. Which vector diagram shows the resultant of vectors A and B ?
2. Which vector diagram shows the vector difference A - B ?

Answer:

1. E
2. None of the above

Question:

Consider the following vectors:



______ **3.** In the figure above, which diagram represents the vector additi
C = A + B?

a. I
b. II
c. III
d. IV

______ **4.** In the figure above, which diagram represents vector subtractio
C = A − B?

a. I
b. II
c. III
d. IV

3. II
4. IV

Question:

Which should be the correct order of the steps followed when applying the process of vector resolution to determine the components of a vector?

1. **Draw perpendicular dashed lines from the tip of the original vector to each axis.**
2. **Construct *x* and *y* axes.**
3. **Apply the correct trig functions to calculate the magnitude of the *x* and *y* components.**
4. **Draw and label the *x* and *y* components on their respective axes.**

a. 1 – 2 – 3 – 4
b. 2 – 1 – 3 – 4
c. 2 – 1 – 4 – 3
d. 1 – 3 – 2 – 4
e. None of the above

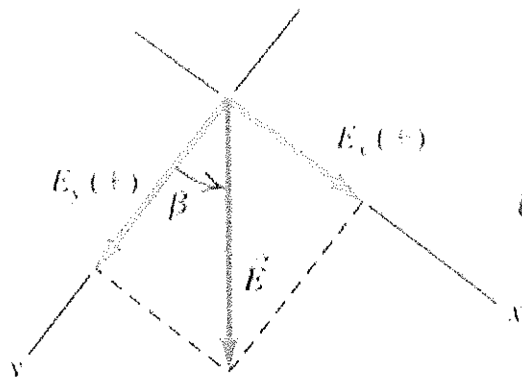
Answer:

c.

A1.1

What are the x– and y–components of the vector $\vec{E}$?

(b)



A. $E_x = E \cos \beta$, $E_y = E \sin \beta$

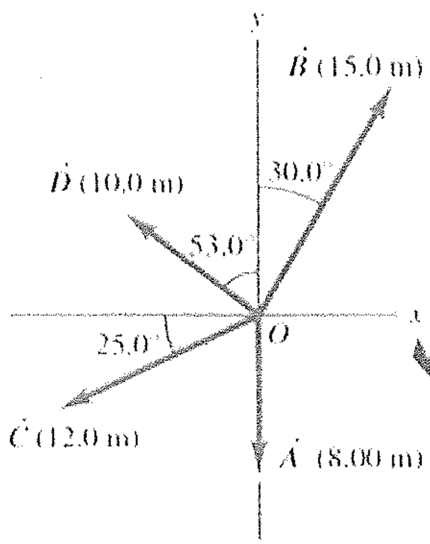
B. $E_x = E \sin \beta$, $E_y = E \cos \beta$

C. $E_x = -E \cos \beta$, $E_y = -E \sin \beta$

D. $E_x = -E \sin \beta$, $E_y = -E \cos \beta$

E. $E_x = -E \cos \beta$, $E_y = E \sin \beta$

A1.2



Consider the vectors shown. Which is a correct statement about $\vec{A} + \vec{B}$?

A. x-component > 0, y-component > 0

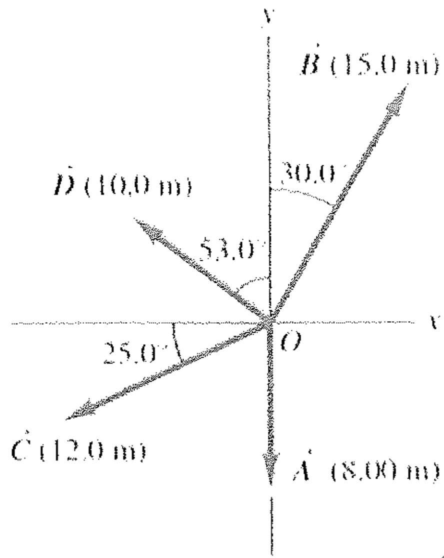
B. x-component > 0, y-component < 0

C. x-component < 0, y-component > 0

D. x-component < 0, y-component < 0

E. x-component $= 0$, y-component > 0

A1.3



Consider the vectors shown. Which is a correct statement about $\vec{A} - \vec{B}$?

A. x-component > 0, y-component > 0

B. x-component > 0, y-component < 0

C. x-component < 0, y-component > 0

D. x-component < 0, y-component < 0 ✓

E. x-component $= 0$, y-component > 0

A1.4

Which of the following statements is correct for *any* two vectors $\vec{A}$ and $\vec{B}$?

A. The magnitude of $\vec{A} + \vec{B}$ is $A + B$.

B. The magnitude of $\vec{A} + \vec{B}$ is $A - B$.

✓ C. The magnitude of $\vec{A} + \vec{B}$ is greater than or equal to $|A - B|$.

D. The magnitude of $\vec{A} + \vec{B}$ is greater than the magnitude of $\vec{A} - \vec{B}$

E. The magnitude of $\vec{A} + \vec{B}$ is $\sqrt{A^2 + B^2}$.

A1.5

Which of the following statements is correct for *any* two vectors $\vec{A}$ and $\vec{B}$?

A. The magnitude of $\vec{A}-\vec{B}$ is $A-B$.

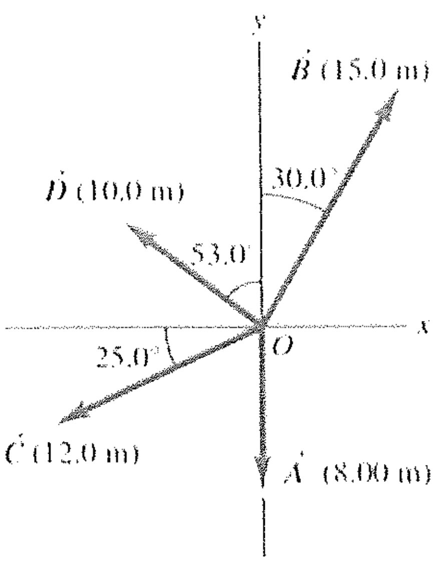
B. The magnitude of $\vec{A}-\vec{B}$ is $A+B$.

✓ C. The magnitude of $\vec{A}-\vec{B}$ is greater than or equal to $|A-B|$.

D. The magnitude of $\vec{A}-\vec{B}$ is less than the magnitude of $\vec{A}+\vec{B}$.

E. The magnitude of $\vec{A}-\vec{B}$ is $\sqrt{A^2+B^2}$.

A1.6



Consider the vectors shown.

What are the components of the vector $\vec{E}=\vec{A}+\vec{D}$?

✓ A. $E_x = -8.00$ m, $E_y = -2.00$ m

B. $E_x = -8.00$ m, $E_y = +2.00$ m

C. $E_x = -6.00$ m, $E_y = 0$

D. $E_x = -6.00$ m, $E_y = +2.00$ m

E. $E_x = -10.0$ m, $E_y = 0$

Question:

Consider the following questions involving vectors:

1. **How does a *unit vector* function to give directional orientation or special dimension**
2. **What is the relationship between a vector and its components?**

Which of the following statements regarding vectors is true?

a. The magnitude of a vector's components can never be equal to the magnitude of the vector itself.
b. The resultant of a system of three or more vectors can never be zero if the vectors all act in different directional orientations.
c. Changing a vector's orientation/direction is the only factor which can change a vector.
d. Multiplying a vector by a scalar does not change a vector's orientation/direction.
e. All of the above are true

Answers:

1. A *unit vector* "acts" or "operates" on a scalar magnitude to give that scalar an inherent directional orientation in 3D space.
2. The components of a vector are the parts/amounts/magnitudes of that vector that act in a particular direction in space or along a particular coordinate axis.

d.

Question:

In terms of how they are interpreted physically, not calculated, what is the distinction between *scalar* DOT and *vector* CROSS products?

Answer:

The scalar DOT product is interpreted as the scalar magnitude or amount of one vector that acts along the same direction as another.

The vector CROSS product is interpreted as the vector that acts perpendicular to the plane in which two vectors produce a twisting effect.

Question:

Consider the two vectors

$$\vec{A} = 3\hat{i} + 4\hat{j}$$

$$\vec{B} = -8\hat{i} + 6\hat{j}$$

What is the dot product $\vec{A} \bullet \vec{B}$?

A. zero

B. 14

C. 48

D. 50

E. none of these

Answer:

A.

Question:

Consider the following force vectors:

A = -4*i* - 12*j* + 9*k* B = 7*i* + 10*j* – 16*k* C = 5*i* + 3*j* + 8*k*

Determine

1. A • B

2. (A • C)B → (A • C) × B

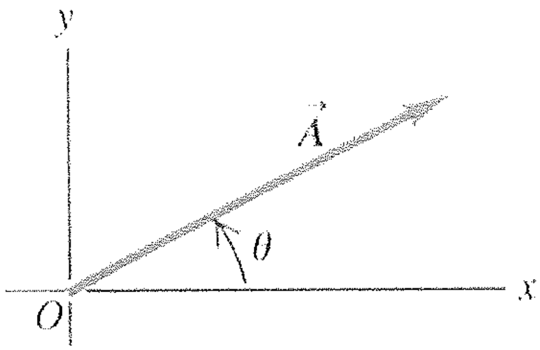
3. B X A

4. (A X C) • B

Answer:

1. **– 292**
2. **112*i* + 160*j* – 256*k***
3. **–102*i* + *j* – 44*k***
4. **–859**

A1.7



The angle θ is measured counterclockwise from the positive x-axis as shown. For which of these vectors is θ greatest?

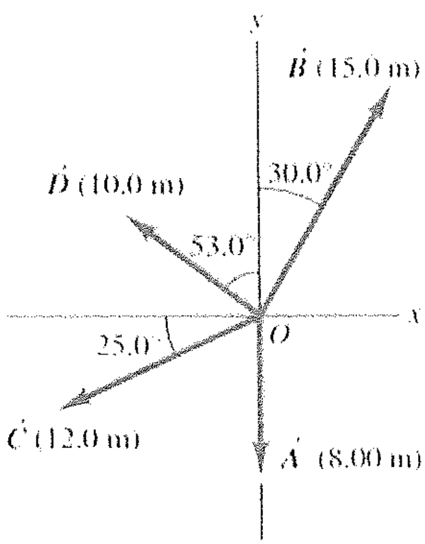
A. $24\hat{i} + 18\hat{j}$

B. $-24\hat{i} - 18\hat{j}$

C. $-18\hat{i} + 24\hat{j}$

✓ D. $-18\hat{i} - 24\hat{j}$

A1.8



Consider the vectors shown.

What is the dot product $\vec{C} \bullet \vec{D}$?

A. $(120\ \text{m}^2)\cos 78.0°$

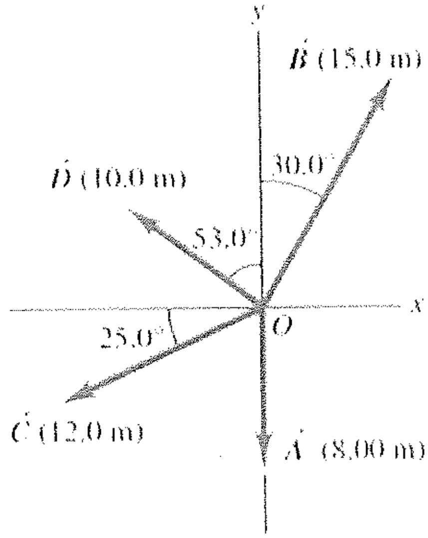
B. $(120\ \text{m}^2)\sin 78.0°$

✓ C. $(120\ \text{m}^2)\cos 62.0°$

D. $(120\ \text{m}^2)\sin 62.0°$

E. none of these

A1.9



Consider the vectors shown.

What is the cross product $\vec{A} \times \vec{C}$?

A. $(96.0\ \text{m}^2)\sin 25.0°\ \hat{k}$

B. $(96.0\ \text{m}^2)\cos 25.0°\ \hat{k}$

C. $-(96.0\ \text{m}^2)\sin 25.0°\ \hat{k}$

✓ D. $-(96.0\ \text{m}^2)\cos 25.0°\ \hat{k}$

E. none of these