Physics Grade 11 Unit 2

Vectors (23 Questions)

4. The vector product of two non-collinear vectors $\vec{A}$ and $\vec{B}$

(A) is perpendicular to the plane formed by $\vec{A}$ and $\vec{B}$.
(B) is on the plane formed by $\vec{A}$ and $\vec{B}$.
(C) must be zero
(D) is a scalar quantity

10. Which of the following is **NOT** true of vector product ?

(A) $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$

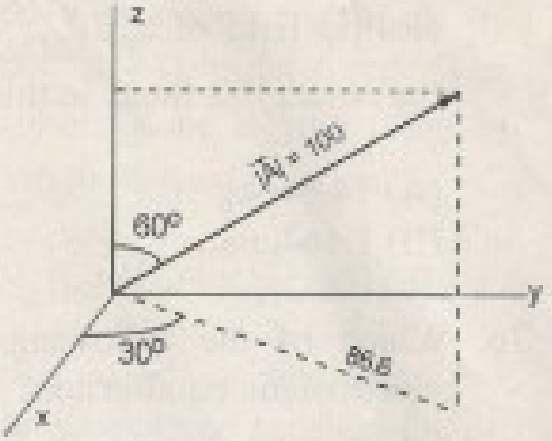
(B) $\vec{A} \times (\vec{B} + \vec{C}) = \vec{B} \times \vec{A} + \vec{A} \times \vec{C}$

(C) $\vec{A} \perp \vec{B} \Rightarrow \left|\vec{A} \times \vec{B}\right| = AB$

(D) $\vec{A} \| \vec{B} \Rightarrow \vec{A} \times \vec{B} = 0$

39. The x, y, and z components of the vector $|\vec{A}| = 100\text{m}$ shown in the figure below, respectively are

(A) 86.6, 21.6, 37.5
(B) 50.0, 43.3, 75.0
(C) 75.0, 43.3, 50.0
(D) 37.5, 21.6, 86.6



1. A vector has components of 6m in the +x direction, 2 m in the +y direction, and 3 m in the +z direction. What is the magnitude of this vector?

A) 49 m
B) 7 m
C) $\sqrt{7}$ m
D) 1 m

2. If $\vec{A} = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{B} = 3\hat{i} + 4\hat{j}$, the angle between the two vectors is:

A) $\cos^{-1}(14/15)$
B) $\cos^{-1}(11/225)$
C) $\cos^{-1}(104/225)$
D) $\cos^{-1}(11/15)$

3. For two vectors, $\vec{A} = 3\hat{i} - 2\hat{j}$ and $\vec{B} = 2\hat{i} + 3\hat{j} - 2\hat{k}$, which of the following vectors is perpendicular to both $\vec{A}$ and $\vec{B}$?

A) $4\hat{i} + 6\hat{j} + 13\hat{k}$
B) $-4\hat{i} + 6\hat{j} + 13\hat{k}$
C) $4\hat{i} - 6\hat{j} + 13\hat{k}$
D) $4\hat{i} + 6\hat{j} - 13\hat{k}$

4. For two non-zero vectors, $\vec{A}$ *and* $\vec{B}$, if $\vec{R} = \vec{A} \times \vec{B}$ and $\theta \neq 90^0$ where θ is the angle between $\vec{A}$ and $\vec{B}$, which of the following is **NOT** true?

A) $|\vec{R}| = |\vec{A}||\vec{B}|\sin\theta$
B) $-\vec{R} = \vec{B} \times \vec{A}$
C) $\vec{A} \bullet \vec{B} = 0$
D) $\vec{R} \bullet \vec{B} = 0$

12. A river flows at 5 km/h west. A man rowing a boat at 10 km/h wishes to cross from the south bank to a point directly opposite on the north bank. At what angle must the boat be headed?

A) 30^0 East of North
B) 60^0 East of North
C) 30^0 North of East
D) 60^0 North of West

1. The sum and difference of two non-zero vectors $\vec{A}$ and $\vec{B}$ are equal in magnitude. What can you conclude about these two vectors?

(A) $\vec{A}$ and $\vec{B}$ have the same direction.
(B) $\vec{A}$ and $\vec{B}$ have opposite directions.
(C) $\vec{A}$ and $\vec{B}$ have the same magnitude.
(D) $\vec{A}$ and $\vec{B}$ are perpendicular to each other.

6. Suppose $\vec{A} = 3\hat{i} - 2\hat{j}$, and $\vec{B} = -\hat{i} - a\hat{j}$ are two vectors in xy-plane. What is the value of a such that $\vec{A} + \vec{B} = 2\hat{i}$?

(A) 3 (B) 2 (C) -2 (D) -3

6. Two non-zero vectors $\vec{A}$ and $\vec{B}$ are related by $\vec{A} = c(\vec{B})$ where c is a scalar. If the two vectors have opposite directions, then one of the following is true about c?

A. c is a positive number
B. c is a negative number
C. c=1
D. c=0

10. A vector that represents the position of an object in relation to another object is called

A. Unit vectors
B. Position vectors
C. Copplanar vectors
D. Collinear vectors

16. If $\vec{A} = 8\vec{i} + \vec{j} - 2\vec{k}$ *and* $\vec{B} = 5\vec{i} - 3\vec{j} + \vec{k}$, then, what is the value of $\vec{B}X\vec{A}$?

A. $3\vec{i} + 4\vec{j} - 3\vec{k}$
B. $-3\vec{i} - 4\vec{j} + 3\vec{k}$
C. $-5\vec{i} - 18\vec{j} - 29\vec{k}$
D. $5\vec{i} + 18\vec{j} + 29\vec{k}$

5. Two none zero vectors D and E have precisely equal magnitudes. For the magnitude of D + E to be 3 times larger than the magnitude of D-E, what must be the angle between D and E?

A. 30^0
B. 37^0
C. 53^0
D. 60^0

15. The vector $2\hat{i} + \hat{j} + \hat{k}$ is perpendicular to $\hat{i} + 4\hat{j} + \lambda$ if λ is equal to

A. -2
B. -1
C. 2
D. 3

3. What is the angle between vectors A = (a i + a $\sqrt{3}j$) units and B = (a $\sqrt{3}i$ + aj) units?

A. 90^0
B. 60^0
C. 37^0
D. 30^0

4. The magnitude of two vectors A and B are 12 units and 5 units, respectively. Which one of the following is **Not** the possible value for the magnitude of the resultant vector A + B?

A. 60units B. 17units C. 13units D. 7units

5.

What is vector product A x B of two vectors

$\mathbf{A} = 7\hat{i} + 4\hat{j} - 8\hat{k}$ and $\mathbf{B} = 3\hat{i} - 2\hat{j} + 5\hat{k}$

A. $36\hat{i} + 11\hat{j} - 2\hat{k}$

B. $4\hat{i} - 59\hat{j} - 26\hat{k}$

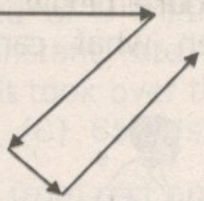
C. $-4\hat{i} + 59\hat{j} + 26\hat{k}$

D. $-36\hat{i} - 11\hat{j} + 2\hat{k}$

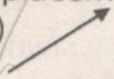
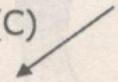
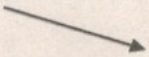
8. Two forces $\vec{F_1} = (8\vec{i} + 3\vec{j})$ N and $\vec{F_2} = (4\vec{i} + 6\vec{j})$ N are acting on an object. What is the magnitude and direction of the resultant force?

(A) 5 N, -37° (B) 15 N, 37° (C) 5 N, 143° (D) 225 N, 143°

9. The diagram below shows a path taken by a flying bird.



Which one of the following vector may represent a resultant displacement?

(A)  (B) (C)  (D) 

10. Four vectors are listed below

$$\vec{A} = \begin{bmatrix} 4 \\ 10 \end{bmatrix}, \quad \vec{B} = \begin{bmatrix} 2 \\ -5 \end{bmatrix}, \quad \vec{C} = \begin{bmatrix} -6 \\ 15 \end{bmatrix}, \quad \vec{D} = \begin{bmatrix} 15 \\ -6 \end{bmatrix},$$

Which pair of the vectors is orthogonal?

(A) $\vec{A}$ and $\vec{B}$

(B) $\vec{B}$ and $\vec{C}$

(C) $\vec{C}$ and $\vec{D}$

(D) $\vec{A}$ and $\vec{D}$

4. What is the magnitude of the resultant velocity for a bird flying first at a speed of 10 m/s North East and then flying to South at a speed of 8 m/s?

(A) 7.13 m/s
(C) 12.8 m/s
(B) 16.6 m/s
(D) 7.07 m/s

5. Let $\vec{C}=\vec{A}X\vec{B}$ and $\theta \neq 90^0$, where θ is the smaller angle between $\vec{A}$ and $\vec{B}$ when they are drawn with their tails at the same point. Which of the following is **NOT** true?

(A) $\vec{A}.\vec{B} = 0$
(C) $/\vec{C}/=/\vec{A}//\vec{B}/\sin\theta$
(B) $\vec{A}.\vec{C} = 0$
(D) $-\vec{C}=\vec{B}X\vec{A}$