

Vector practice

Phys 632

Consider three vectors

$$\mathbf{A} = 4\hat{i} + 6\hat{j} - 2\hat{k}$$

$$\mathbf{B} = 2\hat{i} + 7\hat{j} - 1\hat{k}$$

$$\mathbf{C} = 0\hat{i} + 3\hat{j} + 5\hat{k}$$

1. What is the length or magnitude of \mathbf{A} ?
2. Write an expression for $2\mathbf{A}$.
3. What is $\mathbf{A} + \mathbf{B}$?
4. What is $\mathbf{C} - \mathbf{A}$?
5. What is $\mathbf{C} \times \mathbf{A}$?
6. What is the magnitude of $\mathbf{C} \times \mathbf{A}$?
7. What is the angle between \mathbf{A} and \mathbf{C} ?
8. What is $\mathbf{B} \cdot \mathbf{C}$?
9. Does $\mathbf{B} \cdot \mathbf{C}$ equal $\mathbf{C} \cdot \mathbf{B}$?
10. How are $\mathbf{C} \times \mathbf{A}$ and $\mathbf{A} \times \mathbf{C}$ related?
11. What is the physical meaning of the dot product?
12. Explain the meaning of the cross product.
13. Imagine that the vector \mathbf{A} is a force whose units are given in Newtons. Imagine vector \mathbf{B} is a radius vector through which the force acts. What is the value of the torque $\mathbf{r} \times \mathbf{F}$, in this case?
14. Now imagine that \mathbf{A} continues to be a force vector and \mathbf{C} is a displacement vector whose units are meters. What is the work done in applying force \mathbf{A} through a displacement \mathbf{C} ?
15. What is the vector sum of a vector \mathbf{D} given by 40 m, 30 degrees and a vector \mathbf{E} given by 12 m, 220 degrees? Use the method of resolving vectors into their components and then adding the components.