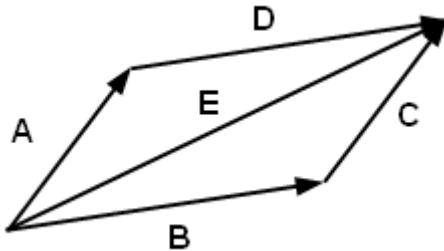
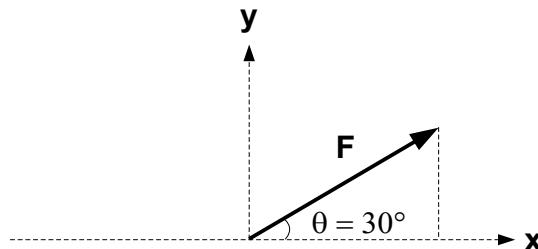


Final Exam – Vector Fundamentals

1. _____ are properties of a vector.
 - a. Magnitude and direction
 - b. Weight and mass
 - c. Speed and size
 - d. Latitude and longitude
2. A scalar has both magnitude and direction.
 - a. True
 - b. False
3. All of the following are examples of vectors except _____.
 - a. temperature
 - b. velocity
 - c. force
 - d. moment (torque)
4. Given vector $\mathbf{A} = 3\mathbf{i} + 4\mathbf{j} - 5\mathbf{k}$, its length is _____.
 - a. 7.07
 - b. 12
 - c. 3.46
 - d. 5.02

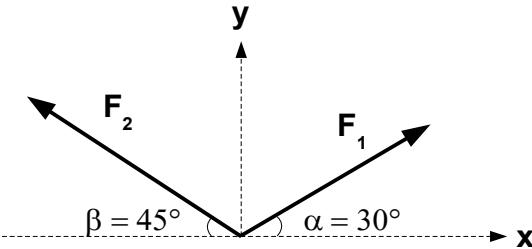


5. Using the above diagram, $\mathbf{A} + \mathbf{B}$ equals _____.
 - a. C
 - b. E
 - c. D
 - d. none of the above



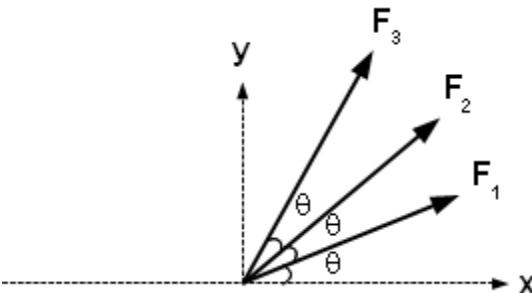
6. Using the above diagram, if $F = 70$ N, the vector component along the x-axis equals _____ N and the vector component along the y-axis equals _____ N.

- 41.3, 56.5
- 35, 60.6
- 50.1, 48.9
- 60.6, 35



7. Using the above diagram, if $F_1 = 60$ N, $F_2 = 50$ N, the resulting force vector is $F =$ _____ $i +$ _____ j N.

- 13.4, 63.2
- 87.4, 65.4
- 16.6, 65.3
- 18.3, 62.1



8. Using the above diagram, if the angles all equal 20 degrees, $F_1 = 10$ N, $F_2 = 12$ N, $F_3 = 15$ N, the resultant vector is $F =$ _____ $i +$ _____ j N.

- 26.1, 24.1
- 7.50, 13.0
- 27.1, 22.6
- 9.40, 3.42

9. Given that $\mathbf{A} = 4\mathbf{i} + 2\mathbf{j} - 5\mathbf{k}$ and $\mathbf{B} = \mathbf{i} - 7\mathbf{j} - 5\mathbf{k}$, the dot product $\mathbf{A} \cdot \mathbf{B}$ is _____.

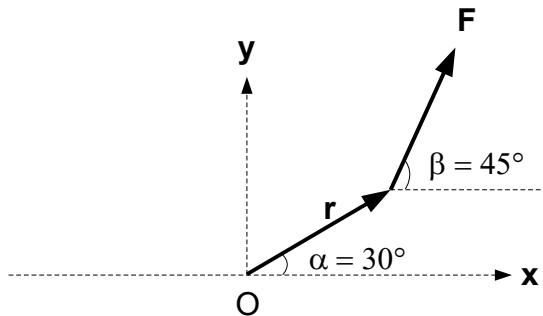
- 14
- 15
- 16
- 17

10. Given that $\mathbf{A} = 4\mathbf{i} + 2\mathbf{j} - 5\mathbf{k}$ and $\mathbf{B} = \mathbf{i} - 7\mathbf{j} - 5\mathbf{k}$, the cross product $\mathbf{A} \times \mathbf{B}$ is _____.

- a. $-43\mathbf{i} + 17\mathbf{j} + 18\mathbf{k}$
- b. $4\mathbf{i} - 14\mathbf{j} + 25\mathbf{k}$
- c. $12\mathbf{i} - 23\mathbf{j} + 27\mathbf{k}$
- d. $-45\mathbf{i} + 15\mathbf{j} - 30\mathbf{k}$

11. The angle between \mathbf{A} and \mathbf{B} in the above problem is _____.

- a. 74.1
- b. 78.6
- c. 75.0
- d. 68.3



12. Using the above diagram, the moment \mathbf{M} resulting from the force $\mathbf{F} = 10 \text{ N}$ applied at a distance $r = 5 \text{ m}$ from the point O is _____ N m .

- a. 11.2
- b. 12.9
- c. 13.5
- d. 14.8

13. Two vectors, \mathbf{A} and \mathbf{B} , form an angle of θ . The projection of \mathbf{A} on \mathbf{B} is given by _____.

- a. $B \cos \theta$
- b. $\mathbf{A} \cdot \mathbf{B}$
- c. $\mathbf{A} \times \mathbf{B}$
- d. $(\mathbf{A} \cdot \mathbf{B}) / B$

14. The angle between two known vectors may be found using _____.

- a. parallelogram method
- b. vector decomposition
- c. the triple product
- d. the dot product

15. The right-hand rule is used _____.

- a. to calculate the dot product of two vectors
- b. to find the projection of a vector onto another vector
- c. to determine the direction of the resulting vector from a cross product

d. to find the magnitude of the resulting vector from a cross product