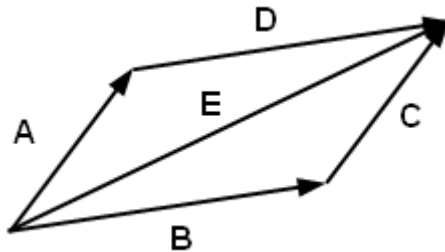
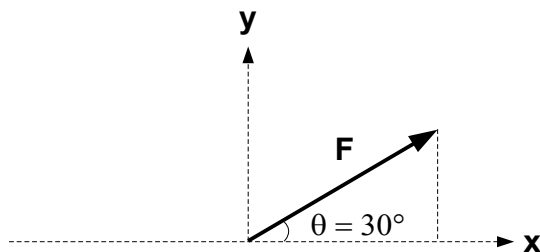


Final Exam – Vector Fundamentals

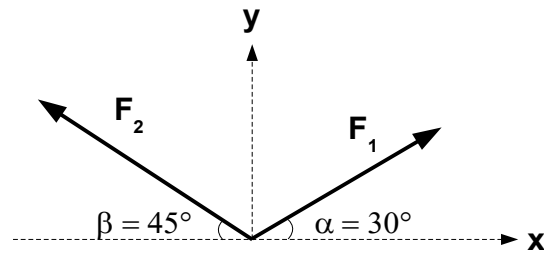
- _____ are properties of a vector.
 - Magnitude and direction
 - Weight and mass
 - Speed and size
 - Latitude and longitude
- A scalar has both magnitude and direction.
 - True
 - False
- All of the following are examples of vectors except _____.
 - temperature
 - velocity
 - force
 - moment (torque)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



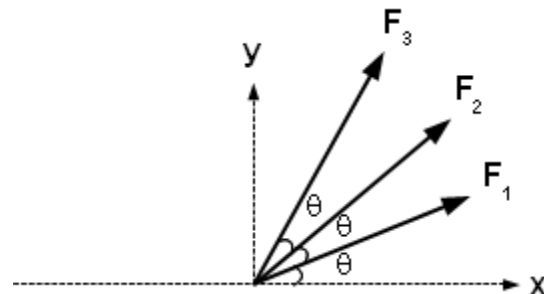
- Using the above diagram, $\mathbf{A} + \mathbf{B}$ equals _____.
 - C
 - E
 - D
 - none of the above



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 $F =$ _____ $\mathbf{i} +$ _____ \mathbf{j} N.
- 13.4, 63.2
 - 87.4, 65.4
 - 16.6, 65.3
 - 18.3, 62.1



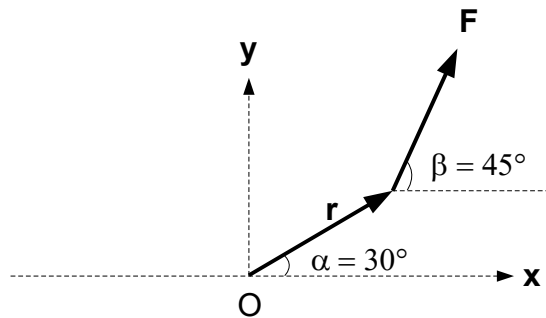
8. Using the above diagram, if the angles all equal 20 degrees, $F_1 = 10$ N, $F_2 = 12$ N, $F_3 = 15$ N, the resultant vector is $F =$ _____ $\mathbf{i} +$ _____ \mathbf{j} N.
- 26.1, 24.1
 - 7.50, 13.0
 - 27.1, 22.6
 - 9.40, 3.42
9. Given that $\mathbf{A} = 4\mathbf{i} + 2\mathbf{j} - 5\mathbf{k}$ 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 $\mathbf{r} = 5 \text{ m}$ from the point O is _____ $\mathbf{k} \text{ Nm}$.

- 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