Vector Calculations

Mathematics · Answer Key · 29 Questions

1. What operation is performed when combining two vectors by adding their corresponding components?

A) Scalar multiplication
B) Vector addition
C) Dot product
D) Cross product

2. If vector A = [2, 3] and vector B = [1, -1], what is vector A + vector B?

A) [3, 2]
B) [1, 4]
C) [2, -3]
D) [3, -1]

3. What is the result of subtracting vector B from vector A if A = [5, 2] and B = [3, 1]?

A) [2, 1]
B) [8, 3]
C) [15, 2]
D) [2, 3]

4. When multiplying a vector by a scalar, what happens to the vector?

A) Its direction changes
B) Its magnitude changes
C) Its direction and magnitude change
D) It remains unchanged

5. If vector V = [4, -2] and the scalar is 3, what is 3 * V?

A) [12, -6]
B) [7, 1]
C) [4, -6]
D) [1, -2]

6. The dot product of two vectors results in a:

A) Vector
B) Scalar
C) Matrix
D) Angle

7. Calculate the dot product of vector P = [2, 5] and vector Q = [3, -1].

A) 1
B) 11
C) -9
D) 6

8. What is the geometric interpretation of the dot product of two vectors?

A) The area they enclose
B) The angle between them
C) Their combined magnitude
D) The sum of their lengths

9. If two vectors are orthogonal, what is their dot product?

A) Equal to 1
B) Equal to their magnitudes multiplied
C) Zero
D) Undefined

10. What is the magnitude of a vector [x, y]?

A) x + y
B) sqrt(x + y)
C) sqrt(x^2 + y^2)
D) x^2 + y^2

11. Find the magnitude of vector R = [3, 4].

A) 5
B) 7
C) 9
D) 12

12. What is a vector with a magnitude of 1 called?

A) Zero vector
B) Unit vector
C) Null vector
D) Scalar vector

13. If vector A = [a1, a2] and vector B = [b1, b2], what is the formula for vector addition?

A) [a1-b1, a2-b2]
B) [a1*b1, a2*b2]
C) [a1+b1, a2+b2]
D) [a1/b1, a2/b2]

14. What is the opposite of vector addition?

A) Scalar multiplication
B) Dot product
C) Vector subtraction
D) Magnitude calculation

15. If vector C = [1, 1] and scalar k = -2, what is k * C?

A) [-2, -2]
B) [2, 2]
C) [-1, -1]
D) [0, 0]

16. The dot product is commutative. What does this mean?

A) A o B = B o A
B) A o B = - (B o A)
C) A o B = |A| * |B|
D) A o B = |A| + |B|

17. If vector S = [-3, 0] and vector T = [0, 5], what is S o T?

A) -3
B) 5
C) 0
D) 15

18. What is the process of finding the length of a vector?

A) Scalar multiplication
B) Dot product
C) Magnitude calculation
D) Vector subtraction

19. What is the result of multiplying vector [x, y] by a scalar 's'?

A) [x, y]
B) [sx, sy]
C) [x+s, y+s]
D) [x-s, y-s]

20. If vector U = [6, -2] and vector V = [1, 3], what is U - V?

A) [5, -5]
B) [7, 1]
C) [6, -6]
D) [5, 1]

21. What does it mean for two vectors to be parallel?

A) Their dot product is 0
B) One is a scalar multiple of the other
C) They are perpendicular
D) They have the same magnitude

22. Calculate the magnitude of vector W = [-6, 8].

A) 10
B) 14
C) 2
D) 48

23. What is the zero vector?

A) A vector with magnitude 1
B) A vector with a negative magnitude
C) A vector with magnitude 0
D) A vector with any magnitude

24. If vector A = [1, 2, 3] and vector B = [4, 5, 6], what is A + B?

A) [5, 7, 9]
B) [-3, -3, -3]
C) [4, 10, 18]
D) [1, 2, 3]

25. What is the dot product of vector A = [1, 0, 0] and vector B = [0, 1, 0]?

A) 1
B) 0
C) -1
D) undefined

26. What is the magnitude of the zero vector [0, 0]?

A) 0
B) 1
C) undefined
D) infinity

27. If vector X = [2, 3] and scalar s = 1/2, what is s * X?

A) [1, 1.5]
B) [4, 6]
C) [2, 3]
D) [0.5, 0.5]

28. What is the relationship between the dot product and the angle between vectors?

A) Directly proportional
B) Inversely proportional
C) Related by the cosine of the angle
D) Not related

29. If vector M = [a, b] and vector N = [c, d], what is the dot product M o N?

A) ac + bd
B) ad + bc
C) ac - bd
D) a+b+c+d