Chapter (3): VECTORS

Choose the correct answer:

1. A vector has two components (**A_x = 3 cm** and **A_y = - 4 cm**). What is the **magnitude of** $\vec{A}$?

(a) 4 cm (b) 5 cm (c) 1 cm (d) 7 cm

---

2. In question 2, What is the **direction of** $\vec{A}$?

(a) -53.1° (b) -25.3° (c) -17.9° (d) -36.9°

---

3. Given the two vectors $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$, Find $\vec{c}$ where $\vec{c} = \vec{a} + \vec{b}$?

(a) $\vec{c} = 3\hat{i} + 5\hat{j} + 7\hat{k}$ (b) $\vec{c} = 3\hat{i} + \hat{j} + 7\hat{k}$ (c) $\vec{c} = \hat{i} + \hat{j} + 7\hat{k}$ (d) $\vec{c} = \hat{i} + 5\hat{j} + \hat{k}$

---

4. In question 3, Find $\vec{a} \cdot \vec{b}$?

(a) 5 (b) 15 (c) 20 (d) 8

---

5. Vectors $\vec{C}$ *and* $\vec{D}$ have magnitudes of **3 units** and **4 units** respectively. What is the **angle between the directions of** $\vec{C}$ *and* $\vec{D}$ **if** $\vec{C} \times \vec{D}$ **= 12**

(a) 90° (b) 180° (c) 270° (d) 0°

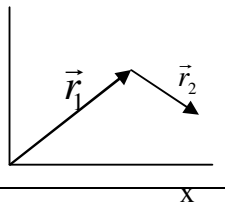
---

6. A vectors $\vec{a}$ has two component, a_x = 2.6 m, a_y = - 2.3 m , what is the **direction** of $\vec{a}$?

(a) – 48.5° (b) 48.5° (c) – 41.3° (d) 41.3°

---

7. In the figure **what are the signs** of the **x and y** component of $\vec{r}_1 + \vec{r}_2$?



(a) (+ , +) (b) (- , -) (c) (+ , -) (d) (- , +)

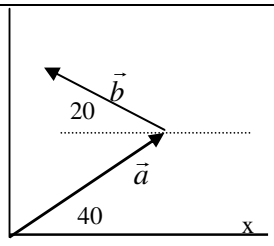
---

8. If $\vec{a} \times \vec{b} = \vec{c}$ then **the value of c_y** equals:

(a) $a_z b_x - b_z a_x$ (b) $a_x b_y - b_x a_y$ (c) $a_y b_z - b_y a_z$ (d) $a_y b_x - b_y a_x$

---

9. Two vectors $\vec{a}$ *and* $\vec{b}$, $\vec{a}$ has a magnitude of **12 m** and has an **angle of 40°** from the +x direction, and $\vec{b}$ has a magnitude of **9 m** in the **direction shown**. **Find the x component of their vector sum**?



(a) 17.65 m (b) 10.79 m (c) 0.73 m (d) 3.21 m

---

10. Two vectors $\vec{a} = (4m)\hat{i} - (3m)\hat{j}$ and $\vec{b} = (6m)\hat{i} + (8m)\hat{j}$, What is **the magnitude** of $\vec{a}$?

(a) 1 m (b) 4 m (c) 5 m (d) 7 m

11. In **question 10**, find $\vec{a} + \vec{b}$?

(a) $10\,\hat{i} + 5\,\hat{j}$ (b) $2\hat{i} + 11\,\hat{j}$ (c) $10\,\hat{i} + 11\,\hat{j}$ (d) $9\,\hat{i} + 12\,\hat{j}$

12. In **question 10**, Find $\vec{a} \cdot \vec{b}$?

(a) 1 (b) 24 (c) 48 (d) zero

13. In **question 10,** Find $\frac{\vec{b}}{2}$?

(a) $3\,\hat{i} + 4\,\hat{j}$ (b) $-3\hat{i} - 4\,\hat{j}$ (c) $12\,\hat{i} + 16\,\hat{j}$ (d) $-12\,\hat{i} - 16\,\hat{j}$

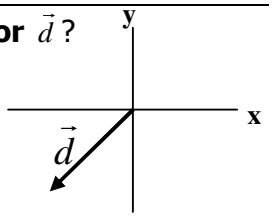
14. Given the two vectors $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 3\hat{k}$, Find $\vec{c}$ where $\vec{c} = \vec{a} + \vec{b}$?

(a) $\vec{c} = 3\hat{i} + 5\hat{j} + 7\hat{k}$ (b) $\vec{c} = 3\hat{i} + \hat{j} + 7\hat{k}$ (c) $\vec{c} = \hat{i} + \hat{j} + 7\hat{k}$ (d) $\vec{c} = \hat{i} + 5\hat{j} + \hat{k}$

15. Vector $\vec{A}$ has a **magnitude of 6 units** and is in the **direction of positive x-axis**, vector $\vec{B}$ has a **magnitude of 4 units** and making an angle of **30° with the positive x-axis**. What is the **magnitude of** $\vec{A} \times \vec{B}$?

(a) 12 units (b) 24 units (c) 20.8 units (d) 28 units

16. In the figure, what is the **signs of the x and y components of vector** $\vec{d}$?

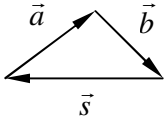


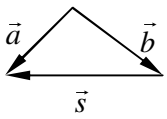
(a) (+ , +) (b) (+ , -) (c) (- , -) (d) (- , +)

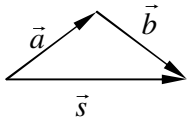
17. Two vectors : $\vec{A} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{B} = \hat{i} - 2\hat{j} + 3\hat{k}$. Find $\vec{A} \cdot \vec{B}$?

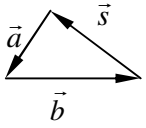
(a) 5 (b) 15 (c) 20 (d) 8

18. **Which figure** of the following represent the relation $\vec{s} = \vec{a} + \vec{b}$:

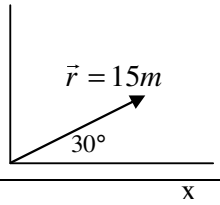
(a) 

(b) 

(c) 

(d) 

19. from the figure, **the y component** of the vector $\vec{r}$ equals:



(a) 13 m (b) 7.5 m (c) 8.7 m (d) 7.8 m

20. Which one of the following is the **scalar quantity**?

(a) Displacement (b) Length (c) Velocity (d) acceleration

21. Vector $\vec{A}$ has two components, $A_x = -25$ **m** , $A_y = 40$ **m**, what is the direction of $\vec{A}$?

(a) 32° (b) -32° (c) 58° (d) -58°

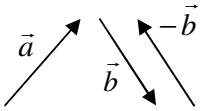
22. If the **x component** of vector $\vec{r}$ **is 2.6 m** and the **y component is -2.3 m** then $\vec{r}$ in **unit-vector notation** is:

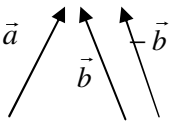
(a) $2.6\ \hat{i} - 2.3\ \hat{j}$ (b) $-2.3\ \hat{i} + 2.6\ \hat{j}$ (c) $2.6\ \hat{i} - (-2.3)\hat{j}$ (d) $2.6\ \hat{i} - 2.3\ \hat{j} + \hat{k}$

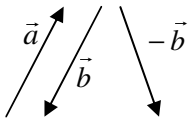
23. Vector $\vec{c}$ has the **magnitude of 36**, what is the magnitude of $\frac{\vec{c}}{4} - 9$?

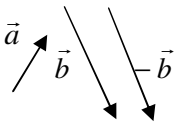
(a) zero (b) 6 (c) 9 (d) 27

24. Which one of the following figures **shows the three vectors $\vec{a}$, $\vec{b}$ and $-\vec{b}$:**

(a) 

(b) 

(c) 

(d) 

25. Two vectors are given by: $\vec{a} = 4\hat{i} - 3\hat{j} + \hat{k}$ **and** $\vec{b} = 6\hat{i} + 8\hat{j} + 4\hat{k}$

Find $\vec{c}$ where $\vec{a} - \vec{b} + \vec{c} = 0$

(a) $4\hat{i} - 3\hat{j} + \hat{k}$ (b) $2\hat{i} + 11\hat{j} + 3\hat{k}$ (c) $-2\hat{i} - 5\hat{j} + \hat{k}$ (d) $\hat{i} + 3\hat{j} + 11\hat{k}$

26. If **the angle between** $\vec{A}$ *and* $\vec{B}$ **is 60°**, and **A = 5 units, B = 6 units,** then **the magnitude** of the **vector product** $\vec{A} \times \vec{B}$ is:

(a) 30 (b) 20.89 (c) 15 (d) 25.98

27. For the following two vectors: $\vec{A} = 2\hat{i} + 3\hat{j} - 4\hat{k}$, $\vec{B} = -3\hat{i} + 4\hat{j} + 2\hat{k}$**. Find** $\vec{A} \cdot \vec{B}$

(a) – 4 (b) – 2 (c) - 8 (d) – 10

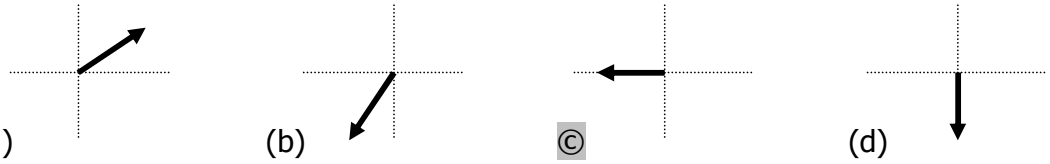
28. In question 27, the **magnitude** of vector $\vec{A}$ equals:

(a) 5.4 (b) 3 © 1.7 (d) 4.2

29. If $\vec{a} \times \vec{b} = \vec{c}$ then **the value of c_x** equals:

(a) $a_z\, b_x - b_z\, a_x$ (b) $a_x\, b_y - b_x\, a_y$ (c) $a_y\, b_z - a_z\, b_y$ (d) $a_y\, b_x - b_y\, a_x$

30. Which **vector** of the following has the **y-component equals zero**:

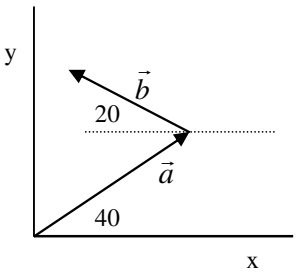


(a) (b) © (d)

31. Vectors $\vec{C}$ *and* $\vec{D}$ have magnitudes of **3 units** and **4 units** respectively. What is the **angle between the directions of** $\vec{C}$ *and* $\vec{D}$ **if** $\vec{C}\cdot\vec{D}$ **= 12 units?**

(a) 90° (b) 180° © 270° (d) 0°

32. Two vectors $\vec{a}$ *and* $\vec{b}$ shown in the figure, if $\vec{r}=\vec{a}+\vec{b}$ then :



(a) r_x = a cos 40 + b cos 20

(b) r_x = a cos 40 + b cos 160

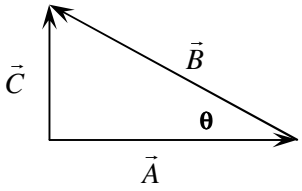
(c) r_x = a sin 40 + b sin 20

(d) r_x = a sin 40 + b sin 160

33. If $\vec{A}=3\hat{i}-3\hat{j}$ and $\vec{B}=\hat{i}-2\hat{j}$, then $\vec{A}-2\vec{B}=$

(a) $\hat{i}+\hat{j}$ (b) $2\hat{i}-\hat{j}$ (c) $5\hat{i}-7\hat{j}$ (d) $4\hat{i}-5\hat{j}$

34. The vector $\vec{B}$ in the diagram is equal to:



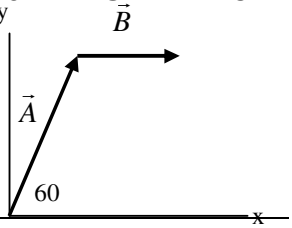
(a) $\vec{B}=\vec{A}-\vec{C}$

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

(c) $\vec{B}=\vec{C}-\vec{A}$

(d) $\vec{B}=-\vec{A}-\vec{C}$

35. In the diagram, the magnitude of $\vec{A}$ **= 12 m** and the magnitude of $\vec{B}$ **= 8 m**. The **x component** of $\vec{A}+\vec{B}=$



(a) 14 m (b) 10 m (c) 6 m (d) 18.4 m

36. Vectors $\vec{A}$ *and* $\vec{B}$ each has **magnitude 4** and the angle between them is **30°**. The value of $\vec{A}\cdot\vec{B}=$

(a) 3.46 (b) 13.86 (c) 16 (d) 8

37. Let $\vec{C}=\vec{A}\times\vec{B}$ and ϕ is the angle between $\vec{A}$ *and* $\vec{B}$, which of the following is **true**?

(a) The magnitude of $\vec{C}=AB\cos\phi$ (c) $-\vec{C}=\vec{B}\times\vec{A}$

(b) $\vec{A}\times\vec{B}=\vec{B}\times\vec{A}$ (d) The angle between $\vec{C}$ *and* $\vec{A}=0^\circ$

38. Vectors $\vec{a}$ *and* $\vec{b}$ have magnitudes **5 units** and **2 units**, respectively. If $\vec{a} \times \vec{b} = 5$ units, then the **angle** ϕ between $\vec{a}$ *and* $\vec{b}$ equals:

(a) 0° (b) 30° (c) 60° (d) 90°

39. If vector $\vec{A} = 6\hat{i} - 8\hat{j}$ then $4\vec{A}$ has a **magnitude** :

(a) 10 (b) 20 (c) 30 (d) 40

40. A vector $\vec{a}$ has a **magnitude of 25 m** and an $\mathbf{a_x}$**= 12 m**. The **angle** it makes with the positive x axis is:

(a) 26° (b) 29° (c) 61° (d) 64°

41. Let $\vec{A} = 2\hat{i} + 6\hat{j} - 3\hat{k}$ **and** $\vec{B} = 4\hat{i} + 2\hat{j} + \hat{k}$. The **vector sum** $\vec{S} = \vec{A} + \vec{B}$ is:

(a) $6\hat{i} + 8\hat{j} - 2\hat{k}$ (b) $-2\hat{i} + 4\hat{j} - 4\hat{k}$ (c) $2\hat{i} - 4\hat{j} + 4\hat{k}$ (d) $8\hat{i} + 12\hat{j} - 3\hat{k}$

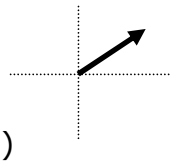
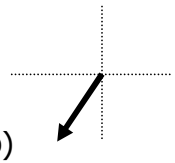
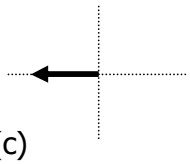
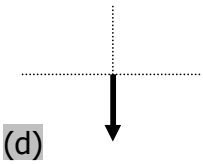
42. Let $\vec{A} = 2\hat{i} + 6\hat{j} - 3\hat{k}$ **and** $\vec{B} = 4\hat{i} + 2\hat{j} + \hat{k}$. Then $\vec{A} \cdot \vec{B} =$

(a) $8\hat{i} + 12\hat{j} - 3\hat{k}$ (b) $12\hat{i} - 14\hat{j} - 20\hat{k}$ (c) 23 (d) 17

43. Vectors $\vec{A}$ and $\vec{B}$ each have **magnitude L**. When the angle between them is **60°**. The **magnitude** of $\vec{A} \times \vec{B}$ is:

(a) 0.5 L^2 (b) L^2 (c) 0.866 L^2 (d) 2 L^2

44. Which **vector** of the following has the **x-component equals zero**:

(a)  (b)  (c)  (d) 

45. The **angle between** $\vec{A} = -25\hat{i} + 45\hat{j}$ and the x axis is

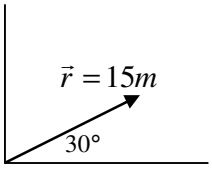
(a) – 29° (b) 29° (c) – 60.9° (d) 60.9°

46. Let $\vec{V} = 2\hat{i} + 6\hat{j} - 3\hat{k}$. The **magnitude of** $\vec{V}$ is

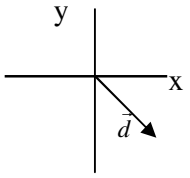
(a) 5 (b) 5.57 (c) 7 (d) 7.42

47. from the figure, **the y component** of the vector $\vec{r}$ equals:

(a) 13 m (b) 7.5 m (c) 8.7 m (d) 7.8 m



48. In the figure, what is **the signs of the x and y components** Of the vector $\vec{d}$:



(a) (+ , +) (b) (- , -) (c) (+ , -) (d) (- , +)

49. Two vectors are given by: $\vec{a} = 4\hat{i} - 3\hat{j} + \hat{k}$ **and** $\vec{b} = 6\hat{i} + 8\hat{j} + 4\hat{k}$

Find $\vec{c}$ **where** $\vec{a} - \vec{b} + \vec{c} = 0$

(a) $4\hat{i} - 3\hat{j} + \hat{k}$ (b) $2\hat{i} + 11\hat{j} + 3\hat{k}$ (c) $-2\hat{i} - 5\hat{j} + \hat{k}$ (d) $\hat{i} + 3\hat{j} + 11\hat{k}$

50. For the following two vectors: $\vec{A} = 2\hat{i} + 3\hat{j} - 4\hat{k}$, $\vec{B} = -3\hat{i} + 4\hat{j} + 2\hat{k}$

Find $\vec{A} \cdot \vec{B}$

(a) - 4 (b) – 2 (c) - 8 (d) – 10

51. Vector $\vec{a}$ has three components, $\mathbf{a_x}$ **=10 m,** $\mathbf{a_y}$ **=10 m, and** $\mathbf{a_z}$ **=5 m**. Its magnitude is:

(a) 225 m (b) 25 m (c) 20 m (d) 15 m

52. **If** $\vec{A} = 2\hat{i} + 6\hat{j} - 3\hat{k}$ and $\vec{B} = 4\hat{i} + 2\hat{j} + \hat{k}$ **. Then** $\vec{A} - \vec{B} =$

(a) $6\hat{i} + 8\hat{j} - 2\hat{k}$ (b) $-2\hat{i} + 4\hat{j} - 4\hat{k}$ (c) $2\hat{i} - 4\hat{j} + 4\hat{k}$ (d) $8\hat{i} + 12\hat{j} - 3\hat{k}$

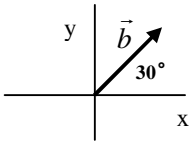
53. Vectors $\vec{C}$ *and* $\vec{D}$ have magnitudes of **3 units** and **4 units** respectively. What is the **angle between the directions of** $\vec{C}$ *and* $\vec{D}$ **if** $\vec{C} \cdot \vec{D}$ **= 12 units?**

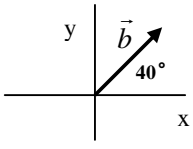
(a) 90° (b) 180° (c) 270° (d) 0°

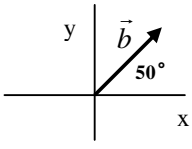
54. The vector $-\vec{b}$ has the same **magnitude** as the vector $\vec{b}$ but

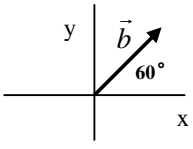
(a) perpendicular to $\vec{b}$ (c) the opposite direction of $\vec{b}$
(b) paralell to $\vec{b}$ (d) the same direction of $\vec{b}$

55. In which figure of the following $\mathbf{b_x}$**= 8.7 m ?** (**b = 10 m**)

(a) 

(b) 

(c) 

(d) 

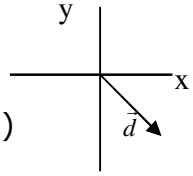
56. The components of $\vec{a}$ are: $\mathbf{a_x}$ **= 3 m,** and $\mathbf{a_y}$ **= 4 m** , the **direction** of $\vec{a}$ is:

(a) 66.8° (b) 63.4° (c) 59° (d) 53.13°

57. **In question 59**, the magnitude of $\vec{a}$ is**:**

(a) 6.71 m (b) 5.83 m (c) 7.62 m (d) 5 m

58. In the figure, **the signs of the x and y components** Of the vector $\vec{d}$ are:



(a) (+ , +) (b) (- , -) (c) (+ , -) (d) (- , +)

59. The **vector product** $\hat{j}\times\hat{k}$ is equal to:

(a) 0 (b) 1 (c) $\hat{i}$ (d) $-\hat{i}$

60. If $\vec{a}=4\hat{i}-3\hat{j}$ **and** $\vec{b}=6\hat{i}+8\hat{j}$,then $\vec{b}-\vec{a}=$

(a) $4\hat{i}-3\hat{j}$ (b) $2\hat{i}+11\hat{j}$ (c) $-2\hat{i}-5\hat{j}$ (d) $\hat{i}+3\hat{j}$

61. If ***A* = 4 units, *B* = 6 units,** and the angle **ϕ =60°**, then **the magnitude** of the **vector product** $\vec{A}\times\vec{B}$ is:

(a) 31.2 units (b) 20.78 units (c) 15.6 units (d) 25.98 units

62. For the following two vectors: $\vec{A}=2\hat{i}+3\hat{j}-4\hat{k}$, $\vec{B}=-3\hat{i}+2\hat{j}+2\hat{k}$. **Find** $\vec{A}\cdot\vec{B}$

(a) – 5 (b) – 2 (c) - 8 (d) – 11

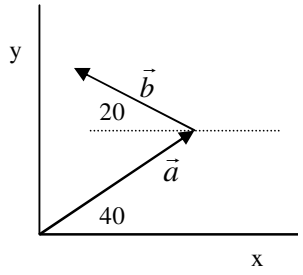
63. If ***C* = 3** units**, *D* = 4** units and $\vec{C}\cdot\vec{D}$ **= -12 units** then the **angle between the directions of** $\vec{C}$ *and* $\vec{D}$ **is:**

(a) 90° (b) 180° (c) 270° (d) 0°

64. If $\vec{D}=5\hat{i}+25\hat{j}$, then $\frac{\vec{D}}{5}$ **equals**:

(a) $5\hat{i}+\hat{j}$ (b) $\hat{i}+5\hat{j}$ (c) $5\hat{i}-\hat{j}$ (d) $\hat{i}-5\hat{j}$

65. Two vectors $\vec{a}$ *and* $\vec{b}$ shown in the figure, if $\vec{r}=\vec{a}+\vec{b}$ then :



(a) r_x = a cos 40 + b cos 20
(b) r_x = a cos 40 + b cos 160
(c) r_x = a sin 40 + b sin 20
(d) r_x = a sin 40 + b sin 160

Are the following statements (**True** ✓) or (**False** ✗) ?

66. **The component of a vector** is the projection of the vector (مسقط المتجه) on an axis.

(a) True (b) False

67. The magnitude of $\vec{A} \cdot \vec{B}$ is maximum when the angle between $\vec{A}\ and\ \vec{B}$ is 90°.

(a) True (b) False

68. The value of $\hat{i} \cdot \left(\hat{j} \times \hat{k}\right)$ is zero.

(a) True (b) False

69. $a_x\ and\ a_y$ are vector components of $\vec{a}$.

(a) True (b) False

70. The magnitude of the unit vector equals 1.

(a) True (b) False