ARJUNA (NEET)

Practice Test - 3

01-08-2021

1. If $\vec{A} \cdot \vec{B} = \sqrt{3}\,|\vec{A} \times \vec{B}|$ then find angle between $\vec{A}$ and $\vec{B}$.
(A) 30° (B) 60°
(C) 90° (D) 0°

2. $\vec{R} = \vec{A} + \vec{B}$ and $\vec{D} = \vec{A} - \vec{B}$ then find angle between $\vec{A}$ and $\vec{B}$ if $|\vec{R}| = |\vec{D}|$
(A) 0° (B) 90°
(C) 30° (D) 60°

3. Which of the following option is correct
(A) $\vec{A} + \vec{B} = \vec{B} + \vec{A}$ (B) $\vec{A} \cdot \vec{B} = \vec{A} \times \vec{B}$
(C) $\vec{A} - \vec{B} = \vec{B} - \vec{A}$ (D) $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$

4. Angle between $\vec{A}$ and $-\vec{B}$ if angle between $\vec{A}$ and $\vec{B}$ is 60°
(A) 60° (B) 120°
(C) 150° (D) 30°

5. Which of the following is not a vector
(A) speed (B) acceleration
(C) velocity (D) force

6. Which of the following is a vector
(A) kinetic energy (B) distance
(C) displacement (D) relative speed

7. The vector $\vec{A}$ and $\vec{B}$ are such that $\vec{A} + \vec{B} = \vec{C}$ and A = B = C then angle between $\vec{A}$ and $\vec{B}$ is
(A) 120° (B) 90°
(C) 60° (D) 30°

8. For what angle between the two vectors is their resultant will be minimum ?
(A) 2π (B) π
(C) zero (D) $\pi/2$

9. Find magnitude of vector $\vec{A} = 2\hat{\imath} + 4\hat{\jmath} + K$.
(A) 20 (B) 40
(C) $\sqrt{21}$ (D) 50

10. Find angle between $\vec{A}$ and x-axis if $\vec{A} = 3\hat{\imath} + 4\hat{\jmath}$.
(A) 37° (B) 53°
(C) 120° (D) 60°

11. The angle between vector $\hat{\imath} + \hat{\jmath}$ and $(\hat{\jmath} + \hat{k})$ is
(A) 180° (B) 0°
(C) 60° (D) 90°

12. Which of the following is correct
(A) $\hat{\imath} \cdot \hat{\jmath} = 1$ (B) $\hat{\jmath} \times \hat{k} = \hat{\imath}$
(C) $\hat{\imath} \times \hat{\jmath} = -k$ (D) $\hat{k} \times \hat{\imath} = -\hat{\jmath}$

13. Two force of magnitude 10 N and 6 N then their vector sum cannot be equal to
(A) 6 N (B) 10 N
(C) 3 N (D) 15 N

14. Which of the following pair of force will give resultant of 1 N.
(A) 4N and 8N (B) 6N and 1N
(C) 1N and 3N (D) 7N and 8N

15. If $\vec{A} = 2\hat{\imath} + 4\hat{\jmath} + 6\hat{k}$ and $\vec{B} = \hat{\imath} + 3\hat{\jmath} + 5\hat{k}$ then find magnitude of $\vec{A} - \vec{B}$.
(A) $\sqrt{3}$ (B) 3
(C) 4 (D) 10

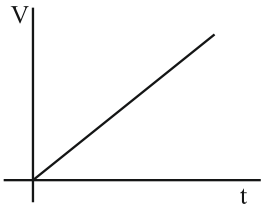
16. If vector $3\hat{\imath} + 4\hat{k} + \hat{\jmath}$ is perpendicular to vector $4\hat{\imath} - 3\hat{k} - \alpha\hat{\jmath}$ then find α.
(A) 20 (B) 0
(C) 4 (D) 6

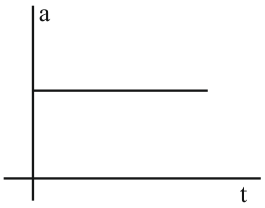
17. Ball is projected with 40 m/s at angle 30° then time after which velocity of ball becomes minimum.

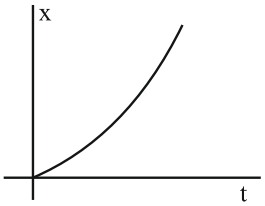
(A) 2 s (B) 4 s

(C) 8 s (D) 70 s

18. In which graph object is moving with constant acceleration

(A) 

(B) 

(C) 

(D) all of these

19. Object is droped then find displacement in 3rd sec.

(A) 5 m (B) 15 m

(C) 25 m (D) 4 m

20. Ball is projected then its speed is 30 m/s at half of the maximum height then find maximum height

(A) 20 m (B) 80 m

(C) 90 m (D) 40 m

21. Object starts its motion from rest and constant acceleration moves 60 m in 10 sec then find displacement in next 10 sec.

(A) 60 m (B) 180 m

(C) 30 m (D) 120 m

22. Which of the following is correct for distance and displacement

(A) $\frac{\text{distance}}{\text{displacement}} > 1$

(B) $\frac{\text{distance}}{\text{displacement}} < 1$

(C) $\frac{\text{distance}}{\text{displacement}} \geq 1$

(D) $\frac{\text{distance}}{\text{displacement}} = 1$

23. If position of object $x = t^2 - 6t + 4$ then find time when object comes to at rest

(A) 2s (B) 3s

(C) 6s (D) 4s

24. If velocity of object $v = at^2 - bt$ then find time when velocity will be minimum.

(A) $\frac{b}{a}$ (B) $\frac{a}{b}$

(C) $\frac{b}{2a}$ (D) $\frac{2a}{b}$

25. Ball (A) is projected upward and ball (B) is projected downward with same speed 10 m/s then find relative acceleration of A w.r.t. B.

(A) g (B) 2g

(C) 0 (D) – g

26. In an experiment, the percentage of error occurred in the measurement of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement X, where $X = \frac{A^2 B^{1/2}}{C^{1/3} D^3}$, will be

(A) 10%

(B) (3/13)%

(C) 16%

(D) –10%

27. Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length ?

(A) $\frac{\sqrt{hG}}{c^{3/2}}$ (B) $\frac{\sqrt{hG}}{c^{5/2}}$

(C) $\sqrt{\frac{hc}{G}}$ (D) $\sqrt{\frac{Gc}{h^{3/2}}}$

28. Which of the following has the dimensions of pressure ?

(A) $[MLT^{-2}]$ (B) $[ML^{-1}T^{-2}]$

(C) $[ML^{-2}T^{-2}]$ (D) $[M^{-1}L^{-1}]$

29. Of the following quantities, which one has dimensions different from the remaining three?

(A) Energy per unit volume

(B) Force per unit area

(C) Product of voltage and charge per unit volume

(D) Angular momentum

30. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be

(A) 8% (B) 2%

(C) 4% (D) 6%

31. A car moves from X to Y with a uniform speed v_u and returns to X with a uniform speed v_d. The average speed for this round trip is

(A) $\sqrt{v_u v_d}$ (B) $\frac{v_d v_u}{v_d + v_u}$

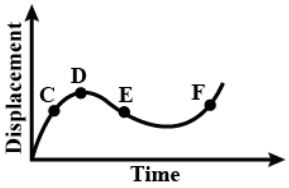
(C) $\frac{v_u + v_d}{2}$ (D) $\frac{2v_d v_u}{v_d + v_u}$

32. A car runs at a constant speed on a circular track of radius 100 m, taking 62.8 seconds for every circular lap. The average velocity and average speed for each circular lap respectively is

(A) 10 m/s, 0 (B) 0, 0

(C) 0, 10 m/s (D) 10 m/s, 10 m/s

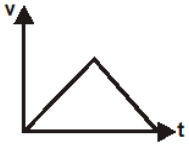
33. The displacement-time graph of a moving particle is shown below. The instantaneous velocity of the particle is negative at the point

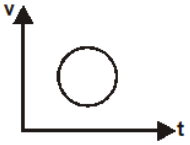


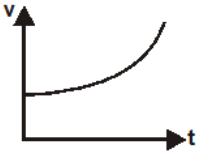
(A) E (B) F

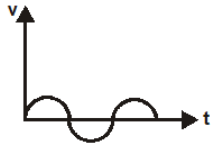
(C) C (D) D

34. Which of the following curve does not represent motion in one dimension ?

(A) 

(B) 

(C) 

(D) 

35. A body starts from rest, what is the ratio of the distance travelled by the body during the 4th and 3rd second ?

(A) $\frac{7}{5}$ (B) $\frac{5}{7}$

(C) $\frac{7}{3}$ (D) $\frac{3}{7}$

36. A body dropped from top of a tower fall through 40 m during the last two seconds of its fall. The height of tower is (g = 10 m/s^2)

(A) 60 m (B) 45 m

(C) 80 m (D) 50 m

37. What will be the ratio of the distance moved by a freely falling body from rest in 4^{th} and 5^{th} seconds of journey ?

(A) 4 : 5 (B) 7 : 9

(C) 16 : 25 (D) 1 : 1

38. A car is moving along a straight road with a uniform acceleration. It passes through two points P and Q separated by a distance with velocity 30 km/h and 40 km/h respectively. The velocity of the car midway between P and Q is

(A) 33.3 km/h (B) $20\sqrt{2}$ km/h

(C) $25\sqrt{2}$ km/h (D) 35 km/h

39. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be

(A) $\frac{t_1 t_2}{t_2 - t_1}$

(B) $\frac{t_1 t_2}{t_2 + t_1}$

(C) $t_1 - t_2$

(D) $\frac{t_1 + t_2}{2}$

40. A bus is moving with a speed of 10 m s^{-1} on a straight road. A scooterist wishes to overtake the bus in 100 s. If the bus is at a distance of 1 km from the scooterist, with what speed should the scooterist chase the bus ?

(A) 40 m s^{-1} (B) 25 m s^{-1}

(C) 10 m s^{-1} (D) 20 m s^{-1}

41. A train of 150 metre length is going towards north direction at a speed of 10 m/s. A parrot flies at the speed of 5 m/s towards south direction parallel to the railways track. The time taken by the parrot to cross the train is

(A) 12 s (B) 8 s

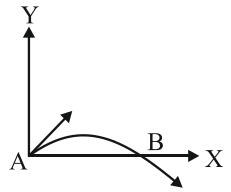
(C) 15 s (D) 10 s

42. A particle has initial velocity $(3\hat{\imath} + 4\hat{\jmath})$ and has acceleration $(0.4\hat{\imath} + 0.3\hat{\jmath})$. Its speed after 10 s is

(A) 7 units (B) $7\sqrt{2}$ units

(C) 8.5 units (D) 10 units

43. The velocity of a projectile at the initial point A is $(2\hat{\imath} + 3\hat{\jmath})$ m/s. Its velocity (in m/s) at point B is



(A) $2\hat{\imath} - 3\hat{\jmath}$ (B) $2\hat{\imath} + 3\hat{\jmath}$

(C) $-2\hat{\imath} - 3\hat{\jmath}$ (D) $-2\hat{\imath} + 3\hat{\jmath}$

44. The horizontal range and the maximum height of a projectile are equal. The angle of projection of the projectile is

(A) $\theta = \tan^{-1}\left(\frac{1}{4}\right)$ (B) $\theta = \tan^{-1}(4)$

(C) $\theta = \tan^{-1}(2)$ (D) $\theta = 45°$

45. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is

(A) 60° (B) 15°

(C) 30° (D) 45°

ANSWERS

1.	(A)	16.	(B)	31.	(D)
2.	(B)	17.	(A)	32.	(C)
3.	(A)	18.	(D)	33.	(A)
4.	(B)	19.	(C)	34.	(B)
5.	(A)	20.	(C)	35.	(A)
6.	(C)	21.	(B)	36.	(B)
7.	(A)	22.	(C)	37.	(B)
8.	(B)	23.	(B)	38.	(C)
9.	(C)	24.	(C)	39.	(B)
10.	(B)	25.	(C)	40.	(D)
11.	(C)	26.	(C)	41.	(D)
12.	(B)	27.	(A)	42.	(B)
13.	(C)	28.	(B)	43.	(A)
14.	(D)	29.	(D)	44.	(B)
15.	(A)	30.	(D)	45.	(A)

HINTS & SOLUTIONS

1. (A)

$AB\cos\theta = \sqrt{3}\,|\vec{A}\times\vec{B}|\sin\theta$

$\tan = \frac{1}{\sqrt{3}}$

$\theta = 30°$

2. (B)

$|\vec{A}+\vec{B}| = |\vec{A}-\vec{B}|$

$A^2 + B^2 + 2AB\cos\theta$

$= A^2 + B^2 - 2AB\cos\theta$

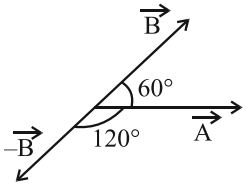
$4AB\cos\theta = 0$

$\theta = 90°$

3. (A)

Vector addition follows commutative law

4. (B)



5. (A)

Speed is scalar.

6. (C)

Displacement is vector.

7. (A)

$A^2 + B^2 + 2AB\cos\theta = C^2$

$A^2 + A^2 + 2A^2\cos\theta = A^2$

$\cos\theta = \frac{-1}{2}$

$\theta = 120°$

8. (B)

If $\theta = \pi$

$|\vec{R}| = |\vec{A}| - |\vec{B}|$

9. (C)

$|\vec{A}| = \sqrt{4+16+1}$

$= \sqrt{21}$

10. (B)

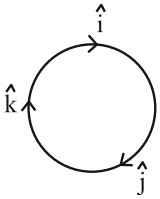
$\tan\theta = \frac{4}{3} \quad \therefore \theta = 53°$

11. (C)

$\cos\alpha = \frac{(\hat{i}+\hat{j})\cdot(\hat{j}+\hat{k})}{\sqrt{2}\cdot\sqrt{2}} = \frac{1}{2}$

$\alpha = 60°$

12. (B)



13. (C)

$4\text{ N} < R < 16\text{ N}$

14. (D)

$8 - 7 < R < 7 + 8$

15. (A)

$\vec{A} - \vec{B} = \hat{\imath} + \hat{\jmath} + \hat{k}$

$|\vec{A} - \vec{B}| = \sqrt{1+1+1} = \sqrt{3}$

16. (B)

$(3\hat{i} + 4\hat{k} + \hat{j})\cdot(4\hat{i} - 3\hat{k} - \alpha\hat{j}) = 0$

$12 - 12 - \alpha = 0$

$\alpha = 0$

17. (A)

$T = \frac{u\sin\theta}{g} = \frac{40\times\sin 30}{10} = 2\text{ sec}$

18. (D)

Slope of $v - t$: acceleration

19. (C)

$S_3 = \frac{10}{2}(2\times 3 - 1) = 25\text{ m}$

20. (C)

$v^2 = u^2 - 2ax$

$900 = u^2 - 2\times 10\times x$

$20x = u^2 - 900$

$20\left(\frac{u^2}{4g}\right) = u^2 - 900$

$\frac{u^2}{2} = u^2 - 900$

$900 = \frac{u^2}{2} \quad \therefore u^2 = 1800$

$H_{max} = \frac{u^2}{2g} = \frac{1800}{20} = 90$ m

21. (B)

$S_1 : S_2 : S_3 :: 1 : 3 : 5$

22. (C)

Distance ≥ Displacement.

23. (B)

$V = 2t - 6$

24. (C)

$\frac{dv}{dt} = 2at - b = 0 \quad \therefore t = \frac{b}{2a}$

25. (C)

$\vec{a}_{AB} = \vec{a}_A - \vec{a}_B = 0\,\text{m/s}^2$

26. (C)

$\frac{\Delta x}{x} = 2\frac{\Delta A}{A} + \frac{1}{2}\frac{\Delta B}{B} + \frac{1}{3}\frac{\Delta C}{C} + 3\frac{\Delta D}{D}$

$\frac{qV}{\text{Volume}} = 2\,\% + \frac{1}{2} \times 2\% + \frac{1}{3} \times 3\% + 3 \times 4\%$

$= 2 + 1 + 1 + 12 = 16\%$

27. (A)

$\frac{\sqrt{hG}}{c^{3/2}} = \frac{\sqrt{(N.m.s)(Nm^2kg^2)}}{(m/s)^{3/2}}$

$= \frac{Ns^2}{kg} = \frac{(kg\ \text{m/s}^2)(s^2)}{kg}$

$= \text{m}$

28. (B)

$D = \frac{MLT^{-2}}{L^2} = ML^{-1}T^{-2}$

29. (D)

$\frac{U}{V} = \frac{ML^2T^{-2}}{L^3} = ML^{-1}T^{-2}$

$\frac{F}{A} = \frac{MLT^{-2}}{L^2} = ML^{-1}T^{-2}$

$V \times \frac{q}{\text{volume}} = \frac{\text{Energy}}{\text{Volume}} = ML^{-1}T^{-2}$

$L = mvr = \text{MLT}^{-1}\,\text{L}$

$= \text{ML}^2\text{T}^{-2}$

30. (D)

$\frac{\Delta v}{v} = 3\frac{\Delta r}{r} = 6\%$

31. (D)

$v_{av} = \frac{2}{\frac{1}{v_4} + \frac{1}{v_d}}$

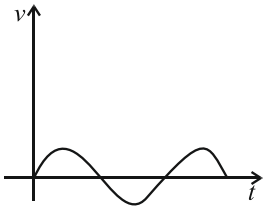
32. (C)

$\vec{v}_{av} = 0$

$v_{av} = \frac{2\pi r}{T}$

33. (A)

At E slope negative.



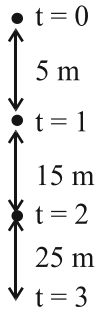
34. (B)

Object can't have two velocity at one time.

35. (A)

$\frac{S_4}{S_3} = \frac{7}{5}$

36. (B)



37. (B)

$\frac{S_4}{S_5} = \frac{7}{9}$

38. (C)

$a = \frac{(40)^2 - (30)^2}{25} = \frac{350}{5} \quad \text{...(i)}$

$v^2 - 30^2 = 2a \cdot \frac{S}{2} \quad \text{...(ii)}$

From (i) and (ii),

$v = 25\sqrt{2}$ km/h.

39. (B)

$$t_1 = \frac{d}{v_P}$$

$$t_2 = \frac{d}{v_e}$$

$$t = \frac{d}{v_P + v_e} = \frac{d}{\frac{d}{t_1} + \frac{d}{t_2}} = \frac{t_1 t_2}{t_1 + t_2}$$

40. (D)

$V_{relative} = V - 10$

$$t = \frac{d}{V_{relative}} \Rightarrow 100 = \frac{d}{V - 10} \Rightarrow 100 = \frac{1000}{V - 10}$$

$\Rightarrow \quad V - 10 = 10 \quad \therefore \quad \boxed{V = 20 \text{ m/s}}$

41. (D)

$V_{relative} = 10 + 5 = 15$ m/s

$$t = \frac{150}{15} = 10 \text{ sec.}$$

42. (B)

$$v = (3\hat{i} + 4\hat{j}) + (0.4\hat{i} + 0.3\hat{j})10$$

$$\vec{v} = 7\hat{i} + 7\hat{j}$$

$|\vec{v}| = 7\sqrt{2}$ units.

43. (A)

Only vertical component of velocity will reversed.

44. (B)

R = H

$$\frac{u^2 \sin 2\theta}{g} = \frac{u^2 \sin^2 \theta}{2g}$$

$$2 \sin\theta \cos\theta = \frac{\sin^2\theta}{2}$$

$$\tan\theta = 4$$

$$\theta = \tan^{-1}(4)$$

45. (A)

$$\frac{V_0}{2} = V_0 \cos\theta \qquad \therefore \cos\theta = \frac{1}{2} \Rightarrow \boxed{\theta = 60°}$$

Note - If you have any query/issue

Mail us at support@physicswallah.org