NEET ANSWER KEY & SOLUTIONS

SUBJECT :- PHYSICS
CLASS :- 11th **PAPER CODE :- CWT-2**
CHAPTER :- BASIC MATHS & VECTOR

ANSWER KEY

1.	(C)	**2.**	(D)	**3.**	(C)	**4.**	(B)	**5.**	(C)	**6.**	(A)	**7.**	(A)
8.	(C)	**9.**	(D)	**10.**	(A)	**11.**	(D)	**12.**	(C)	**13.**	(C)	**14.**	(B)
15.	(D)	**16.**	(C)	**17.**	(C)	**18.**	(D)	**19.**	(C)	**20.**	(D)	**21.**	(A)
22.	(B)	**23.**	(A)	**24.**	(B)	**25.**	(C)	**26.**	(D)	**27.**	(D)	**28.**	(C)
29.	(D)	**30.**	(A)	**31.**	(B)	**32.**	(D)	**33.**	(B)	**34.**	(A)	***35.***	*(D)*
36.	(D)	**37.**	(D)	**38.**	(B)	**39.**	(B)	**40.**	(D)	**41.**	(B)	**42.**	(A)
43.	(B)	**44.**	(C)	**45.**	(D)	**46.**	(A)	**47.**	(B)	**48.**	(A)	**49.**	(D)
50.	(C)												

SOLUTIONS

SECTION-A

1. (C)

Sol. $\vec{A}+\vec{B} = 3\hat{i}+4\hat{j}$

Unit vector $\frac{\vec{A}+\vec{B}}{|\vec{A}+\vec{B}|} = \frac{3\hat{i}+4\hat{j}}{5}$.

2. (D)

Sol. If the resultant of 5N & 4N is R, then $(5 - 4) \le R \le (5 + 4)$

or $1 \le R \le 9$.

3. (C)

Sol. (C) After solving

$$2\vec{A} = 2\hat{i}+2\hat{j}$$

$$2\vec{B} = 2\hat{j}+2\hat{k}$$

$\vec{A} = \hat{i}+\hat{j}$, $\vec{B} = \hat{j}+\hat{k}$

$\cos\theta = \frac{\vec{A}.\vec{B}}{AB} \Rightarrow \cos\theta = \frac{1}{2} \Rightarrow \theta = 60^o$

4. (B)

5. (C)

6. (A)

Sol. $\tan 15 = \tan(45-30) = \frac{\tan 45 - \tan 30}{1+\tan 45 \tan 30} = \frac{1-\frac{1}{\sqrt{3}}}{1+\frac{1}{\sqrt{3}}} = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

$= \frac{(\sqrt{3}-1)^2}{2} = \frac{3+1-2\sqrt{3}}{2} = \frac{4-2\sqrt{3}}{2} = 2-\sqrt{3}$

7. (A)

Sol. $c^2 = a^2 + b^2 - 2ab\cos\theta$

$9 = 9 + 16 - 2 \times 3 \times 4 \times \cos\theta$

$\cos\theta = \frac{16}{24} = \frac{2}{3}$

$\Rightarrow \quad \sin\theta = \sqrt{1-\cos^2\theta} = \frac{\sqrt{5}}{3}$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\sqrt{5}}{2}$

8. (C)

Sol. By comparision with the standard quadratic equation

a = 2, b = 5 and c = – 12

$x = \frac{\sqrt{(5)^2 - 4\times 2(-12)}}{2\times 2} = \frac{-5\pm\sqrt{121}}{4} = \frac{-5\pm 11}{4} = \frac{+6}{4}, \frac{-16}{4}$ or $x = \frac{3}{2}, -4$

9. (D)

Sol. When particle comes to rest, v = 0.

So $t^2 + 3t - 4 = 0 \Rightarrow t = \frac{-3\pm\sqrt{9-4(1)(-4)}}{2(1)} \Rightarrow t = 1$ or -4

10. (A)

Sol. $\frac{d}{dx} e^x \ell nx = \ell n^x \frac{de^x}{dx} + e^x \frac{d\ell n^x}{dx}$

$e^x \ell nx. + \frac{e^x}{x}$

11. (D)

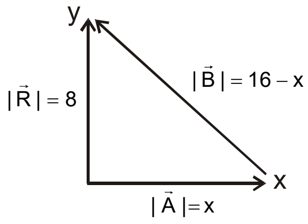
Sol. $y' = \frac{(3x-2)(2)-(2x+5)(3)}{(3x-2)^2} = \frac{-19}{(3x-2)^2}$

12. (C)

Sol. Let $\vec{A}$ & $\vec{B}$ are two vector

give that $|\vec{A}| + |\vec{B}| = 16$

Let $|\vec{A}| < |\vec{B}|$



and $\vec{R} = \vec{A} + \vec{B}$

from given problem

and $\vec{R} \perp \vec{A}$ & $|\vec{R}| = 8$

Let $|\vec{A}| = x$

from triangle $x^2 + 8^2 = (16 - x)^2$ by solving this we get $x = 6$

13. (C)

Sol. Given that $\vec{R} = \overrightarrow{3P} + \overrightarrow{2P}$ .... (1)

If first force is doubled

then $2\vec{R} = \overrightarrow{6P} + \overrightarrow{2P}$ .... (2)

from equation (1) $R^2 = (3P)^2 + (2P)^2 + 2(3P)(2P)\cos\theta$ .... (3)

from equation (2) $(2R)^2 = (6P)^2 + (2P)^2 + 2(6P)(2P)\cos\theta$ .... (4)

from equation (3) and (D)

$0 = 12P^2 + 24P^2\cos\theta$

$\Rightarrow \cos\theta = -1/2$

$\theta = 120°$

14. (B)

Sol. Let $|\vec{F}_1| = 6$ kg wt

$|\vec{F}_2| = 8$ kg wt

and $\vec{R} = \vec{F}_1 + \vec{F}_2$

then $|\vec{A}| \sim |\vec{B}| \le |\vec{R}| \le |\vec{A}| + |\vec{B}|$

$2 \le |\vec{R}| \le 14$

so, from given option ans. is 11 kg wt.

15. (D)

Sol. $\vec{V} = \cos\omega t\,\hat{i} + \sin\omega t\,\hat{j}$

$\vec{V} = \dfrac{d\vec{r}}{dt} = -\,\omega\sin\omega t\,\hat{i} + \omega\cos\omega t\,\hat{j}$

$\vec{a} = \dfrac{d\vec{V}}{dt} = -\,\omega^2\cos\omega t\,\hat{i} - \omega^2\sin\omega t\,\hat{j}$

since $\vec{r}.\vec{V} = 0$ so $\vec{r} \perp_r \vec{V}$

and $\vec{a} = -\omega^2\vec{r}$

so $\vec{a}$ will be always aiming towards the origin.

16. (C)

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

$(A)^2 + (B)^2 + 2(A)(B)\cos\theta = (A)^2 + (B)^2 - 2(A)(B)\cos\theta$

$2\cos\theta = 0 \quad \Rightarrow \theta = 90°$

17. (C)

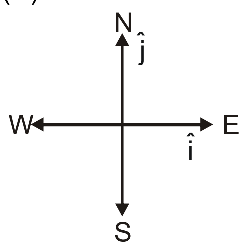
Sol. By Triangle law of vector addition.

18. (D)

Sol. Based on theory

19. (C)

20. (D)



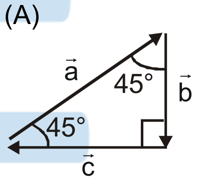
Sol.

$\vec{A} \rightarrow -\hat{k}$

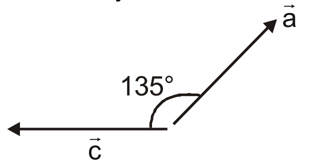
$\vec{B} \rightarrow +\hat{i}$

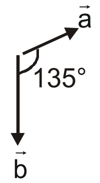
$\vec{A} \times \vec{B} = -\hat{k} \times \hat{i} = \hat{j} \Rightarrow$ south

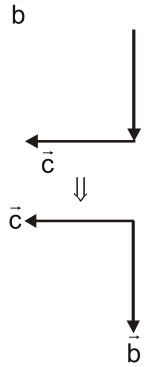
21. (A)



Sol. By vector translation







$\therefore$ 90°, 135°,. 135°

22. (B)

Sol. Can not be zero

23. (A)

Sol. $\int (1-\cot^2 x)dx = \int 1-(\operatorname{cosec}^2 x - 1)\,dx$

$= \int (2-\operatorname{cosec}^2 x)dx$

$= \int 2dx - \int \operatorname{cosec}^2 x\,dx$

$= 2x + \cot x + C$

24. (B)

Sol. By using distance formula $d = \sqrt{(x_2-x_1)^2 (y_2-y_1)^2} \Rightarrow 13 = \sqrt{[3-(-9)]^2 + [3-a]^2}$

$\Rightarrow 13^2 = 12^2 + (3-a)^2 \Rightarrow (3-a)^2 = 13^2 - 12^2 = 5^2$

$\Rightarrow (3-a) = \pm 5 \Rightarrow a = 2$ cm or 8 cm

25. (C)

Sol. $\vec{P} = \vec{R} - \vec{Q}$ (square both side)

$\vec{R}.\vec{Q} = \dfrac{|R|^2 + |Q|^2 - |P|^2}{2}$

$\cos\theta = \dfrac{12}{13}$ $\theta = \cos^{-1}\left(\dfrac{12}{13}\right)$

26. (D)

Sol. For this $|F_{max}|$ > Addition of other two forces
maximum force among therse.

27. (D)

Sol. $R^2 = P^2 + Q^2 + 2PQ\cos\theta$

$4R^2 = P^2 + 4Q^2 + 4PQ\cos\theta$

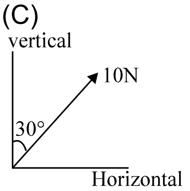
$4(P^2 + Q^2 + 2PQ\cos\theta) = P^2 + 4Q^2 + 4PQ\cos\theta$

$2P^2 + 4Q^2 + 8PQ\cos\theta = P^2 + 4Q^2 + 4PQ\cos\theta$

$3P^2 = -4PQ\cos\theta$

$\dfrac{-3P}{4Q} = \cos\theta$]

28. (C)



[Sol. $F_H = 10\sin 30 = 5$ N]

29. (D)

[Sol. if $\vec{a} + \vec{b} + \vec{c} = 0$

$(\vec{a} + \vec{b} + \vec{c}) \cdot (\vec{a} + \vec{b} + \vec{c}) = 0$

$|\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2[(\vec{a}\cdot\vec{b}) + (\vec{b}\cdot\vec{c}) + (\vec{c}\cdot\vec{a})] = 0$

$(\vec{a}\cdot\vec{b}) + (\vec{b}\cdot\vec{c}) + (\vec{c}\cdot\vec{a}) = -3/2$]

30. (A)

[Sol. $R^2 = P^2 + Q^2 + 2PQ\cos\theta$ ...(1)

$R'^2 = P^2 + \left(\dfrac{R^2 - P^2}{Q}\right)^2 + 2P\left(\dfrac{R^2 - P^2}{Q}\right)\cos(180-\theta)$ ...(2)

From (1)

$\left(\dfrac{R^2 - P^2}{Q}\right) = Q + 2P\cos\theta$

$R'^2 = P^2 + (Q + 2P\cos\theta)^2 + 2P(Q + 2P\cos\theta)\cos(180-\theta)$

$R'^2 = P^2 + Q^2 + 4P^2\cos^2\theta + 4PQ\cos\theta - 2PQ\cos\theta - 4P^2\cos^2\theta$

$R'^2 = P^2 + Q^2 + 2PQ\cos\theta$, $R'^2 = R^2$]

31. (B)

32. (D)

[Sol. Nothing can be concluded about acceleration as nothing is said about change in velocity.

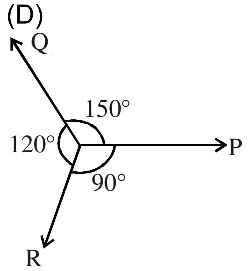
33. (B)

[Sol. $\hat{S} = \dfrac{\vec{S}}{S \text{ magnitude of } \vec{S}}$

34. (A)

35. (D)

[Sol.



$\dfrac{|\vec{P}|}{\sin 120°} = \dfrac{|\vec{Q}|}{\sin 90°} = \dfrac{|\vec{R}|}{\sin 150°}$

$\dfrac{P}{\sqrt{3}/2} = \dfrac{Q}{1} = \dfrac{R}{1/2}$

$\dfrac{P}{\sqrt{3}} = \dfrac{Q}{2} = \dfrac{R}{1}$

$P : Q : R :: \sqrt{3} : 2 : 1$]

SECTION-B

36. (D)

[Sol. $A + B = 17$ $\quad$ $A = 12$

$A - B = 7$ $\quad$ $B = 5$

$A^2 + B^2 = 13^2$]

37. (D)

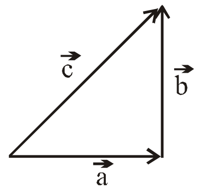
38. (B)

Sol. $\cos\theta = \dfrac{\vec{a}\,.\,\vec{b}}{ab} = \dfrac{-2+3}{\sqrt{2}\,\sqrt{13}} = \dfrac{1}{\sqrt{26}}$

$\therefore \sin\theta = \sqrt{\dfrac{25}{26}}$]

39. (B)

[Sol. Resultant nof $\vec{a} + \vec{b} = \vec{c}$



40. (D)

41. (B)

Sol. Sum of any 3 sides should be greater than fourth side.

42. (A)

Sol. (A) $\int \sec x \tan x \, dx = \sec x + C$

(B) $\int \operatorname{cosec} kx \cot kx \, dx = \dfrac{-\operatorname{cosec} kx}{k} + C$

(C) $\int \operatorname{cosec}^2 kx \, dx = -\dfrac{\cot kx}{k} + C$

(D) $\int \cos kx \, dx = \dfrac{\sin kx}{k} + C$

43. (B)

Sol. $R = \sqrt{A_x^2 + B_y^2} = \sqrt{g^2 + 6^2} = 10$

44. (C)

Sol.

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

$\Rightarrow 4AB\cos\theta = 0$

So $\cos\theta = 0$

$\Rightarrow \theta = 90°$

Answer:(C)

45. (D)

Sol. $|\vec{A} \times \vec{B}| = \sqrt{3}\ \vec{A}\cdot\vec{B}$

$|A||B|\sin\theta = \sqrt{3}|A||B|\cos\theta$

$|\vec{A} \times \vec{B}| = \sqrt{|\vec{A}|^2 + |\vec{B}|^2 + 2|\vec{A}||\vec{B}|\cos}$

$= \sqrt{A^2 + B^2 + AB}$

$= \left(A^2 + B^2 + AB\right)^{1/2}$

46. (A)

Sol. $\dfrac{dy}{dx} = \cos x - \sin x$, $\dfrac{d^2y}{dx^2} = -\sin x - \cos x$

47. (B)

Ans. : $\dfrac{dA}{dt} = 2\pi r \dfrac{dr}{dt}$.

Sol. $\dfrac{dA}{dt} = \dfrac{d(\pi r^2)}{dt} = \dfrac{\pi d(r^2)}{dt} = \dfrac{2\pi r dr}{dt}$

48. (A)

Sol. $\vec{\tau} = \vec{r} \times \vec{F}$

$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 7 & 3 & 1 \\ -3 & 1 & 5 \end{vmatrix}$

$= \hat{i}(15-1) - \hat{j}(35+3) + \hat{k}(7+9) = 14\hat{i} - 38\hat{j} + 16\hat{k}$

49. (D)

Sol. We know that

$\tau_2 = \vec{r} \times \vec{F}$

$\vec{r} = (2-2)\hat{i} + (0+2)\hat{j} + (-3+2)\hat{k}$

$= 0\hat{i} + 2\hat{j} - 3\hat{k}$

$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2 & -1 \\ 4 & 5 & -6 \end{vmatrix}$

$\hat{i}(-12+5)\hat{j}(0+4) + \hat{k}(0-8)$

$-7\hat{i} - 4\hat{j} - 8\hat{k}$

50. (C)

Sol. So, $\vec{F}_{net} = 0$

$\Rightarrow m\dfrac{d\vec{v}}{dt} = 0$

$\vec{v} = $ constant