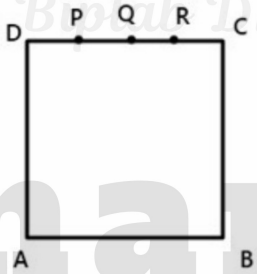
Advanced Test on: **Vector** Duration: **40 min.**

Single option correct type

1) $\vec{a}$ and $\vec{b}$ are non-colinear vectors. If $(2x-1)\vec{a}+\vec{b}$ and $(2y+1)\vec{a}-\vec{b}$ are colinear then x+y is

(A) 1 (B) – 1 (C) 2 (D) 0

2) ABCD is a square CD is divided in equal 4 segments by P, Q, R, S as shown. If $3\overline{AD}+\overline{AB}+\overline{BC}=n\overline{AP}$. Where n is an integer. Find n.



(A) n = 1
(B) n = 2
(C) n = 3
(D) n = 4

3) If $\vec{A}=\vec{B}-\alpha\left(\vec{B}\times\vec{C}\right)$ and magnitudes of $\vec{A}$ and $\vec{B}$ are 10 units and 6 units respectively. Now if magnitude of $\vec{C}$ is doubled, find the magnitude of new $\vec{B}$ such that $\vec{A}$ remains unchanged.

(A) $\sqrt{51}$ units (B) 8 units (C) $30/\sqrt{73}$ units (D) $\sqrt{136}$ units

4) The sum of two forces at a point is 16 N. If their resultant is normal to the smaller force and has a magnitude of 8N. Then the value of larger force is

(A) 10N (B) $8\sqrt{3}$ N (C) 8 N (D) 6 N

Multi Options correct type:

5) The vector $\hat{i}+x\hat{j}+3\hat{k}$ is rotated through an angle θ and doubled in magnitude, then it becomes $4\hat{i}+(4x-2)\hat{j}+2\hat{k}$. The values of x are

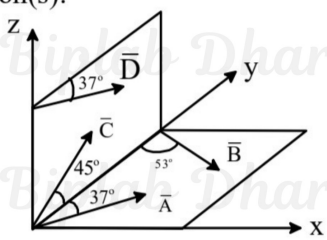
(A) $-\frac{2}{3}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) 2

6) $\vec{A},\vec{B},\vec{C}$ are coplanar vectors such that $\vec{A}+\vec{B}$ is perpendicular to $\vec{B}$ and $\vec{A}+\vec{C}$ is perpendicular to $\vec{C}$. Then choose the correct option(s)

(A) $\left|\vec{B}+\frac{1}{2}\vec{A}\right|=\left|\vec{B}\right|$ (B) $\left|\vec{C}+\frac{1}{2}\vec{A}\right|=\left|\frac{1}{2}\vec{A}\right|$

(C) $\left|\vec{C}+\frac{1}{2}\vec{A}\right|=\left|\vec{B}+\frac{1}{2}\vec{A}\right|$ (D) Maximum value of $\left|\vec{A}+\vec{B}+\vec{C}\right|=2\left|\vec{A}\right|$

7) The figure shows 4 forces acting on a body. $\vec{A}, \vec{B}$ lie on XY plane and have magnitudes of 20 and 15 units respectively. Whereas $\vec{C}, \vec{D}$ lie on YZ plane and have magnitudes of $12\sqrt{2}$ and 10 units respectively. Choose the correct option(s):



(A) The Y component of $\vec{A}+\vec{B}+\vec{C}+\vec{D}$ is 27 units

(B) The Z component of $\vec{B}\times\vec{D}$ is 96 units

(C) The X component of $\vec{B}\times\vec{D}$ is 54 units

(D) The angle between $\vec{A}\times\vec{B}$ with $\vec{C}$ is 45^o

8) Given $\vec{a}+\vec{b}+\vec{c}+\vec{d}=0$, which of the following statements is/are correct:

(A) $\vec{a},\vec{b},\vec{c}$ and $\vec{d}$ must each be a zero vector

(B) The magnitude of $(\vec{a}+\vec{c})$ equals the magnitude of $(\vec{b}+\vec{d})$

(C) The magnitude of $\vec{a}$ can never be greater than the sum of the magnitudes of $\vec{b},\vec{c}$ and $\vec{d}$

(D) $\vec{b}+\vec{c}$ must lie in the plane of $\vec{a}$ and $\vec{d}$ if $\vec{a}$ and $\vec{d}$ are not collinear, and in the line of $\vec{a}$ and $\vec{d}$, if they are collinear

Comprehension Type:

ABCDEFGH is a cube placed on a horizontal floor with the face ABCD on the floor. Now, about edge AD, the cube is turned anticlockwise by 8° then angle turned by the body diagonal AG is found to be $\cos^{-1}\left(\frac{x\sqrt{2}+b}{a}\right)$. Where x, a, b are positive integers.

9) The value of x is_____

10) The value of a/b is _____