Exercise

Vector

(Physicsaholics)

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Exercise-3

(Miscellaneous Type)

Column Matching

Q 1. For component of a vector $\vec{A} = (3\hat{\imath} + 4\hat{\jmath} - 5\hat{k})$, match the following table :

	Table-1		**Table-2**
(A)	y-axis	(P)	5 unit
(B)	Along another vector $(2\hat{\imath} + \hat{\jmath} + 2\hat{k})$	(Q)	4 unit
(C)	Along $(6\hat{\imath} + 8\hat{\jmath} - 10\hat{k})$	(R)	Zero
(D)	Along another vector $(-3\hat{\imath} + 4\hat{\jmath} + 5\hat{k})$	(S)	None

Q 2. If $\vec{R}=\vec{a}+\vec{b}$ and $\vec{S}=\vec{a}-\vec{b}$ also θ is angle between $\vec{a}$ and $\vec{b}$.

Column-I		**Column-II**	
(A)	$R^2 + S^2$	(P)	$\vec{R}$ is perpendicular to $\vec{a}$
(B)	$R^2 - S^2$	(Q)	$2(a^2 + b^2)$
(C)	$\frac{R}{S}$	(R)	$4\,\vec{a}.\vec{b}$
(D)	$R < S$	(S)	$\tan\left(\frac{\theta}{2}\right)$ If $\lvert\vec{a}\rvert = \lvert\vec{b}\rvert$

Q 3. If $\vec{A} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}$ and $\vec{B} = \hat{\imath} + 2\hat{\jmath} + 2\hat{k}$ then -

Column I		**Column II**	
(A)	$\lvert\vec{A} \times \vec{B}\rvert$	(P)	$\sqrt{11}$
(B)	$\lvert\vec{A} - \vec{B}\rvert$	(Q)	6
(C)	$\vec{A}.\vec{B}$	(R)	$\sqrt{35}$
(D)	$\lvert\vec{A} + \vec{B}\rvert$	(S)	$\sqrt{90}$

Q 4. On a vector diagram, show a pair of vectors $\vec{d}$ and $\vec{e}$ such that as mentioned in column-I they could match with the cases mentioned in column-II. Mark the correct matches

Column I		**Column II**	
(A)	$\vec{d}+\vec{e}=\vec{f}$, f=d-e	(P)	$\vec{d}, \vec{e}$ are aligned antiparallel
(B)	$\vec{d}+\vec{e}=\vec{f}$,f=d+e	(Q)	$\vec{d}, \vec{e}$ are aligned parallel

(C) $\vec{d} - \vec{e} = \vec{f}$, f= d+ e

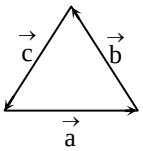
(R) $\vec{d}, \vec{e}$ are aligned at 90°

(D) $\vec{d} + \vec{e} = \vec{f}$,f = d√2, d= e

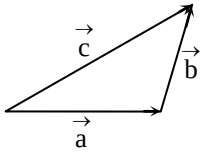
(S) $\vec{d}, \vec{e}$ are aligned at 270°

Q 5. Column-I contains vector diagram of three vectors $\vec{a}, \vec{b}, \vec{c}$ & Column-II contains vector equation. Match them.

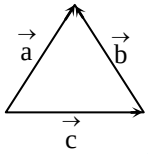
Column-I **Column-II**

(A) 

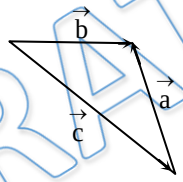
(P) $\vec{a} - (\vec{b} + \vec{c}) = 0$

(B) 

(Q) $\vec{b} - \vec{c} = \vec{a}$

(C) 

(R) $\vec{a} + \vec{b} = -\vec{c}$

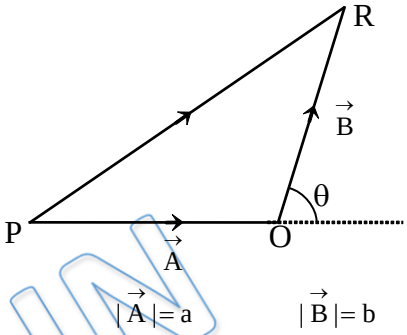
(D) 

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

Paragraph based questions

Passage -1 (Q.6 to Q.8)

The second law of vector addition is triangle law, which says that if we take $\vec{A}$ and $\vec{B}$ as two vectors acting at point O as shown in figure, then the resultant of vector is get by taking $\vec{A}$ and $\vec{B}$ as adjacent sides of a triangle and the 3rd side of the triangle as the resultant, then if θ is angle between $\vec{A}$ and $\vec{B}$ then.



Q 6. If α is the angle made by resultant vector with $\vec{A}$; then tan α =

(A) $\frac{a\sin\theta}{b+a\cos\theta}$ (B) $\frac{b\sin\theta}{a+b\cos\theta}$ (C) $\frac{a\cos\theta}{b+a\cos\theta}$ (D) $\frac{b\cos\theta}{b+a\sin\theta}$

Q 7. If the magnitude of both the vector $|\vec{A}|$ & $|\vec{B}|$ is A, then the resultant will have magnitude –

(A) A cos θ/2 (B) 2A cos θ/2 (C) 3A cos θ/2 (D) 3A cos θ/3

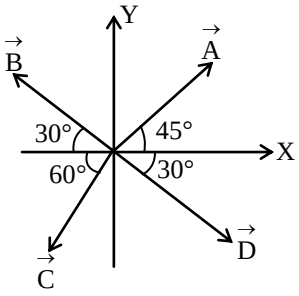
Q 8. If $|\vec{A}| = |\vec{B}|$ = a and θ = 120º , then the two vectors and the resultant will form a –

(A) Acute angle triangle (B) Obtuse angle triangle

(C) Right angle triangle (D) Equilateral triangle

Passage # 2 (Q.9 to Q.11)

Four vectors are shown in the figure where $|\vec{A}| = 5\sqrt{2}$m, $|\vec{B}|$ = 10 m, $|\vec{C}|$ = 10 m and $|\vec{D}|$ = 10 m.



Q 9. (B_X + D_X) is equal to –

(A) $20\sqrt{3}$m (B) – $10\sqrt{3}$m (C) Zero (D) 10 m

Q 10. ($A_X + C_X$) is equal to –

(A) Zero (B) 10 m (C) –5m (D) $-5\sqrt{3}$ m

Q 11. ($A_Y + B_Y + C_Y + D_Y$) is equal to –

(A) $5(1-\sqrt{3})$ m (B) 5(– 1)m (C) 5 $\sqrt{3}$m (D) 10($\sqrt{3}$ – 1) m

Passage # 3 (Q.12 to Q.14)

For the given vectors

$\vec{A} = 2\hat{\imath} + \hat{\jmath} - \hat{k}$

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

$\vec{C} = 2\hat{\imath} + \hat{\jmath} + \hat{k}$

Answer the following

Q 12. The magnitude of $\vec{A} + \vec{B} - \vec{C}$ is :

(A) $\sqrt{10}$ (B) $2\sqrt{3}$ (C) $\sqrt{11}$ (D) 3

Q 13. The angle between $\vec{B}$ and $\vec{C}$ is :

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

Q 14. The vector $\vec{C} \times \vec{B}$ has a magnitude :

(A) $\sqrt{5}$ (B) $\sqrt{18}$ (C) 4 (D) $2\sqrt{5}$

Assertion/Reason Type Questions:

Each of the questions given below consist of Statement – I and Statement – II. Use the following Key to choose the appropriate answer.

(A) If both Statement- I and Statement- II are true, and Statement - II is the correct explanation of Statement– I.

(B) If both Statement - I and Statement - II are true but Statement - II is not the correct explanation of Statement – I.

(C) If Statement - I is true but Statement - II is false.

(D) If Statement - I is false but Statement - II is true.

Q 15. **Statement I :** $\bar{v} = \bar{\omega} \times \bar{r}$ and $\bar{v} \neq \bar{r} \times \bar{\omega}$

Statement II : Cross product is commutative.

Q 16. **Statement I :** When $\bar{P} + \bar{Q} = \bar{R}$ and P + Q = R, the angle between $\bar{P}$ & $\bar{Q}$ must be 0º.

Statement II : Here θ = 0º

R = $\sqrt{P^2 + Q^2 + 2PQ\ cos\ 0º}$ = P + Q.

Answer Key

Q.1) (A) Q, (B) R, (C) S, (D) S	**Q.2)** (A) Q; (B) R; (C) S; (D) P	**Q.3)** (A) S ; (B) P ; (C) Q ; (D) R	**Q.4)** (A) Q, (B) P, R, (C) Q, (D) P, R, S	**Q.5)** (A) R; (B) S; (C) P; (D) Q
Q.6) B	**Q.7) B**	**Q.8) D**	**Q.9) C**	**Q.10) A**
Q.11) A	**Q.12) C**	**Q.13) B**	**Q.14) B**	**Q.15) C**
Q.16) A				