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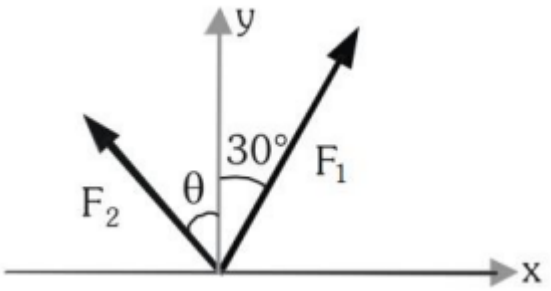
1. **A bird is at a point P(4, −1, −5) and sees two points P1(−1, −1,0) and P2(3, −1, −3). At time t = 0, it starts flying with a constant speed of 10 m/s to be in line with points P1 and P2 in the minimum possible time t. Find t, if all coordinates are in kilometers.**

2. **In the figure, F1 and F2, the two unknown forces give a resultant force of 80√3 N along the y-axis. It is required that F2 must have the minimum magnitude. Find the magnitudes of F1 and F2.**



3. **A particle is displaced from A ≡ (2,2,4) to B ≡ (5, −3, −1). A constant force of 34 N acts in the direction of $\vec{AP}$, where P ≡ (10,2, −11). (Coordinates are in m). (i) Find the $\vec{F}$. (ii) Find the work done by the force to cause the displacement.**

4. **Three concurrent forces of the same magnitude are in equilibrium. What is the angle between the force? Also, name the triangle formed by the force as sides:-**
   - (A) 60◦ equilateral triangle
   - (B) 120◦ equilateral triangle
   - (C) 120◦, 30◦, 30◦ an isosceles triangle
   - (D) 120◦ an obtuse-angled triangle

5. **The resultant of two forces, one double the other in magnitude, is perpendicular to the smaller of the two forces. The angle between two forces is:-**
   - (A) 150◦
   - (B) 90◦
   - (C) 60◦
   - (D) 120◦

6. **The resultant of two forces acting at an angle of 120◦ is 10 kgwt and is perpendicular to one of the forces. That force is:**
   - (A) 10√3 kgwt
   - (B) 20√3 kgwt
   - (C) 10 kgwt
   - (D) 10√3 kgwt

7. **If the resultant of two forces of magnitudes P and Q acting at a point at an angle of 60◦ is √7Q, then P/Q is:-**
- (A) 1
- (B) 3/2
- (C) 2
- (D) 4

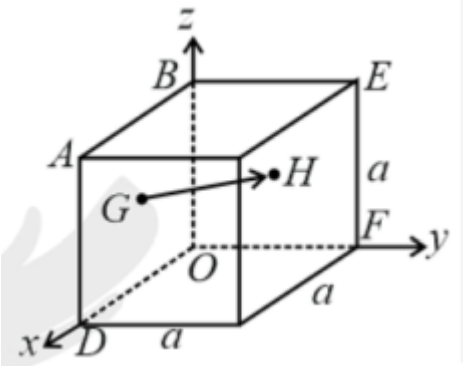
8. **A body placed in free space is simultaneously acted upon by three forces $\vec{F}1$,. $\vec{F}2$, $\vec{F}3$, The body is in equilibrium, and the forces $\vec{F}1$,.and $\vec{F}2$, are known to be 36 N due north and 27 N due east, respectively. Which of the following best describes the force $\vec{F}3$, ?**
- (A) 36 N due south.
- (B) 53 N due 60◦ south of east
- (C) 45 N due 53◦ south of west
- (D) 45 N due 37◦ north of west

9. **Find the resultant of the following two vectors $\vec{A}$ and $\vec{B}$. $\vec{A}$: 40 units due east and ; $\vec{B}$: 25 units 37 ◦ north of west**
- (A) 25 units 37◦ north of west
- (B) 25 units 37◦ north of east
- (C) 40 units 53◦ north of west
- (D) 40 units 53◦ north of east

10. **Two vectors $\vec{a}$ and $\vec{b}$ add to give a resultant c = $\vec{a}$ + $\vec{b}$. In which of these cases is the angle between a and $\vec{b}$ maximum: (a, b, c represent the magnitudes of respective vectors)**
- (A) c = a + b
- (B) c^2 = a^2 + b^2
- (C) c = a − b
- (D) cannot be determined

11. **Let $|\vec{A}1|$ = 3, $|\vec{A}2|$ = 5, and $|\vec{A}1 + \vec{A}2|$ = 5. The value of $(2\vec{A}1 + 3\vec{A}2) \cdot (3\vec{A}1 - 2\vec{A}2)$ is**
- (A) -106.5
- (B) -118.5
- (C) − 99.5
- (D) -112.5

12. **In the cube of side a shown in the figure, the vector from the central point of the face ABOD to the central point of the face BEFO will be**

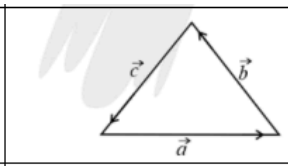
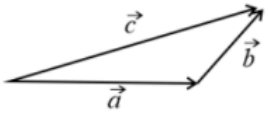
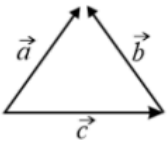
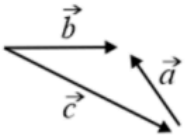


- (A) 1/2a(ĵ − î)
- (B) 1/2a(î − k̂)
- (C) 1/2a(ĵ − k̂)
- (D) 1/2a(k̂ − î)

13. **Two vectors $\vec{A}$ and $\vec{B}$ have equal magnitudes. The magnitude of ($\vec{A}$ +$\vec{B}$) is n times the magnitude of ($\vec{A}$ −$\vec{B}$). The angle between $\vec{A}$ and $\vec{B}$ is**

- (A) cos^-1((n−1)/(n+1))
- (B) cos^-1((n^2-1)/(n^2+1))
- (C) sin^-1((n−1)/(n+1))
- (D) sin^-1(n/(n^2+1))

14. **COLUMN-I contains a vector diagram of three vectors $\vec{a}$, $\vec{b}$, $\vec{c}$, and COLUMN-II contains vector**

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

1.	(100 s)	**2.**	(120 N, $40\sqrt{3}$ N)	**3.**	($16\hat{i} - 30\hat{k}$, 198 J)	**4.**	(B)
5.	(D)	**6.**	(D)	**7.**	(C)	**8.**	(C)
9.	(B)	**10.**	(C)	**11.**	(B)	**12.**	(A)
13.	(B)	**14.**	A → r; B → s; C → p; D → q				