Q.1 A child pulls a box with a force of 200 N at an angle of 60º above the horizontal. Then the horizontal and vertical components of the force are-
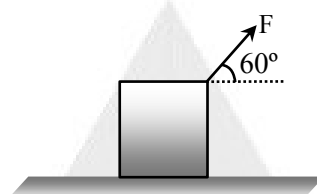

(A) 100 N, 175 N   (B) 86.6 N, 100 N

(C) 100 N, 86.6 N   (D) 100 N, 0 N

Q.2 A boy wants to hold a 50 kg box at rest on a snow covered hill. The hill makes an angle of 30º with the horizontal. What force the boy must exert parallel to the slope ?

(A) 25 N   (B) 245 N

(C) 424 N   (D) 490 N

Q.3 The value of a unit vector in the direction of vector A = $5\hat{i} - 12\hat{j}$, is -

(A) $\hat{i}$ (B) $\hat{j}$ (C) $(\hat{i} + \hat{j})$ / 13   (D) $(5\hat{i} - 12\hat{j})$/13

Q.4 For the figure –
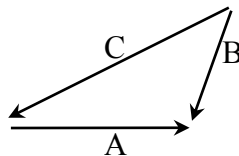
(A) A + B = C   (B) B + C = A

(C) C + A = B   (D) A + B + C = 0

Q.5 Two forces of 4 dyne and 3 dyne act upon a body. The resultant force on the body can only be –

(A) more than 3 dynes

(B) more than 4 dynes

(C) between 3 and 4 dynes

(D) between 1 and 7 dynes

Q.6 A force of 6 kg and another of 8 kg can be applied together to produce the effect of a single force of-

(A) 1kg   (B) 11kg

(C) 15 kg   (D) 20 kg

Q.7 Which of the sets given below may represent the magnitudes of three vectors adding to zero ?

(A) 2, 4, 8   (B) 4, 8, 16   (C) 1, 2, 1   (D) 0.5, 1, 2

Q.8 Two vectors have magnitudes 3 unit and 4 unit respectively. What should be the angle between them if the magnitude of the resultant is -

(i) 1 unit   (ii) 5 unit

(iii) 7 unit

(A) 180º, 90º, 0º   (B) 80º, 70º, 0º

(C) 90º, 170º, 50º   (D) None of these

Q.9 In a two dimensional motion of a particle, the particle moves from point A, position vector r_1 to point B position vector r_2. If the magnitude of these vector are respectively $r_1 = 3$ and $r_2 = 4$ and the angle they make with the x-axis are $\theta_1 = 75º$, $\theta_2 = 15º$ respectively, then magnitude of the displacement vector is-

(A) $\sqrt{3}$ (B) $\sqrt{13}$ (C) $\sqrt{5}$ (D) $\sqrt{1}$

Q.10 A blind person after walking each 10 steps in one direction, each of length 80 cm, turns randomly to the left or to the right by 90º. After walking a total of 40 steps the maximum possible displacement of the person from his starting position could be -

(A) 320 m   (B) 32 m

(C) 16/ $\sqrt{2}$ m   (D) 16 $\sqrt{2}$ m

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Q.11 The resultant of two vectors A and B is perpendicular to the vector A and its magnitude is equal to half the magnitude of vector B. The angle between A and B is -

(A) 120º   (B) 150º
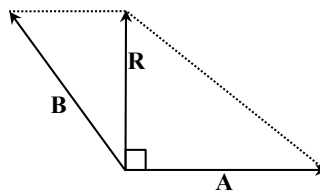
(C) 135º   (D) None of these

Q.12 If the angle between vector a and b is an acute angle, then the difference a – b is -

(A) the main diagonal of the parallelogram

(B) the minor diagonal of the parallelogram

(C) any of the above   (D) none of the above

Q.13 What is the resultant of three coplanar forces: 300 N at 0°, 400 N at 30º and 400 N at 150º ?

(A) 500 N   (B) 700 N

(C) 1100N   (D) 300 N

Q.14 Two forces, F_1 and F_2 are acting on a body. One force is double that of the other force and the resultant is equal to the greater force. Then the angle between the two forces is -

(A) $\cos^{-1}(1/2)$ (B) $\cos^{-1}(-1/2)$

(C) $\cos^{-1}(-1/4)$ (D) $\cos^{-1}(1/4)$

Q.15 If the magnitudes of the vectors A, B and C are 6, 8, 10 units respectively and if A + B = C, then the angle between A and C is -

(A) $\pi/2$ (B) $\cos^{-1}(0.6)$

(C) $\tan^{-1}(0.75)$ (D) $\pi/4$

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Q.16 Angle between (P + Q) and (P – Q) will be-

(A) 0º only

(B) 90º only

(C) 180º only

(D) between 0º and 180º (both the values inclusive)

Q.17 If A = B + C and magnitudes of A, B and C are 5, 4, and 3 units respectively, the angle between A and C is -

(A) $\sin^{-1}$ (3/4)　　(B) $\cos^{-1}$ (4/5)　(C) $\cos^{-1}$ (3/5) (D) π/2

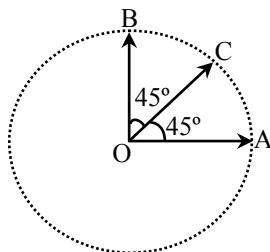**Q.18** A particle is moving in a circle of radius r centre at O with constant speed v the change in velocity moving from A to B ($\angle AOB = 40º$) is -

(A) 2v cos 40º　　　(B) 2v sin 40º

(C) 2v cos 20º　　　(D) 2v sin 20º

Q.19 A truck travelling due north with 20 m/s turns towards west and travels at the same speed. Then the change in velocity is -

(A) 40 m/s north-west

(B) 20 $\sqrt{2}$ m/s north-west

(C) 40 m/s south-west

(D) 20 $\sqrt{2}$ m/s south-west

Q.20 The three vectors OA, OB and OC have the same magnitude R. Then the sum of these vectors have magnitude –

(A) R　　　　　　　(B) $\sqrt{2}$ R

(C) 3R　　　　　　　(D) (1+ $\sqrt{2}$)R

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Q.21 What displacement must be added to the displacement $25\hat{i} - 6\hat{j}$ m to give a displacement of 7.0 m pointing in the x-direction ?

(A) $18\hat{i} - 6\hat{j}$ (B) $32\hat{i} - 13\hat{j}$ (C) $-18\hat{i} + 6\hat{j}$ (D) $-25\hat{i} + 13\hat{j}$

Q.22 Two constant forces $F_1 = 2\hat{i} - 3\hat{j} + 3\hat{k}$ (N) and $F_2 = \hat{i} + \hat{j} - 2\hat{k}$ (N) act on a body and displace it from the position $r_1 = \hat{i} + 2\hat{j} - 2\hat{k}$ (m) to the position $r_2 = 7\hat{i} + 10\hat{j} + 5\hat{k}$ (m). What is the work done ?

(A) 9 Joule   (B) 41 Joule   (C) –3 Joule   (D) None of these

Q.23 Two vectors A and B lie in X-Y plane. The vector B is perpendicular to vector A. If $A = \hat{i} + \hat{j}$, then B may be -

(A) $\hat{i} - \hat{j}$ (B) $-\hat{i} + \hat{j}$

(C) $-2\hat{i} + 2\hat{j}$ (D) Any of the above

Q.24 The two vectors A = $2\hat{i} + \hat{j} + 3\hat{k}$ and

B = $7\hat{i} - 5\hat{j} - 3\hat{k}$ are -

(A) parallel   (B) perpendicular

(C) anti-parallel   (D) none of these

Q.25 Two vectors P = $2\hat{i} + b\hat{j} + 2\hat{k}$ and $Q = \hat{i} + \hat{j} + \hat{k}$ will be perpendicular if -

(A) b = 0   (B) b = 1

(C) b = 2   (D) b = – 4

Q.26 A vector perpendicular to $(4\hat{i} - 3\hat{j})$ is –

(A) $4\hat{i} + 3\hat{j}$ (B) $7\hat{k}$

(C) $6\hat{i}$ (D) $3\hat{i} - 4\hat{j}$

Q.27 Angle that the vector A = $2\hat{i} + 3\hat{j}$ makes with y-axis is –

(A) $\tan^{-1} 3/2$ (B) $\tan^{-1} 2/3$

(C) $\sin^{-1} 2/3$ (D) $\cos^{-1} 3/2$

Q.28 A vector A points. vertically upward and, B points towards north. The vector product A × B is-

(A) along west

(B) along east

(C) zero

(D) vertically downward

Q.29 The linear velocity of a rotating body is given by v = ω × r, where ω is the angular velocity and r is the radius vector. The angular velocity of a body $\omega = \hat{i} - 2\hat{j} + 2\hat{k}$ and their radius vector $r = 4\hat{j} - 3\hat{k}$, |v| is -

(A) $\sqrt{29}$ units   (B) 31 units

(C) $\sqrt{37}$ (D) $\sqrt{41}$ units

Q.30 $0.4\hat{i} + 0.8\hat{j} + c\hat{k}$ represents a unit vector, when c is -

(A) 0.2   (B) $\sqrt{0.2}$

(C) $\sqrt{0.8}$ (D) 0

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	A	B	D	C	D	B	C	A	B	D
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	A	C	B	D	C	D	D	D
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	C	A	D	B	D	B	B	A	A	B

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