TOTAL TIME FOR EXAMS IS ONE HOURS THIRTY MINUTES (1.30HR)

SECTION 1(VECTORS): 15 QUESTIONS ARE TO BE ANSWERED

^^ Determine the value of p so that the vectors 2i +pj +k and 4i -2j -2k perpendicular to each other.

@@ -3

@@ 3 ~

@@ $\frac{1}{3}$

@@ $-\frac{1}{3}$

@@None

^^If any two vectors $\vec{a}$ and $\vec{b}$ are parallel, then

@@ $\vec{a} \times \vec{b} = 0$

@@ $\vec{a} \cdot \vec{b} = \vec{b} \cdot \vec{a}$

@@ $\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}|$ ~

@@ $\vec{a} \times \vec{b} = \vec{b} \times \vec{a}$

@@None

^^Which of the following is not a scalar quantity

@@ Mass

@@ Energy

@@ Density

@@ Pressure

@@ Weight ~

^^ The magnitude of a unit vector perpendicular to the plane of

$\vec{a}$ =2i -6j -3k and $\vec{b}$ =4i +3j -k is

@@ 2

@@ 0

@@ 1 ~

@@ $\sqrt{22}$

@@ None

^^The unit vector parallel to the resultant of vectors $\vec{a}_1$ =6i -3j +2k and $\vec{a}_2$ =3i +j -2k is

@@ $\frac{9i + 2j}{\sqrt{85}}$

@@ $\frac{9i - 2j}{\sqrt{85}}$ ~

@@ $\frac{-9i + 2j}{\sqrt{85}}$

@@ $\frac{-9i - 2j}{\sqrt{85}}$

@@ None

^^ For any unit vector $\vec{q}$ =xi +yj +zk, $\vec{q} \cdot \vec{q}$ is

@@ $\left|\vec{q}^{\,2}\right|$

@@ 1 ~

@@ $\vec{q}^{\,2}$

@@ 0

@@ None

^^ The projection of vector $\vec{p}$ on another vector $\vec{q}$ is

@@ $\frac{\vec{p} \times \vec{q}}{|\vec{p}|}$

@@ $\frac{\vec{p} \cdot \vec{q}}{|\vec{p}|}$

@@ $\frac{\vec{p} \cdot \vec{q}}{|\vec{q}|}$ ~

@@ $\frac{\vec{p} \times \vec{q}}{|\vec{p}||\vec{q}|}$

@@ None

^^ The work done in moving an object along a vector 3i +j -5k if the applied force is 2i -j -k is

@@ 5 units

@@ 33 units

@@ -5 units

@@ 10 units~

@@ None

^^ The cosine of the angle between $\vec{a}_1$ =i +2j -k and $\vec{a}_2$ = -4i +j -2k is

@@ π

@@ $\frac{\pi}{3}$

@@ $\frac{\pi}{2}$ ~

@@ $\frac{\pi}{5}$

@@ 2π

^^ The projection of a vector $\vec{a}_1 = i - 2j + 3k$ on another vector $\vec{a}_2 = i + 2j + 2k$ is

@@ $\frac{1}{3}$

@@ $-\frac{1}{3}$

@@ $\frac{2}{3}$

@@ 1 ~

@@ 2i +5k

^^ All of the following are properties of dot or scalar product except

@@ Commutativity

@@ Distribution of addition over multiplication

@@ Non-negative ~

@@ Associativity

@@ Billinear

^^ If the dot product of two vectors $\vec{a}_1$ and $\vec{a}_2$ are non-zero, but $\vec{a}_1 \cdot \vec{a}_2 = 0$. Then the vectors are,

@@ Parallel to each other ~

@@ Perpendicular to each other

@@ Collinear

@@ Coplanar

@@ None

^^ For what value of m is the work-done by the force (1,1,1) on a particle which is displaced from (3,2,1) to (5,4,m) equals 20 units

@@ 10

@@ 15 ~

@@ 11

@@6

@@ None

^^ A particle moves along a curve whose parametric equations are $x = e^{-t}$, $y = 2t^2$, $z = 2\cos t$ where t is time. The magnitude of velocity at $t = 0$ is

@@ 0

@@ 1 ~

@@ -1

@@ 3

@@ None

^^ If $\vec{a}_1 = 5it^2 + jt - t^3k$ and $\vec{a}_2 = i\sin t - j\cos t$. Then $\left|\frac{d}{dt}\left(\vec{a}_1 \times \vec{a}_2\right)\right|_{t=0}$ is

@@ 0

@@ 1 ~

@@ $\sqrt{136}$

@@ $\sqrt{12}$

@@ None

^^ At what velocity should a body accelerating at $2ti + 3t^2 + 2$ moves if the velocity is zero at $t = 0$

@@ $t^2i + t^3j + 2tk$ ~

@@ $2t^2i + t^3j - 2tk$

@@ $2ti - t^2j + 3t^3k$

@@$2t^2i + 3t^3j - 2tk$

@@ None

^^ The modulus of a vector $\vec{p} = xi + yj + zk$ is given by

@@ $\vec{p} \cdot \vec{p}$

@@ $\sqrt{(x + y + z)^2}$

@@ $\sqrt{x^2 + y^2 + z^2}$ ~

@@ |p|

@@ None

^^ The unit vector of the resultant of the vectors $\vec{a}_1 = 3i + 2j - k$ and $\vec{a}_2 = 2i - 2j - k$ is

@@ $\frac{5i - 2j}{\sqrt{25}}$

@@ $\frac{5i - 2k}{\sqrt{26}}$

@@ $\frac{5i - 2k}{\sqrt{29}}$ ~

@@ $\frac{5i + 2k}{\sqrt{29}}$

@@ None

^^ If the velocity of a particle moving along a curve is given by $i\cos at + j\sin bt + k\,2t$. What is the acceleration of the body at any time?

@@ icos at +jsin bt +2tk

@@ -iacos at +jbsin bt -2k

@@ iasin at +jbcos bt -2k

@@ -iasin at +jbcos bt -2k ~

@@ None

^^ Find the moment of the force represented by 3i +k is acting through the point 2i -j +3k about the point i +2j -k.

@@ -3i +11j -9k

@@ -3i -j +15k

@@ -3i +11j +9k ~

@@ -3i +j +15k

@@ None

^^ All of the following are vectors except

@@ Acceleration

@@ Velocity

@@ Energy ~

@@ Momentum

@@ Friction.

^^ If $\vec{a}$ is a non-zero vector, then the unit vector in its direction is expressed as

@@ $\frac{1}{|\vec{a}|}$

@@ a

@@ $\vec{a}$ ×1

@@ $\dfrac{\vec{a}}{|\vec{a}|}$ ~

^^ If the three points with position vectors $\vec{a}$, $\vec{b}$, $\vec{c}$ are collinear, and $x\vec{a} + y\vec{b} + z\vec{c} = 0$, then

@@ $x = y = z = 0$

@@ $x = y \neq z$

@@ $x = y + z$

@@ $x + y + z = 0$ ~

@@ none

^^ If $\vec{a}$, $\vec{b}$, $\vec{c}$ are non-coplanar,then $x\vec{a} + y\vec{b} + z\vec{c} = 0$ implies

@@ $x = y = z = 0$~

@@ $x = y \neq z$

@@ $x = y + z$

@@ $x + y + z = 0$

@@ none

^^ If the vector function $\vec{u}(t)$ has a constant direction, then

@@ $\vec{u} \times \dfrac{d\vec{u}}{dt} = 0$~

@@ $\vec{u} \cdot \dfrac{d\vec{u}}{dt} = 0$

@@ $\dfrac{d\vec{u}}{dt} = 0$

@@ $\frac{d\vec{u}}{dt} = \vec{u}$

@@ none

^^ A particle moves along the curve
x =aCos (t), y =aSin(t) and z =atTan(y). Find the magnitude of the acceleration at t =0

@@aCosti +aSintj +atTanyk

@@aSecy

@@a ~

@@0

@@aCosecy

^^ when using direction cosine method, which of the following is used in finding the angle between two vectors

@@[l,m,n]

@@cos θ

@@ $l_1l_2 + m_1m_2 + n_1n_2$ ~

@@ $\cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}|\,|\vec{b}|}$

@@none

^^ If $\vec{a} = 2\vec{i} + 4\vec{j} - 5\vec{k}$ and $\vec{b} = \vec{i} + 2\vec{j} + 3\vec{k}$, then the unit vector along $\vec{a} + \vec{b}$ is

@@ $\frac{3\vec{i} - 6\vec{j} - 2\vec{k}}{6}$

@@$\frac{3\vec{i}+6\vec{j}+2\vec{k}}{7}$

@@$\frac{4\vec{i}+6\vec{j}+2\vec{k}}{\sqrt{56}}$

@@$\frac{\vec{i}+2\vec{j}-8\vec{k}}{\sqrt{69}}$

@@$\frac{3\vec{i}+6\vec{j}-2\vec{k}}{7}$~

^^ If $(\alpha-5)\vec{a}+3\alpha\vec{b}$ is parallel to $4\vec{a}+2\vec{b}$, then α is

@@ 1

@@ 2

@@ -1~

@@ -2

@@ 3

^^ The direction cosines of the vector $3\vec{i}-4\vec{j}+12\vec{k}$ are

@@ $\frac{3}{13},\frac{4}{13},\frac{12}{13}$

@@$\frac{3}{13},\frac{-4}{13},\frac{12}{13}$ ~

@@$\frac{3}{5},\frac{4}{5},\frac{12}{5}$

@@ $\frac{3}{5},\frac{-4}{5},\frac{12}{5}$

@@$\frac{3}{13},\frac{-4}{13},\frac{-12}{13}$

^^ If $x\vec{i}-y\vec{j}+z\vec{k}$ is a unit vector then its direction cosines are

@@ l,m,n

@@ i,j,k

@@1,1,1

@@ x,y,z ~

@@ none

^^ The cosine of the angle between the vectors $2\vec{i}+2\vec{j}-\vec{k}$ and $6\vec{i}-3\vec{j}+2\vec{k}$ is

@@ $\frac{1}{3}$

@@ $\frac{1}{7}$

@@ $\frac{1}{21}$

@@$\frac{4}{21}$~

@@ $\frac{20}{21}$

^^ If the vectors $2\vec{i}+m\vec{j}+\vec{k}$ and $6\vec{i}-2\vec{j}-2\vec{k}$ are perpendicular to each other, then m is

@@2

@@ 3

@@ 4

@@ 5 ~

@@ -3

^^ The projection of the vector $2\vec{i} - 3\vec{j} - 6\vec{k}$ on the vector $2\vec{i} + 2\vec{j} - \vec{k}$ is

@@ $\frac{3}{4}$

@@ $\frac{4}{3}$ ~

@@ 4

@@ 3

@@ 12

^^ The vector projection of the vector $2\vec{i} + 3\vec{j} + 4\vec{k}$ on the vector $\vec{i} + \vec{j} + \vec{k}$ is

@@ $3(2\vec{i} + 3\vec{j} + 4\vec{k})$

@@ $\frac{2\vec{i} + 3\vec{j} + 4\vec{k}}{\sqrt{3}}$

@@ $3(\vec{i} + \vec{j} + \vec{k})$ ~

@@ $\frac{\vec{i} + \vec{j} + \vec{k}}{\sqrt{3}}$

@@ $6\vec{i} + 9\vec{j} + 16\vec{k}$

^^ A man pushing a box exerts a force of 516.8Nhorizontally and 188.1N vertically downward. The box moves horizontally a distance of 20m.what is the work done on the box

@@ 516.8N

@@ 2556.2 units

@@ $-\frac{2556.2}{9}$ units

@@ 604.9 units

@@10336 units ~

^^ A unit vector perpendicular to the plane of $2\vec{i} - 6\vec{j} - 3\vec{k}$ and $4\vec{i} + 3\vec{j} - \vec{k}$ is

@@ $\frac{-3\vec{i} - 2\vec{j} + 6\vec{k}}{7}$

@@$\frac{3\vec{i} - 2\vec{j} - 6\vec{k}}{7}$

@@ $\frac{1}{7}(3\vec{i} - 2\vec{j} + 6\vec{k})$ ~

@@$\frac{3\vec{i} + 2\vec{j} + 6\vec{k}}{7}$

@@ $-\frac{1}{7}(3\vec{i} + 2\vec{j} + 6\vec{k})$

^^ The area of a parallelogram with adjacent sides $2\vec{i} + 4\vec{j} - 5\vec{k}$ and $\vec{i} + 2\vec{j} + 3\vec{k}$ is (in square units)

@@ $11\sqrt{5}$~

@@ $5\sqrt{11}$

@@ $\sqrt{55}$

@@ $12\sqrt{5}$

@@ $13\sqrt{5}$

^^ The vector moment about the point $\vec{i} + 2\vec{j} + 3\vec{k}$ of a force $\vec{i} + \vec{j} + \vec{k}$ acting at the point $-2\vec{i} + 3\vec{j} + \vec{k}$ is

@@ $-3\vec{i} + \vec{j} - 4\vec{k}$

@@ $3\vec{i} - \vec{j} - 4\vec{k}$

@@ $3\vec{i} + \vec{j} - 4\vec{k}$ ~

@@ $3\vec{i} + \vec{j} + 4\vec{k}$

@@ $3\vec{i} - \vec{j} + 4\vec{k}$

^^Find the linear velocity of a point P on the body with position vector relative to the point on the axis of rotation given by $3\vec{i} + 2\vec{j} - \vec{k}$ if the angular velocity of the rotating body is $5\vec{i} - 2\vec{j} + 3\vec{k}$. is

@@ $\vec{i} + 3\vec{j} + 9\vec{k}$

@@ 10 units

@@ $8\vec{i} + 2\vec{k}$)

@@ $\frac{4}{\sqrt{10}}(\vec{i} - 3\vec{j} - 9\vec{k})$

@@ $-4\vec{i} + 14\vec{j} + 16\vec{k}$ ~

^^ $\left|\vec{a} \times \vec{b}\right|^2 + \left(\vec{a} . \vec{b}\right)^2$ is

@@ $\left|\vec{a}\right|^2 + \left|\vec{b}\right|^2$

@@ $|\vec{a}|^2 - |\vec{b}|^2$

@@ $|\vec{a}|^2 |\vec{b}|^2$~

@@ None of these

^^ The area of a triangle whose vertices are, A(1,-1,2), B(2,1,-1) and C(3,-1,2) is

@@ 13

@@ $\sqrt{13}$~

@@ 6

@@ $\sqrt{6}$

@@ None

^^ If $\vec{a}$ & $\vec{b}$ are two non-zero vectors, then the component of $\vec{b}$ along $\vec{a}$ is

@@ $\frac{(\vec{a}.\vec{b})\vec{a}}{\vec{a}.\vec{b}}$

@@ $\frac{(\vec{a}.\vec{b})\vec{b}}{\vec{a}.\vec{a}}$

@@ $\frac{(\vec{a}.\vec{b})\vec{b}}{\vec{a}.\vec{b}}$

@@ $\frac{(\vec{a}.\vec{b})\vec{a}}{\vec{a}.\vec{a}}$ ~

@@ None

^^ If $\vec{a} + \vec{b} + \vec{c} = 0$, then the vectors $\vec{a}, \vec{b}, \vec{c}$ satisfies one of the followingrelations

@@ $\vec{a} = \vec{b} = \vec{c} = 0$

@@ $\vec{a} . \vec{b} = \vec{b} . \vec{c} = \vec{c} . \vec{a}$

@@ $\vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a}$ ~

@@ $\vec{a} \times \vec{b} = -\vec{b} \times \vec{c} = \vec{c} \times \vec{a}$

@@ None

^^ A unit vector in the *xy*-plane which is perpendicular to $4\hat{i} - 3\hat{j} + \hat{k}$ is

@@ $\dfrac{\hat{i} + \hat{j}}{\sqrt{2}}$

@@ $\frac{1}{5}\left(3\hat{i} + 4\hat{j}\right)$~

@@ $\frac{1}{5}\left(3\hat{i} - 4\hat{j}\right)$

@@ None

^^ If the position vectors of the points A, B, C, D are

$2\hat{i} + 3\hat{j} + 5\hat{k}$, $\hat{i} + 2\hat{j} + 3\hat{k}$, $-5\hat{i} + 4\hat{j} - 2\hat{k}$, $\hat{i} + 10\hat{j} + 10\hat{k}$ respectively, then:

@@ $\vec{AB} = \vec{CD}$

@@ $\vec{AB} \parallel \vec{CD}$ ~

@@ $\vec{AB} \perp \vec{CD}$

@@ None

^^ The points with the position vectors, 60 i +3 j , 40 i -8 j , a i -52 j are collinear if a is

@@ – 40 ~

@@ 20

@@ - 20

@@ 10

^^ The position vectors of a point *C* w.r.t *B* is i + j and that of *B* w.r.t *A* is i - j . Then the position vector of C w.r.t A is

@@ *2* i ~

@@ *2* j

@@ *-2* j

@@ *-2* i

@@ None

^^ If the magnitude of $\vec{a}$ and $\vec{b}$ are equal and the angle between them is 120^0 and $\vec{a} . \vec{b}$ = -8, then $|\vec{a}|$ is equal to

@@ - 5

@@ 5

@@ 4 ~

@@ 2

@@ None

^^ If $3\hat{i} + 2\hat{j} + 5\hat{k}$ and $2\hat{i} + \hat{j} - 3\hat{k}$ are the forces applied in displacing

a particle from the point $2\hat{i} - \hat{j} - 3\hat{k}$ to the point $4\hat{i} - 3\hat{j} + 7\hat{k}$. Then the work done by the force is

@@ 30 units

@@ 36 units

@@ 24 units ~

@@ 18 units

@@ None

^^ If $(\vec{a} \times \vec{b})^2 + (\vec{a} . \vec{b})^2 = 144$ and $|\vec{a}| = 4$, then $|\vec{b}|$ is equal to

@@ 16

@@ 8

@@ 3 ~

@@ 12

@@ None

^^ If the sum of two unit vectors is a unit vector, then the magnitude of their difference is

@@ $\sqrt{1}$

@@ $\sqrt{2}$

@@ $\sqrt{3}$~

@@ $\sqrt{4}$

@@ None

^^ The rectangular unit vectors ***i*** and ***j*** can have:
@@ a dot product equal to 1.
@@ a dot product equal to 0.~
@@a dot product k.
@@ a negative dot product.

@@ None

^^ The rectangular unit vectors **i** and **j**can have:
@@ a cross product with a magnitude equal to 1.
@@a cross product equal to 0.~
@@ a cross product -j.
@@ a line in the same plane as their cross product

^^ If **a** and **b** are two non zero and non collinear vectors then **a +b** and **a -b** are:
@@ Linearly dependent vectors
@@ Coplanar vectors
@@ parallel vectors
@@ Linearly Independent vectors ~
@@ None

^^ Which one of the following represents a scalar quantity?
@@ The change in momentum of a rubber ball bouncing off the floor.
@@The velocity of an airplane flying at 300 km/h on a bearing 40^0
@@ The speed of a car travelling at 100 km/h. ~
@@ The acceleration of an object thrown vertically upwards and which has reached the highest point of its motion.
@@ None

^^ The projection of the vector $2\vec{i} - 3\vec{k}$ on the vector $3\vec{i} + 4\vec{j}$ is

@@$\frac{6}{5}$ ~

@@ $\frac{6}{3}$

@@ 9

@@ 16

@@ $\frac{5}{3}$

^^ If the vectors $2\vec{i} - \vec{j} + \vec{k}$, $\vec{i} + 2\vec{j} - 3\vec{k}$ and $3\vec{i} + m\vec{j} + 5\vec{k}$ are coplanar, the value of m is

@@ 4

@@ -4 ~

@@ 6

@@ -6

@@ 8

^^ A particle moves along the curve x =5cost, y =5sint, z =5t^2, the magnitude of the acceleration at t =0 is

@@ $3\sqrt{5}$

@@ $4\sqrt{5}$

@@ $5\sqrt{5}$ ~

@@ $6\sqrt{5}$

@@ $7\sqrt{5}$

^^ The value of $\vec{i}.(\vec{j} \times \vec{k})$ is

@@ $\sqrt{3}$

@@ $-\vec{k}$

@@ 3

@@ -1

@@ 1 ~

^^ The unit vector perpendicular to both $\vec{a} = i + 2j - k$ and $\vec{b} = 3i + 2j - k$ is

@@ $\frac{-(j+2k)}{\sqrt{5}}$ ~

@@ $\frac{-j+2k}{\sqrt{5}}$

@@ $\frac{(j-2k)}{\sqrt{5}}$

@@ $\frac{-(2j-4k)}{\sqrt{5}}$

@@ None

^^ For what value of m are the vectors $2i+4j-k$ and $mi+2j-2k$ perpendicular vectors

@@ 2

@@ 5

@@ 4

@@ -5 ~

@@ None

^^ A particle moves along the curve $x=2t^2+1$, $y=t^3$, $z=t+4$, what is its acceleration at time $t=2$

@@ $4i+12j$ ~

@@ $6i-6j+k$

@@ $4i+12j+2k$

@@ $4i-2j$

@@ None

^^ A unit vector parallel to the resultant vector of vectors $\vec{a}_1 = 6i - 3j + 2k$ and $\vec{a}_2 = 3i + j - 2k$

@@ $\frac{9i + 4j}{\sqrt{85}}$

@@ $\frac{9i - 4j}{\sqrt{85}}$

@@ $\frac{13i + 4j}{\sqrt{85}}$

@@ $\frac{9i - 2j}{\sqrt{85}}$ ~

@@ None

^^ Which of the following is a vector quantity

@@ momentum~

@@ energy

@@ power

@@ frequency

@@ None

^^ The points $P(1, 2, 3)$, $Q(-1, 2, -1)$ and $R(1, -2, 3)$ are vertices of a triangle. The area of the triangle is

@@ $2\sqrt{29}$ ~

@@ $3\sqrt{29}$

@@ $4\sqrt{29}$

@@ $5\sqrt{29}$

@@ None

^^ Let $\vec{r} = 2i + j + 3k$ be a vector, $|\vec{r} \times \vec{r}|$ is equal to

@@ 6

@@ 0 ~

@@ 4

@@ 5

@@ None

^^ Given that $P(2,1,3)$, $Q(1,4,5)$, $R(2,5,3)$ and $S(3,2,1)$ are the vertices of a parallelogram $PQRS$. The area of the parallelogram is

@@ $4\sqrt{2}$

@@ $4\sqrt{5}$ ~

@@ $5\sqrt{4}$

@@ $4\sqrt{3}$

@@ None

^^ The cosine of the angle between the vectors $\vec{a}_1 = 5i + j - 2k$ and $\vec{a}_2 = 4i - 4j + 3k$ is

@@ 0.2851 ~

@@ 0.8521

@@ 0.2158

@@ 0.5812

@@ None

^^ Let $\vec{a}_1 = 5i + j - 2k$ be a vector with directional cosines $\cos\alpha$, $\cos\beta$ and $\cos\gamma$ in the x, y, z directions respectively. Then $\cos^2\alpha + \cos^2\beta =$

@@ $\frac{1}{5}$

@@ $\frac{11}{15}$

@@ $\frac{4}{5}$

@@ $\frac{13}{15}$ ~

@@ None

^^ For the unit vectors i, j, k in the directions of x, y, z respectively. $i \times j \times k$ is equal to

@@ 1

@@ 3

@@ 0 ~

@@ -1

@@ None

^^ For the unit vectors i, j, k in the directions of x, y, z respectively.

$(i\times k)\times(k\times j)$ is equal to

@@ 1

@@ i

@@ k

@@ $-k$ ~

@@ None

^^ Let P and Q be two points with position vectors $\vec{r}_1 = 6i - 3j + 2k$ and $\vec{r}_2 = 3i + j - 2k$ respectively. The position vector of the point R which divides the line segment $\overrightarrow{PQ}$ in the ratio $2:3$ is

@@ $\vec{r} = \frac{9}{2}i - \frac{2}{3}j$

@@ $\vec{r} = \frac{9}{5}i - \frac{2}{5}j$

@@ $\vec{r} = \frac{24}{5}i - \frac{7}{5}j + \frac{2}{5}k$ ~

@@ $\vec{r} = \frac{21}{5}i - \frac{3}{5}j - \frac{2}{5}k$

@@ None

^^ The scalar projection of the vector $\vec{a} = 3i - 2j + k$ on another vector $\vec{b} = i + 2j - 3k$

@@ $\frac{2}{\sqrt{14}}$

@@ $\frac{-4}{\sqrt{14}}$ ~

@@ $\frac{3}{\sqrt{14}}$

@@ $\frac{4}{\sqrt{14}}$

@@ None

^^ If two forces $F_1 = 3i + 5j + 6k$ and $F_2 = 2i + 3j - 4k$ act on a body and displaced it by a distance $d = 3i - 2j + 4k$. The work done is equal to:

@@ 23

@@ -16

@@ 7 ~

@@ -7

@@ None

^^ If A and B have position vectors $\vec{a} = 3i + 5j + 6k$ and $\vec{b} = 2i + 3j - 4k$ then $|2a - 3b|$

@@ $\sqrt{757}$

@@ $\sqrt{577}$ ~

@@ $\sqrt{230}$

@@ $\sqrt{332}$

@@ None

^^ If A and B have position vectors $\vec{a} = 3i + 5j + 6k$ and $\vec{b} = 2i + 3j - 4k$ then the vector $\overrightarrow{BA}$ is

@@ $i+2j+10k$

@@ $-i-2j-10k$ ~

@@ $i+2j+3k$

@@ $-i-2j+10k$

@@ None

^^ The two vectors $\vec{a}=2i-3j+k$ and $\vec{b}=4i+j-5k$

@@ Parallel

@@ Perpendicular ~

@@ Linearly dependent

@@ Equal

@@ None

^^ A particle moves along a curve whose equation is $x=3t^3+2t$, $y=t^3-2t$, $z=t^2$. Its acceleration at the instance of 2 seconds is

@@ $3i+4j-6k$

@@ $36i+12j+2k$ ~

@@ $2i+36j+12k$

@@ $3i-36j+2k$

@@ None

^^ A particle starts from rest with the velocity $V=3t^3\underline{i}+2t\underline{j}+t^2\underline{k}$. How far from the starting point is it at 2 seconds

@@ $3i+\frac{4}{3}j-6k$

@@ $36i+12j+2k$

@@ $12i+4j+\frac{8}{3}k$ ~

@@ $\frac{3}{8}i-36j+2k$

@@ None

^^ A particle moves along the curve with equation $x=2t^2+1$, $y=t^2+2t$, $z=t+4$. What is its acceleration at time t=2seconds?

@@ $2i-4j$

@@ $3i+4j$

@@ $i+2j$

@@ $4i-2j$ ~

@@ None

^^ If the vector $2i+3j-4k$ is perpendicular to $4i+8j+mk$, the value of m is

@@ 8~

@@ 6

@@ 9

@@ 7

@@ None

^^ A unit vector perpendicular to both $\vec{a} = i + j$ and $\vec{b} = j + k$ is

@@ $\frac{i - 2j - k}{\sqrt{2}}$

@@ $\frac{i - j + k}{\sqrt{3}}$ ~

@@ $\frac{i + j + k}{\sqrt{2}}$

@@ $\frac{i + 2j + k}{\sqrt{3}}$

@@ None

^^ The projection of $\vec{p} = i + 2j - k$ and $\vec{q} = 2i + 2j + k$ is

@@ $\frac{5}{\sqrt{2}}$

@@ $\frac{1}{\sqrt{5}}$

@@ $\sqrt{5}$ ~

@@ $\frac{2}{\sqrt{5}}$

@@ None

^^ If the vectors $\vec{a} = 2i - 3j + k$ and $\vec{b} = -2i - j + 2k$ are two sides of a triangle, the area of the triangle is

@@ $\frac{2\sqrt{5}}{5}$

@@ $\frac{5\sqrt{5}}{2}$ ~

@@ $\frac{3\sqrt{5}}{2}$

@@ $\frac{2\sqrt{5}}{3}$

@@ None

^^ If a force $F = 2zi + xzj - yx^2k$ acted upon a particle and moves it from $(0,0,0)$ to $(1,1,1)$ along the curve $x = t$, $y = t^2$, $z = t$, the total work done by the force is

@@ $\frac{7}{10}$

@@ $\frac{8}{13}$

@@ $\frac{9}{11}$

@@ $\frac{13}{10}$ ~

@@ None

^^ Given that $\vec{p} = e^t i - 2\cos t\, j + t^3 k$ and $\vec{q} = 4t^2 i - 3e^t j + \sin t\, k$ find $\left|\frac{d}{dt}(\vec{p}\cdot\vec{q})\right|_{t=0}$

@@ 3~

@@ $e^t - 2\sin t$

@@ $e^t + \cos t$

@@ 5

@@ None

^^ The angle between the vectors $\vec{a}=i+j+k$ and $\vec{b}=2i-2j+3k$ is

@@ $\frac{3}{\sqrt{17}}$

@@ $\frac{3}{\sqrt{51}}$ ~

@@ $\frac{3}{\sqrt{3}}$

@@ $\frac{3}{\sqrt{20}}$

@@ None

^^ The acceleration of a particle is given by $\vec{a}=4\sin t\,i+5\cos 3t\,j-7t^2k$ Find its velocity at any time *t* if the velocity is zero at time *t=0*

@@ $-4\cos t\,i+\frac{5}{3}\sin 3t\,j-\frac{7}{3}t^3k$

@@ $(2-4\cos t)\,i+\frac{5}{3}\sin 3t\,j-\frac{7}{3}t^3k$

@@ $(4-4\cos t)\,i+\frac{5}{3}\sin 3t\,j-\frac{7}{3}t^3k$ ~

@@ $-4\cos t\,i+\left(3+\frac{5}{3}\sin 3t\right)j-\frac{7}{3}t^3k$

@@ None

^^ A parallelogram is formed with the vectors $\vec{a}=-i-3j+k$ and

$\vec{b} = 3i + 2j - 3k$, the area of the parallelogram is

@@ $7\sqrt{2}$ ~

@@ 8

@@ 6

@@ $9\sqrt{3}$

@@ None

^^ The direction cosines of $\vec{r} = i - 2j + 3k$ are

@@ $\frac{1}{\sqrt{6}}, \frac{-2}{\sqrt{6}}, \frac{3}{\sqrt{6}}$

@@ $\frac{1}{\sqrt{14}}, \frac{-2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$ ~

@@ $\frac{1}{\sqrt{2}}, \frac{-2}{\sqrt{2}}, \frac{3}{\sqrt{2}}$

@@ $\frac{1}{\sqrt{11}}, \frac{-2}{\sqrt{11}}, \frac{3}{\sqrt{11}}$

@@ None

^^ What is the value of m if the vectors $2i - 3j + mk$ and $-i + \frac{3}{2}j + 9k$ are parallel to each other?

@@ 8

@@ 18

@@ -18 ~

@@ -8

@@ None

^^ If $A = (2, 3, 4)$ and $B = (2, 2, 2)$ then $B\vec{A} \cdot A\vec{B}$ equals to

@@ -5 ~

@@ 5

@@ 4

@@ 3

@@ None

^^ If $A = (2, 3, 4)$ and $B = (1, -2, 3)$ then $A\vec{B} \times B\vec{A}$ equals to

@@ 1

@@ $i - 2j + 3k$

@@ $2i - 6j + 12k$

@@ 0 ~

@@ None

^^ If $(i \times j) \cdot (j \times k) = P$ then $2P$ equals to

@@ 0~

@@ 2

@@ $k \times i$

@@ $i \times k$

@@ None

^^ If the vectors $ai+j$, $j+k$ and $i+k$ are linearly independent, the value of a equals to

@@ 1

@@ 2

@@ -1 ~

@@ -2

@@ None

^^ Let $\vec{p}=i+j+k$ and $\vec{q}=i+2j-3k$ be any two vectors. If the angle between $\vec{p}$ and $\vec{q}$ is θ and the angle between $\vec{p}$ and - $\vec{q}$ is α. Then, $\theta+\alpha=?$

@@ $\frac{\pi}{2}$

@@ π ~

@@ $\frac{\pi}{4}$

@@ 2π

@@ None

^^ If $\vec{r}=\vec{p}\times\vec{q}$, which of the following is true

I $\vec{r}\cdot\vec{p}=\vec{r}\cdot\vec{q}$ II $\vec{r}\cdot\vec{q}=0$ III $|\vec{r}\times\vec{p}|=|\vec{r}||\vec{p}|$

@@ I only

@@ II and III only

@@ I and II only

@@ All of the above ~

@@ None

^^ The equation of the straight line which passes through the point $P(1, 2, 3)$ and parallel to the vector $\vec{V} = i + j - k$ is

@@ $i + j - k + \lambda(i + 2j + 3k)$

@@ $x + 1 = y + 2 = z - 3$

@@ $x - 1 = y - 2 = 3 - z$ ~

@@ $x - 2 = y - 3 = z - 2$

@@ None

^^ Given that $\vec{p} = 2i + 2j + 2k$ and $\vec{q} = 3i - 2j + k$. The projection of $\vec{p}$ on $\vec{q}$ is

@@ $\frac{14}{\sqrt{14}}$ ~

@@ $\frac{14}{\sqrt{17}}$

@@ $\frac{17}{\sqrt{14}}$

@@ $\frac{17}{\sqrt{17}}$

@@ None

^^ A force $F = 7i + 4j - 3k$ moves an object from $(1, 2, 3)$ to $(3, 2, 1)$. The work done by the force is

@@ 14

@@ 22

@@ 20 ~

@@ 18

@@ None

^^ For any three vectors $\vec{p},\ \vec{q}$ and $\vec{r}$, if $(\vec{p}\times\vec{q})\cdot\vec{r}=0$. Which of the following is true?

I $\vec{r}$ and $\vec{p}$ are parallel II $\vec{r}$ and $\vec{q}$ are perpendicular

III $\vec{p},\ \vec{q}$ and $\vec{r}$ are coplanar IV $\vec{p},\ \vec{q}$ and $\vec{r}$ are collinear

@@ I and IV only

@@ II only

@@ III only ~

@@ II and III only

@@ None

^^ Let $\vec{p}$ and $\vec{q}$ be any two vectors, if $|\vec{p}\times\vec{q}|=|\vec{p}\cdot\vec{q}|$ then the angle between $\vec{p}$ and $\vec{q}$ is

@@ 0

@@ $\frac{\pi}{4}$ ~

@@ π

@@ $\frac{\pi}{2}$

@@ None

^^ If $\vec{p}$, $\vec{q}$ and $\vec{r}$ are coplanar, $(\vec{p} \times \vec{q}) \times (\vec{p} \times \vec{r}) = ?$

@@ $\vec{p} \times (\vec{q} \times \vec{r})$

@@ $(\vec{p} \times \vec{p}) \times (\vec{q} \times \vec{r})$

@@ 0 ~

@@ 1

@@ None

^^ If α is a scalar and $\vec{p}$ and $\vec{q}$ are vectors. Then, $\alpha(\vec{p} \times \vec{q})$ is same as any one of the following.

I $(\alpha\vec{p}) \times (\alpha\vec{q})$ II $(\alpha\vec{p}) \times (\vec{q})$ III $(\vec{p}) \times (\alpha\vec{q})$ IV $\alpha(\vec{p} \cdot \vec{q})$

@@ II only

@@ I and III only

@@ II and IV only

@@ II and III only ~

@@ None

^^ Find the area of the triangle with vertices $A(0,1,2)$, $B(1,2,0)$ and $C(2,0,1)$

@@ $\frac{2\sqrt{3}}{3}$

@@ $\frac{3\sqrt{2}}{2}$

@@ $\frac{3\sqrt{3}}{2}$ ~

@@ $\frac{2\sqrt{5}}{3}$

@@ None

^^ Given that the points $P(1,2,3)$, $Q(-2,-1,-3)$, $R(2,2,2)$ and $S(2,1,3)$ are points in space. $P\vec{Q}+Q\vec{R}+R\vec{S}+S\vec{P}=?$

@@ 0 ~

@@ $3i+4j+5k$

@@ $i+2j+3k$

@@ $i+j-k$

@@ None

^^ If the vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ are sides of a triangle, which of the following is/are true

I $\vec{a}+\vec{b}+\vec{c}=0$ II $\left|\vec{a}\times\vec{b}\right|=\left|\vec{c}\times\vec{a}\right|$ III $\left|\vec{a}\times\vec{b}\right|=\left|\vec{b}\times\vec{c}\right|$

@@ I only

@@ I and III only

@@ I, II and III ~

@@ II and III only

@@ None

^^ Given that $\vec{a} = 2i - 3j - k$ and $\vec{b} = i + 4j - k$. Evaluate $(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b})$

@@ $6i - 20j - 22k$

@@ $20i + 6j - 22k$

@@ $-20i - 6j - 22k$ ~

@@ $i + j - 3k$

@@ None

^^ A particle moves along a curve with parametric equation $x = 8t^2 - 2t$, $y = 2\sin 2t$, $z = 2\cos t$. The magnitude of its velocity at time $t = 0$ is

@@ $5\sqrt{2}$

@@ $2\sqrt{5}$ ~

@@ 2

@@ $-2i + 4j$

@@ None

^^ A force $\vec{F} = yz\,\underline{i} + xyz\,\underline{j} + x^2 y\,\underline{k}$ moves a particle along the curve, $x = t$, $y = 2t$ and $z = t^2$ from $(0, 0, 0)$ to $(1, 2, 1)$. The total work done by the force is

@@ 2.75

@@ $2\frac{1}{5}$

@@ 3.1

@@ 2.1 ~

@@ None

^^ Two vectors $\vec{a}$ and $\vec{b}$ of equal magnitude made angle 60° with each other. What is the magnitude of the vectors if $\vec{a}\cdot\vec{b}=8$

@@ 4 ~

@@ 2

@@ 6

@@ 3

@@ None

^^ The magnitude of two vectors $\vec{a}$ and $\vec{b}$ of equal magnitude is $\sqrt{2}$. What is the angle between them if $\vec{a}\cdot\vec{b}=1$

@@ $\frac{\pi}{2}$

@@ $\frac{\pi}{3}$ ~

@@ $\frac{\pi}{4}$

@@ $\frac{\pi}{6}$

@@ None

^^ If the points $60\vec{i}+3\vec{j},\ 40\vec{i}+m\vec{j},\ -40\vec{i}-52\vec{j}$ are collinear, the value of m is

@@ -8 ~

@@ 8

@@ 4

@@ -4

@@ 2

^^ If the vectors $2\vec{i}+3\vec{j}-4\vec{k},\ -\vec{i}+2\vec{j}+\vec{k},\ \vec{i}+p\vec{j}-7\vec{k}$ are coplanar, the value of p is

@@ 9

@@ 19 ~

@@ 6

@@ 16

@@ 18

^^ If vectors $x\vec{i}+3\vec{j}+2\vec{k},\ \vec{i}-7\vec{j}-8\vec{k},\ \vec{i}+\vec{j}-\vec{k}$ are linearly dependent, the value of x is

@@ $\frac{1}{9}$

@@ $\frac{1}{6}$

@@ $\frac{1}{3}$ ~

@@ 3

@@ 6

@@ The projection of the vectors $2\vec{i}+3\vec{j}+4\vec{k}$ on the vector $\vec{i}+\vec{j}+\vec{k}$ is

@@ $\sqrt{3}$

@@ $2\sqrt{3}$

@@ $3\sqrt{3}$ ~

@@ $4\sqrt{3}$

@@ $5\sqrt{3}$ ~

^^ If vectors $2\vec{i} - \vec{j} + \vec{k}$ and $\vec{i} + y\vec{j} - 5\vec{k}$ are perpendicular to another, the value of y is

@@ 1

@@ -1

@@ 2

@@ 3

@@ -3 ~

^^ A particle acted on by a constant force $7\vec{i} + 2\vec{j} - 4\vec{k}$ is displaced from the point $\vec{i} + 2\vec{j} + 3\vec{k}$ to the point $5\vec{i} + 4\vec{j} + \vec{k}$. The work done by the force is

@@ 40 units ~

@@ 30 units

@@ 25 units

@@ 20 units

@@ 10 units

^^ The moment about $(1, -1, 1)$ of the force $3\vec{i} + 4\vec{j} - 5\vec{k}$ acting at $(1, 0, -2)$ is

@@ $7\vec{i} - 9\vec{j} - 3\vec{k}$ ~

@@ $7\vec{i} + 9\vec{j} - 3\vec{k}$

@@ $7\vec{i} - 9\vec{j} + 3\vec{k}$

@@ $7\vec{i} + 9\vec{j} + 3\vec{k}$

@@ $-7\vec{i} - 9\vec{j} - 3\vec{k}$

^^ A particle moves along the curve $x = t^2,\ y = t^3 + 5,\ z = t + 1,$ where t is the time. The velocity of the particle at $t = 1$ is

@@ $2\vec{i} - 3\vec{j} + 3\vec{k}$

@@ $2\vec{i} + 3\vec{j} + \vec{k}$ ~

@@ $3\vec{i} + 3\vec{j} + \vec{k}$

@@ $\vec{i} - 3\vec{j} + \vec{k}$

@@ $\vec{i} - 3\vec{j} - \vec{k}$

^^ If $\vec{a} = t^4\vec{i} + t^3\vec{j} + t^2\vec{k},\ \vec{b} = t^2\vec{i} + t^3\vec{j} + t^4\vec{k}$ when $t = 1,\ \frac{d}{dt}(\vec{a}.\vec{b})$ is

@@ 6

@@ 12

@@ 18 ~

@@ 24

@@ 30

^^ $\int_0^1 \left[3t^2\vec{i} + (4t^3 - 2t)\,\vec{j} + (5t^4 + t)\,\vec{k}\right]dt$ Is

@@ $\vec{i} + \frac{3}{2}\vec{k}$ ~

@@ $\frac{3}{2}\vec{i} + \vec{k}$

@@ $\frac{3}{2}\vec{i} - \vec{k}$

@@ $\vec{i} - \frac{3}{2}\vec{k}$

@@ $-\vec{i} - \frac{3}{2}\vec{k}$

^^ The acceleration of a particle is given by $12\cos 2t\,\vec{i} - 8\sin 2t\,\vec{j} + 16\,t\,\vec{k}.$ If its velocity is zero at $t = 0,$ the velocity at anytime is

@@ $6\sin 2t\vec{i}+4(\cos 2t-1)\vec{j}+8t^2\vec{k}$ ~

@@ $3\sin 2t\vec{i}+4(\cos 2t-1)\vec{j}+8t^2\vec{k}$

@@ $6\sin 2t\vec{i}+3(\cos 2t-1)\vec{j}+8t^2\vec{k}$

@@ $6\sin 2t\vec{i}+4(\cos 2t-1)\vec{j}+5t^2\vec{k}$

@@ $6\sin 2t\vec{i}+4(\cos 2t+1)\vec{j}+8t^2\vec{k}$

^^ $\vec{a}\times(\vec{b}+\vec{c})+\vec{b}\times(\vec{c}+\vec{a})+\vec{c}\times(\vec{a}\times\vec{b})$ is equal to

@@ $\vec{a}+\vec{b}+\vec{c}$

@@ $\vec{a}-\vec{b}+\vec{c}$

@@ $\vec{a}+\vec{b}-\vec{c}$

@@ $\vec{0}$ ~

@@ $5\vec{a}$

^^ $(\vec{a}-\vec{b})^2$ is equal to

@@ $\vec{a}^2-\vec{b}^2$

@@ $\vec{a}^2-2\vec{a}\vec{b}+\vec{b}^2$

@@ $a^2-2\vec{a}.\vec{b}+b^2$ ~

@@ $\vec{a}^2+2\vec{a}\vec{b}+\vec{b}^2$

@@ $2(\vec{a}-\vec{b})$

^^ The vector perpendicular to both $\vec{a}$ and $\vec{b}$ is

@@ $\vec{a}-\vec{b}$

@@ $\vec{a}+\vec{b}$

@@ $\vec{a}\times\vec{b}$ ~

@@ $\frac{\vec{a}}{\vec{b}}$

@@ $\vec{a}\vec{b}$

^^ $\vec{i} \cdot (\vec{j} \times \vec{k})$ is equal to

@@ $\vec{i}$

@@ $\vec{j}$

@@ $\vec{k}$

@@ 1 ~

@@ 0

^^ If $x\vec{i} + 3\vec{j} - 5\vec{k}$ and $2\vec{i} + 2\vec{j} + 2\vec{k}$ are mutually perpendicular, then x is

@@ 2 ~

@@ -2

@@ 4

@@ -4

@@ 3

^^ A unit vector perpendicular to each of the vectors $\vec{i} + 2\vec{j} + 5\vec{k}$ and $3\vec{i} + \vec{j} - \vec{k}$

@@ $\frac{1}{2}(\vec{j} + \vec{k})$

@@ $\frac{1}{\sqrt{2}}(\vec{j} + \vec{k})$ ~

@@ $\frac{1}{2}(\vec{j} - \vec{k})$

@@ $\frac{1}{\sqrt{2}}(\vec{j} - \vec{k})$

@@ $\vec{i} + \vec{j} + \vec{k}$

^^ The direction cosines of a vector $\vec{i} - \vec{j} + \vec{k}$ are

@@ $\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$ ~

@@ $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

@@ $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}$

@@ $-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

@@ $\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

^^ The two vectors (-2,1) and (1,2) are

@@ linearly dependent of each other

@@ forming an orthonormal basis

@@ perpendicular to each other ~

@@ pointing in the opposite direction of each other e) none of the above.

^^ The scalar product (aka dot product) of two perpendicular vectors is A

@@ 0

@@ 1 ~

@@ 2π

@@ -2π

@@ None

^^ If is a scalar value and $\vec{v}$ and $\vec{w}$ are two vectors in $\mathbb{R}3$, then the result of

+ ($\vec{}$ × $\vec{v}$) • ($\vec{v}$ × $\vec{w}$) is

@@ a vector in ℝ3

@@ a scalar ~

@@ undefined

@@ a 3 by 3 matrix.

^^ If the angle between two vectors (both having a non-zero magnitude) is greater than 90° and smaller than 270°, then the scalar product (dot product) of these vectors is

@@ positive

@@ negative ~

@@ undefined

@@ positive when the angle is smaller than 180°, negative when the angle is greater than 180°

^^ If the scalar product (dot product) of two unit vectors is zero, they are

@@ linearly dependent

@@ forming an orthonormal basis ~

@@ pointing in the same direction

@@ at an angle of 180 degrees to each other.

@@ None

^^ If ABCD is a parallelogram, $\vec{AB} = 2i + 4j - 5k$ and $\vec{AD} = 2i + 4j - 5k$, then the unit vector in the direction of BD is

@@ $\frac{1}{\sqrt{69}}(i + 2j - 8k)$

@@ $\frac{1}{69}(i + 2j - 8k)$

@@ $\frac{1}{\sqrt{69}}(-\hat{i} - 2\hat{j} + 8\hat{k})$ ~

@@ None of these

^^ If C is the middle point of AB and P is any point outside AB, then

@@ $\vec{PA} + \vec{PB} = \vec{PC}$

@@ $\vec{PA} + \vec{PB} + \vec{PC} = 0$

@@ $\vec{PA} + \vec{PB} = 2\vec{PC}$ ~

@@ $\vec{PA} + \vec{PB} + 2\vec{PC} = 0$

^^ If the magnitude of $\vec{a}$ and $\vec{b}$ are equal and the angle between them is 120^0 and $a \cdot b = -18$, then $|\vec{a}|$ is equal to

@@ 6 ~

@@ 4

@@ -6

@@ -4

^^ If θ is the angle between $\vec{a}$ and $\vec{b}$, then $\frac{(\vec{a} \cdot \vec{b})^2}{|\vec{a} \cdot \vec{b}|^2}$ is equal to

@@ $\tan^2\theta$

@@ $\cot^2\theta$ ~

@@ 1

@@ $\sec^2\theta$

@@ $|\vec{a}|^2|\vec{b}|^2$

SECTION 2 (DYNAMICS) : ANSWER 15 QUESTIONS FROM THIS SECTION.

^^ A particle is projected vertically upward from ground level with a velocity of $50 ms^{-1}$ The maximum height attained by the particle is (take $g = 10 ms^{-2}$)

@@ 50m

@@ 180m

@@ 100m

@@ 125m ~

@@ None

^^ A particle is projected vertically upward from ground level with a velocity of $50 ms^{-1}$ The time taken to attain a height of 100m when going up is (take $g = 10 ms^{-2}$)

@@ $5 + \sqrt{2}\ s$

@@ $2 + \sqrt{2}\ s$

@@ $5 - \sqrt{5}\ s$ ~

@@ 3 s

@@ None

^^ A particle is projected vertically upward from ground level with a velocity of $50 ms^{-1}$ The total time taken for the particle to return to the ground is (take $g = 10 ms^{-2}$)

@@ 10 s ~

@@ 8 s

@@ 12 s

@@ 5 s

@@ None

^^ A particle is projected at an angle of 60° with the horizontal with an initial velocity of $10 ms^{-1}$. The greatest height attained by the particle is (take $g = 10 ms^{-2}$)

@@ 6 m

@@ 4.25 m

@@ 3.75 m ~

@@ 3.25 m

@@ None

^^ A particle is projected at an angle of 60° with the horizontal with an initial velocity of $10\,ms^{-1}$. The horizontal range of the projectile is (take $g = 10\,ms^{-2}$)

@@ $10\sqrt{3}\ m$

@@ $10\sqrt{2}\ m$

@@ $5\sqrt{2}\ m$

@@ $5\sqrt{3}\ m$ ~

@@ None

^^ A particle is projected at an angle of 60° with the horizontal with an initial velocity of $10\,ms^{-1}$. The total time of flight is (take $g = 10\,ms^{-2}$)

@@ $2\sqrt{3}\ s$

@@ $\sqrt{3}\ s$

@@ $3\sqrt{2}\ s$

@@ $\sqrt{2}\ s$

@@ None

^^ The resultant of two velocities u and v is $\frac{v}{2}$ and perpendicular to u. The ratio of u and v is

@@$\sqrt{3}$:1

@@$\sqrt{2}$:1

@@$\sqrt{3}$:2 ~

@@$\sqrt{3}$:$\sqrt{2}$

@@1:$\sqrt{3}$

^^ The acceleration of a body moving with uniform velocity $20 km/hr$ after 2 hours will be (in km/hr^2)

@@ 40

@@ 20

@@10

@@ 5

@@ 0 ~

^^ A bullet of mass $0.006 kg$ travelling at 120m/sec penetrates x metre into a fixed target and is brought to rest in $0.01 \sec$, then x is (in cm).

@@ 3

@@ 6

@@9

@@ 30

@@ 60 ~

^^ A particle is projected vertically upward with a velocity 28 metre/sec. Taking g=9.8m/sec^2, its Velocity after 2 seconds is (in metre/sec)

@@ 4.8

@@ 8.4 ~

@@84

@@ 48

@@ 0.84

^^ A particle is projected vertically upward with a velocity 28 metre/sec. Taking $g=9.8m/sec^2$, its Position after 2 seconds is (in metre/sec)

@@ 3.64

@@ 34.6

@@36.4 ~

@@ 64.3

@@ 364

^^ A particle is projected vertically upward with a velocity 28 metre/sec. Taking $g=9.8m/sec^2$, its Maximum height attained is (in metre)

@@ 40 ~

@@ 50

@@60

@@ 70

@@ 80

^^ A particle is projected vertically upward with a velocity 28 metre/sec. Taking $g=9.8m/sec^2$, its Total time of flight is (in second)

@@ $\frac{10}{7}$

@@ $\frac{20}{7}$

@@ $\frac{30}{7}$

@@ $\frac{40}{7}$ ~

@@ $\frac{50}{7}$

^^ A particle is projected with a velocity of 49 meters/sec at an elevation of 30^0. If g=9.8m/sec^{2}t, then, the time of flight is

@@ 5 sec ~

@@ 10 sec

@@3 sec

@@ 6 sec

@@ 7 sec

^^ A particle is projected with a velocity of 49 meters/sec at an elevation of 30^0. If g=9.8m/sec^2 , then the horizontal range is

@@ 21.7m

@@ 212.17m ~

@@292m

@@ 29.2m

@@ 300m

^^ A particle is projected with a velocity of 49 meters/sec at an elevation of 30^0. If g=9.8m/sec^2 , the greatest height attained is

@@ 35.6m

@@ 38.6m

@@30.6m ~

@@ 25.6m

@@ 33.6m

^^ A particle is projected with a velocity of 49 meters/sec at an elevation of 30^0. If g=9.8m/sec^2 , if the greatest height attained by a projectile be equal to the horizontal range, then the angle of projection is

@@ $\tan^{-1} 2$

@@$\tan^{-1} 3$

@@$\tan^{-1} 4$ ~

@@$\tan^{-1} 5$

@@$\tan^{-1} 6$

^^ A constant force acting in the direction of motion of a particle of mass 2 kg increases its speed from 4 m/sec to 20 m/sec in 4 seconds. Then the constant force is

@@ 4 N

@@ 2 N

@@ 40 N

@@ 8 N ~

@@ 16 N

^^ A string will break if the tension in it exceeds 10 N. If the maximum extension it can be given is $\frac{1}{4}$ of its natural length, then its modulus of elasticity is

@@ 2.5 N

@@ 5 N

@@ 10 N

@@ 20 N

@@ 40 N ~

^^ The length of string of a seconds pendulum is

@@ $\frac{g}{\pi}$

@@$\frac{g}{\pi^2}$ ~

@@$\frac{\pi}{g}$

@@$\frac{\pi^2}{g}$

@@$\frac{g}{2\pi^2}$

^^ If the vector function $\vec{a}(t)$ has constant direction, then

@@$\frac{d\vec{a}}{dt} = 0$

@@ $\vec{a} \cdot \frac{d\vec{a}}{dt} = 0$

@@ $\vec{a} \times \frac{d\vec{a}}{dt} = \vec{0}$ ~

@@ $\frac{d\vec{a}}{dt} = \vec{0}$

@@ none

^^ If the vector function $\vec{a}(t)$ has constant magnitude, then

@@ $\frac{d\vec{a}}{dt} = 0$

@@ $\vec{a} \cdot \frac{d\vec{a}}{dt} = 0$ ~

@@ $\vec{a} \times \frac{d\vec{a}}{dt} = \vec{0}$

@@ $\frac{d\vec{a}}{dt} = \vec{0}$

@@ none

^^ A particle moves along the curve $x = a\cos t$, $y = a\sin t$, $z = at\tan\alpha$, where a and α are constant. The magnitude of its velocity at time t = 0 is

@@ $a\cos\alpha$

@@ $a\sin\alpha$

@@ $a\sec\alpha$ ~

@@ $a\tan\alpha$

@@ zero

^^ Given that $\vec{r}(t) = \begin{cases} 2\vec{i} - \vec{j} + 2\vec{k} & \text{when } t = 2 \\ 4\vec{i} - 2\vec{j} + 3\vec{k} & \text{when } t = 3 \end{cases}$ Then the value of

$\int_2^3 \vec{r} \cdot \frac{d\vec{r}}{dt}\, dt$ is

@@ 20

@@ 10 ~

@@ 5

@@ 25

@@ 30

^^ If $\vec{F} = 3xy\,\vec{i} - y^2\,\vec{j}$ and C is the curve in the xy-plane $y = 2x^2$ from (0, 0) to (1,2). Then the value of $\int_C \vec{F} \cdot d\vec{r}$ is

@@ $\frac{7}{6}$

@@ $-\frac{7}{6}$ ~

@@ $\frac{6}{7}$

@@ $-\frac{6}{7}$

@@ 42

^^ Which of the following statements correctly describe the stretch of a spring?

@@ A greater stretching force produces a greater stretch

@@ A greater stretching force produces a greater force tending to return the spring to its original length

@@ If a stretch exceeds a spring's elastic limit, the spring will not return to its original length.

@@ all ~

^^ How are frequency and period related?

@@ frequency and period are equal

@@ frequency and period are reciprocals of each other ~

@@ frequency and period are unrelated

@@ additional information is needed

@@ None

^^ A new car bumper is designed to extend the time of impact by 3 times. This reduces the force of impact by

@@ about three times ~

@@ more than three times.

@@ about nine times.

@@ about 1.7 times.

@@ None

^^ A soldier fires a machine gun that shoots 10g bullets at a rate of 10 per second and a speed of 550 m/s. What is the average force of the gun on the soldier?

@@ 0.3 N

@@ 12.6 N

@@ 110 N

@@ 55.0 N. ~

^^ If both the mass m of a simple pendulum and its length L are doubled, the period will

@@ increase by a factor of 1.4

@@ increase by a factor of 2.

@@ increase by a factor of 0.71.

@@ be unchanged. ~

@@ None

^^ Consider a mass hanging vertically from a spring and at equilibrium. If you pull it down by 2 cm and release it, it begins to oscillate at a frequency f1. If you had pulled it down instead by 4 cm, what would its frequency of oscillation be ?

@@ f1/2 ~

@@ (√2)f1

@@ 2f1.

@@ 4f1.

@@ None

^^ The horizontal and vertical components of the initial velocity of a football are 16 m/s and 20 m/s respectively. How long does it take for the football to rise to the highest point of its trajectory?
@@1.0 s

@@ 2.0 s ~

@@ 3.0 s

@@ 4.0 s

@@ None

^^ If two bodies are in direct elastic impact, then the coefficient of restitution e is

@@ e =1

@@ e >1

@@ e <1 ~

@@ e =0

^^ A mass of 4kg is acted on by a force of 20N for 2sec. This force changes its velocity from u m/sec to 11m/sec, the value of u is

@@ 8

@@ 10 ~

@@ 12

@@ 5

@@ 7

^^ If T be the time period of a simple pendulum of natural length L, then the frequency is

@@ $\frac{1}{2\pi}\sqrt{g/L}$ ~

@@ $2\pi\sqrt{L/g}$

@@ $\frac{1}{2\pi}\sqrt{g/L}$

@@ $2\pi\sqrt{L/g}$

^^ The path of a projectile in vacuum is a

@@ Straight line

@@ Circle

@@ Ellipse

@@ Parabola ~

@@ Hyperbola

^^If string is stretched by two opposite forces of 10 N then tension in string is

@@ 5N

@@ 20 N

@@ 10 N

@@ Zero ~

@@ 1N

^^ To every action there is always an equal but opposite reaction, this statement is known as

@@ newton's 2nd law of motion

@@ newton's 1st law of motion

@@ newton's 3rd law of motion ~

@@ law of momentum

@@ law of action

^^ Push and pull that moves or tend to move, stops or tends to stop motion of a body is known as

@@ Force ~

@@ friction

@@ velocity

@@ momentum

@@ None

^^Acceleration that is produced by a 15N force in a mass of 8 kg will be equal to

@@ 1.5 ms^{-2}

@@ 1.87 ms^{-2} ~

@@ 2.35 ms^{-2}

@@ 2 ms^{-2}

@@ 120 ms^{-2}

^^When a net force act on a body, it produces acceleration in body in direction of net force which is directly proportional to net force acting on body and inversely proportional to its mass. This statement is called

@@ newton's 2nd law of motion ~

@@ newton's 1st law of motion

@@ newton's 3rd law of motion

@@ law of momentum

^^ Quantity of motion that body possesses due to its mass and velocity is known as

@@ inertia

@@ momentum ~

@@ force

@@ friction

@@ weight

^^ A wire is streched by 2 equal and opposite forces 15 N each. Tension in string will be

@@ 30 N ~

@@ 20 N

@@ 15 N

@@ 25 N

@@ None

^^A force of 15 N moves a body with an acceleration of 3 ms^{-2}. Its mass is

@@ 10 kg

@@ 8 kg

@@ 12 kg

@@ 5 kg ~

@@ 45kg

^^ The moment taken about $\vec{i} - \vec{j} + \vec{k}$ of a force $2\vec{i} - \vec{j} + \vec{k}$ acting at $\vec{i} + \vec{j} + \vec{k}$ is

@@ $2\vec{i} + 4\vec{k}$

@@ $2\vec{i} - 4\vec{k}$ ~

@@ $2\vec{i} - 4\vec{j}$

@@ $2\vec{i} + 4\vec{j}$

@@ $2\vec{j} - 4\vec{k}$

^^ A rigid body is spinning with angular velocity of 4 radians per second about an axis parallel to $3\vec{j} - \vec{k}$ passing through the point $\vec{i} + 3\vec{j} - \vec{k}$. The linear velocity of the particle at the point $4\vec{i} - 2\vec{j} + \vec{k}$ is

@@ $\frac{4}{\sqrt{10}}(\vec{i} + 3\vec{j} + 9\vec{k})$

@@ $\frac{4}{\sqrt{10}}(\vec{i} + 3\vec{j} - 9\vec{k})$

@@ $\frac{4}{\sqrt{10}}(\vec{i} - 3\vec{j} + 9\vec{k})$

@@ $\frac{4}{\sqrt{10}}(\vec{i} - 3\vec{j} - 9\vec{k})$ ~

@@ $\frac{\sqrt{10}}{4}(\vec{i} - 3\vec{j} - 9\vec{k})$

^^If string is stretched by two opposite forces of 10 N then tension in string is

@@ 5N

@@ 20 N

@@ 10 N

@@ Zero ~

@@ 1N

^^ To every action there is always an equal but opposite reaction, this statement is known as

@@ newton's 2nd law of motion

@@ newton's 1st law of motion

@@ newton's 3rd law of motion ~

@@ law of momentum

@@ law of action

^^ Push and pull that moves or tend to move, stops or tends to stop motion of a body is known as

@@ Force ~

@@ friction

@@ velocity

@@ momentum

@@ None

^^Acceleration that is produced by a 15N force in a mass of 8 kg will be equal to

@@ 1.5 ms^{-2}

@@ 1.87 ms^{-2} ~

@@ 2.35 ms^{-2}

@@ 2 ms^{-2}

@@ 120 ms^{-2}

^^When a net force act on a body, it produces acceleration in body in direction of net force which is directly proportional to net force acting on body and inversely proportional to its mass. This statement is called

@@ newton's 2nd law of motion ~

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@@ newton's 3rd law of motion

@@ law of momentum

^^ Quantity of motion that body possesses due to its mass and velocity is known as

@@ inertia

@@ momentum ~

@@ force

@@ friction

@@ weight

^^ A wire is stretched by 2 equal and opposite forces 15 N each. Tension in string will be

@@ 30 N ~

@@ 20 N

@@ 15 N

@@ 25 N

@@ None

^^A force of 15 N moves a body with an acceleration of 3 ms^{-2}. Its mass is

@@10 kg

@@8 kg

@@12 kg

@@5 kg ~

^^ Gravitational acceleration is acceleration of bodies

@@ on ground

@@ in air

@@ freely falling ~

@@ None

^^The time of ascent when measured from the point of projection of a body projected upwards , the

@@ Time of ascent > Time of descent

@@ Time of ascent < Time of descent

@@ Time of ascent=Time of descent. ~

@@ All of the above

@@ None

^^A ball tossed vertically upward rises, reaches its highest point, and then falls back to its starting point. During this time the acceleration of the ball is always

@@ in the direction of motion

@@ opposite its velocity

@@ directed downward ~

@@ directed upward

@@ None

^^If a particle is projected vertically upward with a velocity 28m/s. Taking $g=9.8m/s^2$, then its velocity after 2secs will be

@@ 8.4m/s ~

@@ 12m/s

@@ 56m/s

@@ 30m/s

@@ 28m/s

^^If a particle is projected vertically upward with a velocity 28m/s. Taking $g=9.8m/s^2$, then its position after 2secs will be

@@ 56.0m

@@ 31.3m

@@ 28m

@@ 36.4m ~

@@ 30m

^^If a particle is projected vertically upward with a velocity 28m/s. Taking $g=9.8m/s^2$, then its maximum height attained will be

@@ 9.8m

@@ 10m

@@ 40m ~

@@ 56m

@@ None

^^If a particle is projected vertically upward with a velocity 28m/s. Taking $g=9.8m/s^2$, then its total time of flight will be

@@ 7.5secs

@@ 8.5secs

@@ 5.1secs

@@ 5.7secs ~

@@ 9.5secs

^^A change in momentum may result from

@@ an acceleration
@@ a force
@@ an impulse
@@ all of the above ~
@@ None