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## PHYSICS

# BOOKS - DISHA PHYSICS (HINGLISH) 

## VECTORS

Physics

1. The length of a seconds hand in watch is 1 cm . The change in velocity of its tip in $15 s$ is
A. zero
B. $\frac{\pi}{30 \sqrt{2} c m / \mathrm{sec}}$
C. $\frac{\pi}{30} \mathrm{~cm} / \mathrm{sec}$
D. (pi(sqrt(2))/(30)cm//sec

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2. A particle moves towards east with velocity $5 \mathrm{~m} / \mathrm{s}$. After 10 sec onds its direction changes towards north with same Velocity. The average acceleration of the particle is
A. zero
B. $\frac{1}{\sqrt{2}} m / s^{2} N-W$
C. $\frac{1}{\sqrt{2}} m / s^{2} N-W$
D. $\frac{1}{\sqrt{2} m / s^{2} S-w}$

## Answer:

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3. A force $F=-K(y \hat{i}+x \hat{j})$ (where K is a positive constant) acts on a particle moving in the $x-y$ plane. Starting from the origin, the particle is taken along the positive x -axis to the point $(a, 0)$, and then parallel to the
y -axis to the point $(a, a)$. The total work done by the force F on the particle is
A. $-2 K a^{2}$
B. $2 K^{2}$
C. $-K a^{2}$
D. $K a^{2}$

## Answer:

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4. A metal sphere is hung by a string fixed to a wall. The sphere is pushed away from the wall by a stick. The forces acting on the sphere are shown
in the second diagram. Which of the following statements is wrong?

A. $P=W \tan \phi$
B. $v a c T+v a c P+v a c W=0$
C. $T^{2}=P^{2}+W^{2}$
D. T=P+W

Answer:
5. A boat having a speed of $5 \mathrm{~km} / \mathrm{hr}$. in still water, crosses a river of width

1 km along the shortest possible path in 15 minutes. The speed of the river in $K m / h r$.
A. $1 \mathrm{~km} / \mathrm{h}$
B. $3 \mathrm{~km} / \mathrm{h}$
C. $4 \mathrm{~km} / \mathrm{h}$
D. $5 \mathrm{~km} / \mathrm{h}$

## Answer:

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6. A man crosses a 320 m wide river perpendicular to the current in 4 min . If in still water he can swim with a speed $5 / 3$ times that of the current, then the speed of the current, in $m / \min$ is
B. 40
C. 50
D. 60

## Answer:

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7. $P, Q$ and $R$ are three coplanar forces acting at a point and are in equilibrium. Given $P=1.9318 \mathrm{~kg}-w t, \sin \theta_{1}=0.9659$, the value of R is
$(\in k g-w t)$

A. 0.9659
B. 2
C. 1
D. $\frac{1}{2}$

Answer:
8. As shown in figure the tension in the horizontal cord is 30 N . The weight $W$ and tension in the string $O A$ in Newton are

A. $30 \sqrt{3}, 30)$
B. $30 \sqrt{3}, 60$
C. $60 \sqrt{3}, 30$
D. None of these

## Answer:

9. A boat is moving with a velocity $3 \hat{i}+4 \hat{j}$ with respect to ground. The water in the river is moving with a velocity $-3 \hat{i}-4 \hat{j}$ with respect to ground. The relative velocity of the boat with respect to water is.
A. $8 \hat{j}$
B. $-6 \hat{j}-8 \hat{j}$
C. $6 \widehat{+} 8 \hat{j}$
D. $5 \sqrt{2 i}$

## Answer:

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10. A person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of $0.5 \frac{\mathrm{~m}}{\mathrm{~s}}$ at an angle of $120^{\circ}$ with the direction of flow of water. The speed of water in the stream is
A. $1 m / s$
B. $0.5 \mathrm{~m} / \mathrm{s}$
C. $0.25 \mathrm{~m} / \mathrm{s}$
D. $0.433 \mathrm{~m} / \mathrm{s}$

## Answer:

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11. A man can swim with velocity v relative to water. He has to cross a river of width d flowing with a velocity $u(u>v)$. The distance through which he is carried down stream by the river is x . Which of the following statements is correct?
A. (a) If he crosses the river in minimum time $x=\frac{d u}{v}$
B. (b) $x$ cannot be less than $\frac{d u}{v}$
C. (c) For $x$ to be minimum he has to swim in a direction making an angle of $\frac{\pi}{2}-\sin ^{-1}\left(\frac{v}{u}\right)$ with the direction of the flow of water.
D. (d) $x$ will be maximum if he swims in a direction making an angle of $\frac{\pi}{2}+\frac{\sin ^{-1}(v)}{u}$ with direction of the flow of water.

## Answer:

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12. A 120 m long train is moving towards west with a speed of $10 \mathrm{~m} / \mathrm{s}$. A bird flying towards east with a speed of $5 \mathrm{~m} / \mathrm{s}$ crosses the train. The time taken by the bird to cross the train will be
A. 16 sec
B. 2 sec
C. 10 sec
D. 8 sec

## Answer: D

13. What is the value of linear velocity, if $\vec{\omega}=3 \hat{i}-4 \hat{j}+\hat{k}$ and $\vec{r}=5 \hat{i}-6 \hat{j}+6 \hat{k}$ ?
A. $6 \hat{i}-2 \hat{j}+3 \hat{k}$
B. $6 \hat{i}-2 \hat{j}+8 \hat{k}$
C. $4 \hat{i}-l 3 \hat{j}+6 \hat{k}$
D. $-18 \hat{i}-13 \hat{j}+2 \hat{j}$

## Answer:

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14. If $|\vec{A} \times \vec{B}|=\sqrt{3} \vec{A} \cdot \vec{B}$, then the value of $|\vec{A}+\vec{B}|$ is
A. $\left(A^{2}+B^{2}+\frac{A B}{\sqrt{3} 6 \frac{1}{2}}\right.$
B. $A+B$
C. $\frac{\left(A^{2}+B^{2}+\sqrt{3} A B\right)^{1}}{2}$
D. $\frac{\left(A^{2}+B^{2}+A B\right)^{1}}{2}$

## Answer:

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15. Find the torque of a force $\vec{F}=-3 \hat{i}+\hat{j}+5 \hat{k}$ acting at the point $\vec{r}=7 \hat{i}+3 \hat{j}+\hat{k}$
A. $14 \hat{i} \pm 38 \hat{j}+16 \hat{k}$
B. $4 \hat{i}+4 \hat{j}+6 \hat{k}$
C. $2 l \hat{i}+4 \hat{j}+4 \hat{k}$
D. $14 \hat{i}+34 \hat{j}=16 \hat{k}$

## Answer:

16. if $|\vec{A} \times \vec{B}|=|\vec{A} \cdot \vec{B}|$, then angle between vecA and vecB will be
A. $30^{\circ}$
B. $45^{\circ}$
C. $60^{\circ}$
D. $90^{\circ}$

## Answer: A:C

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17. The vector $\vec{P}=a \hat{t}+a \hat{j}+3 \hat{j}$ and $\vec{Q}=a \hat{i}-2 \hat{j}-\hat{k}$, are perpendicular to each other. The positive value of $a$ is
A. 3
B. 4
C.
D. 9

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18. A particle moves from position $3 \hat{j}+2 \hat{j}-6 \hat{k} \rightarrow 14 \hat{j}+13 \hat{j}+9 \hat{k} d u e \rightarrow$ aun if or $m f$ or $\operatorname{ceof}(4 \hat{j}+j \overline{\mathcal{F}}$
$N$ If the displacement in metres then work done will be if the displacement in metres then work done will be
A. 100 j
B. 200 j
C. 300 j
D. 250 j

## Answer:

19. 

The
$\vec{A}=3 \hat{i} \equiv 2 \hat{j}+k, \vec{B}=\hat{i}-3 \hat{j}+5 \hat{k}$ and $\vec{C}=2 \hat{i}+\hat{j}-4 \hat{k}$ form
A. (a) an equilateral triangle
B. (b) isosceles triangle
C. (c) a right angled triangle
D. (d) no triangle

## Answer:

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20. Two forces $\vec{F}_{1}=5 \hat{i}+10 \hat{j}-20 \hat{k}$ and $\vec{F}_{2}=10 \hat{i}-5 \hat{j}-15 \hat{k}$ act on a single point. The angle between $\vec{F}_{1}$ and $\vec{F}_{2}$ is nearly
A. $30^{\circ}$
B. $45^{\circ}$
C. $60^{2}$
D. $90^{\circ}$

## Answer:

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21. With respect to a rectangular Cartesian coordinate system, three vectors are expressed as
$\vec{a}=4 \hat{i}-\hat{j}, \vec{b}=-3 \hat{i}+2 \hat{j}$ and $\vec{c}=-\hat{k}$
Where, $\hat{i}, \hat{j}, \hat{k}$ are unit Vector, along the $\mathrm{X}, \mathrm{Y}$ and Z -axis respectively. The unit vectors $\hat{r}$ along the direction of sum of these vector is
A. $\hat{r}=\frac{1}{\sqrt{3}}(\hat{i}+\hat{j}-\hat{k})$
B. $\hat{r}=\frac{1}{\sqrt{2}}(\hat{i}+\hat{j}-\hat{k})$
C. $\hat{r}=\frac{1}{3}(\hat{i}-\hat{j}+\hat{k})$
D. $\hat{r}=\frac{1}{\sqrt{2}}(\hat{i}+\hat{j}+\hat{k})$

## Answer:

22. A boy walks uniformly along the sides of a rectangular park of size $400 \mathrm{~m} \times 300 \mathrm{~m}$, starting from one corner to the other corner diagonally opposite. Which of the following statements is incorrect?
A. (1) He has travelled a distance of 700 m
B. (2) His displacement is 500 m
C. (3) His velocity is not uniform throughout the walk
D. (4) His displacement is 700 m

## Answer:

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23. 

The
three
vectors
$\vec{A}=3 \hat{i}-2 \hat{j}-\hat{k}, \bar{B}=\hat{i}-3 \hat{j}+5 \hat{k}$ and $\bar{C}=2 \hat{i}-\hat{j}-4 \hat{k}$ does not form
A. (1) an equilateral triangle
B. (2) isosceles triangle
C. (3) a right angled triangle
D. (4) no triangle

## Answer:

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24. If for two vectors vecA and vecB, vecA $x x$ vecB $=0$, which of the following is not correct?
A. (1) They are perpendicular to each other
B. (2) They act at an angle of $60^{\circ}$
C. (3) They act at an angle of $30^{\circ}$
D. (4) They are parallel to each other

## Answer:

25. The unit vector perpendicular to vecA is
A. $\frac{-\hat{j}+\hat{k}}{\sqrt{2}}$
B. $\frac{-\hat{j}-\hat{k}}{\sqrt{2}}$
C. $\frac{\hat{i}+\hat{k}}{2}$
D. $\frac{\hat{i}-\hat{k}}{2}$

## Answer:

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26. The unit vector parallel to vecA is
A. $\frac{\hat{i}-\hat{j}+3 \hat{k}}{\sqrt{2}}$
B. $\frac{2 \hat{i}+\hat{j}-2 \hat{k}}{\sqrt{6}}$
c. $\frac{2 \hat{i}-\hat{j}-\hat{k}}{\sqrt{5}}$
D. $\frac{2 \hat{i}+\hat{j}=2 \hat{k}}{\sqrt{6}}$

## Answer:

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27. The unit vector perpendicular to vecB is
A. $\frac{-\hat{j}-\hat{k}}{\sqrt{3}}$
B. $\frac{-\hat{j}+\hat{k}}{\sqrt{2}}$
C. $\frac{\hat{i}-\hat{k}}{3}$
D. $\frac{\hat{i}+\hat{k}}{2}$

## Answer:

28. Statement-1:If , $|\vec{A}+\vec{B}|=|\vec{A}-\vec{B}|$ then angle between vecA and vecB is 90^(@)

Statement-2 :vecA+vecB=vecB+vecA

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29. Assertion: The some of two Vectors can be zero.

Reason: The vector cancel each other, when they are equal and opposite.

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