



# PHYSICS

# **BOOKS - DISHA PHYSICS (HINGLISH)**

# VECTORS

# **Physics**

**1.** The length of a seconds hand in watch is 1cm. The change in velocity

of its tip in 15s is

A. zero

B. 
$$\frac{\pi}{30\sqrt{2}cm/\sec}$$
  
C.  $\frac{\pi}{30}cm/\sec$ 

D. (pi(sqrt(2))/(30)cm//sec`

**2.** A particle moves towards east with velocity 5m/s. After  $10 \sec onds$  its direction changes towards north with same Velocity. The average acceleration of the particle is

B. 
$$rac{1}{\sqrt{2}}m/s^2N-W$$
  
C.  $rac{1}{\sqrt{2}}m/s^2N-W$   
D.  $rac{1}{\sqrt{2}m/s^2S-w}$ 

## 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.  $-2Ka^2$ B.  $2K^2$ C.  $-Ka^2$ 

D.  $Ka^2$ 

# 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.  $P = W an \phi$ 

 $\mathsf{B.} vacT + vacP + vacW = 0$ 

$$\mathsf{C}.\,T^2 = P^2 + W^2$$

D. T=P+W

5. A boat having a speed of 5km/hr. in still water, crosses a river of width 1km along the shortest possible path in 15 minutes. The speed of the river in Km/hr.

A. 1 km / h

B. 3km/h

C.4 km/h

D. 5 km/h

### Answer:

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**6.** A man crosses a 320m 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  $P=1.9318kg-wt,\sin heta_1=0.9659$ , the value of R is

 $(\ \in kg - wt)$ 



A. 0.9659

B. 2

C. 1

 $\mathsf{D}.\,\frac{1}{2}$ 

# Answer:

**8.** As shown in figure the tension in the horizontal cord is 30N. The weight W and tension in the string OA in Newton are



A.  $30\sqrt{3}, 30$ )

- B.  $30\sqrt{3}, 60$
- C.  $60\sqrt{3}, 30$

D. None of these



**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.  $8\hat{j}$ 

 $\mathsf{B.}-6\hat{j}-8\hat{j}$ 

 $\mathsf{C.}\,\widehat{6+8j}$ 

D.  $5\sqrt{2i}$ 

### Answer:



**10.** A person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of  $0.5 \frac{m}{s}$  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 m/s

C. 0.25 m/s

D. 0.433 m/s

#### Answer:



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  $x=rac{du}{v}$ 

B. (b) x cannot be less than  $\frac{du}{v}$ 

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

$$rac{\pi}{2} + rac{\sin^{-1}(v)}{u}$$
 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 m/s. A bird flying towards east with a speed of 5 m/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  $\overrightarrow{\omega} = 3\hat{i} - 4\hat{j} + \hat{k}$  and  $\overrightarrow{r} = 5\hat{i} - 6\hat{j} + 6\hat{k}$ ? A.  $6\hat{i} - 2\hat{j} + 3\hat{k}$ B.  $6\hat{i} - 2\hat{j} + 8\hat{k}$ C.  $4\hat{i} - l3\hat{j} + 6\hat{k}$ D.  $-18\hat{i} - 13\hat{j} + 2\hat{j}$ 

### Answer:

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 $\mathbf{2}$ 

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

$$\mathsf{D}.\,\frac{\left(A^2+B^2+AB\right)^1}{2}$$

## Answer:

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15. Find the torque of a force  $\overrightarrow{F}=-3\hat{i}+\hat{j}+5\hat{k}$  acting at the point  $\overrightarrow{r}=7\hat{i}+3\hat{j}+\hat{k}$ 

A.  $14\hat{i}\pm 38\hat{j}+16\hat{k}$ 

B.  $4\hat{i}+4\hat{j}+6\hat{k}$ 

C. 
$$2l\hat{i}+4\hat{j}+4\hat{k}$$

D.  $14\hat{i}+34\hat{j}=16\hat{k}$ 

#### Answer:

16. if  $|\overrightarrow{A} \times \overrightarrow{B}| = |\overrightarrow{A}, \overrightarrow{B}|$ , 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 
$$\overrightarrow{P} = a\hat{t} + a\hat{j} + 3\hat{j}$$
 and  $\overrightarrow{Q} = a\hat{i} - 2\hat{j} - \hat{k}$ , are

perpendicular to each other. The positive value of a is

A. 3

B. 4

C.

D. 9

# Answer: A::C





- A. 100 j
- B. 200 j
- C. 300 j
- D. 250 j

### Answer:

**19.** The three vectors  $\overrightarrow{A}=3\hat{i}\equiv 2\hat{j}+k, \ \overrightarrow{B}=\hat{i}-3\hat{j}+5\hat{k} \ ext{and} \ \overrightarrow{C}=2\hat{i}+\hat{j}-4\hat{k}$  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  $\overrightarrow{F}_1 = 5\hat{i} + 10\hat{j} - 20\hat{k}$  and  $\overrightarrow{F}_2 = 10\hat{i} - 5\hat{j} - 15\hat{k}$  act on a single point. The angle between  $\overrightarrow{F}_1$  and  $\overrightarrow{F}_2$  is nearly

A.  $30^{\circ}$ 

B.  $45^{\circ}$ 

 $C.\,60^2$ 

### Answer:

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**21.** With respect to a rectangular Cartesian coordinate system, three vectors are expressed as  $\rightarrow$ 

$$\overrightarrow{a} = 4 \hat{i} - \hat{j}, \, \overrightarrow{b} = \, - \, 3 \hat{i} + 2 \hat{j} \, \, ext{and} \, \, \overrightarrow{c} = \, - \, \hat{k}$$

Where,  $\hat{i}$ ,  $\hat{j}$ ,  $\hat{k}$  are unit Vector, along the X, Y and Z-axis respectively. The unit vectors  $\hat{r}$  along the direction of sum of these vector is

$$egin{aligned} \mathsf{A}.\,\hat{r} &= rac{1}{\sqrt{3}}ig(\hat{i}+\hat{j}-\hat{k}ig) \ \mathsf{B}.\,\hat{r} &= rac{1}{\sqrt{2}}ig(\hat{i}+\hat{j}-\hat{k}ig) \ \mathsf{C}.\,\hat{r} &= rac{1}{3}ig(\hat{i}-\hat{j}+\hat{k}ig) \ \mathsf{D}.\,\hat{r} &= rac{1}{\sqrt{2}}ig(\hat{i}+\hat{j}+\hat{k}ig) \end{aligned}$$



**22.** A boy walks uniformly along the sides of a rectangular park of size  $400m \times 300m$ , 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  $\overrightarrow{A} = 3\hat{i} - 2\hat{j} - \hat{k}, \overline{B} = \hat{i} - 3\hat{j} + 5\hat{k}$  and  $\overline{C} = 2\hat{i} - \hat{j} - 4\hat{k}$  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 xx 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  $30^{\circ}{}^{\circ}$ 

D. (4) They are parallel to each other

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. 
$$rac{\hat{i}-\hat{j}+3\hat{k}}{\sqrt{2}}$$
  
B.  $rac{2\hat{i}+\hat{j}-2\hat{k}}{\sqrt{6}}$   
C.  $rac{2\hat{i}-\hat{j}-\hat{k}}{\sqrt{5}}$ 

D. 
$$rac{2\hat{i}+\hat{j}=2\hat{k}}{\sqrt{6}}$$

# Answer:



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.