لكل المهتمين و المهتمات
بدروس و مراجع الجامعية

هام

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Q.1 Which of the following quantities is not a basic quantity?

(A) Mass   (B) Speed   (C) Length   (D) Time

Q.2 A plane flying with a speed of 500 mile per hour. The speed in SI units is: (Hint: 1 mile = 1610 m)

(A) 233   (B) 223.61   (C) 201.25   (D) 245.97

Q.3 Given two vectors $\vec{A} = \hat{i} + 2\hat{j} + 2\hat{k}$ and $\vec{B} = 2\hat{i} - \hat{j} + 2\hat{k}$. Then, $\vec{A} \cdot \vec{B}$ is:

(A) 12   (B) 4   (C) 10   (D) 6

Q.4 Given two vectors $\vec{A} = \hat{i} + 2\hat{j} + 5\hat{k}$ and $\vec{B} = 2\hat{i} - 3\hat{j} + 4\hat{k}$. Then, the vector $\vec{C} = \vec{A} + \vec{B}$ is:

(A) $3\hat{i} - \hat{j} + 7\hat{k}$ (B) $3\hat{i} - \hat{j} + 6\hat{k}$ (C) $3\hat{i} - \hat{j} + 9\hat{k}$ (D) $3\hat{i} - \hat{j} + 5\hat{k}$

Q.5 A cube box with an edge of 9 cm has a volume of:

(A) $5.12\ 10^{-4}\ m^3$ (B) $7.29\ 10^{-4}\ m^3$ (C) $2.16\ 10^{-4}\ m^3$ (D) $3.43\ 10^{-4}\ m^3$

Q.6 A bicycle travels 18 km in 90 min. Its average speed is:

(A) 16 km/h   (B) 14 km/h   (C) 12 km/h   (D) 10 km/h

Q.7 A car moves along the x-axis with constant speed. The acceleration of the car is:

(A) Increasing   (B) Decreasing   (C) Zero   (D) $9.8\ m/s^2$

Q.8 A particle moving from $\vec{r}_1 = \hat{i} + 3\hat{j} + 4\hat{k}$ to $\vec{r}_2 = 2\hat{i} + 4\hat{j} + 8\hat{k}$. Then, the displacement is:

(A) $\hat{i} + \hat{j} + 4\hat{k}$ (B) $\hat{i} + \hat{j} + 2\hat{k}$ (C) $\hat{i} + \hat{j} + 6\hat{k}$ (D) $\hat{i} + \hat{j}$

Q.9 A projectile is launched to achieve a maximum range of 69 m, the initial speed of the projectile must be:

(A) 26m/s   (B) 32m/s   (C) 34m/s   (D) 28m/s

Q.10 The velocity and acceleration of a body in uniform circular motion are:

(A) Parallel   (B) Differed by 100°   (C) Differed by 45°   (D) Perpendicular

Q.11 A car travels east at constant velocity. The net force on the car is:

(A) zero   (B) greater than zero   (C) less than zero   (D) 9.8 N

Q.12 A person of mass 70 kg. His weight is:

(A) 686 N   (B) 637 N   (C) 784 N   (D) 882 N

Q.13 A light cable from the ceiling suspends a ball of weight 380 N in static equilibrium. The tension in the cable is:

(A) 380N   (B) 400 N   (C) 420 N   (D) 450 N

Q.14 A particle of mass 6 kg moves with a speed of 4 m/s, its kinetic energy is:

(A) 12 J   (B) 75 J   (C) 48 J   (D) 27 J

Q.15 If the work done on a particle is 45 J in 5 s. The power is:
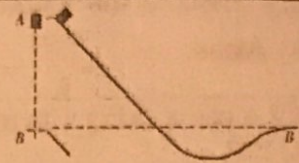
(A) 11 W   (B) 12 W   (C) 9 W   (D) 10 W

Q.16 A force F raises a box of 5 kg up to a height of 20 m. The gravitational potential energy gained by the box is:

(A) 980 J   (B) 735 J   (C) 1470 J   (D) 1225 J

Q.17 In a sliding game at a fun fair, a child train was sliding in different heights. If the train slipped from height A 10 m till height B 4.5 m. The speed of the train at point B is:

(A) 10.38 m/s   (B) 9.9 m/s   (C) 6.26 m/s   (D) 8.85 m/s

Q.18 A force was applied on an object of mass 50 kg which changed its speed from 13 m/s to 125 m/s. The momentum for the final speed is:

(A) 4250 kg.m/s   (B) 3250 kg.m/s   (C) 6250 kg.m/s   (D) 2750 kg.m/s

Q.19 A 0.40 kg ball is initially moving to the left at 30m/s. After hitting the wall, the ball is moving to the right at 20 m/s. The impulse of the net force on the ball during its collision with the wall is:

(A) 4.0 kg.m/s to the left   (B) 20 kg.m/s to the left

(C) 4.0 kg.m/s to the right   (D) 20 kg.m/s to the right

Before $V_{1x} = -30$ m/s $m = 0.40$ kg
After $V_{2x} = +10$ m/s
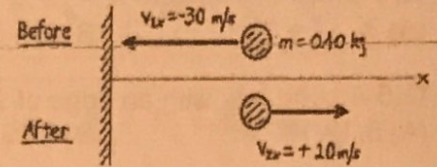
Q.20 On a smooth horizontal frictionless floor, an object slides into a spring which is attached to another stationary mass. Afterward, both objects are moving at the same speed. What is conserved during this interaction? (P is momentum, K is Kinetic, U is potential and M is Mechanical energies).

(A) P only   (B) P and K   (C) P and U   (D) P and M.

Q.21 In the figure, determine the character of the collision. The masses of the blocks, and the velocities before and after are given. The collision is:

(A) partially inelastic   (B) perfectly elastic

(C) completely inelastic.   (D) not possible

Before: 1.8 m/s (4 kg), 0.2 m/s (6 kg); After: 0.6 m/s (4 kg), 1.4 m/s (6 kg)
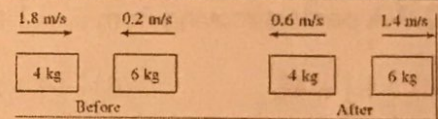
Q.22 The center of mass of the objects shown in the figure is:

(A) (3.54,6.54)m   (B) (4.25,3.45)m

(C) (2.29,1.41)m   (D) (5.65,1.54)m

$m_3 = 9$ kg (1,2); $m_2 = 6$ kg (5,1); $m_1 = 2$ kg (0,0)
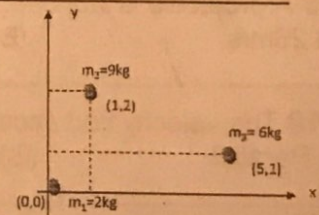
Q.23 Two objects of the same mass move along the same line in opposite directions. The first mass is moving with speed v. The objects collide, stick together, and move with speed 0.15v in the direction of the velocity of the first mass before the collision. The speed of the second mass before the collision is:

(A) 0.6v   (B) 0.5v   (C) 0.8v   (D) 0.7v

Q.24 A bat strikes a 0.145-kg baseball. Just before impact, the ball is traveling horizontally to the right at 40 m/s; when it leaves the bat, the ball is traveling to the left at an angle of 30° above horizontal with a speed of 52 m/s. If the ball and bat are in contact for 2 ms, the magnitude of the average force on the ball is:

(A) 7367.6 N   (B) 6446.6 N   (C) 5157.3 N   (D) 12893.3 N

Q.25 A turbine blade of radius 5 cm rotates an angle of 45°. The angle of rotation in radians is:

(A) $\frac{\pi}{2}$ rad   (B) $\frac{\pi}{4}$ rad   (C) $\frac{\pi}{6}$ rad   (D) $\frac{2\pi}{3}$ rad

Q.26 A turbine blade of radius 5 cm rotates an angle of 45°. The length of scanned arc is:

(A) 7.85 cm   (B) 5.23 cm   (C) 3.92 cm   (D) 2.62 cm

Q.27 The angular position θ of a 0.2 m radius flywheel is given by $\theta = 2t^3$ rad. The distance that a particle on the flywheel rim moves from $t_1 = 2s$ to $t_2 = 5s$ is:

(A) 58.5 m   (B) 70.2 m   (C) 35.1 m   (D) 46.8 m

Q.28 The angular position θ of a 0.18 m radius flywheel is given by $\theta = 2 t^3$ rad. The average angular velocity over the interval from $t_1 = 2s$ to $t_2 = 6s$ is:
(A) 104 rad/s   (B) 38 rad/s   (C) 134 rad/s   (D) 56 rad/s

Q.29 A plumber stands on the end of the cheater applying a force F of 850 N at a point 0.80 m from the center of the fitting as shown below. The wrench handle and cheater make an angle of 19° with the horizontal. The magnitude of the torque he applies about the center of the fitting is:
(A) 605 N.m   (B) 575 N.m   (C) 711 N.m   (D) 643 N.m
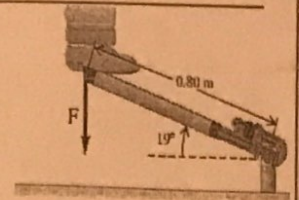
Q.30 A particle has a mass of 0.25 kg and rotate about a point at distance 5 m with velocity given by: $v = 6(m/s^3)\,t^2$. The angular momentum of the particle at t=3s is:

(A) 94.5 Kg.m²/s   (B) 54 Kg.m²/s   (C) 67.5 Kg.m²/s   (D) 81 Kg.m²/s

1) A moving particle of mass 2 kg, has kinetic energy of 10 J. **Its speed is:**

$\frac{1}{2}mv^2$

$v^2 = \frac{1}{2}e$

(a) 10 m/s   b. 3.16 m/s   c. 9.8 m/s   d. 13.2 m/s

Use the following to answer questions 2-3:
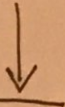A force of 20N works on a ball over distance of 5m

$w = F \cdot d$

$20 \times 5 = 100J$

2) If the force is **parallel** (موازية) to displacement of the ball. **The work** done by the force is:

(a) 100J   b. zero   c. 5J   d. 30J

3) If the force is **perpendicular** (عمودية) to the displacement of the ball. **The work** done by the force is :

a. 100J | b. zero | c. 5J   d.30 J

4) If $|D| = 10$ units , $|E| = 65$ units and the angle $\theta = 60^0$, then the vector product F is :

a. $|F| = 325.0$ units , perpendicular to D and E

$10 \times 65 \cos 60 =$

b. $|F| = 325.0$ units , parallel to D and E

c. $|F| = 562.9$ units , perpendicular to D and E

d. $|F| = 562.9$ units , parallel to D and E

$\frac{1}{u^2}$

2×9.8

V_0

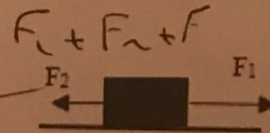5)   Pen is thrown vertically upward with an initial velocity of 10.2 m/s. **The maximum height** of pen is:

$h = \frac{V_0 \sin}{2}$

a. 2.5 m   b. 8.5 m   (c.) 5.3 m   d. 9.6 m

6) In the figure, if $F_1 = 21$ N and $F_2 = 8N$, the **net force** on the block is:

$F_1 + F_2 + f$

$\Sigma F =$ net $f = \Sigma f$

(a) 29N   b. -29N   c. -13N   d. 13N

7) A particle moves **10 m in the positive x direction** while being acted upon by a constant force $\vec{F} = (4\hat{\imath} + 4\hat{k})$ N. **The work done** on the particle by this force is:

a. 16J   b. 44J   c. 80J   d. 40J
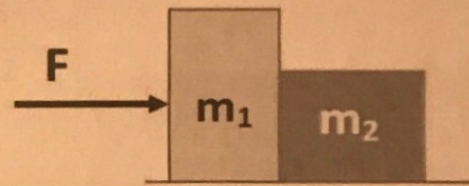
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8) Vector $\vec{N}$ has length 0.1m making angle of 30^0 with positive x axis, the x and y component are:

a. $N_x = 0.086$ m   b. $N_x = 58$ m   c. $N_x = 50$ m   d. $N_x = 0.5$ m

$N_y = 0.05$ m $N_y = 86$ m $N_y = 86$ m $N_y = 0.086$ m

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9) A car uniformly changes its speed from 20 m/s to 5 m/s in 5 s. **The average acceleration a_{avg} is:**

a. 9 m/s²   b. -3 m/s²   c. 4 m/s²   d. -6 m/s²

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10) From the figure, if $m_1 = 10$ kg and $m_2 = 40$ kg, the force acting to accelerate the two bodies by 2 m/s² equals:

a. 100 N   b. 80 N   c. 66N   d. 410

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11) A boy pulls (يسحب) a 58 N box along a friction horizontal floor by a force P as shown in the figure. The frictional force between box and floor is $f=29$ N. **If the box does not move**, which of the following is true?

a. P > 29 N and F_N = 58 N

b. P < 29 N and F_N = 58 N

c. P = 29 N and F_N < 58 N

d. P = 29 N and F_N = 58 N
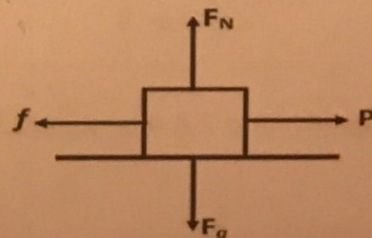
12) An object that has **kinetic energy** must be:

a. falling   b. moving   c. at rest   d. none of these

13) Which of the following is **not used** as a unit of time:

a. day   b. hour   c. meter   d. second

14) A block is attached to the end of an ideal spring (k=2 N/m) and moved from coordinate x_i to x_f. **the work done by spring W_s is positive if:**

|	x_i	x_f
A	2	-2
B	-4	-2
C	3	5
D	10	12

a. A   b. B   c. C   d. D

15) In Newton's third law, **Action and Reaction have**:

a. The same direction and different magnitude .   b. Perpendicular to each other.
c. The same magnitude and direction.   d. The same magnitude and opposite direction

16) A 4 kg cart **starts up an incline with a speed of 3 m/s** and comes to **rest** up the incline. The total work done on the cart is:

a. -18J   b. -3J   c. -9J   d. -6J

17) A 50 Kg box slides on the friction horizontal surface with acceleration a = 0.5 m/s^2 by applied force F as show in figure. If μ_k = 0.4, the **applied force F is:**
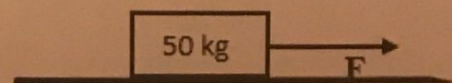
a. 221 N   b. 25 N   c. 196 N   d. 20 N

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18) The coefficient of kinetic fraction μ_k :

   a. in direction of motion   b. has unit of N   c. has no unit   d. none of these

19) 0.000 000 000 198 =

   a. 1.98×10^{-11} b. 1.98×10^{-9} c. 1.98×10^{-10} d. 1.98×10^{-12}

20) A man of mass 80 kg stand on a scale **in elevator,** if the elevator is going **downward** ↓ with acceleration of 2 m/s², **the normal force (F_N) is:**

   a. 944 N   b. 624 N   c. 9.8 N   d. 44 N

21) A body of 55 kg running in a circular path of r=3m at a velocity of 6 m/s. **the centripetal force is:**

   a. 660 N   b. 110N   c. 330N   d. 165 N

22) A 5 kg box is **raised** a distance of 2.5 m from rest by a vertical applied force of 90N. **the work** done on box by the **applied force is :**

90N   d
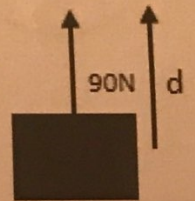
   a. 36J   b. -225J   c. zero   d. 225J

23) According to question 22, the **work** done on the box **by gravity is:**

   a. 12.5J   b. 122.5J   c. -122.5J   d. -12.5J

4

Given two vectors $A = -3i - j$ and $B = -9i - 10j$:

24) $A+B =$

  a. -6i -10j   b. 12 i - 11j   c. -12 i -11j   d. i -11j

25) The magnitude of $\vec{B}$:

  a. 100.5   b. 81.7   c. 13.45   d. 4.35
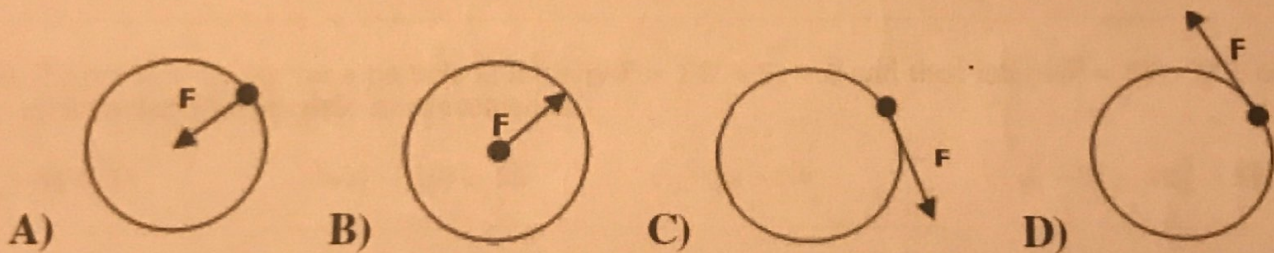
26) $\vec{A}.\vec{B}$ equals $=$

  a. 28   b. -18   c. 10   d. 37

27) The force that **opposes** (عكس) the motion is called:

  a.Tension (T)   b. Normal force (F_N)   c. Gravitational force (Fg)   d. Friction (f)

28) The direction of the **centripetal force** acting on a body moving in uniform circular motion is:

A)   B)   C)   D)

29) A body of mass 10 kg at point where $g=9.8$ m/s².its weight at a point where $g=0$ is:

  a. zero   b. 9.8N   c. 98 N   d. 10 N

30) Person pushes a box and exerts work 100J during 2s. **the power** required is:

  a. 50 W   b. 0.02 W   c. 200 W   d. 100 W

31) The coefficient of static fraction between a 5kg block and horizontal surface is 0.4. the **maximum horizontal force** that can be applied to the block before it slips is:

  a. 19.6 N   b. 45.8 N   c. 10.3 N   d. 25.4 N

32) A block of mass 10 kg moves on a horizontal surface with constant speed by force of 40 N. **the value of the coefficient of fraction μ_k is:**

a. 0.53   b. 0.17   c. 0.64   d. 0.40

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33) A 800 kg car moves from rest to speed of 8 m/s. the **net work done is:**

a. 1210J   b. 2210J   c. 25600J   d. 1000J

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34) Watt is equal

a. J.s   b. s/J   c. J/s   d. none of these

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35) You are throwing a ball straight up in the air. At the highest point, the ball's velocity is :
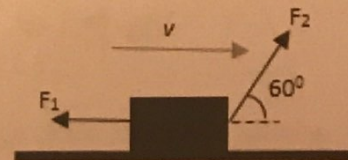
a. $v > v_0$ b. $v < v_0$ c. $v = 0$ d. none of these

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36) The position vector for a particle is initially $\vec{r} = 14\hat{\imath} - 5\hat{\jmath} + \hat{k}$ and then later is $\vec{r} = 5\hat{\imath} - 5\hat{\jmath} + 6\hat{k}$, all in meter. **The particle displacement is:**

a. $-9\hat{\imath} + 5\hat{k}$ b. $9\hat{\imath} - 10\hat{\jmath} - 5\hat{k}$ c. $-9\hat{\imath} - 5\hat{k}$ d. $-9\hat{\imath} - 10\hat{\jmath} - 5\hat{k}$

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37) In the figure $F_1=2$ N and $F_2= 4$N and angled upward by 60^0 acting on box sliding to the right across frictionless floor with velocity v=3 m/s.

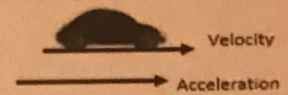The **net power** due to F_1 and F_2 acting on a box is:

a. zero   b. 6 w   c. -6 w   d. 3 w

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38) 1 joule =

a. $N.m^2$ b. N.m   c. N/m   d. none of these

39) From the figure, the car's speed:

Velocity
Acceleration

a. decreases   b. constant   c. zero   d. increases

40) A ball is thrown at an angle of 30° above the horizontal with an initial speed 50 m/s. **The range** of ball is:

a. 318 m   b. 257 m   c. 373.4 m   d. 220.9 m

41) To move a car along a level road you needed to apply a force of about 200N directed at angle $\theta=75^0$ above the horizontal, and you push it 20m, **the work** done on the car is:

a. 4500J   b. 2210J   c. 3000J   d. 2176J

42) Ahmad pushes a box along a smooth floor using a force of 210N and a power output of of 350 W. the time it takes to push the box 20m is:

a. 5 s   b. 12 s   c. 20 s   d. 4 s

43) A truck start from rest, travels with constant acceleration a distance 470 m the final velocity is 50 m/s. it is acceleration is :

a. 0.11 m/s²   b. 2.66 m/s²   c. 5.32 m/s²   d. 1.77 m/s²

44) A stone is tied to a 0.50-m string and whirled at a constant speed of 4m/s in a circle. Its **acceleration at the top of the circle** is:

a. 9.8 m/s²   b.- 9.8 m/s²   c. 32 m/s²   d.-32 m/s²