Q#	1	2	3	4	5	6	7	8	9	10	11	12
Ans	B	B	B	D	B	D	A	C	D	C	C	B

لم يُعْرَفْ هذا السُؤال

Fill the correct answer in the table. Use upper case letters only (A, B, C, D)

Useful constant: $g = 10 m/s^2$

. What is the average acceleration between $t_1 = 5\ s$ and $t = 10\ s$? $\bar{v} = \frac{x_2 - x_1}{t_2 - t_1} = \frac{8+8}{10-5} = \frac{8}{5} = 1.6$
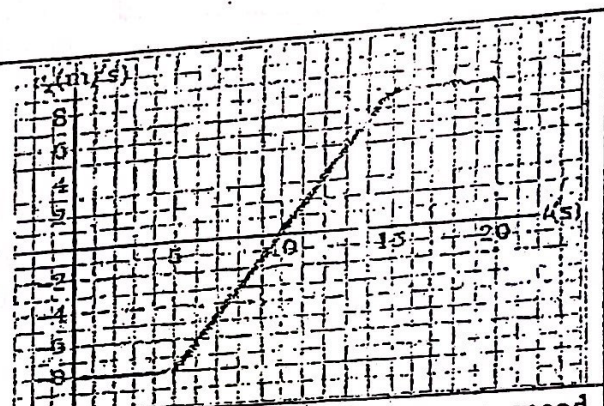
$\bar{a} = \frac{v_f - v_i}{t} = \frac{0+8}{5} = 1.6\ m/s^2$

0.8 m/s^2 B) 1.6 m/s^2

0.5 m/s^2 D) 1.1 m/s^2

---

2. An object moves along the x axis according to $x(t) = 3t^2 - 2t + 3$. What is the average speed between $t = 4s$ to $t = 5\ s$? $\bar{v} = \frac{x_2 - x_1}{t} = \frac{68 - 43}{1} =$ $x(5) = 3 \cdot 25 - 10 + 3 = 68$ $x(4) = 3 \cdot 16 - 8 + 3 = 43$

16 m/s B) 25 m/s C) 19 m/s D) 13 m/s

---

3. A rock is thrown vertically upward from a height of $24\ m$ with a velocity of $18\ m/s$. How long the one takes to reach the ground?

5.8 s   B) 4.6 s   C) 7.8 s   D) 6.7 s

---

4. A particle of mass $m = 3.5\ kg$ its velocity along the x-axis varies in time according to $v(t) = (0 - 5t^2)\ m/s^2$. Find the average force applied on the particle in the time interval $t = 0$ to $t = 2\ s$?

) −20 N   B) −30 N   C) −25 N   'D) −35 N

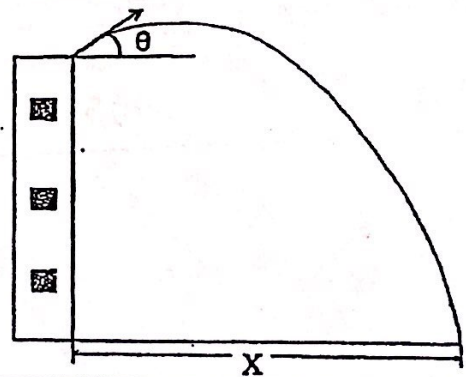
5. A rock is projected from the edge of the top of a building with initial velocity of 12.2 m/s at an angle of 30° above the horizontal. The rock hits the ground a horizontal distance of m from the base of the building. How tall is the building?
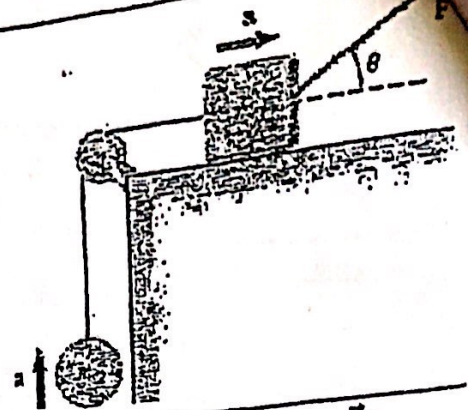
) 13.6 m   B) 14.1 m

) 24.8 m   D) 17.0 m

---

26. If $F = 30\ N$ and $m_1 = m_2 = 3\ kg$, and $\theta = 37°$. What is the magnitude of the acceleration of the suspended mass?

A) $-0.2\ m/s^2$

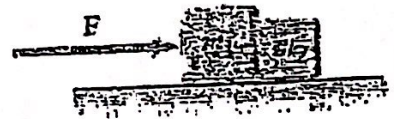B) $1.0\ m/s^2$

C) $-1.6\ m/s^2$

D) $-1.0\ m/s^2$

Q7. A vector $\vec{A}$ when added to $\vec{B} = 4\hat{\imath} + 4\hat{\jmath}$ yields a resultant $\vec{C} = 5\hat{\jmath}$. What is the magnitude of $\vec{A}$?

A) 4.1 unit

B) 3.2 unit

C) 3.6 unit

D) 4.5 unit

Q8. If $m_1 = 5\ kg$, $m_2 = 3\ kg$, and $F = 27\ N$. What is the magnitude of the force from m_1 on m_2 $(\vec{F_{12}})$?

A) 11.6 N

B) 15.0 N

C) 10.1 N

D) 12.0 N

Q9. At what angle (θ) should an object be projected with $v_i = 20\ m/s$ so its range $R = 31\ m$?

A) 15°

B) 30°

C) 45°

D) 25°

Q10. A ball is thrown so that it travels straight upward, the ball takes 2.5 s to reach the maximum heigh Find its maximum height?

A) 45.0 m

B) 61.3 m

C) 31.3 m

D) 20.0 m

Q11. A projectile starts at the origin. The initial velocity, v_0, makes an angle θ_0 with the horizontal where $0 < \theta_0 < 90°$. Which statement is true at the maximum height?

A) $\vec{r}$ is parallel to $\vec{a}$

B) $\vec{r}$ is perpendicular to $\vec{v}$

C) $\vec{v}$ is perpendicular to $\vec{a}$

D) $\vec{v}$ is parallel to $\vec{a}$

Q12. If $\vec{A} = 10\hat{\imath} - 12\hat{\jmath}$ and $\vec{B} = -20\hat{\imath} + 8\hat{\jmath}$. What is the magnitude of the vector $\vec{C} = 2\vec{A} - \vec{B}$?

$\rightarrow \vec{C} = 40\hat{\imath} - 32\hat{\jmath}$

A) 64

B) 51

C) 59

D) 55

$|c| = \sqrt{40^2 + (32)^2}$

$= 51$

Good Luck

Jordan University of Science & Technology
Faculty of Applied Science
Physics Department

Physics 101

المدرس: د. عصام قطاونة

First Semester
2008 / 2009
First Exam

الاسم: .... الرقم الجامعي: ١٣..٩..٨..C الشعبة: ....

Q#	1	2	3	4	5	6	7	8	9	10	11	12
Ans	C	B	D	D	C	A	B	D	B	B	B	C

Consider g=10 m/s²,

انقل رمز الإجابة الصحيحة إلى الجدول

1. A particle is moving according to equation X(t)=3t²+5, where x in meter and t in seconds. Calculate the average velocity during the time interval t1=1s to t2=3s.
   A) 7.5 m/s   B) 5 m/s.   C) 12m/s   D) 8m/s

2. A car travels 160km at 80km/h and 160km at 100km/h. What is the average speed of the car.?
   A) 84 km/h.   B) 89 km/h   C) 49 km/h   D) 91 km/h

3. A ball is thrown downward from the top of a building with an initial speed of 25 m/s. It strikes the ground after 2 seconds. How high is the building?
   A) 30 m   B) 20 m   C) 50m   D) 70 m

4. A car of mass 1000kg accelerates from rest to 27 m/s in 7 seconds. What is the net force on the car?
   A) 2.6X10² N   B) 6.8X10³ N   C) 2.7X10⁴ N   D) 3.9X10³N

5. A ball is thrown from a window of 60m height with an initial velocity of 15m/s in the horizontal direction as shown in the figure. What is the horizontal distance (x)?

   A) 60 m   B) 180 m   C) 52 m   D) 45m

6. A particle moves in XY-plane with an initial velocity of V_0 = (2i+3j)m/s and constant acceleration a = (3i-2j)m/s². What is the velocity after 2s?
   A) 8i-j   B) 5i -j   C) 6i-4j   D) 11i -3j

7. In the figure shown, the magnitude of the displacement vector A=10m and vector B=15m. What is A-B? → A + (-B)
   A) -2i+18j m   B) 17i -6j m   C) -17i+6j m   D) -6i +17j m

8. If the position of an object is given by X(t)= (2t³-5t-16), where t is in seconds and X is in meters, the acceleration at t= 2s is:
   A) 2m/s²   B) 10 m/s²

الاسم: _____ كهرباء ____ الرقم الجامعي: ‏١١٤٢٠٨ ٢٠٠ التسلسل: 39 الشعبة: صبحي (الضعفان)

Q.#	1	2	3	4	5	6	7	8	9	10	11	12
Ans	A	C	A	A	B	B	B	A	D	C	A	A

Consider g=10 m/s², B

انقل رمز الإجابة الصحيحة إلى الجدول

1. A particle is moving according to equation X(t)=3t²+5, where x in meter and t in seconds. Calculate the average velocity during the time interval t1=1s to t2=3s.
   A) 12 m/s   B) 5 m/s   C) 7.5m/s   D) 8m/s

2. A car travels 160km at 80km/h and 160km at 100km/h. What is the average speed of the car.?
   A) 84 km/h   B) 49 km/h   C) 89 km/h   D) 91 km/h

3. A ball is thrown downward from the top of a building with an initial speed of 25 m/s. It strikes the ground after 2 seconds. How high is the building?
   A) 30 m   B) 70 m   C) 50m   D) 20 m

4. A car of mass 1000kg accelerates from rest to 27 m/s in 7 seconds. What is the net force on the car?
   A) 3.9×10^3 N   B) 6.8×10^3 N   C) 2.7×10^4 N   D) 2.6×10^2 N

5. A ball is thrown from a window of 60m height with an initial velocity of 15m/s in the horizontal direction as shown in the figure. What is the horizontal distance (x)?

   A) 60 m   B) 52 m   C) 180 m   D) 45m

6. A particle moves in XY-plane with an initial velocity of $V_0 = (2i+3j)$m/s and constant acceleration a = (3i-2j)m/s². What is the velocity after 2s?
   A) 5i-j   B) 8i -j   C) 6i-4j   D) 11i -3j

7. In the figure shown, the magnitude of the displacement vector A=10m and vector B=15m. What is A-B?
   A) -2i+18j m   B) 17i -6j m   C) -17i+6j m   D) -6i +17j m

8. If the position of an object is given by X(t)= (2t³-5t-16), where t is in seconds and X is in meters, the acceleration at t= 2s is:
   A) 24m/s²   B) 19 m/s²   C) 36 m/s²   D) 2 m/s²

9. In the figure shown, if the surface is smooth (أملس) and the force F=20N, calculate the tension in the rope (الحبل) between the two masses?
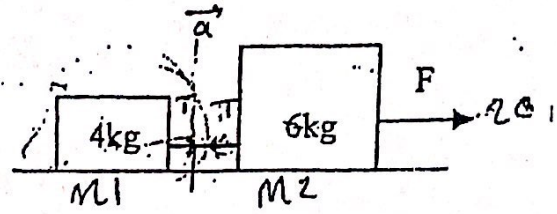
A) 12 N   **B) 8 N**   C) 40 N   D) 0N

10. In the figure shown, if $m1= 20kg$, $m2=30kg$ and $\theta=25°$. Find the acceleration of the system. (assume smooth surfaces، سطوح ملساء)
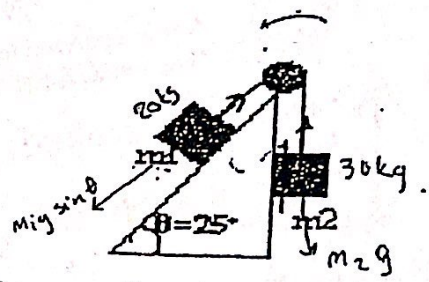
(A) 4.3 m/s²
(B) 7.2 m/s²
C) 2.9 m/s²
D) 19.6 m/s²

11. If the only two forces $F1 = (2i+3j)N$ and $F2 = (2i-3j)N$ act on an object of mass m=2kg, what is the acceleration of the object in m/s²?
A) 0   B) i   C) 2i+3j   D) 2i

12. A ball is thrown from the ground vertically upward with an initial velocity of 20m/s, what is its height above the ground after 1s?
A) 20 m   B) 80 m   C) 15 m   D) 25 m

GOOD LUCK

$T = (4)(2)$
$= 8$

$T = m_1 a$

$F - T = m_6 a$

_____

$F = (m_4 + m_6) a$
$+ m_6$ $(m_4 + m_6)$

$\frac{G}{f} =$ $\boxed{a = 2}$

$m = 2kg$

$F - T = m a$

$20 - T = (6)$
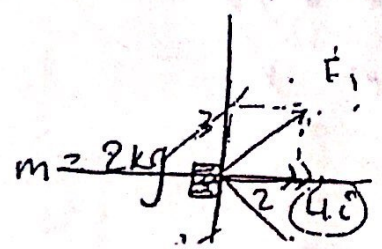
$|F| = \sqrt{16 + 1} = \sqrt{17}$
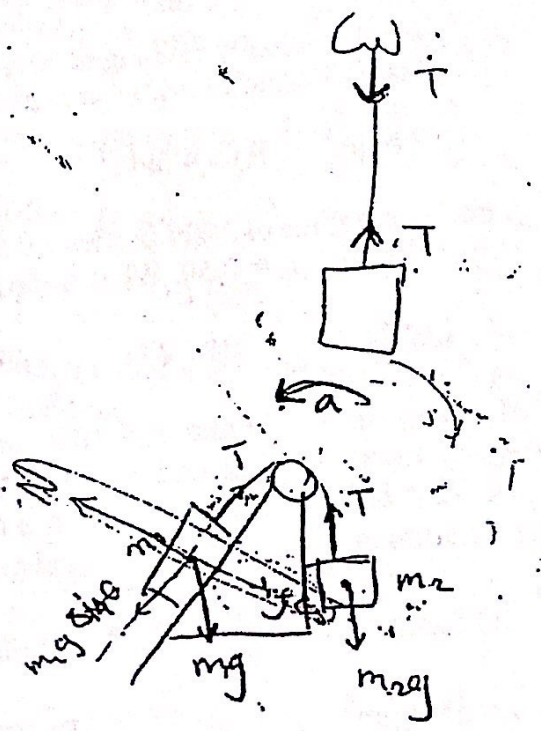
المدرس: رقم التسلسل: الرقم الجامعي: الاسم:

اكتب الحرف الذي يرمز إلى الإجابة الصحيحة في الجدول. $(g = 10 \text{ m/s}^2)$;

1	2	3	4	5	6	7	8	9	10
B	All	C	४७	A	C	A	B	A	C
11	12	13	14	15	16	17	18	19	20
E	B	D	A	C	E	E	B	E	D

1- A 960-N block is suspended as shown. The mass of the beam AB is 40 kg. The tension force of the cable is:

A) 1600 N   B) 1450 N

C) 1200 N

D) 720 N   E) none of these
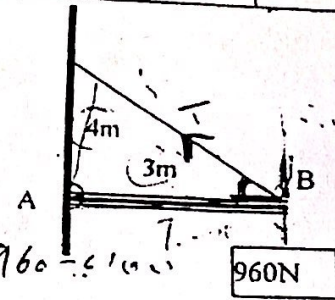
2- A force ($F = 5.0$ N, $\theta = 40°$) acts on a rod of mass $M = 1.2$ kg and length $L = 0.80$ m. If $I_{CM} = ML^2/12$, what is its angular acceleration? (magnitude).

A) 16 rad/s²   B) 12 rad/s²   C) 14 rad/s²

D) 10 rad/s²   E) 33 rad/s²
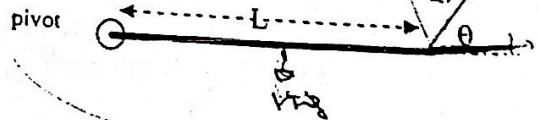
3- A flywheel is initially rotating at 20 rad/s and has a constant angular acceleration. If it rotates 450 rad in 9 s, what is its angular acceleration?

A) 3.3 rad/s²   B) 4.4 rad/s²   C) 6.7 rad/s²   D) 11.0 rad/s²   E) 5.6 rad/s²

4- A horizontal force of 12 N pushes a 0.50-kg book against a vertical wall. If $\mu_s = 0.6$ and $\mu_k = 0.50$. What is the friction force?

A) 12.0 N   B) 7.2 N   C) 3.0 N   D) 5.0 N   E) 2.5 N

Two masses $m_1 = 5$ kg and $m_2 = 10$ kg are connected to the perimeters of two rings of radii $r_1 = 0.5$ m and $r_2 = 1.5$ m. The rings are rigidly connected to each other but are free to rotate on a common smooth axel. If the angular acceleration is 1.5 rad/s², find the moment of inertia of the two rings.

A) 60 kg.m²   B) 68 kg.m²   C) 90 kg.m²

D) 65 kg.m²   E) 35 kg.m²
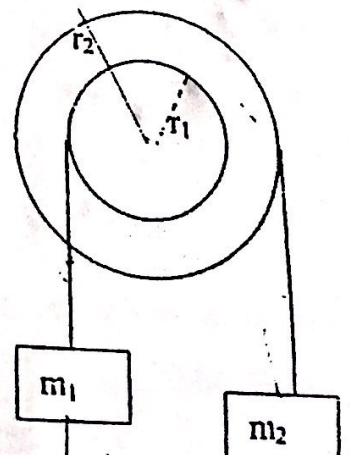
6- A ball of mass 0.15 kg is attached to the end of 1.1 m long cord. The ball is swung in a vertical circle. Determine the minimum speed (in m/s) of the ball at the top of the motion so as the ball continues moving in a circle.
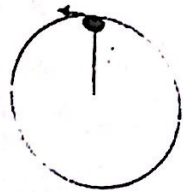
A) 11.0

B) 5.5

C) 3.3

D) 1.7

E) 2.1

7- The force on a particle of mass 2 kg as a function of time is given by;

$$F = (26i - 12t^2 j)N$$

What is the magnitude of the impulse given to the particle between $t=1$ s and $t=2$ s?

A) 38 N.s

B) 48 N.s

C) 58 N.s

D) 68 N.s

E) 78 N.s

8- A 2.2 kg block starting at h=2.0 meters slides down a smooth surface and then on a rough horizontal surface. The mass comes to rest at a distance d= 6.0 meters. Calculate the coefficient of friction between the mass and the rough surface.
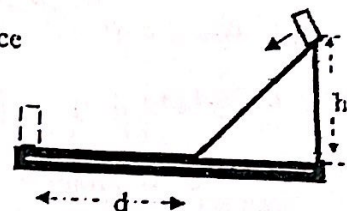
A) 0.18

B) 0.33

C) 0.37

D) 1.1

E) 0.52

9- If it requires 5 J of work to stretch a spring by 2 cm from its equilibrium length, how much more work is needed to stretch it an additional 4 cm?

A) 40 J

B) 30 J

C) 20 J

D) 10 J

E) 70 J

10- Two masses M_1 = 4 kg and M_2 =6 kg are connected by a rope passes over a pulley of mass 2 kg and radius 0.4 m as shown. M_1 is initially at h = 2.5 m above the floor and M_2 is on smooth surface. What is the speed of M_1 just before it hits the floor? (I for the pulley =$1/2 MR^2$)
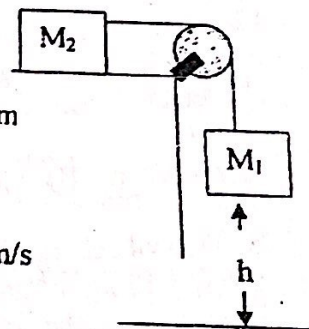
A) 1.5 m/s

B) 2.8 m/s

C) 4.3 m/s

D) 4.5 m/s

E) 4.0 m/s

11- Find the angle between the vector A=2i +j-2k and the negative (-) x-axis.

A) 180°

B) 48°

C) 110°

D) 96°

E) 132°

12- A ball is thrown vertically upward with a speed of 10 m/s from the roof of a building of height H. It strikes the ground 4 seconds later. Find the height of the building.

A) 20 m

B) 40 m

C) 120 m

D) 45 m

E) 35 m

13- The position of a particle moving in the x-y plane with constant acceleration at t=0 is (3i-4j) m. The particle initial velocity is (2i+3j) m/s. Two seconds later the particle is at (5i+3j) m. Find the magnitude of its final velocity at t=2 seconds.

A) 10.8 m/s

B) 2 m/s

C) 4.5 m/s

D) 4.0 m/s

E) 9 m/s

14- A sphere of radius R = 24.5 cm, mass M = 1.2 kg, and moment of inertia $I_{CM} = (2/5)MR^2$ rolls without slipping down a 30^0 incline which is 10 m long. Calculate the speed of center of mass of the sphere at the bottom.

A) 8.5 m/s   B) 10.0 m/s   C) 11.6 m/s
D) 7.1 m/s   E) 14.2 m/s

15- A 6.0-kg particle moves to the right at 4.0 m/s as shown. The magnitude of its angular momentum about the point O is:

A) zero
                  B) 288 kg.m²/s   C) 144 kg.m²/s
D) 24 kg.m²/s   E) 249 kg.m²/s
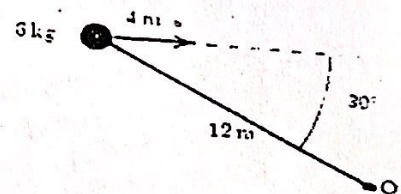
16- The long pendulum shown is drawn aside until the ball has risen 0.50 m. It is then given an initial speed of 3.0 m/s. The speed of the ball at its lowest position is:

A) zero   B) 0.89 m/s   C) 3.1 m/s   D) 3.7 m/s   E) 4.4 m/s
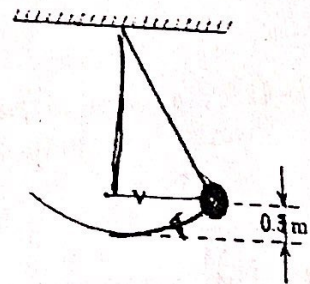
17- Three masses (m_1 = 45 kg, m_2=35 kg and m_3=25 kg) are placed on a board of mass 25 kg and length 3.2 m with a pivot at the center as shown. If the system is at balance, find the distance d.

A) 0.1 m   B)) 0.46 m   C) 0.8 m /   D) 0.96·m   E) 0.64 m

18- Two wheels rotate as shown with (w_1= 2 rad/s and w_2 = 6 rad/s) and (I_1 = 12 kg.m² and I_2= 6). If the two wheels are suddenly connected to each other, the combination will rotate at:

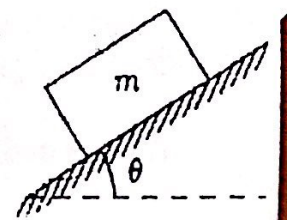A) zero   B) 0.67 rad/s   C) 1.5 rad/s   D) 0.36 rad/s   E) 2.8 rad/s
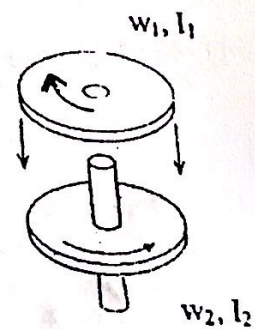
19- A centrifuge rotor has a moment of inertia of 4.25 x 10^{-2} kg.m². How much energy is required to bring it from rest to 9750 rev/min?

A) 3.4 kJ   B) 0.22 kJ   C) 34.1 kJ   D) 0.022 k J   E) 22.2 kJ

20- An object is sliding down a rough incline (θ = 35°) as shown. If μ_k=0.40, the acceleration of the object is: ,

A) zero   B) 8.9 m/s²   C) 5.9 m/s²   D) 2.5 m/s²   E) 3.9 m/s

JORDAN UNIVERSITY FOR SCIENCE & TECH
DEPARTMENT OF PHYSICAL SCIENCES

بسم الله الرحمن الرحيم

PHYSICS
101 (Second)

SUMMER SEMESTER
2004-2005

مــرر ادومــات

Student Name: (باللغة العربية) Key

Instructor Name ....

Uni ID No. :-

Section :-

ANSWER THE FOLLOWING QUESTIONS AND PUT THE CORRECT ANSWER IN THE TABLE BELOW.
CONSIDER ($g = 10$ m/s²) Approximate your answer to those given for each question.

Question No.	1	2	3	4	5	6	7	8	9	10	11	12
Correct Answer	D	A	D	E	D	B	A	A	B	A	D	E

1- A 2.0-kg projectile moves from its initial position to a point that is displaced 22 m horizontally and 15 m above its initial position. How much work is done by the gravitational force on the projectile?
   a. +3.0 kJ   b. +0.29 kJ   c. +30 J   d. −0.29 J   e. −50 J

2- A body moving along the x axis is acted upon by a force F_x that varies with x as shown. What work is done by this force as the object moves from x = 1 m to x = 8 m?
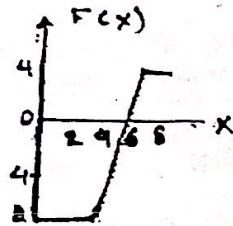
   a. −26 J   b. +18 J   c. −10 J   d. −2 J   e. −18 J

3- A 4.0-kg block is lowered down a 37° incline a distance of 5.0 m from point A to point B. A horizontal force ($F = 10$ N) is applied to the block between A and B as shown in the figure. The kinetic energy of the block at A is 10 J and at B it is 20 J. How much work is done on the block by the force of friction between A and B?
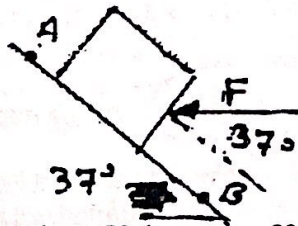
   a. −58 J   b. −53 J   c. −63 J   d. −66 J   e. −47 J

4- A 6.0-kg block slides along a horizontal surface. If $\mu_k = 0.20$ for the block and surface, at what rate is the friction force doing work on the block at an instant when its speed is 4.0 m/s?
   a. −59 W   b. −71 W   c. −71 W   d. −82 W   e. −48 W

5- A pendulum is made by letting a 2.0-kg object swing at the end of a string that has a length of 1.5 m. The maximum angle the string makes with the vertical as the pendulum swings is 30°. What is the speed of the object as it goes through the lowest point in its trajectory?

j)

6-. A 2.0-kg mass is projected from the edge of the top of a 20-m tall building with a velocity of 24 m/s at some unknown angle above the horizontal. Disregard air resistance and assume the ground is level. What is the kinetic energy of the mass just before it strikes the ground?
a. 0.18 kJ   b. 0.97 kJ   c. 0.89 kJ   d. 0.26 kJ   e. 0.40 kJ

7-.In a given displacement of a particle, its kinetic energy increases by 25 J while its potential energy decreases by 10 J. Determine the work of the nonconservative forces acting on the particle during this displacement.

a. +15 J   b. - 35 J   c. -15 J   d. +35 J   e. +55 J

8-.As an object moves from point A to point B only two forces act on it: one force is nonconservative and does −30 J of work, the other force is conservative and does +50 J of work. Between A and B,
a.kinetic energy of object increases, mechanical energy decreases.
b.kinetic energy of object decreases, mechanical energy decreases.
c.kinetic energy of object decreases, mechanical energy increases.
d.kinetic energy of object increases, mechanical energy increases.
e.None of the above.

9-. A 2000-kg truck traveling at a speed of 6.0 m/s makes a 90° turn in a time of 4.0 s and emerges from this turn with a speed of 4.0 m/s. What is the magnitude of the average resultant force on the truck during this turn?

a. 4.0 kN   b. 3.6 kN   c. 5.0 kN   d. 6.4 kN   e. 0.67 kN

10-. A 10-g bullet moving horizontally with a speed of 1.8 km/s strikes and passes through a 5.0-kg block initially at rest on a horizontal frictionless surface. The bullet emerges from the block with a speed of 1.0 km/s. What is the kinetic energy of the block immediately after the bullet emerges?

a. 6.4 J   b. 8.0 J   c. 10 J   d. 9.4 J   e. 5.3 J

11-.At the instant a 2.0-kg particle has a velocity of 4.0 m/s in the positive x direction, a 3.0-kg particle has a velocity of 5.0 m/s in the positive y direction. What is the speed of the center of mass of the two-particle system?

a. 3.8 m/s   b. 4.6 m/s   c. 5.0 m/s   d. 3.4 m/s   e. 4.4 m/s

12-.A wheel starts from rest and rotates with a constant angular acceleration about a fixed axis. It completes the first revolution 6.0 s after it started. How long after it started will the wheel complete the second revolution?

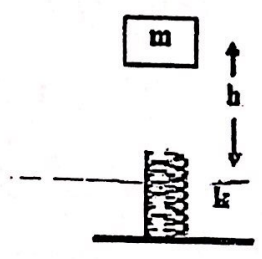a. 9.2 s   b. 7.8 s   c. 6.4 s   d. 9.9 s   e. 8.5 s

Wish you all Good Luck

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اسم الطالب (Name):

الرقم الجامعي (Student ID):

المدرس (Instructor):

رقم التسلسل (Serial #):

الشعبة (Section):

Identify the choice that best completes the statement or answers the question.
Use Capital letters to fill the table

Consider $g = 10 \ m/s^2$

Q#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	C	A	D	C	D	C	A	B	D	C	D	D	C	B	B

1 A 0.25 kg ball attached to a string is rotating in a horizontal circle of radius 0.2 m. Assume the tension force is directed horizontally. If the ball revolves twice every second, what is the tension in the string?

A) 20 N   B) 5 N   C) 8 N   D) 10 N

2 A ball of mass 0.35 kg is attached to the end of a cord of length L = 2m, that rotates in a vertical circle about point O. If the speed of the ball at point A is 4 m/s, then the tension at this point is:

A) 6.3 N   B) 18 N   C) 9 N   D) 36 N

3 Which force is responsible for holding a car in an *unbanked* curve?

A) The vertical component of the normal force   B) The car's weight
C) The horizontal component of the normal force   D) The friction force

4 The gravitational force exerted by the Sun on the Earth holds the Earth in an orbit around the Sun. Assume the orbit is perfectly circular. The work done by this gravitational force during a short time interval in which the Earth moves through a displacement in its orbital path is

A) Positive   B) Negative   C) Zero   D) Impossible to determine

5 The vectors A and B are given by $A = 2\hat{\imath} + 3\hat{\jmath}$ and $B = -\hat{\imath} + 2\hat{\jmath}$. Find the scalar product

A) 8   B) $2\hat{\imath} + 6\hat{\jmath}$ C) $-2\hat{\imath} + 6\hat{\jmath}$ D) 4

6 A 6 kg block initially at rest is pulled to the right along a frictionless horizontal surface by a constant horizontal force of magnitude 30 N. Find the block's speed after it has moved a horizontal distance of 3 m.

A) 3.5 m/s   B) 12 m/s   C) 5.5 m/s   D) 2.5 m/s

7 In the figure shown the spring constant is 1200 N/m. The 10 kg block is initially at rest at its equilibrium position. The block has a speed of 0.7 m/s when it moves 8 cm. How much work is done by the force P during this displacement?

A) 6.3 J   B) 8.4 J
C) 7.0 J   D) 7.7 J

A spring when stretched by 2 mm its potential energy becomes 6 J. If its stretched by 10 mm, its potential energy is equal to

A) 6 J
B) 150 J
C) 30 J
D) 100 J

A force acting on an object moving along the x axis is given by $F_x = (14x - 3x^2)$ N where x is in m. How much work is done by this force as the object moves from $x = -1$ m to $x = +2$ m?

A) −28 J
B) 40 J
C) 28 J
D) 12 J

0 The speed of a 6 kg object is given by $v = (2t)$ m/s, where t is in s. Find the instantaneous power of the resultant force at $t = 1$ s?

A) 16 W
B) 32 W
C) 24 W
D) 56 W

1 The two masses in the figure are released from rest. After the 3 kg mass has fallen 1.5 m, it is moving with a speed of 4 m/s. What is the change in mechanical energy done on the system during this time interval by the frictional force on the 2 kg mass?

A) −21 J
C) −85 J
B) −12 J
D) −5 J

2 kg

3 kg

2 Two objects have equal kinetic energy. How do the magnitudes of their momenta compare?

A) $p_1 < p_2$
B) $p_1 = p_2$
C) $p_1 > p_2$
D) Not enough information to tell

3 In perfectly inelastic one-dimensional collision between two moving objects, what condition alone is necessary so that the final kinetic energy of the system is zero after the collision?

A) The objects must have the same initial velocity
B) The objects must have the same mass
C) The objects must have initial momenta with the same magnitude but opposite direction
D) The objects must have the same initial speed, with velocity vectors in opposite directions

1 A 5 kg particle is moving horizontally with a speed of 5 m/s when it strikes a vertical wall. The particle rebounds with a speed of 3 m/s. What is the magnitude of the impulse delivered to the particle?

A) 10 kg.m/s
B) 40 kg.m/s
C) 25 kg.m/s
D) 15 kg.m/s

5 A 3 kg object moving in the positive x direction has a one-dimensional elastic collision with a 5 kg object initially at rest. After the collision the 5 kg object has a velocity of 6 m/s in the positive x direction. What was the initial speed of the 3 kg object?

A) 6 m/s
B) 8 m/s
C) 7 m/s
D) 2 m/s

8] In the figure shown, if a mass $m = 1$ kg is dropped downward from height $h = 0.2$ m above the spring and compressed the spring with maximum distance 5 cm, calculate the spring constant k (in N/m)?

A) 3000   B) 1500   C) 2000   D) 1000   E) 4000

Q9] In the Figure shown, a mass $m = 5$ kg is moving on a rough horizontal surface and compressed the spring ($k = 800$ N/m) a maximum distance $d = 5$ cm. If the speed of the mass when it hits the spring is $V = 1$ m/s, calculate the coefficient of kinetic friction (μ_k).

A) 0.18   B) 0.6   C) 0.78   D) 0.43   E) 0.35

Q10] A motor lifts 20 kg of water per minute to a height of 3 m. What is the power the motor has (in Watt)?

A) 10   B) 16.5   C) 13.2   D) 20   E) 25.1

Q11] The cars accidents at high speed is very dangerous (حادث تصادم خطير) when the contact time is:

A) very short time   B) long time   C) very long time   D) medium time   E) independent of time

Q12] A 0.2 kg ball of speed 6 m/s hits a vertical wall horizontally and rebounds in the opposite direction with a speed of 4 m/s. If the contact time with wall is 0.5 ms, what is the average force acting on the ball by the wall (in N)?

A) 1,000   B) 4000   C) 2000   D) 500   E) 3000

Q13] A mass m has a kinetic energy of 300J and a momentum of magnitude 36 kg m/s. What is the mass m (in kg)?

A) 6.48   B) 6.01   C) 2.16   D) 3.24   E) 2.03

Q14] A ball of mass $m = 0.56$ kg makes an elastic head-on collision with a second ball initially at rest. The second ball moves with half the original speed of the first ball. What is the mass of the second ball (in kg)?

A) 2.16   B) 0.84   C) 0.56   D) 1.2   E) 1.68

Q15] A 4.0-kg mass at the end of a string rotates in a circular motion on a horizontal frictionless table. The mass has a constant speed of 3 m/s and the radius of the circle is 0.4 m. What is the magnitude of the resultant force acting on the mass (in N)?

A) 90   B) 45   C) 40   D) 160   E) 10

Approximate your answer to those given for each question
Use Capital letters to fill the table

Consider $g = 10 \ m/s^2$

Q#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans	A	A	A	D	A	A	D	A	A	C	A	B	D	B	A

1. A 1500 kg car travels at a constant speed of 12 m/s around a horizontal circular track that has a radius of 100 m. determine the magnitude of the net force that acts on the car.

   A) 2.2 kN
   B) 1.5 kN
   C) 2.5 kN
   D) 0.5 kN

2. A car moves on a flat, horizontal road in a circle of radius 30 m. The coefficient of static friction between tires and road is 0.27. The maximum speed with which this car can round this curve is:

   A) 12 m/s
   B) 3 m/s
   C) 9 m/s
   D) 10 m/s

3. One end of a 1 m long string is fixed; the other end is attached to a 3 kg stone. The stone swings in a vertical circle, passing the lowest point at 4 m/s. The tension force of the string at the lowest point is about:

   A) 30 N
   B) 18 N
   C) 78 N
   D) 48 N

4. A particle moves 5m in the positive z direction while being acted upon by a constant force $F = (4\hat{\imath} + 2\hat{\jmath} - 4\hat{k})N$. The work done on the particle by this force is:

   A) −10 J
   B) 20 J
   C) 10 J
   D) −20 J

5. An 1000 kg car is traveling at 12 m/s along a horizontal road when the brakes are applied. The car stops in 4 s. How much kinetic energy does the car lose in this time?

   A) 7.2×10^4 J
   B) 4.8×10^4 J
   C) 5.8×10^4 J
   D) 1.2×10^5 J

6. A potential energy function for a system is given by $U(x,y) = 3x^3 y - 7x$. Find the magnitude of the force that acts at the point (2, 1)

   A) 3.6 N
   B) 24.0 N
   C) 37.6 N
   D) 29.0 N

7. A 10 kg mass is attached to a light spring ($k = 400 \ N/m$) that passes over a pulley as shown. The pulley is frictionless, and the mass is released from rest when the spring is unstretched. After the mass has dropped 0.4 m, what is its speed?

   A) 1.9 m/s
   B) 2.2 m/s
   C) 3.8 m/s
   D) 1.3 m/s

   $\varepsilon_1 = \varepsilon_2$

   $0 \to 0 = \frac{1}{2} m v_f^2 + \frac{1}{2} k x^2 - mgh$
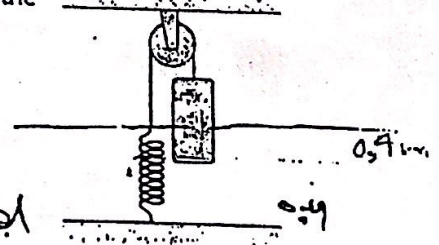
8. As a 1.5 kg mass moves along the x axis, it is acted upon by a single conservative force given by $F_x = (6.0x^2)N$, where x is in m. At $x = 0$, the potential energy associated with the force is +40 J. What is the potential energy at $x = 2.0$ m

   A) 14 J
   B) 16 J
   C) 24 J

...to kg object moves 4 m upward a frictionless slope shown. Find the work done by the force P if the speed of the object is decreasing at a rate of 1.5 m/s^2

A) 160 J
B) 112 J
C) 48 J
D) – 48 J

$P = r f \,! \cos$
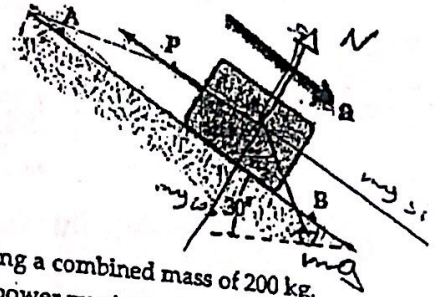
10. An elevator car (عربية مصعد) has a mass of 1600 kg is carrying passengers having a combined mass of 200 kg. A constant friction force of 4000 N retarded its motion (اعاقت حركتها). How much power must a motor deliver to lift up the elevator car and its passengers at a constant velocity of 2 m/s.

A) 28 kW
B) 36 kW
C) 40 kW
D) 44 kW

11. A force (P = 3 N, $\theta = 40^0$) acts on the block between A and B, as shown. Points A and B are 1.5 m apart. If the kinetic energy of the block at A is 5 J and at B is 4 J, how much work is done on the block by the force of friction as the block moves from A to B?

A) – 2.4 J
B) + 4.4 J
C) + 2.4 J
D) – 4.4 J
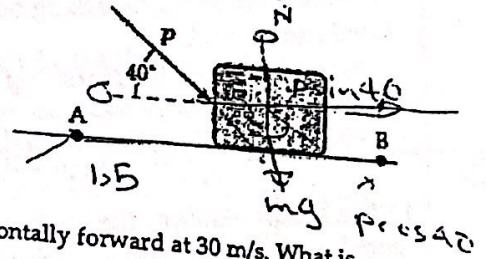
12. A 60 kg man stands at rest on frictionless ice and throw 0.5 kg stone horizontally forward at 30 m/s. What is the velocity of the man after throwing the stone?

A) 30 m/s backward
B) 0.25 m/s backward
C) 0.25 m/s forward
D) 0

13. A 4 kg object is traveling at 6 m/s. It strikes an 8 kg object, which is stationary. The two objects stick together. Their common final speed is

A) 2 m/s
B) 6 m/s
C) 4 m/s
D) 3 m/s

14. The two blocks shown suffer a one dimensional elastic collision. Find the velocity of the 4 kg object after the collision

A) 25 m/s to the right
B) 25 m/s to the left
C) 50 m/s to the left
D) 50 m/s to the right
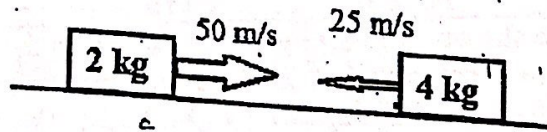
15. At an instant when a particle of mass 50 g has a velocity of 25 m/s in the positive y direction, a 75 g particle has a velocity of 30 m/s in the positive x direction. What is the y component of the velocity of the center of mass of this two particle system at this instant

A) 28 m/s
B) 10 m/s
C) 21 m/s
D) 18 m/s

$$V_{cm} = \frac{\Sigma m_i v_i}{(m_1 + m_2)}$$

Q#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	C	B	E	D	A	E	A	D	C	B	D	B	C	A	E

Q1

In the figure shown, find the force of friction between the block and the surface when F=10N
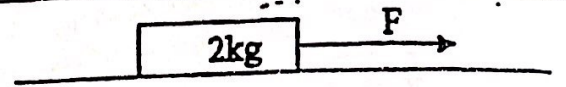
أوجد تسارع الجسم و قوة الاحتكاك للنظام المبين جنبا

$\mu_k = 0.25$, $\mu_s = 0.5$

A) f_k=5N   B) f_s=8N   C) f_s=10N

D) 0   E) f_s=6 N

Q2

If the velocity of the 2-kg block at point A is 2m/s. Find the normal force acting on the block when the angle θ=37.
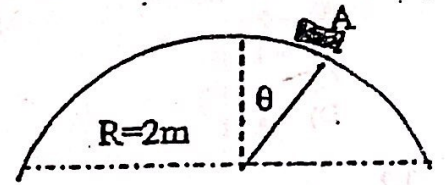
كانت سرعة الجسم عند النقطة A تساوي 2m/s . ما قيمة للقوة العمودية على الجسم 2kg من السطح عندما كانت الزاوية 37 درجة.

A) 16N   B) 12N   C) 4N   D) 8N   E) 0

Q3

In the figure shown, the system is moving with constant acceleration of $1m/s^2$. Find the coefficient of kinetic friction between m_2 and the surface. ($m_1= m_2$=1kg).
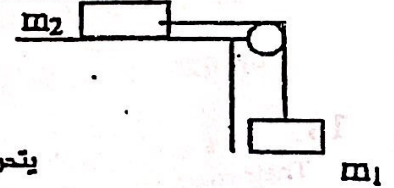
يتحرك النظام بتسارع ثابت متداره $1m/s^2$. أوجد معامل الاحتكاك الحركي بين m_2 و السطح

A) 0.25   B) 0.15   C) 0.30   D) 0.35   E) 0.80

Q4

An object is constrained by a cord to move in a circular path of radius 1 m on a horizontal frictionless surface. The cord will break if its tension exceeds 64 N. The maximum kinetic energy the object can have is:

يدور جسم مربوط بخيط على مسار دائري أفقي أملس نصف قطره 1m . فإذا كان أقصى شد يتحمله الخيط يساوي 64N . ما أكبر طاقة حركية يسمح للجسم إمتلاكها لكي لا ينقطع الخيط

A) 4 J   B) 8 J   C) 16 J   D) 32 J   E) 64 J

Q5

In the figure shown, the 4kg block moved 2m up the rough incline with constant acceleration of $2m/s^2$. Find the total work done on the block?
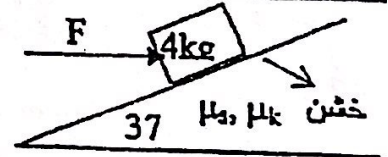
تحرك الجسم(كتلته 4kg) الى الاعلى فوق السطح المائل الخشن مسافة 2m بتسارع ثابت متداره $2m/s^2$. إن الشغل الكلي المبذول على الجسم يساوي:

A) +16 J   B) -16J   C) +4J

D) - 4J   E) +12J

Q6

In a given displacement of a particle, its kinetic energy increases by 25 J while its potential energy decreases by 20 J. Determine the work of the non-conservative forces acting on the particle during this displacement.

إزدادت الطاقة الحركية لجسم ما خلال أزاحة معينة بمقدار 25J و نقصت طاقة وضعه بمقدار 20J . أوجد الشغل المبذول من القوى غير المحافظة التي تؤثر على الجسم

A) –15 J   B) +35 J   C) +15 J   D) –5 J   E) +5 J

Q7

A 5 N force is the only force acting on a 2-kg block that starts from rest. At the instant the object has gone 5m the rate at which the force is doing work is:

قوة الوحيدة التي حركت الجسم 2kg من السكون تساوي(5 N) . أوجد معدل الشغل الذي تقوم به هذه القوة في اللحظة التي تحركها جسم فيها مسافة (5m) .

A) 25W   B) 50W   C) 75W   D) 100W

Q7- The velocity of a car moving on a circular road of radius 100 m increases with constant rate of 0.5 m/s². What is the magnitude of its total acceleration when its speed is 8.4 m/s?

a) 0.56 m/s²   b) 0.25 m/s²   c) 0.50 m/s²   d) 0.86 m/s²

Q8- For the two vectors $A = 1i + 2j$ and $B = 2i - 3j$. Calculate $A \cdot (A \times B)$

a) -14   b) 14   c) Zero   d) 35

Q9- An object is initially located at the origin. It has an acceleration of $a = 3j$ m/s² and an initial velocity of $v_i = 5i$ m/s. Find the magnitude of the velocity of the object at t = 1 second.

a) 5.0 m/s   b) 5.8 m/s   c) 7.8 m/s   d) 11.0 m/s

Q10- The position of an object is given by: $x = 2t^3$, where x is measured in meters and t is measured in seconds. What is the average velocity of the object between t = 0 s and t = 3 s?

a) 18 m/s   b) 26 m/s   c) 30 m/s   d) 28 m/s

Q11- A bullet is fired horizontally with initial velocity of magnitude 40 m/s from 5 m above the ground. What is the horizontal displacement relative to the point at which it is fired?

a) 40.0 m   b) 20.0 m   c) 56.6 m   d) 28.3 m

Q12- A ball is thrown from the top of a building with initial velocity 10 m/s at an angle of 37° above the horizontal. It strikes the ground 3 seconds later. Calculate the maximum height it reaches from the ground.

a) 28.8 m   b) 33.8 m   c) 36.8 m   d) 43.8 m

الرقم الجامعي:												الاسم:	
Q.#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ans	A	D	B	B	A	C	A	D	C	A	D	B	C	D

Q1. An object moving with constant speed on a horizontal circular path has:

A) an inward radial acceleration   B) a constant velocity   C) zero acceleration   D) an outward radial acceleration

Q2. A 1.5 kg object is fired from the ground with 24 m/s speed vertically up. The object reaches a maximum height of 16 meters above the ground. What is the work done on the object by the air resistance force?

A) Zero
B) – 432 N.m
C) – 240 N.m
D) –192 N.m

Q3. How much work is required to change the velocity of a 15 kg mass from 6 m/s to 9 m/s?

A) –22.5 N.m
B) –337.5 N.m
C) 45 N.m
D) 675 N.m

$\frac{1}{2} m (v_f^2 - v_i^2)$

Q4. The moon revolves around the earth once every 30 days. What is its angular speed?

A) 1.93×10^{-4} rad/s
B) 2.42×10^{-6} rad/s
C) 5.7×10^{-7} rad/s
D) 1.2×10^{-4} rad/s

Q5. In the figure shown, a 200 N.m net work is done to move a block a distance $d = 7m$, by a force F= 40 N that makes an angle θ above the smooth horizontal surface. Find θ.

A) 44.4°
B) 26.1°
C) 33.2°
D) 21.4°
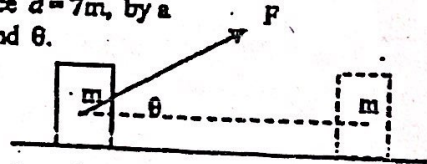
Q6. Two identical masses $m_1 = m_2 = m$, move toward each other with velocities $v_1 = 2$ m/s and $v_2 = 3$ m/s as shown. The masses make an elastic head-on collision. What is the velocity of mass m_2 just after the collision?

A) -3.0 m/s
B) 3.0 m/s
C) 2.0 m/s
D) -2.0 m/s

Q7. A bullet of mass m = 20 g. is fired with a speed of 400 m/s towards a wooden block of mass M= 2 kg that is at rest. If the bullet comes to rest inside the block and the block-bullet move together, what will be the velocity of the system ?

A) 4.0 m/s
B) 3.0 m/s
C) 2.0 m/s
D) 5.0 m/s

Q8. A 0.5 kg ball falls down on a floor with 25 m/s velocity. It returns up with 15 m/s velocity. For how long is the ball in contact with the floor if the magnitude of the force exerted by the floor on the ball is 1000N?

A) 0.040 s
B) 0.010 s
C) 0.005 s
D) 0.020 s

Q9. An M= 12 kg mass is moving along the x-axis with 20 m/s speed when it splits into two masses $m_1 = 4$ kg and $m_2 = 8$ kg. After splitting, m_1 moves along the y-axis with 30 m/s speed. What is the speed of mass m_2 ?

A) 30 m/s
B) 10 m/s
C) 33.5 m/s
D) 50 m/s

Q10. In the figure shown, the mass starts with $v_o = 8$ m/s speed and travels a distance d= 4.2 meters on the rough horizontal surface ($\mu = 0.4$) before it start climbing the smooth inclined. What is the maximum height reached by the mass?

A)   1.52 m/s   B)   3.20 m/s
C)   2.64   m/s   D)   4.68 m/s
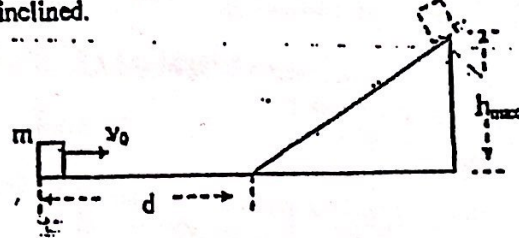
Q11. A rotor starts rotating from rest with constant angular acceleration of 4π rad/s^2. Calculate the angular velocity of the rotor when its angular displacement is 32π.

A) 28π rad/s   B) 36π rad/s   C) 8π rad/s   D) 16π rad/s

Q12. An object starts from rest with a constant angular acceleration of 2.0 rad/s^2 on the circumference of a circle of radius R= 0.9 meter. What is the centripetal acceleration of the object after 5.0 s?

A). 18 m/s^2 B) 90 m/s^2 C)   1.8 m/s^2 D) 9 m/s^2

. Q13. A mass m=0.5 kg is dropped from a height h=0.75m above a vertical spring. If the mass compresses the spring a maximum distance of 0.15 m, What is the spring constant k?

A) 200 N/m   B) 166 N/m   C) 400 N/m   D) 432 N/m
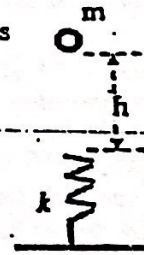
Q14. In the figure shown, the system starts moving from rest when the 3 kg mass is at height h= 2 m above the ground. Find the speed of the 3kg mass as it hits the ground.

A) 21.2 m/s   B) 4.47 m/s
C) 6.32 m/s   D) 3.87 m/s
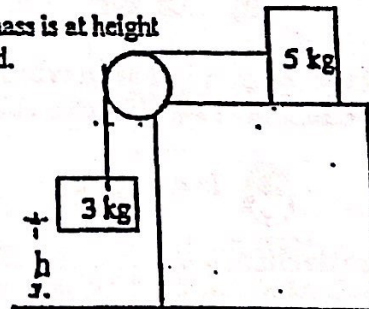
$g = 10 \text{m/s}^2$; $km = 1 \times 10^3$ m

1	2	3	4	5	6	7	8	9	10
b	b	b	A	d	d E	b A	A	C	C

1. Which of the following answers is a unit of force ?
a. erg
b. kg.m/s²
c. m/hr
d. answers a and b

2. An automobile moving along a straight track (مسار مستقيم) a distance of 300 m. What is the time needed to change its velocity from 40 m/s to 80 m/s?
a. 1.66 s
b. 5.0 s
c. 3.33 s
d. 6.67 s

3. If the magnitude of vector A is 15 m and makes an angle of 80° with the x-axis and vector is B = 3i – 4j, what is the magnitude of A + 4B?
a. 18.36
b. 14.65
c. 10.94
d. 11.93

4. A particle moving along the x axis has a position given by $x = (16t - 2t^2)$ m, where t is measured in s. How far the particle moved before it stopped?
a. 32 m
b. 40 m
c. 72 m
d. 18 m

$16 = 4t$

$t = 4$

5. If the only forces acting (تؤثر) on a 2-kg mass are $F_1 = (7i - 8j)$ N and $F_2 = (5j + 3j)$ N, what is the direction of the acceleration of the particle?
a. -32°
b. -20°
c. -26°
d. -22°

$(12 - 5)$

6. A ball is thrown (رميت) from a window 15 m above the ground with velocity of 20 m/s with an angle of 30° to the horizontal (أفقي) and hits the ground 52 m horizontally away. What is the maximum height the ball reached from the ground?
a. 45 m
b. 60 m
c. 5 m
d. 20 m

$\dfrac{(V_1 \times \sin\theta)^2}{2g}$

7. From problem 6. What is the time needed for the ball to strike (تضرب) the ground?
a. 7 s
b. 4 s
c. 3 s
d. 8 s

8. A particle starts from the origin at $t = 0$ with a velocity of (2i + 24j) m/s and moves in the xy plane with a constant acceleration of (4i + 2j) m/s². At the instant (اللحظة) the x coordinate of the particle is 24 m, what is the value of its velocity?
a. 33.1 m/s
b. 19.8 m/s
c. 26.1 m/s
d. 38.6 m/s

9. A block of mass 15 kg is moving on an incline (سطح مائل) makes an angle of 30° to the horizontal (أفقي). What is the force exerted (تؤثر) by the incline on the block (no friction)
a. 173 N
b. 43 N
c. 86 N
d. 130 N

10. An elevator (مصعد) has a mass of (1000) kg. It accelerates upward at (2m/s²). What is the force exerted (تؤثر) by the cable (حبل معدني) on the elevator?

a. 0.8 x10⁴ N
b. 0.9 x10⁴ N
c. 1.2 x10⁴ N
d. 1.1 x10⁴ N