KING ABDULAZIZ UNIVERSITY

SCIENCE FACULTY

PHYSICS DEPARTMENT

Summer Term

Second Exam

A

Student Name: Student Number: Group:

CHOOSE THE CORRECT ANSWER:

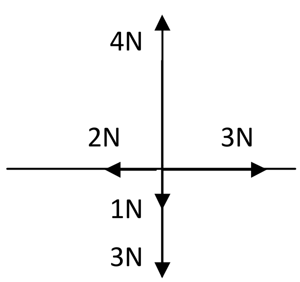
1. A Ball is thrown from ground level making an angle of 30◦ above the horizontal. The ball speed is 980 m/s. What is the of Range the projectile?
a) 4.3×10^3 m   b) 8.5×10^3 m   c) 43×10^3 m   d) 84.8×10^3 m

2. Acceleration is defined as:
   a) Rate of change of position with time.
   b) Distance divided by time.
   c) Rate of change of velocity with time.
   d) A position of an object.

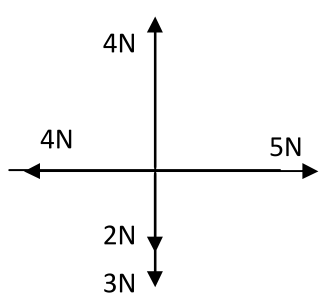
3. Which of the following is a scalar quantity?
a) Speed   b) Velocity   c) Displacement   d) Acceleration

4. A force of 1N is:
a) 1 kg/s   b) 1 kg · m/s   c) 1 kg · m/s^2 d) 1 kg · m^2/s

5. In which figure of the following the **Y- Component** of the net forces is Zero :



(a)



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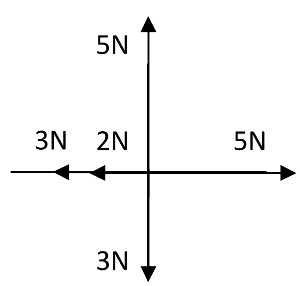

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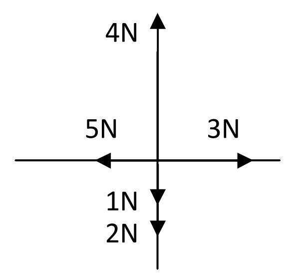
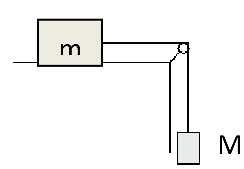


(d)

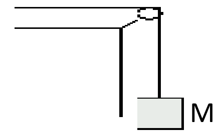
6. A block of mass m is connected to a block of mass M as shown , the normal force on block m is :



a) $F_N = mg - T$ b) $F_N = Mg - T$

c) $F_N = mg$ d) $F_N = Mg$

7. In the diagram, if we cut the cord, the acceleration of mass M is :



a) a = zero b) a = - 9.8 m/s^2

c) a = 4.9 m/s^2 d) a = 735 m/s^2

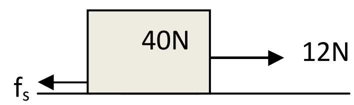
8. The coefficient of static friction μ_s = 0.4 between a 5 kg block and horizontal surface. The maximum horizontal force that can be applied to the block before it slips is:

a) 10 N b) 19.6 N c) 5.5 N d) 8.7 N

9. A 40-N box rests on a rough horizontal floor. A 12 N horizontal force is then applied to it but the box does not move. What is the magnitude of the frictional force on the box?

a) 28N b) 52N

c) 3.3N d) 12N



10. The two physical quantities measured in the same units are;

a) velocity and acceleration b) weight and force

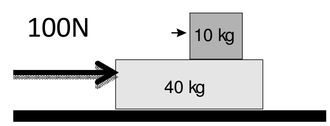
c) mass and weight d) force and mass

11. An 800 N person is standing in an elevator. If the normal force on the person is 600 N, the person is;

a) at rest b) accelerating upward c) accelerating downward

d) moving up at a constant speed

12. From the diagram; the acceleration of the two blocks is;



a) 1 m/s^2 b) 2 m/s^2

c) 30 m/s^2 d) 50 m/s^2

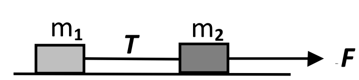
13. If the position of an object changes from $\vec{r}_1 = -2\hat{i} + 3\hat{j}$ to $\vec{r}_2 = \hat{i} - 2\hat{j}$, the displacement is:

a) $\Delta\vec{r} = 3\hat{i} + 5\hat{j}$ b) $\Delta\vec{r} = -\hat{\imath} - 5\hat{\jmath}$ c) $\Delta\vec{r} = -3\hat{i} - 5\hat{j}$ d) $\Delta\vec{r} = 3\hat{i} - 5\hat{j}$

14. Two masses m_1=2 kg, m_2= 4 kg situated on a frictionless horizontal surface are connected by a string. A force F = 12 N is exerted on m_2 as shown in fig. The acceleration of the system is

a) 4 m/s^2 b) 3 m/s^2

c) 2 m/s^2 d) 1 m/s^2



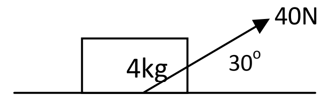
15. The position of a particle is given by $\vec{r}(t) = 25t\hat{\imath} + 4t^2\hat{\jmath}$, the instantaneous ***acceleration*** at t = 1 s is:

a) $(25\hat{\imath} + 8\hat{\jmath})$ m/s^2 b) $(25\hat{\imath} + 8t\hat{\jmath})$ m/s^2 c) 8 $\hat{\jmath}$ m/s^2 d) 2 m/s^2

16. A box, has mass of 4 kg, is pulled over a frictionless floor with a force of magnitude 40 N making an angle of 30^o above the horizontal. The normal force is:

a) 39.2 N b) 59.2 N

c) 19.2 N d) 40 N



17. If the net forces applied to a 5.0 kg box is 10 N, then the magnitude of the acceleration of the box is:

a) 0.50 m/s^2 b) 2.0 m/s^2 c) 2.8 m/s^2 d) 10 m/s^2

18. The angle that gives the maximum range for a projectile is:

a) $\theta=40^o$ b) $\theta=44^o$ c) $\theta=90^o$ d) $\theta=45^o$

19. A 400 N steel ball is suspended by a light rope from the ceiling. The tension in the rope is:

a) 400N b) 800N c) zero d) 200N

20. Which law says that force is equal to mass times acceleration (F=MA)?

a) Newton's first law of motion b) Newton's third law of motion

c) Newton's second law of motion d) none

21. A particle's displacement is given by $r_x= 4t^2+2$ and $r_y= 2t^3$. The velocity components are:

a) $v_x=8t$, $v_y= 6t^2$ b) $v_x=-8t$, $v_y= 6t$

c) $v_x=8t+2$, $v_y= 6t^2$ d) $v_x=4t$, $v_y= 0$

22. As in Newton's second law, acceleration is always in the direction:

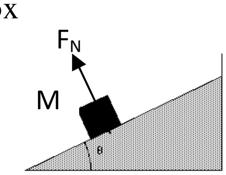
a) of the displacement b) of the final velocity

c) of the initial velocity d) of the net force

23. From the diagram; the magnitude of the normal force F_N acting on the box

a) Mg b) Mg cosθ

c) Mg sinθ d) M g tanθ



24. A car travels east at constant velocity. The net force on the car is;

a) east b) west c) up d) zero

25. The gravitational force of earth acting on a 1 kg is

a) 8.9N b) 9.8N c) 980N d) 1N

26. An 80 kg man stands on a scale in an elevator cab, if the cab accelerate upward with 1.2 m/s^2, the normal force (F_N) is;

a) 80 N b) 880 N c) zero N d) 680 N

27. Two forces act on a particle that moves with constant velocity, one of the forces is $\vec{F}_1 = 3\hat{i} - 5\hat{j}$ N, what is the other force?

a) $\vec{F}_2 = 3\hat{i} - 5\hat{j}$ b) $\vec{F}_2 = 5\hat{i} - 8\hat{j}$ c) $\vec{F}_2 = -3\hat{i} + 5\hat{j}$ d) $\vec{F}_2 = -5\hat{i} + 8\hat{j}$

28. A 10 N horizontal force pushes a block of weight 50 N to make it move with constant speed, the value of the coefficient of friction μ_k is;

a) 0.2 b) 0.4 c) 0.5 d) 0.10

29. A man of mass 72 kg stands on a scale in an elevator cab. What does the scale read if the cab is not moving?

a) 21 N b) 200 N c) 705.6 N d) 0

30. The y component of a vector **A;** (A_y) is given by:

a) A tan θ b) A sin θ c) A cos θ d) A cot θ

31. A ball in projectile motion at the highest point,

a) $v_y = 0$ and $v_x =$ constant
b) $v_y =$ constant and $v_x = 0$
c) $v_y =$ constant and $v_x =$ constant
d) $v_y = 0$. and $v_x = 0$

32. A girl weighs 489 N on Earth. Her mass is;

a) 489 kg b) 9.8 kg c) 0 kg d) 50 kg

33. In Newton's third law the action and reaction forces are;

a) Both forces are equal and opposite in direction.
b) Both are in the same direction.
c) The action force is greater than the reaction force.
d) The reaction force is greater than the action force.

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

First Term
1432-1433 H

Date: 10/ 1/ 1433H

A

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A girl of mass 50 kg standing in a stationary elevator, her **weight** is:

   a) 490 N b) 550 N c) 245 N d) 392 N

   $W = mg$
   $W = 50 \times 9.8 = 490$ N

2. Three forces act on a 2 kg object give it an acceleration $\vec{a} = -8\hat{i} + 6\hat{j}$. if $\vec{F}_1 = 30\hat{i} + 16\hat{j}$ and $\vec{F}_2 = -12\hat{i} + 8\hat{j}$ the **third force** is

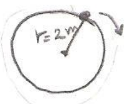
   a) $\vec{F}_3 = 34\hat{i} + 12\hat{j}$
   b) $\vec{F}_3 = -34\hat{i} - 12\hat{j}$
   c) $\vec{F}_3 = -30\hat{i} - 6\hat{j}$
   d) $\vec{F}_3 = 8\hat{i} - 16\hat{j}$

   $\Sigma F = ma$
   $F_1 + F_2 + F_3 = ma$
   $30\hat{i} + 16\hat{j} + (-12\hat{i}) + 8\hat{j} + F_3 = 2(-8\hat{i} + 6\hat{j})$
   $18\hat{i} + 24\hat{j} + F_3 = -16\hat{i} + 12\hat{j}$
   $F_3 = -34\hat{i} - 12\hat{j}$

3. A particle in uniform circular motion of radius r = 2m moved one period. **The distance that the particle travelled** in meters is:

   a) 4π b) 2π c) π d) 3π

   المسافة المقطوعة $= 2\pi r = 4\pi$



4. A particle is said to be in uniform circular motion if

   a) its velocity has a constant magnitude
   b) its velocity has a constant direction
   c) its velocity is directed towards the center
   d) its velocity equals zero

5. 10.3 N is **equal to**

   a) $10.3\frac{kg.m}{s^2}$ b) $10.3\frac{kg.m^2}{s^2}$ c) $10.3\frac{kg^2.m^2}{s^2}$ d) $10.3\frac{kg.m}{s}$

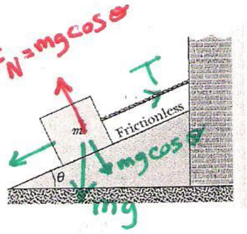
   $F = ma$
   $N = kg\,m/s^2$
   $10.3\,N = 10.3\,\frac{kg.m}{s^2}$

6. At the maximum height of a projectile, **what of the following is correct**?

a) Its velocity is zero
b) Its y-component velocity is zero
c) Its x-component velocity is zero
d) Its acceleration is zero

Use the following to answer questions 7-9:

In the figure, a cord holds stationary a block of mass m = 8.5 kg on a frictionless plane that is inclined at an angle $\theta = 30^0$.



$T - mg\sin\theta = ma$, $a = 0$

$T = mg\sin\theta$

$= 8.5(9.8)\sin 30$

7. The **tension in the cord T equals:**

a) 72.14 N b) 83.3 N c) 53.14 N d) 41.65 N

8. The **normal Force F_N** acting on the block is

$F_N = mg\cos\theta = 8.5(9.8)\cos 30 = 72.14\ N$

a) 53.14 N b) 41.65 N c) 83.3 N d) 72.14 N

9. If the cord is cut, the magnitude of the **acceleration** of the block is

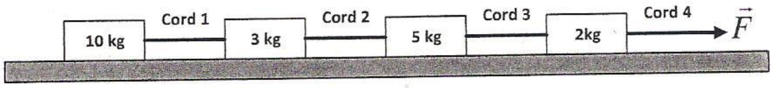
$T = 0$, $T - mg\sin\theta = ma$, $-mg\sin\theta = ma$, $a = g\sin\theta = 9.8\sin 30$

a) zero b) 4.9 m/s^2 c) 6 m/s^2 d) 4 m/s^2

10. A bag rests on a table, exerting a downward force on the table. The **reaction to this force is:**

a) The force of Earth on the bag
b) The force of the table on the bag
c) The force of the Earth on the table
d) The force of the bag on Earth

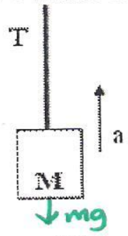
11. The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F} = 60N$, what is the **magnitude** of the system's **acceleration?**



a) 3 m/s² b) 6 m/s² c) 12 m/s² d) 20 m/s²

$F = ma$
$a = \frac{F}{m}$
$a = \frac{60}{10+3+5+2}$
$a = \frac{60}{20} = 3 m/s^2$

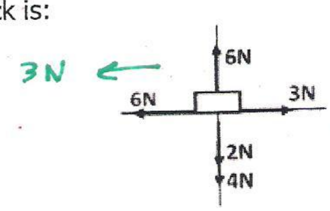
12. The cable in the figure is raising a box of mass M = 250 kg with an upward acceleration of 4 m/s². **The tension T** in the cable is



a) 863 N b) 1725 N c) 3450 N d) 6900

$F_{net} = ma$
$T - mg = ma$
$T = ma + mg$
$T = m(a+g)$
$T = 250(4+9.8)$

13. In the figure the **net force** on the block is:



a) 1 N -right b) 6 N -up c) 3 N -left d) 4 N -down

باهمال مقاومة الهواء

14. Ignoring air resistance, the **acceleration** of any projectile along the x-direction a_x in (SI units) is $a_x = 0$

a) 9.8 m/s² b) zero c) not constant d) less than zero

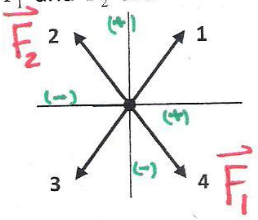
15. Three forces $\vec{F}_1 = 3\hat{i} - 4\hat{j}$, $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ and $\vec{F}_3 = -6\hat{j}$ acting on a body, **the value of $F_{net,x}$** and **$F_{net,y}$** are:

a) $F_{net,x}$= 6 N and $F_{net,y}$ = -8 N
b) $F_{net,x}$= -6 N and $F_{net,y}$ = 8 N
c) $F_{net,x}$= 0 and $F_{net,y}$ = -6 N
d) $F_{net,x}$= 9 N and $F_{net,y}$ = 16 N

$F_{net,x} = (3-3+0) = 0 N$

$F_{net,y} = (-4+4-6) = -6 N$

16. Two forces $\vec{F}_1 = 3\hat{i} - 4\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body, from the free body diagram the vectors that represent $\vec{F}_1$ and $\vec{F}_2$ are



a) $\vec{F}_1$ is vector **1** , $\vec{F}_2$ is vector **3**

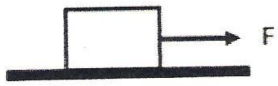
b) $\vec{F}_1$ is vector **2** , $\vec{F}_2$ is vector **4**

c) $\vec{F}_1$ is vector **3** , $\vec{F}_2$ is vector **1**

d) $\vec{F}_1$ is vector **4** , $\vec{F}_2$ is vector **2**

Use the following to answer questions 17-20:

A block lies on a floor as shown in the figure



17. The **magnitude of the frictional force** on it from the floor when F = 0

a) 0 b) 5 N c) 20 N d) 8 N

18. When F pulls the block to the right with an acceleration a_x , **The coefficient of Kinetic friction** μ_K is:

a) $\mu_k = \frac{F - ma_x}{F_N}$ b) $\mu_k = \frac{F_N}{F - ma_x}$ c) $\mu_k = \frac{ma_x}{F_N}$ d) $\mu_k = \frac{ma_x - F}{F_N}$

19. The **magnitude of the frictional force** on it from the floor when **F = 8 N** ,but the block does not move

a) 0 b) 5 N c) 20 N d) 8 N

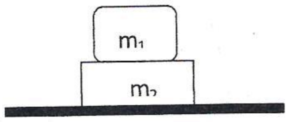
20. If the maximum static frictional force $f_{s,max}$= 20 N ,**the block will move to the right when F is equal to**

a) 21 N b) 15 N c) 19 N d) 12 N

21. A car moves in a circular road of radius r = 7.6 m with a speed 96.6 km/h, the car's **acceleration** is:

a) 18.4×10^3 km/h^2
b) 12.3×10^5 km/h^2
c) 20.7×10^3 km/h^2
d) 15.8×10^2 km/h^2

22. Two boxes m_1=10 kg and m_2=15 kg, **the gravitational force (Fg) on m_2** is



a) 25 N b) 245 N c) 2450 N d) 5 N

23. The position vector of a moving car in meters is: $\vec{r} = (3t^3)\hat{i} + (4t^2+3)\hat{j}$, its **acceleration** at **t = 1** s is:

a) $\vec{a} = 18\hat{i} + 8\hat{j}$ b) $\vec{a} = 8\hat{i} + 18\hat{j}$ c) $\vec{a} = 9\hat{i} + 18\hat{j}$ d) $\vec{a} = 9\hat{i} + 8\hat{j}$

24. The position of a moving particle is $\vec{r} = \hat{i} + 4t^2\,\hat{j} + t\,\hat{k}$, its **velocity** as a function of time is;

a) $\vec{v} = 8\hat{j}$ b) $\vec{v} = 8t\,\hat{j} + \hat{k}$ c) $\vec{v} = \hat{i} + 8t\,\hat{j} + \hat{k}$ d) $\vec{v} = 8t\,\hat{j}$

25. According to Newton's second law, the **force and acceleration** are:

a) in the opposite direction.
b) in the same direction.
c) perpendicular to each other.
d) scalar quantities.

26. The position of a particle was initially at $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and later at $\vec{r} = -2\hat{i} + 6\hat{j} + 2\hat{k}$. The particle's **displacement vector** is:

a) $\Delta\vec{r} = -7\hat{i} + 12\hat{j}$
b) $\Delta\vec{r} = 3\hat{i} + 4\hat{j}$
c) $\Delta\vec{r} = 7\hat{i} - 12\hat{j}$
d) $\Delta\vec{r} = 3\hat{i} + 12\hat{j} + 4\hat{k}$

$t = 10$, $X = -2(10)^2 + 10(10) + 30 = -200 + 100 + 30 = -70$

27. A rabbit runs across a field. The coordinates of the rabbits position as a function of time are given by: $x = -2t^2 + 10t + 30$, and $y = t^2 - 5t + 10$ **at t = 10 s** the **position vector** $\vec{r}$ is:

$Y = (10)^2 - 5(10) + 10 = 100 - 50 + 10 = 60$

a) $\vec{r} = 70\hat{i} - 60\hat{j}$ c) $\vec{r} = -60\hat{i} + 70\hat{j}$

b) $\vec{r} = 60\hat{i} - 70\hat{j}$ d) $\vec{r} = -70\hat{i} + 60\hat{j}$

Use the following to answer questions 28-30:

A ball rolls horizontally off the top of a building with a speed of 30 m/s. If the ball landed on the ground in a time t = 3.03 s

$\theta = 0$, $V_{ox} = 30$ m/s, $t = 3.03$ s

$t = \sqrt{\frac{2h}{g}}$, $t^2 = \frac{2h}{g} \Rightarrow h = \frac{g t^2}{2} = \frac{9.8(3.03)^2}{2} = 45$ m

28. The **height of the building** from the ground is

a) 45 m b) 14.8 m c) 90 m d) 22 m

29. At what **horizontal distance** from the rolling point does the projectile strikes the ground

$X - X_o = V_{ox} t = 30(3.03) = 90.9$ m

a) 9.9 m b) 90.9 m c) 0.9 m d) 99 m

30. What is the magnitude of **the vertical component of its velocity** as it strikes the ground

$\sin 0 = 0$

$V_y = V_o \sin\theta_o - gt$

$V_y = 0 - 9.8(3.03)$

$|V_y| = 29.7$ m/s

a) 2.9 m/s b) 0.31 m/s c) 3.2 m/s d) 29.7 m/s

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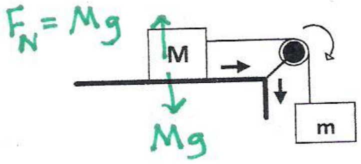
31. A block of mass M is connected to a block of mass m as shown. The **normal force on block M** is:



a) $F_N = Mg$ b) $F_N = Mg - T$ c) $F_N = mg - T$ d) $F_N = mg$

$\vec{v}_{avg} = \frac{r_2 - r_1}{t_2 - t_1} = \frac{24\hat{i} - (-10)\hat{k}}{2}$

32. A particle moves from $\vec{r}_1 = (-10m)\hat{k}$ to $\vec{r}_2 = (24m)\hat{i}$ in 2 s. Its **average velocity** is:

a) $\vec{v}_{avg} = \left(24\frac{m}{s}\right)\hat{i} + \left(10\frac{m}{s}\right)\hat{k}$

b) $\vec{v}_{avg} = \left(12\frac{m}{s}\right)\hat{i} + \left(5\frac{m}{s}\right)\hat{k}$

c) $\vec{v}_{avg} = \left(-10\frac{m}{s}\right)\hat{i} + \left(24\frac{m}{s}\right)\hat{k}$

d) $\vec{v}_{avg} = \left(-5\frac{m}{s}\right)\hat{i} + \left(12\frac{m}{s}\right)\hat{k}$

33. A force F is applied to an object of mass $m_1 = 45$ kg produces an acceleration of 2 m/s^2. The same force is applied to a second object of mass m_2 produces an acceleration of 1.5 m/s^2. **The value of m_2** is

a) 45 kg b) 60 kg c) 30 kg d) 67 kg

$F_1 = F_2$

$m_1 a_1 = m_2 a_2$

$45 \times 2 = m_2 \times 1.5$

$m_2 = \frac{45 \times 2}{1.5}$

$= 60 kg$

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

First Term
1432-1433 H

Date: 10/ 1/ 1433H

A

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A girl of mass 50 kg standing in a stationary elevator, her **weight** is:

   a) 490 N **b)** 550 N **c)** 245 N **d)** 392 N

2. Three forces act on a 2 kg object give it an acceleration $\vec{a} = -8\hat{i} + 6\hat{j}$. if $\vec{F}_1 = 30\hat{i} + 16\hat{j}$ and $\vec{F}_2 = -12\hat{i} + 8\hat{j}$ the **third force** is

   a) $\vec{F}_3 = 34\hat{i} + 12\hat{j}$
   b) $\vec{F}_3 = -34\hat{i} - 12\hat{j}$
   c) $\vec{F}_3 = -30\hat{i} - 6\hat{j}$
   d) $\vec{F}_3 = 8\hat{i} - 16\hat{j}$

3. A particle in uniform circular motion of radius r = 2m moved one period. **The distance that the particle travelled** in meters is:

   a) 4π **b)** 2π **c)** π **d)** 3π

4. A particle is said to be in uniform circular motion if

   a) its velocity has a constant magnitude
   b) its velocity has a constant direction
   c) its velocity is directed towards the center
   d) its velocity equals zero

5. 10.3 N is **equal to**

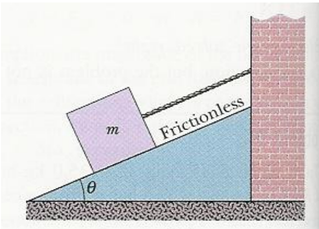
   a) $10.3\frac{kg.m}{s^2}$ **b)** $10.3\frac{kg.m^2}{s^2}$ **c)** $10.3\frac{kg^2.m^2}{s^2}$ **d)** $10.3\frac{kg.m}{s}$

6. At the maximum height of a projectile, **what of the following is correct**?

a) Its velocity is zero
b) Its y-component velocity is zero
c) Its x-component velocity is zero
d) Its acceleration is zero

Use the following to answer questions 7-9:

In the figure, a cord holds stationary a block of mass m = 8.5 kg on a frictionless plane that is inclined at an angle $\theta = 30^0$.



7. The **tension in the cord T equals:**

a) 72.14 N b) 83.3 N c) 53.14 N d) 41.65 N

8. The **normal Force F_N** acting on the block is

a) 53.14 N b) 41.65 N c) 83.3 N d) 72.14 N

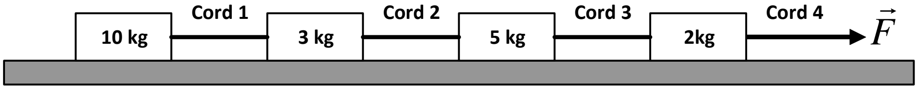
9. If the cord is cut, the magnitude of the **acceleration** of the block is

a) zero b) 4.9 m/s^2 c) 6 m/s^2 d) 4 m/s^2

10. A bag rests on a table, exerting a downward force on the table. The **reaction to this force is:**

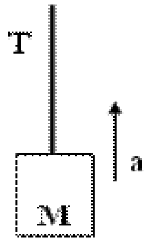
a) The force of Earth on the bag
b) The force of the table on the bag
c) The force of the Earth on the table
d) The force of the bag on Earth

11. The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F} = 60N$, what is the **magnitude** of the system's **acceleration?**



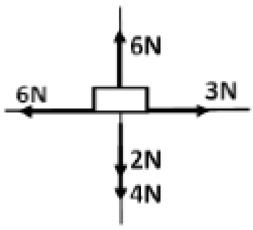
a) 3 m/s^2 **b)** 6 m/s^2 **c)** 12 m/s^2 **d)** 20 m/s^2

12. The cable in the figure is raising a box of mass M = 250 kg with an upward acceleration of 4 m/s^2. **The tension T** in the cable is



a) 863 N **b)** 1725 N **c)** 3450 N **d)** 6900

13. In the figure the **net force** on the block is:



a) 1 N -right **b)** 6 N -up **c)** 3 N -left **d)** 4 N -down

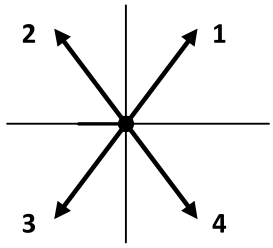
14. Ignoring air resistance, the **acceleration** of any projectile along the x-direction a_x in (SI units) is

a) 9.8 m/s^2 **b)** zero **c)** not constant **d)** less than zero

15. Three forces $\vec{F}_1 = 3\hat{i} - 4\hat{j}$, $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ and $\vec{F}_3 = -6\hat{j}$ acting on a body, **the value of $F_{net,x}$** and **$F_{net,y}$** are:

a) $F_{net,x}$= 6 N and $F_{net,y}$ = -8 N
b) $F_{net,x}$= -6 N and $F_{net,y}$ = 8 N
c) $F_{net,x}$= 0 and $F_{net,y}$ = -6 N
d) $F_{net,x}$= 9 N and $F_{net,y}$ = 16 N

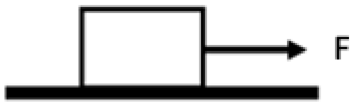
16. Two forces $\vec{F}_1 = 3\hat{i} - 4\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body, from the free body diagram the vectors that represent $\vec{F}_1$ and $\vec{F}_2$ are



a) $\vec{F}_1$ is vector **1** , $\vec{F}_2$ is vector **3**
b) $\vec{F}_1$ is vector **2** , $\vec{F}_2$ is vector **4**
c) $\vec{F}_1$ is vector **3** , $\vec{F}_2$ is vector **1**
d) $\vec{F}_1$ is vector **4** , $\vec{F}_2$ is vector **2**

Use the following to answer questions 17-20:

A block lies on a floor as shown in the figure



17. The **magnitude of the frictional force** on it from the floor when **F = 0**

a) 0 **b)** 5 N **c)** 20 N **d)** 8 N

18. When F pulls the block to the right with an acceleration a_x , **The coefficient of Kinetic friction** μ_K is:

a) $\mu_k = \frac{F - ma_x}{F_N}$ **b)** $\mu_k = \frac{F_N}{F - ma_x}$ **c)** $\mu_k = \frac{ma_x}{F_N}$ **d)** $\mu_k = \frac{ma_x - F}{F_N}$

19. The **magnitude of the frictional force** on it from the floor when **F = 8 N** ,but the block does not move

a) 0 **b)** 5 N **c)** 20 N **d)** 8 N

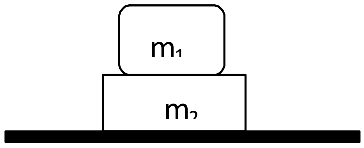
20. If the maximum static frictional force $f_{s,max}$= 20 N ,**the block will move to the right when F is equal to**

a) 21 N **b)** 15 N **c)** 19 N **d)** 12 N

21. A car moves in a circular road of radius r = 7.6 m with a speed 96.6 km/h, the car's **acceleration** is:

a) 18.4×10^3 km/h^2
b) 12.3×10^5 km/h^2
c) 20.7×10^3 km/h^2
d) 15.8×10^2 km/h^2

22. Two boxes m_1=10 kg and m_2=15 kg, **the gravitational force (Fg) on m_2** is



a) 25 N **b)** 245 N **c)** 2450 N **d)** 5 N

23. The position vector of a moving car in meters is: $\vec{r} = \left(3t^3\right)\hat{i} + \left(4t^2 + 3\right)\hat{j}$, its **acceleration** at **t = 1** s is:

a) $\vec{a} = 18\hat{i} + 8\hat{j}$ **b)** $\vec{a} = 8\hat{i} + 18\hat{j}$ **c)** $\vec{a} = 9\hat{i} + 18\hat{j}$ **d)** $\vec{a} = 9\hat{i} + 8\hat{j}$

24. The position of a moving particle is $\vec{r} = \hat{i} + 4t^2\ \hat{j} + t\ \hat{k}$, its **velocity** as a function of time is;

a) $\vec{v} = 8\hat{j}$ **b)** $\vec{v} = 8t\ \hat{j} + \hat{k}$ **c)** $\vec{v} = \hat{i} + 8t\ \hat{j} + \hat{k}$ **d)** $\vec{v} = 8t\ \hat{j}$

25. According to Newton's second law, the **force and acceleration** are:

a) in the opposite direction.
b) in the same direction.
c) perpendicular to each other.
d) scalar quantities.

26. The position of a particle was initially at $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and later at $\vec{r} = -2\hat{i} + 6\hat{j} + 2\hat{k}$. The particle's **displacement vector** is:

a) $\Delta\vec{r} = -7\hat{i} + 12\hat{j}$
b) $\Delta\vec{r} = 3\hat{i} + 4\hat{j}$
c) $\Delta\vec{r} = 7\hat{i} - 12\hat{j}$
d) $\Delta\vec{r} = 3\hat{i} + 12\hat{j} + 4\hat{k}$

27. A rabbit runs across a field. The coordinates of the rabbits position as a function of time are given by: $x = -2t^2 + 10t + 30$, and $y = t^2 - 5t + 10$ **at t = 10 s** the **position vector** $\vec{r}$ is:

a) $\vec{r} = 70\hat{i} - 60\hat{j}$

b) $\vec{r} = 60\hat{i} - 70\hat{j}$

c) $\vec{r} = -60\hat{i} + 70\hat{j}$

d) $\vec{r} = -70\hat{i} + 60\hat{j}$

Use the following to answer questions 28-30:

A ball rolls horizontally off the top of a building with a speed of 30 m/s. If the ball landed on the ground in a time t = 3.03 s

28. The **height of the building** from the ground is

a) 45 m **b)** 14.8 m **c)** 90 m **d)** 22 m

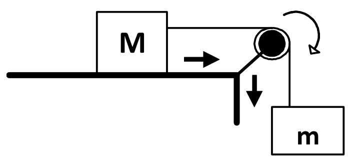
29. At what **horizontal distance** from the rolling point does the projectile strikes the ground

a) 9.9 m **b)** 90.9 m **c)** 0.9 m **d)** 99 m

30. What is the magnitude of **the vertical component of its velocity** as it strikes the ground

a) 2.9 m/s **b)** 0.31 m/s **c)** 3.2 m/s **d)** 29.7 m/s

31. A block of mass M is connected to a block of mass m as shown. The **normal force on block M** is:



a) $F_N = M g$ **b)** $F_N = M g - T$ **c)** $F_N = m g - T$ **d)** $F_N = m g$

32. A particle moves from $\vec{r}_1 = (-10m)\hat{k}$ to $\vec{r}_2 = (24m)\hat{i}$ in 2 s. Its **average velocity** is:

a) $\vec{v}_{avg} = \left(24\frac{m}{s}\right)\hat{i} + \left(10\frac{m}{s}\right)\hat{k}$

b) $\vec{v}_{avg} = \left(12\frac{m}{s}\right)\hat{i} + \left(5\frac{m}{s}\right)\hat{k}$

c) $\vec{v}_{avg} = \left(-10\frac{m}{s}\right)\hat{i} + \left(24\frac{m}{s}\right)\hat{k}$

d) $\vec{v}_{avg} = \left(-5\frac{m}{s}\right)\hat{i} + \left(12\frac{m}{s}\right)\hat{k}$

33. A force F is applied to an object of mass m_1= 45 kg produces an acceleration of 2 m/s^2. The same force is applied to a second object of mass m_2 produces an acceleration of 1.5 m/s^2. **The value of m_2** is

a) 45 kg **b)** 60 kg **c)** 30 kg **d)** 67 kg

Answer Key

1. a
2. b
3. a
4. a
5. a
6. b
7. d
8. d
9. b
10. b
11. a
12. c
13. c
14. b
15. c
16. d
17. a
18. a
19. d
20. a
21. b
22. b
23. a
24. b
25. b
26. a
27. d
28. a
29. b
30. d
31. a
32. b
33. b

A

جامعة الملك عبد العزيز/ كلية العلوم/ قسم الفيزياء

اختبار الدوري الثاني للفيزياء 110 -- زمن الأختبار 90 دقيقة

1431/6/4هـ

الشعبة:	الرقم الجامعي:	أسم الطالب:

Q1-1. If the position of an object changes from $\vec{r}_1 = -2\hat{i} + 3\hat{j}$ to $\vec{r}_2 = \hat{i} - 2\hat{j}$, the displacement is:

A) $\Delta\vec{r} = 3\hat{i} + 5\hat{j}$ B) $\Delta\vec{r} = -\hat{\imath} - 5\hat{\jmath}$ C) $\Delta\vec{r} = -3\hat{i} - 5\hat{j}$ D) $\Delta\vec{r} = 3\hat{i} - 5\hat{j}$

Q2-A projectile is launched at an angle of 30^0 to the horizontal with a speed of 100 *m/s.* The maximum height of the projectile is :

A) 100m B) 127.55 m C) 250 m D) 44.0 m

Q3- Referring to Q2, the range of the projectile is:

A) 88.37 m B) 383 m C)8.8 m D) 883.69 m

Q4- Referring to Q2, its time of flight is:

A) 10.2 s B) 25.2 s C) 6.04 s D) 5.02 s

Q5. A man throws a stone horizontally off a cliff that is 40 m above the sea level. If the velocity of the stone is 30 m/s, the time it takes to hit the sea level is:

A) 3.49 s B) 4 s C) 2.85 s D) 6 s

Q6- An object was fired with an angle 30^0 with the horizontal with a speed of 80 m/s . The vertical component of the velocity is:

A) 40 m/s B) 4.0 m/s C) 15 m/s D) 35 m/s

Q7- An object is in equilibrium, the acceleration of the object is:

A) 9.8 m/s^2 B) -9.8 m/s^2 C) Zero D) Constant

Q8- If a body sliding down on an incline smooth plane. The force causing the body to slide is:

A) mg sin θ B) mg cos θ C) mg tan θ D) mg

Q9- An object weighing 600 N is pulled up a frictionless inclined plan of an angle of 30^0at a constant velocity. The force causing the motion is:

A) 200 N B) 245 N C) 520 N D) 300 N

Q10- A body moves in a circular orbit with constant velocity. Its acceleration is:

A) zero B) in the direction of the tangent

C) toward the center D) outward, of the center

Q11- A car travels in a circular track of 200 m in circumference at a constant velocity of 18 m/s . The radial acceleration of the car is:

A) 8.37 m/s^2 B) 12.8 m/s^2 C) 7.31 m/s^2 D) 10.2 m/s^2

Q.12 In figure(1) a block of mass m =1 kg hangs from the ceiling by means of two cords. The angle between each cord and the ceiling is 60^0. The tension in the right cord is:

A) 56.6 N B) 28.65 N C)20.63 N D)5.66N

A

A) 3.26 B) 1.25 C) 1.09 D) 1.9

Q14- A force of 50 N pulls a 5 kg crate up an inclined rough surface with angle30°. If the coefficient of friction $\mu_k = 0.5$, the acceleration of the crate is:

A) 0.6 m/s^2 B) 1.2 m/s^2 C) 0.86 m/s^2 D) 1.39 m/s^2

Q15- An object weighing 24 N is placed on a 30^0 slope as shown in figure (3). The normal force is:

A) 20.78 N B) 17.02N C) 23.02 N D) 24.78 N

Q16- Referring to Q15, the force preventing the object from moving is:

A) 8.38 N B) 12 N C) 10 N D) Zero

Q17- Weight of 50 N is supported by a rod and a cable as shown in figure (4). The tension (T_1) is:

A) 45.77 N B) 138.59 N C) 77.78 N D) 87.77 N

Q18- The coefficient of static friction μ_s of inclined plane depends on:

A) angle B) mass C)velocity D) acceleration

Q19- A projectile is fired with a velocity of 80 m/s at an angle of θ to the horizontal. If the vertical component of the initial velocity was 60 m/s, the angle θ is:

A) 48.6^0 B) 54.5^0 C) 32.23^0 D) 20^0

Q20- A bullet is fired horizontally from the roof of a building with a velocity of 850 m/s. Its height in 3.0 s is:

A) 29.4 m B) - 44.1 m C) -100 m D) 19.60 m

Q21- Referring to Q21, If the building is 100 m height, the time for the bullet to reach the ground is:

A) 3.13 s B) 81.32 s C) 4.52 s D) 20.41 s

Q22- A ball kicked with a velocity of 15 m/s and with an angle of θ from the horizontal. The maximum range is:

A) 25.85 m B) 40.82m C) 50.20 m D) 22.96 m

Q23- A man weighing 800 N is standing in an elevator moving with a constant velocity. The force exerted by the man on the floor of the elevator is:

A) less than 80 N B) 800 N C)between 80 and 800 N D) more than 800 N

Q24- A 25 kg box is pushed across a frictionless horizontal floor with a force of 30 N, directed 20° below the horizontal. The acceleration of the box is:

A) 1.13 m/s^2 B)1 .5 m/s^2 C) 2.82 m/s^2 D) 0.75 m/s^2

Q25- Referring to Q24, the normal force acting on the ground by the box is:

A) 108.26 N B) 25 N C) 255.26 N D) 125 N

Q26- A car moves in a circular road of radius 120 m. If μ_s= 0.5, then the maximum speed of the car without sliding is:

A)24.25 m/s B) 22.1m/s C)19.79 m/s D) 17.15 m/s

Q27- A car of mass 1050 kg is traveling at 72 km/h on a curved road with radius of 60 m. The force of friction needed to prevent the car from sliding is:

A) 6800 N B) 5124.1 N C) 7000 N D) 6600 N

A

Q28- A block of mass 80 kg is moving along a rough horizontal surface with a coefficient of kinetic friction equal 0.2. If its initial speed is14 m/s, the block will stop after covering a distance:

A) 57.39 m B) 50.0 m C) 106.3 m D) 33.33 m

Q29- Two masses m_1=2 kg, m_2 = 4 kg situated on a frictionless horizontal surface are connected by a string. A force F = 12 N is exerted on m_2 as shown in fig. (5). The acceleration of the system is

A) 4 m/s^2 **B)** 3 m/s^2 C) 2 m/s^2 D) 1 m/s^2

Q 30- A 25 kg block moves with an initial velocity of 25 m/s on a frictionless surface. The block came to rest by the effect of an external force F=-235i N. The distance the block moved is:

A) 76.1 m B) 266.66 m C) 33.24 m D) 14.6 m

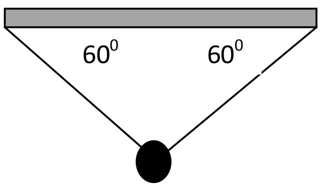


Fig (1)

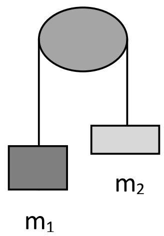


Fig. 2

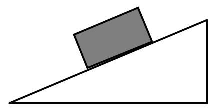


Fig. (3)

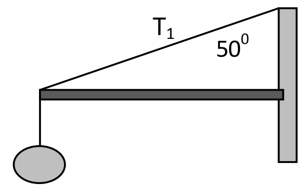


Fig. (4)

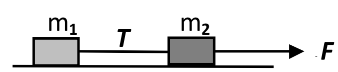


Fig. 5

Referring	العودة الى	Tension	الشد	Ceiling	سقف
Skier	متزلج على الثلج	Launched	اطلقت	Hang	معلق
Vertically	عامودي	Elevator	مصعد	Prevent	يمنع
Circumference	محيط الدائرة	Circular	دائري	Tangent	مماس
Crate	صندوق	Rough	خشن	Cliff	جرف بحري
Radius	نصف قطر	Coefficient	معامل	Friction	الاحتكاك
Sliding	ينزلق	Static	السكوني	causing	المسبب للحركة
Radial	دائري	Kinetic	الحركي	equilibrium	متزن
Support	يدعم	Rod	قضيب	Situated	موضوع على

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1- In the projectile motion, the y-component of the velocity at the maximum height is:
(a)Zero (b) constant (c) the maximum value (d) Negative

2- In the projectile motion, the x-component of the velocity is:
(a) $v_0 \sin\theta$ (b) $-v_0 \sin\theta$ (c) $v_0 \cos\theta$ (d) $-v_0 \tan\theta$

3- In the projectile motion, the angle for the maximum range is:
(a)90^0 (b) 75^0 (c) 180^0 (d) 45^0

4- In the projectile motion, the maximum range is:
(a) $\frac{v_0^2}{g}(\cos 2\theta)$ (b) $\frac{v_0^2}{g}$ (c) $\frac{v_0}{g}$ (d) $\frac{v_0^2}{g}(\cos\theta)^2$

5-A body move with a velocity $\vec{v} = 2\hat{i} - 3\hat{j}\ \ m/s$ and acceleration $\vec{a} = 2\hat{i} + \hat{j}\ \ m/s^2$.The velocity after 2s (in SI unit) is:
(a) $\vec{v} = 6\hat{i} - \hat{j}$ (b) $\vec{v} = 6\hat{i} + \hat{j}$ (c) $\vec{v} = -6\hat{i} - \hat{j}$ (d) $\vec{v} = +6\hat{i} + \hat{j}$

6-A ball is thrown with a velocity of 15 m/s at an angle of 30^0. The y-component of the velocity is :
(a)30 m/s (b) 7.5 m/s (c)15 m/s (d) 13m/s

7- In question (6), the x-component of the velocity is:
(a)30 m/s (b) 7.5 m/s (c)15 m/s (d) 13m/s

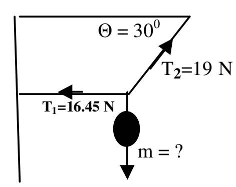
8- In question (6), the maximum height is :
(a)2870m (b)287m (c)2.87 m (d) 28.7 m

9- In question (6), the range is:
(a) 19.88 m (b)198.8 m (c) 1988 m (d) 1.988 m

10- In question (6), the time of flight is:
(a)0.015 s (b)0.15 s (c) 15 s (d) 1.5 s

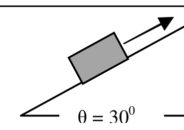
11- A boy hold a rope of 30 cm long, from one end and the other end a stone, he rotate the stone in a horizontal circle with speed of 3 m/s. The acceleration of the stone is:
(a) 0.03 m/s^2 (b) 30 m/s^2 (c)3.0 m/s^2 (d) 300 m/s^2

12- A man stand on the ground level, if his mass is 80 kg, his weight is:
(a) 7.84 N (b)784 N (c) 78.4 N (d)7840 N



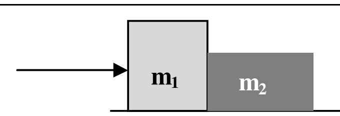
13- A body of mass m, is hung by the ropes, at equilibrium, as shown in the figure. The value of mass is:
(a) 950 kg (b) 0.97 kg (c) 9.5 kg (d) 95 kg

14- The force needed to keep the mass (m=20 kg) at rest , as shown in the figure, the force is:
(a) 98 N (b)980 N (c)9.8 N (d)0.98 N



15- In question (14), the normal force on the body is:
(a) 1.69 N (b) 10.0 N (c) 16.97 N (d) 169.7 N

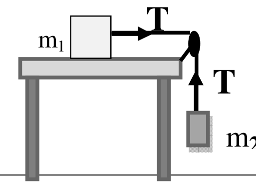
16- From the figure m_1=20kg and m_2 =10 kg. The force acting to accelerate the two bodies by 2 m/s^2, the force is:
(a) 60 N (b) 6.0 N (c)600 N (d)0.06 N



17- A racing car of mass 600 kg moves is decelerated by 4.5 m/s^2 using the brakes, the frictional force is:
(a) 225 N (b)0.225 N (c)2700 N (d) 2.25 N

18- In the figure shown, if m_1=5kg and the system move with acceleration of 2 m/s^2 and the tension in the rope was 10 N. The value of m_2 is:

(a)2.5 kg (b)1.28 kg (c)8.0 kg (d)50 kg

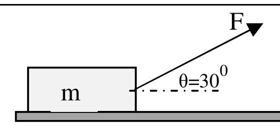


19- In question (18), the normal force on the m_1 is:

(a) 0.49 N (b) 490 N (c) 4.9 N (d) 49 N

20- A block of mass 10 kg, was pulled by a force 30 N, the block was going with a constant speed (as shown in the figure) on a rough surface. The friction force is:

(a)25.98 N (b)259.8 N (c) 2.598 N (d) 0.2598N

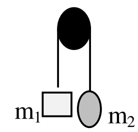


21- A space satellite moves in a circular orbit around the earth, at altitude of 530 km and with speed of 8.2 km/s. The acceleration of the satellite is: (the earth radius 6.37×10^6m)

(a) 0.974 m/s^2 (b)3 m/s^2 (c)9.74 m/s^2 (d)5.5 m/s^2

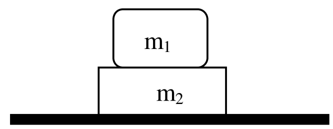
22- In the figure shown two bodies are hung by a rope over a frictionless pulley. If m_1=3 kg and m_2= 1.5 kg. the acceleration of the two bodes is:

(a) 2.7 m/s^2 (b) 0.327 m/s^2 (c) 7.27 m/s^2 (d)3.27 m/s^2



23- Two boxes m_1=10 kg and m_2=15 kg, the gravitational force on m_2 is

(a)25 N (b)245 N (c)2450 N (d)5 N



24- In question 23, the gravitational force on m_1 is:

(a)0.98 N (b)9.8 N (c)98 0 N (d)98 N

25- A man of mass 80 kg stand on elevator, if the elevator is going upward with acceleration of 2 m/s^2, the apparent weight of the man is:

(a)944 N (b)80 N (c)44 N (d)9.8 N

26- In question (25), if the elevator is going with constant velocity 5 m/s, the weight of the man is:

(a) 80 N (b)7.84 N (c)784 N (d)78.4 N

27- A box stands on rough incline plane of 30^0, when just about to move, the static coefficient of friction is:

(a) 1.00 (b) 5.8 (c) Zero (c) 0.58

28- A box stands on rough incline plane of θ, the box is moving with a constant velocity, the frictional force is:

(a) mg sin θ (b) mg tan θ (c) mg cos θ (d) mg

29- A box of mass 5 kg is sliding down with a constant velocity on a rough incline surface at an angle 20^0 with the horizontal. The kinetic friction coefficient is:

(a) 0.1 (b) 2.6 (c)0.36 (d) 1.00

30- A car was going in a circular road with a radius of 50m with constant velocity of 25 m/s, the static friction coefficient is:

(a) 0.816 (b) 0.1 (c) 1.00 (d) 1.27

Referring	العودة الى	Initial	ابتدائي	Hitting	اصطدم
Thrown	قذف	altitude	إرتفاع عن سطح الارض	Magnitude	القيمة العددية
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Sliding	ينزلق	Static	السكوني	Floor	الارض
Upward	إلى اعلى	Kinetic	الحركي	Stand	يقف

(A) جامعة الملك عبد العزيز/ كلية العلوم/ قسم الفيزياء

الدوري الثاني/ زمن الاختبار ساعة و نصف 1431/1/14هـ

1- In the projectile motion, the y-component of the velocity at the maximum height is:
(a)Zero (b) constant (c) the maximum value (d) Negative

2- In the projectile motion, the x-component of the velocity is:
(a) $v_0 \sin\theta$ (b) $-v_0 \sin\theta$ (c) $v_0 \cos\theta$ (d) $-v_0 \tan\theta$

3- In the projectile motion, the angle for the maximum range is:
(a)90^0 (b) 75^0 (c) 180^0 (d) 45^0

4- In the projectile motion, the maximum range is:
(a) $\frac{v_0^2}{g}(\cos 2\theta)$ (b) $\frac{v_0^2}{g}$ (c) $\frac{v_0}{g}$ (d) $\frac{v_0^2}{g}(\cos\theta)^2$

5-A body move with a velocity $\vec{v} = 2\hat{i} - 3\hat{j}\ \ m/s$ and acceleration $\vec{a} = 2\hat{i} + \hat{j}\ \ m/s^2$.The velocity after 2s (in SI unit) is:
(a)$\vec{v} = 6\hat{i} - \hat{j}$ (b) $\vec{v} = 6\hat{i} + \hat{j}$ (c) $\vec{v} = -6\hat{i} - \hat{j}$ (d) $\vec{v} = +6\hat{i} + \hat{j}$

6-A ball is thrown with a velocity of 15 m/s at an angle of 30^0. The y-component of the velocity is :
(a)30 m/s (b) 7.5 m/s (c)15 m/s (d) 13m/s

7- In question (6), the x-component of the velocity is:
(a)30 m/s (b) 7.5 m/s (c)15 m/s (d) 13m/s

8- In question (6), the maximum height is :
(a)2870m (b)287m (c)2.87 m (d) 28.7 m

9- In question (6), the range is:
(a) 19.88 m (b)198.8 m (c) 1988 m (d) 1.988 m

10- In question (6), the time of flight is:
(a)0.015 s (b)0.15 s (c) 15 s (d) 1.5 s

11- A boy hold a rope of 30 cm long, from one end and the other end a stone, he rotate the stone in a horizontal circle with speed of 3 m/s. The acceleration of the stone is:
(a) 0.03 m/s^2 (b) 30 m/s^2 (c)3.0 m/s^2 (d) 300 m/s^2

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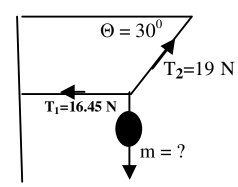

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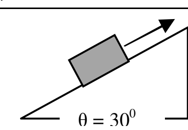

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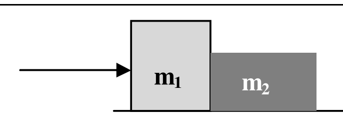

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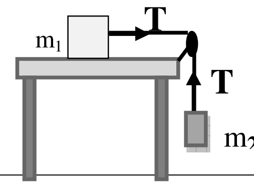

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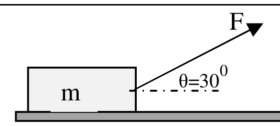

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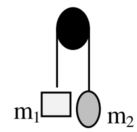

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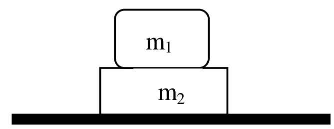

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29- A box of mass 5 kg is sliding down with a constant velocity on a rough incline surface at an angle 20^0 with the horizontal. The kinetic friction coefficient is:
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30- A car was going in a circular road with a radius of 50m with constant velocity of 25 m/s, the static friction coefficient is:
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King Abdulaziz University
Faculty of Sciences
Physics Department

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

B

Second Exam - Phys 110

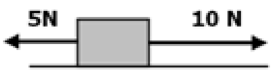
Name: **ID No:** **Section:**

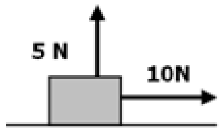
CHOOSE THE CORRECT ANSWER

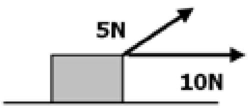
1. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

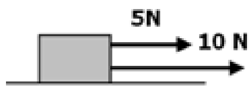
A) $v_y = v_o \sin\theta + g\, t$ **B)** $v_y = v_o \sin\theta - g\, t$ **C)** $v_y = v_o (\cos\theta)t$ **D)** $v_y = v_o (\sin\theta)t$

2. Two forces, have magnitudes 5 N and 10 N, are applied to an object moving along an $x-$axis. In **which figure** of the following the magnitude of the acceleration of the object is the least ?

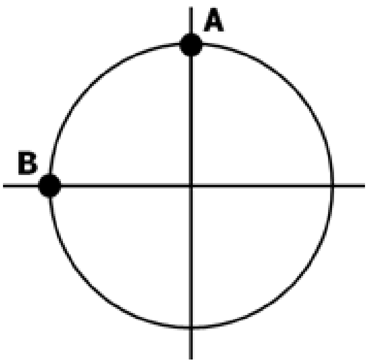
A) 

C) 

B) 

D) 

3. In the figure, a car moves at constant speed around the circle path in a horizontal xy plane, with the center at the origin. When it is at point A its coordinates are $x = 0$, $y = 3$m and its velocity is (6 m/s) $\hat{i}$. When it is **at point B its velocity and acceleration** are:



A) $\vec{v} = +4\,\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

C) $\vec{v} = +6\,\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

B) $\vec{v} = +6\hat{i}$ and $\vec{a} = -12\hat{i}$, respectively

D) $\vec{v} = -6\,\hat{j}$ and $\vec{a} = +12\,\hat{j}$, respectively

4. A projectile is fired from the ground level with an initial velocity 283 m/s with an angle of 60^0 with the horizontal. **The maximum height** the projectile reached

A) 2245.9 m **B)** 1598.6 m **C)** 3064.6 m **D)** 8957.4 m

5. A 12 kg object is moving with a net force of 7 N north on it. The object having an **acceleration** of:

A) 1.71 m/s^2 south **B)** 0.58 m/s^2 south **C)** 0.58 m/s^2 north **D)** 1.71 m/s^2 north

6. When a person is standing on a scale in an elevator, the scale reads higher than the normal weight of the person if the elevator is :

A) accelerating downward
B) moving up with constant velocity.
C) stationary
D) accelerating upward

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

A) 45.8 N **B)** 25.4 N **C)** 10.3 N **D)** 19.6 N

8. Two objects having masses of 1Kg and 2Kg moving around a circle of radius *r* = 1 m and with *v* = 1 m/s. Their **accelerations** are related by:

A) $\frac{a_1}{a_2}=2$ **B)** $a_1=a_2$ **C)** $a_1=a_2=0$ **D)** $\frac{a_1}{a_2}=\frac{1}{2}$

9. A 0.15 kg particle moves along an $x-$axis with acceleration $a(t)=8-18t$ with a in m/s^2 and *t* in seconds. The **net force** in Newtons acting on the particle at t = 3.40s is

A) $-5.21\,\hat{i}$ **B)** $-7.98\,\hat{i}$ **C)** $8.52\,\hat{i}$ **D)** $12.4\,\hat{i}$

10. The **coefficient of static friction** (μ_s):

A) is in the direction of motion
B) has a magnitude of exactly 1
C) is dimensionless
D) is in the direction of the normal force

11. Two forces $\vec{F}_1=7\hat{i}-5\,\hat{j}$ and $\vec{F}_2=-3\hat{i}+4\,\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

A) 10 N **B)** 7.14 N **C)** 4.12 N **D)** 13.2 N

12. The **force that always perpendicular to the surface** is called

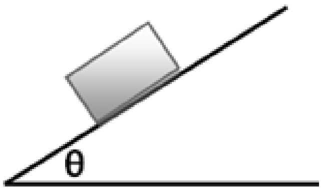
A) Friction **B)** Normal force **C)** Tension **D)** Gravitational force

13. The **horizontal range** is the horizontal distance the projectile has traveled when it returns to

A) its initial height **B)** the origin **C)** the start point **D)** its maximum height

Use the following to answer questions 14-15:

In the figure, a block of mass m = 25 kg is sliding down on a frictionless plane inclined at θ = 60^0



14. The **normal force** ($\vec{F}_N$) on the block is:

A) mg cosθ **B)** mg **C)** mg sinθ **D)** ma

15. The **magnitude of the force** that causes the block sliding down is

A) 150 N **B)** 90.44 N **C)** 311 N **D)** 212.17 N

Use the following to answer questions 16-17:

The coordinates of a particle's position vector as a function of time are given by $x = 5t^2 + 16$, and $y = -t^3 + 5$, with x and y in meters and t in seconds:

16. The **velocity** as a function of time is:

A) $t\,\hat{i} + 6t\,\hat{j}$ **B)** $10t\,\hat{i} - 3t^2\,\hat{j}$ **C)** $10\,\hat{i} - 6t^2\,\hat{j}$ **D)** $5t\,\hat{i} - 6\,\hat{j}$

17. The position vector $\vec{r}$ at t =2 s is

A) $15\hat{i} - 5\hat{j}$ **B)** $81\hat{i} + 3\hat{j}$ **C)** $26\hat{i} - 7\hat{j}$ **D)** $36\hat{i} - 3\hat{j}$

18. An objects move at a constant speed of 5 m/s on a circular path of radius 10 m. The **period** in seconds is:

A) π **B)** $3\pi^3$ **C)** 4π **D)** 20

19. A man of mass 75 kg stand on an elevator, if the elevator is going downward with acceleration of 1.7 m/s^2, the **normal force** on the man from the elevator is:

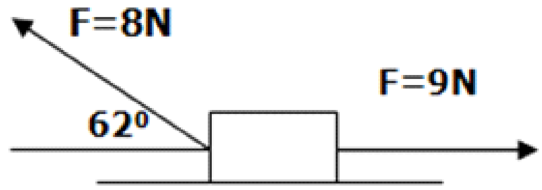
A) 607.5 N **B)** 323.9 N **C)** 523.4 N **D)** 700.5 N

20. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\hat{j} - 2\hat{k}$, all in meters, its **average velocity ($\vec{v}_{avg}$)** in unit vector notation is

A) $-0.7\,\hat{i} + 1.4\,\hat{j} - 0.4\,\hat{k}$ **C)** $-0.3\,\hat{i} - 1.4\,\hat{j} + 0.6\,\hat{k}$

B) $-5\,\hat{i} + 2.4\,\hat{j} + 0.4\,\hat{k}$ **D)** $4.7\,\hat{i} - 1.4\,\hat{j} + 0.9\,\hat{k}$

21. From the figure, the **acceleration of the block** of mass 3 kg moving along an $x-$axis on a frictionless table is:



A) 1.75 m/s^2 **B)** 3 m/s^2 **C)** 2.45 m/s^2 **D)** - 2.3 m/s^2

22. A ball is shot at an angle of 25^0 above the horizontal with an initial speed of v_0 . If the range it reaches is 140 m, what its **initial speed**?

A) 40 m/s **B)** 80 m/s **C)** 42.3 m/s **D)** 20 m/s

23. A car goes from $\vec{v}_i = 2\hat{i} + 4\hat{j}$ to $\vec{v}_f = 3\hat{i} + 9\hat{j}$ in 5 s. **The average acceleration** of the car

A) $\vec{a}_{avg} = \hat{i} - \hat{j}$ **B)** $\vec{a}_{avg} = 3\hat{i}$ **C)** $\vec{a}_{avg} = \hat{i} - 6\hat{j}$ **D)** $\vec{a}_{avg} = 0.2\hat{i} + \hat{j}$

24. A 980 kg car is traveling at constant speed 28 m/s around circular track of radius R = 230 m. The **magnitude of the frictional force** on the car is

A) 6241.6 N **B)** 3340.5 N **C)** 4141.5 N **D)** 1245.7 N

25. A bomb (قنبلة) is fired from a cannon and has initial horizontal and vertical components of velocity equal to 23 m/s and 54 m/s, respectively .The **angle** the bomb fired with the horizontal is

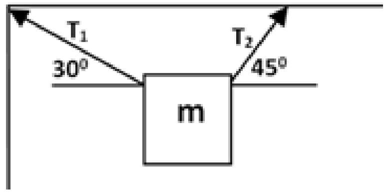
A) 85^0 **B)** 49^0 **C)** 33^0 **D)** 67^0

26. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

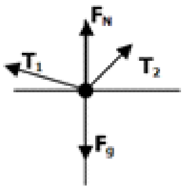
A) 5 m/s **B)** 7 m/s **C)** 12 m/s **D)** 2 m/s

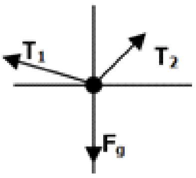
Use the following to answer questions 27-29:

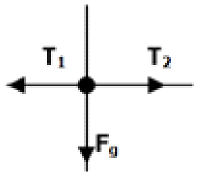
A block of mass m = 5 kg is hanging by two ropes as shown in the figure:

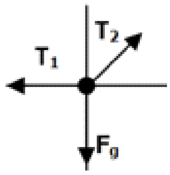


27. The **free body diagram** representing the forces on m is:

A) 

B) 

C) 

D) 

28. The **magnitude of weight (W)** in Newtons is equal to:

A) - 49 N **B)** 9.8 N **C)** 49 N **D)** - 9.8 N

29. From the figure, $\mathbf{F}_{\mathbf{net,x}}$ on the block is:

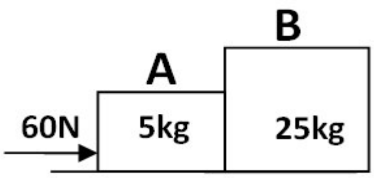
A) $T_1 \cos45 - T_2 \cos30 = m a_x$

B) $T_1 \cos 30 - T_2 \cos45 = m a_x$

C) $-T_1 \cos 30 + T_2 \cos45 = 0$

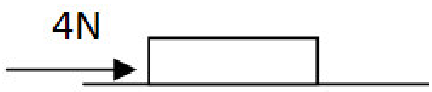
D) $T_1 \cos 45 - T_2 \cos30 = 0$

30. In the figure, two blocks slide over a frictionless surface along an $x-$axis with an acceleration equals 2 m/s^2. The force F on block A from block B is:



A) 40 N **B)** 50 N **C)** 60 N **D)** 57 N

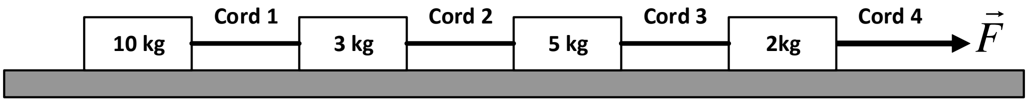
31. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



A) 0.6 **B)** 0.4 **C)** 0.8 **D)** 0.3

Use the following to answer questions 32-33:

The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, with an acceleration equal to 3 m/s²



32. The **magnitude of force** $\vec{F}$ on the four blocks is

A) 20 N **B)** 60 N **C)** 30 N **D)** 40 N

33. The **total mass accelerated to the right by Cord 3** is

A) 20 kg **B)** 13 kg **C)** 18 kg **D)** 10 kg

Answer Key

1. B
2. A
3. C
4. C
5. C
6. D
7. D
8. B
9. B
10. C
11. C
12. B
13. A
14. A
15. D
16. B
17. D
18. C
19. A
20. A
21. A
22. C
23. D
24. B
25. D
26. A
27. B
28. C
29. C
30. B
31. B
32. B
33. C

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

C

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A 980 kg car is traveling at constant speed 28 m/s around circular track of radius R = 230 m. The **magnitude of the frictional force** on the car is

   A) 4141.5 N **B)** 6241.6 N **C)** 3340.5 N **D)** 1245.7 N

2. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

   A) 2 m/s **B)** 7 m/s **C)** 5 m/s **D)** 12 m/s

3. The **force that always perpendicular to the surface** is called

   A) Normal force **B)** Gravitational force **C)** Tension **D)** Friction

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

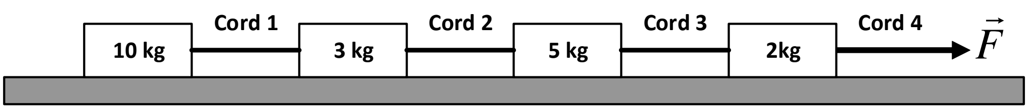
   A) 25.4 N **B)** 10.3 N **C)** 45.8 N **D)** 19.6 N

5. A ball is shot at an angle of 25^0 above the horizontal with an initial speed of v_0 . If the range it reaches is 140 m, what its **initial speed**?

   A) 40 m/s **B)** 80 m/s **C)** 42.3 m/s **D)** 20 m/s

Use the following to answer questions 6-7:

The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, with an acceleration equal to 3 m/s^2



6. The **total mass accelerated to the right by Cord 3** is

A) 20 kg B) 18 kg C) 10 kg D) 13 kg

7. The **magnitude of force** $\vec{F}$ on the four blocks is

A) 60 N B) 40 N C) 30 N D) 20 N

8. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

A) $v_y = v_o \sin\theta + g\, t$ B) $v_y = v_o \sin\theta - g\, t$ C) $v_y = v_o (\cos\theta) t$ D) $v_y = v_o (\sin\theta) t$

9. The **coefficient of static friction** (μ_s):

A) is in the direction of the normal force
B) is in the direction of motion
C) is dimensionless
D) has a magnitude of exactly 1

Use the following to answer questions 10-11:

The coordinates of a particle's position vector as a function of time are given by $x = 5t^2 + 16$, and $y = -t^3 + 5$, with x and y in meters and t in seconds:

10. The position vector $\vec{r}$ at t =2 s is

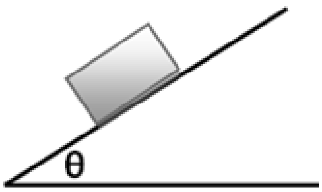
A) $81\hat{i} + 3\hat{j}$ B) $36\hat{i} - 3\hat{j}$ C) $26\hat{i} - 7\hat{j}$ D) $15\hat{i} - 5\hat{j}$

11. The **velocity** as a function of time is:

A) $t\,\hat{i} + 6t\,\hat{j}$ B) $10t\,\hat{i} - 3t^2\,\hat{j}$ C) $10\,\hat{i} - 6t^2\,\hat{j}$ D) $5t\,\hat{i} - 6\,\hat{j}$

Use the following to answer questions 12-13:

In the figure, a block of mass m = 25 kg is sliding down on a frictionless plane inclined at θ = 60^0



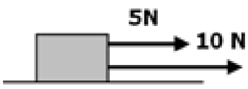
12. The **normal force** ($\vec{F}_N$) on the block is:

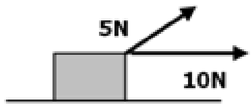
A) mg cosθ B) mg C) mg sinθ D) ma

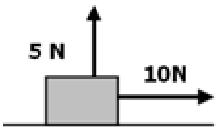
13. The **magnitude of the force** that causes the block sliding down is

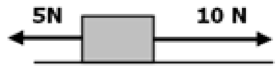
A) 311 N **B)** 90.44 N **C)** 212.17 N **D)** 150 N

14. Two forces, have magnitudes 5 N and 10 N, are applied to an object moving along an x−axis. In **which figure** of the following the magnitude of the acceleration of the object is the least ?

A)


C)


B)


D)


15. A car goes from $\vec{v}_i = 2\hat{i} + 4\hat{j}$ to $\vec{v}_f = 3\hat{i} + 9\hat{j}$ in 5 s. **The average acceleration** of the car

A) $\vec{a}_{avg} = \hat{i} - \hat{j}$ **B)** $\vec{a}_{avg} = 3\hat{i}$ **C)** $\vec{a}_{avg} = \hat{i} - 6\hat{j}$ **D)** $\vec{a}_{avg} = 0.2\hat{i} + \hat{j}$

16. A projectile is fired from the ground level with an initial velocity 283 m/s with an angle of 60^0 with the horizontal. **The maximum height** the projectile reached

A) 8957.4 m **B)** 2245.9 m **C)** 3064.6 m **D)** 1598.6 m

17. A man of mass 75 kg stand on an elevator, if the elevator is going downward with acceleration of 1.7 m/s^2, the **normal force** on the man from the elevator is:

A) 523.4 N **B)** 323.9 N **C)** 700.5 N **D)** 607.5 N

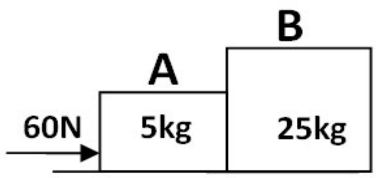
18. A bomb (قنبلة) is fired from a cannon and has initial horizontal and vertical components of velocity equal to 23 m/s and 54 m/s, respectively .The **angle** the bomb fired with the horizontal is

A) 67^0 **B)** 49^0 **C)** 85^0 **D)** 33^0

19. A 12 kg object is moving with a net force of 7 N north on it. The object having an **acceleration** of:

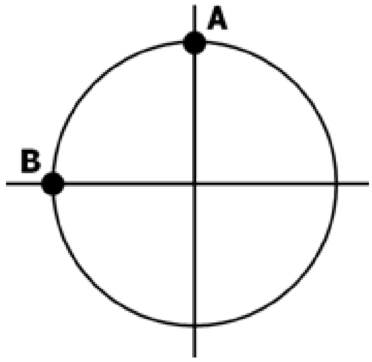
A) 0.58 m/s^2 north **B)** 1.71 m/s^2 south **C)** 0.58 m/s^2 south **D)** 1.71 m/s^2 north

20. In the figure, two blocks slide over a frictionless surface along an $x-$axis with an acceleration equals 2 m/s^2. The force F on block A from block B is:



A) 40 N **B)** 50 N **C)** 60 N **D)** 57 N

21. In the figure, a car moves at constant speed around the circle path in a horizontal xy plane, with the center at the origin. When it is at point A its coordinates are $x=0$, $y=3$m and its velocity is (6 m/s) $\hat{i}$. When it is **at point B its velocity and acceleration** are:



A) $\vec{v}=+6\hat{j}$ and $\vec{a}=+12\hat{i}$, respectively

B) $\vec{v}=-6\hat{j}$ and $\vec{a}=+12\hat{j}$, respectively

C) $\vec{v}=+4\hat{j}$ and $\vec{a}=+12\hat{i}$, respectively

D) $\vec{v}=+6\hat{i}$ and $\vec{a}=-12\hat{i}$, respectively

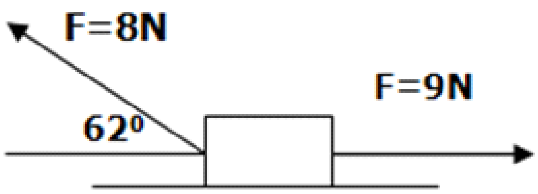
22. The **horizontal range** is the horizontal distance the projectile has traveled when it returns to

A) its initial height **B)** the origin **C)** the start point **D)** its maximum height

23. Two forces $\vec{F}_1=7\hat{i}-5\hat{j}$ and $\vec{F}_2=-3\hat{i}+4\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

A) 4.12 N **B)** 10 N **C)** 7.14 N **D)** 13.2 N

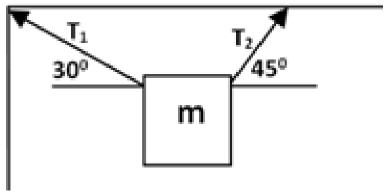
24. From the figure, the **acceleration of the block** of mass 3 kg moving along an $x-$axis on a frictionless table is:



A) 1.75 m/s^2 **B)** 2.45 m/s^2 **C)** - 2.3 m/s^2 **D)** 3 m/s^2

Use the following to answer questions 25-27:

A block of mass m = 5 kg is hanging by two ropes as shown in the figure:



25. The **magnitude of weight (W)** in Newtons is equal to:

A) 49 N **B)** - 49 N **C)** 9.8 N **D)** - 9.8 N

26. From the figure, $\mathbf{F_{net,x}}$ on the block is:

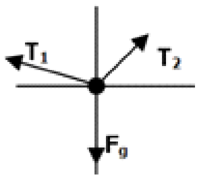
A) $-T_1 \cos 30 + T_2 \cos 45 = 0$

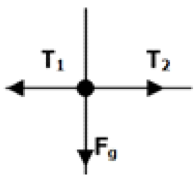
B) $T_1 \cos 45 - T_2 \cos 30 = 0$

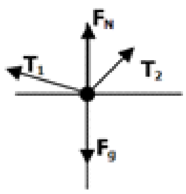
C) $T_1 \cos 45 - T_2 \cos 30 = m a_x$

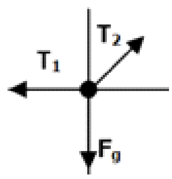
D) $T_1 \cos 30 - T_2 \cos 45 = m a_x$

27. The **free body diagram** representing the forces on m is:

A)


B)


C)


D)


28. A 0.15 kg particle moves along an $x-$axis with acceleration $a(t) = 8 - 18t$ with a in m/s^2 and t in seconds. The **net force** in Newtons acting on the particle at t = 3.40s is

A) $8.52\,\hat{i}$ **B)** $12.4\,\hat{i}$ **C)** $-5.21\,\hat{i}$ **D)** $-7.98\,\hat{i}$

29. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\hat{j} - 2\hat{k}$, all in meters, its **average velocity ($\vec{v}_{avg}$)** in unit vector notation is

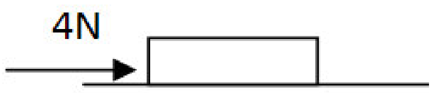
A) $-5\,\hat{i} + 2.4\,\hat{j} + 0.4\,\hat{k}$

B) $-0.7\,\hat{i} + 1.4\,\hat{j} - 0.4\,\hat{k}$

C) $4.7\,\hat{i} - 1.4\,\hat{j} + 0.9\,\hat{k}$

D) $-0.3\,\hat{i} - 1.4\,\hat{j} + 0.6\,\hat{k}$

30. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



A) 0.6 **B)** 0.8 **C)** 0.3 **D)** 0.4

31. An objects move at a constant speed of 5 m/s on a circular path of radius 10 m. The **period** in seconds is:

A) π **B)** $3\pi^3$ **C)** 4π **D)** 20

32. Two objects having masses of 1Kg and 2Kg moving around a circle of radius r = 1 m and with v = 1 m/s. Their **accelerations** are related by:

A) $a_1 = a_2 = 0$ **B)** $a_1 = a_2$ **C)** $\frac{a_1}{a_2} = \frac{1}{2}$ **D)** $\frac{a_1}{a_2} = 2$

33. When a person is standing on a scale in an elevator, the scale reads higher than the normal weight of the person if the elevator is :

A) accelerating downward
B) stationary
C) accelerating upward
D) moving up with constant velocity.

Answer Key

1. C
2. C
3. A
4. D
5. C
6. B
7. A
8. B
9. C
10. B
11. B
12. A
13. C
14. D
15. D
16. C
17. D
18. A
19. A
20. B
21. A
22. A
23. A
24. A
25. A
26. A
27. A
28. D
29. B
30. D
31. C
32. B
33. C

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

D

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A 12 kg object is moving with a net force of 7 N north on it. The object having an **acceleration** of:

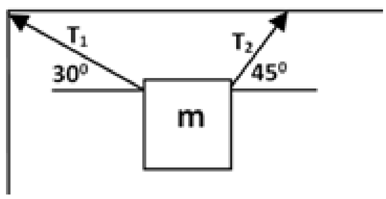
   A) 1.71 m/s^2 north **B)** 0.58 m/s^2 north **C)** 1.71 m/s^2 south **D)** 0.58 m/s^2 south

2. A car goes from $\vec{v}_i = 2\hat{i} + 4\hat{j}$ to $\vec{v}_f = 3\hat{i} + 9\hat{j}$ in 5 s. **The average acceleration** of the car

   A) $\vec{a}_{avg} = 3\hat{i}$ **B)** $\vec{a}_{avg} = \hat{i} - 6\hat{j}$ **C)** $\vec{a}_{avg} = 0.2\hat{i} + \hat{j}$ **D)** $\vec{a}_{avg} = \hat{i} - \hat{j}$

Use the following to answer questions 3-5:

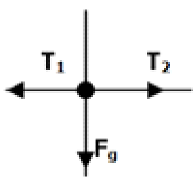
A block of mass m = 5 kg is hanging by two ropes as shown in the figure:

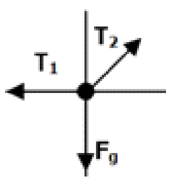


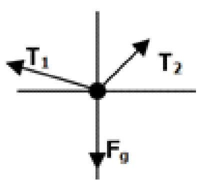
3. The **magnitude of weight (W)** in Newtons is equal to:

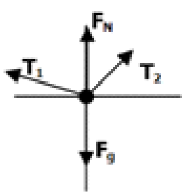
   A) - 9.8 N **B)** 9.8 N **C)** 49 N **D)** - 49 N

4. The **free body diagram** representing the forces on m is:

A)


B)


C)


D)


5. From the figure, $\mathbf{F_{net,x}}$ on the block is:

A) $T_1 \cos 45 - T_2 \cos 30 = 0$
B) $T_1 \cos 30 - T_2 \cos 45 = m a_x$
C) $-T_1 \cos 30 + T_2 \cos 45 = 0$
D) $T_1 \cos 45 - T_2 \cos 30 = m a_x$

6. A bomb (قنبلة) is fired from a cannon and has initial horizontal and vertical components of velocity equal to 23 m/s and 54 m/s, respectively .The **angle** the bomb fired with the horizontal is

A) 49^0 **B)** 33^0 **C)** 67^0 **D)** 85^0

7. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\hat{j} - 2\hat{k}$, all in meters, its **average velocity (**$\vec{v}_{avg}$**)** in unit vector notation is

A) $-0.3\,\hat{i} - 1.4\,\hat{j} + 0.6\,\hat{k}$
B) $4.7\,\hat{i} - 1.4\,\hat{j} + 0.9\,\hat{k}$
C) $-5\,\hat{i} + 2.4\,\hat{j} + 0.4\,\hat{k}$
D) $-0.7\,\hat{i} + 1.4\,\hat{j} - 0.4\,\hat{k}$

8. A 980 kg car is traveling at constant speed 28 m/s around circular track of radius R = 230 m. The **magnitude of the frictional force** on the car is

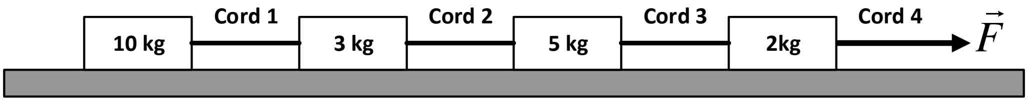
A) 3340.5 N **B)** 1245.7 N **C)** 6241.6 N **D)** 4141.5 N

9. A man of mass 75 kg stand on an elevator, if the elevator is going downward with acceleration of 1.7 m/s^2, the **normal force** on the man from the elevator is:

A) 700.5 N **B)** 523.4 N **C)** 607.5 N **D)** 323.9 N

Use the following to answer questions 10-11:

The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, with an acceleration equal to 3 m/s^2



10. The **magnitude of force** $\vec{F}$ on the four blocks is

A) 30 N **B)** 60 N **C)** 20 N **D)** 40 N

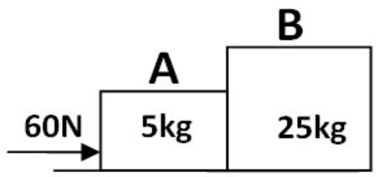
11. The **total mass accelerated to the right by Cord 3** is

A) 10 kg **B)** 20 kg **C)** 13 kg **D)** 18 kg

12. An objects move at a constant speed of 5 m/s on a circular path of radius 10 m. The **period** in seconds is:

A) 4π **B)** 20 **C)** $3\pi^3$ **D)** π

13. In the figure, two blocks slide over a frictionless surface along an $x-$axis with an acceleration equals 2 m/s^2. The force F on block A from block B is:



A) 57 N **B)** 40 N **C)** 50 N **D)** 60 N

14. A ball is shot at an angle of 25^0 above the horizontal with an initial speed of v_0 . If the range it reaches is 140 m, what its **initial speed**?

A) 42.3 m/s **B)** 20 m/s **C)** 80 m/s **D)** 40 m/s

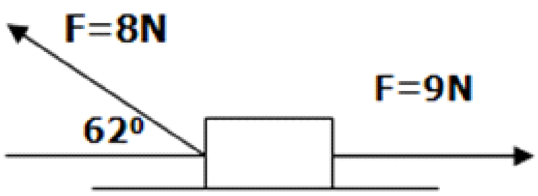
15. The **force that always perpendicular to the surface** is called

A) Friction **B)** Normal force **C)** Gravitational force **D)** Tension

16. A 0.15 kg particle moves along an $x-$axis with acceleration $a(t)=8-18t$ with a in m/s^2 and t in seconds. The **net force** in Newtons acting on the particle at t = 3.40s is

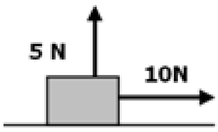
A) -7.98 $\hat{i}$ **B)** -5.21 $\hat{i}$ **C)** 8.52 $\hat{i}$ **D)** 12.4 $\hat{i}$

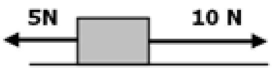
17. From the figure, the **acceleration of the block** of mass 3 kg moving along an $x-$axis on a frictionless table is:

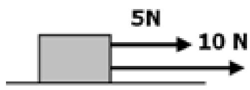


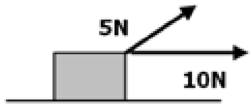
A) 3 m/s^2 **B)** - 2.3 m/s^2 **C)** 1.75 m/s^2 **D)** 2.45 m/s^2

18. Two forces, have magnitudes 5 N and 10 N, are applied to an object moving along an $x-$axis. In **which figure** of the following the magnitude of the acceleration of the object is the least ?

A) 

B) 

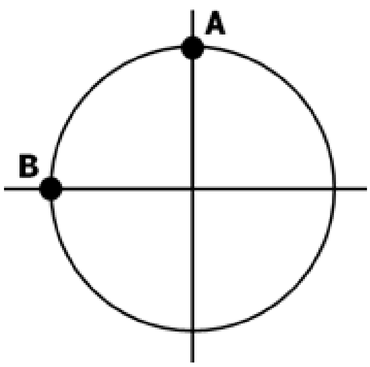
C) 

D) 

19. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

A) 5 m/s **B)** 12 m/s **C)** 7 m/s **D)** 2 m/s

20. In the figure, a car moves at constant speed around the circle path in a horizontal xy plane, with the center at the origin. When it is at point A its coordinates are $x=0$, $y=3$m and its velocity is (6 m/s) $\hat{i}$. When it is **at point B its velocity and acceleration** are:



A) $\vec{v}=+4\hat{j}$ and $\vec{a}=+12\hat{i}$, respectively

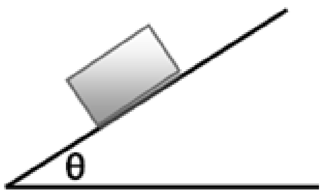
B) $\vec{v}=+6\hat{j}$ and $\vec{a}=+12\hat{i}$, respectively

C) $\vec{v}=+6\hat{i}$ and $\vec{a}=-12\hat{i}$, respectively

D) $\vec{v}=-6\hat{j}$ and $\vec{a}=+12\hat{j}$, respectively

Use the following to answer questions 21-22:

In the figure, a block of mass m = 25 kg is sliding down on a frictionless plane inclined at θ = 60^0



21. The **magnitude of the force** that causes the block sliding down is

A) 90.44 N **B)** 212.17 N **C)** 150 N **D)** 311 N

22. The **normal force** ($\vec{F}_N$) on the block is:

A) mg **B)** ma **C)** mg cosθ **D)** mg sinθ

Use the following to answer questions 23-24:

The coordinates of a particle's position vector as a function of time are given by $x = 5t^2 + 16$, and $y = -t^3 + 5$, with x and y in meters and t in seconds:

23. The **velocity** as a function of time is:

A) $5t\ \hat{i} - 6\ \hat{j}$ **B)** $t\ \hat{i} + 6\,t\ \hat{j}$ **C)** $10t\ \hat{i} - 3\,t^2\ \hat{j}$ **D)** $10\ \hat{i} - 6\,t^2\ \hat{j}$

24. The position vector $\vec{r}$ at t=2 s is

A) $15\hat{i}\ - 5\ \hat{j}$ **B)** $81\hat{i}\ + 3\ \hat{j}$ **C)** $36\hat{i}\ - 3\ \hat{j}$ **D)** $26\hat{i}\ - 7\ \hat{j}$

25. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :

A) 0.4 **B)** 0.3 **C)** 0.6 **D)** 0.8

26. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

A) $v_y = v_o(\cos\theta)t$ **B)** $v_y = v_o \sin\theta + g\,t$ **C)** $v_y = v_o(\sin\theta)t$ **D)** $v_y = v_o \sin\theta - g\,t$

27. A projectile is fired from the ground level with an initial velocity 283 m/s with an angle of 60^0 with the horizontal. **The maximum height** the projectile reached

A) 2245.9 m **B)** 1598.6 m **C)** 8957.4 m **D)** 3064.6 m

28. The **horizontal range** is the horizontal distance the projectile has traveled when it returns to

A) its maximum height **B)** its initial height **C)** the origin **D)** the start point

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

A) 10.3 N **B)** 19.6 N **C)** 25.4 N **D)** 45.8 N

30. When a person is standing on a scale in an elevator, the scale reads higher than the normal weight of the person if the elevator is :

A) accelerating upward
B) accelerating downward
C) moving up with constant velocity.
D) stationary

31. The **coefficient of static friction** (μ_s):

A) is dimensionless
B) is in the direction of the normal force
C) has a magnitude of exactly 1
D) is in the direction of motion

32. Two objects having masses of 1Kg and 2Kg moving around a circle of radius *r* = 1 m and with *v* = 1 m/s. Their **accelerations** are related by:

A) $a_1 = a_2$ **B)** $\frac{a_1}{a_2} = 2$ **C)** $a_1 = a_2 = 0$ **D)** $\frac{a_1}{a_2} = \frac{1}{2}$

33. Two forces $\vec{F}_1 = 7\hat{i} - 5\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

A) 13.2 N **B)** 7.14 N **C)** 4.12 N **D)** 10 N

Answer Key

1. B
2. C
3. C
4. C
5. C
6. C
7. D
8. A
9. C
10. B
11. D
12. A
13. C
14. A
15. B
16. A
17. C
18. B
19. A
20. B
21. B
22. C
23. C
24. C
25. A
26. D
27. D
28. B
29. B
30. A
31. A
32. A
33. C

King Abdulaziz University
Faculty of Science
Physics Dept.
Physics 110

A

Test #2	22/1/1434H	Time:90 min.
Student Name:	Student no.:	Section:

Q.1 The displacement of a particle moving from $\vec{r}_1 = \hat{i} + 2\hat{j} + 3\hat{k}$ to $\vec{r}_2 = 2\hat{i} - 3\hat{j} + 4\hat{k}$ is:

(A) $5\hat{i} + 4\hat{j} - 5\hat{k}$ (B) $\hat{i} + 5\hat{j} + \hat{k}$ (C) 25 (D) $\hat{i} - 5\hat{j} + \hat{k}$ (E) $\hat{k}$

Q.2 A particle moves in x-y plane in such a way that its x and y coordinates vary with time according to $\mathbf{x=t^3-5t}$ **m** and $\mathbf{y=3t^2+6}$ **m**. where t is measured in seconds. The velocity of the particle at t=2 s is:

(A) $7\hat{i} - 12\hat{j}$ m/s (B) $12\hat{i} + 7\hat{j}$ m/s (C) 14 m/s (D) $7\hat{i} + 12\hat{j}$ m/s (E) $\hat{k}$

Q.3 If you drive west at 20 km/h for one hour, then drive east at 15 km/h for one hour, your net displacement is:

(A) 5 km east (B) 35 km west (C) 15 km west (D) 35 km east (E) 5 km west

Q.4 If a ball is projected with velocity 20 m/s at angle of 30° with the horizontal. The Y-component of the velocity of the ball after one second is:

(A) 5 m/s (B) 20 m/s (C) 0.2 m/s (D) 10 m/s (E) 12 m/s

Q.5 Refer to question 4, the time taken by the ball to return to the ground is:

(A) 5 s (B) 4 s (C) 2.04 s (D) 10 s (E) 3 s

Q.6 Refer to question 4, the range of the projectile is:

(A) 100 m (B) 200 m (C) 11.2 m (D) 35.3 m (E) 20 m

Q.7 Refer to question 4, the maximum height attained by the projectile is:

(A) 5.1 m (B) 20 m (C) 100 m (D) 10 m (E) 25 m

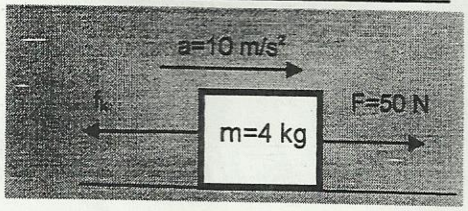
Q.8 A body of 800 N running in a circular path of R=1 m at a velocity of 8 m/s. The centripetal force is:

(A) 64.5 N (B) 5224.5 N (C) 4096 N (D) 408 N (E) 81.5 N

Q.9 An 800 kg elevator is moving down with an acceleration of 1.2 m/s^2. The tension in the cable is:

(A) 8800 N (B) 12800 N (C) Zero (D) 10400 N (E) 6880 N

Q.10 The diagram shows a 4 kg object accelerating at 10 m/s^2 on rough horizontal surface. The magnitude of the frictional force f_k acting on the object is:



(A) 20 N (B) 40 N (C) 10 N (D) 50 N (E) 25 N

Q.11 You drive your car clockwise around a circular track of radius 30 m. you completes 10 revolutions around the track in 2 minutes. Your average speed is:

(A) 30 m/s (B) 9.8 m/s (C) 10 m/s (D) 4.8 m/s (E) 15.7 m/s

Q.12 If the forces on an object are balanced, the object will

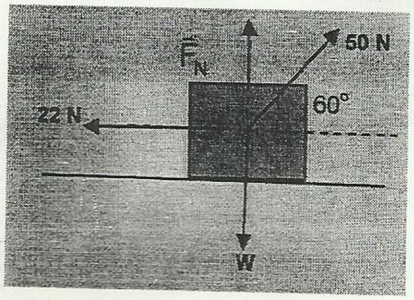
(A) Remain at rest if initially at rest.
(B) Continue moving in a straight line if initially moving in a straight line.
(C) Both A and B
(D) Neither A nor B
(E) None of these

Q.13 Which of the following units is equivalent to a newton (N)?
(A) kg · m²/s (B) g·cm/s (C) kg.s²/m (D) kg.m/s (E) kg.m/s²

Q.14 At the highest point, the magnitude of the acceleration of a projectile is
(A) 9.8 m/s² (B) Zero (C) 4.9 m/s² (D) 19.6 m/s² (E) -9.8 m/s²

Q.15 An object is pulled northward with a force of 10 N and southward with a force of 15 N. The magnitude of the net force on the object is:
(A) Zero (B) 5 N (C) 10 N (D) 15 N (E) 25 N

Q.16 Describe the motion of the 2 kg mass in the horizontal frictionless plane, as shown in the figure:



(A) The object accelerates at 1.5 m/s² (right)
(B) The object accelerates at 10 m/s² (right)
(C) The object accelerates at 15 m/s² (right)
(D) The object accelerates at 3 m/s² (right)
(E) The object does not accelerate

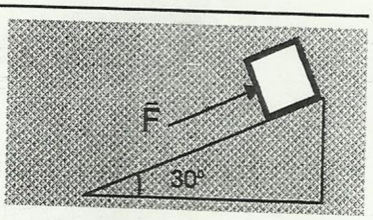
Q.17 A 10 kg brick and a 1 kg book are dropped in a vacuum. The force of gravity on the 10 kg brick is:
(A) The same as the force on the 1 kg book.
(B) 10 times as much as the force on the 1 kg book.
(C) Zero
(D) All of these
(E) None of these

Q.18 The force that opposes the motion of an object is called
(A) Tension (B) Friction (C) Gravitational force (D) Applied force (E) Normal force

Q.19 A ball is shot from the ground into the air. At a height of 12.5 m, its velocity is observed to be $\vec{v} = 5.8\hat{i} + 9.7\hat{j}$ in m/s. The magnitude of the ball's initial velocity is:
(A) 18.41 m/s (B) 5.8 m/s (C) 19.3 m/s (D) 9.7 m/s (E) 33.6 m/s

Q.20 Mr. Felix of 800 N opens his parachute and experiences an air resistance force of 500 N. The net force on the Felix is:
(A) 300 N downward (B) 500 N downward (C) 800 N downward (D) 300 N upward (E) 500 N upward

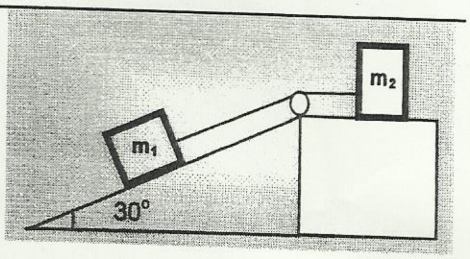
Q.21 A 5 kg mass is held at rest on a frictionless 30° incline by force $\vec{F}$. The magnitude of $\vec{F}$ is:



(A) 5 N (B) 50 N (C) 100 N (D) 24.5 N (E) Zero

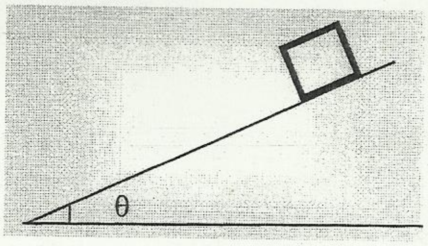
Q.22 A force of 24 N is applied to move a stationary body of mass 8 kg. The acceleration of the body is:
(A) 3 m/s² (B) 12 m/s² (C) 16 m/s² (D) 8 m/s² (E) 4 m/s²

Q.23 In the figure m_1=2 kg and m_2=1 kg the coefficient of kinetic friction between m_2 and the horizontal plane is 0.50. The inclined plane is frictionless. The frictional force exerted on m_2 by the plane is:



(A) Zero (B) 9.8 N (C) 19.6 N (D) 2 N (E) 4.9 N

Q.24 A toolbox, of mass M, is resting on a flat board. One end of the board is lifted up until the toolbox just to slide. The angle θ that the board makes with horizontal for this to occur depends on the



(A) mass, M (B) gravity is not acting on it (C) normal force
(D) coefficient of static friction (E) none of these

Q.25 A block is initially sliding with acceleration of -1 m/s^2 on a rough horizontal surface. The coefficient of friction between the block and the surface is:
(A) 0.3 (B) 0.2 (C) 0.1 (D) 0.4 (E) 0.15

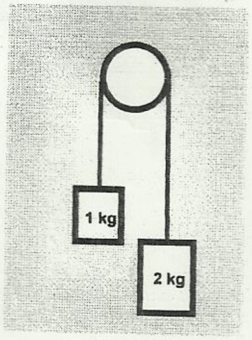
Q.26 An object moves left to right (right is positive) with speed decreasing at a constant rate,
(A) its acceleration is positive. (B) the net force on it is decreasing
(C) the net force on it is increasing (D) its acceleration is negative. (E) none of these

Q.27 A ball was projected upward at angle θ_0 with the horizontal at an initial speed 50 m/s. The ball reached the highest point after three seconds, the angle θ_0 is:
(A) 5.7° (B) 36° (C) 60° (D) 34.4° (E) 11.3°

Q.28 Two forces act on a particle of mass 2 kg. $\vec{F}_1(80\hat{i}+60\hat{j})$ N and $\vec{F}_2(40\hat{i}+100\hat{j})$ N. The magnitude of acceleration is:
(A) 10 m/s^2 (B) Zero (C) 50 m/s^2 (D) 100 m/s^2 (E) 200 m/s^2

Q.29 A particle of mass m=2 kg is moving with velocity, $v(t) = [(5t^2)\hat{i} - (2t)\hat{j}]$ m/s where t is time. The net force on the particle in SI units is:
(A) $5\hat{i} - 4\hat{j}$ (B) $14t\hat{j}$ (C) 25 (D) $20t\hat{i} - 4\hat{j}$ (E) $16\hat{i}$

Q.30 In the figure m_1=2kg and m_2=1 kg are connected by a light string that passes over a smooth pulley. The tension in the string is:



(A) 23.52 N (B) 9.8 N (C) 39.20 N (D) 13.07 N (E) zero

نماذج الاختبار الدوري الثاني
لمقرر فيزياء ١١٠

PHYS 110

CH.5,6 and 7

ing Abdulaziz University
aculty of Science
hysics Dept.
hysics 110

Test#2 | Time: 90 min.

Student Name: | Student no.: | Section:

Q.1 A man of mass 6 kg. His weight is:
(A) 58.8 N (B) 6.12 N (C) 122 N (D) 9.8 N (E) 588 N

Q.2 1Newton is equivalent to:
(A) 9.8 kg.m/s^2 (B) 1 kg. m/s^2 (C) 1 kg m/s^3 (D) 1 m^2/s^2 (E) none of these

Q.3 The displacement of a particle moving from $\vec{r}_1 = 5\hat{i} - 6\hat{j} + 2\hat{k}$ to $\vec{r}_2 = +5\hat{i} + 6\hat{j} + 2\hat{k}$ is:
(A) $-10\hat{i}$ (B) $4\vec{j} + 6\vec{k}$ (C) $12\hat{j}$ (D) $5\hat{j}$ (E) $10\hat{i} + 5\hat{j}$

Q.4 The components of a car velocity as a function of time are given by $v_x = t^2 + 2$ and $v_y = t^2 - 2$, then its velocity $\vec{v}$ at $(t = 3s)$ is:
(A) $\vec{v} = 8\hat{i} - 10\hat{j}$ (B) $\vec{v} = 9\hat{i} - 3\hat{j}$ (C) $\vec{v} = 8\hat{i} + 10\hat{j}$ (D) $\vec{v} = 11\hat{i} - 7\hat{j}$ (E) $\vec{v} = 10\hat{i} - 8\hat{j}$

Q.5 In the projectiles motion the acceleration in the horizontal direction is:
(A) 4.9 m/s^2 (B) 9.8 m/s^2 (C) 19.6 m/s^2 (D) 32 m/s^2 (E) Zero

Q.6 A ball is shot from the top of a building of height 10 m, with initial velocity $\vec{v}_0 = 5.8\,\hat{i} + 8\,\hat{j}$, in meters per second ($\hat{i}$ horizontal, $\hat{j}$ upward). What is the y-component of the ball's velocity just before it hits the ground?
(A) 5 m/s (B) 18.41 m/s (C) 19.3 m/s (D) 16.12 m/s (E) Zero

Q.7 A projectile is fired from the ground. If it reaches the maximum range at 45 m from the starting point, the initial velocity is:
(A) 21 m/s (B) 10 m/s (C) 196 m/s (D) 24.25 m/s (E) 22.14 m/s

Q.8 Two forces are applied to a 13 kg object, one is 33 N to the north and the other is 56 N to the west. The magnitude of the acceleration of the object is:
(A) 4 m/s^2 (B) 2 m/s^2 (C) 3 m/s^2 (D) Zero (E) 5 m/s^2

Q.9 Three forces act on a particle that moves at a constant speed. If $\vec{F}_1 = -5\hat{i} - 4\hat{j}$ N and $\vec{F}_2 = -5\hat{i} + 4\hat{j}$ N, $\vec{F}_3$ is:
(A) $10\hat{i}$ (B) $8\hat{j}$ (C) $10\hat{i} + 8\hat{j}$ (D) $-10\hat{j}$ (E) $8\hat{i}$

Q.10 A plastic box of mass 0.7 kg slides down an inclined plane with an angle 40° with the horizontal. If $\mu_k = 0.3$ the acceleration of the box in SI units is:
(A) 1.5 up (B) 4.8 down (C) 0.5 up (D) 4.05 down (E) 3.5 up

Q.11 A body moves with constant speed in a circular orbit. Its acceleration is:
(A) equal zero
(B) opposite to the velocity of the body.
(C) outward, away from the center
(D) in the direction of the velocity of the body
(E) toward the center

Q.12 A block slides down on a frictionless inclined plane at an angle of 25°. The acceleration of the block is:
(A) 9.8 m/s^2 (B) 4.14 m/s^2 (C) Zero (D) 3.35 m/s^2 (E) 1 m/s^2

Q.13 The force and acceleration of a body in a uniform circular motion are:
(A) in the same direction (B) differed by 135^0 (C) perpendicular (D) untiparallel (E) none of these

Q.14 A cable holds a ball of mass 30 kg in static equilibrium. The tension in the cord is:
A) 500 N (B) 294 N (C) 220 N (D) zero (E) 196 N

Q.15 A 1200 kg box is moving with a constant speed. The net force on the box is:
(A) 9.8 N (B) 1500 N (C) 14700 N (D) Zero (E) 153 N

Q.16 A forward horizontal force of 12 N is used to pull a 120 N crate at constant velocity across a horizontal floor. The coefficient of friction is:
(A) 1 (B) 0.1 (C) 2.3 (D) 0.3 (E) 0.05

Q.17 A block of mass m is pulled at constant velocity along a rough horizontal floor by an applied force **F** as shown. The magnitude of the frictional force is:
(A) mg cosθ (B) T sinθ (C) Ttanθ (D) T cosθ (E) zero

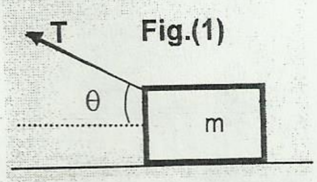


Fig.(1)

Q.18 The horizontal range for the projectile is maximum when it launch angle is:
(A) 360° (B) 60° (C) 45° (D) 90° (E) 180°

Q.19 A block is initially at a speed of 9.8 m/s on a rough horizontal surface. If it come to rest in a distance of 16.3 m, the coefficient of friction between the block and the surface is:
(A) 1 (B) 0.1 (C) 2.3 (D) 0.3 (E) 0.5

Q.20 A particle moves at constant speed in a horizontal circle of radius 10 m, making a complete circle in 5 s. The acceleration is:
(A) 15 m/s^2 (B) 10 m/s^2 (C) 8 m/s^2 (D) 12.34 m/s^2 (E) 15.79 m/s^2

Q.21 The x-and y-coordinates of a particle in motion, as functions of time t, are given by: $x=18t-6$ and $y=3t^2-6t$. The x- and y-components of the velocity at t=0 is:
A) (-3,-12) m/s (B) (10,-6) m/s (C) (18,-6) m/s (D) (-6,-3) m/s (E) (-6,10) m/s

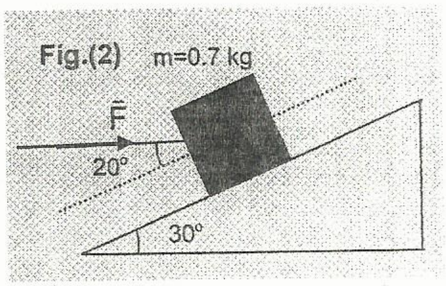
Q.22 The formula for the centripetal acceleration is:
(A) $F = m\frac{v^2}{R}$ (B) F=ma (C) F=mg (D) $a = \frac{v^2}{R}$ (E) none of these

Q.23 A boy kicks a ball at an angle of 30° to the horizontal with a speed of 28 m/s. The time it takes to reach the horizontal range is:
(A) 0.92 s (B) 2.86 s (C) 0.15 s (D) 1.43 s (E) 0.38 s

Q.24 boy kicks a ball at an angle of 30° to the horizontal with a speed of 28 m/s. The maximum height that the ball can reach is:
(A) 10 m (B) 4.13 m (C) 15.33 m (D) 12.68 m (E) 2.5 m

Q.25 As shown in the figure (2), a box on frictionless inclined plane. The horizontal force, which prevents the box from slipping down the plane, then the magnitude of $\vec{F}$ is:

(A) 2.45 N (B) 9.8 N (C) 3.65 N (D) 2.83 N (E)Zero



Q.26 In the figure (2), if F=4 N then the value of box acceleration is:

(A) 1 m/s^2 (B) 6 m/s^2 (C) 9.8 m/s^2 (D) 0.50 m/s^2 (E) 2.03 m/s^2

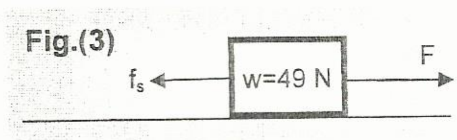
Q.27 In the figure (2), if F=4 N then the normal force on the box is:

(A) 7.31 N (B) 3.1 N (C) 2 N (D) 5.94 N (E) Zero

Q.28 The formula for the friction force is:

(A) F=2f (B) F=ma (C) w=mg (D) F=N (E) f=μ N

Q.29 In the figure, the block is about to slide when a force **F** is applied. If the coefficient of static friction μ_s=0.45, then the applied force is:



(A) 13.23 N (B) 30 N (C) 26.46 N (D) 22.05 N (E) Zero

Q.30 Refer to question 29, the normal force on the box is:

(A) 26.4 N (B) 84.87 N (C) 49 N (D) 58.8 N (E) Zero

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est#2 | Time: 90 min.

tudent Name: | Student no.: | Section:

ꞁ.1 A car of mass 1200 kg. Its weight is:
(A) 122.45 N (B) 11760 N (C) zero (D) 9.8 N (E) 1200 N

ꞁ.2 1Newton is equivalent to:
(A) 9.8 $kg.m/s^2$ (B) 1 kg. m/s^2 (C)-1 kg of mass (D) 1 kg of force (E) none of these

ꞁ.3 A particle moving from $\vec{r}_1 = 2\hat{i} + 5\hat{j} + 8\hat{k}$ *to* $\vec{r}_2 = 2\hat{i} + 10\hat{j} + 8\hat{k}$ then the displacement is:
(A) $10\hat{i} - 3\hat{j}$ (B) $4\hat{j} + 6\hat{k}$ (C) $10\hat{i} + 5\hat{j}$ (D) $5\hat{j}$ (E) 8

Q.4 The x-and y-coordinates of a particle in motion, as functions of time t, are given by: $x=5t^2-3t+6$ m $y=3t-3$ m. The magnitude of the acceleration is:
(A) Zero (B) 10 m/s^2 (C) 5 m/s^2 (D) 12 m/s^2 (E) 15 m/s^2

Q.5 Two projectiles are in flight at the same time. The acceleration of one relative to the other:
(A) always 9.8 m/s^2 (B) large then 9.8 m/s^2 (C) can be horizontal (D) zero (E) none of these

Q.6 A particle of mass 3 kg is moving with velocity $v(t) = (13t^2\hat{i} + 25\hat{j})m/s$ where t is time. The net force on the particle in SI units is:
(A) $26\hat{i}$ (B) $78t\hat{i}$ (C) 9.8 (D) $15\hat{j}$ (E) $25\hat{j}$

Q.7 A projectile is fired from the ground at 45° above the horizontal. If it reaches the ground at 60 m from the starting point, the initial velocity is:
(A) 34.3 m/s (B) 10 m/s (C) 196 m/s (D) 24.25 m/s (E) 12 m/s

Q.8 A block is initially at a speed of 9.8 m/s on a rough horizontal surface. If it come to rest in a distance of 49 m, the coefficient of friction between the block and the surface is:
(A) 1 (B) 0.1 (C) 2.3 (D) 0.3 (E) 0.5

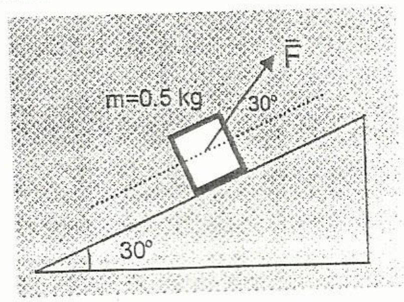
Q.9 A particle moves at constant speed in a horizontal circle of radius 5 m, making a complete circle in 4 s. The acceleration is:
(A) 15 m/s^2 (B) 10 m/s^2 (C) 8 m/s^2 (D) 12.34 m/s^2 (E) Zero

Q.10 The x-and y-coordinates of a particle in motion, as functions of time t, are given by:
$x=5t^2-3t+6$ $y=3t^3-3t^2-12t-3$. The x- and y-components of the velocity at t=0 is:
(A) (-3,-12) m/s (B) (10,-6) m/s (C) (18,-6) m/s (D) (-6,-3) m/s (E) (-6,10) m/s

Q.11 A car rounds a 20 m radius curve at 10 m/s. The magnitude of its acceleration is:
(A) Zero (B) 5 m/s^2 (C) 2 m/s^2 (D) 4 m/s^2 (E) 6 m/s^2

Q.12 The formula for the centripetal force is:
(A) $a = \frac{v^2}{R}$ (B) F=ma (C) F=mg (D) $F = m\frac{v^2}{R}$ (E) none of these

Q.13 As shown in the figure a box on frictionless inclined plane. The magnitude of $\vec{F}$ Which prevents the box from slipping down the plane is:
The magnitude of $\vec{F}$ is:
(A) 2.83 N (B) 9.8 N (C) 4.9 N (D) 8.3 N (E) Zero



Q.14 In the figure, if F=4 N then the value of box acceleration is:
(A` m/s^2 (B) 4 m/s^2 (C) 9.8 m/s^2 (D) 6 m/s^2 (E) 2.03 m/s^2

Q.15 In the figure, if F=4 N then the normal force on the box is:
(A) 2 N (B) 2.24 N (C) 6.24 N (D) 4.24 N (E) Zero

Q.16 A boy kicks a ball at an angle of 30° to the horizontal with a speed of 14.0 m/s. The time it takes to reach the horizontal range is:
(A) 0.92 s (B) 0.71 s (C) 0.15 s (D) 1.43 s (E) 0.38 s

Q.17 boy kicks a ball at an angle of 30° to the horizontal with a speed of 14.0 m/s. The maximum height that the ball can reach is:
(A) 9.87 m (B) 4.13 m (C) 15.33 m (D) 12.68 m (E) 2.5 m

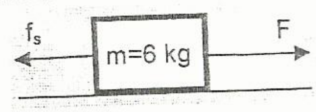
Q.18 boy kicks a ball at an angle of 30° to the horizontal with a speed of 14.0 m/s. The horizontal range that the ball can reach is:
(A) 17.32 m (B) 19.7 m (C) 15.33 m (D) 12.68 m (E) 14.0 m

19 A block slides down on a frictionless inclined plane at an angle of 20°. The acceleration of the block is:
(A) 9.8 m/s^2 (B) 4.9 m/s^2 (C) Zero (D) 3.35 m/s^2 (E) 1 m/s^2

Q.20 The formula for the friction force is:
(A) F=2f (B) F=ma (C) w=mg (D) F=N (E) $f=\mu N$

Q.21 The velocity and acceleration of a body in a uniform circular motion are:
(A) differed by 45° (B) differed by 135° (C) perpendicular (D) parallel (E) none of these

Q.22 In the figure, the block is about to slide when a force **F** is applied. If the coefficient of static friction μ_s=0.45, then the applied force is:



(A) 6 N (B) 30 N (C) 26.46 N (D) 13.23 N (E) Zero

Q.23 Refer to question 22, the normal force on the box is:
(A) 49 N (B) 84.87 N (C) Zero (D) 58.8 N (E) 26.4 N

Q.24 A cable holds a ball of mass 20 kg in static equilibrium. The tension in the cord is:

(A) 500 N (B) 9.8 N (C) 220 N (D) zero (E) 196 N

Q.25 A 1500 kg car is moving with a constant speed. The net force on the box is:

(A) Zero (B) 1500 N (C) 14700 N (D) 9.8 N (E) 153 N

Q.26 A car of mass 900 kg rounds a 25 m radius curve at 10 m/s. The centripetal of the force is:

(A) 900 N (B) 1800 N (C) Zero (D) 3600 N (E) 250 N

Q.27 A 1200 kg elevator is moving up with acceleration 3 m/s^2. The tension in the cable is:

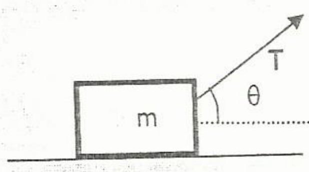
(A) 9800 N (B) 12800 N (C) Zero (D) 1000 N (E) 15360 N

Q.28 A forward horizontal force of 12 N is used to pull a 240 N crate at constant velocity across a horizontal floor. The coefficient of friction is:

(A) 1 (B) 0.1 (C) 2.3 (D) 0.3 (E) 0.05

Q.29 A block of mass m is pulled at constant velocity along a rough horizontal floor by an applied force T as shown. The magnitude of the frictional force is:

(A) T cosθ (B) T sinθ (C) T tanθ (D) mg cosθ (E) zero

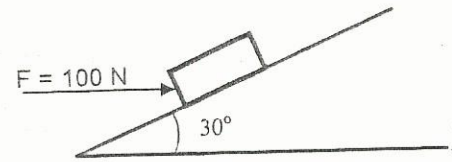


Q.30 A box is sliding down an incline that is 35° above the horizontal. If the coefficient of kinetic friction is 0.40, the acceleration of the crate is:

(A) Zero (B) 2.4 m/s^2 (C) 5.8 m/s^2 (D) 8.8 m/s^2 (E) 1.3 m/s^2

Good Luck

Q.1
A 5 kg box is pushed up a rough surface μ_k=0.5 inclined at 30° to the horizontal by a horizontal force of magnitude of 100 N.



a) The Normal force is:
(a) 42.4 N (b) 92.4 N (c) 86.6 N (d) Zero (e) 100 N

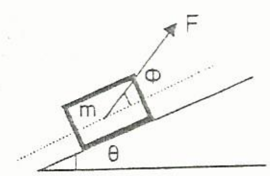
b) The frictional force is:
(a) 50 N (b) 100 N (c) Zero (d) 109.87 N (e) 46.2 N

c) The acceleration of the box is:
(a) 3.18 m/s^2 (b) 9.8 m/s^2 (c) 1.58 m/s^2 (d) Zero (e) 8 m/s^2

d) If the acceleration is equal to zero, the pushing force is:
(a) 100 N (b) 81.6 N (c) Zero (d) 50 N (e) 86.6 N

Q.2
In the figure (1), the mass m of the block is 3 kg rests on a frictionless surface, the force F is 10 N θ=30° and Φ=15°. The magnitude of the acceleration of the block is:

Fig. (1)



(a) 1.3 m/s^2 (b) 0.7 m/s^2 (c) 1.04 m/s^2 (d) 2.9 m/s^2 (e) 4.5 m/s^2 (f) 1.68 m/s^2

Q.3
In the figure (1) the magnitude of the normal force exerted outward on the block by the plane on which on which it rests is:

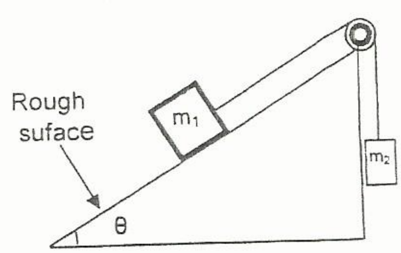
(a) 9.7 N (b) 3 N (c) 22.87 N (d) 25.5 N (e) Zero (f) 2.59 N

Q.4
A 4 kg block is sliding on a frictionless plane inclined at θ=20°. The magnitude of the acceleration of the block is:
(a) 3.35 m/s^2 (b) 9.8 m/s^2 (c) 16.76 m/s^2 (d) 4.9 m/s^2 (e) 9.2 m/s^2 (f) Zero

---

Q.5
In the figure (2) a crate of mass m_1=12 kg moves along a plane that makes an angle of θ=30° with the horizontal, That crate is connected to a crate of mass m_2=12 kg by a taut, massless cord. The hang crate descends with constant velocity. The magnitude of the frictional force exerted on m_1 by the plane is:

Fig.(2)



(a) 24 N (b) 12 N (c) 29.7 N (d) 117.6 N (e) Zero (f) 58.8 N

Q6

In the previous question, the coefficient of kinetic friction μ_k is:

(a) 0.3 (b) 0.12 (c) 0.58 (d) 1.7 (e) Zero (f) 0.08

Q.7

A ball shot up making an angle θ with the horizontal, with a speed of 30 m/s. The time that the object needs to reach its maximum range is:

(a) 4.3 s (b) 3.1 s (c) 42.4 s (d) 0.41 s (e) 6.1 s (f) 129.9 s

---

Q.8

A stone is thrown up with a speed of 20 m/s making an angle 45° with the horizontal. The height of the stone at half the range is:

(a) 199.6 m (b) 99.8 m (c) 20.4 m (d) 10.21 m (e) 203.8 m (f) 40 m

---

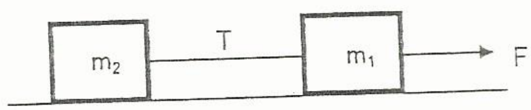
Q.9

A ball was projected upward at angle θ_0 with the horizontal and an initial speed of 50 m/s. The ball reached the highest point after three seconds, the angle θ_0 is:

(a) 11.3° (b) 34.4° (c) 36° (d) 60° (e) 5.7° (f) 30°

Q.10

In the figure two blocks are connected and bulled to the right on a horizontal frictionless table by a force with a magnitude of 84 N. If the mass m_1 = 8 kg and m_2 =13 kg , the acceleration of the system is:



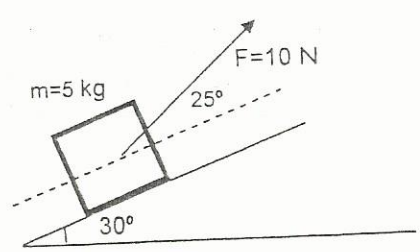
(a) 3 m/s^2 (b) 4 m/s^2 (c) 5 m/s^2 (d) 6 m/s^2 (e) 7 m/s^2 (f) 2 m/s^2

Q.11 Two forces act on a particle of mass 2 kg. $\vec{F}_1 = (80\hat{i} + 60\hat{j})\,N$ and $\vec{F}_2 = (40\hat{i} + 100\hat{j})\,N$ The magnitude of the acceleration is:

(a) 25 m/s^2 (b) 50 m/s^2 (c) 100 m/s^2 (d) 200 m/s^2 (e) 400 m/s^2 (f) 10 m/s^2

Q.12

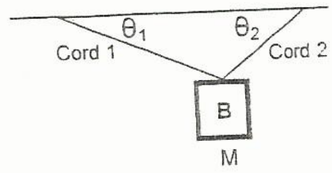
In the figure, the normal force on the mass is:



(a) 39.2 N (b) 4.2 N (c) 42.4 N (d) 46.7 N (e) Zero (f) 10 N

Q.14

In the figure a block B of unknown mass M hangs by a cord from the ceiling by means of two cords. The angle $\theta_1 = 20°$ and $\theta_2 = 40°$. The tension in cord 1 is 90 N. The tension in cord 2 is:



(a) 122.7 N (b) 110.4 N (c) 85.9 N (d) 98.1 N (e) 9.2 N (f) Zero

---

Q.15

A 5-kg block slides down on a frictionless inclined plane at an angle of 25°. The magnitude of the net force on it is:

(a) Zero (b) 11 N (c) 44.4 N (d) 29 N (e) 62.2 N (f) 20.7 N

Q.16

A 5-kg block slides down on an inclined plane at an angle of 25°. The friction coefficient μ_k is 0.2. The magnitude of the net force on it is:

(a) 65.4 N (b) 16.6 N (c) 40.3 N (d) 11.8 N (e) Zero (f) 4 N

Q.17

A force accelerates a 5 kg particle of mass from rest to a speed of 12 m/s in 4 s. The magnitude of this force is:

(a) 10 N (b) Zero (c) 20 N (d) 25 N (e) 15 N (f) 30 N

Q.18

A 900 kg car is traveling at constant speed 18 m/s around circular track of radius R = 200 m. What is the magnitude of the frictional force on the car?

(a) 1645 N (b) 1539 N (c) 1458 N (d) 1377 N (e) 1296 N (f) 729 N

Q.19

A 3.2 kg box is moving with a constant speed of 24.7 m/s . The net force on the box is:

(a) 245.1 N (b) 190.2 N (c) Zero (d) 31.5 N (e) 70.7 N (f) 63 N

Q.20

A boy shot a foot ball vertically up with an initial speed v_o. When the ball was 2 m above the ground, the speed was 0.4 of the initial speed. The initial speed is :

(a) 11.7 m/s (b) 3.4 m/s (c) 6.8 m/s (d) 4.8 m/s (e) 19.6 m/s (f) 5 m/s

---

Q.21

A ball is kicked with an initial speed of 7.2 m/s. The time the ball takes to reach the maximum range is:

(a) 0.1 s (b) 8.7 s (c) 1.5 s (d) 0.75 s (e) 11s (f) 1.04 s

Q.22

A stone is thrown at a building of height h with initial speed 32 m/s directed 60° above the horizontal. The stone landed on the roof of the building 4 seconds after launching. The height is:

(a) 50 m (b) 32.45 m (c) 16 m (d) 8 m (e) 100 m (f) Zero

Q.23

A projectile is fired from a cannon with initial speed of 72 m/s with an angle 30° above the horizontal and hits a target on the ground. The distance between the target and the cannon is:

(a) 800 m (b) 226 m (c) 16 m (d) 458.1 m (e) 1600 m (f) 72 m

Q.24

In the previous question the maximum height the projectile reaches is:

(a) 144 m (b) 66.1 m (c) 98 m (d) 33 m (e) Zero (f) 18 m

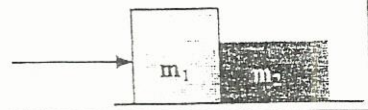
1- In the projectile motion, the y-component of the velocity at the maximum height is:
(a) Negative (b) constant (c) the maximum value (d) Zero

2- In the projectile motion, the x-component of the velocity at the initial is:
(a) $\upsilon_0 \sin\theta$ (b) $-\upsilon_0 \sin\theta$ (c) $\upsilon_0 \cos\theta$ (d) $-\upsilon_0 \sin\theta$

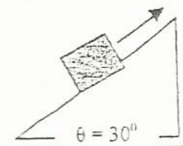
3- In the projectile motion, the angle for the maximum range is:
(a) 45^0 (b) 75^0 (c) 180^0 (d) 145^0

4- At the projectile motion, the maximum range is:
(a) $\frac{\upsilon_0^2}{g}(\cos 2\theta)$ (b) $\frac{\upsilon_0^2}{g}(\cos\theta)^2$ (c) $\frac{\upsilon_0}{g}$ (d) $\frac{\upsilon_0^2}{g}$

5- In the figure shown, m_1=10kg and m_2 =15 kg. A force acting to accelerate the two bodies by 2 m/s^2 is:
(a) 60 N (b) 500 N (c)50 N (d)0.05 N

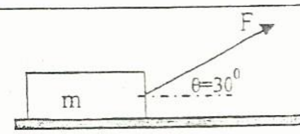


6- ...e force needed to keep the mass (mass=30 kg) at rest a shown in the figure is:
(a) 98 N (b)147 N (c)9.8 N (d) 14.7 N



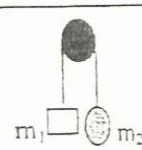
7- In question (6), the normal force on the m_1 is:
(a) 2.54 N (b) 2540 N (c) 25.4 N (d) 254.6N

8- A block of mass 11 kg, was pulled by a force 40 N, the block was going with a constant speed (as shown in the figure) on a rough surface. The net friction force is:
(a) 34.64 N (b) 3.464 N (c) 346.4 N (d) 0.3464 N



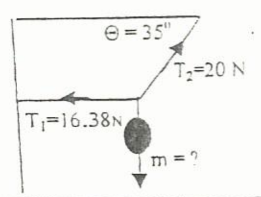
9- A space satellite in a circular orbit around the earth, at altitude of 530 km and with speed of 7.5 km/s. The acceleration of the satellite is: (the earth radius 6.37×10^6m)
(a) 9.8 m/s^2 (b)0.815 m/s^2 (c)8.15 m/s^2 (d)81.5 m/s^2

10- As show in the figure two bodies are hung by a rope over a fractionaless pulley. If m_1=3 kg and m_2= 1.5 kg. the acceleration of the two bodes is:
(a) -9.8 m/s^2 (b) 4.9 m/s^2 (c) 9.8 m/s^2 (d)3.27 m/s^2



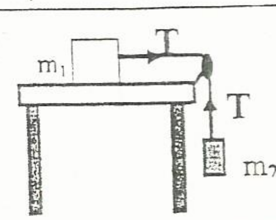
11- A boy stand on the ground level, if his mass is 40 kg, his weight is:
(a) 3.92 N (b)392 N (c) 39.2 N (d)3920 N

12- A body of mass m, is hung by the ropes at equilibrium as shown in the figure. The value of the mass is:
(a) 1.17 kg (b) 11.7 kg (c) 117 kg (d) 0.117 kg



14- In the figure shown, if m_1=6kg and the system move with acceleration of 2 m/s^2 and the tension in the rope was 12 N. The value of m_2 is:
(a) 0.15 kg (b)154 kg (c)1.54 kg (d)15.4 kg

15- In question (14). the normal force on the body is:
(a) 5880 N (b) 0.588 N (c) 5.88 N (d) 58.8 N



16- A body moves with velocity $\bar{\upsilon} = \hat{i} - \hat{j}\ m/s$ and acceleration $\bar{a} = \hat{i} + \hat{j}\ m/s^2$. The velocity after 2s (in SI unit) is:
(a) $\bar{\upsilon} = 3\hat{i} + \hat{j}$ (b) $\bar{\upsilon} = -\hat{i} - 3\hat{j}$ (c) $\bar{\upsilon} = 6\hat{i} - 3\hat{j}$ (d) $\bar{\upsilon} = +\hat{i} + \hat{j}$

17- A box stands on rough incline plane of 30^0. when just about to move, the static coefficient of fraction is:
a) sin θ b) 0.58 c) 1.00 d) zero

;-A ball is thrown with a velocity of 25 m/s at an angle of 45^0 . The y-component of the velocity is :
)17.7 m/s (b) 1.77 m/s (c)177 m/s (d) 0.177m/s

9- In question (18), the x-component of the velocity is :
ı) 1.77 m/s (b) 17.7 m/s (c)177 m/s (d) 0.177m/s

0- In question (18), the maximum height is :
a) 0.159m (b) 1.594m (c)15.94 m (d) 159.4 m

:1- In question (18), the range is:
a) 6.377 m (b)637.7 m (c) 6377 m (d) 63.77m

22- In question (18), the time of flight is:
(a) 3.6 s (b)0.36 s (c) 36 s (d) 0.36 s

23- A boy hold a rope of 30 cm long, from one end and the other end a stone, he rotate the stone with the horizontal circle with the speed of 4 m/s, the acceleration of the stone is:
(a) 0.053 m/s^2 (b) 53.3 m/s^2 (c) 5.33 m/s^2 (d) 0.533 m/s^2

24- A an object was going in a circular orbit of a radius 80m with constant velocity of 25 m/s. The static friction coefficient is:
(a)79 (b) 7.9 (c) 0.79 (d) 790

25- A man of mass 60 kg stands in elevator, if the elevator going upward with acceleration of 2 m/s^2, the apparent weight of the man is:
(a) 7080 N (b) 7.08 N (c)70.8 N (d) 708 N

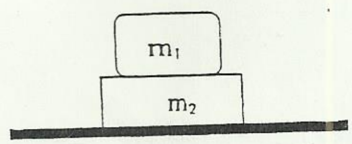
26- A man of mass 60 kg stands in elevator, if the elevator going with constant velocity 5 m/s, the weight of the man is:
(a) 588 N (b) 5.88 N (c) 58.8 N (d) 5880 N

27- A racing car of mass 700 kg move, the driver stopped the car by using the brake, if the car was going with a acceleration of 4.5 m/s^2. The frictional force is:
(a) 315 N (b) 3150 N (c) 3.150 N (d) 31.50 N

28- A box of mass m sliding down on an incline plane of θ^0, and the box moving with a constant velocity . The frictional force is:
a) mg (b) mg tan θ (c) mg sin θ (d) mg cos θ

29- A box of mass 8 kg is sliding down with a constant velocity on a rough incline surface at an angle 20^0 with the horizontal. The kinetic friction coefficient is:
(a) 0.36 (b) 26.7 (c) 2.67 (d) 1.00

30- Two boxes m_1=15 kg and m_2=20 kg, the gravitational force on m_2 is:
(a)25 N (b)343 N (c)2450 N (d)5 N



24- In Question 30, the gravitational force on m_1 is:
(a)0.96 N (b)9.6 N (c)196 N (d)147 N

Referring	العودة الى	Initial	ابتدائي	Hitting	اصطدم
Thrown	قذف	altitude	إرتفاع عن سطح الارض	Magnitude	القيمة العددية
Vertically	عامودي	Elevator	مصعد	Prevent	يمنع
Hangs	معلق	Circular	دائري	Apparent weight	الوزن الظاهري
Horizontal	أفقي	Rough	خشن	Gravitational	الجاذبية الارضية
Radius	نصف قطر	Coefficient	معامل	Frictional	الاحتكاك
Sliding	ينزلق	Static	السكوني	Floor	الارض
Upward	إلى اعلى	Kinetic	الحركي	Stand	يقف

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ysics 110

TEST # 2

Q.1 The velocity of a particle moving in the x-y plane is $\vec{v}(t) = [(12t - 3t^2)\hat{i} + 5\hat{j}]$ m/s. The acceleration is zero when the time is:
(A) 12 s (B) 2 s (C) zero (D) 14 s (E) 5 s

Q.2 A car is moving in x-y plane, has x-and y-coordinates that vary with time $x=2-t^2$ and $y=2t+3$. Where x (in meters) and t (in seconds). At t=0 the position vector is:
(A) $2\hat{i}$ m (B) $2\hat{i}+3\hat{j}$ m (C) $25\hat{k}$ m (D) $9\hat{j}$ m (E) $10\hat{j}$ m

Q.3 Referring to question (2), the magnitude of the instantaneous velocity at t=2 s is:
(A) 1 m/s (B) 3.3 m/s (C) 1.64 m/s (D) 4.5 m/s (E) 25 m/s

Q.4 A particle moves so that its position (in meters) as a function of time (in seconds) is $\bar{r} = 4t^2\hat{i} + 2t\hat{j}$
Its velocity as functions of time is:
(A) $10\hat{i}+3\hat{j}$ m/s (B) $10t\,\hat{j}+\hat{k}$ m/s (C) $8t\,\hat{i}+2\hat{j}$ m/s (D) $5\hat{j}$ m/s (E) 4 m/s

Q.5 A particle moves so that its position (in meters) as a function of time (in seconds) is $\bar{r} = 4t^2\hat{i} + 2t\hat{j}$
Its acceleration as functions of time is:
(A) $4\hat{i}+5\hat{j}$ m/s^2 (B) $\hat{j}+\hat{k}$ m/s^2 (C) $8\hat{i}$ m/s^2 (D) $9\hat{j}$ m/s^2 (E) $10\hat{j}$ m/s^2

Q.6 A truck is traveling with a constant speed of 16 m/s. When the truck follows a curve in the road, its centripetal acceleration is 4.0 m/s^2. The radius of the curve is:
(A) 3.8 m (B) 14 m (C) 56 m (D) 64 m (E) 210 m

Q.7 A stone thrown from the top of a tall building follows a path that is:
(A) parabolic (B) two straight line (C) hyperbolic (D) circular (E) a straight line

Q.8 A football player kicks a ball off with an initial speed 6 m/s and angle 40° with the horizontal. The maximum height is:
(A) 1.38 m (B) 0.76 m (C) 1.5 m (D) 1.23 m (E) none of these

Q.9 Referring to question (8), the vertical component of the velocity at the maximum height is:
(A) 3 m/s (B) 6 m/s (C) 36 m/s (D) 12 m/s (E) zero

Q.10 The period of a particle moving at a constant speed of 4 m/s on a circular path of radius 12 m is:
(A) π s (B) 2π s (C) 4π s (D) 6π s (E) 8π s

Q.11 The horizontal range for the projectile is maximum when it launch angle is:
(A) 120° (B) 45° (C) 30° (D) 90° (E) 180°

Q.12 A car travels east at constant velocity. The net force on the car is:

(A) East (B) West (C) Zero (D) Down (E) up

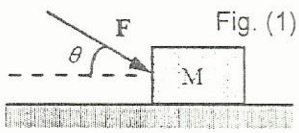
Q.13 A string from the ceiling suspends a mass of 3 kg. The tension in the string is:
(A) 29.4 N (B) 12 N (C) zero (D) 19.6 N (E) 10 N

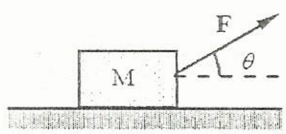
Q.14 A particle moving from $\vec{r}_1 = 2\hat{i} + 5\hat{j} + 2\hat{k}$ to $\vec{r}_2 = 6\hat{i} + 5\hat{j} + 4\hat{k}$ then the displacement in SI units is:
(A) $10\hat{i} + 3\hat{j}$ (B) $2\hat{j} + 2\hat{k}$ (C) $4\hat{i} + 2\hat{k}$ (D) $5\hat{j}$ (E) 4

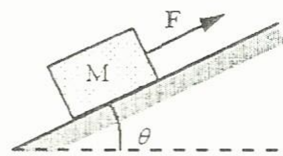
Q.15 In which case will the magnitude of the normal force on the block be equal to ($Mg - F \sin\theta$)?

(A) case 1only
(B) case 2 only
(C) both cases 1 and 2
(D) both cases 2 and 3
(E) cases 1, 2, and 3

Fig. (1)







Q.16 Referring to question (15), in which case will the y-component of the weight of the block be equal to (Mg cosθ)?

(A) case 1 only (B) case 2 only (C) cases 1 and 2 (D) cases 2 and 3 (E) case 3 only

Q.17 A man weighing 700 N is in an elevator that is accelerating upward at 3 m/s^2. The magnitude of the force exerted on him by the elevator's floor is:

(A) 990 N (B) 290 N (C) Zero (D) 914 N (E) 71 N

Q.18 The unit of force called the Newton is:
(A) 9.8 $kg.m/s^2$ (B) 1 kg. m/s^2 (C) 1 kg of mass (D) 1 kg of force (E) none of these

Q.19 Two forces act on a particle in which it moves with constant velocity, if $\vec{F}_1 = -6\hat{i} - 5\hat{j}$ then $\vec{F}_2$ is:
((A) $4\hat{i} - 5\hat{j}$ (B) $2\hat{i} + 2\hat{J}$ (C) $5\hat{i}$ (D) $5\hat{j}$ (E) $6\hat{i} + 5\hat{j}$

Q.20 Two blocks (A and B) are in contact on a horizontal frictionless surface. A 40 N constant force is applied to A as shown. The acceleration of A is:

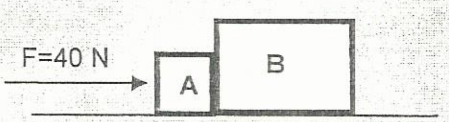


Fig.(3)

(A) 1.1 m/s^2 (B) 6 m/s^2 (C) 1.6 m/s^2 (D) 3 m/s^2 (E) 3.6 m/s^2

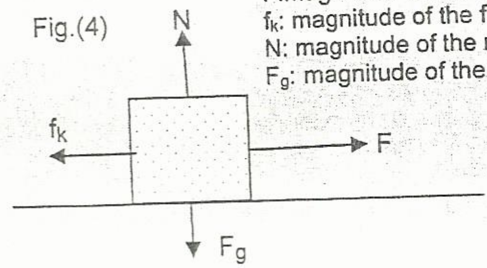
Q.21 Acceleration is always in the direction of the:
(A) displacement (B) initial velocity (C) final velocity (D) net force (E) opposite to the frictional force

Q.22 A 4 kg block is sliding on a frictionless plane inclined at θ=25°. The magnitude of the acceleration of the block is:
(A) 3.35 m/s^2 (B) 9.8 m/s^2 (C) 16.76 m/s^2 (D) 4.1 m/s^2 (E) 9.2 m/s^2

Q.23 A boy pulls a wooden box along a rough horizontal floor at **constant speed**. Which of the following must be true?

F: magnitude of the Force
f_k: magnitude of the force of friction
N: magnitude of the normal force
F_g: magnitude of the force of gravity

Fig.(4)



(A) $F=f_k$ and $N=F_g$

(B) $F=f_k$ and $N>F_g$

(C) $F>f_k$ and $N<F_g$

(D) $F>f_k$ and $N=F_g$

(E) none of these

Q.24 Referring to question (23),if the force F makes an angle of 30° with the horizontal, which of the following must be true?
(A) $F=f_k$ and $N=F_g$ (B) $F=f_k$ and $N>F_g$ (C) $F>f_k$ and $N<F_g$ (D) $F>f_k$ and $N=F_g$ (E) none of these

---

Q.25 In the figure (5) a crate of mass m_1=10 kg moves along the horizontal surface. That carte is connected to a carte of mass m_2=5 kg by a massless cord. The hang carte descends with **constant velocity**. The magnitude of the frictional force exerted on m_1 by the plane is:

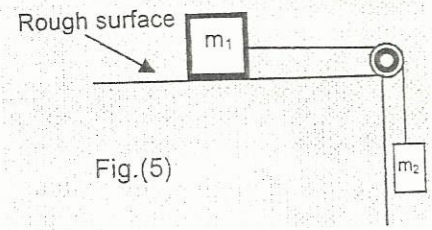


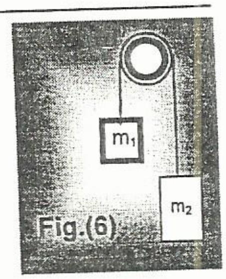
Fig.(5)

(A) 1.5 N (B) 58.8 N (C) 29.7 N (D) 49 N (E) zero

Q.26 Referring to question (25), the Normal force between the surface and m_1 is:
(A) 98 N (B) 12 N (C) zero (D) 117.6 N (E) 10 N

Q.27 Referring to question (25), the tension in the cord is:
(A) 58.8 N (B) 49 N (C) zero (D) 6 N (E) none of these

Q.28 In the figure (6) if m_1=5 kg and m_2=12 kg. The acceleration is:



(A) 4 m/s^2 (B) 12 m/s^2 (C) 9.17 m/s^2 (D) 3.33 m/s^2 (E) Zero

---

Q.29 A 1100 kg elevator is moving upward with acceleration 4 m/s^2. The tension in the cable is:
(A) 1224 N (B) 650 N (C) 15180 N (D) 1100 N (E) 6380 N

Q.30 An automobile moves on a circular road of radius 40 m. The coefficient of friction between tires and road is 0.50. The maximum speed with which this car can round this curve without sliding is:
(A) 3 m/s (B) 4.9 m/s (C) 14 m/s (D) 12.12 m/s (E) 13 m/s

Radius	نصف القطر	Parabolic	قاطع مكافئ	Elevator	مصعد	Aangle	زاوية
Referring to question	بالرجوع الى السؤال السابق	Period	الزمن الدوري	Exerted	مبذولة	Automobile	سيارة
truck	شاحنه	Rough surface	سطح خشن	Hang	معلق	Block	جسم
Upwards	للاعلى	Speed	سرعة	Hyperbolic	قطاعي زائد	Brake	فرامل
Vertically	عموديا	String	خيط	Initial	الابتدائية	Component	مركبة
kick	ضربت	Tension	الشد	Magnitude	قيمة	Cord	حبل
circular	مسار دائري	Thrown	قذف	Massless	عديم الوزن	Carte	صندوق
		Traveling	تسير	Object	جسيم	Cubic	مكعب

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Physics Dept.
Physics 110

Test 2 | **Time:** 90 min.

Student Name: Student no.: Section:

Q.1 A man of weight 490 N. His mass is:
(A) 40 kg (B) 980 kg (C) zero (D) 50 kg (E) 490 kg

Q.2 1Newton is equivalent to:
(A) 9.8 $kg.m/s^2$ (B) 1 kg of force (C) 1 kg of mass (D) 1 $kg.\ m/s^2$ (E) none of these

Q.3 A particle moving from $\vec{r}_1 = 2\hat{i} + 5\hat{j} + 8\hat{k}$ *to* $\vec{r}_2 = 2\hat{i} + 10\hat{j} + 18\hat{k}$ then the displacement is:
(A) $10\hat{i} - 3\hat{j}$ (B) $5\hat{j} + 10\hat{k}$ (C) $10\hat{i} + 5\hat{j}$ (D) $5\hat{j}$ (E) 8

Q.4 Two forces are applied to an object of mass 18.25 kg. One force is 27.5 N to the north and the other is 24.0 N to the west. The magnitude of the acceleration of the object is:
(A) 2.0 m/s^2 (B) 3.0 m/s^2 (C) 4.0 m/s^2 (D) 2.5 m/s^2 (E) 5.0 m/s^2

Q.5 A boy kicks a ball at an angle of 40° to the horizontal with a speed of 14.0 m/s. The time it takes to reach the highest point is:
(A) 0.92 s (B) 0.77 s (C) 0.15 s (D) 1.12 s (E) 0.38 s

Q.6 Referring to question 5, the maximum height that the ball can reach is:
(A) 9.87 m (B) 4.13 m (C) 15.33 m (D) 12.68 m (E) 14.0 m

Q.7 Referring to question 5, the horizontal range that the ball can reach is:
(A) 9.87 m (B) 19.7 m (C) 15.33 m (D) 12.68 m (E) 14.0 m

Q.8 A block slides down on a frictionless inclined plane at an angle of 30°. The acceleration of the block is:
(A) 9.8 m/s^2 (B) 4.9 m/s^2 (C) Zero (D) 19.6 m/s^2 (E) 1 m/s^2

Q.9 A particle is thrown with an initial velocity of 40 m/s. The time it takes to reach its maximum range is:
(A) 1.2 s (B) 2.89 s (C) 3 s (D) 4.10 s (E) 5.77 s

Q.10 The initial velocity of a projectile is 150 m/s. The angle between the velocity vector and the trajectory at the projectile's maximum height is:
(A) 90° (B) 45° (C) Zero (D) 63.1° (E) 36.9°

Q.11 A 5 kg body is moving in a circular path of radius 0.5 m in radius with a constant speed makes five revolutions per second. Then its speed is:
(A) 15.71 m/s (B) 3.14 m/s (C) 7.5 m/s (D) 0.20 m/s (E) Zero

Q.12 At t=0, a car moves with velocity $\vec{v}_0 = 2\hat{i} + \hat{j}$ (m/s) and acceleration $\vec{a} = 2\hat{j}$ (m/s^2). The velocity of the car at t=2 s is:
(A) $6\hat{i} + \hat{j}$ (B) $2\hat{i} + 5\hat{j}$ (C) $2\hat{i} + \hat{j}$ (D) $\hat{i} + 5\hat{j}$ (E) 1

Q.13 A particle moves in xy plane as x(t)= 2t (m) and y(t)=t^2-1 (m). The velocity of the particle in vector notion at t=1 s is:

(A) $\hat{i}+\hat{j}$ (m/s) (B) $2\hat{i}+\hat{j}$ (m/s) (C) $2\hat{i}+2\hat{j}$ (m/s) (D) $2\hat{i}\ \ \hat{j}$ (m/s) (E) 10 (m/s)

Q.14 A projectile is launched to achieve a maximum range of 140 m, the speed of the projectile must be:

(A) 17 m/s (B) 27 m/s (C) 37 m/s (D) 45 m/s (E) 10 m/s

Q.15 The formula for the friction force is:

(A) f=μ N (B) F=ma (C) w=mg (D) F=N (E) F=2f

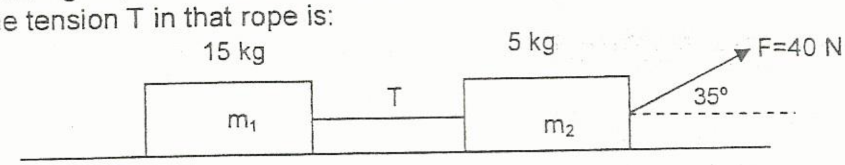
Q.16 A car travels east at constant velocity. The net force on the car is:

(A) greater than zero (B) less than zero (C) zero (D) 9.8 N (E) 4.9 N

Q.17 A car moves in a curved rounds a 20 m radius curve at 10 m/s. The magnitude of its acceleration is:

(A) Zero (B) 5 m/s^2 (C) 2 m/s^2 (D) 4 m/s^2 (E) 6 m/s^2

Q.18 As shown in the figure, if the two blocks are moving on frictionless surface and connected with a rope of negligible mass. The tension T in that rope is:



(A) 2.5 N (B) 9.98 N (C) 23 N (D) Zero (E) 24.57 N

Q.19 Referring to question 18, the normal force on the block m_1 is:

(A) 147 N (B) 5 N (C) Zero (D) 15 N (E) 49 N

Q.20 A car is traveling at 20 m/s on a horizontal highway. If the coefficient of friction between the road and tires on rainy day is 0.1, the distance in which the car will stop is:

(A) 408 m (B) Zero (C) 20 m (D) 204.1 m (E) 10.2 m

Q.21 The velocity and acceleration of a body in a uniform circular motion are:

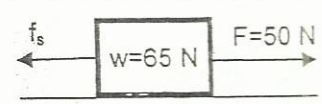
(A) differed by 45^0 (B) perpendicular (C) differed by 135^0 (D) parallel (E) none of these

---

Q.22 A 60 kg person weighs 100 N on the moon. The acceleration of gravity on the moon is:

(A) zero (B) 4.9 m/s^2 (C) 19.6 m/s^2 (D) 1.67 m/s^2 (E) 9.8 m/s^2

Q.23 A block slides on a rough surface (see Figure). The block starts to slide when a parallel force of 30 N is applied. The coefficient of static friction μ_s is:



(A) 1 (B) 0.77 (C) 0.33 (D) 0.67 (E) Zero

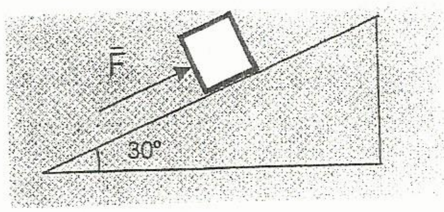
Q.24 A cable holds a ball of weight 350 N in static equilibrium. The tension in the cord is:

(A) 500 N (B) 9.8 N (C) 250 N (D) zero (E) 350 N

Q.25 The formula for the centripetal force is:

(A) $a = \frac{v^2}{R}$ (B) F=ma (C) F=mg (D) $F = m\frac{v^2}{R}$ (E) none of these

Q.26 In the figure a 5 kg box is pushed at a constant speed up the frictionless ramp by a horizontal force $\vec{F}$. The magnitude of $\vec{F}$ is:



(A) 44.5 N (B) 98 N (C) 49 N (D) 24.5 N (E) Zero

Q.27 Refer to question 26, the normal force on the box is:

(A) 49 N (B) 84.87 N (C) Zero (D) 98 N (E) 42.44 N

Q.28 Three forces act on a particle in which it moves with constant speed, if $\vec{F}_1 = (-8\hat{i})$ N and $\vec{F}_2 = (10\hat{j})$ N. Then $\vec{F}_3$ is:

(A) $-8\hat{i}-10\hat{j}$ (B) $8\hat{i}$ (C) $8\hat{i}-10\hat{j}$ (D) $10\hat{j}$ (E) $18\hat{k}$

Q.29 A 3 kg box is moving with a constant speed. The net force on the box is:

(A) 245.10 N (B) 190.20 N (C) Zero (D) 31.50 N (E) 70.70 N

Q.30 A 1000 kg elevator is moving up with acceleration 3 m/s². The tension in the cable is:

(A) 9800 N (B) 12800 N (C) Zero (D) 1000 N (E) 6800 N

King Abdul-Aziz University
Faculty of Science
Physics Dept

A

PHYS 110 2nd EXAM

Time: 90 min.

Student Name:	Student Number:	Section:

Choose the correct answer:

1. Newton's second law is written as:

(a) $\vec{a} = \vec{F}m$ (b) $\vec{a} = \frac{\vec{F}}{m}$ (c) $m = \vec{F}\vec{a}$ (d) $\vec{F} = \frac{\vec{a}}{m}$

2. 10^5 g.cm/s^2 is equal:

(a) 10 N (b) 1 N (c) 100 N (d) 1000 N

3. Acceleration is always in the direction of the :

(a) displacement (b) initial velocity (c) final velocity (d) net force

4. The **maximum range** of a projectile is **at launch angle**

(a) $\theta = 25°$ (b) $\theta = 35°$ (c) $\theta = 45°$ (d) $\theta = 55°$

5. The force that **opposes the motion** is called

(a) Tension (b) Friction (c) Normal force (d) gravitational force

6. In the **projectile motion** the acceleration in the horizontal direction is:

(a) 19.6 m/s^2 (b) zero (c) 9.8 m/s^2 (d) 4.9 m/s^2

7. If the **x component** of vector $\vec{r}$ **is 2.6 m** and the **y component is -2.3 m** then $\vec{r}$ in **unit-vector notation** is:

(a) $2.6\ \hat{i} - 2.3\ \hat{j}$ (b) $-2.3\ \hat{i} + 2.6\ \hat{j}$ (c) $6.2\ \hat{i} + 3.2\ \hat{j}$ (d) $3.2\ \hat{i} - 6.2\ \hat{j}$

8. The **displacement** of a particle moving **from** $\vec{r}_1 = 5\hat{i} - 6\hat{j} + 2\hat{k}$ **to** $\vec{r}_2 = -2\hat{i} + 6\hat{j} + 2\hat{k}$ **is:**

(a) $-7\hat{i} + 12\hat{j}$ (b) $3\hat{i} + 4\hat{k}$ (c) $7\hat{i} - 12\hat{j}$ (d) $-3\hat{i} - 4\hat{k}$

9. The components of a car's velocity as a function of time are given by :

$V_x = 2t + 3$, and $V_y = 4t - 1$, its velocity $\vec{V}$ at **(t= 1 s)** is:

(a) $\vec{V} = 9\hat{i} + 11\hat{j}$ (b) $\vec{V} = 5\hat{i} + 3\hat{j}$ (c) $\vec{V} = 7\hat{i} + 7\hat{j}$ (d) $\vec{V} = 11\hat{i} + 15\hat{j}$

10. A rope from the ceiling suspends a ball of **weight 400 N**. The **tension in the rope** is:

(a) 800 N (b) 200 N (c) 560 N (d) 400 N

11. The components of a car's **velocity** as a function of time are given by **$v_x = 6t^2 - 5$, $v_y = -3t^3$**. The **acceleration components** are:

(a) **$a_x = 10t$, $a_y = -12t^2$** (b) **$a_x = 4t$, $a_y = -6t^2$** (c) **$a_x = 6t$, $a_y = -15t^2$** (d) **$a_x = 12t$, $a_y = -9t^2$**

12. A particle moving with **initial velocity** $\vec{v}_0 = -2\hat{i} + 4\hat{j}$ m/s, and **acceleration** $\vec{a} = -5\hat{i} + 8\hat{j}$ m/s^2, **the x-component v_x of the final velocity at (t=1 s) is ?**

(a) -7 m/s (b) - 17 m/s (c) -27 m/s (d) -37 m/s

---

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

(a) 318.1 m (b) 267.3 m (c) 373.4 m (d) 220.9 m

---

14. The **period** of an objects moving at a constant speed of **4 m/s** on a circular path of **radius 2 m** is:

(a) π s (b) 2π s (c) 4π s (d) 8π s

---

15. Referring to question 14, the **acceleration** of the object is:

(a) 1 m/s^2 (b) 2 m/s^2 (c) 4 m/s^2 (d) 8 m/s^2

---

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

(a) east (b) west (c) zero (d) up

---

17. Two forces act on a particle that moves with **constant velocity,** if $\vec{F}_1 = 2\hat{i} - 6\hat{j}$, then $\vec{F}_2$ equals:

(a) $\vec{F}_2 = 6\hat{i} - 2\hat{k}$ (b) $\vec{F}_2 = -2\hat{i} + 6\hat{k}$ (c) $\vec{F}_2 = -6\hat{i} + 2\hat{j}$ (d) $\vec{F}_2 = -2\hat{i} + 6\hat{j}$

---

18. When a force of **8 N** is applied to a body, its acceleration is **2 m/s^2**. The **mass of the body is:**

(a) 4 kg (b) 16 kg (c) 8 kg (d) 1/4

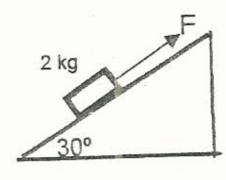
---

19. From the figure the acceleration of the block of mass m= 0.5 kg moving along the x-axis on a frictionless table is:

(a) – 2m/s^2 (b) – 4 m/s^2 (c) – 6 m/s^2 (d) – 8 m/s^2

---

20. From the figure the normal force F_N on a block sliding down a frictionless inclined plane is:



(a) 9.8 N (b) 33.95 (c) 16.97 N (d) 19.8 N

---

21. Referring to question 21 , if the block is sliding down with constant speed then the magnitude of F is:
(a) 19.6 N (b) zero (c) 9.8 N (d) 4.9 N

---

22. Referring to question 21 , if the magnitude of F is zero then the acceleration of the block is:
(a) 19.6 m/s^2 (b) zero (c) 9.8 m/s^2 (d) 4.9 m/s^2

---

23. A 1000kg elevator is moving up with acceleration 3 m/s^2. The tension in the cable is:

(a) 6800 N (b) 1000 N (c) 12800 N (d) 9800 N

24. A horizontal force of 200N is required to start moving a 800-N crate initially at rest on a horizontal floor. The coefficient of static friction is:

(a) 4 (b) 0.25 (c) zero (d) 0.5

25. A block **of mass 100 kg** slides on a horizontal surface with acceleration **$a=6\ m/s^2$, the force of friction** between the block and the surface is:

(a) -360 N (b) - 480 N (c) - 600 N (d) – 720 N

26. A block of **weight 5 N** moves with **constant speed** by a force of **3 N**, the value of the **coefficient of friction** μ_k is:

(a) 0.3 (b) 0.4 (c) 0.5 (d) 0.6

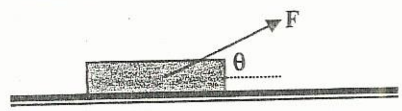
27. A boy pulls a box of mass m on a horizontal surface by a horizontal force $\vec{F}$ along the x-axis at constant speed , then the magnitude of $\vec{F}$ is:

(a) **$\mu_k mg$** (b) **mg** (c) **$\mu_k g$** (d) **F_N**

28. A particle of mass **5 kg** at a point where **$g = 9.8\ m/s^2$**, its **weight** at a point where **$g = 0$** is:

(a) 9.8 N (b) 49 N (c) 98 N (d) zero

29. As shown in the figure, a block of mass m is pulled at constant velocity along a rough horizontal surface by a force F. The magnitude of the frictional force is:



(a) F sin θ (b) zero (c) mg cos θ (d) F cos θ

30. Referring to question 29 , the normal force is:

(a) mg-F sin θ (b) mg+F sin θ (c) mg (d) F sin θ-mg

launch	قذف	opposes	يمانع	horizontal	أفقي	rope	حبل
ceiling	سقف	suspends	يعلق	initial	إبتدائي	circular	دائري
path	مسار	applied	أثرت	frictionless	أملس	table	طاوله
sliding	ينزلق	inclined	مائل	Referring to	بالرجوع إلى	elevator	مصعد
tension	شد	crate	عربه	pulls	يسحب	rough	خشن

حل امتحان الدوري الثاني لعام ١٤٣٤هـ- الترم الثاني

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam-PHYS 110

Second Term
1433-1434 H

Date : 13 / 6 / 1434 H

C

Name: ____________________ **ID No:** ____________ **Section :** ________

CHOOSE THE CORRECT ANSWER :

$V_y = 0$

1. In the projectile motion, the y-component of the velocity at the maximum height is:
   A) positive (B) zero C) negative D) the maximum value

---

2. A man of mass m stands on a scale (ميزان) in an elevator, the general solution for the scale reading is :
   A) $F_N = m(-a_y - g)$ B) $F_N = m\,a_y$
   C) $F_N = m(a_y - g)$ (D) $F_N = m(a_y + g)$

$F_{net,y} = m a_y$
$F_N - F_g = m a_y$
$F_N - mg = m a_y$
$F_N = m(a_y + g)$

---

3. The coefficients μ_s and μ_k : $\mu_s = \frac{f_s}{F_N} = \frac{N}{N} = 1$
   A) always parallel to the surface B) both opposite to each other
   (C) have no units D) are vectors

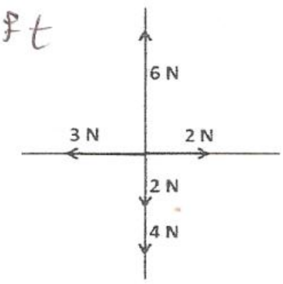
---

4. In Newton's First law , If no net force act on a body ....:
   A) the body's velocity cannot change , that is, the body can accelerate
   B) the body's velocity can change , that is, the body can accelerate
   C) the body's velocity can change , that is, the body cannot accelerate
   (D) the body's velocity cannot change , that is, the body cannot accelerate

---

5. In the figure the net force on the block is :

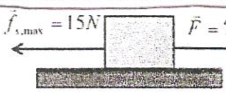
$F_{net,x} = 2 - 3 = -1\,N$, left
$F_{net,y} = 6 - 2 - 4 = 0$



   (A) 1N- left
   B) 6N- down
   C) 1N- right
   D) 4N- up

---

6. In the figure the block will move on the floor if F equals



A) 15N
B) 13N
C) 14N
D) 16N

---

7. In the uniform circular motion , the centripetal force is :

A) $m\frac{v}{R}$ B) $\frac{v^2}{R}$ C) $m\frac{v^2}{R}$ D) $m\frac{v^2}{R^2}$

---

8. Two forces $\vec{F}_1 = 8\hat{i} + 6\hat{j}$ and $\vec{F}_2 = 4\hat{i} + 10\hat{j}$ act on a particle of mass 2Kg .The acceleration is :

A) $4\hat{i} + 3\hat{j}$ B) $2\hat{i} + 5\hat{j}$ C) $6\hat{i} + 8\hat{j}$ D) $2\hat{i} + 2\hat{j}$

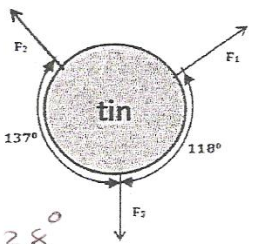
---

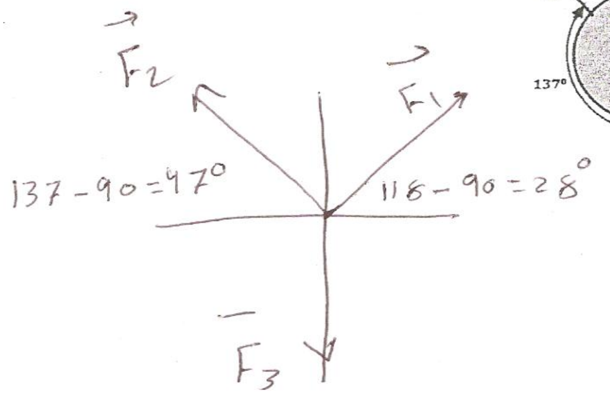
9. Projectile is fired (أطلق) from a ground at angle 45°above the horizontal. If it reaches the ground at 60 m from the starting point, the initial velocity (v_0) is:

A) 9.8m/s B) 24.2 m/s C) 31.3m/s D) 50m/s

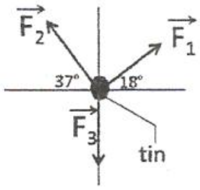
Use the following to answer questions 10-11:

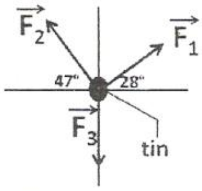
Three forces act horizontally on a tin (علبة) at the angles shown in the figure , the tin remains (تبقى) stationary

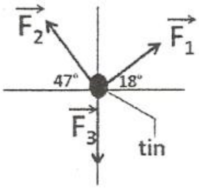


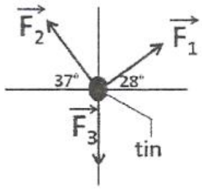


10. The free body diagram representing the forces on tin is :

A) 

(B) 

C) 

D) 

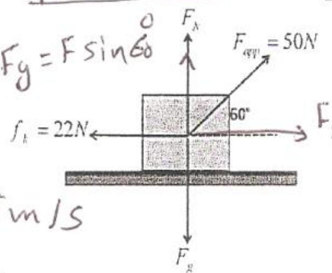
11. From Newton's 2nd law

A) $\vec{F}_1-\vec{F}_2-\vec{F}_3=m\vec{a}$ B) $\vec{F}_1-\vec{F}_2-\vec{F}_3=0$

(C) $\vec{F}_1+\vec{F}_2+\vec{F}_3=0$ D) $\vec{F}_1+\vec{F}_2+\vec{F}_3=m\vec{a}$

Fnet,x = 7.2 , Fnet,y = 0

12. In the figure a 2Kg mass slide over a horizontal frictional plane ,the object ....



Fy = F sin 60
Fx = F cos 60°

Fnet,y = 0
Fnet,x = ma
Fx − fk = ma
F cos 60 − 22 = 2a
a = (50 cos 60 − 22)/2 = 3/2 = 1.5 m/s

(A) accelerates at 1.5 m/s^2 (right)
B) dose not accelerate
C) accelerates at 3 m/s^2 (right)
D) accelerates at 10 m/s^2 (right)

---

13. If m_1= 227 kg and m_2= 454 kg and the same force is applied to both masses, then the ratio (النسبة) of their accelerations is:

A) $\frac{a_1}{a_2}=2.4$ B) $\frac{a_1}{a_2}=\frac{1}{5}$ (C) $\frac{a_1}{a_2}=2$ D) $\frac{a_1}{a_2}=\frac{1}{2}$

$\frac{a_1}{a_2}=\frac{m_2}{m_1}=\frac{454}{227}=2$

---

14. You are standing on the floor ,the push on you from the floor is Normal Force

(A) Normal force B) Gravitational force C) Friction D) Tension

---

15. The centripetal force accelerates a body by changing the direction of the body's .... without changing the body's speed.
A) acceleration B) displacement C) velocity D) path

Use the following to answer questions 16-17:

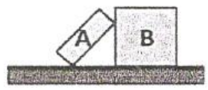
A plane enters a horizontal circular turn with $\vec{v}_i = 300\hat{i}\ m/s$ and 15 s later leaves the turn with $\vec{v}_f = -300\hat{i}\ m/s$:

16. If the radius of the circular path is 4890 m , then the centripetal acceleration is :
A) 9183.6m/s^2 B) 18.4m/s^2 C) 30.6m/s^2 D) 0.06m/s^2

17. The period of the plane is :
A) 30s B) 45s C) 60s D) 15s

---

18. Two bodies A and B interact , the magnitude of the forces on the bodies from each other are :



A) $F_{AB} \langle F_{BA}$
B) $F_{AB} = F_{BA}$
C) $F_{AB} = F_{BA} = 0$
D) $F_{AB} \rangle F_{BA}$

---

19. A particle moved a displacement $\Delta\vec{r} = (18m)\hat{i} + (22m)\hat{j} + (22m)\hat{k}$ in 2s. Its average velocity is:
A) $\vec{v}_{avg} = 9\hat{i} + 11\hat{j} + 11\hat{k}$ B) $\vec{v}_{avg} = 8\hat{i} + 11\hat{j} + 11\hat{k}$
C) $\vec{v}_{avg} = 9\hat{i} + 11\hat{k}$ D) $\vec{v}_{avg} = 8\hat{i} + 11\hat{k}$

---

20. A 0.15kg particle moves along an x-axis with acceleration a(t)= 2-12t (m/s^2), the net force acting on the particle at t =1s is :
A) $(-1.8N)\hat{i}$ B) $(-1.5N)\hat{i}$ C) $(0.3N)\hat{i}$ D) $(2.1N)\hat{i}$

---

21. The components of a car's position as a function of time are given by $r_x = 2t + 3$, and $r_y = 4t - 1$. The position vector at t= 2s is :
A) $\vec{r} = 7\hat{i} + 7\hat{j}$ B) $\vec{r} = 11\hat{i} + 15\hat{j}$ C) $\vec{r} = 5\hat{i} + 3\hat{j}$ D) $\vec{r} = 9\hat{i} + 11\hat{j}$

Use the following to answer questions 22-24:

A ball is thrown with initial velocity v_0=95 m/s at an angle $\theta_0 = 30^\circ$ above the horizontal:

22. The maximum height that the ball can reach is:
A) 57.55 m B) 460.4 m (C) 115.1 m D) 230.2 m

$h_{max} = \frac{V_0^2 \sin^2 \theta}{2g} = 115.1 m$

23. The ball's initial velocity v_0 in unit vector notation is :
A) $\vec{v}_0 = 47.5\hat{i} + 47.5\hat{j}$ B) $\vec{v}_0 = 82.3\hat{i}$
C) $\vec{v}_0 = 47.5\hat{j}$ (D) $\vec{v}_0 = 82.3\hat{i} + 47.5\hat{j}$

$V_{0x} = V_0 \cos\theta = 95\cos 30 = 82.3$
$V_{0y} = V_0 \sin\theta = 95 \sin 30 = 47.5$
$\vec{V}_0 = 82.3\hat{i} + 47.5\hat{j}$

24. The ball's acceleration in unit vector notation is:
A) $\vec{a} = 0$ (B) $\vec{a} = -9.8\hat{j}$ C) $\vec{a} = -9.8\hat{i}$ D) $\vec{a} = 9.8\hat{i} + 9.8\hat{j}$

---

25. A block of mass 3.5 Kg slides on horizontal surface the coefficient of kinetic friction is 0.47, the kinetic friction force between the block and the surface is :
A) 11N (B) 16N C) 13N D) 15N

$f_k = \mu_k F_N = \mu_k mg = (0.47)(3.5)(9.8) = 16.1N$

---

26. A 22 kg mass is sliding horizontally on a frictionless surface,the normal force F_N is :
A) 204N B) 121N (C) 215.6N D) 334N

$F_N = mg = (22)(9.8) = 215.6N$

---

27. A force of 50N is:
A) 50 kg. m^2/s (B) 50 kg.m/s^2 C) 50 g.m/s^2 D) 50 kg.m/s

$50 N = 50 kg \cdot m/s^2$

---

28. The coefficient of static friction between a 5kg block and horizontal surface is 0.4.The maximum static frictional force is :
(A) 19.6N B) 49N C) 10N D) 5.5N

$f_{s,m} = \mu_s F_N = (0.4)(5)(9.8) = 19.6N$

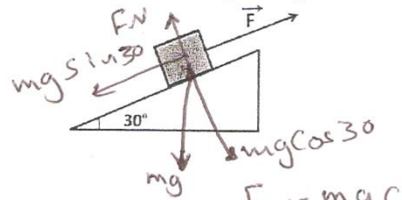
---

29. Three forces $\vec{F}_1 = 3\hat{i}$, $\vec{F}_2 = 4\hat{j}$ and $\vec{F}_3$ act on a body which is moving with a constant velocity . $\vec{F}_3$ is:
A) $\vec{F}_3 = -3\hat{i} + 4\hat{j}$ B) $\vec{F}_3 = 3\hat{i} + 4\hat{j}$ (C) $\vec{F}_3 = -3\hat{i} - 4\hat{j}$ D) $\vec{F}_3 = 3\hat{i} - 4\hat{j}$

$V = Const$
$a = 0$
$F_{net} = 0$
$F_1 + F_2 + F_3 = 0$
$F_3 = -F_1 - F_2$
$F_3 = -3\hat{i} - 4\hat{j}$

Use the following to answer questions 30-31:

A 5 Kg box is held at rest on a frictionless inclined plane by a force $\vec{F}$



$F_N = mg\cos 30^\circ$

30. The normal force $\vec{F}_N$ on the box is:
A) 0 B) mg C) $mg\cos 30^\circ$ D) $mg\sin 30^\circ$

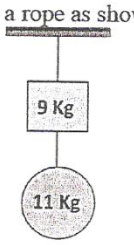
$F = mg\sin 30 = 5(9.8)\sin 30 = 24.5\,N$

31. The magnitude of $\vec{F}$ is :
A) zero B) 24.5 N C) 50 N D) 100 N

---

32. Two blocks are suspended (معلق) by a rope as shown , the tension in the top rope is:

$T = (m_1 + m_2)g = (9+11)\,9.8 = 196\,N$



A) 196 N
B) 88.2 N
C) 19.6 N
D) 107.8 N

---

33. The SI unit of weight is : → Force
A) Kilogram B) pound C) Newton D) gram

دراليز جعبور

King Abdulaziz University
Faculty of Sciences
Physics Department

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

A

Second Exam - Phys 110

الدوري الثاني - ١٤٣٣هـ

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A projectile is fired from the ground level with an initial velocity 283 m/s with an angle of 60⁰ with the horizontal. **The maximum height** the projectile reached $h = \frac{V_0^2 \sin^2\theta}{2g}$

   A) 8957.4 m [B)] 3064.6 m C) 2245.9 m D) 1598.6 m $h = \frac{(283)^2 \sin^2 60°}{(2)(9.8)} = 3064.63$

2. A car goes from $\vec{v}_i = 2\hat{i} + 4\hat{j}$ to $\vec{v}_f = 3\hat{i} + 9\hat{j}$ in 5 s. **The average acceleration** of the car $a_{avg} = \frac{V_2 - V_1}{\Delta t} = \frac{(3-2)\hat{i} + (9-4)\hat{j}}{5}$

   A) $\vec{a}_{avg} = \hat{i} - 6\hat{j}$ [B)] $\vec{a}_{avg} = 0.2\hat{i} + \hat{j}$ C) $\vec{a}_{avg} = 3\hat{i}$ D) $\vec{a}_{avg} = \hat{i} - \hat{j}$ $= \frac{\hat{i} + 5\hat{j}}{5} = 0.2\hat{i} + \hat{j}$

3. An objects move at a constant speed of 5 m/s on a circular path of radius 10 m. The **period** in seconds is: $T = \frac{2\pi r}{v} = \frac{2\pi(10)}{5} = 4\pi$

   A) $3\pi^3$ [B)] 4π C) 20 D) π

4. The **horizontal range** is the horizontal distance the projectile has traveled when it returns to

   A) its maximum height [B)] its initial height C) the origin D) the start point

Use the following to answer questions 5-6:

The coordinates of a particle's position vector as a function of time are given by $x = 5t^2 + 16$, **and** $y = -t^3 + 5$, **with** x **and** y **in meters and** t **in seconds:**

5. The **velocity** as a function of time is:

   [A)] $10t\,\hat{i} - 3t^2\,\hat{j}$ B) $10\,\hat{i} - 6t^2\,\hat{j}$ C) $5t\,\hat{i} - 6\,\hat{j}$ D) $t\,\hat{i} + 6t\,\hat{j}$

   $\vec{r} = (5t^2 + 16)\hat{i} + (-t^3 + 5)\hat{j}$
   $\vec{v} = \frac{d\vec{r}}{dt} = (10t)\hat{i} - (3t^2)\hat{j}$

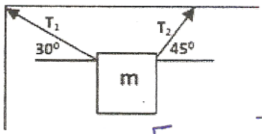
6. The position vector $\vec{r}$ at t =2 s is

$\vec{r}(2) = (20+16)\hat{i} + (-8+5)\hat{j} = 36\hat{i} - 3\hat{j}$

A) $26\hat{i} - 7\hat{j}$ [B)] $36\hat{i} - 3\hat{j}$ C) $81\hat{i} + 3\hat{j}$ D) $15\hat{i} - 5\hat{j}$

Use the following to answer questions 7-9:

A block of mass m = 5 kg is hanging by two ropes as shown in the figure:



$F_{net,x} = T_2 \cos 45° - T_1 \cos 30° = 0$

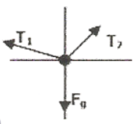
7. From the figure, $\mathbf{F}_{net,x}$ on the block is:

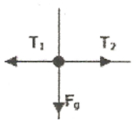
A) $T_1 \cos 45 - T_2 \cos 30 = 0$
[B)] $-T_1 \cos 30 + T_2 \cos 45 = 0$
C) $T_1 \cos 45 - T_2 \cos 30 = m a_x$
D) $T_1 \cos 30 - T_2 \cos 45 = m a_x$

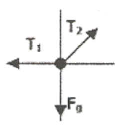
8. The **magnitude of weight (W)** in Newtons is equal to: $W = mg = 5(9.8) = 49\ N$

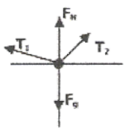
A) 9.8 N B) - 9.8 N C) - 49 N [D)] 49 N

9. The **free body diagram** representing the forces on m is:

[A)] 

B) 

C) 

D) 

10. The **coefficient of static friction** (μ_s):

A) has a magnitude of exactly 1
[B)] is dimensionless
C) is in the direction of the normal force
D) is in the direction of motion

11. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

A) $v_y = v_o(\cos\theta)t$ B) $v_y = v_o(\sin\theta)t$ [C)] $v_y = v_o\sin\theta - g\,t$ D) $v_y = v_o\sin\theta + g\,t$

12. Two forces $\vec{F}_1 = 7\hat{i} - 5\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

A) 7.14 N **[B)]** 4.12 N C) 13.2 N D) 10 N

$\vec{F}_{net} = \vec{F}_1 + \vec{F}_2 = (7-3)\hat{i} + (-5+4)\hat{j} = 4\hat{i} - \hat{j}$

$|F_{net}| = \sqrt{4^2 + (-1)^2} = \sqrt{16+1} = \sqrt{17} = 4.12 N$

13. A 0.15 kg particle moves along an $x-$axis with acceleration $a(t) = 8 - 18t$ with a in m/s² and t in seconds. The **net force** in Newtons acting on the particle at t = 3.40s is $\vec{F}_{net} = m\vec{a}$

[A)] -7.98 $\hat{i}$ B) 12.4 $\hat{i}$ C) -5.21 $\hat{i}$ D) 8.52 $\hat{i}$

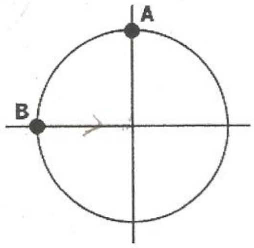
$a_x(3.4) = 8 - 18(3.4) = 8 - 61.2 = -53.2$

$\vec{F}_{net} = (0.15)(-53.2)\hat{i} = -(7.98)\hat{i} N$

14. In the figure, a car moves at constant speed around the circle path in a horizontal xy plane, with the center at the origin. When it is at point A its coordinates are $x = 0$, $y = 3$m and its velocity is (6 m/s) $\hat{i}$. When it is **at point B its velocity and acceleration** are:

$v = 6 m/s \hat{j}$

$a = \frac{v^2}{r} = \frac{(6)^2}{3} = \frac{36}{3} = 12\hat{i}$



[A)] $\vec{v} = +6\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

B) $\vec{v} = -6\hat{j}$ and $\vec{a} = +12\hat{j}$, respectively

C) $\vec{v} = +6\hat{i}$ and $\vec{a} = -12\hat{i}$, respectively

D) $\vec{v} = +4\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

15. A 12 kg object is moving with a net force of 7 N north on it. The object having an **acceleration** of:

$a = \frac{F_{net}}{m} = \frac{7}{12} = 0.58 m/s^2$ north

[A)] 0.58 m/s² north B) 1.71 m/s² south C) 1.71 m/s² north D) 0.58 m/s² south

16. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\hat{j} - 2\hat{k}$, all in meters, its **average velocity** ($\vec{v}_{avg}$) in unit vector notation is

A) $-0.3\hat{i} - 1.4\hat{j} + 0.6\hat{k}$

[B)] $-0.7\hat{i} + 1.4\hat{j} - 0.4\hat{k}$

C) $4.7\hat{i} - 1.4\hat{j} + 0.9\hat{k}$

D) $-5\hat{i} + 2.4\hat{j} + 0.4\hat{k}$

$v_{avg} = \frac{r_2 - r_1}{\Delta t} = \frac{(-2i + 8j - 2k) - (5\hat{i} - 6\hat{j} + 2k)}{10} = \frac{-7\hat{i} + 14\hat{j} - 4k}{10} = -0.7\hat{i} + 1.4\hat{j} - 0.4\hat{k}$

17. A 980 kg car is traveling at constant speed 28 m/s around circular track of radius R = 230 m. The **magnitude of the frictional force** on the car is

A) 4141.5 N B) 1245.7 N **[C)]** 3340.5 N D) 6241.6 N

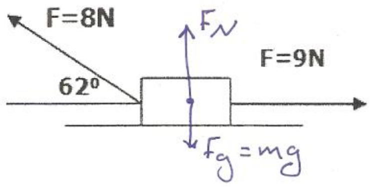
$F = \frac{mv^2}{R} = \frac{(980)(28)^2}{230} = 3340.5 N$

18. From the figure, the **acceleration of the block** of mass 3 kg moving along an $x-$axis on a frictionless table is:

$\vec{F}_{net} = m\vec{a}$

$9 - 8\cos 62^\circ = (3)a$

$a = \frac{9 - 8\cos 62^\circ}{3} = \frac{5.24}{3} = 1.75\ m/s^2$



A) 2.45 m/s² **[B)]** 1.75 m/s² C) - 2.3 m/s² D) 3 m/s²

19. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

A) 7 m/s B) 12 m/s C) 2 m/s **[D)]** 5 m/s

V_x at maximum height = 5 m/s

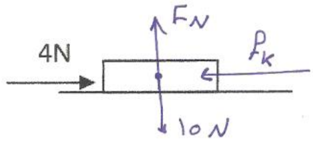
20. A bomb (قنبلة) is fired from a cannon and has initial horizontal and vertical components of velocity equal to 23 m/s and 54 m/s, respectively .The **angle** the bomb fired with the horizontal is

$V_{0x} = 23\ m/s,\ V_{0y} = 54\ m/s$

$\theta_0 = \tan^{-1}\left(\frac{V_{0y}}{V_{0x}}\right) = \tan^{-1}\left(\frac{54}{23}\right) = 66.93^\circ \approx 67^\circ$

A) 49⁰ **[B)]** 67⁰ C) 85⁰ D) 33⁰

21. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



$\vec{F}_{net} = m\vec{a}$

Constant velocity ⇒ $a = 0$

$F_{net} = 0$

$4 - f_k = 0 \Rightarrow f_k = 4$

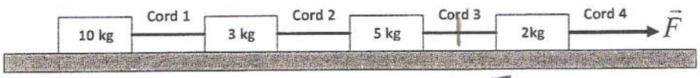
$\mu_k F_N = 4$

$\mu_k = \frac{4}{F_N} = \frac{4}{10} = 0.4$

A) 0.8 B) 0.6 C) 0.3 **[D)]** 0.4

Use the following to answer questions 22-23:

The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, with an acceleration equal to 3 m/s²



22. The **magnitude of force** $\vec{F}$ on the four blocks is

$F = Ma = (m_1 + m_2 + m_3 + m_4)(a)$

$= (10 + 3 + 5 + 2)(3) = 20 \times 3 = 60\ N$

A) 40 N B) 30 N C) 20 N **[D)]** 60 N

23. The **total mass accelerated to the right by Cord 3** is

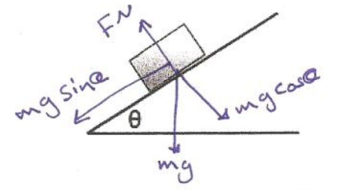
A) 18 kg B) 20 kg C) 10 kg D) 13 kg

24. A man of mass 75 kg stand on an elevator, if the elevator is going downward with acceleration of 1.7 m/s², the **normal force** on the man from the elevator is:

A) 523.4 N B) 700.5 N C) 323.9 N D) 607.5 N

Use the following to answer questions 25-26:

In the figure, a block of mass m = 25 kg is sliding down on a frictionless plane inclined at θ = 60⁰



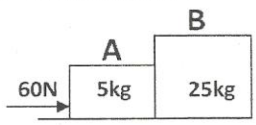
25. The **normal force** ($\bar{F}_N$) on the block is:

A) mg B) ma C) mg cosθ D) mg sinθ

26. The **magnitude of the force** that causes the block sliding down is

A) 212.17 N B) 150 N C) 90.44 N D) 311 N

27. In the figure, two blocks slide over a frictionless surface along an $x-$axis with an acceleration equals 2 m/s². The force F on block A from block B is:



A) 50 N B) 60 N C) 57 N D) 40 N

28. When a person is standing on a scale in an elevator, the scale reads higher than the normal weight of the person if the elevator is :

A) accelerating upward
B) accelerating downward
C) moving up with constant velocity.
D) stationary

29. A ball is shot at an angle of 25^0 above the horizontal with an initial speed of v_0 . If the range it reaches is 140 m, what its **initial speed**?

A) 80 m/s B) 20 m/s C) 40 m/s D) 42.3 m/s

$R = \frac{V_0^2 \sin 2\theta}{g}$ $V_0 = \sqrt{\frac{Rg}{\sin 2\theta}} = \sqrt{\frac{140 \times 9.8}{\sin 50}} = 42.3 m/s$

30. The **force that always perpendicular to the surface** is called

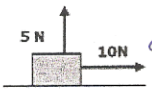
A) Gravitational force B) Tension C) Friction D) Normal force

31. Two objects having masses of 1Kg and 2Kg moving around a circle of radius r = 1 m and with v = 1 m/s. Their **accelerations** are related by:

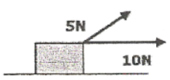
$a = \frac{V^2}{r} = \frac{(1)^2}{1} = 1 m/s^2$ $a_1 = a_2$

A) $\frac{a_1}{a_2} = \frac{1}{2}$ B) $\frac{a_1}{a_2} = 2$ C) $a_1 = a_2$ D) $a_1 = a_2 = 0$

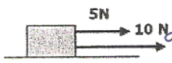
32. Two forces, have magnitudes 5 N and 10 N, are applied to an object moving along an x – axis. In **which figure** of the following the magnitude of the acceleration of the object is the least ?

A) 

$a = \frac{10}{m}$

C) 

$a = \frac{10 + 5\cos\theta}{m}$

B) 

$a = \frac{10+5}{m} = \frac{15}{m}$

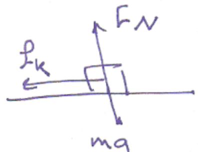
D) 

$a = \frac{10-5}{m} = \frac{5}{m}$

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

A) 25.4 N B) 19.6 N C) 45.8 N D) 10.3 N

$f_{s,max} = \mu_s F_N = (0.4)(mg)$
$= (0.4)(5)(9.8) = 19.6 N$



King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

A

Name: **ID No:** **Section:**

CHOOSE THE CORRECT ANSWER

1. A projectile is fired from the ground level with an initial velocity 283 m/s with an angle of 60^0 with the horizontal. **The maximum height** the projectile reached

   A) 8957.4 m **B)** 3064.6 m **C)** 2245.9 m **D)** 1598.6 m

2. A car goes from $\vec{v}_i = 2\hat{i} + 4\hat{j}$ to $\vec{v}_f = 3\hat{i} + 9\hat{j}$ in 5 s. **The average acceleration** of the car

   A) $\vec{a}_{avg} = \hat{i} - 6\hat{j}$ **B)** $\vec{a}_{avg} = 0.2\hat{i} + \hat{j}$ **C)** $\vec{a}_{avg} = 3\hat{i}$ **D)** $\vec{a}_{avg} = \hat{i} - \hat{j}$

3. An objects move at a constant speed of 5 m/s on a circular path of radius 10 m. The **period** in seconds is:

   A) $3\pi^3$ **B)** 4π **C)** 20 **D)** π

4. The **horizontal range** is the horizontal distance the projectile has traveled when it returns to

   A) its maximum height **B)** its initial height **C)** the origin **D)** the start point

Use the following to answer questions 5-6:

The coordinates of a particle's position vector as a function of time are given by $x = 5t^2 + 16$**, and** $y = -t^3 + 5$**, with** x **and** y **in meters and** t **in seconds:**

5. The **velocity** as a function of time is:

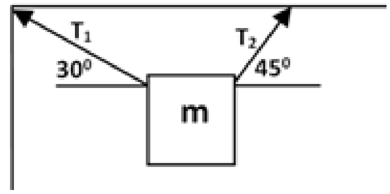
   A) $10t\ \hat{i} - 3t^2\ \hat{j}$ **B)** $10\ \hat{i} - 6t^2\ \hat{j}$ **C)** $5t\ \hat{i} - 6\ \hat{j}$ **D)** $t\ \hat{i} + 6t\ \hat{j}$

6. The position vector $\vec{r}$ at t =2 s is

A) $26\hat{i} - 7\hat{j}$ B) $36\hat{i} - 3\hat{j}$ C) $81\hat{i} + 3\hat{j}$ D) $15\hat{i} - 5\hat{j}$

Use the following to answer questions 7-9:

A block of mass m = 5 kg is hanging by two ropes as shown in the figure:



7. From the figure, $\mathbf{F}_{net,x}$ on the block is:

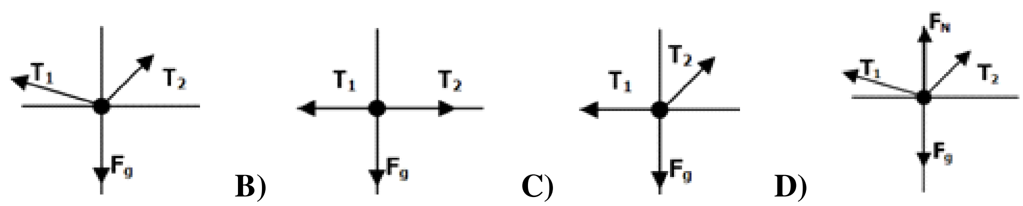
A) $T_1 \cos 45 - T_2 \cos 30 = 0$
B) $-T_1 \cos 30 + T_2 \cos 45 = 0$
C) $T_1 \cos 45 – T_2 \cos 30 = m a_x$
D) $T_1 \cos 30 – T_2 \cos 45 = m a_x$

8. The **magnitude of weight (W)** in Newtons is equal to:

A) 9.8 N B) - 9.8 N C) - 49 N D) 49 N

9. The **free body diagram** representing the forces on m is:

A) B) C) D)



10. The **coefficient of static friction** (μ_s):

A) has a magnitude of exactly 1
B) is dimensionless
C) is in the direction of the normal force
D) is in the direction of motion

11. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

A) $v_y = v_o(\cos\theta)t$ B) $v_y = v_o(\sin\theta)t$ C) $v_y = v_o\sin\theta - g\,t$ D) $v_y = v_o\sin\theta + g\,t$

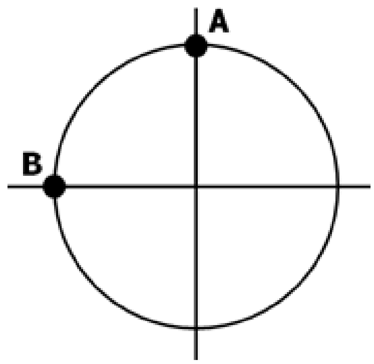
12. Two forces $\vec{F}_1 = 7\hat{i} - 5\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

A) 7.14 N **B)** 4.12 N **C)** 13.2 N **D)** 10 N

13. A 0.15 kg particle moves along an $x-$axis with acceleration $a(t) = 8 - 18t$ with a in m/s^2 and t in seconds. The **net force** in Newtons acting on the particle at t = 3.40s is

A) $-7.98\,\hat{i}$ **B)** $12.4\,\hat{i}$ **C)** $-5.21\,\hat{i}$ **D)** $8.52\,\hat{i}$

14. In the figure, a car moves at constant speed around the circle path in a horizontal xy plane, with the center at the origin. When it is at point A its coordinates are $x = 0$, $y = 3$m and its velocity is (6 m/s) $\hat{i}$. When it is **at point B its velocity and acceleration** are:



A) $\vec{v} = +6\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

B) $\vec{v} = -6\hat{j}$ and $\vec{a} = +12\hat{j}$, respectively

C) $\vec{v} = +6\hat{i}$ and $\vec{a} = -12\hat{i}$, respectively

D) $\vec{v} = +4\hat{j}$ and $\vec{a} = +12\hat{i}$, respectively

15. A 12 kg object is moving with a net force of 7 N north on it. The object having an **acceleration** of:

A) 0.58 m/s^2 north **B)** 1.71 m/s^2 south **C)** 1.71 m/s^2 north **D)** 0.58 m/s^2 south

16. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\hat{j} - 2\hat{k}$, all in meters, its **average velocity ($\vec{v}_{avg}$)** in unit vector notation is

A) $-0.3\,\hat{i} - 1.4\,\hat{j} + 0.6\,\hat{k}$

B) $-0.7\,\hat{i} + 1.4\,\hat{j} - 0.4\,\hat{k}$

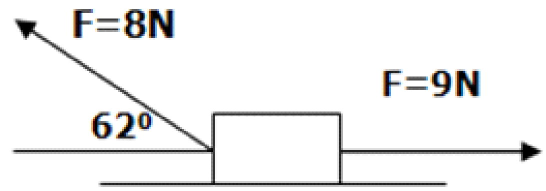
C) $4.7\,\hat{i} - 1.4\,\hat{j} + 0.9\,\hat{k}$

D) $-5\,\hat{i} + 2.4\,\hat{j} + 0.4\,\hat{k}$

17. A 980 kg car is traveling at constant speed 28 m/s around circular track of radius R = 230 m. The **magnitude of the frictional force** on the car is

A) 4141.5 N **B)** 1245.7 N **C)** 3340.5 N **D)** 6241.6 N

18. From the figure, the **acceleration of the block** of mass 3 kg moving along an $x-$axis on a frictionless table is:



A) 2.45 m/s² **B)** 1.75 m/s² **C)** - 2.3 m/s² **D)** 3 m/s²

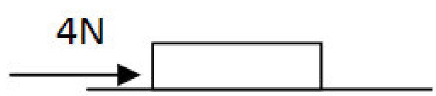
19. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

A) 7 m/s **B)** 12 m/s **C)** 2 m/s **D)** 5 m/s

20. A bomb (قنبلة) is fired from a cannon and has initial horizontal and vertical components of velocity equal to 23 m/s and 54 m/s, respectively .The **angle** the bomb fired with the horizontal is

A) 49^0 **B)** 67^0 **C)** 85^0 **D)** 33^0

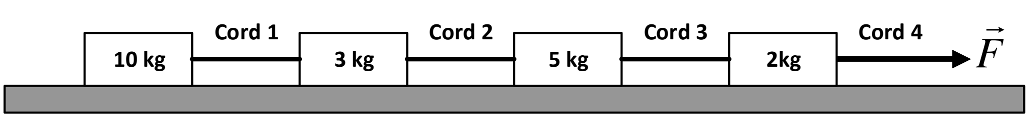
21. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



A) 0.8 **B)** 0.6 **C)** 0.3 **D)** 0.4

Use the following to answer questions 22-23:

The figure shows a train of four blocks being pulled across a frictionless floor by force $\vec{F}$, with an acceleration equal to 3 m/s²



22. The **magnitude of force** $\vec{F}$ on the four blocks is

A) 40 N **B)** 30 N **C)** 20 N **D)** 60 N

23. The **total mass accelerated to the right by Cord 3** is

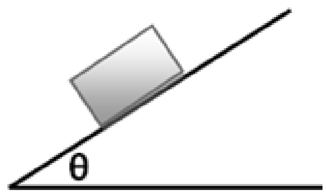
A) 18 kg **B)** 20 kg **C)** 10 kg **D)** 13 kg

24. A man of mass 75 kg stand on an elevator, if the elevator is going downward with acceleration of 1.7 m/s^2, the **normal force** on the man from the elevator is:

A) 523.4 N **B)** 700.5 N **C)** 323.9 N **D)** 607.5 N

Use the following to answer questions 25-26:

In the figure, a block of mass m = 25 kg is sliding down on a frictionless plane inclined at θ = 60^0



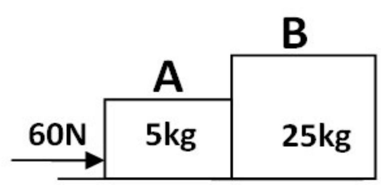
25. The **normal force** ($\vec{F}_N$) on the block is:

A) mg **B)** ma **C)** mg cosθ **D)** mg sinθ

26. The **magnitude of the force** that causes the block sliding down is

A) 212.17 N **B)** 150 N **C)** 90.44 N **D)** 311 N

27. In the figure, two blocks slide over a frictionless surface along an $x-$axis with an acceleration equals 2 m/s^2. The force F on block A from block B is:



A) 50 N **B)** 60 N **C)** 57 N **D)** 40 N

28. When a person is standing on a scale in an elevator, the scale reads higher than the normal weight of the person if the elevator is :

A) accelerating upward
B) accelerating downward
C) moving up with constant velocity.
D) stationary

29. A ball is shot at an angle of 25^0 above the horizontal with an initial speed of v_0 . If the range it reaches is 140 m, what its **initial speed**?

A) 80 m/s **B)** 20 m/s **C)** 40 m/s **D)** 42.3 m/s

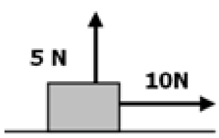
30. The **force that always perpendicular to the surface** is called

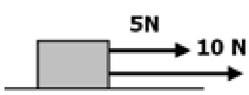
A) Gravitational force **B)** Tension **C)** Friction **D)** Normal force

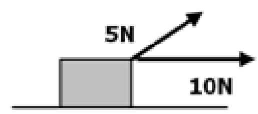
31. Two objects having masses of 1Kg and 2Kg moving around a circle of radius r = 1 m and with v = 1 m/s. Their **accelerations** are related by:

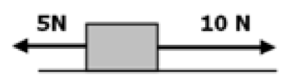
A) $\frac{a_1}{a_2}=\frac{1}{2}$ **B)** $\frac{a_1}{a_2}=2$ **C)** $a_1=a_2$ **D)** $a_1=a_2=0$

32. Two forces, have magnitudes 5 N and 10 N, are applied to an object moving along an $x-$axis. In **which figure** of the following the magnitude of the acceleration of the object is the least ?

A)


B)


C)


D)


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

A) 25.4 N **B)** 19.6 N **C)** 45.8 N **D)** 10.3 N

Answer Key

1. B
2. B
3. B
4. B
5. A
6. B
7. B
8. D
9. A
10. B
11. C
12. B
13. A
14. A
15. A
16. B
17. C
18. B
19. D
20. B
21. D
22. D
23. A
24. D
25. C
26. A
27. A
28. A
29. D
30. D
31. C
32. D
33. B

King Abdulaziz University
Faculty of Sciences
Physics Department

First Term
1433-1434 H

Date: 20 / 1/ 1434H

A

Second Exam - Phys 110

Name: ID No: Section:

CHOOSE THE CORRECT ANSWER

1. A particle initially has $v = 4\hat{i} - 2\hat{j} + 3\hat{k}$ m/s and then 4 s later has $v = -2\hat{i} - 2\hat{j} + 5\hat{k}$ m/s, the **magnitude of the average acceleration** a_{avg} is

   a) 2.25 m/s² (b) 1.58 m/s² c) 0.25 m/s² d) 1.85 m/s²

Use the following to answer questions 2-3:

A particle moves with initial velocity $\vec{v}_0 = 6\hat{i} - 2.6\hat{j}$ m/s , and a constant acceleration $\vec{a} = -0.3\hat{i} + \hat{j}$ m/s²

2. **How long** does the particle take to reach its maximum x −coordinate

   (a) 20 s b) 2.6 s c) 4.3 s d) 22.6 s

3. What is the **particle's maximum** x **−coordinate**

   a) 7 m b) 3.6 m (c) 60 m d) 36 m

Use the following to answer questions 4-6:

A ball is projected with initial velocity v_0 =82 m/s at an angle θ_0 =60° above the horizontal

4. At the **maximum height** ,the ball's velocity $\vec{v}$ in **unit vector notation** is

   (a) $\vec{v} = 41\hat{i}$ b) $\vec{v} = 82\hat{i} + 71\hat{j}$ c) $\vec{v} = 41\hat{i} + 71\hat{j}$ d) $\vec{v} = 71\hat{j}$

5. The ball's velocity $\vec{v}_0$ in **unit vector notation** is:

   a) $\vec{v}_0 = 30\hat{i}$ b) $\vec{v}_0 = 24\hat{i} + 52\hat{j}$ (c) $\vec{v}_0 = 41\hat{i} + 71\hat{j}$ d) $\vec{v}_0 = 71\hat{j}$

6. The **maximum range** R_{max} is

   a) 442 m b) 820 m c) 541 m (d) 686 m

7. The position vector for moving particle as it moves in xy plane is

$\vec{r} = (-3t^3 - 4t)\hat{i} + (-5t^2 + 6)\hat{j}$, the x and y **acceleration components** are:

a) a_x = constant, and a_y = not constant

b) a_x = constant, and a_y = constant

c) a_x = not constant, and a_y = constant

d) a_x = not constant, and a_y = not constant

Use the following to answer questions 8-10:

A ball is **projected horizontally** with a velocity v_0 of magnitude 5m/s

8. The x - component of **its position** after 0.25 s is

a) x = 15 m **b)** x = 5 m **c)** x = 125m **d)** x = 1.25 m

9. The vertical component of its **position** after 0.25 s is

a) y = - 0.613 m **c)** y = - 1.22 m

b) y = - 0.306 m **d)** y = - 2.45 m

10. The x - component of its velocity after 0.25 s is

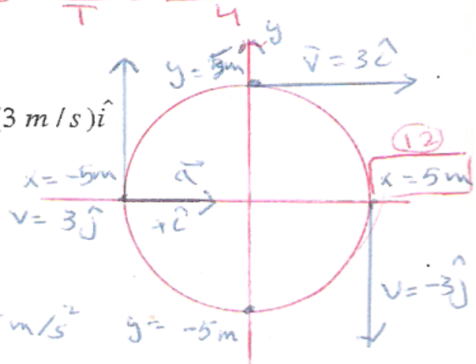
a) v_x = 3 m/s **b)** v_x = 2 m/s **c)** v_x = 4 m/s **d)** v_x = 5 m/s

11. The **speed** of a car moving in a circular path of radius 5m making **two complete circle** in 8 s is

a) 1.25 m/s **b)** 2.5 m/s **c)** 3.925 m/s **d)** 7.85 m/s

Use the following to answer questions 12-13:

A particle is moving in circular path, at y = 5 m the particles velocity is $\vec{v} = (3\ m/s)\hat{i}$



12. At which point **the velocity** is $\vec{v} = -3\ \hat{j}$

a) y = - 5 m **b)** x = +5 m **c)** y = +5 m **d)** x = - 5 m

13. The **acceleration** at x = -5m is

a) $\vec{a} = (0.6\ m/s^2)\hat{i}$ **c)** $\vec{a} = (-1.8\ m/s^2)\hat{i}$

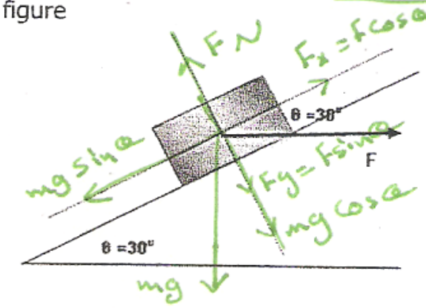
b) $\vec{a} = (1.8\ m/s^2)\hat{i}$ **d)** $\vec{a} = (-0.6\ m/s^2)\hat{i}$

14. A 5 kg block is supported (رُبط) by a cord and pulled upward with an acceleration of 2 m/s², the **tension** in the cord is

a) T = 59 N **b)** T = 10 N **c)** T = 49 N **d)** T = 25 N

Use the following to answer questions 15-16:

A box of mass m=100 kg is pushed at constant speed up the frictionless inclined plane of angle 30⁰ by a force F as shown in the figure



15. Applying Newton's second law to the x −axis, the **magnitude of F** is

a) F = 565.8 N **b)** F = 490.7 N **c)** F = 980 N **d)** F = 577 N

16. Applying Newton's second law to the y − axis, the **normal force F_N** is:

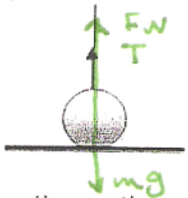
a) $F_N = F \sin\theta - mg \cos\theta$
b) $F_N = mg$
c) $F_N = F \sin\theta + mg \cos\theta$
d) $F_N = mg \sin\theta - mg$

17. Three forces $\vec{F}_1 = 27.7\hat{i} + 16\hat{j}$, $\vec{F}_2 = 55\hat{i}$ and $\vec{F}_3 = 20.5\hat{i} - 35.5\hat{j}$ acting on a 120 kg block that can slide over a frictionless floor, the **acceleration** of the block in unit vector notation is

a) $\vec{a} = (0.46 m/s^2)\hat{i} - (0.7 m/s^2)\hat{j}$
b) $\vec{a} = (0.86 m/s^2)\hat{i} - (0.16 m/s^2)\hat{j}$
c) $\vec{a} = (0.18 m/s^2)\hat{i} - (0.34 m/s^2)\hat{j}$
d) $\vec{a} = (0.54 m/s^2)\hat{i} - (0.12 m/s^2)\hat{j}$

Use the following to answer questions 18-20:

A ball with a weight of 3 N is at rest on a horizontal surface. A tension force T=1N is applied to the ball by an attached vertical rope but the ball is still at rest



18. The **normal force F_N** acting on the ball is

a) F_N = 1 N **b)** F_N = 4 N **c)** F_N = 2 N **d)** F_N = 3 N

19. The ball exerting a downward force on the surface. The **reaction to this force** is

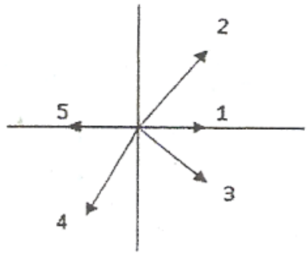
a) The force of Earth on the ball
(b) The force of the surface on the ball
c) The force of the earth on the surface
d) The force of the ball on Earth

20. The **ball's mass** is

a) 0.6 kg (b) 0.31 kg c) 0.11 kg d) 0.5 kg

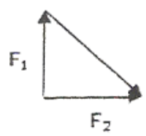
$mg = 3N$
$m = \frac{3}{g} = \frac{3}{9.8} \simeq 0.31$ kg

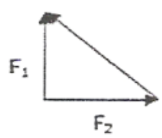
21. Three forces $\vec{F}_1 = -\hat{i} - \hat{j}$, $\vec{F}_2 = -\hat{i}$ and $\vec{F}_3 = \hat{i} + \hat{j}$ acting on a body, from the free body diagram the **vectors that represent these forces** are:



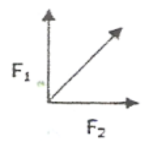
a) $\vec{F}_1$ is vector **5** , $\vec{F}_2$ is vector **2** , $\vec{F}_3$ is vector **3**
b) $\vec{F}_1$ is vector **3** , $\vec{F}_2$ is vector **4** , $\vec{F}_3$ is vector **1**
(c) $\vec{F}_1$ is vector **4** , $\vec{F}_2$ is vector **5** , $\vec{F}_3$ is vector **2**
d) $\vec{F}_1$ is vector **1** , $\vec{F}_2$ is vector **3** , $\vec{F}_3$ is vector **4**

22. Which of the figures show the vector addition of forces F_1 and F_2 to give their **net force** $\mathbf{F_{net}}$:

a)


b)


c)

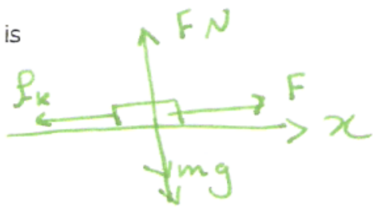

(d)


Use the following to answer questions 23-24:

A person pushes horizontally a 38 kg block with a force F to move it across a floor along the + x -axis

23. The coefficient of kinetic friction is 0.35, the **magnitude of friction force** is

a) f_k =13.3 N b) f_k =12.25 N c) f_k =3.43 N (d) f_k =130.3 N



$m = 38$ kg
$\mu_k = 0.35$
$f_k = \mu_k F_N$
$f_k = \mu_k (mg) = 0.35 (38)(9.8) = 130.3$ N

24. The **acceleration** of the block is:

$F_{net} = ma$

$F - f_k = ma \Rightarrow a = \frac{F - f_k}{m}$

a) $a = \frac{F - f_k}{m}$ b) $a = \frac{F}{m}$ c) $a = \frac{F_N - \mu_k f}{m}$ d) $a = \frac{f_s - F}{m}$

25. A block of mass 50 kg lies on a floor, the **magnitude of the frictional force** on it from the floor is:

because is No Force at sliding

$F = 0$

a) 490 N b) 0 c) 50 N d) 4.9 N

26. A block of weight 45N resting on a table in an elevator moving upward at increasing speed, $+a$ the magnitude of the normal force F_N :

$F_{net} = ma$

$F_N - mg = ma$

$\therefore F_N = ma + mg = ma + 45$

$\therefore F_N > 45\ N$

a) $F_N < 45$ N b) $F_N = 0$ c) $F_N > 45$ N d) $F_N = 45$ N

27. The **physical quantities** are measured in the **same units** are:

a) mass and weight (kg, N)
b) friction and acceleration (N, m/s^2)
c) velocity and displacement (m/s, m)
d) weight and tension (N, N)

28. In the figure, if the body does not move, then the **static frictional force** f_s and the **component of F** are:

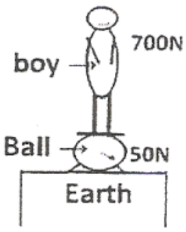
a) f_s = zero
b) f_s > the component of F
c) f_s = and opposite of the component of F
d) f_s < the component of F

29. A **newton** is the force:

$N = 1\ kg \cdot m/s^2 \Leftarrow F = ma$

a) of gravity on a 1 kg body
b) of gravity on a 1 g body
c) that gives a 1 g body an acceleration of 1 cm/s^2
d) that gives a 1 kg body an acceleration of $1 m/s^2$

30. In a given figure, the **weight** exerted on Earth from the ball is



$W = 700 + 50 = 750\ N$

a) 750N b) 50N c) 700N d) 490N

$V_x = \text{Const} \Rightarrow a_x = 0$

31. In projectile motion, the **acceleration** of any projectile along the x-direction is:

a) -9.8m/s^2 **(b))** 0 **c)** less than zero **d)** great than zero

32. The position vector $\vec{r}$ of a body is defined by equation $\vec{r} = (Pt - Qt^3)\hat{i} + N\hat{j}$ where *P*, *Q* and *N* are constants. The **velocity of the particle will be zero at time** equal to:

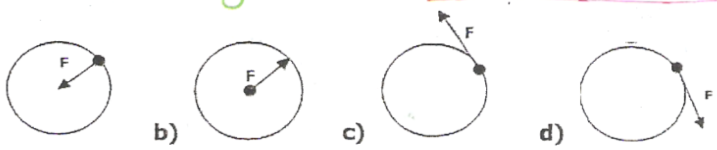
a) $\frac{Q}{P}$ **(b)** $\sqrt{\frac{P}{3Q}}$ **c)** $\sqrt{\frac{3Q}{P}}$ **d)** $\sqrt{PQ}$

$V = 0$ at $t = ?$

$V = \frac{dr}{dt} = (P - 3Qt^2)\hat{i}$

$0 = P - 3Qt^2 \Rightarrow t = \sqrt{\frac{+P}{+3Q}}$

33. The **direction of the centripetal force** acting on a body moving in uniform circular motion is always point toward the Center of the circle



(a)) **b)** **c)** **d)**