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:

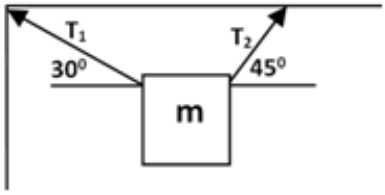
   A) $10t\ \hat{i} - 3t^2\ \hat{j}$ **B)** $10\ \hat{i} - 6t^2\ \hat{j}$ **C)** $5t\ \hat{i} - 6\ \hat{j}$ **D)** $t\ \hat{i} + 6t\ \hat{j}$

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:



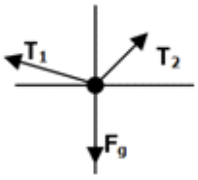
7. From the figure, $\mathbf{F_{net,x}}$ on the block is:

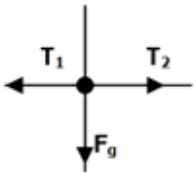
A) $T_1 \cos 45 - T_2 \cos 30 = 0$
B) $-T_1 \cos 30 + T_2 \cos 45 = 0$
C) $T_1 \cos 45 - T_2 \cos 30 = m a_x$
D) $T_1 \cos 30 - T_2 \cos 45 = m a_x$

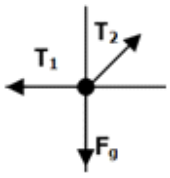
8. The **magnitude of weight (W)** in Newtons is equal to:

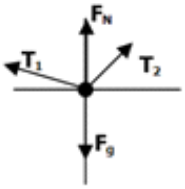
A) 9.8 N **B)** - 9.8 N **C)** - 49 N **D)** 49 N

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)** $v_y = v_o \sin\theta + g\,t$

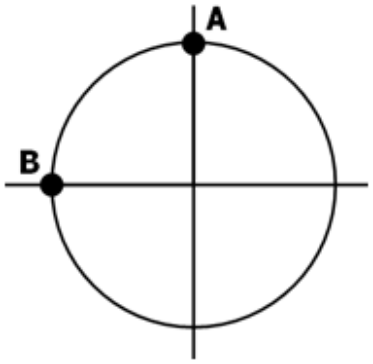
12. Two forces $\vec{F}_1 = 7\hat{i} - 5\hat{j}$ and $\vec{F}_2 = -3\hat{i} + 4\hat{j}$ acting on a body that can move over frictionless floor, the **magnitude of the net force** is :

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/s² 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/s² north **B)** 1.71 m/s² south **C)** 1.71 m/s² north **D)** 0.58 m/s² south

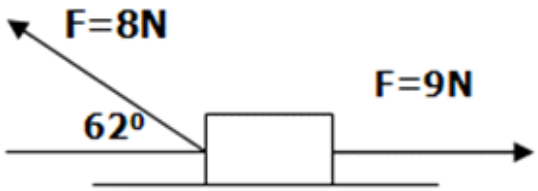
16. The position vector for an airplane initially is $\vec{r} = 5\hat{i} - 6\,\hat{j} + 2\hat{k}$ and then 10s later is $\vec{r} = -2\hat{i} + 8\,\hat{j} - 2\hat{k}$, all in meters, its **average velocity ($\vec{v}_{avg}$)** in unit vector notation is

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

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

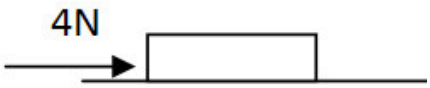
19. A particle is projected with an initial velocity $\vec{v}_0 = 5.0\hat{i} + 4.0\hat{j}$ in meters per second. The **horizontal component of its velocity at the maximum height** is:

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

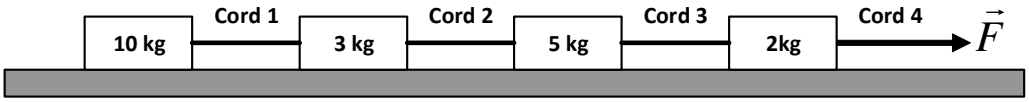
21. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



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/s^2



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

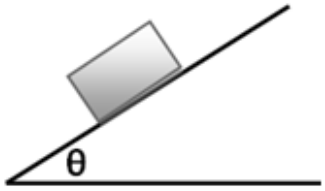
A) 18 kg **B)** 20 kg **C)** 10 kg **D)** 13 kg

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



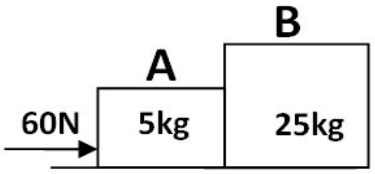
25. The **normal force** ($\vec{F}_N$) on the block is:

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

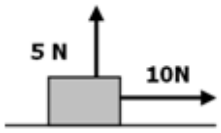
A) Gravitational force **B)** Tension **C)** Friction **D)** Normal force

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:

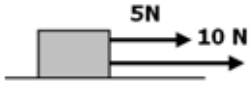
A) $\frac{a_1}{a_2}=\frac{1}{2}$ **B)** $\frac{a_1}{a_2}=2$ **C)** $a_1=a_2$ **D)** $a_1=a_2=0$

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 ?

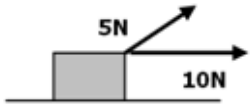
A)



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