King Abdulaziz University
Faculty of Sciences
Physics Department

Second Exam - Phys 110

Second Term
1432-1433 H

Date: 2 / 6 / 1433H

B

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

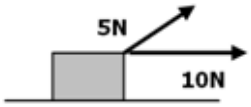
CHOOSE THE CORRECT ANSWER

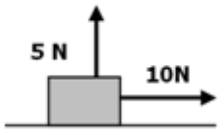
1. In the projectile motion ,the vertical component of the velocity at any time in the y-direction is equal to

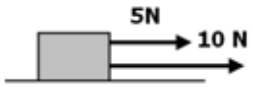
A) $v_y = v_o \sin\theta + g\,t$ **B)** $v_y = v_o \sin\theta - g\,t$ **C)** $v_y = v_o (\cos\theta)t$ **D)** $v_y = v_o (\sin\theta)t$

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 ?

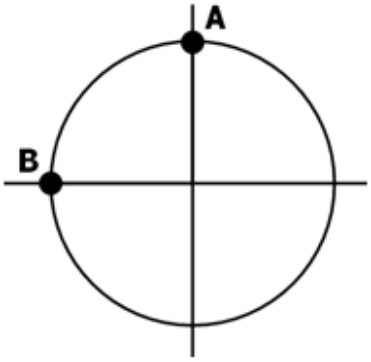
A)


B)


C)


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

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

C) $\vec{v}=+6\,\hat{j}$ 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

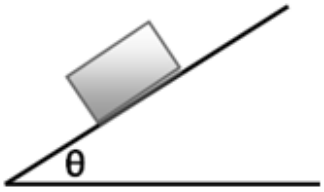
A) Friction **B)** Normal force **C)** Tension **D)** Gravitational force

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 $\cos\theta$ **B)** mg **C)** mg $\sin\theta$ **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) $t\ \hat{i} + 6\,t\ \hat{j}$ **B)** $10t\ \hat{i} - 3\,t^2\ \hat{j}$ **C)** $10\ \hat{i} - 6\,t^2\ \hat{j}$ **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:

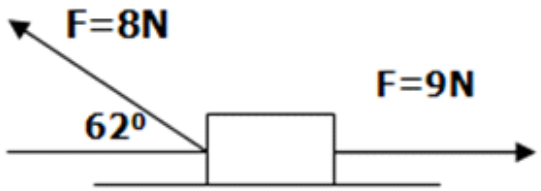
A) 607.5 N **B)** 323.9 N **C)** 523.4 N **D)** 700.5 N

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/s² **B)** 3 m/s² **C)** 2.45 m/s² **D)** - 2.3 m/s²

22. A ball is shot at an angle of 25⁰ 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

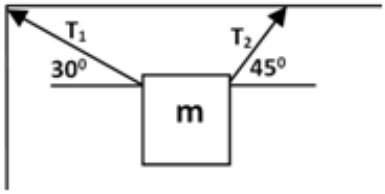
A) 85⁰ **B)** 49⁰ **C)** 33⁰ **D)** 67⁰

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:

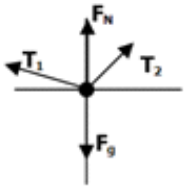
A) 5 m/s **B)** 7 m/s **C)** 12 m/s **D)** 2 m/s

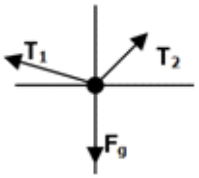
Use the following to answer questions 27-29:

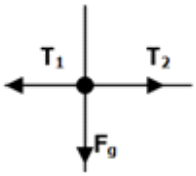
A block of mass m = 5 kg is hanging by two ropes as shown in the figure:

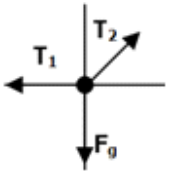


27. The **free body diagram** representing the forces on m is:

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, $\mathbf{F_{net,x}}$ on the block is:

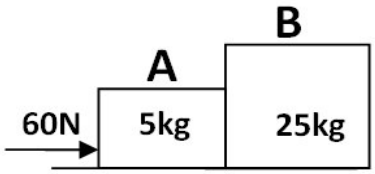
A) $T_1 \cos 45 - T_2 \cos 30 = m a_x$

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

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

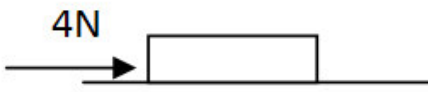
D) $T_1 \cos 45 - T_2 \cos 30 = 0$

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

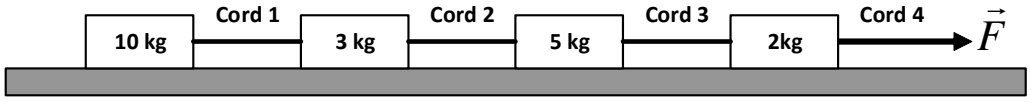
31. A horizontal force of 4N pushes a block of weight 10N to make it move with constant velocity, the value of the **coefficient of kinetic friction** (μ_k) is :



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/s^2



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