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**

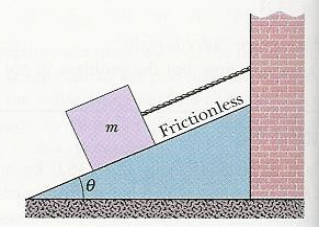
a) $10.3\frac{kg.m}{s^2}$ **b)** $10.3\frac{kg.m^2}{s^2}$ **c)** $10.3\frac{kg^2.m^2}{s^2}$ **d)** $10.3\frac{kg.m}{s}$

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

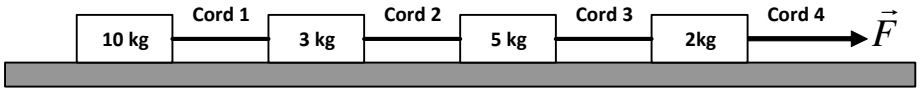
9. If the cord is cut, the magnitude of the **acceleration** of the block is

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:**

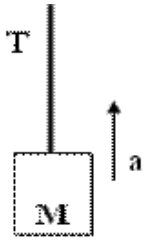
a) The force of Earth on the bag
b) The force of the table on the bag
c) The force of the Earth on the table
d) The force of the bag on Earth

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?**



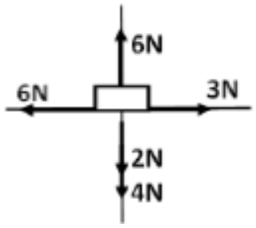
a) 3 m/s^2 **b)** 6 m/s^2 **c)** 12 m/s^2 **d)** 20 m/s^2

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

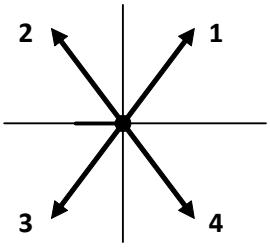
14. Ignoring air resistance, the **acceleration** of any projectile along the x-direction a_x in (SI units) is

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

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

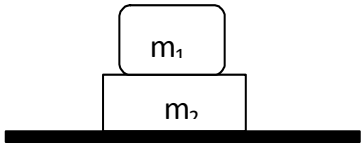
20. If the maximum static frictional force $f_{s,max}$= 20 N ,**the block will move to the right when F is equal to**

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 x 10^3 km/h^2
b) 12.3 x 10^5 km/h^2
c) 20.7 x 10^3 km/h^2
d) 15.8 x 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) $\vec{r} = 70\hat{i} - 60\hat{j}$ **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

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

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

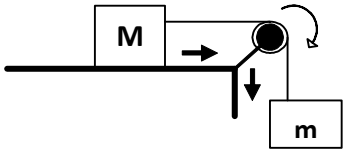
29. At what **horizontal distance** from the rolling point does the projectile strikes the ground

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