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Full Name: \_\_\_\_\_ ID: \_\_\_\_\_ Section: \_\_\_\_\_  
Instructor's Name: \_\_\_\_\_

For Instructors' Use

| Part I (24%) | Part II (6%) | Total (30%) |
|--------------|--------------|-------------|
|              |              |             |

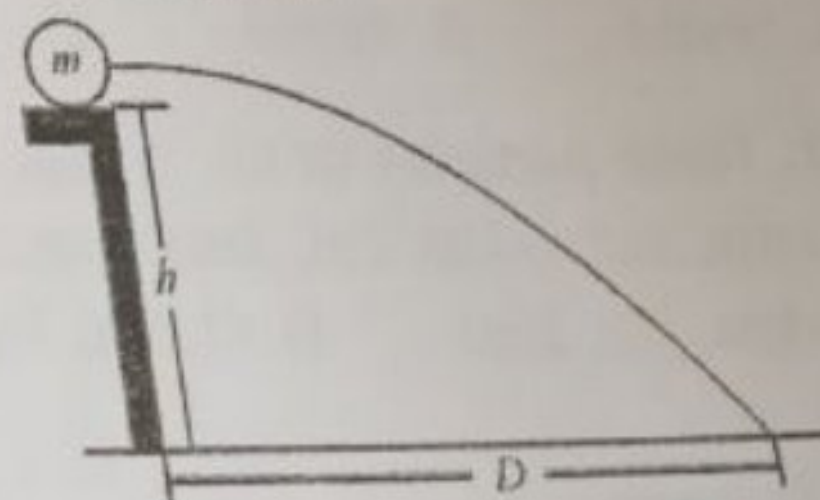
Useful Constant:  $g = 10 \text{ m/s}^2$ ,  $\sin 37^\circ = 0.6$  and  $\cos 37^\circ = 0.8$

**CALCULATOR AND MOBILE IS NOT ALLOWED AT ALL**

**Part I: Multiple Choices (24%)**

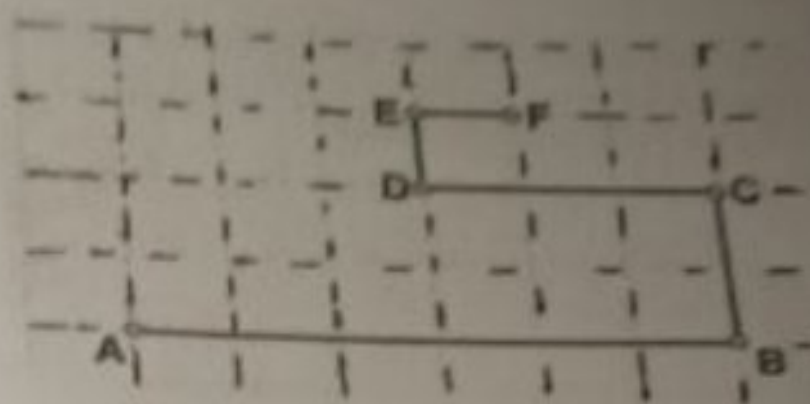
**Instruction:** Choose the best answer and write your choice in Capital letter on the space provided for each question.

1. A car from rest and uniformly accelerates to a final speed of 20.0 m/s in a time of 15.0 seconds. How far does the car travel during the time?  
A. 150.0m      B. 600.0m      C. 400.0m      D. 300.0m
2. Consider three vectors,  $\vec{A} = 3\hat{i} - 3\hat{j}$ ,  $\vec{B} = -\hat{i} - 4\hat{j}$  and  $\vec{C} = -5\hat{i} - 5\hat{j}$ . If  $r\vec{A} - k\vec{B} + \vec{C} = 0$ , the value of the scalars  $r$  and  $k$  respectively are \_\_\_\_\_.  
A. 2 and 3      B. 2 and 4      C. 1 and 2      D. 2 and 2
3. A 20g bullet is fired into a stationary block of wood having mass 8 kg. The bullet imbeds into the block. The speed of the bullet-plus-wood combination immediately after the collision is 1 m/s. What was the original speed of the bullet?  
A. 402m/s      B. 401m/s      C. 400m/s      D. 399m/s
4. As shown in the figure below, a ball on a table of height  $h$  is thrown horizontally and the ball is rolled off the table traveling at a speed  $v$ , neglecting air resistance. How far ( $D$ ) from the bottom of the table the ball falls?  
A.  $v\sqrt{h/g}$       B.  $hv/2g$       C.  $v\sqrt{2h/g}$       D.  $2h$
5. A block of mass  $m$  is pulled along a horizontal floor with a rope that is maintained at an angle  $\theta$  above the horizontal. The coefficient of friction between the block and the floor is  $\mu$ . What force is required to maintain the motion of the block at constant speed?  
A.  $\mu mg$       B.  $\mu mg \tan \theta$       C.  $\frac{\mu mg}{\cos \theta}$       D.  $\frac{\mu mg}{\cos \theta + \mu \sin \theta}$



6. Starting from point A an object moves along the grid through points A, B, C, D, E, and stops at F as shown below. The side of square tiles measures 0.1 km. The distance covered by the moving object and the magnitude of the displacement of the object respectively are.

- A. 0.7 km and  $\frac{\sqrt{13}}{10}$  km  
 B. 1.3 km and 0.5 km  
 C. 0.5 km and 1.3 km  
 D.  $\frac{\sqrt{13}}{10}$  km and 0.7 km



7. Which one is not true about projectile motion of an object?  
 A. The horizontal component of its velocity changes with time.  
 B. The only force that acts on the object is gravity.  
 C. The acceleration at maximum height is non zero.  
 D. Vertical velocity at maximum height is zero.

8. You press your physics textbook flat against a vertical wall with your hand. What is the direction of the normal force on the book?

- A. downward  
 B. upward  
 C. out from the wall  
 D. into the wall

9. The length and the width of a metal plate are 8.71 cm by 3.2 cm. The area of the metal plate with the appropriate significant figures is

- A. 28 cm<sup>2</sup>  
 B. 27.87 cm<sup>2</sup>  
 C. 27.9 cm<sup>2</sup>  
 D. 27.872 cm<sup>2</sup>

10. An object is thrown vertically upward at 35 m/s. The velocity of the object 5s later is:  
 A. 15 m/s up  
 B. 15 m/s down  
 C. 85 m/s down  
 D. 85 m/s up

11. A 400-kg piano slides 2m down a 37° incline and is kept non accelerating by a man who is pushing back on it parallel to the incline as shown. If the coefficient of friction is 0.5 the work done on the piano by the man is

- A. 1600J  
 B. 4800J  
 C. -4800J  
 D. -1600J



12. Three particles of  $m_1 = 1\text{kg}$ ,  $m_2 = 2\text{kg}$  and  $m_3 = 3\text{kg}$  are located at coordinates (1m, 4m, 4m), (-2m, 4m, 1m), and (-1m, 2m, 2m) respectively. What is the position of their center of mass?

- A. (-1m, 3m, 2m)  
 B. (1.5m, 1m, 1.5m)  
 C. (2m, 3m, 4m)  
 D. (-1.5m, 1m, 4m)

## Part II- Short Answer.

Write the precise answer on the space provided on the question paper. (2pts each)

- When we release a block at the top of an inclined plane of slope angle  $\theta$  the block slides down with a constant velocity. The block is then projected up the same plane with an initial velocity  $v_0$  at the bottom. In terms of velocity  $v_0$ ,  $g$  and  $\theta$  the expression for the distance moved by the block up the inclined is \_\_\_\_\_.
- If we have two vectors  $\vec{A} = 3\hat{i} - 4\hat{j} + 4\hat{k}$  and  $\vec{B} = 2\hat{i} - 3\hat{j} + \hat{k}$ . A unit vector in the direction of  $2\vec{B} - \vec{A}$  is \_\_\_\_\_.
- If the linear momentum of a particle is doubled, its kinetic energy will be changed by a factor of \_\_\_\_\_.

