SHATIN TSUNG TSIN SECONDARY SCHOOL
2004-2005 Uniform Test
S.3 Physics

Date: / /2005
Time allowed: 35 min.

Instructions:
1. There are Two sections in this paper
2. Answer ALL questions
3. Only calculators approved by HKEAA can be used
4. The diagrams in this paper are NOT necessarily drawn to scale
5. Take \( g = 10 \text{ m s}^{-2} \) downward when necessary

Section A: Multiple Choice (20 marks)
There are 10 questions in the section. Answer ALL questions in the Multiple Choice Answer Sheet provided. Choose the best answer. Two or more answers will score No Mark.

1. John is going to his friend’s home but he loses his way. He phones his friend, and his friend told him “when you arrived at the supermarket, just turn right and walk for 400 metres. That is my home.” In this conservation, what quantity is used?
   (1) Direction
   (2) Displacement
   (3) Acceleration
   A. (1) only
   B. (2) only
   C. (1) and (3) only
   D. (2) and (3) only

2. Which of the following graphs correctly describes the motion of a free falling object, which is initially at rest?
   \( s = \) displacement, \( v = \) velocity, \( t = \) time

   A.  
   B.  
   C.  
   D.  

3. A bead falls freely from rest (point \( A \)) for 2 m and then it enters a viscous medium (粘稠) vertically. When it enters that medium, it moves at uniform speed immediately. The depth of the viscous medium is 1.8 m. Find the total time for the bead to travel from point \( A \) to point \( B \).

   A. 2.01 s
   B. 0.91 s
   C. 1.5 s
   D. 0.28 s

-- to be continued --
4. Which of the following velocity-time graphs correctly represents the motion of a ball that free fall from certain height and bounces back to its original position.

A. 

B. 

C. 

D. 

5. Graph below shows the displacement-time graph of four objects. Which object is moving at the greatest speed?

A. Object A  
B. Object B  
C. Object C  
D. Object D

6. A lift and three men inside have a total mass of 600 kg. If the lift is accelerating upwards with acceleration of 1.1 m s\(^{-2}\), find the force in the cable of the lift.

A. 6 60 N  
B. 5 060 N  
C. 5 340 N  
D. 6 660 N

7. In the deep outer space, there is no gravity at all. If a force acts on an object, it will gain great speed after a considerable of time. Calculate the speed of a 0.1 kg mass if a force of 2 N is acted on it for 2 days. Given that the mass is initially at rest.

A. \(2.40 \times 10^2\) m s\(^{-1}\)  
B. \(3.46 \times 10^0\) m s\(^{-1}\)  
C. \(7.38 \times 10^1\) m s\(^{-1}\)  
D. \(3.00 \times 10^1\) m s\(^{-1}\)

8. Which of the following statements is / are CORRECT?

(1) The SI unit of force is N.  
(2) The unit of force can be kg m s\(^{-2}\).  
(3) The SI unit of weight is kg.

A. (1) only  
B. (1) and (2) only  
C. (1) and (3) only  
D. (1), (2) and (3)
9. Which of the following statements is / are CORRECT?
   (1) The weight of a man on the Moon is smaller than that on the Earth.
   (2) The mass of a man is the same on both the Moon and the Earth.
   (3) We cannot determine our own mass in the outer space because there is no gravity.
   A. (1) only
   B. (3) only
   C. (1) and (2) only
   D. (2) and (3) only

10. In the following figure, calculate the value of the acceleration of the two block if a force of 5N is now acted on the 1.5 kg block.

A. 2.5 m s$^{-2}$
B. 1.43 m s$^{-2}$
C. 3.33 m s$^{-2}$
D. 10 m s$^{-2}$

Section B : Conventional Question( 25 marks)
There are 3 questions in this section. Answer ALL questions in the answer sheet provided.

1. The following is the velocity-time graph of a car.

(a) Find the acceleration of the car during the first 5 s of motion. (2 marks)
(b) Find the acceleration of the car at $t = 15$ s. (2 marks)
(c) Find the total displacement of the car within the first 15 seconds. (2 marks)
(d) Find the total displacement of the car within the last 12.5 seconds. (2 marks)
(e) Find the average velocity of the car for the whole journey. (2 marks)
2. A ball is thrown vertically upwards at a height of 2 m above the ground. It takes 3 s to reach a height of 10 m above the releasing point. **Take \( g = 10 \text{ m s}^{-2} \) and the downward direction as positive.**

(a) Find the initially velocity of the ball. (2 marks)
(b) Find the velocity of the ball at a height 10 m below the maximum point. (2 marks)

3 A 5 kg block is initially at rest on a desktop as shown in the figure. In region \( AB \), the surface is smooth and frictionless. In region \( BC \), there is a friction of 5 N between the block and the surface. Now an external force of 10 N is acting on the block in the region of \( AB \) only.

(a) Find the acceleration of the block in region \( AB \). (2 marks)
(b) Find the speed of the block at point \( B \). (2 marks)
(c) How long will it take to enter region \( BC \)? (2 marks)
(d) Find the acceleration of the block in region \( BC \)? (1 mark)
(e) **Prove/show that the block will fall from the edge \( C \)? (4 marks)

**2 marks out of 4 will be given to effective communication.**

End
Answer

Section A: Multiple Choice (20 marks)

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Section B: Conventional Question (25 marks)

1  (a) Acceleration = slope of \( AB = \frac{12 - 0}{5 - 0} = 2.4 \text{ m s}^{-2} \)
(b) Acceleration at \( t = 15 \text{ s}, \) = slope of \( CE \)
= \( \frac{-12 - 12}{20 - 10} \)
= \(-2.4 \text{ m s}^{-2} \)
(c) Total displacement = Area of \( ABCD \)
= \( \frac{[(10 - 5) + 15] \times 12}{2} \)
= \( 120 \text{ m} \)
(d) Total displacement = Area of \( DEFG \)
= \( \frac{-(22.5 - 20) + (27.5 - 15)}{2} \times 12 \)
= \(-90 \text{ m} \)
(e) Total displacement travelled = \( 120 - 90 = 30 \text{ m} \)
Average velocity = \( \frac{30}{27.5} = 1.09 \text{ m/s} \)

2  (a) Given that \( s = 10 \text{ m}, t = 3 \text{ s} \)
By \( s = ut + \frac{1}{2}gt^2 \)
\( 10 = 3u + \frac{1}{2} \times (-10) \times 3^2 \)
\( u = \frac{10 + (5)(9)}{3} = 18.33 \text{ m/s} \)
(1M+1A)
(b) Given that \( u = 0 \text{ m/s}, s = 10 \text{ m}, g = 10 \text{ m/s}^2 \)
By \( v^2 = u^2 + 2gs \)
\( v = \sqrt{2(10)(10)} = 14.1 \text{ m/s} \)
(1M+1A)

3  (a) \( F = ma, a = 10/5 = 2 \text{ m/s}^2 \)
(b) \( 2as = v^2 - u^2 \),
\( v^2 = 2 \times 2 \times 3 = 12 \)
\( v = 3.46 \text{ m/s} \)
(1M + 1A)
(c) \( v = u + at, t = v/a = 3.46 /2 = 1.73 \text{ s} \)
\( v = 3.46 \text{ m/s} \)
(1M + 1A)
(d) \( F = ma, a = F/m = -5/5 = -1 \text{ m/s}^2 \)
(1M + 1A + 2C)
(e) \( 2as = v^2 - u^2 \),
\( 2 \times (-1) \times 5 = v^2 - 12 \)
\( v^2 = 2 \)
since \( v > 0 \) when the block reaches the edge C, it will fall from the edge C.