SAMPEL PERCUMA

Trial STPM 2019 Fizik Semester 1 SMK Horley Methodist, Teluk Intan

Set penuh: Kertas Percubaan STPM

Sem 1 · Fizik

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CONFIDENTIAL

NAME :_____ **CLASS :** _____

SMK HORLEY METHODIST
TELUK INTAN

STPM TRIAL EXAM 2019

960/1
PHYSICS
PAPER 1
OCT

1 $\frac{1}{2}$ hours **1 hour 30 minutes**

Instructions to candidates:

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

*There are **fifteen** questions in Section A. For each question, four choices of answers are given. Choose **one** correct answer and indicate it on the Multiple-choice Answer Sheet provided. Read the instructions on the Multiple-choice Answer Sheet very carefully. Answer **all** questions. Marks will not be deducted for wrong answers.*

*Answer **all** questions in Section B. Write your answers in the spaces provided.*

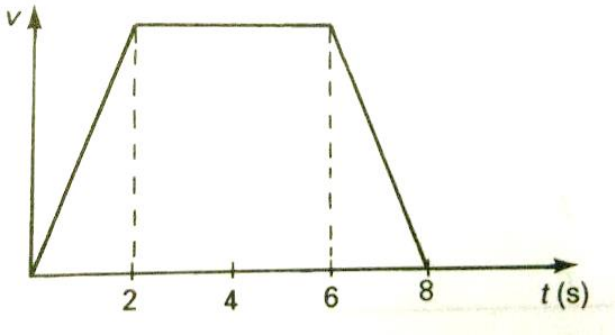
*Answer any **two** questions in Section C. All working should be shown. For numerical answers, units should be quoted wherever appropriate. Begin each answer on a fresh sheet of paper and arrange your answers in numerical order.*

For examiner's use	
Section B	
16	
17	
Section C	
Total	

Section A [15 marks]
Answer **all** questions in this section.

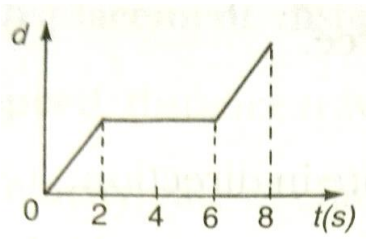
1. Which of the following is the correct dimension of k so that the equation
   momentum = k × density
   is dimensionally consistent?
   A. ML^2T^{-1}
   B. ML^2T^{-2}
   C. L^4T^{-1}
   D. L^2T^{-1}

2. The velocity-time (v-t) graph of a particle is as shown below.

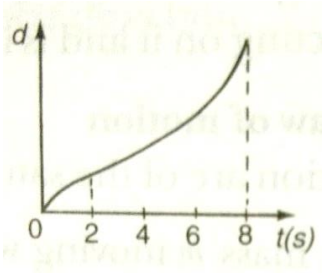


Which of the following is the displacement-time (d-t) graph of the motion?

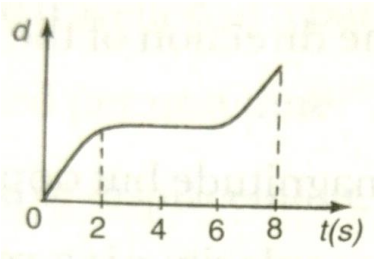
A.



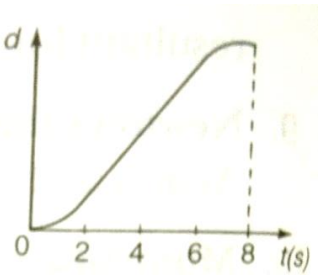
C.



B.

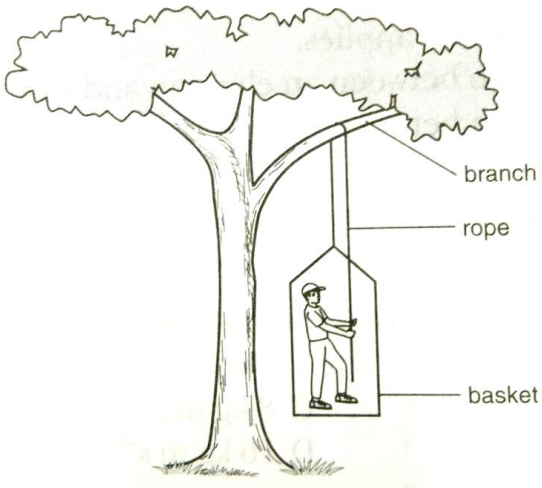


D.



3. Which one of the following is **not** a valid example of action and reaction to which Newton's third law of motion applies.
   A. The forces of attraction between an electron and a proton in a hydrogen atom.
   B. The forces of repulsion between two parallel wires carrying currents in opposite directions.
   C. The forces of attraction between two gas molecules passing near each other.
   D. The weight of a satellite and the centripetal force keeping the satellite in orbit.

4. A man of mass *M* is in a basket of mass *m*. The man raises himself by pulling on a rope hanging from a branch of a tree. Friction between the rope and the branch may be neglected.



When the man and the basket accelerate upwards with an acceleration *f*, the tension *T* in the rope is

A. $T = \frac{1}{2}(m + M)(f + g)$
B. $T = \frac{1}{2}(m + M)(g - f)$
C. $T = \frac{1}{2}(M - m)(f + g)$
D. $T = \frac{1}{2}(M - m)(g - f)$

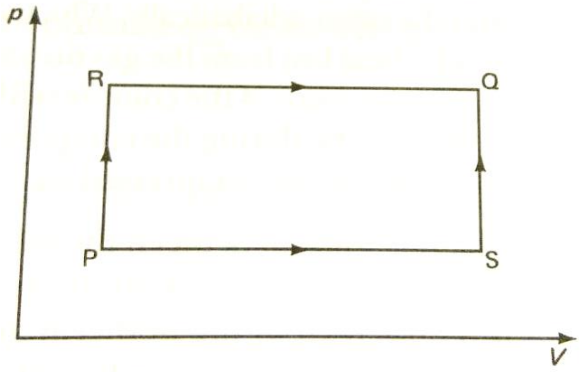
5. The engine power of a car of mass *m* is *P*. What is the minimum time taken for the car to accelerate from rest to a speed of *v*?

A. $\frac{P}{mv}$
B. $\frac{mv^2}{2P}$
C. $\frac{2P}{mv^2}$
D. $\frac{mv^2}{4P}$

10. A steel cable of diameter 2.0 cm and length 10 m is used on a crane to raise a load of 1200 kg. The Young's modulus of the steel is 2.0×10^{11} Pa. Which statement about the steel cable is **not** correct?
    A. The cable is stretched by 1.9 mm.
    B. The strain energy of the cable is 3.5×10^{3} J.
    C. The strain produced by the cable is 1.9×10^{-4}.
    D. The applied stress of the cable is 3.7×10^{7} Pa.

11. In a mixture of two monatomic gases X and Y at thermal equilibrium, the molecular mass of Y is double the molecular mass of X. The mean translational kinetic energy for Y is 6.0×10^{-21} J per molecule.
    What is the mean translational kinetic energy per molecule for X?
    A. 3.0×10^{-21} J
    B. 4.2×10^{-21} J
    C. 6.0×10^{-21} J
    D. 8.5×10^{-21} J

12. A certain mass of a gas undergoes changes in pressure and volume as shown in the figure.



    When the gas changes its state from P to Q through stages PR and RQ, 8 J of heat is absorbed by the gas. When the same change follows paths PS and SQ, 1 J of work is done by the gas. In this case,
    A. 12 J of heat is lost to the surroundings.
    B. 10 J of heat is absorbed by the gas.
    C. 8 J of heat is absorbed by the gas.
    D. 6 J of heat is absorbed by the gas.

13. A container of volume V contains n moles of an ideal gas at a pressure p and a temperature T. If the molar heat capacity of the gas at constant volume is $C_{v,m}$, what is the expression of the heat needed to increase the temperature of the gas by 1 K at constant pressure?
    A. $C_{v,m} + \frac{pV}{T}$
    B. $nC_{v,m} + \frac{pV}{T}$
    C. $C_{v,m} + \frac{npV}{T}$
    D. $nC_{v,m} + \frac{npV}{T}$

14. $\frac{dQ}{dt} = kA\frac{d\theta}{dl}$

The equation above shows the rate of heat flow $\frac{dQ}{dt}$ in a rod of cross-sectional area *A* and conductivity *k*, with a temperature gradient $\frac{d\theta}{dl}$.

One condition that must be obeyed for this relationship to be valid is

A. the rod must be well lagged.
B. the rod must be made of a good conductor.
C. only lattice conduction is to be considered.
D. steady state must be achieved.

15. A refrigerator door is 150.0 cm high, 80.0 cm wide and 6.0 cm thick. The temperatures of the inner and outer surface of the door are 0℃ and 30℃ respectively. What is the heat flow through the door in one minute?

A. 1.26×10^2J
B. 7.56×10^2J
C. 1.27×10^4J
D. 7.64×10^5J

Section B [15 marks]

Answer **all** questions in this section.

16. A stationary object, P, is released from a height of 50.0 m above the ground. After one second, another object, Q, is thrown vertically downwards, also from the same height of 50.0 m, with such a speed that both the objects reach the ground at the same time. determine

a) the initial speed of Q [3 marks]

b) the speed of P and Q when they reach the ground. [4 marks]

17. A car which has a mass of 2000 kg moves at a constant speed of 12.0 m s^{-1} round a bend on a flat horizontal road.

a) State the source and direction of the centripetal force which enables the car to go round the bend. [1 mark]

_____
_____
_____

b) (i) State two conditions that cause the car to skid to the outer fringe of the road. [2 marks]

_____
_____

(ii) What is the shape of the path if the car is to skid to the outer fringe of the road? Explain your answer. [2 marks]

_____
_____

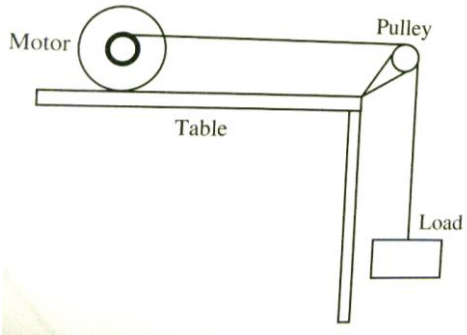
c) If the radius of the path taken by the car is 50.0 m, calculate the resultant force acting on the car. [2 marks]

Section C [30 marks]
Answer any **two** questions in this section.

18. (a) (i) Define *work*, and state the relationship between work and energy. [2 marks]

(ii) Using Newton's second law of motion, show that the work done on an object is equal to the change in its kinetic energy. [3 marks]

(b) A motor pulling a load of mass 80.0 kg at rest with a constant force of 1200.0 N is shown in the diagram below.



The frictional force on the pulley is 50.0 N, and the mass of the pulley is negligible. Calculate

(i) the acceleration of the load, [3 marks]

(ii) the increase kinetic energy of the load in 1.0 s, [2 marks]

(iii) the work done by the motor in the first second. [3 marks]

(c) Explain the different between your answers in (b) (ii) and (b) (iii). [2 marks]

Marking Scheme:

1. C	6. B	11. C
2. D	7. B	12. D
3. D	8. B	13. B
4. A	9. A	14. D
5. B	10. B	15. B

16. (a) Object P

$s = ut + ½ at^2$

$50 = ½(9.81) t^2$

$t^2 = 10.1937$

$t = 3.193$ s

Object Q

$s = ut + ½ at^2$

$50 = V_Q (2.193) + ½ (9.81)(2.193)^2$

$50 = 2.193 V_Q + 23.5894$

$2.193 V_Q = 26.4106$

$V_Q = 12.04$ m s^{-1}

(b) Object P

$v^2 = u_p^2 + 2(9.81)(50)$

$v^2 = 981$

$v^2 = 31.3$ m s^{-1}

Object Q

$v^2 = u_Q^2 + 2as$

$v^2 = 12.04^2 + 2(9.81)(50)$

$v^2 = 12.04^2 + 981$

$v = 33.6$ ms^{-1}

17. (a) - Frictional force between the tyres and road surface.
- centripetal force direct toward the centre of circular motion.

(b) (i) - velocity of car is too high.
- radius of curvature is too small.
- road surface is slippery.

(ii) - circular path with larger radius.
- To reduce centripetal force required.

(c) $F = \frac{mv^2}{r}$

$= \frac{(2000)(12.0)^2}{50.0}$

$= 5760$

$= 5.76 \times 10^3$ N

TAMAT SAMPEL

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