SAMPEL PERCUMA

Trial STPM 2022 Fizik Semester 1 Terengganu

Set penuh: Kertas Percubaan STPM

Sem 1 · Fizik

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- Blueprint 30 hari Semester 1 (setiap subjek)
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JABATAN PENDIDIKAN NEGERI TERENGGANU

STPM 2022

PEPERIKSAAN PERCUBAAN
SEMESTER 1

PHYSICS

Nama :.....

Kelas :.....

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tanpa kebenaran Pengarah Pendidikan Negeri Terengganu

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

1. The acceleration a of an object is related to power P in an equation $a = kP$ whereby the dimensions of the equation are consistent. Hence the dimensions of k are

   A. $ML^{-1}T$ B. $M^{-1}LT$ C. $M^{-1}L^{-1}T$ D. $M^{-1}L^{-1}T^2$

2. Which error is ***not*** systematic error?
   A. The zero error of a micrometre screw gauge
   B. The error due to the calibration of the thermometer
   C. The end error in the slide wire of a Wheatstone bridge
   D. The error in the reading to the smallest scale of a metre rule

3. A stone is thrown vertically upwards from the height of 10.0 m from the ground. If the initial velocity is 5.0 ms^{-1}, what is the time taken by the stone to reach the ground?
   [the acceleration of the freefall is 10.0 ms^{-2}]

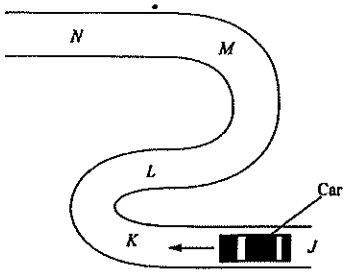
   A. 0.50 s B. 1.00 s C. 1.50 s D. 2.00 s

4. A train has an engine that provides a constant thrust force F when it is accelerating from rest. If the train experiences a dragging force F' when moving at speed v, what is the power required to accelerate it?

   A. Fv B. $F'v$ C. $(F-F')v$ D. $(F+F')v$

5. A static frictional force influences sliding movement .When an object is placed on a surface the resistance to slide to the object will increase when
   A. a weight is place on top of the object
   B. A layer of oil is smeared on the surface
   C. air is allowed between the object and the surface
   D. ball bearing are placed between the object and the surface

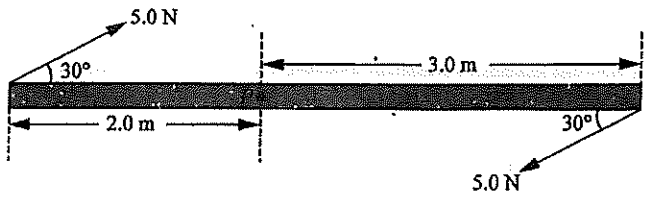
6. The diagram below shows a car travelling at a constant speed along the road ***JKLMN***



   At which part of the journey does the car have the greatest acceleration

   A. ***JK*** B. ***KL*** C. ***LM*** D. ***MN***

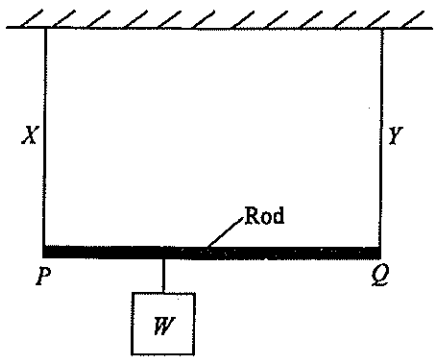
9. The diagram below shows a rod pivoted at point P on a smooth horizontal surface.



Two force each of magnitude 5.0 N acting in opposite direction are applied at the two ends of the rod. The resultant torque on the rod is.

A. 2.5 Nm B. 12.5 Nm C. 21.7 Nm D. 25.0 Nm

10. A 99.0 cm long rod PQ of negligible weigh which is supported at the both of its ends by two equally long wires X and Y is shown in the diagram below



The cross-sectional areas of X and Y are 1.50mm^2 and 3.00 mm2 respectively. The Young's Modulus of wires X and Y are 1.80 x 10^{11} Pa respectively. A weight W is suspended from the rod such that X and Y are stretched. At what distance from P should the weight W is be suspended along the rod so that it remains horizontal?

A. 24.6 cm B. 42.4 cm C. 56.6 cm D. 74.4 cm

11. The pressure of an ideal gas in a vessel of fixed volume is p. If the gas in the vessel is heated so that the r.m.s speed of its molecules in increased three times the initial value, what is the new pressure of the gas.

A. $\frac{1}{\sqrt{3}}p$ B. $\sqrt{3}p$ C. $3p$ D. $9p$

12. Which one is ***not*** an assumption of the kinetic theory of the gases in an ideal gas model?

A. The motion of molecules is random.

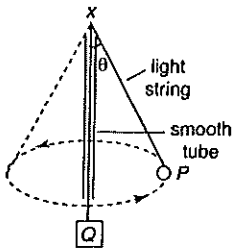
B. The mass of a molecule is negligible.

C. The collisions between a molecule and the wall of a container is elastic.

D. The volume of molecules is negligible as compared to the volume of gas.

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

16 An object P is tied to one end of a string which passes through a smooth vertical tube. An object Q of mass 2.0 kg is tied to the other end of the string, as shown in the figure below. P is made to move at constant angular velocity in a horizontal circle such that the string makes an angle $\theta = 60^{\circ}$ to the vertical. The length of the string PX is 50 cm.
Satu objek P diikat pada satu tali yang melalui suatu tiub menegak yang licin. Suatu objek Q dengan jisim 2.0 kg diikat pada satu hujung, seperti dalam gambarajah. P dibiarkan bergerak pada halaju sudut yang malar dalam bulatan mendatar dengan bersudut $\theta = 60^{\circ}$. Panjang tali PX ialah 50 cm.



Determine,
Tentukan,

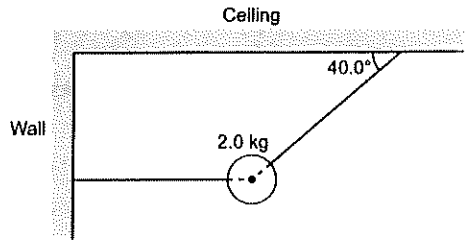
a) The tension in the string [2 marks]
Tegangan pada tali

b) The mass of P [3 marks]
Jisim tali P

c) The centripetal force which acts on P [2 marks]
Daya memusat yang bertindak pada P

19 (a) State the conditions for the equilibrium of a rigid body. [1 marks]
Nyatakan syarat bagi keseimbanngan jasad tegar

(b) A spherical steel ball of mass 2.0 kg is supported by two cords fixed to a ceiling and wall is shown in the diagram below.
Sebiji bola besi sfera berjisim 2.0 kg yang disokong oleh dua tali yang dipasang pada siling dan dinding ditunjukkan dalam gambar rajah di bawah.



The angle between the cord and the ceiling is 40.0° while the other cord is attached horizontally to the steel ball.
Sudut antara tali dengan siling ialah 40.0°, manakala tali yang satu lagi diikat pada bola besi itu secara mengufuk.

(i) Sketch a triangle of forces representing the forces in equilibrium .
Lakar segi tiga daya yang mewakili daya-daya dalam keseimbangan. [2 *marks*]

(ii) Determine the tensions in the two cords
Tentukan tegangan dalam kedua-dua tali itu. [2 *marks*]

(iii) If the breaking tension of both cords is 45 N, calculate the maximum mass of the steel ball which can be supported by the cords
Jika tegangan putus bagi kedua-dua tali ialah 45 N, hitung jisim maksimum bola besi itu yang boleh disokong oleh tali tersebut.. [2 *marks*]

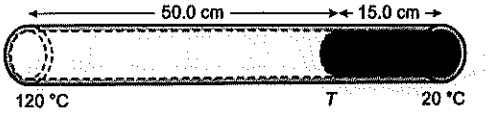
(c) A 20.0 kg uniform door of dimensions 80.0 cm x 210.0 cm hinged at *A* and B, where the distance between *A* and *B* is one third of the height of the door, is shown in the diagram.
20.0 kg pintu sekata dengan dimensi 80.0 cm x 210.0 cm digantung pada A dan B, dimana jaral antara A dan B adalah satu per tiga ketinggian pintu tersebut, seperti yang ditunjukkan pada rajah.

20 (a) (i) Describe the mechanism of heat conduction in a non-metallic solid. [3 marks]
Huraikan mekanisme pengaliran haba dalam pepejal bukan logam.

(ii) Define the thermal conductivity of a material. [1 mark]
Tentukan kekonduksian terma sesuatu bahan.

(iii) In determining the thermal conductivity of a weak heat conductor, the major problem is poor heat flow. Explain how can it be overcome.
Dalam menentukan kekonduksian terma konduktor haba yang lemah, masalah utama adalah aliran haba yang lemah. Terangkan bagaimana ia boleh diatasi. [2 marks]

(b) An aluminium rod of length 50.0 cm and cross-sectional area 4.00 cm^2 is joined to a steel rod of length 15.0 cm with the same cross-sectional area is shown in the diagram below.
Sebatang rod aluminium yang panjangnya 50.0 cm dan luas keratan rentasnya 4.00 cm- disambungkan kepada sebatang rod keluli yang panjangnya 15.0 cm dengan luas keratan rentas yang sama ditunjukkan dalam gambar rajah di bawah.



The side of the rods is perfectly insulated. One end of the aluminium rod is kept at 120 °C while the other end of the steel rod is kept at 20 °C. Determine the temperature at the aluminium-steel junction,
Sisi rod-rod itu ditebat dengan sempurna. Satu hujung rod aluminium dikekalkai pada 120 °C manakala hujung rod keluli yang satu lagi dikekalkan pada 20 °C. Tentukan suhu pada persimpangan aluminium-keluli [3marks]

(c) A wall with dimensions 3.0 m x 5.0 m consists of a layer of concrete layer and a layer of wood, with a layer of air in between the two layers. The thickness of the layers of concrete, air, and wood are 12.0 cm, 1.2 cm, and 6.5 cm respectively. If the temperatures at the outer surface of the concrete layer and the wooden layer are 40°C and 20°C respectively,
Dinding berdimensi 3.0 m x 5.0 m terdiri daripada lapisan lapisan konkrit dan lapisan kayu, dengan lapisan udara di antara dua lapisan. Ketebalan lapisan konkrit, udara, dan kayu masing-masing ialah 12.0 cm, 1.2 cm, dan 6.5 cm. Jika suhu pada permukaan luar lapisan konkrit dan lapisan kayu masing-masing ialah 40°C dan 20°C,

[Thermal conductivity of concrete = 0.800 W $m^{-1}K^{-1}$, thermal conductivity of air = 0.024 W $m^{-1}K^{-1}$, thermal conductivity of wood = 0.130 W m^{-1} K^{-1})

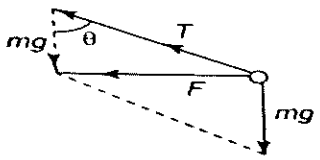
i) Calculate the rate of heat flow through the wall when the steady state is achieved.
Hitung kadar pengaliran haba melalui dinding apabila keadaan mantap dicapai.
[2 marks]

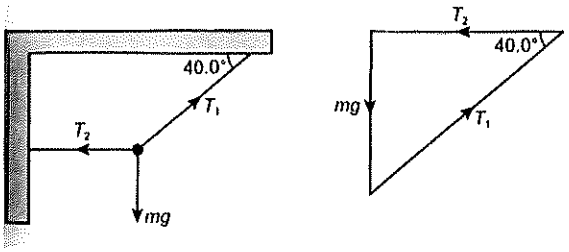
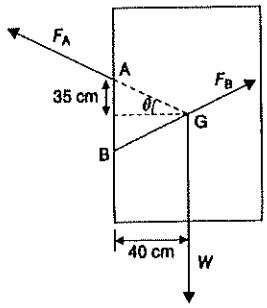
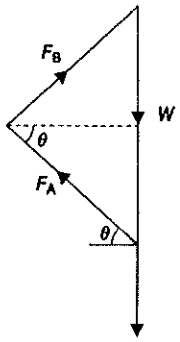
ii) Calculate the temperature gradient across the air layer in the wall.
Kira kecerunan suhu merentasi lapisan udara di dinding. [2marks]

iii) Explain why, in practice, the rate of heat flow through the wall is actually higher.
Terangkan mengapa, secara praktikal, kadar pengaliran haba melalui dinding sebenarnya lebih tinggi [2 marks]

ANSWER SCHEME TRIAL TERM 1 2022
PHYSICS 960/1

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

	SECTION B	
16(a)	Tension = weight of Q = (2)(9.8) = 19.6 N	1 1
(b)	The two external forces which act on P are weight of P and the tension T in the string  $mg = T\cos\theta$ $m(9.8) = (19.6)\cos 60°$ $m = 1.0\ kg$	1 1 1
(c)	$F = mg\tan\theta$ $= (1)(9.8)\tan 60° = 17.0\ N$	1 1
17(a)	Law of equipartition of energy states that the total kinetic energy of a gas molecule is distributed equally among all the degrees of freedom of gas molecule and each degree of freedom has energy ½ KT	1 1
(b)(i)	Mean translational kinetic energy of a bromine molecule $= \frac{3}{2} kT$ $= \frac{3}{2}(1.38 \times 10^{-23})(300)$ $= 6.21 \times 10^{-21}$ J Mean translational kinetic energy of an argon molecule $= \frac{3}{2} kT$ $= \frac{3}{2}(1.38 \times 10^{-23})(300)$ $= 6.21 \times 10^{-21}$ J	1 1

d(ii)	$Net\ force = mg\sin\theta - \mu R$ $Net\ work = [mg\sin\theta - \mu R]L$ $= \left[(5.0)(9.81)\left(\frac{1.0}{L}\right) - (0.20)(5)(9.81)\left(\frac{3.0}{L}\right)\right]L$ $= 19.6\,J$	1 1 1
d(iii)	$\frac{1}{2}mv^2 = 19.6\,J$ $v = 2.80ms^{-1}$	1 1
19(a)	Conditions for equilibrium of a rigid body 1. Resultant force = 0 2. Resultant torque = 0	1
b(i)	 (b) (i) Triangle of forces	2
b(ii)	$\sin 40° = \frac{mg}{T_1}, T_1 = \frac{(2.0)(9.81)}{\sin 40°} = 30.5$ N $\tan 40° = \frac{mg}{T_2}, T_2 = \frac{(2.0)(9.81)}{\tan 40°} = 23.4$ N	1 1
b(iii)	$T_1 > T_2$, hence T_1 will reach the breaking tension first. $\sin 40° = \frac{mg}{T_1}, m = \frac{T_1 \sin 40°}{g}$ Maximum value of $m = \frac{(45)\sin 40°}{9.81}$ kg $= 2.95$ kg	1 1
c(i)	Assuming that the reactions at A and B are of the same magnitude, then the forces on the door are as shown in Figure 1. Figure 2 is the triangle of force.  Figure 1  Figure 2	1 1 1

TAMAT SAMPEL

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