SAMPEL PERCUMA

Trial STPM 2023 Fizik Semester 1 Terengganu

Set penuh: Kertas Percubaan STPM

Sem 1 · Fizik

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- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

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KEMENTERIAN PENDIDIKAN
JABATAN PENDIDIKAN NEGERI TERENGGANU

STPM 2023

PEPERIKSAAN PERCUBAAN SEMESTER 1

PHYSICS

960/1

Nama :.....

Kelas :.....

DIBIAYAI OLEH KERAJAAN NEGERI TERENGGANU

Tidak dibenarkan menyunting atau mencetak mana-mana bahagian dalam kertas soalan ini tanpa kebenaran Pengarah Pendidikan Negeri Terengganu

ANJAKAN MUAFAKAT NEKAD

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

1 The universal gravitational constant *G* has which of the following SI units ?

A $m\ s^{-2}$ **B** $J\ m^{-1}\ kg^{-1}$ **C** $m^2\ kg^{-2}$ **D** $m^3\ kg^{-1}\ s^{-2}$

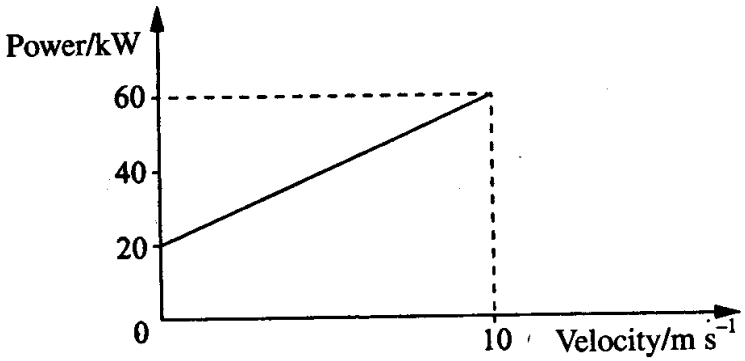
2 A long jumper, jumps at angle of 20.0^o to the horizontal with a take-off speed of $11.0\ ms^{-1}$. What is the distance of his jump ?

A 3.96 m **B** 4.22 m **C** 7.93 m **D** 12.33 m

3 Which of following pairs of forces is not a valid example of action and reaction as in Newton's third law of motion?

A. The force of attraction between two neighbouring atoms in a solid.
B. The force of attraction between an electron and a proton in a hydrogen atom.
C. The force of repulsion between two parallel wires carrying currents in opposite directions.
D. The tension in the string and the centripetal on a stone whirling round a horizontal circle at the end of the string.

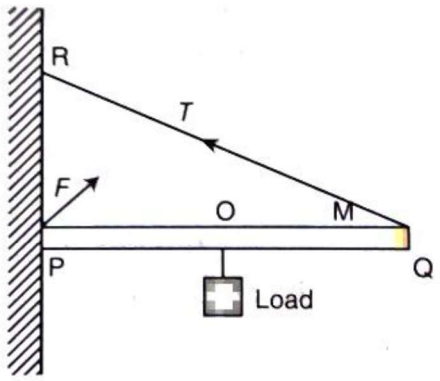
4 The power of a motorcycle varies with its velocity as shown in the figure below.



If the total mass of the motorcycle and its rider is 500kg, what is the acceleration of the motorcycle?

A $1.25\ m\ s^{-2}$ **B** $4.00\ m\ s^{-2}$ **C** $8.00\ m\ s^{-2}$ **D** $12.5\ m\ s^{-2}$

8 A light rod is hinged at the point P on a wall and supported horizontally by a wire RQ. A load hangs from the midpoint O of the road as shown in the following figure. The tension in the wire is T, and the reaction at the hinge is F.



The load is then moved to the point M. What happens to the magnitude of the tension in the wire and the reaction at the hinge ?

	Magnitude of T	**Magnitude of F**
A	Increases	Increases
B	Increases	Decreases
C	Decreases	Increases
D	Decreases	Decreases

9. A steel wire of length 2.0 m and diameter 1.00 mm that is suspended vertically from the ceiling produces an extension of 5.0 mm when a load, W is suspended at its free end. If Young's modulus of the wire is 2.00×10^{11} Pa, the value of W is

A 244 N **B** 393 N **C** 450 N **D** 503 N

10 An ideal gas exerts a pressure of 60 P when its temperature is 400 K and the number of molecules present in unit volume is *n*. Another sample of the same gas exerts a pressure of 30 Pa when its temperature is 300 K. How many molecules are present in unit volume of this second sample?

A $\frac{4n}{3}$ **B** $\frac{3n}{2}$ **C** $\frac{3n}{4}$ **D** $\frac{2n}{3}$

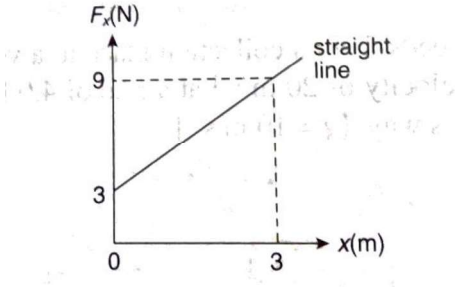
11. The equation $pV = nRT$ is applicable for real gas if

A. the molecular mass of gas is very high.
B. the temperature is very low
C. the pressure is very low
D. the volume is large and the pressure is very high

Section B [*40 marks*]
Answer **all** *questions in this section*

16 (a) Define the work done on an object and state the work-energy theorem [2]
Definasikan kerja yang dibuat dan teorem kerja-tenaga

(b) An object of mass 3.0 kg travels from rest along the x-axis. A conservative force, F_x, which is parallel to the x-axis, acts on the object. F_x varies with displacement, x, in the manner as shown in graph below.



When the object travels from x = 0.0 m to x = 3.0 m, determine
Suatu objek berjisim 3.0 kg bergerak dari keadaan rehat sepanjang paksi x. Suatu daya, F_x yang selari dengan paksi-x, bertindak ke atas objek tersebut. Nilai Fx berubah-ubah dengan sesaran, x seperti dalam gambarajah di atas. Apabila objek tersebut bergerak dari x = 0.0 m to x = 3.0 m, hitung

(i) the work done, [2]
kerja yang dilakukan

(ii) the change in the potential energy of the object [1]
perubahan tenaga keupayaan objek

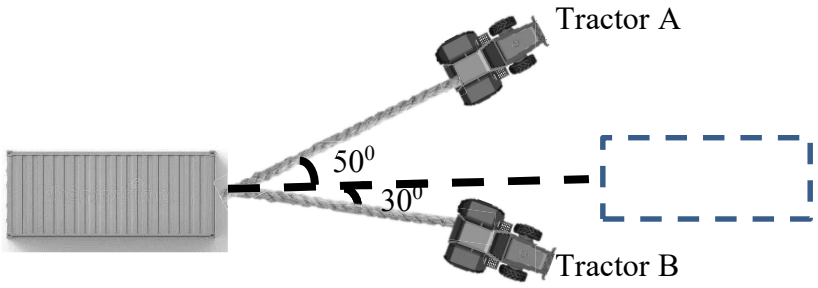
(iii) the velocity of the object at x = 3.0 m [2]
Halaju objek pada x = 3.0 m

Section C [*30 marks*]
Answer **two** *questions only.*

You may answer all the questions ***but*** *only the first* ***two*** *answers will be marked.*

18. a) State Newton's second law
Nyatakan hukum kedua Newton [1]

b) Tractor A and tractor B are used to move a container house to a new position as shown in figure below.
Traktor A dan traktor B digunakan untuk menggerakkan sebuah rumah kontena ke kedudukan yang baru seperti ditunjukkan rajah di bawah.



Force of 4500N used by tractor A to move the container. The two tractors pull the container house at an angle of 50^0 and 30^0 so that the container house can be moved straight.

Traktor A menggunakan daya 4500N untuk menggerakkan kontena tersebut. Kedua - dua traktor tersebut menarik rumah kontena dengan sudut 50^0 dan 30^0 agar rumah kontena dapat digerak secara lurus.

i. Sketch a free body diagram and label all the force acting on the container [2]
Lakarkan gambarajah daya dan labelkan semua daya yang bertindak ke atas kontena itu

ii. Calculate tension of rope exert by tractor B [2]
Kira tegangan tali yang dikenakan oleh traktor B

iii. Determine the total tension of rope by the tractor A and tractor B to move container house to new position [3]
Tentukan jumlah tegangan tali oleh traktor A dan traktor B bagi menggerakkan rumah kontena ke kedudukan yang baru.

20 (a) Describe the mechanism of heat conduction in a non-metallic solid. [3]
Terangkan mekanisma pengaliran haba dalam pepajal non-metallic.

(b) (i) Define the thermal conductivity of a material. [2]
Definasi terma kekonduksian bagi suatu bahan.

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

(c) The wall of a house is made of bricks with a thickness of 20.0 cm and has an area of 30.0 m^2. In the afternoon, the outside temperature of the house can reach 38.0 ^oC while the inside temperature is maintained at 18.0^oC. In order to reduce heat loss, the contractor applied plaster with a thickness of 15.0 mm on the inside surface of the wall of the house. Assuming that the outside and inside temperatures of the house are constant, calculate

Dinding sebuah rumah diperbuat batu bata yang mempunyai ketebalan 20.0 cm dan luas sebanyak 30.0 m^2. Pada waktu tengahari, suhu di luar rumah mencapai 38.0^oC, manakala suhu di dalam rumah kekal 18.0^oC. Dalam proses mengurangkan haba hilang, seorang kontraktor menggunakan plaster dengan ketebalan 15.0 mm dalam permukaan dinding rumah. Andaian bahawa suhu diluar dan di dalam rumah adalah tetap, hitung

i) the rate of heat flow through the wall without plaster [2]
kadar pengaliran haba melalui dinding tanpa plaster.

ii) the rate of heat flow through the wall with plaster [2]
kadar pengaliran haba melalui dinding dengan plaster.

iii) the interface temperature between the wall and the plaster [2]
suhu berhadapan antara dinding dan plaster

iv) the percentage of energy blocked by adding the plaster. [2]
peratus tenaga yang dihalang oleh plaster tersebut.
[The conductivity for brick and plaster is 0.84 $Wm^{-1}K^{-1}$ and 4.0 x 10^{-3} $Wm^{-1}K^{-1}$ respectively]

ANSWER SCHEME TRIAL SEMESTER 1 STPM 2023

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

Section B

Question 16

(a)

Work on a body by a force F, 1

$\boldsymbol{W = F.\ s}$

Where s = displacement of the body in the direction of the force

The work-energy theorem states that the work done on a system increase the mechanical energy of the system 1

(b)

(a) Work done $= \frac{1}{2}(3+9)(3) = 18$ J 2

(b) $U = 18$ J 1

(c) Change in potential energy, $U = \frac{1}{2}mv^2$ 1

$18 = \frac{1}{2}(3.0)v^2$

$v^2 = 12$

$\therefore$ velocity, $v = 3.5\ \text{m s}^{-1}$ 1

Question 17

(a)(i) An ideal gas is a gas that obey gas law at any temperature and pressure 1

(a)(ii) An absolute zero temperature, the molecules of the gas stop translating, rotating and vibrating. 1

The pressure of the gas is zero and the volume of the gas is total volume of all the molecules in the gas. 1

(b) (i) The number moles of oxygen 1

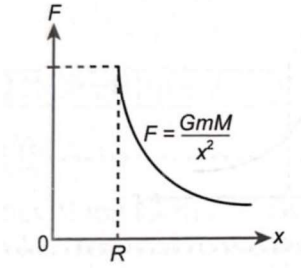
$$n = \frac{m}{M} = \frac{mass\ of\ gas}{molar\ mass\ of\ gas}$$

$$= \frac{5}{16} = 0.3125$$

$using\ ideal\ gas\ equation\ pV = nRT$ 1

$$T = \frac{pV}{nR} = \frac{(2.2 \times 10^6) \times (2.0 \times 10^{-3})}{0.3125 \times 8.31}$$

$$= 169.4K$$ 1

(c-ii)	$S_2 = 1.8$ m	1
(c-iii)	Final v_2 just before hit the ground = u_1 after it moving up 1.80 m, m_1 $v_2^2 = u_2^2 + 2as_2$ or $v_2 = \sqrt{u_2^2 + 2as_2}$ $v_2 = \sqrt{0^2 + 2(1.817)(1.8)}$ $v_2 = 2.56ms^{-1}$ KE m_1 & m_2 + U gain by m_1 = U loss by m_2 $\frac{1}{2}(m_1 + m_1)v^2 + m_1gh = m_2gh$ $v = \sqrt{\frac{2(m_2gh - m_1gh)}{m_1 + m_1}}$ $v = \sqrt{\frac{2(3.2gh - 2.2gh)}{3.2A + 2.2}} = 2.56ms^{-1}$ After moving up 1.80 m, m_1 moves under gravity $v_2 = u_1 = 2.56ms^{-1}$ $v_1 = 0$ $v_1^2 = u_1^2 + 2as_1$ $s_1 = \frac{v_1^2 - u_1^2}{2a} = \frac{0^2 - 2.56^2}{2(9.81)} = 0.334m$ $s_{1\ max} = 0.334m + 1.80m = 2.134\ m$	1 1 1
Question 19		
(a-i)	The Newton's law of universal gravitation states that the force of attraction between two objects is directly proportional to the product of their masses and inversely proportional to the square of the distance between the objects	1
(a-ii)	The gravitational field strength at a point in a gravitational field is the gravitational force per unit mass acting on a body at that point The gravitational potential at a point in a gravitational field is defined as the work done to bring a unit mass from infinity to that point	1 1
(b-i)		2
(b-ii)	at the surface of the planet, $F = \frac{GmM}{R^2} = 4.30 \times 10^4$N when it is at a distance R from the surface of the planet, $F_r = \frac{GmM}{(2R)^2} = \frac{GmM}{4R^2}$ $F_r = \frac{GmM}{(2R)^2} = \frac{GmM}{4R^2}$ $= \frac{1}{4}(4.30 \times 10^4)$ $= 1.08 \times 10^4$N	1 1 1

TAMAT SAMPEL

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- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

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