SAMPEL PERCUMA

# Trial STPM 2020 Fizik Semester 1 SMK Mantin, Negeri Sembilan

## Set penuh: Kertas Percubaan STPM

Sem 1 · Fizik

**Sampel ini: 8 muka surat. Set penuh ada:**

- 3 fail PDF
- 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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Sampel bermula di muka surat sebelah

Name :…… Class:……...

# 960/1 Trial 1 STPM 2020

**SMK MANTIN**

**PHYSICS**

**PAPER 1**

**One and a half hours**

**MAJLIS PEPERIKSAAN MALAYSIA**
(MALAYSIAN EXAMINATIONS COUNCIL)

**SIJIL TINGGI PERSEKOLAHAN MALAYSIA**
(MALAYSIA HIGHER SCHOOL CERTIFICATE)

**Instructions to candidates:**

**DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.**

*Answer* **all** *questions in Section A. Marks will not be deducted for wrong answers. For each question, four suggested answers are given. Choose the correct answer and circle the answer.*

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

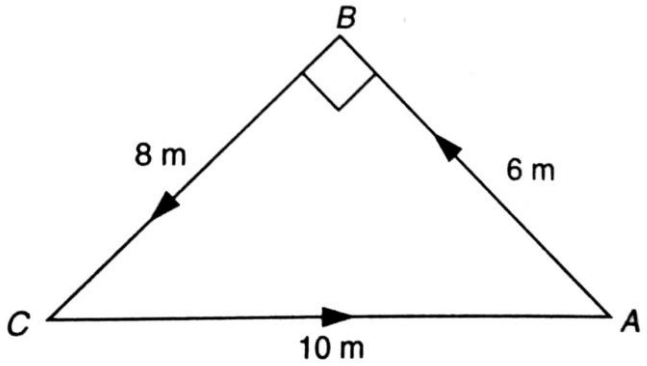
*Answer* any **two** *questions in Section C. All essential working should be shown. For numerical answers, unit should be quoted wherever appropriate. Begin each answer on a fresh sheet of paper and arrange your answers in numerical order.*

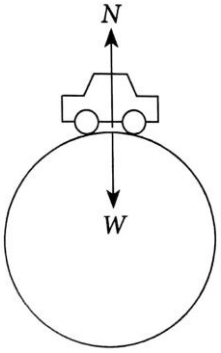
*Values of constants are provided on page in this question paper.*

| For examiner's use | | |
|---|---|---|
| Question | Total marks | Marks obtained |
| Section A | | |
| **1-15** | 15 | |
| Section B | | |
| **16** | 8 | |
| **17** | 7 | |
| Section C | | |
| **18** | 15 | |
| **19** | 15 | |
| **20** | 15 | |
| **Total** | ***60*** | |

**Section A** [*15 marks*]

*Answer all questions in this section*

| | |
|---|---|
| 1 | In an experiment, a plastic tube with an external diameter $d_1$ was measured at (54±2)mm while its internal diameter $d_2$ was measured at (37±1)mm. The maximum percentage error for he quantity ( $d_1$-$d_2$) is<br><br>A 20 %<br>B 18 %<br>C 4 %<br>D 0.6 % |
| | ***Solution***: $d_1 = (54 \pm 2)$ mm<br>$d_2 = (37 \pm 1)$ mm<br>Uncertainty in $(d_1 - d_2) = (2 + 1)$ mm<br>$= 3$ mm<br>$(d_1 - d_2) = 54 - 37$<br>$= 17$ mm<br>$\therefore$ The percentage error $= \frac{3}{17} \times 100\%$<br>$= 18\%$<br>***Answer***: B |
| 2 | A body moves along AB, BC and CA as shown in the diagram below with uniform velocity 4ms$^{-1}$, 8ms$^{-1}$ and 10ms$^{-1}$ respectively.<br><br><br>Which of the following is the average velocity of the body for the entire journey?<br><br>A 0.00 ms$^{-1}$<br>B 3.43 ms$^{-1}$<br>C 6.85 ms$^{-1}$<br>D 13.70 ms$^{-1}$ |
| | ***Solution:*** Average velocity $= \frac{\text{Total displacement}}{\text{Total time taken}}$<br>$= 0.00$ m s$^{-1}$ (Since total displacement = 0)<br>***Answer:*** A |
| 3 | A coin is placed on top of a block as shown in the figure below |

| | |
|---|---|
| | B 99.0 % D 78.3% |
| | (a) $W_{force} = \vec{F} \bullet \vec{s}$<br>$= 10\left(\frac{2}{\sin 30^\circ}\right)$<br>$= 40$ J<br>(b) $W_{machine} = \Delta U_G$<br>$= mg(h_f - h_L)$<br>$= 1.8(9.81)(2 - 0)$<br>$= 35.3$ J<br>(c) $\eta = \frac{W_{out}}{E_{in}} \times 100$<br>$= \frac{35.3}{40} \times 100$<br>$= 88.3\%$ |
| 6 | A 1500 kg car moves at 20 $ms^{-1}$ over the top of the hill that has a radius of 100 m. What is the normal force acting on the car at the hill top?<br><br><br>A 8715 N C 6000 N<br>B 9870 N D 15000 N |
| | (a) $F_c = \frac{mv^2}{r}$<br>$= \frac{1500(20^2)}{100}$<br>$= 6000$ N<br>(b) $\sum F_y = F_c$<br>$W - N = 6000$<br>$N = mg - 6000$<br>$= 1500(9.81) - 6000$<br>$= 8715$ N |
| 7 | Which graph correctly shows the variation of gravitational field strength g with distance r from the centre of the earth? (R is the radius of the Earth) |

Change in internal energy $= \frac{f}{2}\ n\ R\ \Delta T$

$= \frac{5}{2}(2)(8.31)(8)$ (Diatomic gas)

$= 332.4\ \text{J}$

$= 3.32 \times 10^2\ \text{J}$

***Answer:*** B

11 A wire is pulled by force of 35 N and it extends by 3 mm. If the wire has a mass of 5.2 g and length 2.8 m. What is the Young's Modulus for the metal of the wire? $[\rho_{wire} = 2.7 \times 10^3 kgm^{-3}]$

A $2.89 \times 10^{12} Pa$
B $8.32 \times 10^{10} Pa$
C $4.75 \times 10^{10} Pa$
D $4.15 \times 10^{10} Pa$

(a) $\rho = \frac{m}{V} = \frac{m}{Al_0}$

$2.7 \times 10^3 = \frac{5.2 \times 10^{-3}}{A(2.8)}$

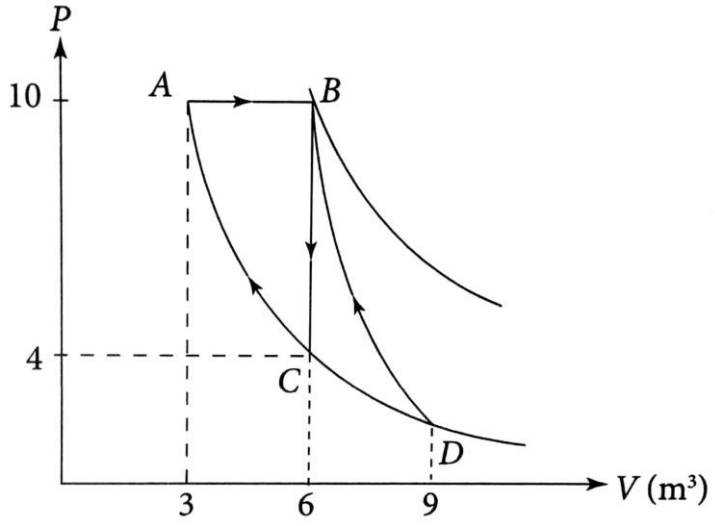
$A = 6.88 \times 10^{-7}\ \text{m}^2$

$Y = \frac{Fl_0}{Ae}$

$= \frac{35(2.8)}{(6.88 \times 10^{-7})(3 \times 10^{-3})}$

$= 4.75 \times 10^{10}\ \text{Pa}$

12 Which of the following processes in the P-V graph given are correct?




| | AB | BC | DB | DA |
|---|---|---|---|---|
| A | Isochoric | Isobaric expansion | Adiabatic compression | Isothermal compression |

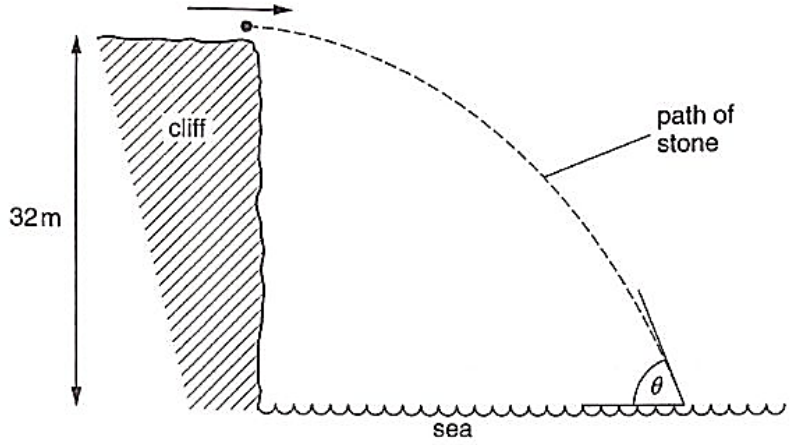
**Section B** [*15 marks*]

*Answer **all** questions in this section.*

16. (a) Derive equations of linear motion for an object undergoing constant acceleration

[4 marks]

(b) A stone of mass 130 g is thrown horizontally from the top of the cliff of height 32m, as illustrated below.




Air resistance is negligible. The stone enters the sea with a speed 0f 34 $ms^{-1}$.
Determine, for the stone as it hits the sea,
(i) the vertical component of the velocity of the stone,

[2 marks]

(ii) the angle θ to the horizontal of the stone's path.

[2 marks]

17. (a) State two assumptions of the kinetic theory of gases. [2 marks]

……...
……...
……..
……...
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(b) According to the kinetic theory of gases, $p = \frac{1}{3}\left(\frac{Nm}{V}\right) < c^2 >$. State the meaning of the symbols for N and $< c >$. [2 marks]

(c) A gas tank contains 7.0 kg of butane gas. Assuming that butane gas behaves as an ideal gas, calculate its internal energy at 27 ℃.
[Molecular mass of butane is 58 $gmol^{-1}$] [3 marks]

Answer :
17 (a)
(i) The collisions of gas molecules (with the vessel wall) are perfectly elastic.
(ii) The volume occupied by gas molecules is negligible compare to volume of vessel
(iii) There is no intermolecular force between molecules
(iv) The time of collision is negligible compare time between collisions with the vessel wall

(b) N = number of gas molecules.
$< c >$ = root-mean-square velocity of gas molecules.

(c) Internal energy $= \frac{6}{2}nRT$

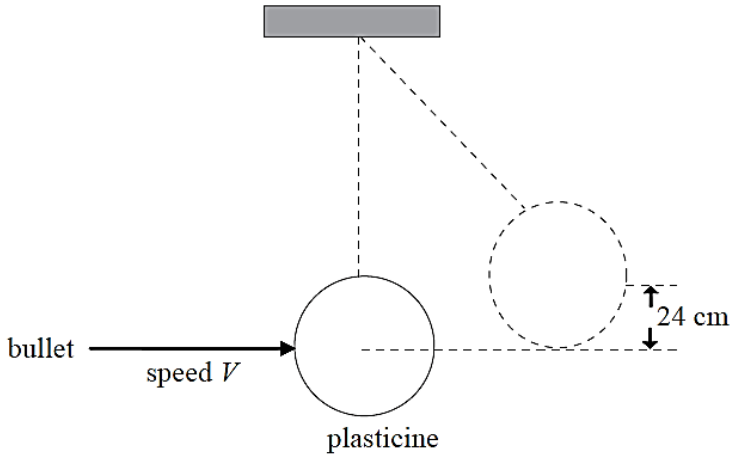
$$= \frac{6}{2}\left[\frac{7.0}{58\times10^{-3}}\right](8.31)(300)$$

$$= 9.0 \times 10^5 J$$

**Section C** [*30 marks*]

*Answer any two questions in this section.*

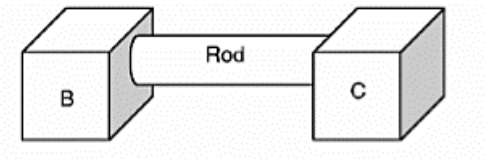
18. (a) State Newton's Laws of motion. [3 marks]
(b) By applying Newton's laws of motion to the collision of two particles, deduce that momentum is conserved in the collision. [3 marks]
(c) In an experiment to measure the speed of a bullet, the bullet is fired into a piece of plasticine suspended from a rigid support by a light thread as shown in the diagram below.




The speed of the bullet on impact with the plasticine is V. As a result of the impact, the bullet embeds itself in the plasticine and the plasticine is displaced vertically through a height of 24 cm. The mass of the bullet is 5.20x10-3 kg and the mass of the plasticine is 0.38 kg.

(i) Calculate the speed of the plasticine immediately after the impact. [2 marks]
(ii) Deduce the speed V with which the bullet strikes the plasticine. [2 marks]
(iii) Calculate the heat dissipated in the impact. [2 marks]

20. (a) The diagram below shows an aluminum rod 1.0 m long and 1.0 cm in diameter with their ends connected to two blocks B and C. Blocks B and C are maintained at 100 ℃ and 0 ℃ respectively. The side of the rod is perfectly insulated. The system reaches equilibrium.

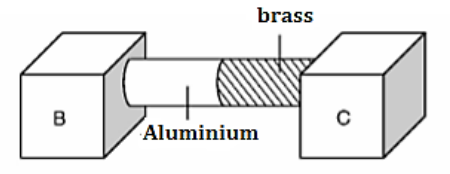



(i) Calculate the rate of heat flow in the rod. [3 marks]

(ii) Calculate the temperature at a point 25 cm from block C. [2 marks]

(b) If block C is instantaneously replaced by a huge block of ice, calculate the amount of ice melt in 10 minutes. [3 marks]

(c) Half of the aluminium rod is then replaced with a brass rod of equal dimensions, with its free end connected to block C as shown in the diagram below. The system reaches equilibrium.




(i) Calculate the temperature at the aluminium-brass junction. [3 marks]

(ii) Calculate the rate of heat flow through the aluminium-brass junction. [2 marks]

(d) Calculate the length of a copper rod that has the same conducting ability as the 1.0 m aluminium rod.

[Thermal conductivity of aluminium = 205 W $m^{1}$ $K^{-1}$, thermal conductivity of brass = 109 W $m^{1}$ $K^{-1}$, thermal conductivity of copper = 385 W $m^{1}$ $K^{-1}$, latent heat of fusion of ice = 3.34 x 105 J $kg^{1}$.] [2 marks]

TAMAT SAMPEL

# Suka sampel ini?

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