Nama: .... Kelas: ....

SEKOLAH MENENGAH KEBANGSAAN

PEPERIKSAAN PERCUBAAN SPM
FIZIK **4531/2**
TINGKATAN 5
Kertas 2
JULAI 2026
2 ½ jam Dua jam tiga puluh minit

JANGAN BUKA KERTAS PEPERIKSAAAN INI SEHINGGA DIBERITAHU

1. *Kertas peperiksaan ini adalah dalam dwibahasa.*
2. *Soalan dalam Bahasa Melayu mendahului soalan yang sepadan dalam Bahasa Inggeris.*
3. *Kertas ini mengandungi tiga bahagian:* **Bahagian A, Bahagian B** *dan* **Bahagian C**.
4. *Jawapan hendaklah ditulis pada ruangan jawapan yang disediakan di dalam kertas peperiksaan ini.*
5. *Jawapan boleh ditulis dalam Bahasa Melayu atau Bahasa Inggeris.*
6. *Kerja mengira mesti ditunjukkan.*
7. **Kertas peperiksaan** *ini hendaklah diserahkan kepada guru pada akhir peperiksaan.*

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	**1**	4	
	2	5	
	3	6	
	4	9	
	5	9	
	6	9	
	7	9	
	8	9	
B	**9**	20	
	10	20	
C	**11**	20	
Jumlah			

Rumus-rumus berikut boleh membantu anda menjawab soalan. Simbol-simbol yang diberi adalah yang biasa digunakan.

DAYA DAN GERAKAN I
FORCE AND MOTION I

1 $v = u + at$

2 $s = \frac{1}{2}(u+v)t$

3 $s = ut + \frac{1}{2}at^2$

4 $v^2 = u^2 + 2as$

5 Momentum $= mv$

6 $F = ma$

KEGRAVITIAN
GRAVITATIONAL

1 $F = \frac{Gm_1m_2}{r^2}$

2 $g = \frac{Gm}{r^2}$

3 $F = \frac{mv^2}{r}$

4 $a = \frac{v^2}{r}$

5 $v = \frac{2\pi r}{T}$

6 $\frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3}$

7 $v = \sqrt{\frac{GM}{r}}$

8 $U = -\frac{GMm}{r}$

9 $v = \sqrt{\frac{2GM}{r}}$

HABA
HEAT

1 $Q = mc\theta$

2 $Q = ml$

3 $Q = Pt$

4 $P_1V_1 = P_2V_2$

5 $\frac{V_1}{T_1} = \frac{V_2}{T_2}$

6 $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

GELOMBANG
WAVES

1 $v = f\lambda$

2 $\lambda = \frac{ax}{D}$

CAHAYA DAN OPTIK
LIGHT AND OPTICS

1 $n = \frac{c}{v}$

2 $n = \frac{\sin i}{\sin r}$

3 $n = \frac{1}{\sin c}$

4 $n = \frac{H}{h}$

5 $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

6 $n_1 \sin\theta_1 = n_2 \sin\theta_2$

7 Pembesar linear, $m = \frac{v}{u}$

Linear Magnification, $m = \frac{v}{u}$

DAYA DAN GERAKAN II
FORCE AND MOTION II

1 $F = kx$

2 $E = \frac{1}{2}Fx$

3 $E = \frac{1}{2}kx^2$

TEKANAN
PRESSURE

1 $P = \frac{F}{A}$

2 $P = h\rho g$

3 $\rho = \frac{m}{V}$

ELEKTRIK
ELECTRICITY

1 $E = \frac{F}{Q}$

2 $I = \frac{Q}{t}$

3 $V = \frac{E}{Q}$

4 $V = IR$

5 $R = \frac{\rho l}{A}$

6 $\varepsilon = V + Ir$

7 $P = IV$

8 $P = \frac{E}{t}$

9 $E = \frac{V}{d}$

KEELEKTROMAGNETAN
ELECTROMAGNETISM

1 $\frac{V_S}{V_P} = \frac{N_S}{N_P}$

2 $\eta = \frac{\text{Kuasa output}}{\text{Kuasa input}} \times 100\%$

$\eta = \frac{\textit{Output power}}{\textit{Input power}} \times 100\%$

ELEKTRONIK
ELECTRONIC

1 Tenaga keupayaan elektrik, $E = eV$

Electrical potential energy, $E = eV$

2 Tenaga kinetik maksimum, $E = \frac{1}{2}mv^2$

Maximum kinetic energy, $E = \frac{1}{2}mv^2$

3 $\beta = \frac{I_C}{I_B}$

FIZIK NUKLEAR
NUCLEAR PHYSICS

1 $N = \left(\frac{1}{2}\right)^n N_O$

2 $E = mc^2$

3 $c = 3.00 \times 10^8\ m\ s^{-1}$

4 $1\ \text{u.j.a} = 1.66 \times 10^{-27}\ kg$

$1\ a.m.u = 1.66 \times 10^{-27}\ kg$

FIZIK KUANTUM
QUANTUM PHYSICS

1 $E = hf$

2 $f = \frac{c}{\lambda}$

3 $\lambda = \frac{h}{p}$

4 $\lambda = \frac{h}{mv}$

5 $E = \frac{hc}{\lambda}$

6 $p = nhf$

7 $hf = W + \frac{1}{2}mv_{maks}^2$

8 $W = hf_O$

9 $g = 9.81\ m\ s^{-2}$ @ $9.81\ N\ kg^{-1}$

10 $G = 6.67 \times 10^{-11}\ N\ m^2\ kg^{-2}$

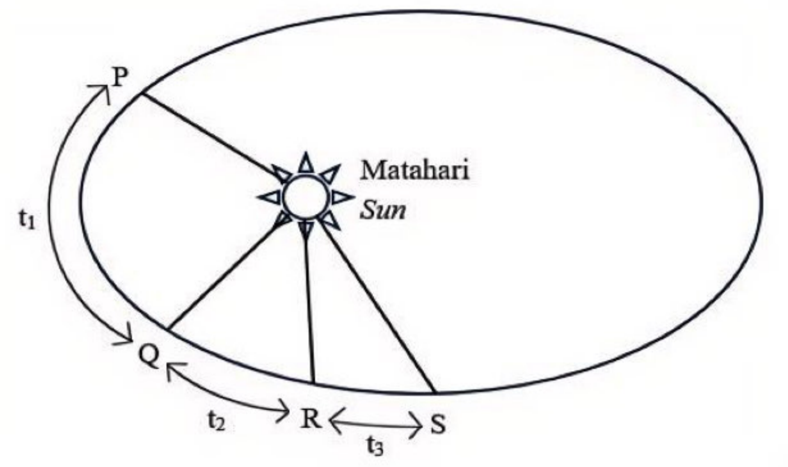
11 $h = 6.63 \times 10^{-34}\ J\ s$

Bahagian A
***Section* A**

[60 markah]
[60 *marks*]

Jawab ***semua*** soalan dalam bahagian ini.
Answer **all** *questions in this section*.

1 Rajah 1 menunjukkan Bumi mengorbit Matahari.
Diagram 1 *shows the Earth orbiting the Sun.*



Rajah 1
Diagram 1

(a) Nyatakan bentuk orbit dalam Rajah 1.
State the shape of the orbit in Diagram 1.

....

[1 markah]
[1 *mark*]

(b) Nyatakan hukum fizik yang menerangkan bahawa Bumi mencakupi luas yang sama dalam selang masa yang sama semasa bergerak mengelilingi Matahari.
State the physics law that explains that the Earth sweeps out equal areas in equal intervals of time as it moves around the Sun.

....

[1 markah]
[1 *mark*]

(c) Berdasarkan Rajah 1, selang masa t_1, t_2 dan t_3 adalah sama.
Based on Diagram 1, *the time intervals* t_1, t_2 *and* t_3 *are equal.*

(i) Lengkapkan pernyataan berikut.
Complete the following statement.

Bumi bergerak dengan laju linear yang lebih tinggi dari titik ……………

ke titik ………………

The Earth moves with higher linear speed from point ……………. *to*

point ………………

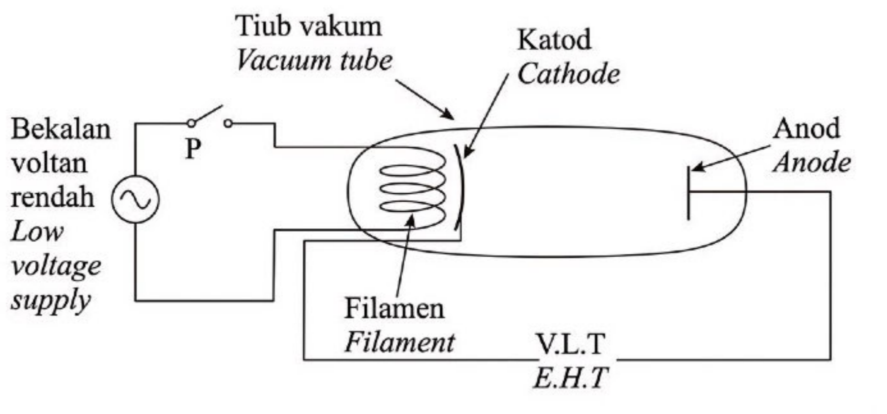
[1 markah]
[1 *mark*]

(ii) Nyatakan **satu** sebab bagi jawapan dalam **1**(b)(i).
*State **one** reason for the answer in* **1**(b)(i).

………………………………………………………………………………

[1 markah]
[1 *mark*]

2 Rajah 2.1 menunjukkan satu tiub sinar katod ringkas. Katod memancarkan elektron apabila suis P ditutup.
Diagram 2.1 *shows a simple cathode ray tube. Cathode emits electrons when switch* P *is closed.*



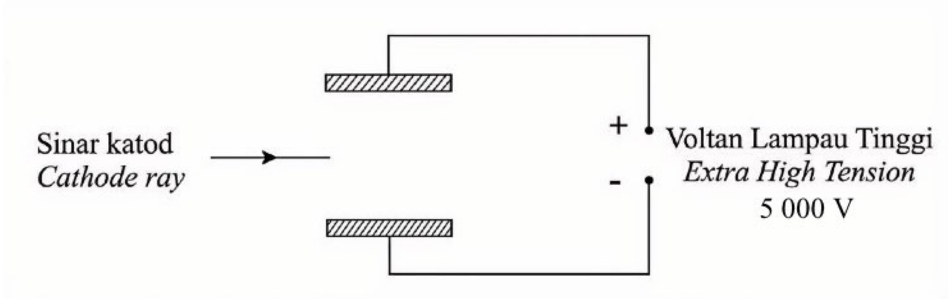
Rajah 2.1
Diagram 2.1

(a) Nyatakan maksud sinar katod.
State the meaning of cathode ray.

....

[1 markah]
[1 *mark*]

(b) Rajah 2.2 menunjukkan lintasan sinar katod yang tidak lengkap.
Diagram 2.2 *shows an incomplete path of a cathode ray.*



Rajah 2.2
Diagram 2.2

(i) Dalam Rajah 2.2, lengkapkan lintasan sinar katod tersebut dalam medan elektrik.
In Diagram 2.2, complete the path of the cathode ray in an electric field.

[1 markah]
[1 *mark*]

(ii) Berikan satu sebab bagi jawapan dalam **2**(b)(i).
Give one reason for the answer in **2**(b)(i*).*

……………………………………………………………………………………

[1 markah]
[1 *mark*]

(c) Hitung halaju elektron selepas ia dipecutkan dari katod dalam keadaan pegun ke anod.
Diberi jisim elektron, $m = 9.11 \times 10^{-31}$ kg dan cas elektron, $e = 1.6 \times 10^{-19}$ C.

Calculate the velocity of an electron after it has been accelerated from cathode at rest to anode.
Given mass of an electron, $m = 9.11 \times 10^{-31}$ kg *and the charge of an electron,* $e = 1.6 \times 10^{-19}$ C.

[2 markah]
[2 *marks*]

3 Rajah 3 menunjukkan ketulan ais berjisim 80 g dimasukkan ke dalam sebuah mangkuk sup kacang merah yang panas. Haba pendam pelakuran diserap oleh ais semasa proses peleburan.
Diagram 3 shows an ice cube of 80 g *being added into a bowl of hot red bean soup. Heat energy is absorbed by the ice as latent heat of fusion during the melting process.*

Rajah 3
Diagram 3

(a) Nyatakan maksud haba pendam pelakuran.
State the meaning of the latent heat of fusion.

…………………………………………………………………………………………

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

(b) Beri **satu** sebab mengapa suhu ais kekal malar semasa proses peleburan.
Give ***one*** *reason why the temperature of the ice remains constant during the melting process.*

…………………………………………………………………………………………

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

(c) Hitungkan jumlah tenaga haba yang diserap oleh ketulan ais 80 g untuk melebur sepenuhnya.
[Haba pendam tentu pelakuran, $l_{ais} = 3.34 \times 10^5$ J kg^{-1}]
Calculate the amount of heat energy absorbed by 80 g *of ice cube to melt completely.*
[*Specific latent heat of fusion,* $l_{ice} = 3.34 \times 10^5$ J kg^{-1}]

[2 markah]
[2 *marks*]

(d) Nyatakan perubahan terhadap masa penyejukan jika ketulan ais digantikan dengan ais hancur. Terangkan jawapan anda.
State the change on the cooling time if the ice cube is replaced with crushed ice. Explain your answer.

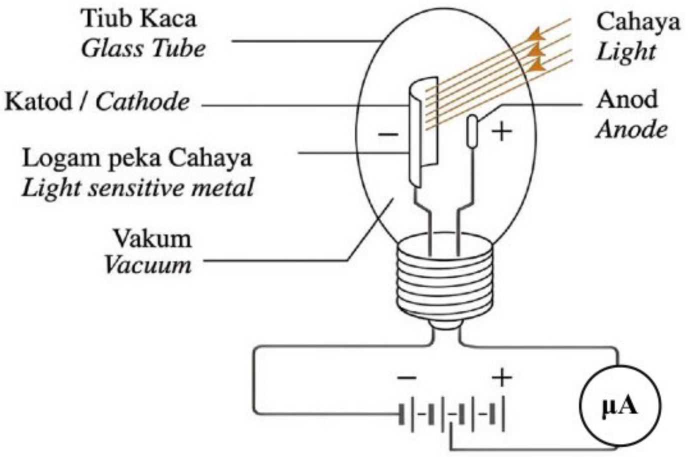
……………………………………………………………………………………

……………………………………………………………………………………

……………………………………………………………………………………

[2 markah]
[2 *marks*]

4 Rajah 4.1 menunjukkan satu fotosel yang digunakan untuk mengkaji pancaran elektron daripada permukaan logam.
Diagram 4.1 shows a photocell that is used to investigate the emission of electrons from a metal surface.



Rajah 4.1
Diagram 4.1

(a) Nyatakan fenomena fizik yang berlaku dalam eksperimen tersebut.
State the physics phenomenon that is occurs in the experiment.

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

(b) Apakah fungsi vakum di dalam tiub kaca itu?
What is the function of the vacuum inside the glass tube?

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

(c) Frekuensi cahaya ditingkatkan tetapi keamatan cahaya tidak berubah.
The frequency of the light is increased but the intensity of the light is *unchanged.*

Nyatakan perubahan pada bacaan mikroammeter.
State the change in the reading of the microammeter.

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

(d) Rajah 4.2 menunjukkan pintu automatik yang menggunakan fotosel.
Diagram 4.2 *shows an automatic door that uses a photocell.*

Rajah 4.2
Diagram 4.2

(i) Hitung tenaga satu foton sinar inframerah dengan panjang gelombang 9.0 μm yang dipancarkan ke arah pengesan sinar.
Diberi laju cahaya, $c = 3.0 \times 10^{8}$ m s^{-1} dan Pemalar Planck,
$h = 6.63 \times 10^{-34}$ J s

Calculate the energy of one photon of the infrared ray with a wavelength of 9.0 μm *emitted toward the ray detector.*
Given speed of light, $c = 3.0 \times 10^{8}$ m s^{-1} and *Planck's Constant ,*
$h = 6.63 \times 10^{-34}$ J s.

[3 markah]
[3 *marks*]

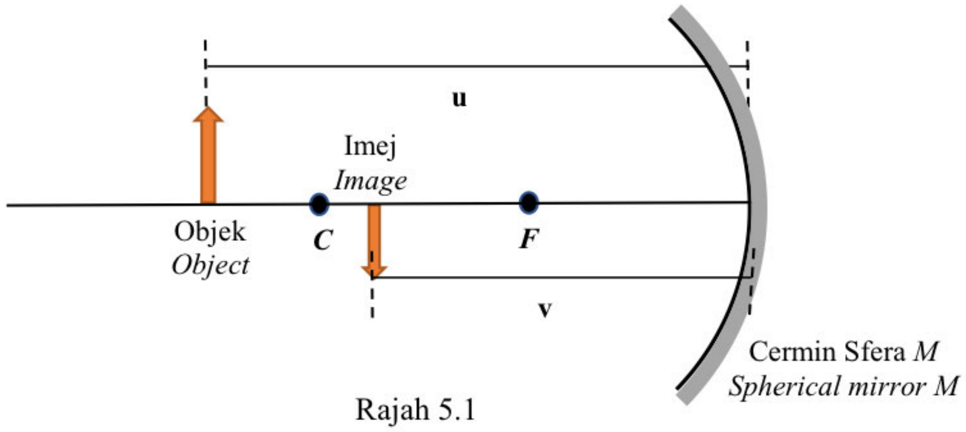
(ii) Bilangan foton, n yang dipancarkan sesaat jika kuasa sinar inframerah, P ialah 2.5 W.
Number of photon, n *emitted per second if the power of infrared*, P *is* 2.5 W.

[2 markah]
[2 *marks*]

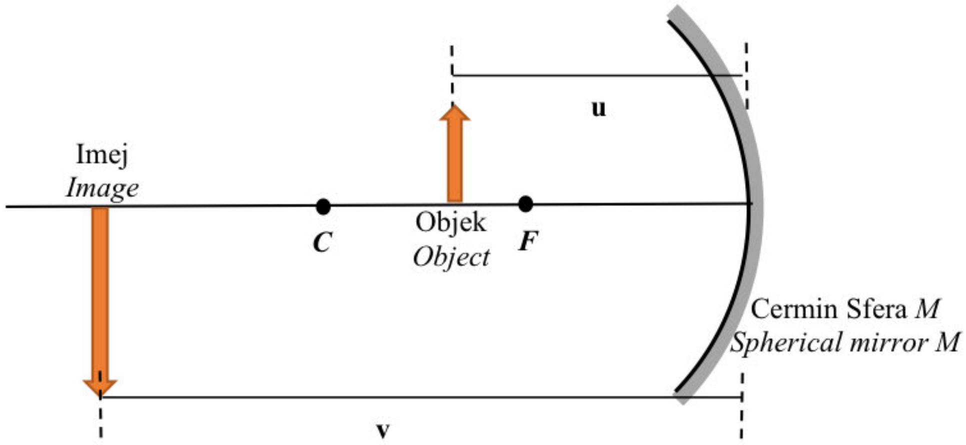
(e) Nyatakan satu lagi aplikasi kesan fotoelektrik dalam teknologi hijau.
State another application of photoelectric effect in the green technology.

……………………………………………………………………………………
[1 markah]
[1 *mark*]

5 Rajah 5.1 dan Rajah 5.2 menunjukkan kedudukan berbeza satu objek dan imejnya di hadapan sebuah cermin sfera *M*.
Diagram 5.1 *and Diagram* 5.2 *show the different positions of an object and its image in front of a spherical mirror M*.



Rajah 5.1
Diagram 5.1



Rajah 5.2
Diagram 5.2

(a) Nyatakan jenis cermin sfera M.
State the type of spherical mirror M.

……………………………………………………………………………………

[1 markah]
[1 *mark*]

(b) Berdasarkan Rajah 5.1 dan Rajah 5.2, bandingkan
Based on Diagram 5.1 *and Diagram* 5.2*, compare*

(i) jarak objek, u
object distance, u

……………………………………………………………………………

[1 markah]
[1 *mark*]

(ii) jarak imej, v
image distance, v

……………………………………………………………………………

[1 markah]
[1 *mark*]

(iii) pembesaran linear bagi imej yang terbentuk.
linear magnification of the image formed.

……………………………………………………………………………

[1 markah]
[1 *mark*]

(c) Berdasarkan jawapan di 5(b), nyatakan hubungan antara
Based on the answers in 5(b), *state the relationship between*

(i) jarak objek, u dengan jarak imej, v.
the object distance, u *and the image distance*, v.

……………………………………………………………………………

[1 markah]
[1 *mark*]

(ii) jarak imej, v dengan pembesaran linear bagi imej yang terbentuk.
the image distance, v *and linear magnification of the image formed.*

……………………………………………………………………………

[1 markah]
[1 *mark*]

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(*d*) Panjang fokus cermin sfera M ialah 15 cm.
Jika jarak objek, u ialah 25 cm, hitung jarak imej, v.
The focal length of the spherical mirror M *is* 15 cm.
If the object distance, u *is* 25 cm, *calculate the image distance*, v.

[2 markah]
[2 *marks*]

(e) Cermin sfera *M* biasanya digunakan oleh doktor gigi. Nyatakan kedudukan objek yang sesuai supaya doktor gigi dapat melihat imej gigi yang tegak dan dibesarkan.
Spherical mirror M *is commonly used by dentists. State the suitable position of the object so that the dentist can see an upright and magnified image of the tooth.*

....

[1 markah]
[1 *mark*]

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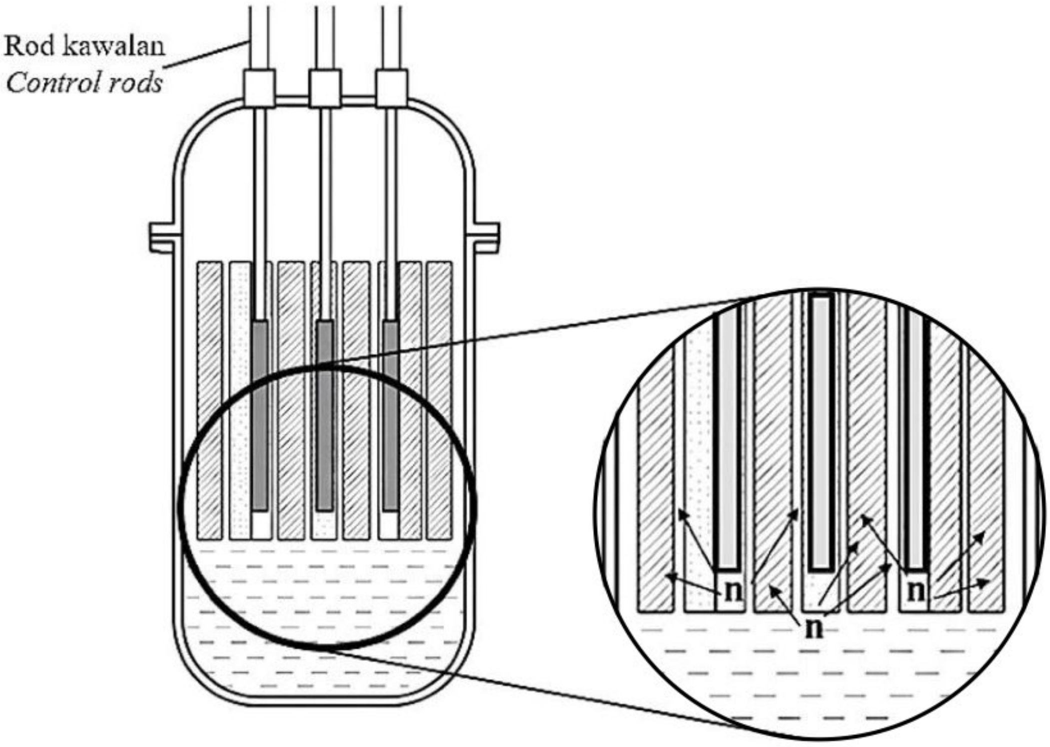
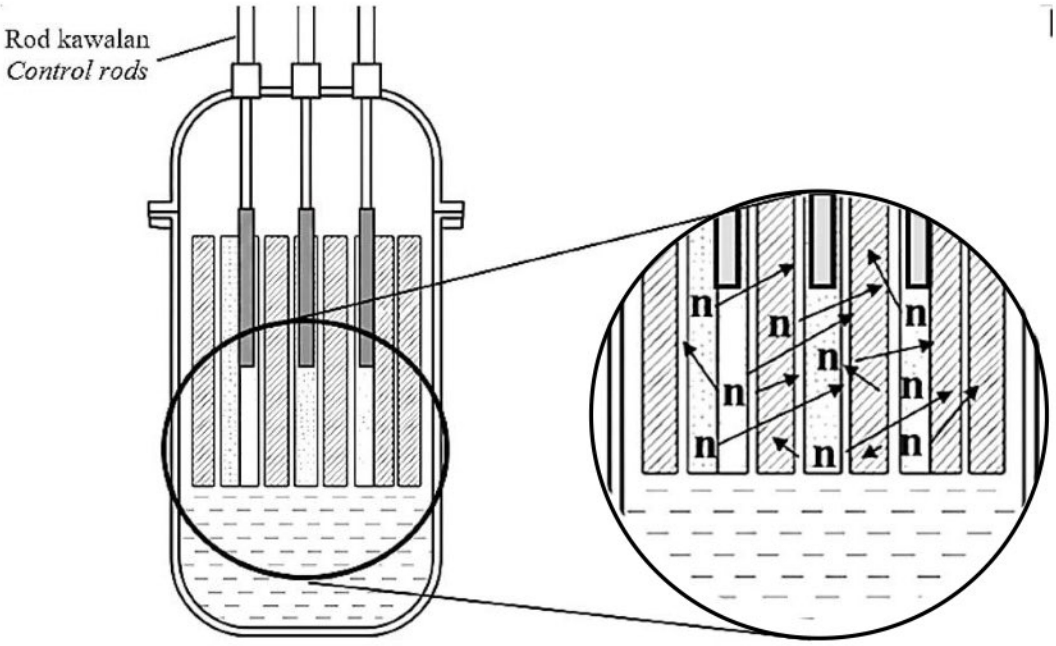
6 Rajah 6.1 dan Rajah 6.2 menunjukkan dua buah reaktor nuklear. Bilangan neutron, n awal untuk tindak balas pelakuran adalah sama.
Diagram 6.1 *and Diagram* 6.2 *show two nuclear reactors. Initial numbers of neutrons, n for fission reactions are the same.*



Rajah 6.1
Diagram 6.1



Rajah 6.2
Diagram 6.2

(a) Nyatakan fungsi rod kawalan di dalam reaktor nuclear.
State the function of control rods in the nuclear reactor .

…………………………………………………………………………………………
[1 markah]
[1 *mark*]

(b) Berdasarkan Rajah 6.1 dan Rajah 6.2, bandingkan
Based on Diagram 6.1 *and Diagram* 6.2*, compare*

(i) kedudukan rod kawalan dalam teras.
the position of the control rods in the core.

…………………………………………………………………………………
[1 markah]
[1 *mark*]

(ii) bilangan nuetron yang diserap oleh rod kawalan.
number of neutrons absorbed by control rods.

…………………………………………………………………………………
[1 markah]
[1 *mark*]

(iii) tenaga nuklear yang dihasilkan.
the nuclear energy produced.

…………………………………………………………………………………
[1 markah]
[1 *mark*]

(c) Berdasarkan jawapan di 6(b), hubungkaitkan
Based on the answers in 6(b), *relate*

(i) kedudukan rod pengawal terendam dengan bilangan neutron yang diserap.
the position of the control rods with the number of neutrons absorbed..

…………………………………………………………………………………
[1 markah]
[1 *mark*]

(ii) bilangan neutron yang diserap dengan tenaga nuklear yang dihasilkan.
the number of neutrons absorbed with the nuclear energy produced.

....

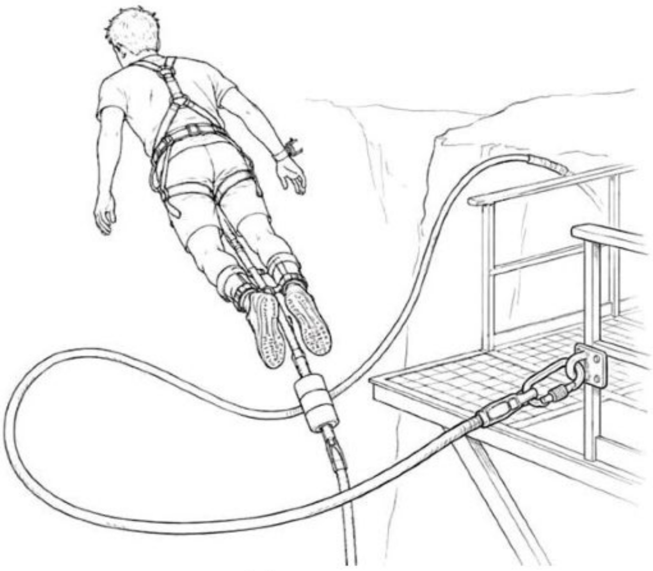
[1 markah]
[1 *mark*]

(d) Hitung tenaga nuklear yang dibebaskan apabila cacat jisim dalam tindak balas tersebut ialah 0.0578 u.j.a.
Calculate the nuclear energy released when the mass defect in the reaction is 0.0578 *a.m.u.*

[Diberi: 1 u.j.a = 1.66×10^{-27} kg, laju cahaya, c = 3.00×10^{8} m s^{-1}]
[*Given: 1 a.m.u* = 1.66×10^{-27} kg, *speed of light,* c = 3.00×10^{8} m s^{-1}]

[3 markah]
[3 *marks*]

7 Rajah 7 menunjukkan aktiviti terjun lelabah. Panjang asal tali untuk terjun lelabah itu adalah 20 m. Penerjun akan mengalami jatuh bebas pada awal terjunan. Halaju penerjun akan berkurang sebaik sahaja tali mula meregang.
Diagram 7 shows the activity of a bungee jump. The original length of cord for the bungee jump is 20 m. *The jumper will experience free fall at the beginning of the jump. The velocity of the jumper will decrease once the cord starts to stretch.*



Rajah 7
Diagram 7

(a) Apakah yang dimaksudkan dengan jatuh bebas?
What is meant by free fall?

……………………………………………………………………………………
[1 markah]
[1 *mark*]

(b) (i) Hitung halaju maksimum penerjun itu sejurus sebelum tali terjun lelabah itu mula meregang.
Calculate the maximum velocity of the jumper just before the cord of bungee jump starts to stretch.

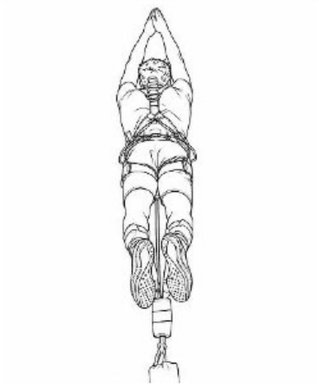
[2 markah]
[2 *marks*]

(ii) Nyatakan perubahan tenaga yang dialami oleh penerjun itu sejurus sebelum tali terjun lelabah itu mula meregang.
State the energy change that is experienced by the jumper just before the cord of bungee jump starts to stretch.

……………………………………………………………………………

[1 markah]
[1 *mark*]

(c) Jadual 1 menunjukkan panjang tali bungee dan posisi badan penerjun semasa terjunan.
Table 1 shows the length of bungee jump cord and body posture of the jumper during the jump.

Pilihan *Option*	Panjang tali terjun lelabah *Length of cord of bungee jump*	Posisi badan semasa jatuh *Body posture during the fall*
X	25 m	 Buka tangan dan kaki *Spread out the limbs*
Y	25 m	 Rapatkan tangan dan kaki *Close the limbs*

Z	20 m	Rapatkan tangan dan kaki *Close the limbs*

Jadual 1
Table 1

Berdasarkan Jadual 1, nyatakan ciri yang sesuai untuk mencapai kelajuan yang paling tinggi semasa terjunan melalui udara.
Based on Table 1, *state the suitable characteristics to achieve the highest speed during the jump throughout the air.*

(i) Panjang tali terjun lelabah
Length of cord of bungee jump

…………………………………………………………………………………

Sebab
Reason

…………………………………………………………………………………
[2 markah]
[2 *marks*]

(ii) Posisi badan semasa terjunan
Body posture during the jump

…………………………………………………………………………………

Sebab
Reason

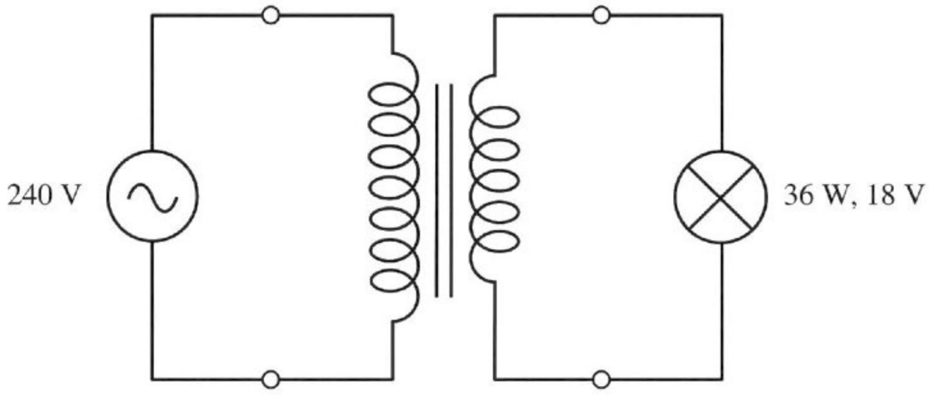
…………………………………………………………………………………
[2 markah]
[2 *marks*]

(d) Berdasarkan jawapan di **7**(c), pilih pilihan yang paling sesuai.
Based on the answers in **7**(c), *choose the most suitable option.*

…………………………………………………………………………………………

[1 markah]
[1 *mark*]

8 Rajah 8.1 menunjukkan satu mentol 36 W, 18 V disambungkan ke terminal output sebuah transformer unggul. Mentol tersebut menyala dengan kecerahan normal.
Diagram 8.1 *shows a light bulb* 36 W, 18 V *that is connected to the output terminal of an ideal transformer. The bulb lights up with normal brightness.*



Rajah 8.1
Diagram 8.1

(a) Nyatakan maksud transformer unggul.
State the meaning of ideal transformer.

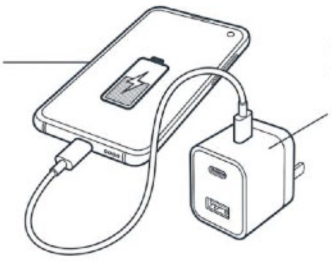
……………………………………………………………………………………………

[1 markah]
[1 *mark*]

(b) Hitungkan arus yang mengalir dalam gegelung sekunder.
Calculate the current follow in the secondary coil.

[2 markah]
[2 *marks*]

(c) Rajah 8.2 menunjukkan sebuah pengecas telefon yang mengandungi sebuah transformer untuk menurunkan voltan input 240 V kepada voltan output 6 V.
Diagram 8.2 *shows a phone charger that contains a transformer to reduce the input voltage from* 240 V *to the output voltage of* 6 V.



Rajah 8.2
Diagram 8.2

Pengecas telefon tersebut cepat menjadi panas dan tidak dapat mengecas x telefon sepenuhmya dalam tempoh masa yang singkat.
Cadangkan pengubahsuaian yang perlu dilakukan pada pengecas itu supaya ia dapat mengecas telefon pintar dengan lebih cepat dan tidak mudah panas.

Berikan sebab untuk setiap cadangan anda

The phone charger becomes hot quickly and is unable to fully charge the phone in a short time.
Suggest the modifications that need to be made to the charger so that it can charge the smartphone faster and does not heat up easily.

Give a reason for each of your suggestions.

(i) Ketebalan dawai gegelung
Thickness of coiled wire

....

Sebab
Reason

....

[2 markah]
[2 *marks*]

(ii) Jenis teras
Type of core

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Sebab
Reason

…………………………………………………………………………………

[2 markah]
[2 *marks*]

(iii) Susunan gegelung primer dan gegelung sekunder
Arrangement of the primary coil and secondary coil.

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Sebab
Reason

…………………………………………………………………………………

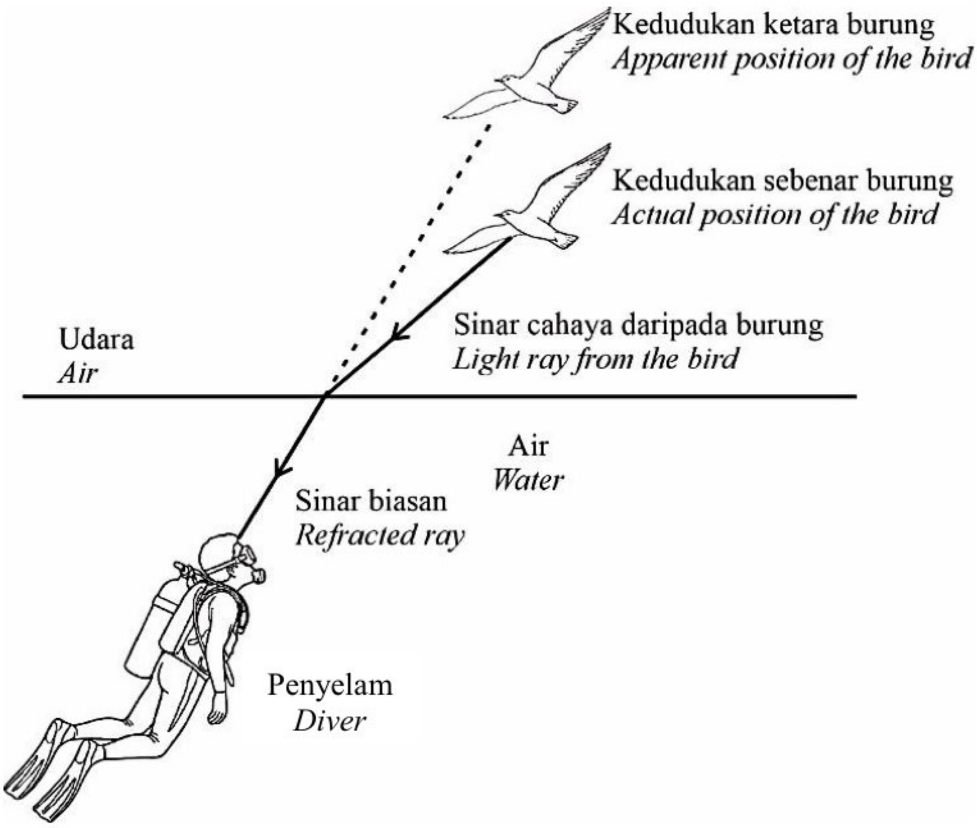
[2 markah]
[2 *marks*]

Bahagian B
Section B

[20 markah]
[20 marks]

Bahagian ini mengandungi ***dua*** soalan. Jawab ***satu*** soalan.
This section consists of **two** *questions. Answer* **one** *question.*

9 Rajah 9 menunjukkan seorang penyelam ternampak seekor burung terbang di langit apabila naik ke permukaan air.
Diagram 9 shows a diver spotting a bird flying in the sky when he ascends to the water surface



Rajah 9
Diagram 9

(a) Nyatakan fenomena cahaya yang berlaku.
State the light phenomenon that occur.

[1 markah]
[1 *mark*]

(b) Kedudukan burung dalam Rajah 9 kelihatan lebih tinggi berbanding kedudukan sebenarnya dari sudut pandangan penyelam. Terangkan bagaimana perkara ini berlaku.
The position of the bird in Diagram 9 appears to be higher than its actual position from the diver's point of view. Explain how this happens.

[4 markah]
[4 *marks*]

(c) Satu alur cahaya merambat masuk dari air ke kaca pada sudut tuju 25^{o}.
Diberi indeks biasan kaca dan air masing-masing ialah 1.65 dan 1.33.
A light beam travels from the water into the glass at an incidence angle of 25^{o}.
Given refractive indices of glass and water are 1.65 *and* 1.33 *respectively.*

Hitung
Calculate

(i) sudut biasan di dalam kaca.
the angle of refraction in the glass.

[3 markah]
[3 *marks*]

(ii) laju cahaya di dalam kaca tersebut.
the speed of light in the glass.

[2 markah]
[2 *marks*]

(d) Anda dikehendaki untuk menyiasat ciri-ciri kamera yang digunakan untuk mengambil gambar hidupan liar di laut dalam. Jadual 2 menunjukkan spesifikasi bagi empat jenis kamera J, K, L, dan M.
You are required to investigate the characteristics of a camera used for taking deep-sea wildlife pictures. Table 2 shows the specifications for four types of cameras J, K, L, *and* M.

Kamera *Camera*	**Indeks biasan kanta** *Refractive index of lens*	**Bahan kanta** *Material of lens*	**Saiz kanta** *Size of lens*	**Peralatan tambahan** *Additional equipment*
J	1.65	Kaca *Glass*	Kecil *Small*	Penapis warna *Color filter*
K	1.49	Plastik *Plastic*	Besar *Large*	Lampu LED *LED lamp*
L	1.65	Kaca *Glass*	Besar *Large*	Lampu LED *LED lamp*
M	1.49	Plastik *Plastic*	Kecil *Small*	Penapis warna *Color filter*

Jadual 2
Table 2

Kaji spesifikasi tersebut dan tentukan kamera yang paling sesuai digunakan untuk merakam imej yang jelas di laut dalam. Berikan sebab untuk pilihan anda.
Study the specifications and determine the most suitable camera to be used to capture clear images in the deep sea. Give reasons for your choice.

[10 markah]
[10 *marks*]

Soalan 9:

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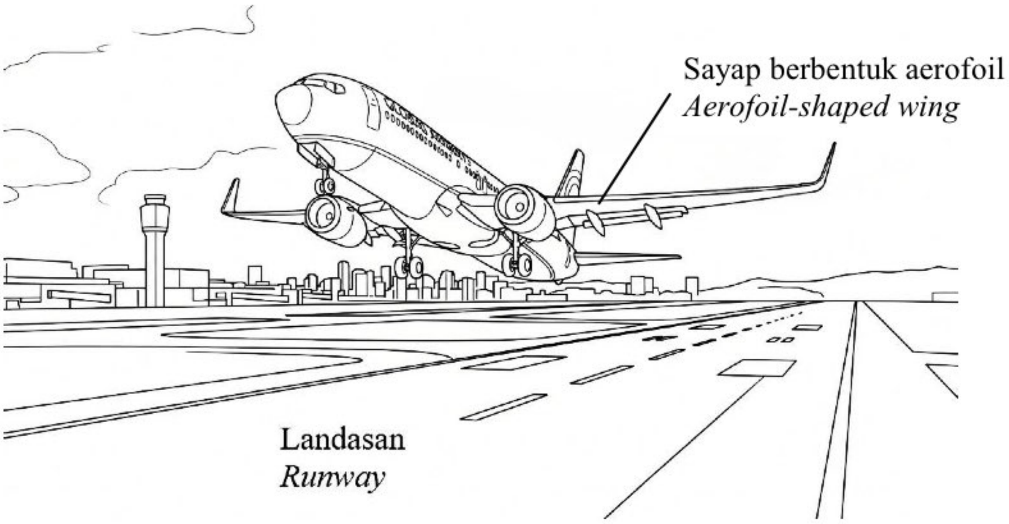
10 Rajah 10.1 menunjukkan sebuah kapal terbang yang sedang berlepas dari landasan.
Diagram 10.1 *shows an airplane that is taking off from a runway.*



Rajah 10.1
Diagram 10.1

(a) Nyatakan prinsip fizik yang terlibat dalam situasi di atas.
State the physics principle involved in the situation above.

[1 markah]
[1 *mark*]

(b) Terangkan bagaimana mengangkat kapal terbang naik ke udara dari landasan.
Explain how to lift the aeroplane up into the air from runway.

[4 markah]
[4 *marks*]

(c) Kapal terbang dalam Rajah 10.1 berjisim 2.4×10^4 kg. Jumlah luas permukaan sayapnya ialah 330 m^2.
The aeroplane in Diagram 10.1 *has a mass of* 2.4×10^4 kg. *Total surface area of its wings is* 330 m^2.

(i) Kapal terbang itu memecut secara seragam dari pegun dengan 3.0 m s^{-2} selama 25 s di landasan sebelum berlepas.
The aeroplane accelerates uniformly from rest with 3.0 m s^{-2} *for* 25 s *on the runway before take-off.*

Hitung sesaran kapal terbang itu sebelum berlepas.
Calculate the displacement of the aeroplane before take-off.

(ii) Kapal terbang tersebut terbang pada ketinggian tetap dengan halaju seragam.
The aeroplane flies at a constant height with uniform velocity.

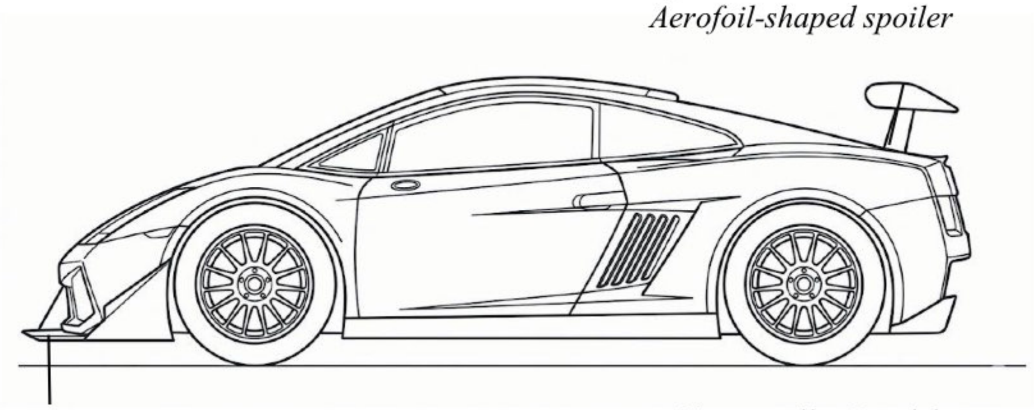
Hitung perbezaan tekanan antara permukaan atas dan bawah sayap kapal terbang.
Calculate the pressure difference between the upper and lower surfaces of the aeroplane wing.

[5 markah]
[5 *marks*]

(d) Rajah 10.2 menunjukkan empat buah kereta lumba P, Q, R dan S dengan spesifikasi yang berbeza.
Diagram 10.2 *shows four racing cars* P, Q, R *and* S *with different specifications.*

Kereta Lumba P
Racing Car P

Spoiler berbentuk aerofoil
Aerofoil-shaped spoiler



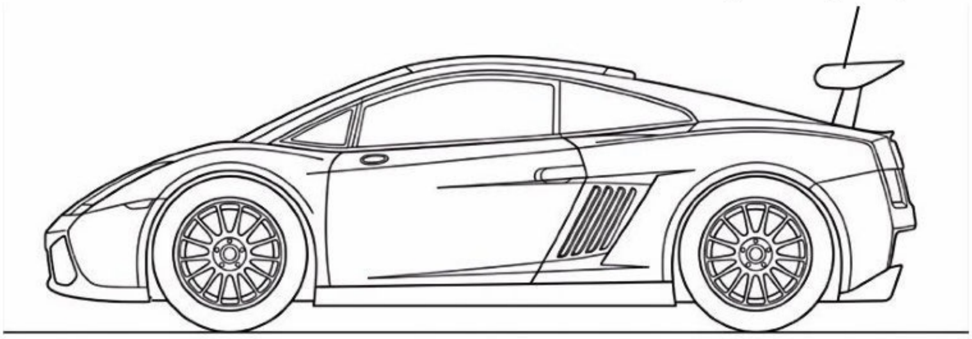
Dengan *splitter*
With splitter

Jisim kereta lumba: 600 kg
Mass of racing car: 600 kg

Kuasa enjin: Rendah
Power of engine: Low

Kereta Lumba Q
Racing Car Q

Spoiler berbentuk aerofoil terbalik
Inverted aerofoil-shaped spoiler



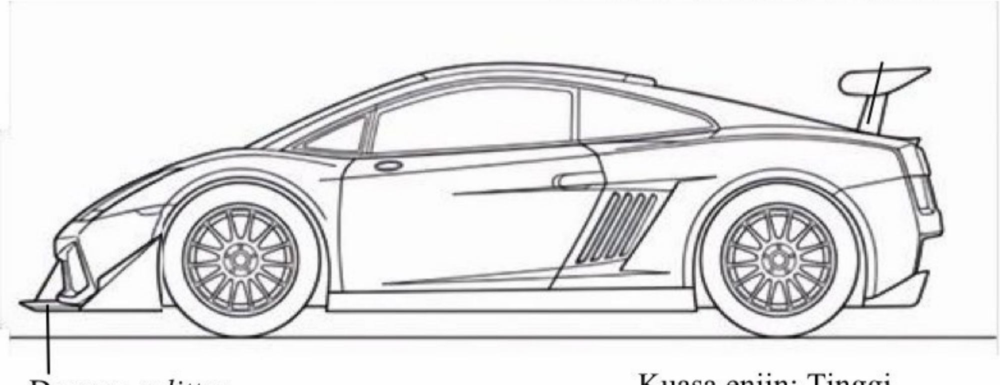
Tanpa *splitter*
Without splitter

Kuasa enjin: Rendah
Power of engine: Low

Jisim kereta lumba: 950 kg
Mass of racing car: 950 kg

Kereta Lumba R
Racing Car R

Spoiler berbentuk aerofoil terbalik
Inverted aerofoil-shaped spoiler



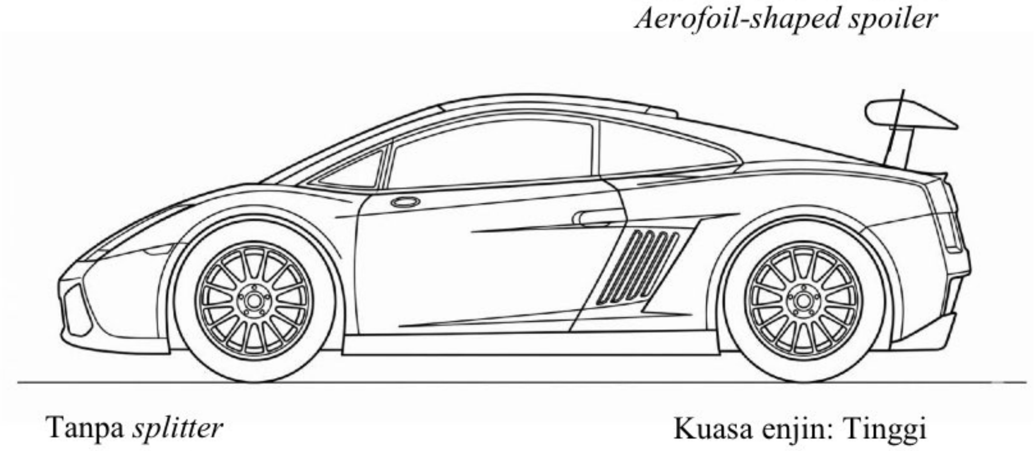
Dengan *splitter*
With splitter

Kuasa enjin: Tinggi
Power of engine: High

Jisim kereta lumba: 650 kg
Mass of racing car: 650 kg

Kereta Lumba S
Racing Car S

Spoiler berbentuk aerofoil
Aerofoil-shaped spoiler



Tanpa *splitter*
Without splitter

Kuasa enjin: Tinggi
Power of engine: High

Jisim kereta lumba: 650 kg
Mass of racing car: 650 kg

Rajah 10.2
Diagram 10.2

Anda dikehendaki menentukan ciri-ciri yang sesuai untuk kereta lumba yang paling pantas dan paling selamat untuk memenangi acara perlumbaan kereta. Terangkan kesesuaian untuk setiap spesifikasi dan tentukan kerreta lumba yang paling sesuai.
Beri sebab-sebab bagi pilihan anda.

You are required to determine the suitable characteristics for fastest and safest racing car to win the car racing event. Explain the suitability of each specification and determine the most suitable racing car.
Give reasons for your choice.

[10 markah]
[10 *marks*]

Soalan 10:

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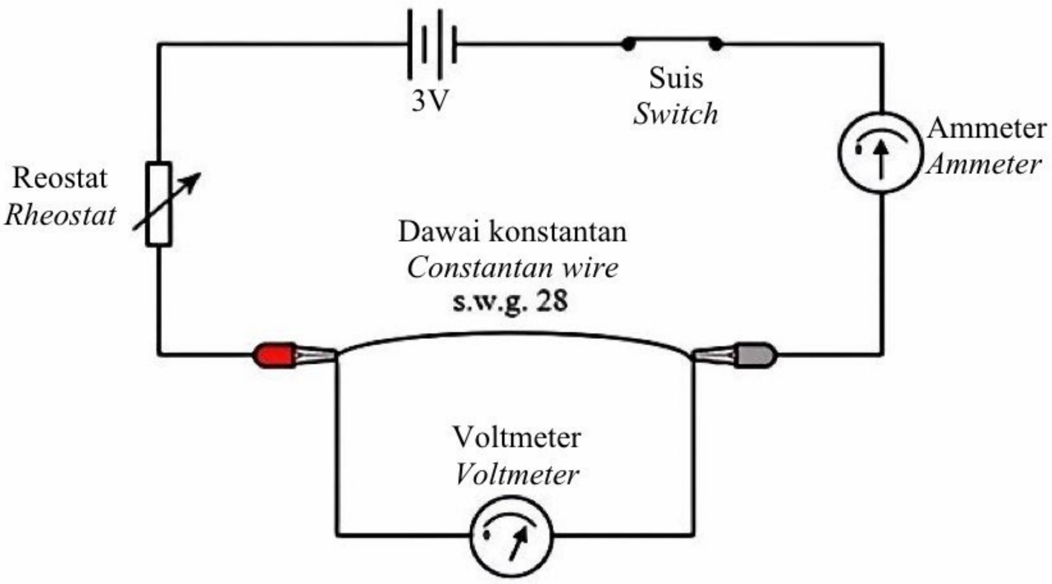
Bahagian C
Section C

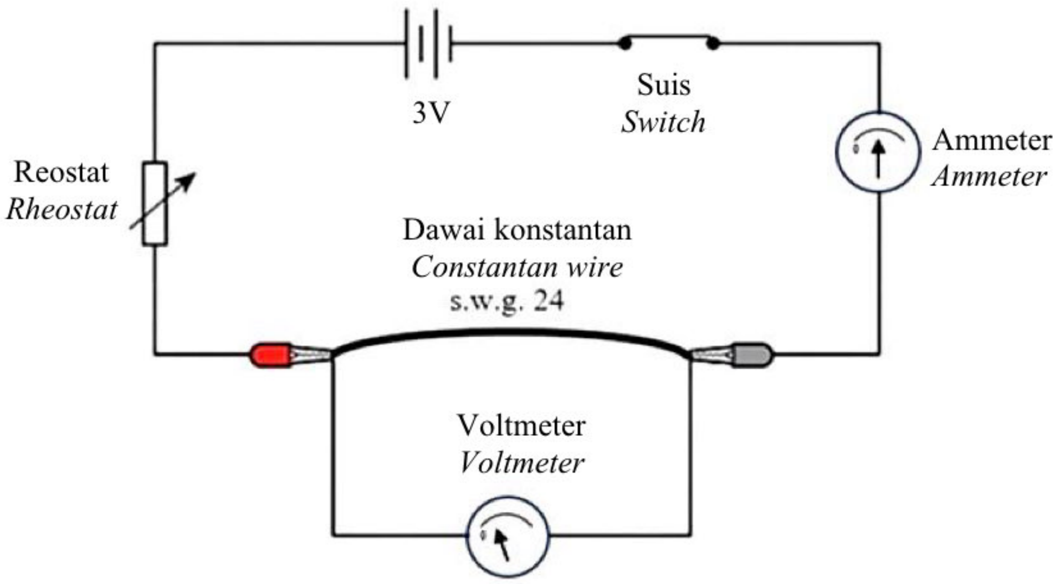
[20 markah]
[20 *marks*]

Soalan ini ***mesti*** dijawab.
This question **must** *be answered.*

11 Rajah 11.1 menunjukkan sebuah litar elektrik yang digunakan untuk menyiasat hubungan antara rintangan, *R* dan nilai s.w.g. bagi suatu dawai konstantan.
Diagram 11.1 *shows an electric circuit that is used to investigate the relationship between resistance, R and the value of* s.w.g. *of constantan wire.*



Rajah 11.1
Diagram 11.1



Rajah 11.2
Diagram 11.2

(a) Nyatakan maksud rintangan.
State the meaning of resistance.

[1 markah]
[1 *mark*]

(b) (i) Berdasarkan Rajah 11.1 dan Rajah 11.2, bandingkan nilai s.w.g., bacaan voltmeter dan rintangan dawai konstantan.

Based on Diagram 11.1 and Diagram 11.2*, compare the value of s.w.g., voltmeter reading and resistance of constantan wire.*

[3 markah]
[3 *marks*]

(ii) Nyatakan hubungan antara nilai s.w.g. dan bacaan voltmeter. Seterusnya deduksikan hubungan antara bacaan voltmeter dan rintangan dawai.

State the relationship between the value of s.w.g. *and voltmeter reading. Then deduce the relationship between the voltmeter reading and the resistance of the wire.*

[2 markah]
[2 *marks*]

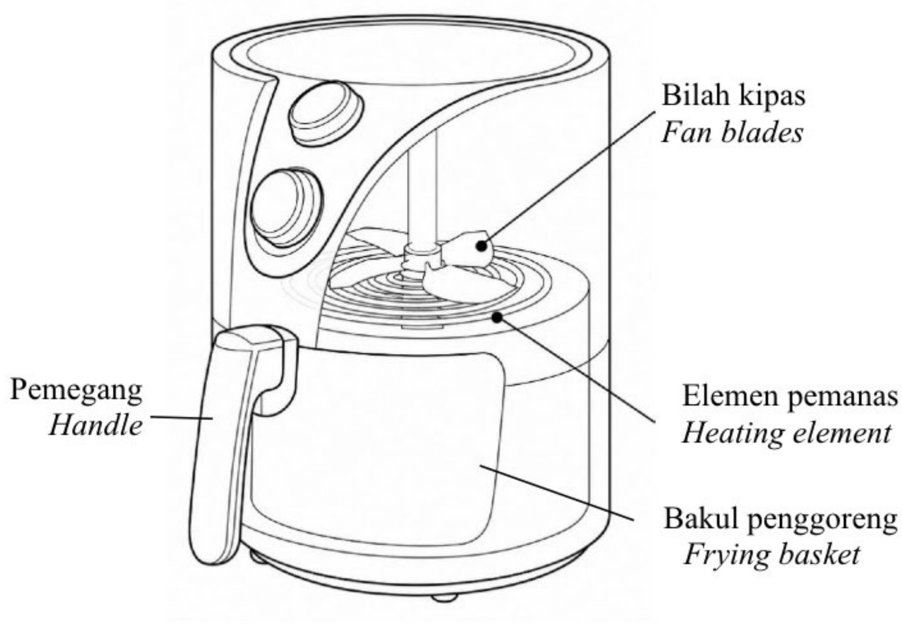
(c) Rajah 11.3 menunjukkan sebiji mentol berfilamen.
Diagram 11.3 *shows a filament bulb.*

Rajah 11.3
Diagram 11.3

Terangkan mengapa filamen berbentuk gegelung seperti dalam Rajah 11.3 akan menghasilkan lebih banyak cahaya.
Explain why the coil-shaped filament as in Diagram 11.3 *will produce more light.*

[4 markah]
[4 *marks*]

(d) Rajah 11.4 menunjukkan sebuah penggoreng udara.
Diagram 11.4 *shows an air fryer.*



Rajah 11.4
Diagram 11.4

Sebagai seorang jurutera, anda dikehendaki untuk mengubah suai sebuah penggoreng udara di dalam Rajah 11.4 supaya ia dapat memasak lebih banyak makanan dengan lebih cepat dan lebih selamat.

Dengan menggunakan konsep fizik yang sesuai, nyatakan dan terangkan cadangan anda berdasarkan aspek berikut:

- Ciri-ciri elemen pemanas
- Bahan pemegang
- Saiz bakul
- Ciri-ciri bilah kipas
- Sebarang komponen keselamatan tambahan

As an engineer, you are required to modify the air fryer in Diagram 11.4 *so that it can cook more food faster and safer.*
By using suitable physics concepts, state and explain your suggestions based on the following aspects:

- *Characteristics of the heating element*
- *Material of the handle*
- *Size of the frying basket*
- *Characteristics of the fan blades*
- *Any additional safety components.*

[10 markah]
[10 *marks*]

Soalan 11:

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KERTAS SOALAN TAMAT
END OF QUESTION PAPER