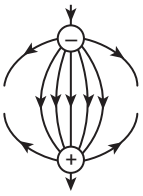
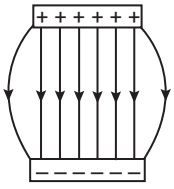
Soalan Objektif

1. Rajah manakah yang menunjukkan corak medan elektrik yang betul?
Which diagram shows the correct electric field pattern?

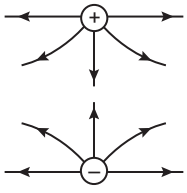
A



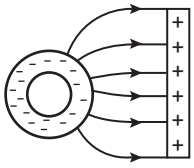
C



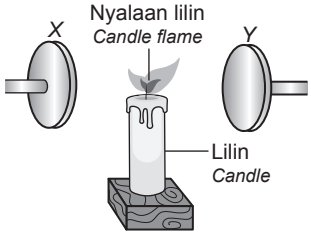
B



D



2. Rajah 1 menunjukkan satu nyalaan lilin terletak di antara dua plat, *X* dan *Y*, yang disambung ke bekalan kuasa VLT. Nyalaan lilin pecah kepada dua bahagian seperti yang ditunjukkan.
Diagram 1 shows a burning candle placed between two plates, X and Y, which are connected to an EHT power supply. The candle flame splits into two portions as shown.



Rajah 1 / *Diagram 1*

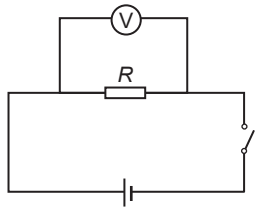
Apakah cas-cas pada plat *X* dan *Y*?
What are the charges on plate X and plate Y?

	X	*Y*
A	Positif / *Positive*	Negatif / *Negative*
B	Positif / *Positive*	Positif / *Positive*
C	Negatif / *Negative*	Negatif / *Negative*
D	Negatif / *Negative*	Positif / *Positive*

3. Arus elektrik sebanyak 500 mA mengalir melalui satu perintang dalam 1 minit. Berapakah bilangan elektron yang melalui perintang itu?
An electric current of 500 mA flows through a resistor in 1 minute. What is the number of electrons that pass through the resistor?
(Cas satu elektron / *Charge per electron* = 1.6×10^{-19} C)

A 1.125×10^{19}
B 1.875×10^{20}
C 3.125×10^{21}
D 3.125×10^{23}

4. Rajah 2 menunjukkan satu litar yang mengandungi sel kering dan perintang, *R*. Sel kering itu mempunyai rintangan dalam, *r*, dan daya gerak elektrik (d.g.e.) 3.0V.
Diagram 2 shows a circuit containing a dry cell and resistor, R. The dry cell has internal resistance, r, and electromotive force (e.m.f.) 3.0 V.



Rajah 2 / *Diagram 2*

Apakah bacaan voltmeter apabila suis dihidupkan?
What is the voltmeter reading when the switch is on?

A 0 V
B 3.0 V
C Kurang daripada 3.0 V / *Less than 3.0 V*
D Lebih daripada 3.0 V / *More than 3.0 V*

5. Dalam sebuah motor elektrik, diberi suatu tenaga input sebanyak 500 J. Didapati bahawa tenaga outputnya ialah 450 J. Pernyataan manakah yang betul?
An electric motor is given an input energy of 500 J. It is found that its output energy is 450 J. Which statement is correct?

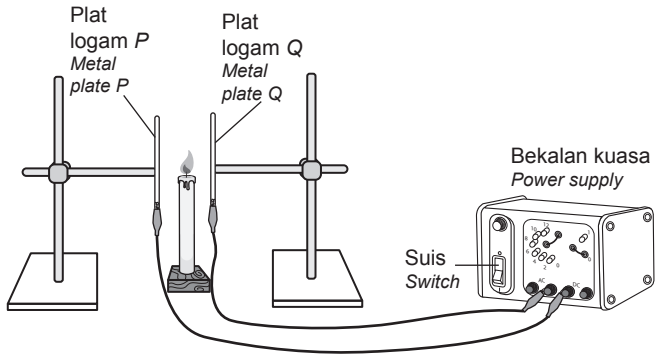
I Perubahan tenaga ialah dari elektrik ke kinetik.
The energy change is from electric to kinetic.
II Kecekapan motor ialah 90%.
The motor efficiency is 90%.
III Tenaga yang terpindah sebagai haba lebih kurang 450 J.
Energy that transformed into heat is more or less 450 J.

A I dan II sahaja / *I and II only*
B I dan III sahaja / *I and III only*
C I, II dan III / *I, II and III*

Soalan Struktur

***Bahagian* A**

1. Rajah 1 menunjukkan lilin bernyala diletakkan di antara dua plat logam *P* dan *Q*.
Diagram 1 shows a burning candle placed between two metal plates, P and Q.



Rajah 1 / *Diagram 1*

Dua plat logam itu disambungkan kepada suatu bekalan VLT. Suatu medan elektrik yang kuat di antara *P* dan *Q* dihasilkan apabila suis dihidupkan.
The two metal plates are connected to an Extra High Tension (E.H.T.) supply. A strong electric field between P and Q is produced when the switch is on.

(a) Apakah medan elektrik?
What is an electric field?

[1 markah / *mark*]

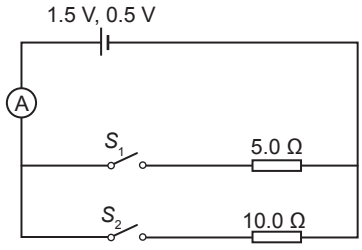
(b) (i) Apakah yang berlaku kepada nyalaan lilin apabila suis dihidupkan?
What happens to the candle flame when the switch is on?

[2 markah / *marks*]

(ii) Jelaskan jawapan anda di (b)(i).
Explain your answer in (b)(i).

[3 markah / *marks*]

(c) Rajah menunjukkan suatu litar elektrik.
Diagram shows an electric circuit.



D.g.e. sel ialah 1.5 V dan rintangan dalamnya ialah 0.5 Ω. Hitungkan bacaan ammeter apabila
The e.m.f. of the cell is 1.5 V and its internal resistance is 0.5 Ω. Calculate the reading of the ammeter when

(i) hanya suis S_1 dihidupkan. / *only switch S_1 is on.*

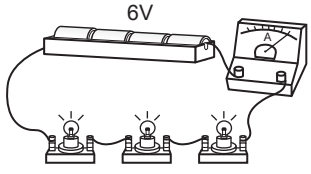
[2 markah / *marks*]

(ii) kedua-dua suis S_1 dan S_2 dihidupkan.
both switches S_1 and S_2 are turned on.

[2 markah / *marks*]

Bahagian B

2. Rajah 2(a) menunjukkan sambungan litar biasa dengan susunan sel kering, mentol dan ammeter.
Diagram 2(a) shows typical circuit with the arrangement of dry cells, bulbs and an ammeter.



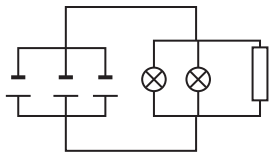
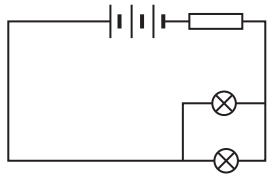
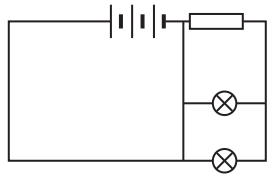
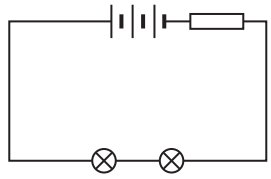
Rajah 2(a) / *Diagram* 2(a)

(a) (i) Namakan jenis arus yang dibekalkan oleh sel tersebut.
Name the type of current provided by the cells. [1 markah / *mark*]

(ii) Namakan jenis sambungan mentol.
Name the type of connection of the bulbs. [1 markah / *mark*]

(iii) Lukiskan gambar rajah litar bagi Rajah 2(a).
Draw a circuit diagram for the Diagram 2(a). [3 markah / *marks*]

(b) Jadual 2 menunjukkan empat litar, *P*, *Q*, *R* dan *S* yang mengandungi sel kering dengan d.g.e. = 1.5 V setiap satunya. Setiap mentol yang sama disambungkan dalam litar mempunyai kadar kuasa 3 V, 0.6 W. Nilai rintangan perintang boleh dilaraskan.
Table 2 shows four circuits, P, Q, R and S that contain dry cells of e.m.f. = 1.5 V each. Each of the identical bulbs connected in the circuit has a power rating of "3V, 0.6W". The resistance of the resistor is adjustable.

P	*Q*	*R*	*S*
			

Jadual 2 / *Table* 2

Anda ditugaskan untuk menentukan litar yang paling sesuai digunakan dalam sebuah lampu suluh. Kajian terhadap spesifikasi-spesifikasi itu hendaklah berdasarkan aspek-aspek berikut:
You are assigned to determine the most suitable circuit that can be applied in torchlight. The study of the specifications should be based on the following aspects:

(i) Jenis sambungan sel kering
The connection type of the dry cells

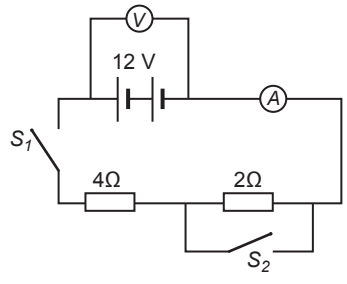
(ii) Jenis sambungan mentol
The connection type of the bulbs

(iii) Sambungan di antara terminal-terminal sel kering tersebut
The connection between the terminals of the dry cells

(iv) Sambungan di antara perintang dengan mentol
The connection between the resistors and the bulbs [10 markah / *marks*]

Berikan keterangan kepada kesesuaian setiap aspek. Tentukan litar yang paling sesuai. Berikan sebab untuk pilihan anda.
Give explanation to the suitability of each aspect. Determine the most suitable circuit. Give reason for your choice.

(c) Rajah 2(b) menunjukkan sebuah litar elektrik. D.g.e bagi sel adalah 12.0 V dan rintangan dalamnya ialah 1.0 W.
Diagram 2(b) shows an electric circuit. The e.m.f of the cell is 12.0 V and its internal resistance is 1.0 W.



Rajah 2(b) / *Diagram* 2(b)

(i) Berikan bacaan voltmeter ketika suis S_1 dan S_2 dibuka.
Give the reading of the voltmeter when switch S_1 and S_2 is are opened.

(ii) Hitungkan nilai bacaan ammeter ketika suis S_1 ditutup dan S_2 dibuka.
Calculate the reading of the ammeter when switch S_1 is closed and S_2 is opened.

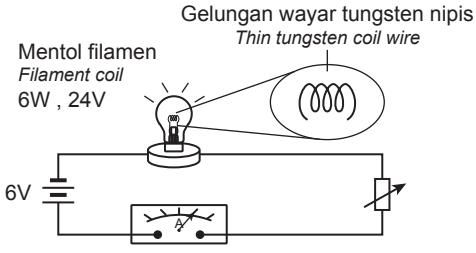
(iii) Hitungkan nilai bacaan ammeter ketika suis S_1 dan S_2 ditutup.
Calculate the reading of the ammeter when switch S^1 and S^2 are closed. [5 markah / *marks*]

Bahagian C

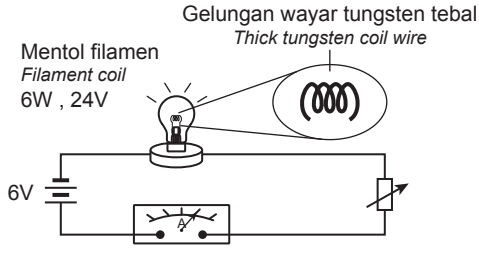
3. (a) Apakah yang dimaksudkan dengan arus elektrik?
What is meant by the electric current?

[1 markah / *mark*]

(b) Rajah 3(a) dan Rajah 3(b) menunjukkan ketebalan gegelung filamen bagi mentol *M* dan *N* , dalam dua litar yang serupa.
Diagram 3(a) and Diagram 3(b) show the thickness of coiled filament inside the bulb M and N, in two identical electrical circuits.



Rajah 3(a) / *Diagram 3(a)*

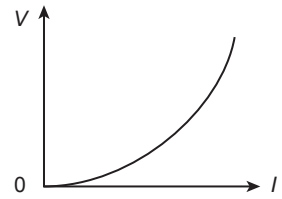


Rajah 3(b) / *Diagram 3(b)*

Berdasarkan Rajah 3(a) dan Rajah 3(b), bandingkan bacaan ammeter, kecerahan mentol, serta ketebalan gegelung filament. Hubung kaitkan kecerahan mentol dengan ketebalan gegelung filamen. Deduksikan satu hubungan antara ketebalan gegelung filamen dengan tenaga haba yang dibebaskan oleh mentol.
Based on Diagram 3(a) and Diagram 3(b), compare the reading of the ammeters, the brightness of the bulbs, and the thickness of the coiled filaments. Relate the brightness of the bulbs with the thickness of the coiled filaments. Make a deduction on the relationship between thickness of the coiled filament and the heat energy released by the bulb.

[5 markah / *marks*]

(c) Rajah 3(c) menunjukkan graf beza keupayaan, *V* melawan arus elektrik, *I* bagi sebuah mentol berfilamen.
Diagram 3(c) shows a graph of potential difference, V againts electric current, I for a filament bulb.



Rajah 3(c) / *Diagram 3(c)*

(i) Adakah Hukum Ohm dipatuhi dalam situasi ini? Berikan penjelasan anda.
Is Ohm's Law obeyed in this situation? Give your explanation.

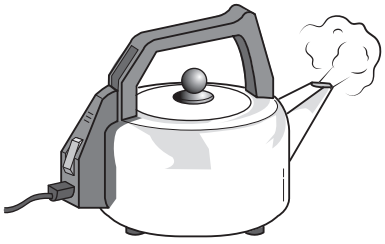
[2 markah / *marks*]

(ii) Terangkan bagaimanakah nilai rintangan filamen tersebut dipengaruhi oleh perubahan nilai arus.
Explain how the resistance of the filament is affected by the change in the current.

[2 markah / *marks*]

(d) Rajah 3(d) menunjukkan sebuah cerek elektrik dengan elemen pemanas yang dipasang pada dasar cerek tersebut. Anda dikehendaki membuat pengubahsuaian terhadap elemen pemanas di dalam cerek tersebut supaya air didihkan dengan lebih berkesan. Cadangan anda hendaklah berdasarkan aspek-aspek berikut:

Diagram 3(d) shows an electric kettle with heating element which is installed at the base of the kettle. Your asked to modify the heating element in the kettle so that water can be heated efficiently. Your suggestion should based on the following aspects:



Rajah 3(d) / *Diagram 3(d)*

(i) Ketumpatan bahan elemen pemanas
The density of the material of the heating element

(ii) Takat lebur bahan elemen pemanas
The melting point of the material of the heating element

(iii) Kadar pengoksidaan bahan elemen pemanas
The oxydation rate of the material of the heating element

(iv) Kerintangan bahan elemen pemanas
The resistivity of the material of the heating element

(v) Bentuk elemen pemanas
The shape of the heating element

[10 markah / *marks*]