

FIZIK

TINGKATAN 5

BAB 2

ELEKTRIK

MODUL

CEMERLANG

## KERTAS 2

### BAHAGIAN A.

#### SOALAN NO 3 [6 markah]

1. Diagram 3 shows a hair dryer with specification 240 V, 1000 W.  
Rajah 3 menunjukkan pengering rambut dengan spesifikasi 240 V, 1000 W.

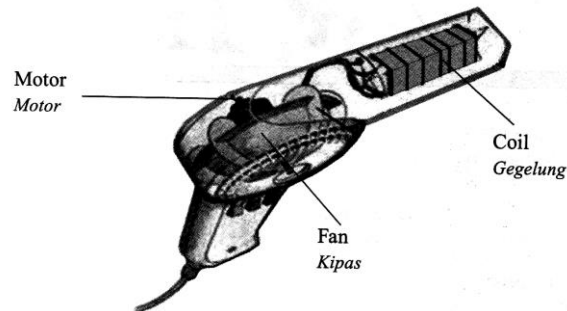


Diagram 3 / Rajah 3

- (a) What is the meaning of 240 V, 1000W ?  
*Apakah yang dimaksudkan 240 V, 1000W ?*  
.....  
[1M]
- (b) Calculate the current flowing in the hair dryer.  
*Hitungkan arus yang mengalir dalam pengering rambut tersebut.*  
.....  
[2M]
- (c) (i) Give one reason why the efficiency of the hair dryer decreases after it has been used over one hour.  
*Berikan satu sebab mengapa kecekapan pengering rambut berkurang selepas digunakan melebihi satu jam.*  
.....  
[1M]
- (ii) State one method to overcome the problem in 3(c)(i)  
*Nyatakan satu kaedah untuk mengatasi masalah di 3(c)(i)*  
.....  
[1M]
- (d) The hairdryer is switched on for one hour. What happens to the power output of the hairdryer in Diagram 3 when the current supplied is increase ?  
*Apakah yang terjadi kepada kuasa output pengering rambut dalam Rajah 3 apabila arus yang dibekalkan meningkat.*  
.....  
[1M]

2. Diagram 3.1 shows an electric circuit of an experiment to determine the electromotive force and internal resistance of dry cells.

Diagram 3.2 shows a potential difference against current graph obtained from the experiment.

Rajah 3.1 menunjukkan satu litar elektrik bagi satu eksperimen untuk menentukan daya gerak elektrik dan rintangan dalam bagi sel-sel kering.

Rajah 3.2 menunjukkan graf beza keupayaan melawan arus yang diperolehi daripada eksperimen tersebut.

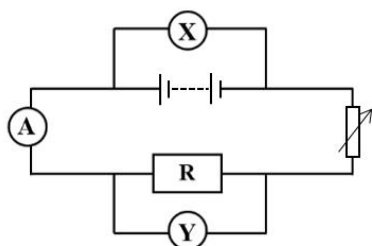


Diagram 3.1  
Rajah 3.1

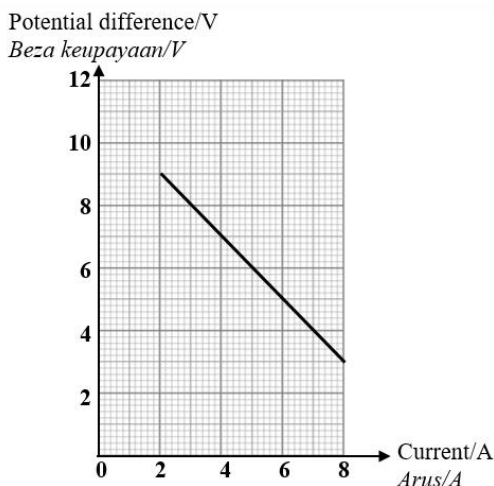


Diagram 3.2  
Rajah 3.2

- (a) What is the meaning of electromotive force?

Apakah yang dimaksudkan dengan daya gerak elektrik?

..... [1 M]

- (b) Where is the suitable position of a voltmeter?

Di manakah kedudukan voltmeter yang sesuai?

Tick (✓) the correct answer in the box provided.

Tanda (✓) jawapan yang betul dalam kotak yang disediakan.

☐ X

☐ Y

[1 M]

- (c) Based on Diagram 3.2, determine

Berdasarkan Rajah 3.2, tentukan

- (i) the internal resistance of dry cells  
rintangan dalam bagi sel-sel kering

[2 M]

- (ii) the electromotive force of dry cells.  
*daya gerak elektrik bagi sel-sel kering.*

Show on the graph how you determine the electromotive force of dry cells.  
*Tunjukkan pada graf bagaimana anda menentukan daya gerak elektrik bagi sel-sel kering.*

[2 M]

#### SOALAN NO 4 [7 markah]

1. Diagram 4.1 shows two identical resistor P and Q. Ammeter  $A_2$  shows a reading 0.5 A.  
*Rajah 4.1 menunjukkan dua perintang P dan Q yang serupa. Ammeter  $A_2$  memberi bacaan 0.5 A.*

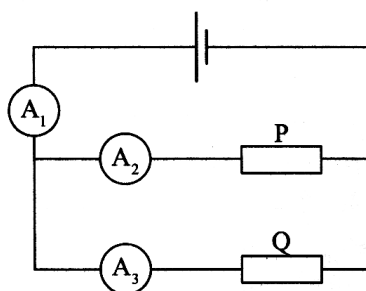


Diagram 4.1 / Rajah 4.1

- (a) Name the type of connection of the resistors in Diagram 4.1  
*Namakan jenis sambungan perintang-perintang dalam Rajah 4.1*

[1M]

- (b) What are the ammeter reading of ammeter  $A_1$  and  $A_3$  ?  
*Apakah bacaan ammeter  $A_1$  dan  $A_3$ ?*

$A_1$  : .....

$A_3$  : .....






[2M]

- (c) If the resistance of resistor Q is  $3\ \Omega$ , calculate the potential difference across the resistor Q.  
*Jika rintangan perintang Q ialah  $3\ \Omega$ , hitung beza keupayaan melalui perintang Q.*

[2M]

- (d) You are provided with a switch, two dry cells and three bulbs as shown below. Draw and label an electrical circuit that can light up the bulb with normal brightness.

*Anda dibekalkan dengan satu suis, dua sel kering dan tiga biji mentol seperti di bawah. Lukis satu rajah litar yang dapat menyalakan mentol pada kecerahan normal.*

A  3.0 V, 9.0 W	B  1.5 V, 4.5 W	C  1.5 V, 4.5 W	 3.0 V	
--	--	--	--	---

[2M]

2. Diagram 4.1 shows an electrical circuits.  
*Rajah 4.1 menunjukkan satu litar elektrik.*

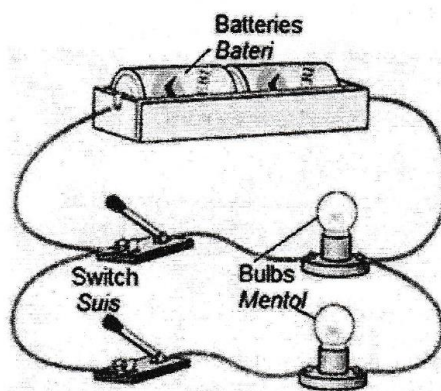


Diagram 4.1/ *Rajah 4.1*

- (a) (i) Tick (✓) the correct answer in the box provided.  
*Tandakan (✓) pada jawapan yang betul dalam kotak yang disediakan.*

The bulbs in Diagram 4.1 are connected in ...

*Mentol-mentol dalam Rajah 4.1 disambung secara ...*

☐

Series / sesiri

☐

Parallel /selari

[1 M]

- (ii) When the switches is on, what happens to the other bulb when one bulb blows?

*Apabila suis itu dihidupkan, apakah yang berlaku kepada mentol lain bila satu mentol terbakar?*

.....

[1 M]

- (b) Diagram 4.2 shows an electrical circuit. Assume that the internal resistance of the battery is negligible.

*Rajah 4.2 menunjukkan sebuah litar elektrik. Anggapkan rintangan dalam bateri boleh diabaikan*

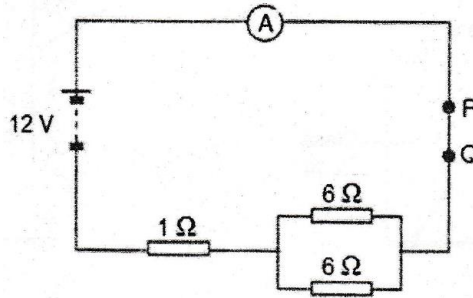


Diagram 4.2 / Rajah 4.2

Calculate  
*Hitungkan*

- (i) the effective resistance of the circuit.  
*rintangan berkesan litar tersebut.*
- (ii) the reading of the ammeter?  
*bacaan ammeter?*

[2 M]

- (c) Another resistor of  $2\ \Omega$  is fixed between points P and Q. What happens to the ammeter reading?  
*Sebuah lagi perintang  $2\ \Omega$  dipasang di antara titik P dan titik Q. Apakah yang akan berlaku pada bacaan ammeter?*

[1 M]

SOALAN NO 6 – Tingkatan 5 [8 markah]

1. Diagram 6.1 and Diagram 6.2 show circuits used to investigate the relationship between resistance and cross sectional area of a wire. Constantan wire of s.w.g. 36 and s.w.g 24 with same length are used.

*Rajah 6.1 dan Rajah 6.2 menunjukkan litar yang digunakan untuk menyiasat Hubungan antara rintangan dan luas keratan rentas dawai. Dawai konstantan s.w.g. 36 dan s.w.g 24 dengan panjang yang sama digunakan.*

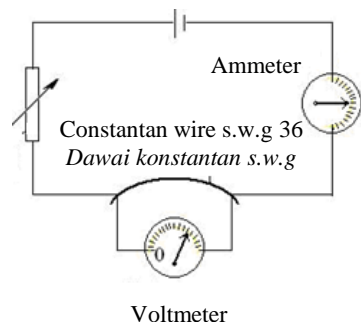


Diagram 6.1  
*Rajah 6.1*

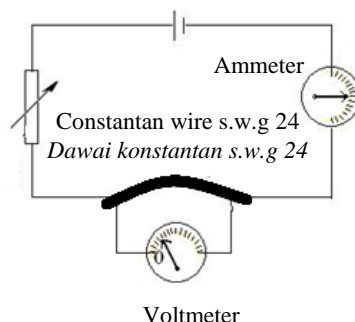


Diagram 6.2  
*Rajah 6.2*

- (a) What is the meaning of resistance?  
*Apakah maksud rintangan ?*  
.....  
[1 M]
- (b) Using Diagram 6.1 and Diagram 6.2  
*Menggunakan Rajah 6.1 dan Rajah 6.2*
- (i) Compare the cross sectional area of the constantan wires .  
*Bandingkan luas keratan rentas dawai konstantan.*  
.....  
[1 M]
- (ii) Compare the potential difference across the constantan wires.  
*Bandingkan beza keupayaan melalui dawai konstantan.*  
.....  
[1 M]
- (iii) Compare the magnitude of the current that flow along the constantan wires.  
*Bandingkan magnitud arus yang mengalir melalui dawai-dawai konstantan tersebut*  
.....  
[1 M]
- (c) Using your answers in 6(b);  
*Dengan menggunakan jawapan anda dalam 6(b);*
- (i) Compare the resistance of the constantan wires.  
*Bandingkan rintangan dawai konstantan.*  
.....  
[1 M]

- (ii) Relate the cross sectional area of constantan wire to the resistance of the wire.

*Hubungkait luas keratan rentas dawai konstantan dengan rintangan dawai*

[1 M]

- (d) What will happen to the reading of voltmeter when another constantan wire s.w.g 36 of the same length is connected parallel to the wire in circuit Diagram 6.1? Explain your answer.

*Apakah yang berlaku kepada bacaan voltmeter apabila dawai konstantan s.w.g 36 yang sama panjang dipasang selari dengan dawai dalam litar Rajah 6.1? Jelaskan jawapan anda.*

[2 M]

2. Diagram 6.1 and Diagram 6.2 show two electrical circuits with identical batteries and identical bulbs, P and Q.

The circuits obey Ohm's law.

*Rajah 6.1 dan Rajah 6.2 menunjukkan dua litar elektrik dengan bateri yang serupa dan mentol yang serupa, P dan Q.*

*Litar itu mematuhi Hukum Ohm.*

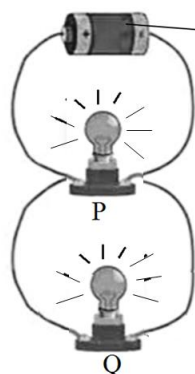


Diagram 6.1  
*Rajah 6.1*

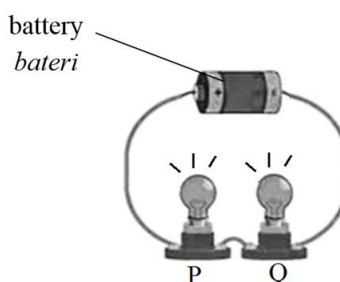


Diagram 6.2  
*Rajah 6.2*

- (a) State Ohm's law.

*Nyatakan Hukum Ohm.*

[1 M]

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

- (i) compare the arrangement of bulb P and bulb Q in the circuit.  
*bandingkan susunan bagi mentol P dan mentol Q dalam litar itu.*

[1 M]



- (ii) compare the brightness of bulb P and bulb Q in the circuit.  
*bandingkan kecerahan mentol P dan mentol Q dalam litar itu.*  
 .....  
 [1 M]
- (iii) compare the potential difference across each bulb in Diagram 6.1 and Diagram 6.2.  
*bandingkan beza keupayaan merentasi setiap mentol dalam Rajah 6.1 dan Rajah 6.2.*  
 .....  
 [1 M]
- (c) Based on answers in 6(b),  
*Berdasarkan jawapan dalam 6(b),*
- (i) state the relationship between the arrangement of bulbs and the brightness of bulbs  
*nyatakan hubungan antara susunan mentol-mentol dan kecerahan bagi mentol-mentol itu.*  
 .....  
 [1 M]
- (ii) state the relationship between the arrangement of the bulbs in the circuit and the potential difference across each bulb.  
*nyatakan hubungan antara susunan mentol-mentol dalam litar itu dan beza keupayaan merentasi setiap mentol.*  
 .....  
 [1 M]
- (d) Diagram 6.3 shows another identical bulb, bulb R is connected to the circuit in Diagram 6.1.  
*Rajah 6.3 menunjukkan mentol lain yang serupa, mentol R disambung ke padalitar dalam Rajah 6.1.*

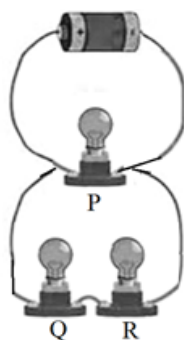


Diagram 6.1 / Rajah 6.1

- (i) Compare the brightness of bulb P, bulb Q and bulb R.  
*Banding kecerahan bagi mentol P, mentol Q dan mentol R.*  
 .....  
 [1 M]

- (ii) Give **one** reason for your answer in 6(d)(i).  
*Beri **satu** sebab untuk jawapan anda dalam 6(d)(i).*

[1 M]

SOALAN NO 7 – Tingkatan 4/5 [10 markah]

1. Diagram 7.1 and Diagram 7.2 show circuits consists of three identical bulbs arranged in two different ways. Each bulb has a resistance of  $4\ \Omega$   
*Rajah 7.1 dan Rajah 7.2 menunjukkan dua litar yang mengandungi tiga mentol yang sama jenis disusun dalam dua cara yang berbeza. Setiap mentol mempunyai rintangan  $4\ \Omega$ .*

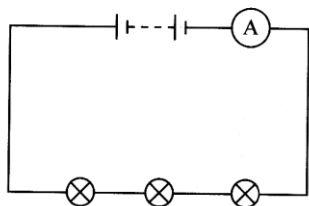


Diagram 7.1  
*Rajah 7.1*

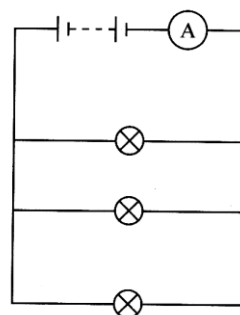


Diagram 7.2  
*Rajah 7.2*

- (a) Name the circuit arrangement in Diagram 7.1.  
*Namakan susunan litar pada Rajah 7.1.*
- (b) (i) Calculate the effective resistance in each diagram.  
*Kira rintangan berkesan bagi setiap rajah.*

[1M]

[2M]

- (ii) State which circuit will produce greater brightness of the bulb.  
*Nyatakan litar manakah akan menghasilkan mentol yang lebih cerah.*

[1M]

- (iii) Give two reasons for your answer in 7(b)(ii)  
*Berikan dua sebab untuk jawapan anda di 7(b)(ii)*

[2M]

- (c) Diagram 7.3 shows a torch light with filamen bulb.  
*Rajah 7.3 menunjukkan sebuah lampu suluh bermentol filamen*



Diagram 7.3  
*Rajah 7.3*

The torch light is not bright enough even when new cells are used.  
Modifications is required to make it light brighter.

*Cahaya daripada lampu suluh ini tidak cukup terang walaupun bateri yang baharu digunakan. Satu pengubahsuaian diperlukan untuk menjadikannya bercahaya lebih terang.*

Suggest the modification that needs to be done through these aspects:

*Cadangkan pengubahsuaian yang perlu dibuat melalui aspek-aspek berikut:*

- (i) Number of cells  
*Bilangan bateri*

.....  
[1M]

- (ii) The way the cells are arranged  
*Cara susunan bateri*

.....  
[1M]

- (iii) Internal resistance of the cell  
*Rintangan dalam bateri*

.....

Give a reason

*Berikan satu sebab*

.....  
[2M]

2. Diagram 7.1 and Diagram 7.2 show circuits consist of two identical bulbs arranged in two different ways. Each bulb has a resistance of  $2\ \Omega$ .

*Rajah 7.1 dan Rajah 7.2 menunjukkan dua litar yang mengandungi dua mentol yang sama jenis disusun dengan dua cara yang berbeza. Setiap mentol mempunyai rintangan  $2\ \Omega$ . Kedah 2017*

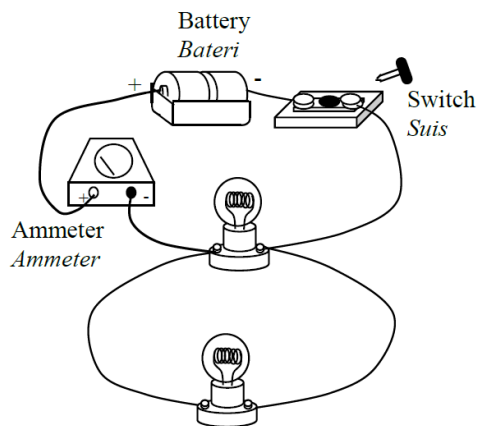


Diagram 7.1  
*Rajah 7.1*

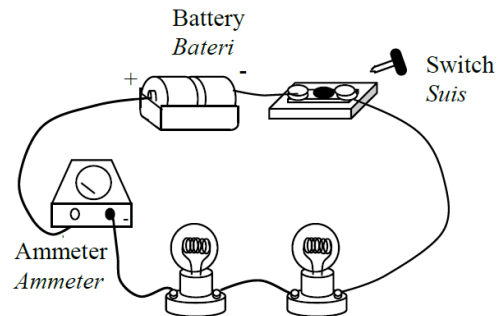


Diagram 7.2  
*Rajah 7.2*

- (a) Name the circuit arrangements in Diagram 7.1 and Diagram 7.2.  
*Namakan susunan litar pada Rajah 7.1 dan Rajah 7.2.*

[1M]

- (b) Based on Diagram 7.1 and Diagram 7.2,  
*Berdasarkan Rajah 7.1 dan Rajah 7.2,*

- (i) calculate the effective resistance for each circuit  
*hitungkan rintangan berkesan bagi setiap litar*

[2M]

- (ii) state the circuit which produces the highest reading of the ammeter.  
*nyatakan litar yang menghasilkan bacaan ammeter yang tertinggi.*

[1M]

- (c) Diagram 7.3 shows an incubator. Bulb is used to heat up the incubator.

*Rajah 7.3 menunjukkan sebuah inkubator. Mentol digunakan untuk memanaskan inkubator itu*



Diagram 7.3 / *Rajah 7.3*

The heat supplied to the incubator is not enough.  
*Haba yang dibekalkan kepada inkubator tidak mencukupi.*

Based on the following aspects, suggest the modification to make it warmer and more efficient.

*Berdasarkan aspek berikut, cadangkan pengubahsuaian untuk menjadikannya lebih panas dan berkesan.*

(i) Number of bulbs:  
*Bilangan mentol:*

Reason / *Sebab:*

[2 M]

(ii) Arrangement of the bulbs:  
*Susunan mentol:*

Reason / *Sebab:*

[2 M]

(iii) Size of incubator:  
*Saiz inkubator:*

Reason / *Sebab:*

[2 M]

#### SOALAN NO 8 – Tingkatan 5/4 [12 markah]

1. Diagram 8.1 and Diagram 8.2 shows three identical filament bulb marked 6V, 12W arranged in two different ways and connected to a battery 6 V.

*Rajah 8.1 dan Rajah 8.2 menunjukkan tiga mentol filamen yang serupa berlabel 6 V, 12 W disusun dengan dua cara berbeza dan disambungkan kepada bateri 6 V.*

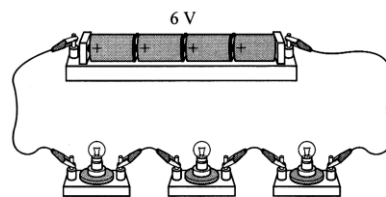


Diagram 8.1  
*Rajah 8.1*

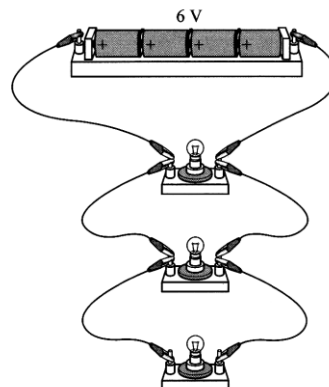


Diagram 8.2  
*Rajah 8.2*

- (a) What is means by 6 V, 12 W ?

*Apakah yang dimaksudkan dengan 6 V, 12 W ?*

.....  
[1M]

- (b) State the type of circuit in Diagram 8.1 and Diagram 8.2.

*Nyatakan jenis sambungan litar dalam Rajah 8.1 dan Rajah 8.2*

Diagram 8.1 / *Rajah 8.1*  
.....

Diagram 8.2 / *Rajah 8.2*  
.....

[2M]

- (c) The bulb in Diagram 8.2 are brighter than the bulb in Diagram 8.1. Explain your answer.

*Mentol dalam Rajah 8.2 lebih cerah dari mentol Rajah 8.1. Terangkan jawapan anda.*  
.....  
.....

[2M]

The resistance of each bulb in Diagra 8.1 and Diagram 8.2 is  $4\ \Omega$ . Determine the current flow in each bulb.

*Rintangan setiap mentol dalam Rajah 8.1 dan Rajah 8.2 adalah  $4\ \Omega$ . Tentukan arus yang mengalir dalam setiap mentol*

- (i) Diagram 8.1 / *Rajah 8.1*

- (ii) Diagram 8.2 / *Rajah 8.2*

[4M]

- (e) A student wants to design an incubator. Bulbs used to heat up the incubator  
*Seorang murid hendak mereka bentuk sebuah incubator. Mentol digunakan untuk memanaskan inkubator itu.*

- (i) Between the circuit in Diagram 8.1 and Diagram 8.2, which circuit is the most suitable to be used by the student to heat up the incubator?

*Diantara litar Rajah 8.1 dan Rajah 8.2, litar manakah yang paling sesuai digunakan murid untuk memanaskan inkubator ?*  
.....

[1M]

- (ii) Give **two** reasons for your answer in 8(c)(i)

*Berikan **dua** sebab kepada jawapan anda di 8(c)(i)*  
.....  
.....

[2M]

2. Diagram 8.1 shows part of an electric iron with specification of 240 V, 1000 W.  
*Rajah 8.1 menunjukkan bahagian sebuah seterika elektrik dengan spesifikasi 240 V, 1000 W.*

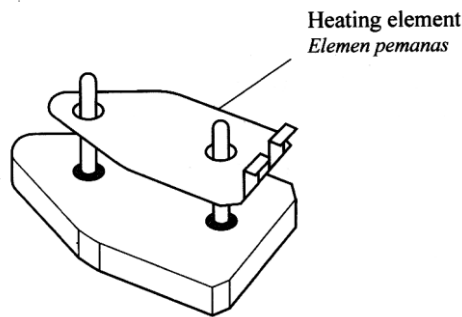


Diagram 8.1 / *Rajah 8.1*

- (a) What is meant by specification 240 V, 1000 W ?  
*Apakah yang dimaksudkan dengan spesifikasi 240 V, 1000 W ?*  
 .....  
 [1M]
- (b) The electric iron is connected to a 240 V supply and used to iron clothes for 30 minutes.  
*Seterika elektrik itu disambungkan kepada bekalan 240 V dan digunakan untuk menggosokan pakaian selama 30 minit.*
- Calculate.  
*Hitungkan,*
- (i) Current that passes through the heating element in the iron.  
*Arus yang mengalir melalui elemen pemanas di dalam seterika itu.*  
 [2M]
- (ii) The cost of using the electric iron in 30 days  
 (1 unit energy = 23 cent)  
*Kos menggunakan seterika elektrik itu selama 30 hari*  
*(1 unit tenaga = 23 sen)*  
 [3M]

- (c) A student conduct an experiment to compare the heating effect of bread toaster P,Q and R. Two slices of bread is toasted each time.

Table 8.1 shows the result of the experimen.

*Seorang murid menjalankan eksperimen untuk membandingkan kesan pemanasan pembakar roti, P,Q dan R. Dua keping roti dibakar dalam satu masa.*

*Jadual 8.1 menunjukkan keputusan eksperimen tersebut.*

Bread toaster <i>Pembakar roti</i>	Potential difference,V/V <i>Beza Keupayaan, V/V</i>	Current, I/A <i>Arus, I/A</i>	Time to toast 2 slices of bread, t/s <i>Masa untuk membakar 2 keping roti, t / s</i>
<i>P</i>	240	6.0	90
<i>Q</i>	240	5.0	150
<i>R</i>	240	4.0	120

Table 8.1 / *Rajah 8.1*

Calculate the energy supplied by each of bread toaster to toast 2 slices of bread.

*Hitungkan tenaga yang dibekalkan bagi setiap pembakar roti untuk membakar 2 keping roti .*

(i) P :

(ii) Q :

(iii) R :

[3M]

- (d) (i) Using your answer in 8(c), state which is the most suitable bread toaster to toast bread.

*Menggunakan jawapan di 8(c), nyatakan pembakar roti yang paling sesuai untuk membakar roti.*

.....

[1M]

- (ii) Give two reasons for your answer in 8(d)(i)

*Berikan dua sebab bagi jawapan anda di 8(d)(i)*

.....

.....

[2M]



KERTAS 2  
BAHAGIAN B

SOALAN NO 10 – Tingkatan 5 [20 markah]

1. Diagram 1.1(a) and Diagram 1.1(b) show photographs of two electric circuit. Each circuit contains two identical new dry cell marked 1.5 V, a  $2\ \Omega$  resistor and an ammeter.

Diagram 1.2(a) and Diagram 1.2(b) show the reading of the ammeter for each circuit respectively.

*Rajah 1.1(a) dan Rajah 1.2(b) menunjukkan gambar foto bagi dua litar elektrik. Setiap litar mengandungi dua sel baru yang serupa bertanda 1.5 V, satu perintang  $2\ \Omega$  dan satu ammeter*

*Rajah 1.2(a) dan Rajah 1.2(b) menunjukkan bacaan ammeter untuk litar elektrik masing-masing*

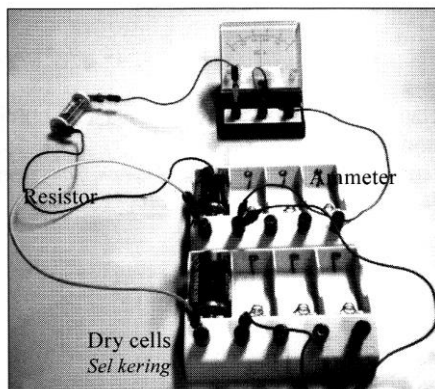


Diagram 1.1(a)  
*Rajah 1.1(a)*

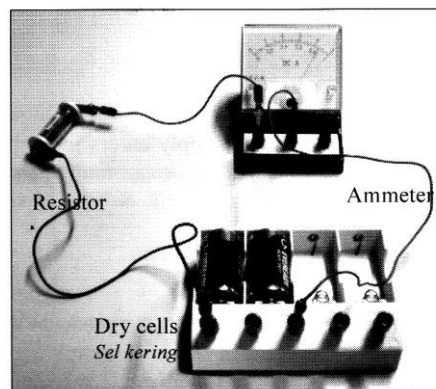


Diagram 1.1(b)  
*Rajah 1.1(b)*

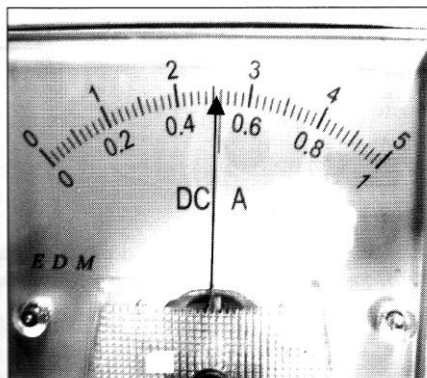


Diagram 1.2(a)  
*Rajah 1.2(a)*

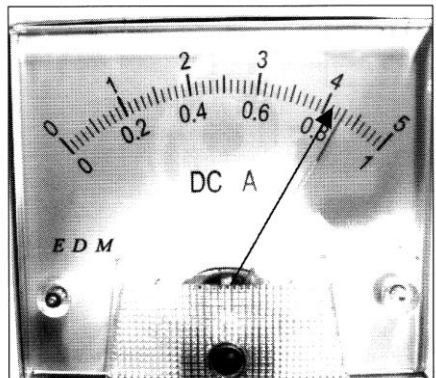


Diagram 1.2(b)  
*Rajah 1.2(b)*

- (a) State the energy transformations that take place in the dry cell.  
*Nyatakan perubahan tenaga yang berlaku dalam sel kering*
- [ 1M ]
- (b) Observe Diagram 1.1 and Diagram 1.2. Compare the arrangement of dry cells in the circuit, the voltage supplied and the reading of the ammeter. State the relationship between the energy transferred to flow the electric charges around the circuit and the voltage supplied and the current flowing around the circuit.

Perhatikan Rajah 1.1 dan Rajah 1.2, Bandingkan susunan sel-sel kering di dalam litar, voltan yang dibekalkan dan bacaan ammeter. Nyatakan hubungan diantara tenaga yang dipindahkan untuk menggerakkan cas mengelilingi litar dengan voltan yang dibekalkan dan arus yang mengalir di dalam litar.

[ 5M ]

- (c) Explain why it is more dangerous to touch the live wire of a main supply, rather than the neutral wire.

*Terangkan mengapa adalah lebih berbahaya memegang wayar hidup daripada bekalan utama berbanding dengan wayar neutral.*

[ 4M ]

- (d) Diagram 1.3 shows a cabin wiring consisting of a filament lamp, an air conditioner and an electric kettle. The electric supply enters the cabin via meter and fuse box.

*Rajah 1.3 menunjukkan pendawaian di suatu kabin yang terdiri daripada satu lampu filament, satu penyaman udara dan satu cerek elektrik. Bekalan elektrik kepada kabin melalui meter dan kotak fuis.*

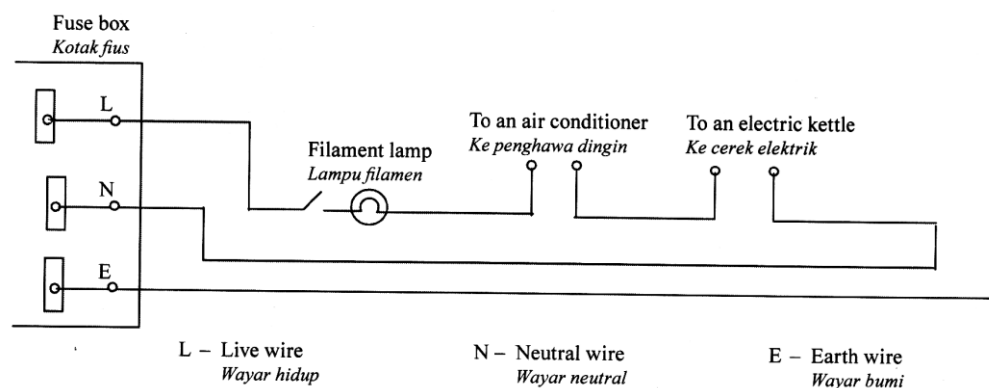


Diagram 1.3/Rajah 1.3

Using your knowledge on electricity and Diagram 1.3, suggest and explain suitable design or ways to make the cabin wiring more effective, protect electric appliances from damage, prevent electric shock and increase energy efficiency. *Menggunakan pengetahuan anda tentang electricity dan Rajah 1.3, cadang dan terangkan reka bentuk atau kaedah yang sesuai dilakukan supaya pendawaian kabin adalah berkesan, kerosakan alat-alat elektrik boleh dielakkan, kejutan elektrik boleh dielakkan dan kecekapan tenaga boleh ditingkatkan.*

[ 10M ]

2. Diagram 10.1 shows an electrical circuit consist of three identical bulbs. Two bulbs and an ammeter are placed across PQ. A bulb and an ammeter are placed across RS. Assume the internal resistance of the dry cells is zero.

*Rajah 10.1 menunjukkan litar elektrik mengandungi tiga mentol yang serupa. Dua mentol dan ammeter diletakkan merentasi PQ. Satu mentol dan ammeter diletakkan merentasi RS. Anggap rintangan dalam sel kering adalah sifar.*

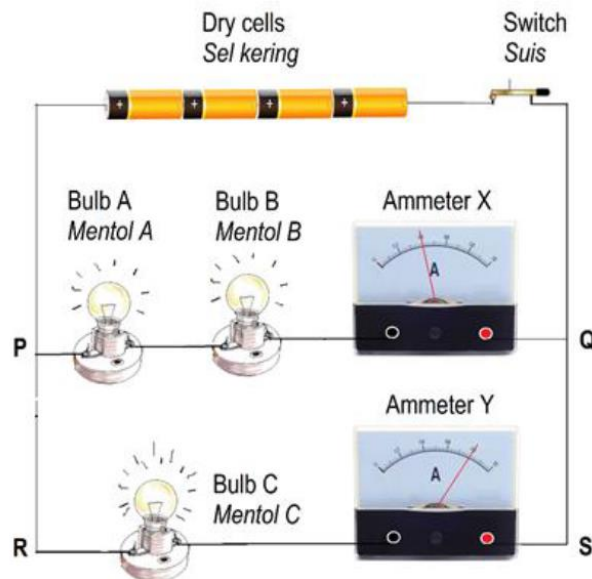


Diagram 10.1 /Rajah 10.1

- (a) What is meant by internal resistance in a dry cell?  
*Apakah yang dimaksudkan dengan rintangan dalam dalam sel kering?* [1 M]
- (b) Using Diagram 10.1  
*Menggunakan Rajah 10.1*
- (i) compare number of bulbs across PQ and RS, magnitude of current flow across PQ and RS and the total resistance across PQ and RS.  
*bandingkan bilangan mentol merentasi PQ dan RS, arus yang mengalir merentasi PQ dan RS serta jumlah rintangan merentasi PQ dan RS.* [3 M]
- (ii) state the relationship between number of bulbs and magnitude of current flow to make a deduction regarding the relationship between resistance and magnitude of current.  
*nyatakan hubungan antara bilangan mentol dan arus yang mengalir untuk membuat deduksi tentang hubungan antara rintangan dan magnitud arus.* [2 M]
- (c) A piece of copper wire is connected across Bulb B in Diagram 10.1.  
*Seutas dawai kuprum disambung merentasi Mentol B dalam Rajah 10.1.*
- Explain what happens to the ammeter readings and brightness of the bulbs.  
*Terangkan apakah yang berlaku kepada bacaan ammeter dan kecerahan mentol.* [4 M]
- (d) Diagram 10.2 shows a torch light with a dim bulb.  
*Rajah 10.2 menunjukkan lampu suluh dengan mentol yang malap.*

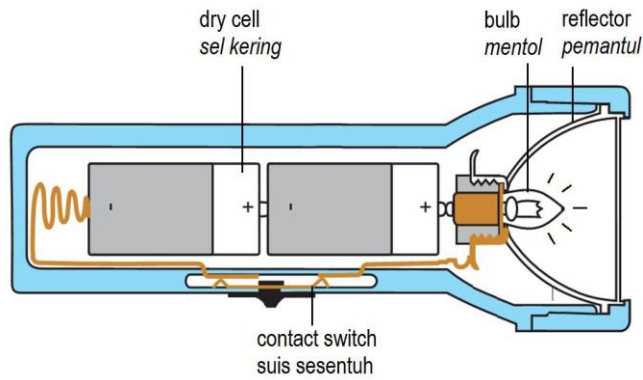


Diagram 10.2 / Rajah 10.2

You are required to modify the torch light in Diagram 10.2 to make the torch light up brighter.

*Anda dikehendaki untuk mengubahsuai lampu suluh dalam Rajah 10.2 untuk menyalakan mentol dengan lebih cerah.*

State and explain the modifications based on the following aspects:

*Nyata dan terangkan pengubahsuaian berdasarkan aspek-aspek berikut:*

- (i) number of dry cells  
*bilangan sel kering*
- (ii) internal resistance of the cells  
*rintangan dalam sel kering*
- (iii) power of bulb  
*kuasa mentol*
- (iv) surface of reflector  
*permukaan pemantul*
- (v) position of the bulb  
*kedudukan mentol*

[10 M]

KERTAS 2  
BAHAGIAN C

SOALAN NO 12 – Tingkatan 5 [20 markah]

1. Diagram 12.1 shows a birds perching on a high voltage cable that transmits electrical power to the consumer.

*Rajah 12.1 menunjukkan seekor burung sedang hinggap di atas suatu kabel bervoltan tinggi yang menghantar kuasa elektrik kepada pengguna.*

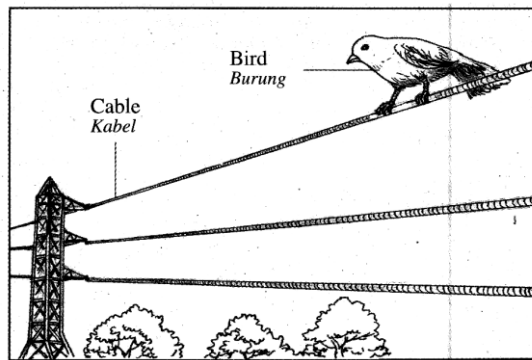


Diagram 12.1 / Rajah 12.1

- (a) (i) What is the meaning of power ?  
*Apakah maksud kuasa ?* [1M]
- (ii) Based on Diagram 12.1, the bird does not experience an electric shock. Explain this situation in terms of the length of the cable between the bird's legs and the potential difference across the legs.  
*Berdasarkan Rajah 12.1, burung itu tidak mengalami sebarang kejutan elektrik. Terangkan situasi tersebut dalam konteks panjang kabel di antara kaki burung dengan beza keupayaan merentasi kaki burung itu.* [4M]
- (b) Diagram 12.2 shows the design and characteristics of four different circuits. Study the specifications of all the four circuits. Explain the suitable circuit to enable the electrical appliance to work efficiently.  
Give reason for your choice.  
*Rajah 12.2 menunjukkan reka bentuk dan ciri-ciri bagi empat litar yang berbeza. Kaji spesifikasi keempat-empat litar itu. Terangkan kesesuaian bagi setiap reka bentuk dan ciri-ciri litar dan tentukan litar yang paling sesuai untuk membolehkan alat-alat elektrik itu berfungsi dengan cekap. Beri sebab untuk pilihan anda.*

[10 M]

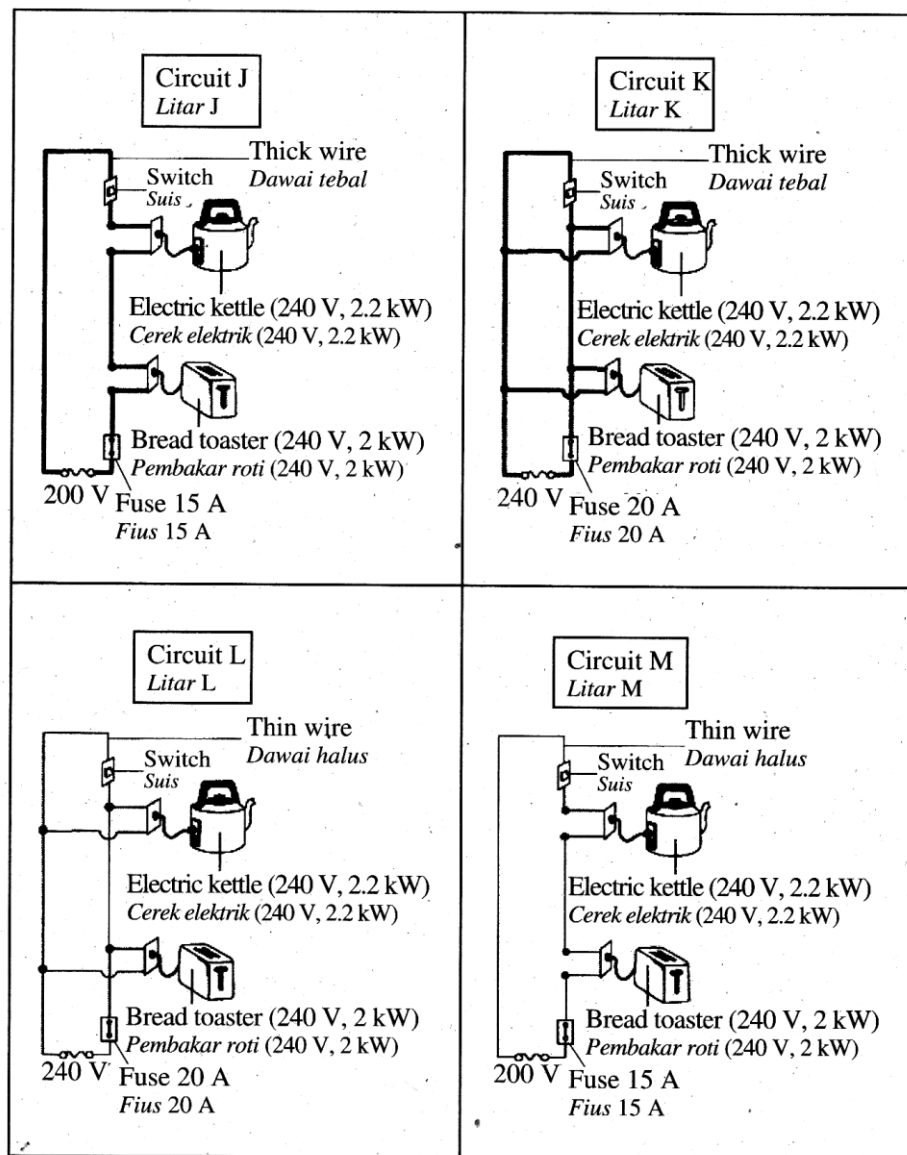


Diagram 12.2 / Rajah 12.2

- (c) Diagram 12.3 shows a circuit consisting of two resistors and a bulb. The reading is 1.5 A when the switch S is off.  
 Rajah 12.3 menunjukkan suatu litar yang mengandungi dua perintang dan sebuah mentol. Bacaan ammeter ialah 1.5 A apabila suis S dimatikan.

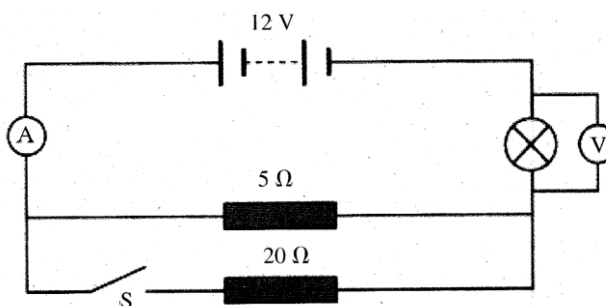


Diagram 12.3 / Rajah 12.3

Calculate;

*Hitung ;*

- (i) The resistance of the bulb  
*Rintangan mentol*
- (ii) The reading of ammeter and voltmeter when the switch S is on.  
*Bacaan ammeter dan voltmeter apabila suis S dihidupkan.*

[5 M]

2. Diagram 12.1 shows the arrangement of a voltmeter, ammeter, battery, switch and three bulbs.

*Rajah 12.1 menunjukkan susunan voltmeter, ammeter, sel kering, suis dan tiga mentol.*

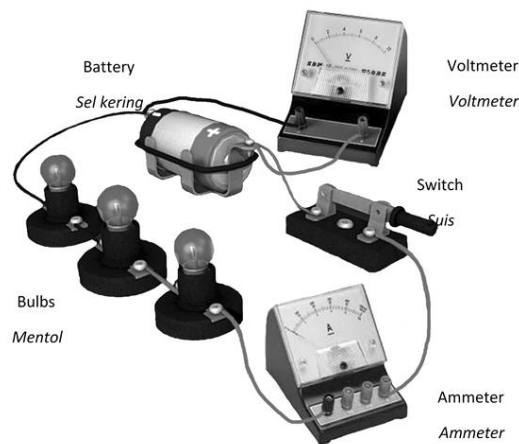


Diagram 12.1 / *Rajah 12.1*

- (a) Name the physic quantity measured by the voltmeter.  
*Namakan kuantiti fizik yang diukur oleh voltmeter.*
- (b) (i) Draw a circuit diagram that represent the arrangement in Diagram 12.1 by using correct symbols.  
*Lukiskan gambarajah litar yang mewakili susunan Rajah 12.1 dengan menggunakan simbol yang betul.*

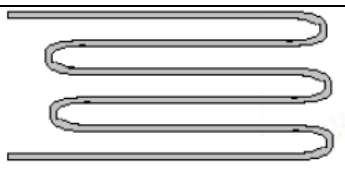

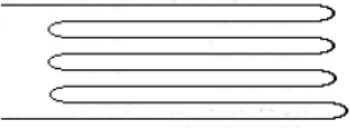

[1 M]

- (ii) All the bulbs are then arranged in parallel.  
By using symbols, draw the possible arrangement of bulbs in parallel.  
*Semua mentol kemudian disusun secara selari.  
Dengan menggunakan simbol, lukis susunan mentol yang mungkin dalam susunan selari*

[4 M]

- (c) Table 12.1 shows four heating elements F, G, H and J with different specifications. Three identical heating panels are needed to be fixed on three sides of an electric dryer.

*Jadual 12.1 menunjukkan empat elemen pemanas F, G, H dan J dengan spesifikasi yang berbeza. Tiga panel pemanas yang serupa diperlukan untuk dipasang pada tiga sisi satu pengering elektrik.*

Heating element <i>Elemen pemanas</i>	Diameter of wire <i>Diameter dawai</i>	Type of heating panel <i>Jenis panel pemanas</i>	Arrangement of heating panel <i>Susunan panel pemanas</i>	Melting points <i>Takat lebur</i>
F	Thick <i>tebal</i>	 Straight wire / <i>Dawai lurus</i>	Parallel circuit <i>Litar selari</i>	Low <i>rendah</i>
G	Thin <i>Halus</i>	 Coil wire/ <i>Dawai bergelung</i>	Parallel circuit <i>Litar selari</i>	High <i>Tinggi</i>
H	Thin <i>Halus</i>	 Straight wire / <i>Dawai lurus</i>	Series circuit <i>Litar sesiri</i>	High <i>Tinggi</i>
J	Thick <i>Nipis</i>	 Coil wire / <i>Dawai bergelung</i>	Parallel circuit <i>Litar selari</i>	High <i>Tinggi</i>

You are required to determine the most suitable heating element that can produce highest amount of heat faster.

*Anda dikehendaki menentukan elemen pemanas yang paling sesuai yang boleh menghasilkan haba paling banyak dalam masa yang singkat.*

Explain the suitability of each aspects and then determine the most suitable heating element.

Give a reason of your choice.

*Terangkan kesesuaian setiap aspek dan seterusnya tentukan element pemanas yang paling sesuai.*

*Beri sebab untuk pilihan anda.*

[10 M]

(d)



Diagram 12.2 / *Rajah 12.2*

Diagram 12.2 shows an electric bulb labeled 40W 240V.

*Rajah 12.2 menunjukkan sebuah mentol elektrik berlabel 40W 240V.*



- (i) State the energy transformation in the bulb.  
*Nyatakan perubahan tenaga dalam mentol itu.*

[1 M]

- (ii) Calculate  
*Hitungkan*

- the current flows in the filament of the bulb.  
*arus yang mengalir dalam filamen mentol itu.*

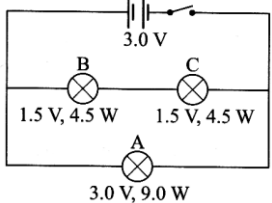
[2 marks]

- the unit of energy consumed when it is used for 8 hours a day in 20 days  
*unit tenaga yang digunakan bila dipasang selama 8 jam sehari dalam 20 hari.*

[2 M]

## PERATURAN PEMARKAHAN KERTAS 2

### MODUL CEMERLANG

Section A		
Question	Marking scheme	
3		
1	(a)	The energy released is 1000 J in one second when the hairdryer is connected to voltage 240 V power supply. <i>Tenaga yang dibebaskan sebanyak 1000 J setiap satu saat apabila pengering rambut itu disambungkan kepada voltan 240 V.</i>
	(b)	$1000 = 240 \times I$ $I = 4.17 \text{ A}$
	(c)(i)	Energy lost as heat <i>Tenaga hilang sebagai haba</i>
	(ii)	Use low resistance wire // use thicker wire in the motor <i>Gunakan wayar rintangan rendah // gunakan wayar lebih tebal dalam motor.</i>
	(d)	Power output increases <i>kuasa output bertambah.</i>
2	(a)	Voltage when $I=0$ // Energy supplied to move 1C of charge through open circuit <i>Voltan apabila <math>I=0</math> // Tenaga yang dibekalkan untuk menggerakkan 1 C cas melalui litar terbuka.</i>
	(b)	X
	(c)(i)	M1 $r = - \text{gradient} // - \frac{9-3}{2-8}$ M2 $r = 1.0 \Omega$
	(c)(ii)	M1 Draw an extrapolation line on the graph M2 11 V
Question	Marking scheme	
4		
1	(a)	Parallel / <i>Selari</i>
	(b)	$A_1 : 1.0 \text{ A}$ $A_2 : 0.5 \text{ A}$
	(c)	$V = IR$ $= (0.5)(3)$ $= 1.5 \text{ V}$
	(d)	
2	(a)(i)	Parallel / <i>Selari</i>
	(ii)	Still light up / <i>Masih menyala</i>
	(b)(i)	$\frac{1}{R'} = \frac{1}{6} + \frac{1}{6} = \frac{1}{3}$ $R' = 3 \Omega$ Effective resistance = $1 \Omega + 3 \Omega$ $= 4 \Omega$
	(ii)	$I = \frac{V}{R}$

		$= \frac{12}{4}$ $= 3 \text{ A}$
	(iii)	Decrease // <i>berkurang</i>
Question	Marking Scheme	
6		
1.	(a)	Resistance is the ratio of potential difference to the current flow <i>Rintangan ialah nisbah beza keupayaan terhadap pengaliran arus.</i>
	(b)(i)	Cross sectional area $6.2 > 6.1$ // <i>luas keratan rentas <math>6.2 &gt; 6.1</math></i>
	(ii)	Potential difference $6.1 > 6.2$ // <i>Beza keupayaan <math>6.1 &gt; 6.2</math></i>
	(iii)	Current for both circuits are the same/ equal <i>Arus kedua-dua litar sama</i>
	(c)(i)	Resistance $6.1 > 6.2$ // <i>rintangan <math>6.1 &gt; 6.2</math></i>
	(ii)	As the cross sectional area increases, resistance decreases <i>Semakin bertambah luas keratan rentas, semakin berkurang rintangan</i>
	(d)	1. Decreases // <i>berkurang</i> 2. Because total/effective <u>resistance decreases</u> <i>Kerana rintangan berkesan berkurang</i>
2.	(a)	V is directly proportional to I provided that the physical state and temperature remains constant. <i>V berkadar terus terhadap I dimana keadaan fizikal dan suhu bahan tetap</i>
	(b) (i)	D6.1 bulbs are connected in parallel and D6.2 bulbs are connected in series <i>D6.1 mentol-mentol disambungkan secara selari dan D6.2 mentol-mentol disambungkan secara sesiri</i>
	(ii)	(Brightness (of bulbs) in) Diagram 6.1 > Diagram 6.2 // vice-versa <i>Kecerahan mentol Rajah 6.1 &gt; Rajah 6.2</i>
	(iii)	(Potential difference in) D6.1 > D6.2 // vice-versa <i>Beza keupayaan Dalam Rajah 6.1 &gt; Rajah 6.2</i>
	(c) (i)	When bulbs are arranged in parallel, brightness of bulb increased // vice-versa <i>Apabila mentol disambungkan secara selari, Kecerahan mentol bertambah</i>
	(ii)	Bulbs in parallel, potential difference more / equal to p.d. of the battery // vice-versa <i>Apabila mentol disambung secara selari, beza keupayaan lebih besar // sama dengan beza keupayaan bateri.</i>
	(d)(i)	$P > Q = R$
	(ii)	Effective resistance of P and R is more than Q // Current, I is more in bulb Q / vice-versa <i>Rintangan berkesan P dan Q lebih besar dari Q // Arus lebih besar di dalam Q</i>
Question	Marking Scheme	
7		
1	(a)	Series circuit // <i>litar sesiri</i>
	(b)(i)	<u>Diagram 7.1</u> $R_e = R_1 + R_2 + R_3$ $= 4 + 4 + 4 \text{ ( substitution )}$ $= 12 \Omega \text{ ( answer with unit )}$ <u>Diagram 7.2</u> $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$ $R_e = \frac{4}{3}$

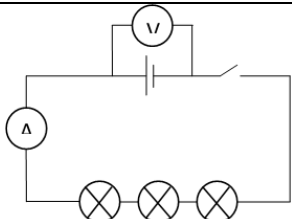
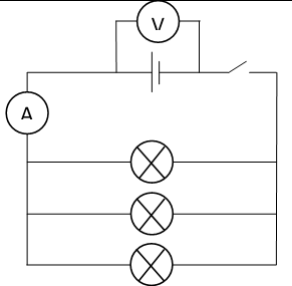
		= 1.33 Ω
	(ii)	Diagram 7.2 is higher // <i>Rajah 7.2 lebih tinggi</i>
	(iii)	<ul style="list-style-type: none"><li>Total effective resistance is lower in parallel circuit // the current flow increase <i>Jumlah rintangan berkasa lebih rendah dalam litar selari // pengaliran arus bertambah</i></li><li>Voltage across bulb is higher. // <i>voltan mengalir melalui mentol tinggi.</i></li></ul>
	(c)(i)	More // <i>banyak</i>
	(ii)	In series // <i>sesiri</i>
	(iii)	<ul style="list-style-type: none"><li>Lower // <i>rendah // kecil</i></li><li>Voltage lost (drop) will decrease // <i>kehilangan voltan akan berkurang</i></li></ul>
3	(a)	Diagram 7.1 : parallel circuit // <i>Litar selari</i> Diagram 7.2 : series circuit // <i>litar sesiri</i>
	(b)(i)	Diagram 7.1: R = 1 Ω Diagram 7.2: R = 4 Ω
	(ii)	Diagram 7.1
	(c)(i)	More number of bulbs // <i>bilangan mentol bertambah</i> More heat supplied // <i>banyak haba dibekalkan</i>
	(ii)	Bulbs arrange in series // <i>mentol-mentol disusun secara sesiri</i> Higher resistance / more heat supplied // <i>rintangan tinggi // banyak haba dibekalkan</i>
	(iii)	Larger size // <i>saiz yang besar</i> More eggs can be heated at once // <i>banyak telur boleh dipanaskan dalam satu masa.</i>
Question		Marking Scheme
8		
1	(a)	12 J energy is released in one second when connected to 6 V power supplied. <i>12 J tenaga dibebaskan dalam masa satu saat apabila disambungkan kepada bekalan kuasa 6 V.</i>
	(b)	<ul style="list-style-type: none"><li>Series // <i>sesiri</i></li><li>Parallel // <i>selari</i></li></ul>
	(c)	<ul style="list-style-type: none"><li>Voltage for each bulb in Diagram 8.2 &gt; Diagram 8.1 <i>Voltan setiap mentol dalam Rajah 8.2 &gt; Rajah 8.1</i></li><li>Total resistance in Diagram 8.2 &lt; Diagram 8.1 // Current flow D8.2&gt;D8.1 <i>Jumlah rintangan dalam Rajah 8.2 &lt; Rajah 8.1</i></li></ul>
	(d)(i)	$R_1 = 4 + 4 + 4$ $= 12 \Omega$ $I = \frac{V}{R} = \frac{6.0}{12} \quad (\text{substitution})$ $= 0.5 \text{ A} \quad (\text{answer + correct unit})$
	(ii)	$\frac{1}{R} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$ $R = 4/3 = 1.33 \Omega$ $I_T = 6.0 / 1.33$ $= 4.5 \text{ A}$ $I \text{ flow each bulb} = 4.5 / 3 \quad (\text{substitution})$ $= 1.5 \text{ A} \quad (\text{Answer + correct unit})$
	(e)(i)	Diagram 8.2 // <i>Rajah 8.2</i>
	(ii)	<ul style="list-style-type: none"><li>If one bulb blow another bulb can still function <i>Jika satu mentol terbakar, mentol lain masih berfungsi</i></li></ul>

		<ul style="list-style-type: none"> <li>less effective resistance // more current flow <i>rintangan berkesan berkurang // banyak arus mengalir.</i></li> </ul>
2	(a)	1000 J of energy is consumed in 1 s when connected to a 240 V power supply. <i>1000 J tenaga digunakan dalam masa 1 s apabila disambungkan kepada 240 V bekalan kuasa.</i>
	(b)(i)	$= 1000 / 240$ $= 4.17 \text{ A}$
	(ii)	$E = 1000 \times 10^{-3} \times (30/60) \times 3$ Cost = 15 kWh x 0.23 RM 3.45
	(c)(i)	$E = 240 \times 6.0 \times 90 // 1.296 \times 10^5 \text{ J}$
	(ii)	$E = 240 \times 5.0 \times 150 // 1.800 \times 10^5 \text{ J}$
	(iii)	$E = 240 \times 4.0 \times 120 // 1.152 \times 10^5 \text{ J}$
	(d)(i)	R
	(ii)	Use least of energy // <i>menggunakan kurang tenaga</i> Save cost // <i>jimat kos</i>

Section B						
Question		Marking scheme				
10						
1	(a)	Chemical energy -----> Electrical energy <i>Tenaga kimia -----&gt; Tenaga elektrik</i>				
	(b)	Diagram 10.1(a) the dry cells are connected in parallel // <i>sel kering sambung secara selari</i> Diagram 10.1(b) the dry cells are connected in series // <i>sel kering sambung secara sesiri</i>				
		Voltage supply in Diagram 10.1 (a) is smaller // <i>bekalan voltan D10.1 lebih kecil</i>				
		The ammeter reading in Diagram 10.2(a) is smaller // <i>Bacaan ammeter D10.2(b) lebih kecil</i>				
		When the voltage supply increase, energy transferred to flow the electric charge around circuit increases. <i>Apabila bekalan voltan bertambah, tenaga yang dipindahkan untuk mengalirkan cas mengelilingi litar bertambah.</i>				
		When the current flow through circuit increase, energy tranferred increases. <i>Apabila pengaliran arus melalui litar bertambah, tenaga dipindahkan bertambah.</i>				
	(c)	1. Our bodies are at earth potential (0 V) 2. If we touch the life wire, there will be a large potential difference (p.d) between the life wire and our body. A large current flow through it , probably fatal. 3. The neutral wire stays at eart potential (0V), roughly at the same potential as our bodies. 4. If we touch the neutral wire, there is no p.d across us and so no current flow.				
	(d)	<table><tr><th>Modification</th><th>Explanation</th></tr><tr><td>The elektrical appliance connected in parallel // <i>Sambung secara selari</i></td><td>Allow each electric appliance to be switch on and off independently //</td></tr></table>	Modification	Explanation	The elektrical appliance connected in parallel // <i>Sambung secara selari</i>	Allow each electric appliance to be switch on and off independently //
Modification	Explanation					
The elektrical appliance connected in parallel // <i>Sambung secara selari</i>	Allow each electric appliance to be switch on and off independently //					

			<i>membenarkan alatan elektrik bebas dihidup atau dimatikan</i>												
		Fit fuse at live wire in the fuse box <i>Pasang kat fuis pada wayar hidup dalam kotak fuis</i>	Prevent from short circuit // <i>mengelakkan litar pintas</i>												
		Earth connection to the metal case // <i>dawai bumi disambungkan kepada bekas logam</i>	Protect a person from the electrical shock.// <i>mengelakkan kejutan elektrik</i>												
		Use low power lamp //install fluorecent lamp <i>Guna lampu berkuasa rendah // pasang lampu flouresen.</i>	Remove dust from the air filters of air condition. <i>Mengeluarkan habuk dari penapis udara penyaman udara.</i>												
		Do not put more water in a kettle than needed for hot drinks.	To save energy // <i>menjimatkan tenaga</i>												
2	(a)	Resistance due to electrolite that resist the flow of electrons in the dry cell													
	(b)(i)	Number of bulbs across PQ is more than that of RS The magnitude of current flow across PQ is less than that of RS The total resistance across PQ is more than that of RS													
	(ii)	The more the number of bulbs, the less the magnitude of current The greater the resistance, the lower the magnitude of current													
	(c)	Bulb B doesn't light up because of short circuit The total resistance across PQ decrease, hence the current increase Brightness of Bulb A and B is the same Ammeter reading of X and Y is the same													
	(d)	<table><tr><th>Modification</th><th>Explanation</th></tr><tr><td>More number of dry cells</td><td>Greater voltage</td></tr><tr><td>Low internal resistance</td><td>Less voltage drop</td></tr><tr><td>High power of bulb</td><td>Produce more light</td></tr><tr><td>Shiny reflector</td><td>Can reflect most of the light // Good reflector</td></tr><tr><td>Bulb at focal point of the reflector</td><td>Produce bright light in parallel</td></tr></table>		Modification	Explanation	More number of dry cells	Greater voltage	Low internal resistance	Less voltage drop	High power of bulb	Produce more light	Shiny reflector	Can reflect most of the light // Good reflector	Bulb at focal point of the reflector	Produce bright light in parallel
Modification	Explanation														
More number of dry cells	Greater voltage														
Low internal resistance	Less voltage drop														
High power of bulb	Produce more light														
Shiny reflector	Can reflect most of the light // Good reflector														
Bulb at focal point of the reflector	Produce bright light in parallel														

Section C		
Question	Marking scheme	
12		
1	(a)(i)	Energy per time // work per time // rate of energy
	(ii)	1. Length small / kecil / low 2. Resistance small // R low 3. Potential difference low // V low // voltage low 4. Current low

(b)		<table><tr><th>Characteristics</th><th>Explanation</th></tr><tr><td>Thick / tebal</td><td>Low R // small heat // withstand heat // tahan haba //low heat lost //high current //total R low</td></tr><tr><td>240 / high</td><td>Voltage same appliance rating // appliance normal work // voltan sama spesifikasi alat-alat // alat-alat bekerja secara normal</td></tr><tr><td>parallel</td><td>One not working other working // effective resistance small // high current // same voltage</td></tr><tr><td>20 // large // big</td><td>17.5 //fuse great / high // (2200/240)+(200/240) //break the circuit when the current flow bigger than fuse limit.</td></tr><tr><td colspan="2">K is choosen Because combination of characteristics.</td></tr></table>	Characteristics	Explanation	Thick / tebal	Low R // small heat // withstand heat // tahan haba //low heat lost //high current //total R low	240 / high	Voltage same appliance rating // appliance normal work // voltan sama spesifikasi alat-alat // alat-alat bekerja secara normal	parallel	One not working other working // effective resistance small // high current // same voltage	20 // large // big	17.5 //fuse great / high // (2200/240)+(200/240) //break the circuit when the current flow bigger than fuse limit.	K is choosen Because combination of characteristics.	
	Characteristics	Explanation												
	Thick / tebal	Low R // small heat // withstand heat // tahan haba //low heat lost //high current //total R low												
	240 / high	Voltage same appliance rating // appliance normal work // voltan sama spesifikasi alat-alat // alat-alat bekerja secara normal												
	parallel	One not working other working // effective resistance small // high current // same voltage												
	20 // large // big	17.5 //fuse great / high // (2200/240)+(200/240) //break the circuit when the current flow bigger than fuse limit.												
K is choosen Because combination of characteristics.														
(c)(i) & (ii)	(12/1.5)- 5 // 8 – 5 // 4.5 per 1.5 3													
	1/R = 1/R1 + 1/R2 // 1/5 + 1/20 // 4													
	4+3 // 7													
	12/7 // 1/7143													
	(12 / 7 ) x 3 // 5.1429													
2	(a)	Potential difference // voltage / Beza keupayaan //voltan												
	(b)(i)													
	(ii)	 <div>M1 : all symbol correct / <i>Semua simbol betul</i> M2 : ammeter and bulbs in series / <i>ammeter dan mentol dalam siri</i> M3 : voltmeter in parallel / <i>voltmeter dalam selari</i> M4 : correct parallel connection of bulbs <i>Sambungan mentol-mentol secara selari betul</i></div>												
	(c)	<table><tr><th>Aspect <i>Aspek</i></th><th>Characteristics <i>Ciri-ciri</i></th><th>Explanation <i>Penerangan</i></th></tr><tr><td>Diameter of wire / <i>Diameter dawai</i></td><td>Thin / <i>Halus</i></td><td>High resistance / <i>rintangan tinggi</i></td></tr><tr><td>Type of heating panel / <i>Jenis panel pemanas</i></td><td>Coil wire / <i>Dawai bergelung</i></td><td>Increase length // high resistance <i>Panjang bertambah / rintangan tinggi</i></td></tr><tr><td>Arrangement of heating panel /</td><td>Parallel / <i>Selari</i></td><td>If one panel not function,others panel still function / <i>sekiranya</i></td></tr></table>	Aspect <i>Aspek</i>	Characteristics <i>Ciri-ciri</i>	Explanation <i>Penerangan</i>	Diameter of wire / <i>Diameter dawai</i>	Thin / <i>Halus</i>	High resistance / <i>rintangan tinggi</i>	Type of heating panel / <i>Jenis panel pemanas</i>	Coil wire / <i>Dawai bergelung</i>	Increase length // high resistance <i>Panjang bertambah / rintangan tinggi</i>	Arrangement of heating panel /	Parallel / <i>Selari</i>	If one panel not function,others panel still function / <i>sekiranya</i>
Aspect <i>Aspek</i>	Characteristics <i>Ciri-ciri</i>	Explanation <i>Penerangan</i>												
Diameter of wire / <i>Diameter dawai</i>	Thin / <i>Halus</i>	High resistance / <i>rintangan tinggi</i>												
Type of heating panel / <i>Jenis panel pemanas</i>	Coil wire / <i>Dawai bergelung</i>	Increase length // high resistance <i>Panjang bertambah / rintangan tinggi</i>												
Arrangement of heating panel /	Parallel / <i>Selari</i>	If one panel not function,others panel still function / <i>sekiranya</i>												

		<i>Susunan panel pemanas</i>		<i>satu panel rosak, yang lain masih berfungsi</i>
		Melting point / <i>Takat lebur</i>	High / <i>Tinggi</i>	Withstand high temperature / <i>dapat menahan suhu yang tinggi</i>
		G is choosen Because Diameter of wire is thin , type of heating panel is coil wire, the arrangment of heating panel is parallel and high melting point.		
	(d)(i)	Electrical to light energy / <i>tenaga eletrik kepada tenaga haba</i>		
	(ii)	$- I = \frac{P}{V}$ $= \frac{40}{120}$ $= 0.167 A$ $E = Pt$ $= 40 \times 80 \times 20$ $= 64000 \text{ Wh // } 6.4 \text{ kWh // } 6.4 \text{ unit}$		