

***BENGKEL TEKNIK***

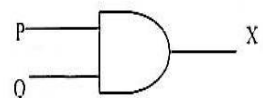
***FIZIK SPM 2015***

***Smk St Mary***

*Penceramah : Thong Kum Soon*

*Success is depend on your mind and your will.*

**You are the one. who decide it. PROVE IT!!**



### **PART B Paper 3 Planning Experiment**

1. Identify the MV and RV from the diagram and questions. **CIRCLE IT UP**
2. Identify the apparatus given to link to the PHYSICS CONCEPT of experiment.
3. Relate the experiment which you had done before in school and identify the relationship between the variables.
4. Identify the variable from the text and diagram.
  - (a) Manipulated variable
  - (b) Responding variable
  - (c) Fixed variable (can be measured)  
---NOT TYPE OF SUBSTANCE

**Underline the variables of MV and RV from the diagram. Use the variables to substitute the format of Planning Experiment.**

### **Tips for Paper 3 No 1 and No 2**

1. Identify the variable from the text and diagram.
  - (a) Manipulated variable
  - (b) Responding variable
  - (c) Fixed variable (can be measured)  
---NOT TYPE OF SUBSTANCE
  - (d) Observe the diagram measurement
  - (e) Identify the value in table
  - (f) Tabulate data with symbol and unit
  - (g) Plan your graph (unit and symbol)
  - (h) Determine the relationship from the graph
2. Read the question CAREFULLY
  - (a) Extrapolate the graph and write the value next to it
  - (b) Plot biggest triangle and get closest value with unit
  - (c) Substitute the value correctly with 2 decimal places
  - (d) Place precaution
    - Observe the reading perpendicular to the eyes to prevent parallax errors
    - Off the circuit when measurement is not taken to prevent heating of wires and cause systematic errors
    - Repeat the experiment for 3 times and determine the average to prevent systematic error

Diagram 3.1 and Diagram 3.2 show that a foot feels more painful when it is step on by a high heel shoe compare to a flat one.

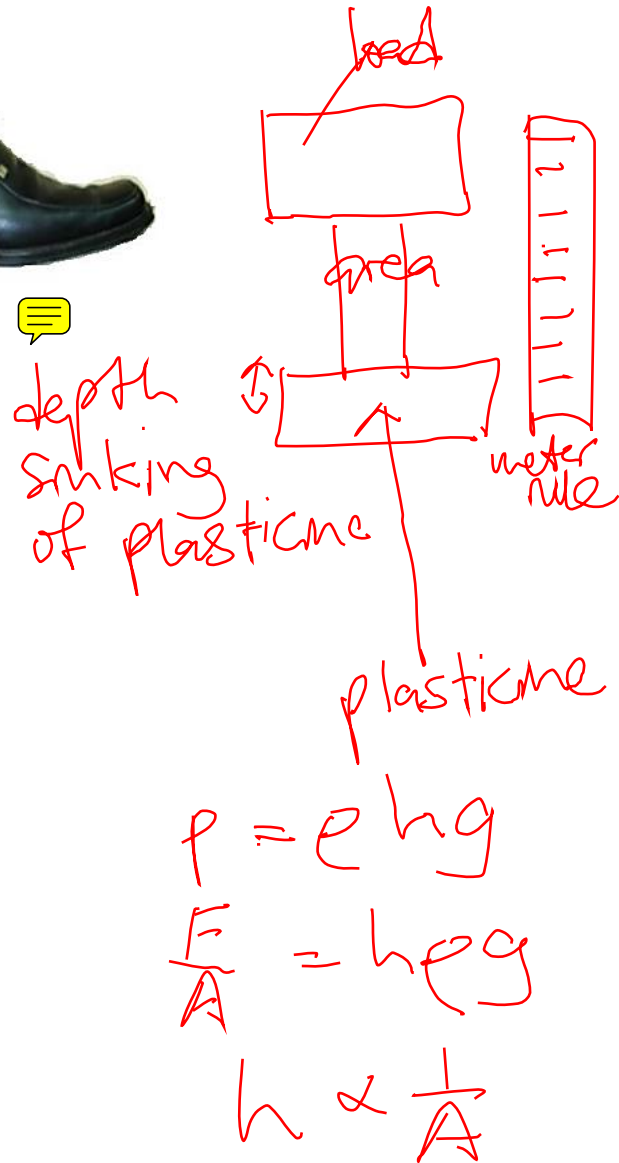
Rajah 3.1 dan Rajah 3.2 menunjukkan kaki merasa lebih sakit apabila dipijak oleh kasut bertumit tinggi berbanding kasut tapak rata.



- (a) State one suitable inference. [1 mark]  
Nyatakan satu inferens yang sesuai. [1 markah]
- (b) State **one** suitable hypothesis. [1 mark]  
Nyatakan **satu** hipotesis yang sesuai. [1 markah]
- (c) With the use of apparatus such as load, ruler and others apparatus, describe an experiment to investigate the hypothesis stated in 3 (b).  
Dengan menggunakan radas seperti beban, pembaris dan lain-lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan pada 3(b).  
In your description, state clearly the following:  
Dalam penerangan anda, nyatakan dengan jelas perkara berikut:
- (i) Aim of the experiment.  
Tujuan eksperimen.
  - (ii) Variables in the experiment.  
Pembolehubah dalam eksperimen.
  - (iii) List of apparatus and materials.  
Senarai radas dan bahan
  - (iv) Arrangement of the apparatus.  
Susunan radas.
  - (v) The procedure of the experiment which include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.  
Prosedur eksperimen termasuk **satu** kaedah mengawal pembolehubah dimanipulasikan dan **satu** kaedah mengukur pembolehubah bergerak balas.
  - (vi) The way you would tabulate the data.  
Cara untuk meniadualkan data.
  - (vii) The way you would analyse the data.  
Cara menganalisis data.

[10 marks ]

[10 markah]



2.

The lamp of the bicycle lights up when the magnet in the dynamo is rotated by turning the wheel.

Diagram 4.1 shows a lady cycles her bicycle with moderate velocity.

Diagram 4.2 shows a bicycle cyclist cycles his bicycle with high velocity. It is found that his bicycle's lamp lights up brighter.

Lampu sebuah basikal menyala apabila magnet di dalam dinamo itu berputar oleh putaran tayar.

Rajah 4.1 menunjukkan seorang wanita mengayuh basikalnya dengan kelajuan sederhana.

Rajah 4.2 pula menunjukkan seorang pelumba basikal mengayuh basikalnya dengan halaju yang tinggi. Didapati nyalaan lampunya lebih terang.

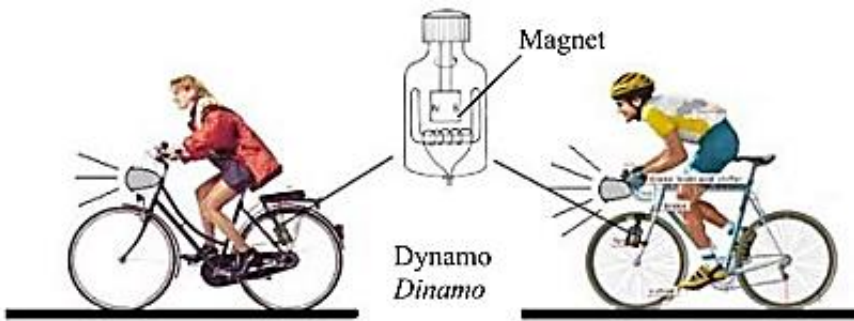
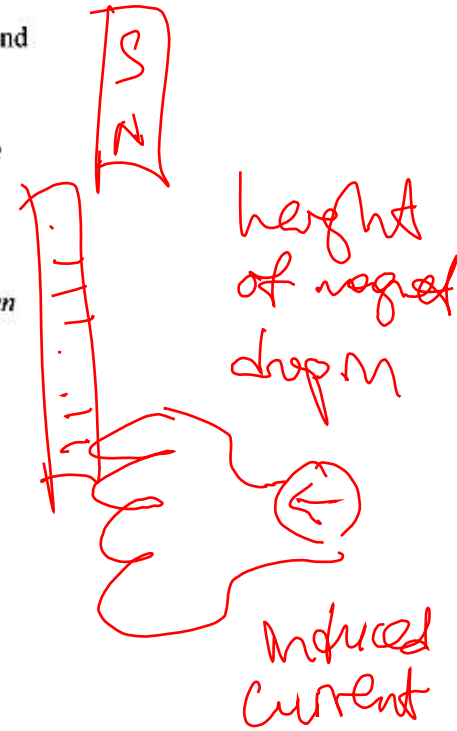


Diagram 4.1  
Rajah 4.1

Diagram 4.2  
Rajah 4.2

- (c) With the use of apparatus such as a bar magnet, a coil of a copper wire and others describe one experiment framework to investigate the hypothesis stated in 4(b).



$$mgh = \frac{1}{2}mv^2$$

$$h = \frac{v^2}{2}$$

$$E = mgh$$

$$Pt = mgh$$

$$VIt = mgh$$

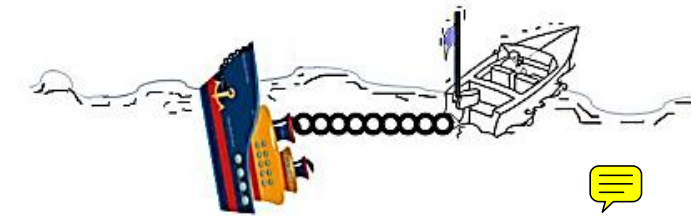
$$h \propto I$$

3.

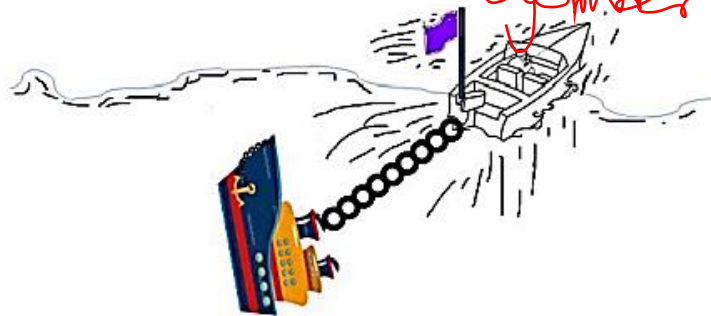
Diagram 3.1 shows a worker driving a boat for towing a shipwreck in the middle of the ocean. He found it is difficult to bring the ships that partially immersed towards the beach quickly.

Rajah 3.2 menunjukkan pekerja itu memandu bot yang sama menunda sebuah kapal karam di tengah lautan. Dia mendapati mudah untuk menunda kapal yang tenggelam sepenuhnya ke tepi pantai.

Diagram 3.2 shows the worker driving the same boat towing a shipwreck in the middle of the ocean. He found that it is easy to bring the ship that fully immersed towards the beach.



Rajah 3.1  
Diagram 3.1



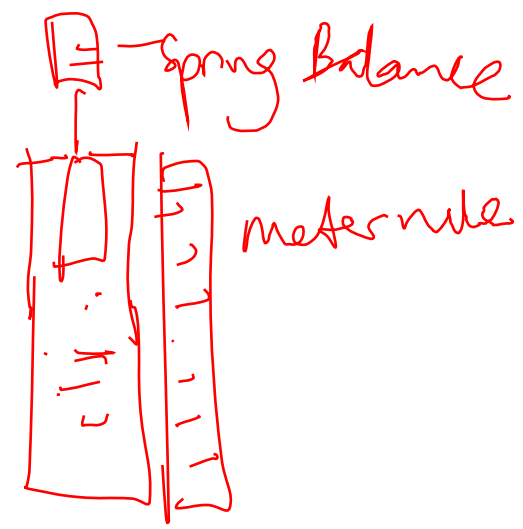
measuring cylinder

$$F_B = w$$

$$\rho g V = mg$$

$$\rho g A h = mg$$

$$h \propto m$$

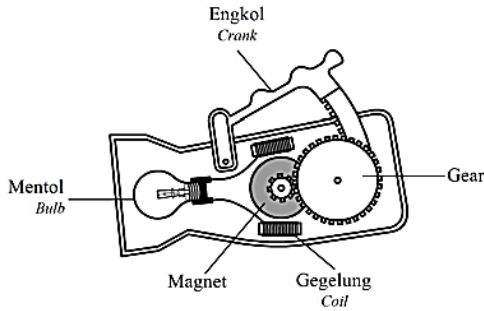


(c) Dengan menggunakan radas seperti benang, bikar, neraca spring dan lain-lain radas, terangkan satu rangka kerja eksperimen untuk menyiasat hipotesis yang anda yatakan di 3(b).

With the use of apparatus such as a thread, beaker, spring balance and other apparatus, describe an experiment framework to investigate the hypothesis stated in 3(b).

4.

Rajah 4 menunjukkan sebuah lampu suluh kuasa tangan yang mempunyai satu magnet dan dua gegelung dawai kuprum bertebat. Mentol akan dinyalakan apabila magnet diputar dengan memampat engkol lampu suluh tersebut. Nyalaan bertambah terang apabila engkol dimampatkan dengan lebih laju. Diagram 4 shows a hand powered flashlight which has a magnet and two coils of insulated copper wire. The bulb will light up when the magnet is spun by compressing the crank of the flashlight. The light gets brighter when the crank compressed faster.



Rajah 4  
Diagram 4

height of magnet drop into solenoid

$Pt = \frac{1}{2}mv^2$

$mgh = \frac{1}{2}mv^2$

$h = \frac{v^2}{2g}$

$h \propto I^2$

- (c) Dengan menggunakan radas seperti galvanometer dan gegelung wayar, terangkan satu eksperimen untuk mengkaji hipotesis yang dinyatakan di 4(b). Dalam penerangan anda, jelaskan perkara berikut:

With the use of apparatus such as galvanometer and coil, describe an experiment to investigate the hypothesis stated in 4(b).

5.

Diagram 3.1 shows a worker pushing down on the piston of a clogged bicycle pump. Diagram 3.2 shows the same worker finding it harder to push the piston further down.

With the use of apparatus such as a Bourdon gauge and other apparatus, describe an experiment to investigate the hypothesis stated.

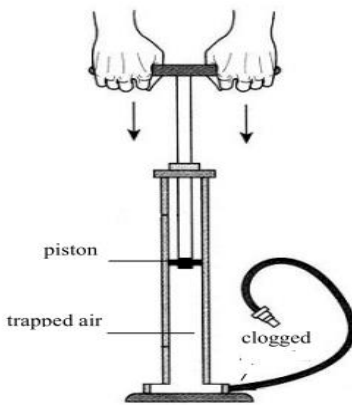


Diagram 3.1

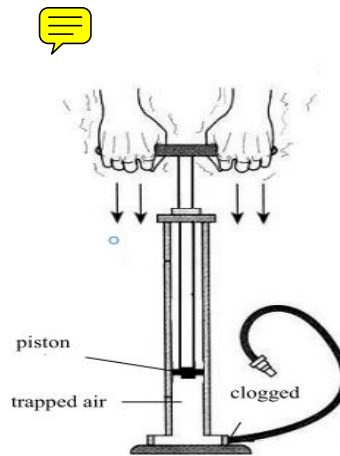


Diagram 3.2

$P \propto \frac{1}{V}$

$P_1 V_1 = P_2 V_2$

4. Diagram 4.1 show a lamp which lights up with normal brightness when the dimmer knob is set at its minimum value. Diagram 4.2 shows the lamp dimmer when the dimmer knob is set at its maximum value.



With the use of apparatus such as constantan wire, voltmeter and other apparatus, describe an experiment to investigate the hypothesis stated.

$$R = \frac{V}{I}$$

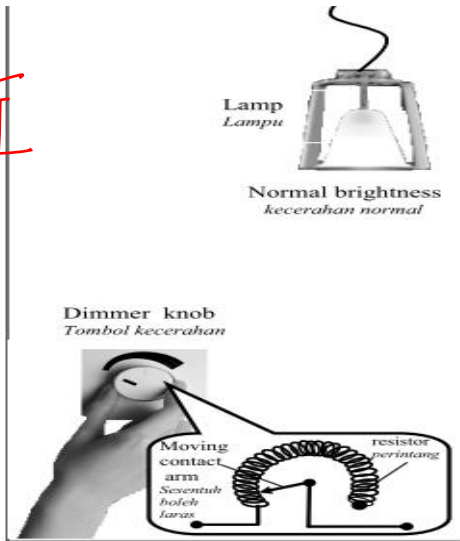


Diagram 4.1

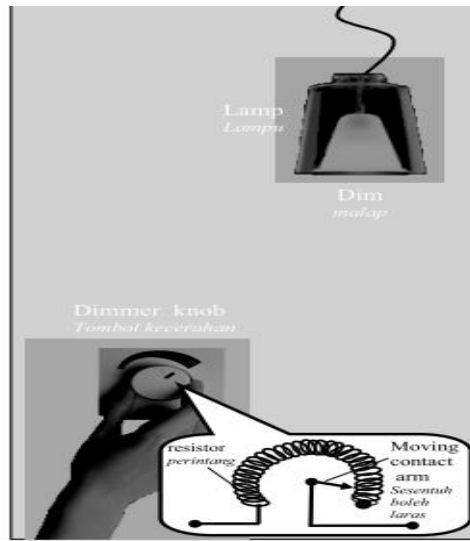


Diagram 4.2

Rd. panjang

$\downarrow$   $R \uparrow$



1.

Diagram 3.1 shows an empty plastic bottle being left on the seat of a car on a hot afternoon.

Rajah 3.1 menunjukkan sebuah botol plastik kosong yang ditinggalkan di tempat duduk sebuah kereta pada waktu tengah hari yang panas.

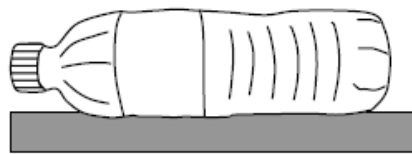


Diagram 3.1 / Rajah 3.1

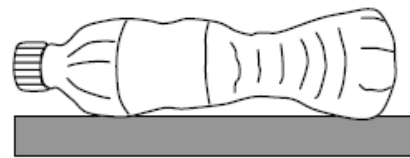


Diagram 3.2 / Rajah 3.2

Diagram 3.2 shows the same plastic bottle the following morning when the weather was very cold.

Rajah 3.2 menunjukkan botol plastik yang sama pada pagi berikutnya di mana cuaca sangat sejuk.



meter rule

Charles law  
 $V \propto T$

With the use of apparatus such as a glass tube as shown in Diagram 3.3, water bath, and other apparatus, describe one experiment to investigate the hypothesis stated in 3(b).

*Dengan menggunakan radas seperti tiub kaca seperti ditunjukkan dalam Rajah 3.3, kukusan air dan radas lain, terangkan satu eksperimen untuk menyiasat hipotesis yang dinyatakan di 3(b).*

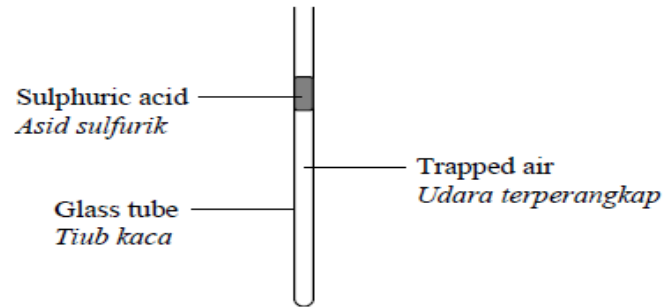


Diagram 3.3 / Rajah 3.3



Structure

8. Diagram 8 shows one bulb connected to one dry cell.  
*Rajah 8 menunjukkan satu mentol disambungkan kepada satu sel kering.*

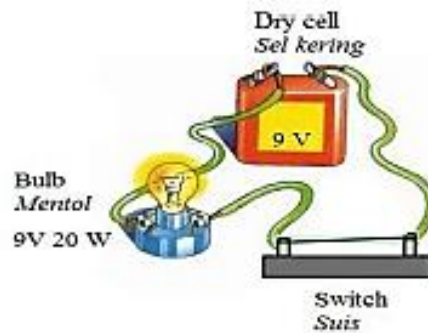


Diagram 8  
*Rajah 8*

- (a) What is meant by the label “9V, 20W” on the bulb?  
*Apakah yang dimaksudkan dengan label 9 V, 20W pada mentol itu?*

[ 1 mark ]

[1 markah]

- (b) Based on Diagram 8, calculate  
*Berdasarkan Rajah 8, hitungkan*

- (i) current flowing through the bulb.  
*arus mengalir melalui mentol.*

[2 marks]

[2 markah]

- (ii) resistance of the filament of the bulb?  
*rintangan bagi filamen mentol tersebut?*

- (c) Table 8.1 shows three different types of filament to be used in bulb in Diagram 8 above.

*Jadual 8.1 menunjukkan tiga jenis filamen berbeza yang akan digunakan di dalam mentol pada Rajah 8 diatas.*


Filament <i>Filamen</i>	Power supplied to the bulb <i>Kuasa dibekalkan kepada mentol</i>	Power produced (Light) <i>Kuasa dihasilkan (Cahaya)</i>
P	$20\text{Js}^{-1}$	$15\text{Js}^{-1}$
Q	$30\text{Js}^{-1}$	$28\text{Js}^{-1}$
R	$50\text{Js}^{-1}$	$43\text{Js}^{-1}$

Table 8.1



Jadual 8.1

- (i) State the effect of thickness of wire of the filament to the rate of energy loss in the filament.  
*Nyatakan kesan ketebalan dawai filamen terhadap kadar kehilangan tenaga pada filamen.*

.....  
 [1 mark]  
[1 markah]

- (ii) Calculate the efficiency of each filaments P,Q, and R.  
*Hitungkan kecekapan setiap filamen P,Q dan R.*

[4 marks]  
[4 markah]

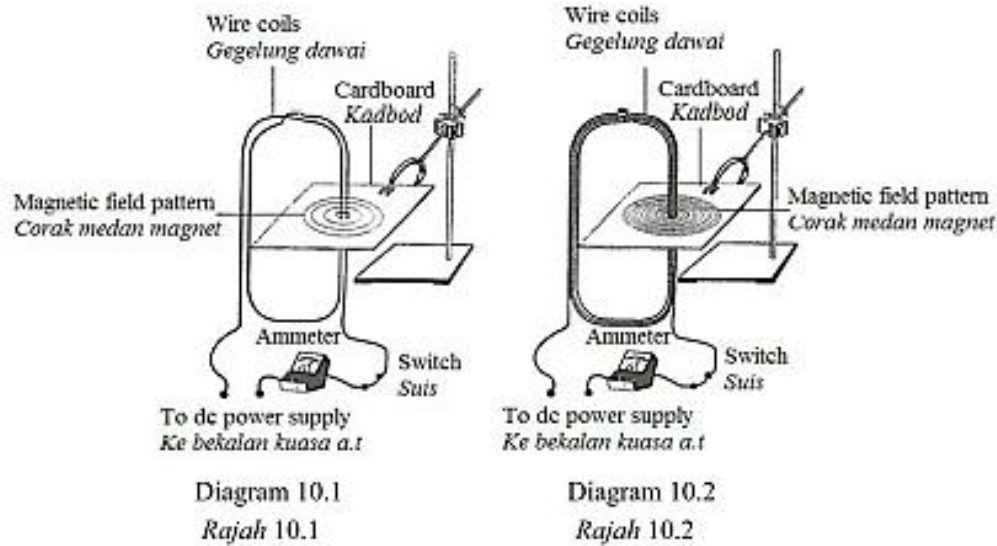
- (iii) Suggest the most suitable filament to be used in the bulb.  
Justify your choice.  
*Cadangkan filamen yang paling sesuai digunakan di dalam mentol.  
Berikan alasan bagi pilihan anda itu*

essay



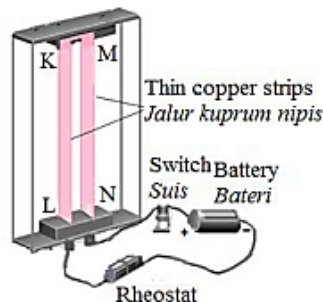
10. Diagram 10.1 and diagram 10.2 show coils of wire connected to ammeter, switch and d.c power supply.

Rajah 10.1 dan 10.2 menunjukkan gelungan dawai disambung kepada ammeter, suis dan bekalan arus terus.



When the switch is on the magnetic field pattern is formed as shown in the diagram above.  
Apabila suis dihidupkan corak medan magnet terbentuk seperti dalam rajah di atas.

- (a) What is meant by magnetic field?  
Apakah maksud medan magnet? [ 1 mark] [1 markah]
- (b) Using Diagram 10.1 and Diagram 10.2 compare the number of turns of the coils, the pattern of the magnetic field and the ammeter reading.  
Berdasarkan Rajah 10.1 dan Rajah 10.2, bandingkan bilangan lilitan gelung, corak medan magnet dan bacaan ammeter. [ 3 marks] [3 markah]
- (c) State the relationship between the strength of magnetic field and,  
Nyatakan hubungan antara kekuatan medan magnet dengan,
- (i) the pattern of magnetic field.  
corak medan magnet. [ 1 mark] [1 markah]
- (ii) the number of turns of the coil.  
bilangan lilitan gelung. [ 1 mark] [1 markah]
- (d) Diagram 10.3 shows two thin copper strip KL and MN connected to circuit.  
Rajah 10.3 menunjukkan dua jalur kepingan kuprum nipis KL dan MN yang disambung kepada satu litar.



- (i) What happens to the copper strip KL and MN, when the switch is on. [ 1 mark]

*Apa yang berlaku kepada jalur kuprum KL and MN apabila suis dihidupkan.* [1 markah]

- (ii) Explain your answer by drawing a catapult field. [ 3 marks]

*Terangkan jawapan anda dengan lukis medan lastik.* [3 markah]

(e) Diagram 10.4 shows an incomplete parts of a simple electric motor.

*Rajah 10.4 menunjukkan sebuah motor elektrik ringkas dengan bahagian yang tidak lengkap.*

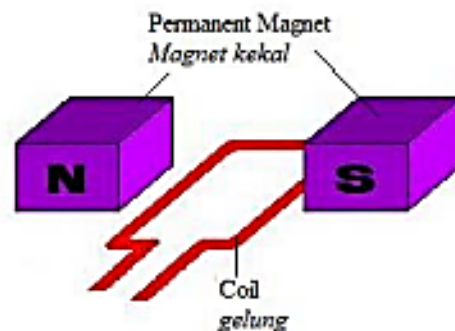


Diagram 10.4

Rajah 10.4

You are required to give some suggestions and modification of additional components to make an efficient direct current motor.

Explain the suggestions based on the following aspects:

*Anda dikehendaki memberi beberapa cadangan dan pengubahsuaian bagi beberapa komponen untuk membuat sebuah motor arus terus yang efisien.*

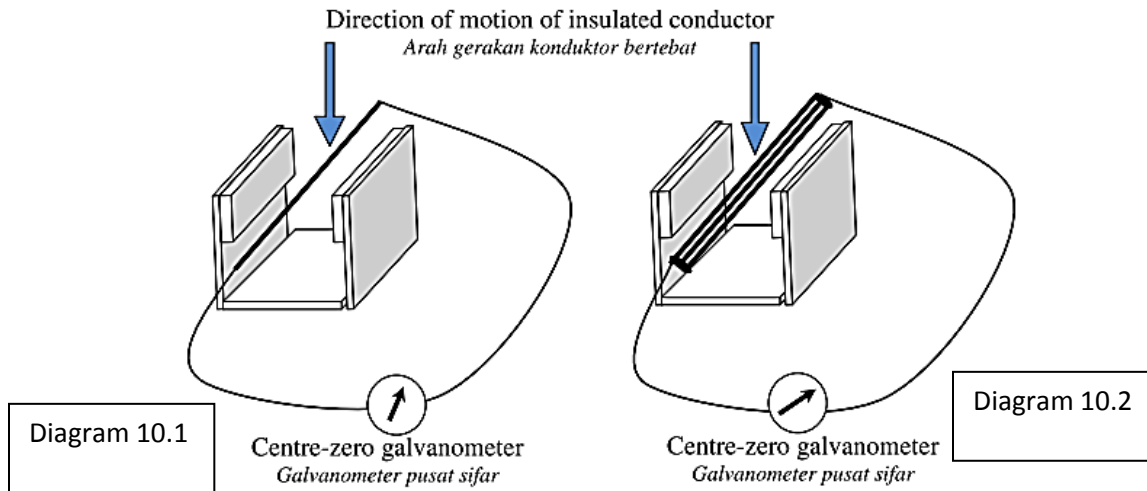
- (i) Number of turns of the coil [ 1 mark]
- Bilangan lilitan gelung*
- (ii) Additional components to enable the coil to rotate continuously [ 1 mark]
- Komponen-komponen tambahan untuk membolehkan gelung berputar berterusan.*
- (iii) Shape of the permanent magnet [ 1 mark]
- Bentuk magnet kekal*
- (iv) Type of the core for the motor. [ 1 mark]

10 marks

Paper 2 Essay

- 10 Diagram 10.1 shows one insulated conductor which is moved downwards in a magnetic field. Diagram 10.2 shows three insulated conductors which are moved downwards in the magnetic field.

Rajah 10.1 menunjukkan satu konduktor berteras digerakkan ke bawah dalam medan magnet. Rajah 10.2 menunjukkan tiga konduktor berteras digerakkan ke bawah dalam medan magnet.



- (a) What is meant by electromagnetic induction? [1 mark]  
 Apakah yang dimaksudkan dengan aruhan elektromagnetik? [1 markah]

- (b) Using Diagram 10.1 and Diagram 10.2, compare, *Menggunakan Rajah 10.1 dan Rajah 10.2, bandingkan.*

- (i) The number of conductor wires [1 mark]  
 Bilangan wayar konduktor [1 markah]
- (ii) The deflection of the galvanometer pointer [1 mark]  
 Pesongan penunjuk galvanometer [1 markah]

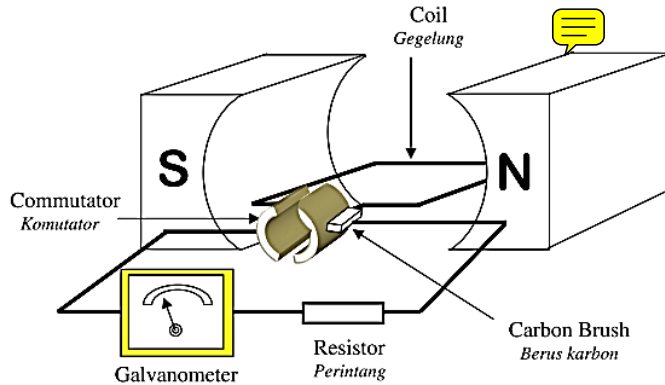
- (iii) Relate the number of conductor and the rate of cutting of magnetic flux. [1 mark]  
 Hubungkan bilangan konduktor dan kadar pemotongan fluks medan magnet. [1 markah]

- (iv) Relate the rate of cutting of magnetic flux and the induced current. [1 mark]  
 Hubungkan kadar pemotongan fluks medan magnet dengan arus aruhan. [1 markah]

- (v) Name the physics law involved. [1 mark]  
 Namakan hukum fizik yang terlibat. [1 markah]

- (c) Diagram 10.3 shows the structure of a generator. Explain how the generator can be used to produce electricity.

*Rajah 10.3 menunjukkan struktur sebuah penjana. Terangkan bagaimana penjana itu digunakan untuk menghasilkan arus elektrik.*



- (d) Diagram 10.4 shows the cross section of a moving coil microphone which converts one form of energy into another.

*Rajah 10.4 menunjukkan keratan rentas sebuah mikrofon gegelung bergerak yang menukarkan satu bentuk tenaga ke bentuk yang lain.*

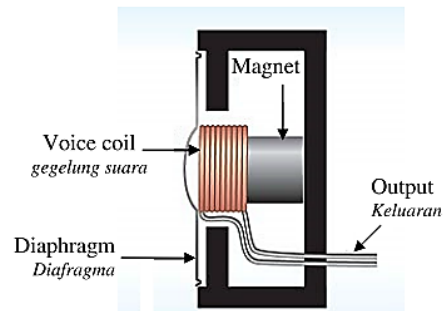


Diagram 10.4  
*Rajah 10.4*

When sound vibrates the diaphragm, the attached voice coil moves in and out the magnetic field and generates a small electric current in the coil.

Using the appropriate concepts in physics, suggest and explain suitable modifications or ways to enable the microphone to detect sound effectively and generate bigger current based on the following aspects :

- (i) **The thickness of the diaphragm**  
*Ketebalan diafragma*
- (ii) **The strength of the material for the diaphragm**  
*Kekuatan bahan untuk diafragma*
- (iii) **The number of turns of the coil**  
*Bilangan lilitan gegelung*
- (iv) **The diameter of the coil wire**  
*Diameter dawai gegelung*
- (v) **The strength of the magnet**  
*Kekuatan magnet*

[10 marks]  
[10 markah]

3.

A student carried out an experiment to find out the relationship between the terminal voltage,  $V$ , and the electric current,  $I$ , and to determine the electromotive force,  $E$  and the internal resistance of the cell. The student repeated the experiment at five different electric current.

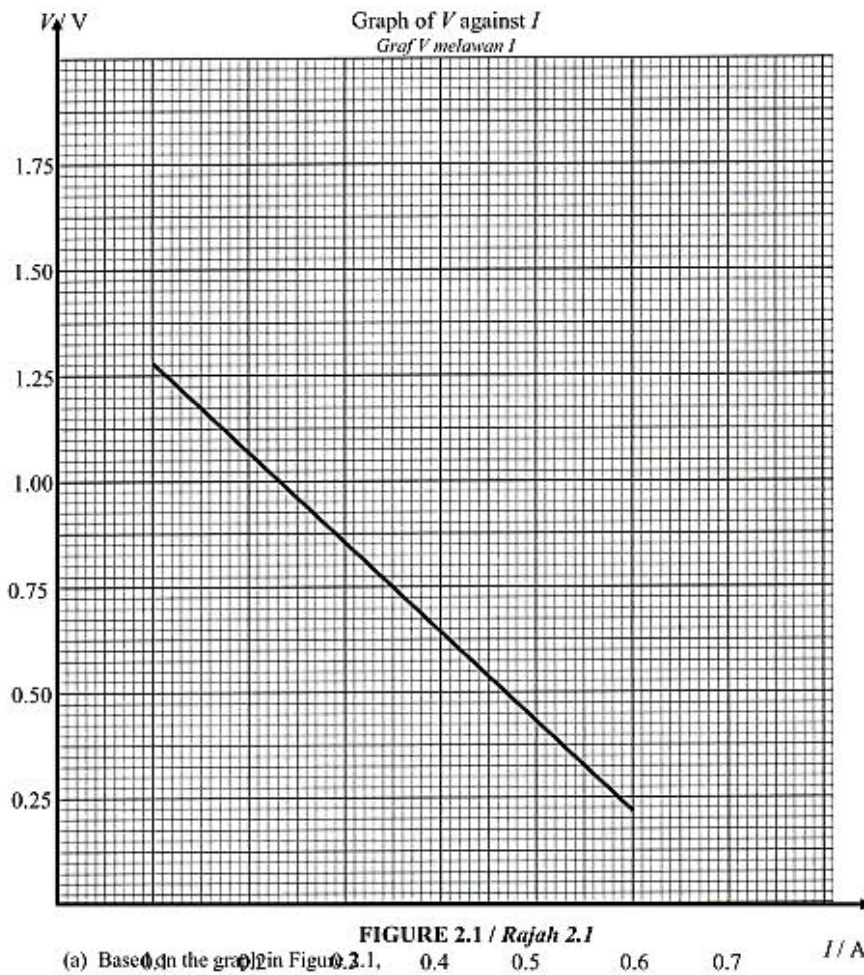
*Seorang murid menjalankan suatu eksperimen untuk mengkaji hubungan antara voltan terminal,  $V$ , dan arus elektrik,  $I$ , dan untuk menentukan daya gerak elektrik,  $E$ , dan rintangan dalam bagi sebuah sel. Murid itu mengulangi eksperimen tersebut dengan lima nilai arus elektrik yang berlainan.*

The results of the experiment are shown on a graph of  $V$  against  $I$  as in Figure 2.1

*Keputusan eksperimen itu ditunjukkan pada graf  $V$  melawan  $I$  seperti dalam Rajah 2.1*

The results of the experiment are shown on a graph of  $V$  against  $I$  as in Figure 2.1

*Keputusan eksperimen itu ditunjukkan pada graf  $V$  melawan  $I$  seperti dalam Rajah 2.1*



Berdasarkan graf dalam Rajah 2.1,

- (i) state the relationship between  $V$  and  $I$ .  
*nyatakan hubungan antara  $V$  dan  $I$ .*

[ 1 mark /markah ]

- (ii) determine the terminal voltage,  $V$  when the electric current,  $I = 0.3$  A.  
Show on the graph, how you determine  $V$ .  
*tentukan voltan terminal,  $V$ , apabila arus elektrik,  $I = 0.3$  A.*  
*Tunjukkan pada graf, bagaimana anda menentukan  $V$ .*

$V = \dots\dots\dots$  V

[ 2 marks/markah ]

- (b) The electromotive force,  $E$  is given by the intercept of  $V$ -axis of the graph  $V$  against  $I$ .  
Determine the electromotive force of the cell.  
Show on the graph, how you determine  $E$ .  
*Daya gerak elektrik,  $E$ , diberikan oleh pintasan di paksi- $V$  bagi graf  $V$  melawan  $I$ . Tentukan daya gerak elektrik bagi sel itu.*  
*Tunjukkan pada graf, bagaimana anda menentukan  $E$ .*

$E = \dots\dots\dots$  V

[ 2 marks/markah ]

- (c) The internal resistance,  $r$  is given by the following equation:  
*Rintangan dalam,  $r$ , diberikan oleh persamaan berikut:*

$$r = -m$$

where  $m$  is the gradient of the graph  $V$  against  $I$ .  
*di mana  $m$  adalah kecerunan bagi graf  $V$  melawan  $I$ .*

- (i) Determine the gradient of the graph  $V$  against  $I$ .  
Show on the graph how you determine the gradient,  $m$ .  
*Tentukan kecerunan bagi graf  $V$  melawan  $I$ .*  
*Tunjukkan pada graf, bagaimana anda menentukan kecerunan,  $m$ , tersebut.*





[ 3 marks/markah ]

- (ii) Hence, determine the internal resistance,  $r$ .  
Maka, tentukan rintangan dalam,  $r$ .

$r = \dots\dots\dots$

[ 1 mark/markah ]

- (d) The experiment is repeated using a different cell of internal resistance,  $r = 1.6 \Omega$ .  
When the electric current is adjusted to 0.5 A, the terminal voltage obtained is 1.2 V.  
Calculate the electromotive force,  $E'$  of the cell.  
Eksperimen itu diulangi menggunakan sebuah sel lain yang mempunyai rintangan dalam,  $r = 1.6 \Omega$ . Apabila arus elektrik dilaraskan kepada 0.5 A, voltan terminal yang diperolehi adalah 1.2 V.  
Hitung daya gerak elektrik,  $E'$  bagi sel tersebut.

$E' = \dots\dots\dots$

[ 2 marks/markah ]

- (e) State **one** precaution that should be taken during the experiment.  
Nyatakan **satu** langkah berjaga-jaga yang perlu diambil sepanjang eksperimen itu.



4.

Diagram 3 shows two similar catapults A and B which are applied with the force of 10 N and 20 N respectively.  
Rajah 3 menunjukkan dua buah lastik A dan B yang serupa, masing-masing dikenakan dengan daya 10 N dan 20 N.

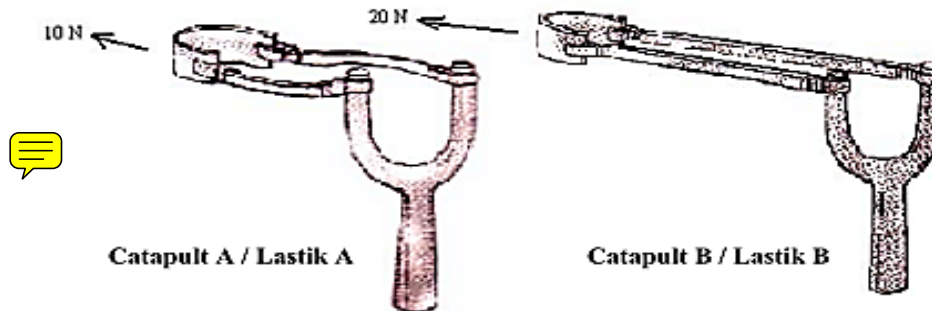


Diagram 3 / Rajah 3

- c) With the use of apparatus such as spring, retort stand and the other apparatus, describe an experimental framework to investigate the hypothesis stated in 3(b).

$F = kx$   
 $x \propto F$

