Name : ..... Class : .....

CONFIDENTIAL
4531/2
Fizik
Kertas 2
November
2021

$2\frac{1}{2}$ jam

4531/2

MAKTAB RENDAH SAINS MARA

PEPERIKSAAN AKHIR SIJIL PENDIDIKAN MRSM 2021

FIZIK

Kertas 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS PEPERIKSAAN INI SEHINGGA DIBERITAHU

1. Write down your name and class in the space provided.
   Tuliskan nama dan kelas anda pada ruang yang disediakan

2. The questions are written in English and *bahasa Melayu.*
   Kertas peperiksaan ini adalah dalam bahasa Inggeris dan bahasa Melayu.

3 Candidates are required to read the information at the back of the booklet
Calon dikehendaki membaca maklumat di halaman belakang buku soalan ini.

For Examiner's Use			
Bahagian	Soalan	Markah Penuh	Markah diperoleh
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			

Kertas peperiksaan ini mengandungi **33** halaman bercetak

The following information may be useful. The symbols have their usual meaning.
(Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.)

1 $a = \frac{v-u}{t}$

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

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

4 Momentum = mv

5 $F = ma$

6 Kinetic Energy / *Tenaga kinetik* = $\frac{1}{2}mv^2$

7 Power / *Kuasa*, $P = \frac{Energy}{Time}$

8 Power / *Kuasa*, $P = IV$

9 Pressure / *Tekanan*, $P = h\rho g$

10 Pressure / *Tekanan* , $P = \frac{F}{A}$

11 Heat / *Haba*, $Q = mc\Delta\theta$

12 $\frac{PV}{T} = constant$

13 $n = \frac{\sin i}{\sin r}$

14 $n = \frac{real\ depth}{appreant\ depth}$

15 $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

16 *Linear magnification*, $m = \frac{v}{u}$

17 $\lambda = \frac{ax}{D}$

18 $v = f\lambda$

19 $V = IR$

20 $Q = It$

21 Gravitational force / *Daya graviti* $F = \frac{Gm_1m_2}{r^2}$

22 Gravitational acceleration / *Pecutan graviti*, $g = \frac{GM}{r^2}$

23 Centripetal force / *Daya memusat*, $F = \frac{mv^2}{r}$

24 Centripetal acceleration / *Pecutan memusat*, $a = \frac{v^2}{r}$

25 Gravitational potential energy / *Tenaga keupayaan graviti*, $U = -\frac{Gm_1m_2}{r}$

26 Linear speed / *Laju linear*, $v = \sqrt{\frac{GM}{r}}$

27 Linear speed / *Laju linear*, $v = \frac{2\pi r}{T}$

28 Escape velocity / *Halaju lepas*, $v = \sqrt{\frac{2GM}{r}}$

29 Orbital period / *Tempoh orbit*, $T^2 = \frac{4\pi^2r^3}{GM}$

30 $\frac{T_1^2}{T_2^2} = \frac{r_1^3}{r_2^3}$

31 Gravitational constant / *Pemalar graviti*, $G = 6.67 \times 10^{-11}\ Nm^2kg^{-2}$

32 Mass of Earth / *Jisim bumi*, $M = 5.97 \times 10^{24}\ kg$

33 Radius of earth / *Jejari bumi*, $R = 6.37 \times 10^6\ m$

34 Mass of the sun / *Jisim matahari* = $1.99 \times 10^{30}\ kg$

35 Planck's constant / *Pemalar Planck*, h = 6.63 x 10^{-34} J s

36 $E = mc^2$

37 $c = 3.0 \times 10^8\ m\,s^{-1}$

38 $g = 9.81\ m\,s^{-2}$

39 Energy / *Tenaga*, E = hf

40 $hf = W + \frac{1}{2}mv^2$

For Examiner's Use

Section A
Bahagian A

[60 *marks*]
[60 *markah*]

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

1 Diagram 1 shows a lady spinning an iron ball tied to a string with force, F to maintain its circular motion at uniform speed, v.

Rajah 1 *menunjukkan seorang wanita sedang memutar sebiji bola besi yang diikat pada satu tali dengan daya, F bagi mengekalkan gerakan membulatnya pada laju seragam, v.*

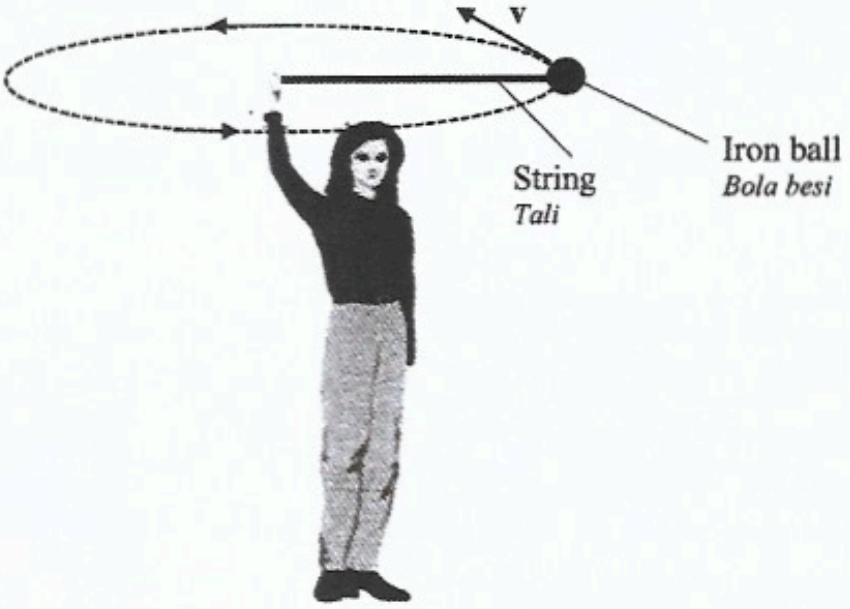


Diagram 1
Rajah 1

(*a*) Name the force, F.
Namakan daya, F.

.....

[1 mark]
[1 *markah*]

1 (*a*)

1

(*b*) Based on Diagram 1,
Berdasarkan pada Rajah 1,

(i) draw an arrow to show the direction of force, F that acts on the string.
lukis anak panah untuk menunjukkan arah daya, F yang bertindak pada tali itu.

[1 mark]
[1 *markah*]

1 (*b*)(i)

1

For Examiner's Use

1(*b*)(ii)

1

(ii) state **one** factor that affect the speed,v

*nyatakan **satu** faktor yang mempengaruhi laju,v*

.....

[1 mark]
[1 *markah*]

(*c*) What happens to the direction of the iron ball if the string suddenly breaks?

Apakah yang berlaku kepada arah gerakan bola besi itu jika tali terputus secara tiba-tiba?

1(*c*)

1

.....

[1 mark]
[1 *markah*]

Total A1

4

For Examiner's Use

2 Diagram 2 shows a nuclear reaction in a nuclear reactor.
Rajah 2 menunjukkan tindakbalas nuklear di dalam sebuah reaktor nuklear.

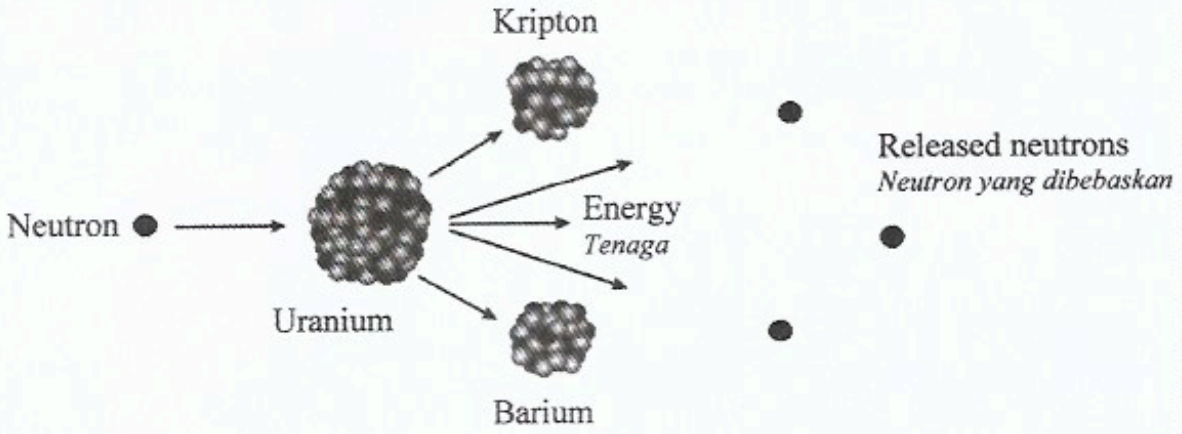


Diagram 2
Rajah 2

(*a*) State the type of nuclear reaction that occurs.
Namakan jenis tindakbalas nuklear yang berlaku.

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

2 (*a*) 1

(*b*) In Diagram 2, the neutrons produced continuously bombarded other uranium nuclei and releases a large amount of energy.
Dalam Rajah 2, neutron-neutron yang terhasil secara berterusan akan menghentam nukleus uranium lain dan menghasilkan tenaga yang besar.

(i) Name the reaction process
Namakan proses tindakbalas tersebut

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

2 (*b*)(i) 1

(ii) What is the condition need to be fulfilled so that the reaction in **2**(*b*)(i) can be sustained?
Apakah syarat yang perlu dipenuhi supaya tindak balas dalam **2**(*b*)(i) *boleh berlaku secara berterusan?*

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

2 (*b*)(ii) 1

[Turn over

For Examiner's Use

(c) The nuclear reaction above is represented by the following equation.
Tindakbalas nuklear di atas diwakili oleh persamaan berikut

$$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{X}_{56}Ba + {}^{92}_{Y}Kr + 3\,{}^{1}_{0}n + \text{Energy / } \textit{Tenaga}$$

Calculate the value of X and Y
Hitungkan nilai X dan Y.

2 (c)

2

[2 marks]
[2 *markah*]

Total A2

5

For Examiner's Use

3 Diagram 3 shows a projectile motion of a stunt action performance. A human cannon ball is fired with high momentum to the air at an angle of 60°.

Rajah 3 menunjukkan gerakan projektil satu pertunjukan lagak ngeri. Seorang manusia yang bertindak sebagai peluru ditembak dengan momentum yang tinggi ke udara pada sudut 60°.

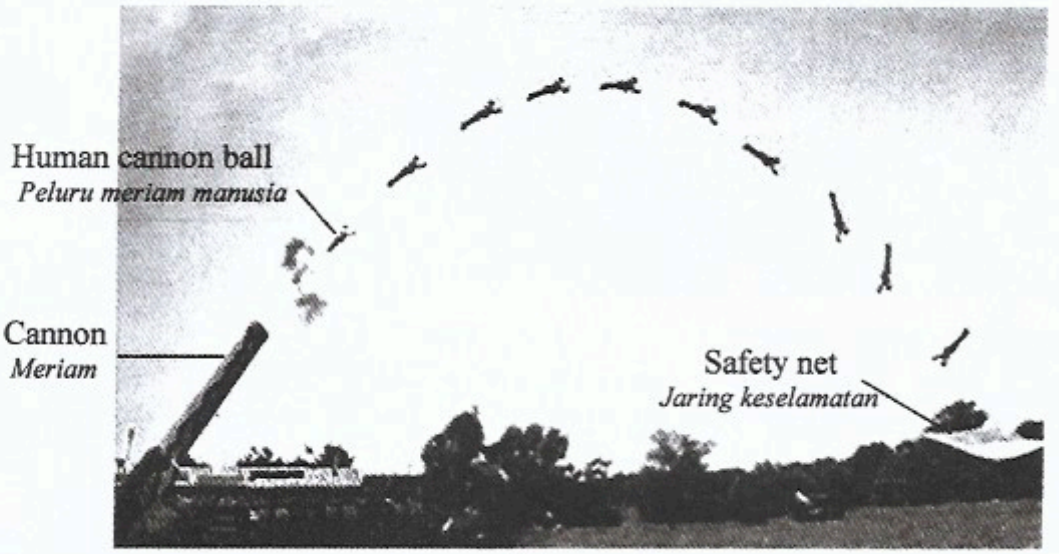


Diagram 3
Rajah 3

(*a*) What is the meaning of momentum?

Apakah maksud momentum?

.....

[1 mark]
[1 *markah*]

3 (*a*) 1

(*b*) The mass of cannon is 250 kg and the mass of the human cannon ball is 50 kg. After explosion the cannon recoil at a velocity of 3.5 m s^{-1} and the human cannon ball moves forward with a velocity, v_1.

Jisim meriam ialah 250 kg dan jisim peluru manusia ialah 50 kg. Selepas letupan, meriam tersentak ke belakang pada halaju 3.5 m s^{-1} dan peluru manusia bergerak ke hadapan dengan halaju, v_1.

(i) Determine the total momentum before explosion.

Tentukan jumlah momentum sebelum letupan.

.....

[1 mark]
[1 *markah*]

3 (*b*)(i) 1

For Examiner's Use

(ii) Calculate the velocity of the human cannon ball, v_1.

Hitung halaju peluru manusia tersebut, v_1

3 (*b*)(ii) 2

[2 marks]
[2 *markah*]

(*c*) Name the physics principle involved in **3**(*b*).

Namakan prinsip fizik yang terlibat dalam **3**(*b*).

3 (*c*) 1

.....

[1 mark]
[1 *markah*]

(*d*) Based on Diagram 3, state one modification that can be done so that the human can be fired further.

Berdasarkan Rajah 3, *nyatakan satu pengubahsuaian yang boleh dilakukan supaya manusia itu dapat ditembak lebih jauh.*

3 (*d*) 1

.....

[1 mark]
[1 *markah*]

Total A3 6

For Examiner's Use

4 Diagram 4.1 shows a transistor circuit which acts as an automatic switch.
The air conditioner will be switched on automatically when the room temperature is more than 28 °C.

Rajah 4.1 *menunjukkan satu litar transistor yang bertindak sebagai suis automatik.*
Penghawa dingin akan dihidupkan secara automatik apabila suhu bilik melebihi 28 °C.

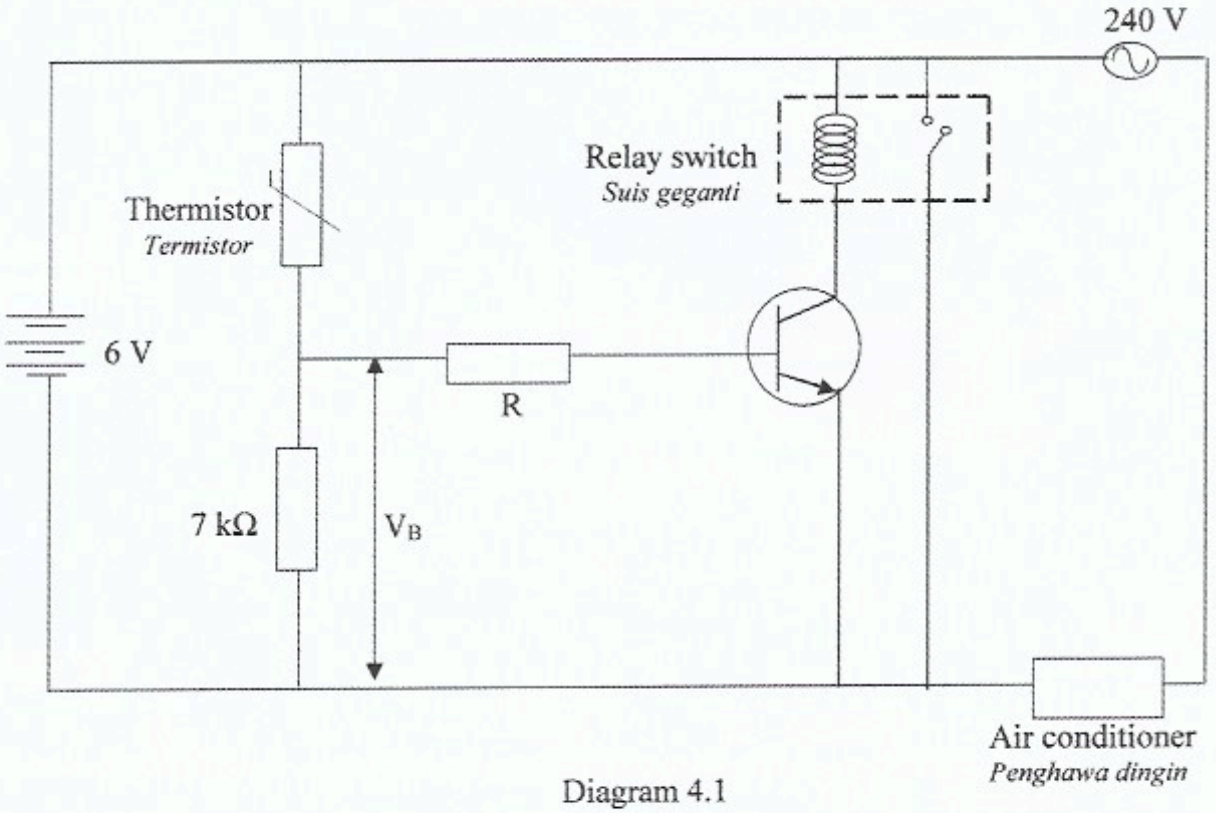


Diagram 4.1
Rajah 4.1

(*a*) Name the type of the transistor used.
Namakan jenis transistor yang digunakan.

.....

[1 mark]
[1 *markah*]

4 (*a*) 1

(*b*) Which statement correctly describe the function of the relay switch.
Tick (√) the correct answer in the box provided.
Pernyataan manakah memerihalkan dengan betul tentang fungsi suis geganti.
Tandakan (√) pada jawapan yang betul dalam kotak yang disediakan.

☐ To switch on the secondary circuit
Untuk menghidupkan litar kedua.

☐ To switch on the collector circuit.
Untuk menghidupkan litar pengumpul.

[1 mark]
[1 *markah*]

4 (*b*) 1

For Examiner's Use

(c) The transistor is switched on when the base voltage, $V_B \geq 4$ V.
Calculate:
Transistor itu dihidupkan apabila voltan tapak, $V_B \geq 4$ V.
Hitung:

(i) The potential difference across the thermistor
Beza keupayaan merentasi termistor

4 (c)(i)

1

[1 mark]
[1 *markah*]

(ii) The minimum resistance of thermistor.
Rintangan minimum termistor.

4 (c)(ii)

2

[2 marks]
[2 *markah*]

(d) Diagram 4.2 shows a graph obtained from an activity to study the relationship between I_C and I_B.
Rajah 4.2 *menunjukkan graf yang diperolehi dari satu aktiviti untuk mengkaji hubungan antara* I_C *dan* I_B.

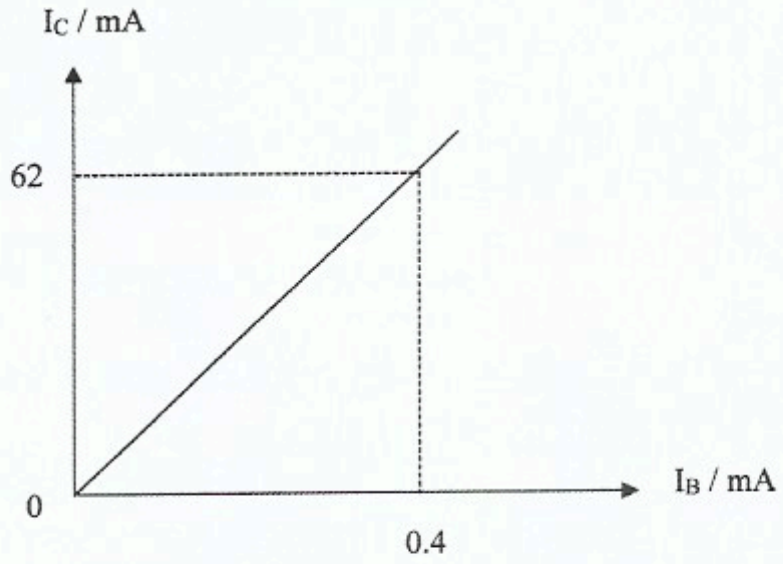


Diagram 4.2
Rajah 4.2

Based on the graph in Diagram 4.2,
Berdasarkan graf pada Rajah 4.2,

For Examiner's Use

(i) Calculate the gradient of the graph.
Kirakan kecerunan graf.

[2 marks]
[2 *markah*]

4 (*d*)(i)
2

(ii) What is the physical quantity represented by gradient of the graph?
Apakah kuantiti fizik yang diwakili oleh kecerunan graf?

.....

[1 mark]
[1 *markah*]

4 (*d*)(ii)
1

(*e*) Besides being used as an automatic switch, state another function of a transistor.
Selain digunakan sebagai suis automatik, nyatakan fungsi lain bagi transistor.

.....

[1 mark]
[1 *markah*]

4 (*e*)
1

Total A4
9

For Examiner's Use

5 Diagram 5.1 shows the reading of a Bourdon Gauge before the piston of the gas container is pushed inwards.
Diagram 5.2 shows the reading of the Bourdon Gauge after the piston of the gas container is pushed inwards.

Rajah 5.1 menunjukkan bacaan Tolok Bourdon sebelum omboh bekas gas ditolak ke dalam.
Rajah 5.2 menunjukkan bacaan Tolok Bourdon selepas omboh bekas gas ditolak ke dalam.

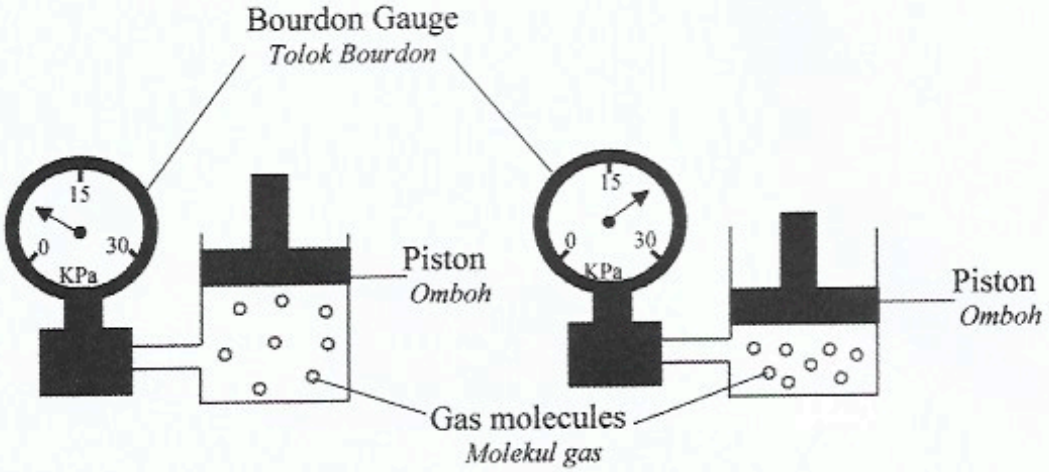


Diagram 5.1
Rajah 5.1

Diagram 5.2
Rajah 5.2

(*a*) Based on Diagram 5.1, tick (√) the correct answer in the box provided.

Berdasarkan Rajah 5.1, tandakan (√) pada jawapan yang betul di dalam kotak yang disediakan.

The Bourdon Gauge measures
Tolok Bourdon mengukur

☐ gas temperature
suhu gas

☐ gas pressure
tekanan gas

☐ gas volume
isipadu gas

5 (*a*) 1

[1 mark]
[1 *markah*]

(*b*) Observe Diagram 5.1 and Diagram 5.2,
Perhatikan Rajah 5.1 dan Rajah 5.2,

For Examiner's Use

(i) Compare the volume of gas in the container.
Bandingkan isipadu gas di dalam bekas

.....

[1 mark]
[1 *markah*]

5 (*b*)(i) 1

(ii) Compare the reading of the Bourdon Gauge
Bandingkan bacaan Tolok Bourdon

.....

[1 mark]
[1 *markah*]

5 (*b*)(ii) 1

(iii) Compare the number of gas molecules inside the container.
Bandingkan bilangan molekul gas di dalam bekas.

.....

[1 mark]
[1 *markah*]

5 (*b*)(iii) 1

(*c*) Based on your answers in **5**(*b*),
Berdasarkan jawapan anda pada **5**(*b*),

(i) state the relationship between the volume of gas and the reading of the Bourdon Gauge.
nyatakan hubungan antara isipadu gas dan bacaan Tolok Bourdon.

.....

[1 mark]
[1 *markah*]

5 (*c*)(i) 1

(ii) Name the physics law involved.
Namakan hukum fizik yang terlibat.

.....

[1 mark]
[1 *markah*]

5 (*c*)(ii) 1

For Examiner's Use

(iii) Using molecular kinetic theory, explain your answers in **5**(*c*)(ii).
Menggunakan teori kinetik molekul, terangkan jawapan anda pada **5**(*c*)(ii).

.....

.....

.....

[2 marks]
[2 *markah*]

5 (*c*)(iii)
2

(*d*) What happens to the kinetic energy of the gas molecules after the piston is pushed inward?
Apakah yang berlaku kepada tenaga kinetik molekul gas selepas piston ditolak ke dalam?

.....

[1 mark]
[1 *markah*]

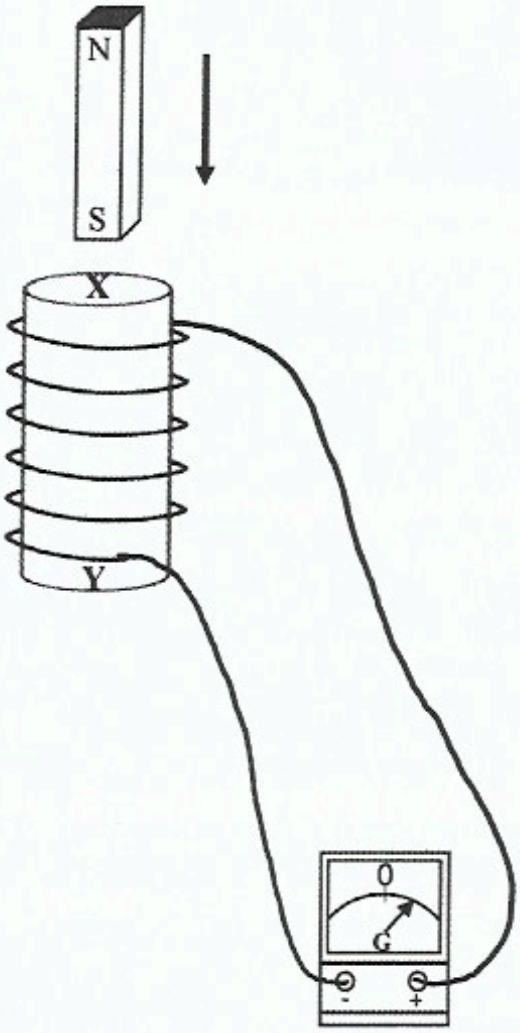
5 (*d*)
1

Total A5
9

6 Diagram 6.1 and Diagram 6.2 show identical bar magnets are dropped at the same height into two solenoids. Both solenoids are connected to galvanometer A and galvanometer B, respectively.

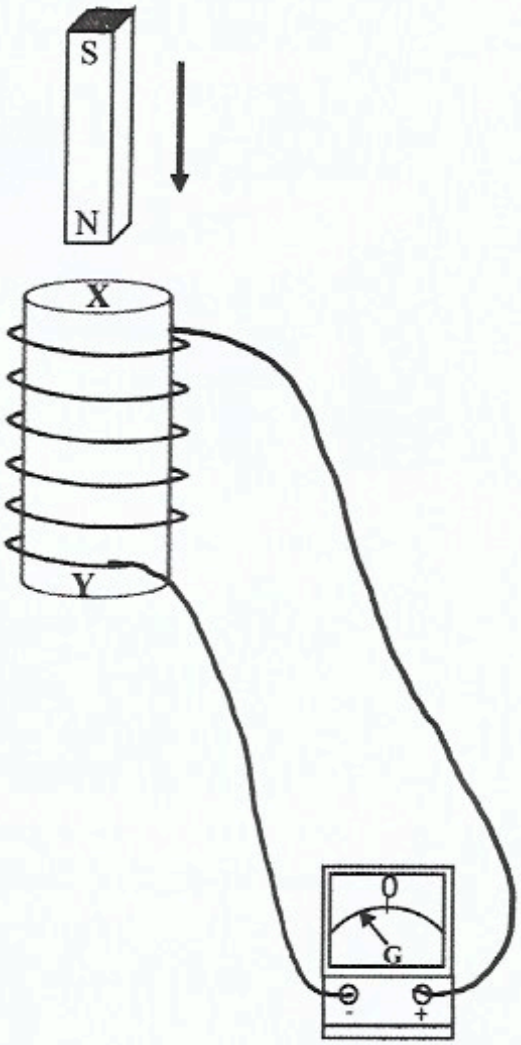
Rajah 6.1 *dan Rajah* 6.2 *menunjukkan magnet bar yang serupa dijatuhkan pada ketinggian yang sama ke dalam dua solenoid. Kedua-dua solenoid masing-masing disambungkan kepada galvanometer* A *dan galvanometer* B.

For Examiner's Use



Galvanometer A

Diagram 6.1
Rajah 6.1



Galvanometer B

Diagram 6.2
Rajah 6.2

When the bar magnet enters the solenoid, the magnetic field changes and the galvanometer pointer deflected.

Apabila magnet bar memasuki solenoid, medan magnet berubah dan jarum galvanometer terpesong.

(*a*) What is the meaning of magnetic field?

Apakah maksud medan magnet?

.....

[1 mark]
[1 *markah*]

6 (*a*) 1

[Turn over

For Examiner's Use

(*b*) Based on Diagram 6.1 and Diagram 6.2,

Berdasarkan Rajah 6.1 *dan Rajah* 6.2,

(i) compare the number of turns of the solenoid

bandingkan bilingan lilitan solenoid

6 (*b*)(i) 1

.....

[1 mark]
[1 *markah*]

(ii) compare the polarity of magnet that enter the solenoid.

bandingkan kekutuban magnet yang memasuki solenoid tersebut.

6 (*b*)(ii) 1

.....

[1 mark]
[1 *markah*]

(iii) compare the direction of deflection of the galvanometer pointer.

bandingkan arah pesongan jarum galvanometer.

6 (*b*)(iii) 1

.....

[1 mark]
[1 *markah*]

(*c*) Relate the polarity of magnet that enters the solenoid to the direction of deflection of the galvanometer pointer.

Hubungkaitkan kekutuban magnet yang memasuki solenoid dengan arah pesongan jarum galvanometer.

6 (*c*) 1

.....

[1 mark]
[1 *markah*]

(*d*) Based on Diagram 6.1,

Berdasarkan Rajah 6.1,

(i) state the polarity at X.

nyatakan kekutuban pada X.

6 (*d*)(i) 1

X : .....

[1 mark]
[1 *markah*]

(ii) name the law used to determine the polarity of X.

namakan hukum yang digunakan untuk menentukan kekutuban X.

.....

[1 mark]
[1 *markah*]

For Examiner's Use

6 (*d*)(ii)

1

(*e*) The magnet in Diagram 6.1 is then released from a higher position.
What happen to the deflection of the galvanometer pointer?
Explain your answer.

Magnet dalam Rajah 6.1 *kemudiannya dilepaskan dari kedudukan yang lebih tinggi.*
Apakah yang berlaku kepada pesongan jarum galvanometer?
Terangkan jawapan anda.

.....

.....

[2 marks]
[2 *markah*]

6 (*e*)

2

Total A6

9

For Examiner's Use

7 Diagram 7 shows an object, O is placed in front of a convex lens, J. The focal length of the convex lens is 4 cm.

Rajah 7 menunjukkan satu objek,O diletakkan di hadapan satu kanta cembung, J. Panjang fokus kanta cembung itu ialah 4 cm.

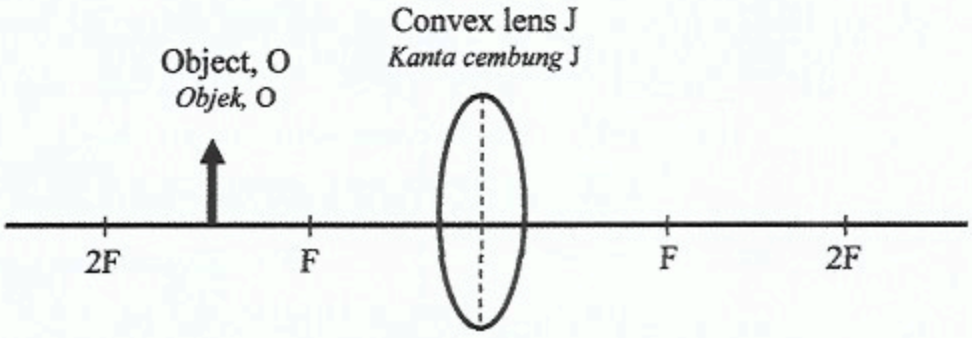


Diagram 7
Rajah 7

(*a*) What is the meaning of focal length?

Apakah maksud panjang fokus?

7 (*a*)

.....

[1 mark]
[1 *markah*]

(*b*) (i) On Diagram 7, draw a ray diagram of the object to form an image.

Pada rajah 7, lukiskan satu rajah sinar bagi objek tersebut untuk membentuk satu imej.

7 (*b*)(i)

[2 marks]
[2 *markah*]

(ii) Give **one** characteristic of the image formed.

*Berikan **satu** ciri imej yang terbentuk.*

7 (*b*)(ii)

.....

[1 mark]
[1 *markah*]

(*c*) Convex lens J acts as an eyepiece lens and need to be combined with another convex lens that acts as objective lens to build an astronomical telescope. Convex lenses P, Q, R and S can be used as the objective lens.

Kanta cembung J bertindak sebagai kanta mata dan perlu digabungkan dengan kanta cembung yang lain yang bertindak sebagai kanta objektif untuk membina sebuah teleskop astronomi. Kanta cembung P, Q, R dan S boleh digunakan sebagai satu kanta objektif.

Table 7 shows characteristics of four convex lenses P, Q, R and S.

Jadual 7 menunjukkan ciri-ciri empat kanta cembung P, Q, R dan S.

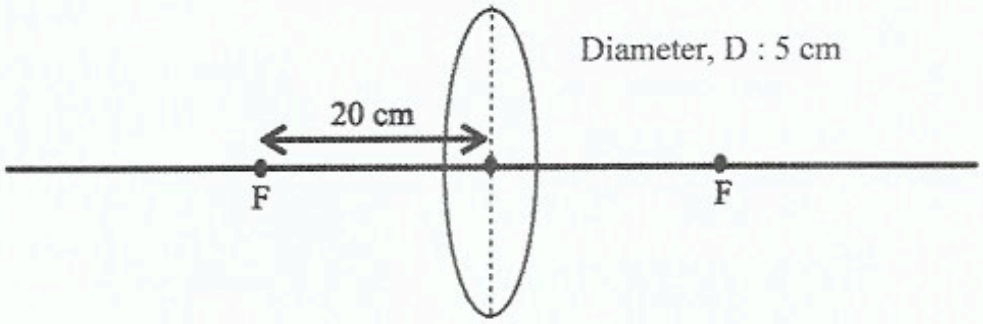
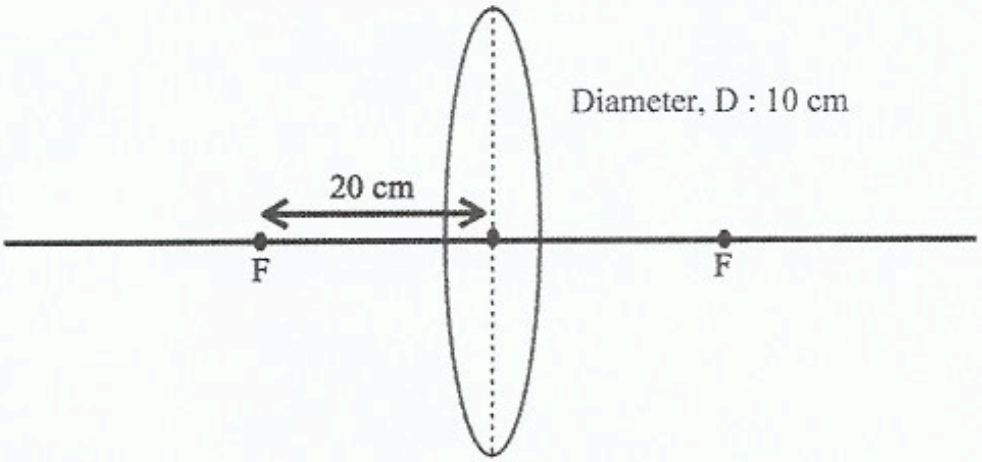
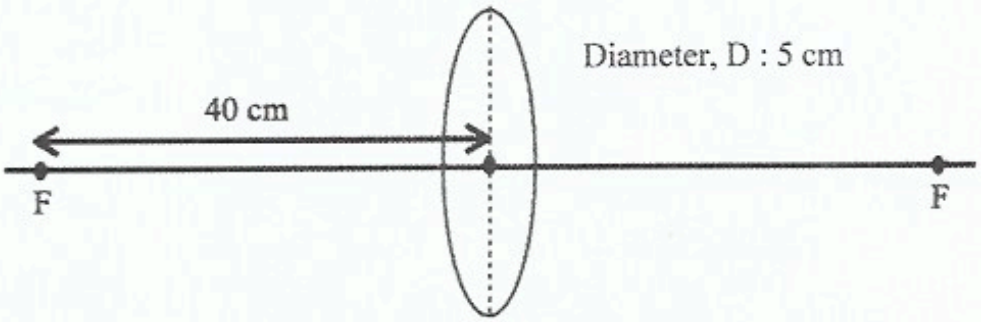
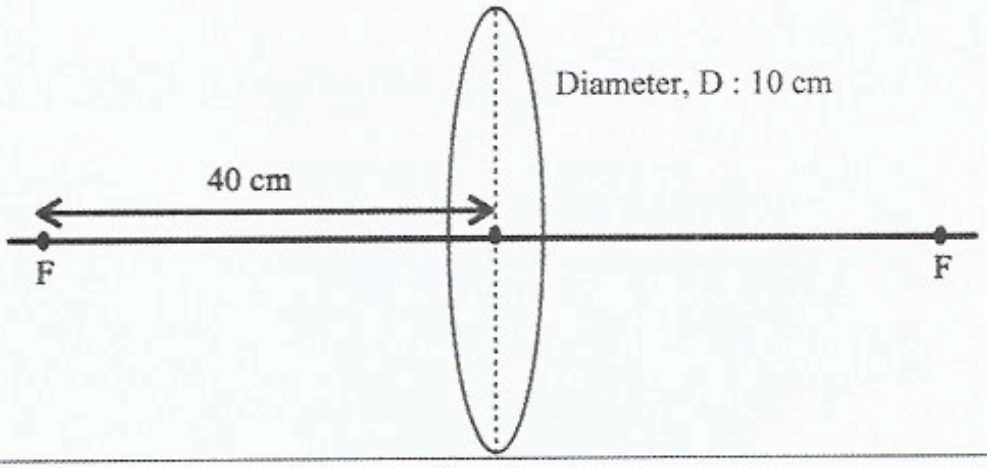
Convex lens P *Kanta cembung* P	
Convex lens Q *Kanta cembung* Q	
Convex lens R *Kanta cembung* R	
Convex lens S *Kanta cembung* S	

Table 7

Jadual 7

For Examiner's Use

Based on the information in Table 7, state the suitable characteristics of the objective lens which can produce larger and clearer image.

Give reason for the suitability of the characteristics.

Berdasarkan maklumat pada Jadual 7, nyatakan ciri-ciri yang sesuai bagi kanta objektif yang dapat menghasilkan imej yang lebih besar dan jelas.

Beri sebab untuk kesesuaian ciri-ciri tersebut.

(i) Focal length.

Panjang fokus.

.....

[1 mark]
[1 *markah*]

Reason

Alasan

.....

[1 mark]
[1 *markah*]

7 (*c*)(i) 2

(ii) Diameter

Diameter

.....

[1 mark]
[1 *markah*]

Reason

Alasan

.....

[1 mark]
[1 *markah*]

7 (*c*)(ii) 2

(*d*) Based on your answer in 7(*c*), choose the most suitable convex lens to be used as an objective lens of astronomical telescope.

Berdasarkan kepada jawapan anda di 7(*c*), *pilih kanta cembung yang paling sesuai digunakan sebagai kanta objektif bagi teleskop astronomi tersebut.*

.....

[1 mark]
[1 *markah*]

7 (*d*) 1

Total A7 9

For Examiner's Use

8 Diagram 8 shows a trainee using an elastic pull sit-up spring in her training.

Rajah **8** *menunjukkan seorang pelatih menggunakan spring bangkit tubi yang elastik dalam latihannya.*

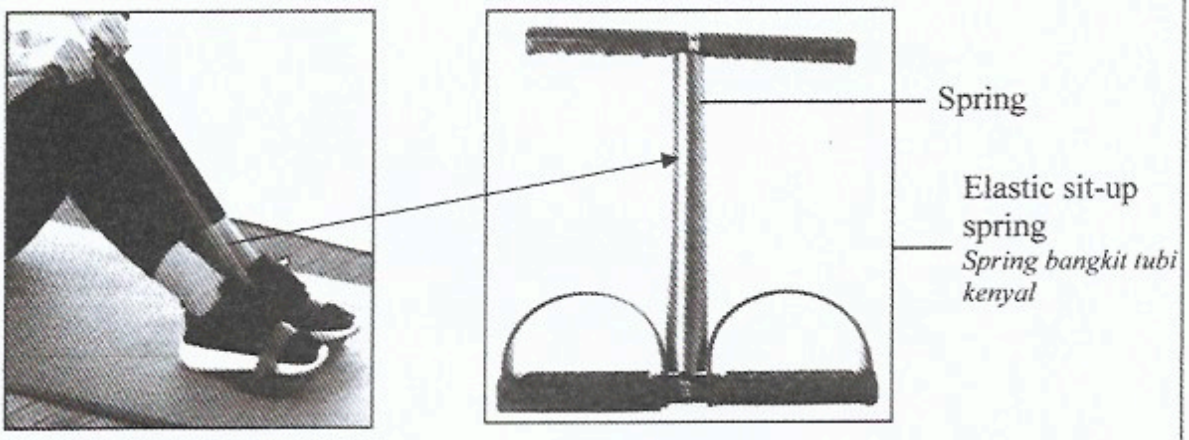


Diagram 8
Rajah 8

A spring is attached between the handle and footrest of the elastic sit-up spring. When force is applied, the spring stretches and return to its original position once the force is removed.

The force applied can be determined by using formula of F = kx, where k is spring constant and x is extension of the spring.

Satu spring dipasang antara pemegang dan tempat letak kaki spring bangkit tubi kenyal. Apabila daya dikenakan, spring meregang dan kembali ke kedudukan asalnya apabila daya dialihkan.

Daya yang dikenakan boleh ditentukan menggunakan rumus F = kx *di mana* k *ialah pemalar spring dan* x *ialah pemanjangan spring.*

(*a*) Name the physics law related with the above formula.

Namakan hukum fizik yang berkaitan dengan formula di atas.

.....

[1 mark]
[1 *markah*]

8 (*a*) 1

(*b*) The maximum force can be applied to the elastic sit-up spring is 450 N.
What happens to the spring if the force applied is 500 N?
Explain your answer.

Daya maksimum yang boleh dikenakan kepada spring bangkit tubi kenyal itu ialah 450 *N. Apakah yang akan berlaku kepada spring jika daya yang dikenakan adalah* 500 *N? Terangkan jawapan anda.*

.....

.....

[2 marks]
[2 *markah*]

8 (*b*) 2

[Turn over

For Examiner's Use

(c) Suggest modification to the spring so that it can withstand a bigger force and give reason.

Cadangkan penambahbaikan kepada spring supaya dapat menahan daya yang lebih besar dan beri sebab.

(i) Thickness wire of the spring.

Ketebalan dawai spring.

.....

[1 mark]
[1 *markah*]

Reason

Alasan

.....

[1 mark]
[1 *markah*]

8 (c)(i) 2

(ii) Number of springs.

Bilangan spring.

.....

[1 mark]
[1 *markah*]

Reason

Alasan

.....

[1 mark]
[1 *markah*]

8 (c)(ii) 2

(iii) Arrangement of the springs.

Susunan spring.

.....

[1 mark]
[1 *markah*]

Reason

Alasan

.....

[1 mark]
[1 *markah*]

8 (c)(iii) 2

Total A8 9

Section B

Bahagian B

[20 *marks*]
[20 *markah*]

Answer any **one** question from this section

Jawab mana-mana ***satu*** *soalan daripada bahagian ini*

9 Diagram 9.1 shows an interference pattern of water waves from two coherent sources, S_1 and S_2.

Rajah 9.1 *menunjukkan corak interferens gelombang air daripada dua sumber yang koheren,* s_1 *dan* s_2.

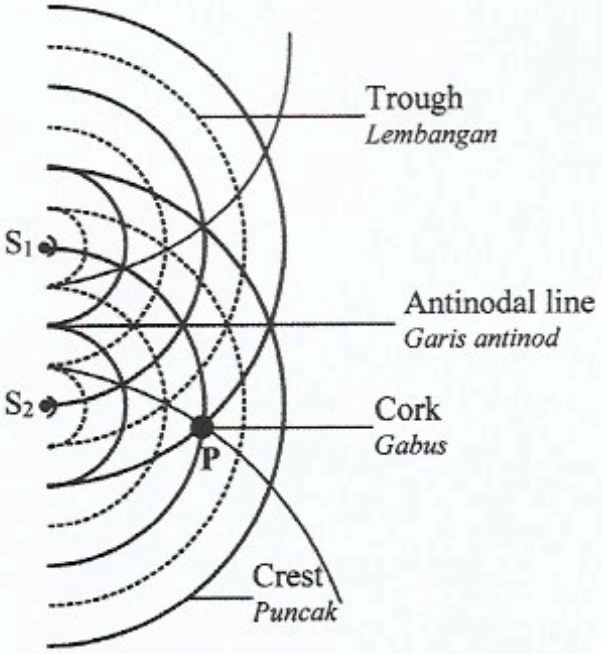


Diagram 9.1
Rajah 9.1

(*a*) What is antinodal line?
Apakah garis antinod?

[1 mark]
[1 *markah*]

(*b*) Describe the movement of the cork at point **P**. Explain your answer.
Huraikan gerakan gabus pada titik ***P****. Terangkan jawapan anda.*

[4 marks]
[4 *markah*]

(c) Diagram 9.2 shows a mobile unit vehicle to deliver information on the Movement Control Order (MCO) during the Covid-19 pandemic among residents. However, the sound produced is not clear.

Rajah 9.2 menunjukkan kenderaan unit bergerak untuk menyampaikan maklumat mengenai Perintah Kawalan Pergerakan (PKP) semasa pandemik Covid-19 dalam kalangan penduduk. Walaubagaimanapun, bunyi yang dihasilkan adalah tidak jelas.

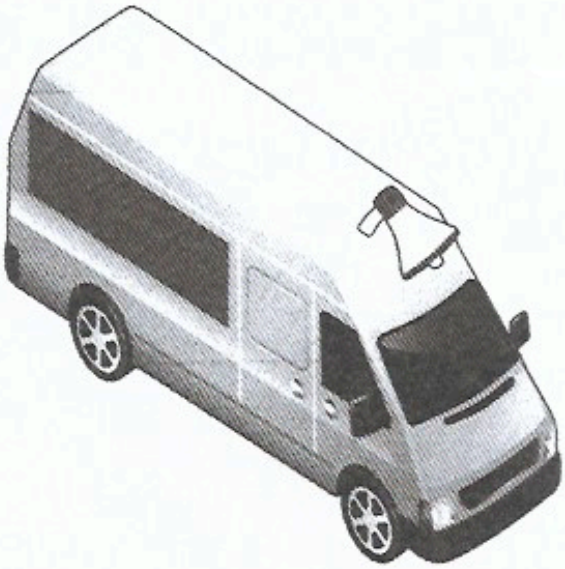


Diagram 9.2
Rajah 9.2

You are required to investigate the speaker set up **J**, **K**, **L** and **M** as shown in Table 9.

Anda dikehendaki untuk mengkaji susun atur pembesar suara **J**, **K**, **L** *dan* **M** *seperti yang ditunjukkan di dalam Jadual 9.*

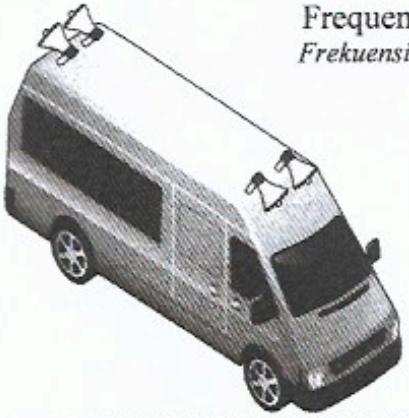
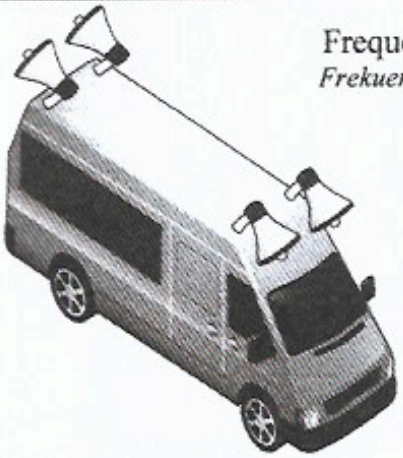
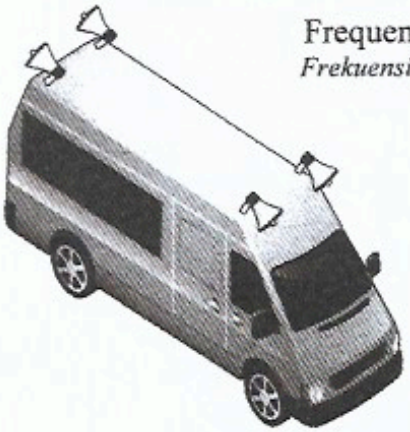
J	 Frequency of the speaker = 5000 Hz *Frekuensi pembesar suara = 5000 Hz*
K	 Frequency of the speaker = 10000 Hz *Frekuensi pembesar suara = 10000 Hz*
L	 Frequency of the speaker = 5000 Hz *Frekuensi pembesar suara = 5000 Hz*
M	 Frequency of the speaker = 10000 Hz *Frekuensi pembesar suara = 10000 Hz*

Table 9
Jadual 9

(*c*) Study the specification of all the speaker set up.

Explain the suitability and determine the most suitable speaker set up to be used on the vehicle so that the sound produced can be heard clearly.
Give reasons for your choice.

Kaji spesifikasi kesemua susun atur pembesar suara.

Terangkan kesesuaian dan tentukan susun atur pembesar suara yang paling sesuai digunakan pada kenderaan supaya bunyi yang terhasil dapat didengari dengan jelas.
Berikan sebab bagi pilihan anda.

[10 marks]
[10 *markah*]

(*d*) Diagram 9.3 shows the fringe pattern obtained in a Young's double slit experiment using a monochromatic orange light. The two slits are 0.5 mm apart and the distance from the double slit to the screen is 2.5 m.

Rajah 9.3 *menunjukkan corak pinggir yang diperoleh daripada eksperimen dwi celah Young menggunakan cahaya monokromatik jingga. Jarak antara dua celah adalah* 0.5 *mm dan jarak dari dwi celah ke skrin adalah* 2.5 *m.*

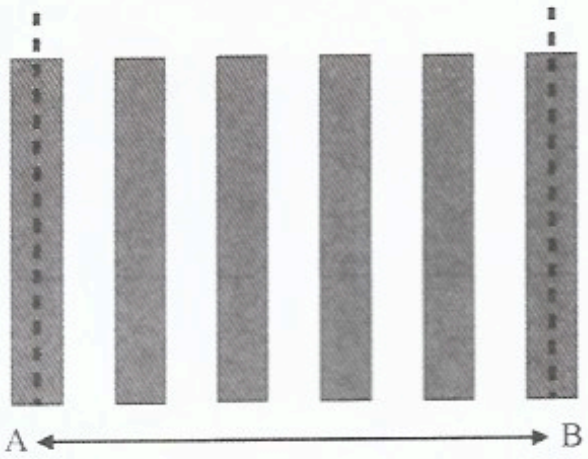


Diagram 9.3
Rajah 9.3

(i) The wavelength of the orange light used in the experiment is 600 nm. Find the distance between the two consecutive orange fringes.

Panjang gelombang cahaya jingga yang digunakan dalam eksperimen ini adalah 600 *nm. Hitungkan jarak antara dua pinggir jingga yang berturutan.*

[3 marks]
[3 *markah*]

(ii) Calculate the distance from A to B.

Hitungkan jarak dari A ke B.

[2 marks]
[2 *markah*]

10 Diagram 10.1 shows an air fryer used to fry fries.
The air fryer used 1450 W of electrical power when connected to 240 V a.c. power supply.

Rajah 10.1 *menunjukkan sebuah penggoreng kering yang digunakan untuk menggoreng kentang. Penggoreng kering tersebut menggunakan kuasa elektrik sebanyak* 1450 *W apabila disambungkan kepada bekalan kuasa a.u.* 240 *V.*

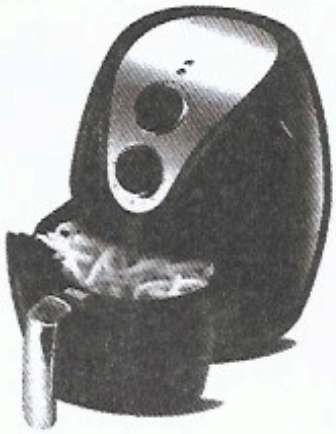


Diagram 10.1
Rajah 10.1

(*a*) What is the meaning of power?
Apakah maksud kuasa?

[1 mark]
[1 *markah*]

(*b*) Diagram 10.2 shows inside of an air fryer.
Rajah 10.2 *menunjukkan bahagian dalam penggoreng kering.*

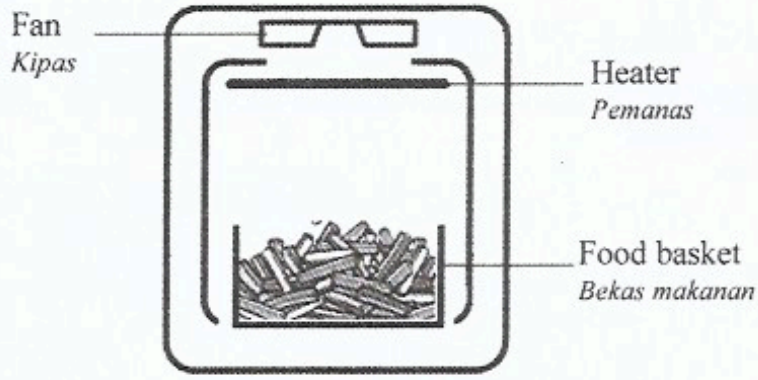


Diagram 10.2
Rajah 10.2

Explain how hot air is generated and circulated inside the air fryer when the switch is on.

Terangkan bagaimana penghasilan dan perolakan udara panas berlaku di dalam penggoreng kering tersebut apabila suis dihidupkan.

[4 marks]
[4 *markah*]

[Turn over

(*c*) An air fryer is designed to fry food without submerging it in oil.
Table 10 shows four different types of air fryer.

Sebuah penggoreng kering direka untuk menggoreng makanan tanpa merendamkannya ke dalam minyak.
Jadual 10 menunjukkan empat buah penggoreng kering yang berbeza.

Air fryer *Penggoreng kering*	**Power (W)** *Kuasa (W)*	**Materials of Heater** *Bahan pemanas*	**Melting point of heater (°C)** *Takat lebur pemanas (°C)*	**Electronic component** *Komponen elektronik*
W	1 400	Iron *Besi*	1 500	Thermostat *Termostat*
X	1 500	Nichrome *Nikrom*	1 400	Thermostat *Termostat*
Y	1 300	Iron *Besi*	1500	Thermistor *Termistor*
Z	1 200	Nichrome *Nikrom*	1 400	Thermistor *Termistor*

Table 10
Jadual 10

You are required to study the characteristics of the air fryer shown in Table 10. Explain the suitability of each characteristic and determine the most efficient air fryer to cook food faster.

Give reasons for your choice.

Anda dikehendaki mengkaji ciri-ciri penggoreng kering yang ditunjukkan dalam Jadual 10. Terangkan kesesuaian setiap ciri-ciri dan tentukan penggoreng kering yang paling cekap untuk memasak makanan dengan cepat.

Nyatakan sebab bagi pilihan anda.

[10 marks]
[10 *markah*]

(*d*) An air fryer has a specification of 240 V, 1450 W.
Calculate,

Sebuah penggoreng kering mempunyai spesifikasi 240 V, 1450 W.
Kirakan,

(i) the current flows through the air fryer.

arus yang mengalir melalui penggoreng kering tersebut.

(ii) the electrical energy consumed in the heating element of air fryer for 10 minutes.

tenaga yang digunakan oleh elemen pemanas penggoreng kering selama 10 *minit.*

(iii) the power loss through the heating element if the resistance is 38 Ω.

kuasa yang hilang melalui elemen pemanas jika rintangannya ialah 38 Ω.

[5 marks]
[5 *markah*]

Section C
Bahagian C

[20 Marks]
[20 *Markah*]

Answer **all** question from this section.
Jawab **semua** *soalan daripada bahagian ini.*

11 Diagram 11.1 and Diagram 11.2 show two identical cruise ships sailing in the North Atlantic Ocean.
The cruise ship in Diagram 11.1 carries 700 passengers and the cruise ship in Diagram 11.2 carries 3000 passengers.
Both of the ships float due to buoyant force.

Rajah 11.1 *dan Rajah* 11.2 *menunjukkan dua buah kapal persiaran yang sama sedang berlayar di Lautan Atlantik Utara.*
Kapal persiaran pada Rajah 11.1 *membawa* 700 *orang penumpang dan kapal persiaran pada Rajah* 11.2 *membawa* 3000 *orang penumpang.*
Kedua-dua kapal itu terapung disebabkan oleh daya apungan.

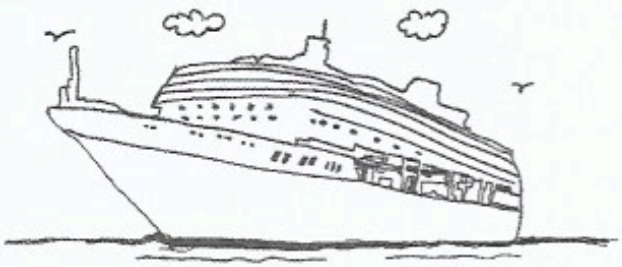


Diagram 11.1
Rajah 11.1

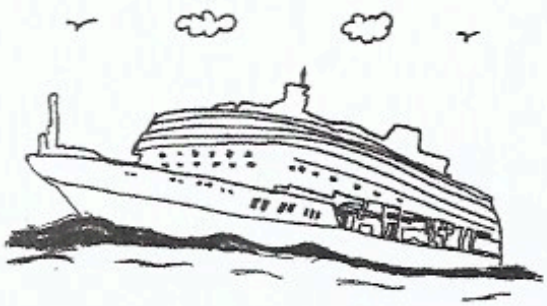


Diagram 11.2
Rajah 11.2

(*a*) What is the meaning of buoyant force?

Apakah maksud daya apungan?

[1 mark]
[1 *markah*]

(*b*) Observe Diagram 11.1 and Diagram 11.2, compare the weight, depth immersed and volume of water displaced by the cruise ships.

Relate the weight of the cruise ship with the depth immersed and make a deduction regarding the relationship between the weight of the ship and buoyant force.

Perhatikan Rajah 11.1 *dan Rajah* 11.2, *bandingkan berat, kedalaman yang tenggelam dan isipadu air yang tersesar oleh kapal persiaran tersebut.*

Hubungkaitkan berat kapal persiaran dengan kedalaman kapal persiaran tenggelam dan buat satu deduksi berkaitan dengan hubungan antara berat kapal persiaran dengan daya apungan.

[5 marks]
[5 *markah*]

(*c*) Diagram 11.3 shows a paraglider used in a recreational activity.

Rajah 11.3 *menunjukkan sebuah peluncur angin yang digunakan dalam aktiviti rekreasi.*

Diagram 11.3
Rajah 11.3

Explain how the paraglider can increase and decrease its altitude while gliding.

Terangkan bagaimana peluncur angin dapat menambah dan mengurangkan altitudnya semasa meluncur.

[4 marks]
[4 *markah*]

(*d*) Diagram 11.4 shows the wings of aeroplane being assembled at an aircraft factory.

Rajah 11.4 *menunjukkan sayap kapal terbang yang sedang dipasang di sebuah kilang membuat kapal terbang*

Diagram 11.4
Rajah 11.4

As an aircraft engineer, you are required to design the most suitable wings to be installed on the body of the aeroplane so it can fly safely.

Using your physics knowledge, explain your suggestions according to the materials, structure and other aspects of the wings of an aeroplane.

Sebagai seorang jurutera pesawat, anda diminta untuk merekabentuk sayap yang paling sesuai untuk dipasang pada badan kapal terbang supaya ia boleh terbang dengan selamat.

Dengan menggunakan pengetahuan fizik, terangkan cadangan anda berdasarkan bahan, struktur dan lain-lain aspek berkaitan sayap kapal terbang.

[10 marks]
[10 *markah*]

END OF QUESTION PAPER
KERTAS PEPERIKSAAN TAMAT