JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009
PHYSICS
Kertas 1
Ogos/September
1 ¼ jam   **Satu jam lima belas minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1.   *Kertas soalan ini adalah dalam dwibahasa.*

2.   *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*

3.   *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kertas soalan ini mengandungi 31 halaman bercetak dan 1 halaman tidak bercetak

The following information maybe useful. The symbols have their usual meaning.

Maklumat berikut mungkin berfaedah. Simbol-simbol mempunyai makna yang biasa.

1. $a = \dfrac{v - u}{t}$

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. Gravitational potential energy / *Tenaga keupayaan graviti* $= mgh$

8. Elastic potential energy / *Tenaga keupayaan kenyal* $= \dfrac{1}{2}Fx$

9. $\rho = \dfrac{m}{V}$

10. Pressure / *Tekanan*, $p = h\rho g$

11. Pressure / *Tekanan*, $p = \dfrac{F}{A}$

12. Heat / *Haba*, $Q = mc\theta$

13. Heat / *Heat*, $Q = ml$

14. $\dfrac{pV}{T} =$ constant / *pemalar*

15. $E = mc^2$

16. $v = f\lambda$

17. Power, $P = \dfrac{\text{energy}}{\text{time}}$

    Kuasa, $P = \dfrac{tenaga}{masa}$

18. $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$

19. $\lambda = \dfrac{ax}{D}$

20. $n = \dfrac{\sin i}{\sin r}$

21. $n = \dfrac{\text{real depth}}{\text{apparent depth}}$

$n = \dfrac{dalam \quad nyata}{dalam \quad ketara}$

22. $Q = It$

23. $V = IR$

24. Power / *Kuasa*, $P = IV$

25. $\dfrac{N_s}{N_p} = \dfrac{V_s}{V_p}$

26. Efficiency / *Kecekapan* $= \dfrac{I_s V_s}{I_p V_p} \times 100\%$

27. $g = 10 \ m \ s^{-2}$

28. $c = 3.0 \times 10^8 \ m \ s^{-1}$

1   A car is moving with velocity 60 km h^{-1}.
    Sebuah kereta bergerak dengan halaju 60 km j^{-1}.
    What is the velocity in m s^{-1}?
    Berapakah halaju ini dalam m s^{-1}?

    A   0.17
    B   1.67
    C   10.0
    D   16.7

2   Which measurement has the greatest value?
    Ukuran manakah yang mempunyai nilai paling besar?

    A 1.13×10^8 mm
    B 1.13×10^8 cm
    C 1.13×10^8 µm
    D 1.13×10^8 nm

3   Diagram 1 shows the scale of a voltmeter.
    Rajah 1 menunjukkan skala bagi voltmeter.
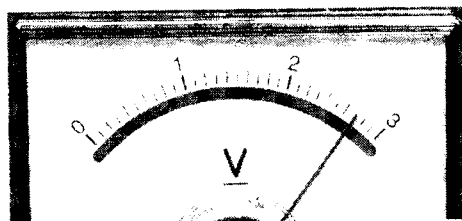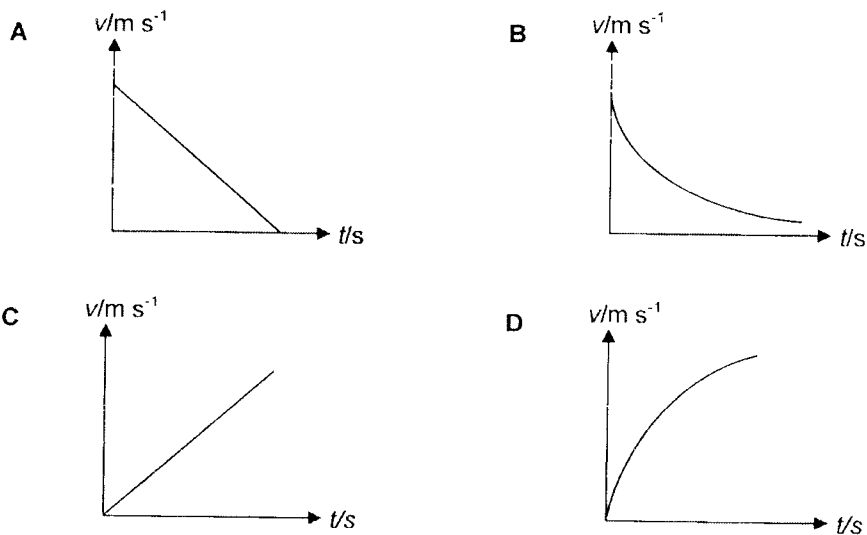

Diagram 1
Rajah 1

What is the accuracy of the voltmeter?
Berapakah kejituan voltmeter?

    A   0.20 V   B   0.10 V
    C   0.02 V   D   0.01 V

4   Which graph shows constant acceleration?
     Graf manakah yang menunjukkan pecutan seragam?

A v/m s^{-1}

B v/m s^{-1}

C v/m s^{-1}

D v/m s^{-1}

5   Diagram 2 shows trolley A and trolley B of same mass.
     Rajah 2 menunjukkan troli A dan troli B yang mempunyai jisim yang sama.

Before collision   After collision
Sebelum perlanggaran   *Selepas perlanggaran*

Plasticine   At rest
Plastisin *Pegun*
u_1

v

Trolley A   Trolley B   Trolley A   Trolley B
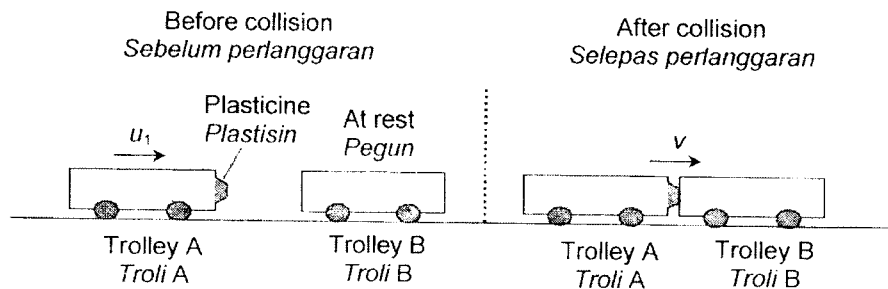*Troli* A   *Troli* B   *Troli* A   *Troli* B

Diagram 2
Rajah 2

Which comparisons are true for the velocity of trolleys A and B after collision?
Perbandingan manakah adalah benar mengenai halaju troli A dan B selepas perlanggaran?

	Trolley A *Troli* A	Trolley B *Troli* B
A	Increases *Bertambah*	Increases *Bertambah*
B	Increases *Bertambah*	Decreases *Berkurang*
C	Decreases *Berkurang*	Increases *Bertambah*
D	Unchanged *Tidak berubah*	Unchanged *Tidak berubah*

6   Diagram 3 shows a heavy trailer.
     Rajah 3 menunjukkan sebuah treler yang berat.

Diagram 3
Rajah 3

It is difficult to change the direction of this vehicle.
Adalah sukar untuk menukar arah kenderaan ini.
This statement is refers to
Pernyataan ini adalah merujuk kepada

A   the concept of inertia
     konsep inersia
B   the concept of equilibrium of forces
     konsep keseimbangan daya
C   the principle of conservation of energy
     prinsip keabadian tenaga
D   the principle of conservation of momentum
     prinsip keabadian momentum

7   Diagram 4 shows a car of mass 800 kg with a forward thrust of 3600 N and a
     frictional force of 2000 N.
     *Rajah 4 menunjukkan sebuah kereta berjisim 800 kg, dengan daya tujah ke
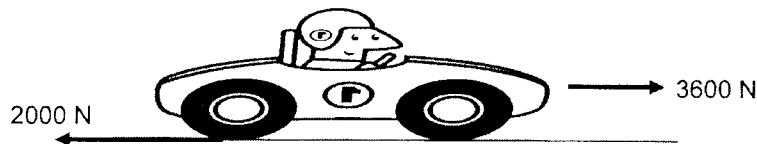   hadapan 3600 N dan daya geseran 2000 N.*

2000 N   3600 N

Diagram 4
Rajah 4

What is the acceleration of the car?
Berapakah pecutan kereta itu?

A 2.0 m s^{-2}
B 2.5 m s^{-2}
C 4.5 m s^{-2}
D 7.0 m s^{-2}

8   Diagram 5 shows the path of a ball rolling down a smooth slope.
     *Rajah 5 menunjukkan lintasan sebiji bola yang berguling menuruni suatu cerun
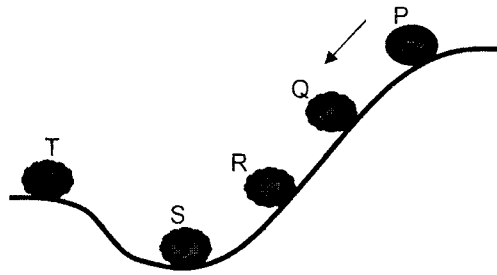   yang licin.*

Diagram 5
Rajah 5

The ball has the greatest change in gravitational potential energy between the
positions
*Bola itu mengalami perubahan tenaga keupayaan graviti yang maksimum di
antara kedudukan*

A   P and R
     P *dan* R
B   Q and S
     Q *dan* S
C   P and S
     P *dan* S
D   R and T
     R *dan* T

9   Diagram 6 shows a picture hanging stationary on a wall.
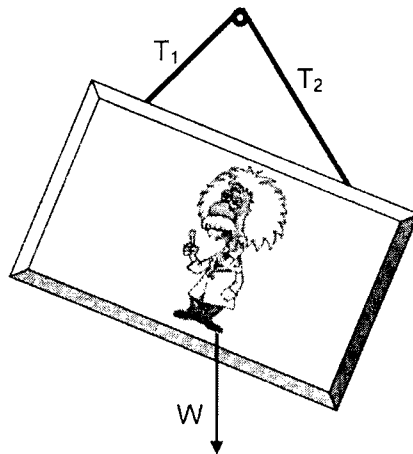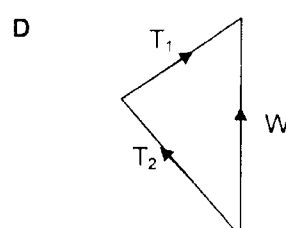   *Rajah 6 menunjukkan sekeping gambar tergantung pegun di dinding.*
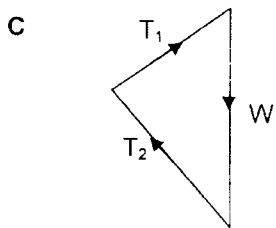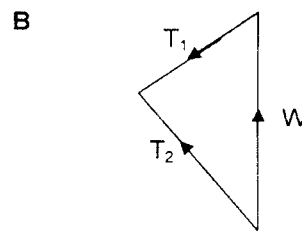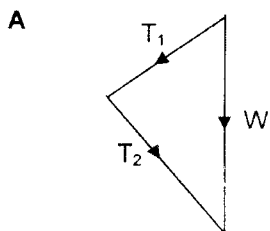

Diagram 6
Rajah 6

Which diagram represents the forces acting on the picture correctly?
*Rajah manakah yang betul untuk mewakili daya-daya yang bertindak ke atas
gambar itu?*

A

B

C

D

10 Diagram 7 shows a car involved in an accident.
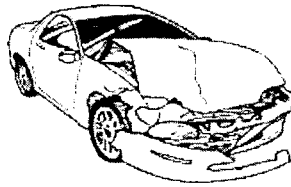*Rajah 7 menunjukkan sebuah kereta yang terlibat dalam kemalangan.*

Diagram 7
Rajah 7

Why is its front and rear sections designed to crumple easily?
Mengapakah bahagian hadapan dan belakangnya direka bentuk supaya mudah remuk?

A To increase friction
Untuk menambahkan geseran
B To decrease impulse
Untuk mengurangkan impuls
C To decrease momentum
Untuk mengurangkan momentum
D To increase impact time
Untuk menambahkan masa hentaman

11 Diagram 8 shows a rabbit placed on three different arrangement of springs, P, Q and R consisting of identical springs.
Rajah 8 menunjukan seekor arnab diletakkan pada tiga susunan spring yang berbeza, P, Q dan R yang mengandungi spring-spring serupa.
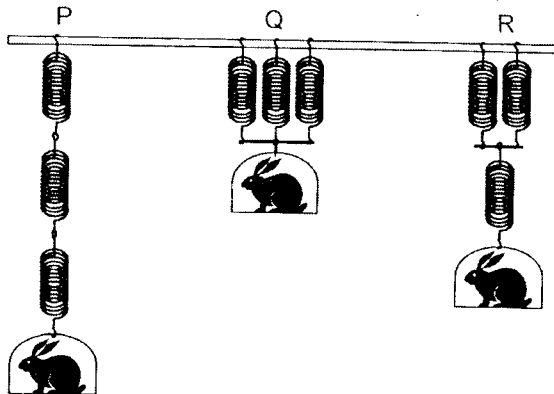

Diagram 8
Rajah 8

Which comparison is correct about the extension, x, of P, Q and R?
Perbandingan manakah yang betul tentang pemanjangan, x bagi P, Q dan R?

A $x_P > x_R > x_Q$
B $x_Q > x_R > x_P$
C $x_R > x_Q > x_P$
D $x_P > x_Q > x_R$

[Lihat sebelah
SULIT

12   Diagram 9.1 shows a lady wearing high heels and Diagram 9.2 shows her
      wearing sport shoes.
      *Rajah 9.1 menunjukkan seorang wanita memakai kasut bertumit tinggi dan Rajah
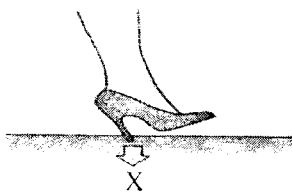   9.2 menunjukkan dia memakai kasut sukan.*

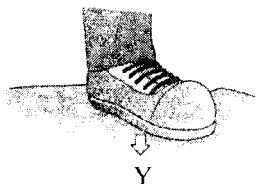   Diagram 9.1   Diagram 9.2
              Rajah 9.1   *Rajah 9.2*

      Which comparison is correct?
      Perbandingan manakah yang betul?

      A   Pressure on X = Pressure on Y
              Tekanan di X = Tekanan di Y
      B   Pressure on X < Pressure on Y
              Tekanan di X < Tekanan di Y
      C   Pressure on X > Pressure on Y
              Tekanan di X > Tekanan di Y

13   Diagram 10.1 shows object X in liquid R and Diagram 10.2 shows the same
      object in liquid S.
      *Rajah 10.1 menunjukkan objek X dalam cecair R dan Rajah 10.2 menunjukkan
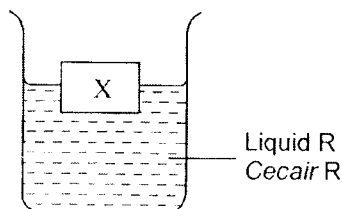   objek yang sama dalam cecair S.*

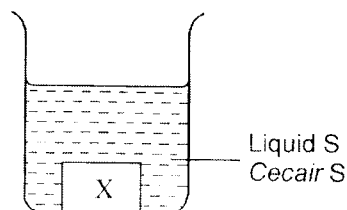   Diagram 10.1   Diagram 10.2
              Rajah 10.1   *Rajah 10.2*

      Which statement explain the above situations?
      Pernyataan manakah yang menerangkan situasi di atas?

      A   Liquid R is less dense than object X
              Cecair R adalah kurang tumpat daripada objek X
      B   Liquid S is less dense than liquid R
              Cecair S adalah kurang tumpat daripada cecair R
      C   Liquid S is denser than object X
              Cecair S adalah lebih tumpat daripada objek X
      D   Liquid S is denser than liquid R
              Cecair S adalah lebih tumpat daripada cecair R

14   Diagram 11 shows a simple mercury barometer.
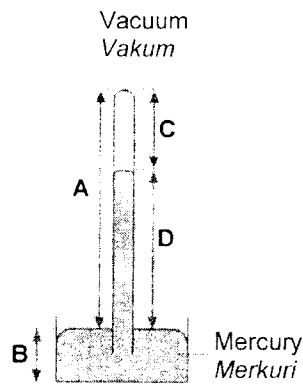   *Rajah 11 menunjukkan sebuah barometer merkuri ringkas.*

Vacuum
Vakum

Diagram 11
Rajah 11

Which height, **A, B, C** or **D** measure the atmospheric pressure?
*Ketinggian **A, B, C** atau **D** yang manakah mengukur tekanan atmosfera?*

15   Diagram 12 shows a hydraulic jack.
        Rajah 12 menunjukkan sebuah jek hidraulik.
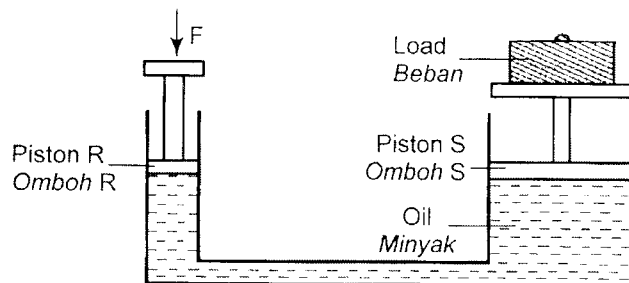

Diagram 12
Rajah 12

Which comparison is correct about pressure and force?
Perbandingan manakah yang betul tentang tekanan dan daya?

A   The force on piston R is smaller than the weight of the load
        Daya omboh R lebih kecil daripada berat beban
B   The force on piston R is greater than the weight of the load
        Daya omboh R lebih besar daripada berat beban
C   The pressure on piston R is smaller than the pressure on S
        Tekanan pada omboh R adalah lebih kecil daripada tekanan pada S
D   The pressure on piston R is greater than the pressure on piston S
        Tekanan omboh R lebih besar daripada tekanan pada S

16 Diagram 13 shows an object being removed from the beaker.
Rajah 13 menunjukkan satu objek dialihkan dari bikar.
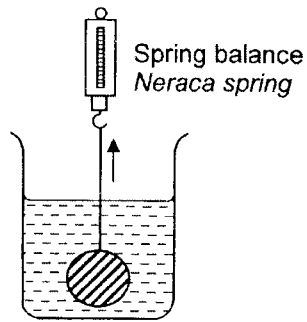
Diagram 13
Rajah 13

What happens to the reading of the spring balance?
Apakah yang berlaku kepada bacaan neraca spring?

A Increases
Bertambah
B Decreases
Berkurang
C Remains constant
Tidak berubah

17 Diagram 14 shows liquid X floating on top of water in a U-tube.
Rajah 14 menunjukkan cecair X terapung di atas air dalam tiub-U.

Diagram 14
Rajah 14

The density of water is 1000 kg m^{-3}.
What the density of liquid X?
Ketumpatan air ialah 1000 kg m^{-3}.
Berapakah ketumpatan cecair X?

A 1500 kg m^{-3}
B 1000 kg m^{-3}
C 800 kg m^{-3}
D 500 kg m^{-3}

18   Diagram 15 shows a ping-pong ball placed under a stream of water.
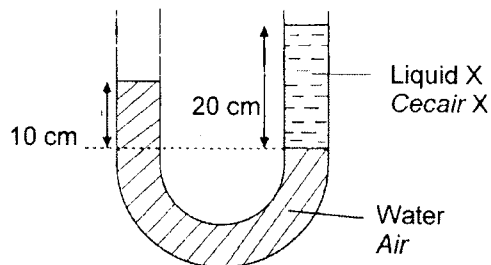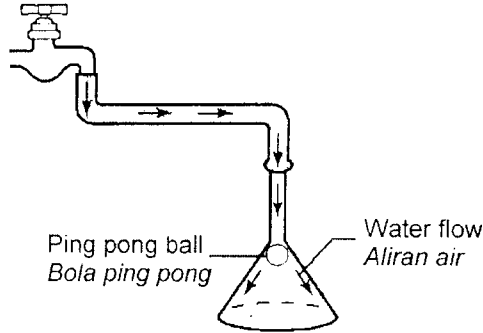*Rajah 15 menunjukkan sebiji bola ping pong diletakkan di bawah aliran air.*

Diagram 15
Rajah 15

Which explains the above observation?
Manakah yang menerangkan pemerhatian di atas?

A   Pascal's Principle
     Prinsip Pascal
B   Bernoulli's Principle
     Prinsip *Bernoulli*
C   Archimedes' Principle
     Prinsip Archimedes
D   Principle of Conservation of Momentum
     Prinsip Keabadian Momentum

19   Diagram 16 shows a thermometer.
Rajah 16 menunjukkan sebatang termometer.

Bulb   Capillary tube
Bebuli   *Tiub kapilari*
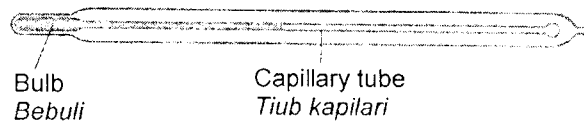
Diagram 16
Rajah 16

Which design features will increase the sensitivity of this thermometer?
Ciri-ciri reka bentuk manakah yang akan meningkatkan kepekaan termometer ini?

	Bulb *Bebuli*	Capillary tube *Tiub kapilari*
A	thin glass *kaca nipis*	narrow *halus*
B	thin glass *kaca nipis*	wide *kasar*
C	thick glass *kaca tebal*	narrow *halus*
D	thick glass *kaca tebal*	wide *kasar*

20 Diagram 17 shows two copper blocks, P and Q touching each other.
The initial temperature of P and Q are 60 °C and 30 °C respectively.
Rajah 17 menunjukkan dua blok kuprum, P dan Q yang saling bersentuhan.
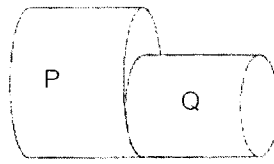*Suhu awal P dan Q masing-masing adalah 60 °C dan 30 °C.*

Diagram 17
Rajah 17

Which statement is correct when P and Q are at thermal equilibrium?
Pernyataan manakah yang betul bila P dan Q berada dalam keseimbangan terma?

A Temperature of P is higher than Q
  Suhu P lebih tinggi dari Q
B The quantity of heat in P is same as in Q
  Quantity haba pada P sama dengan Q
C Net rate of heat flow between P and Q is zero
  Kadar pengaliran haba bersih antara P dan Q adalah sifar
D Rate of change in temperature of P is higher than that of Q
  Kadar perubahan suhu P lebih tinggi berbanding Q

21 50 g of water at 10 °C is added to 100 g of water at 40 °C.
50 g air pada suhu 10 °C ditambah kepada 100 g air pada suhu 40 °C.
What is the final temperature of the mixture?
Apakah suhu akhir bagi campuran?
[Assume there is no heat lost to the surroundings]
[Anggap tiada haba hilang ke persekitaran]

A 10 °C
B 15 °C
C 20 °C
D 30 °C

22 What is the temperature of the substance when it is absorbing latent heat of fusion?
Apakah suhu suatu bahan bila ia sedang menyerap haba pendam pelakuran?

A at its boiling point
  pada takat didihnya
B at its melting point
  pada takat leburnya
C above its boiling point
  di atas takat didihnya
D between its melting point and boiling point
  di antara takat lebur dan takat didihnya

23   Diagram 18 shows an air tight flask at room temperature. The flask is then placed
      in melting ice.
      *Rajah 18 menunjukkan satu kelalang kedap udara pada suhu bilik. Kelalang
      tersebut kemudiannya dimasukkan ke dalam ais yang sedang melebur.*
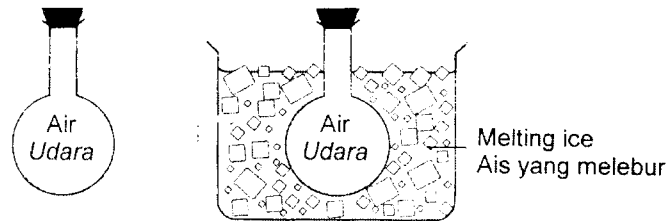
Diagram 18
Rajah 18

What happens to the air pressure and the speed of the air molecules?
*Apakah yang berlaku kepada tekanan udara dan kelajuan molekul-molekul
udara?*

	Pressure *Tekanan*	**Speed of molecules** *Kelajuan molekul*
A	Decrease *Berkurang*	Increase *Bertambah*
B	Decrease *Berkurang*	Decrease *Berkurang*
C	Increase *Bertambah*	Increase *Bertambah*
D	Increase *Bertambah*	Decrease *Berkurang*

24   Diagram 19 shows light wave passing through three mediums.
      Rajah 19 menunjukkan gelombang cahaya merambat melalui tiga medium.

Diagram 19
Rajah 19

Which statement is correct about the refractive index, *n*, of the mediums?
*Pernyataan manakah yang betul tentang indeks biasan, n, medium-medium
tersebut?*

A $n_1 > n_2 > n_3$
B $n_3 > n_2 > n_1$
C $n_2 > n_1 > n_3$
D $n_3 > n_1 > n_2$

25 Diagram 20 shows the side mirror of a car.
Rajah 20 menunjukkan cermin sisi sebuah kereta.

Side view mirror
Cermin sisi
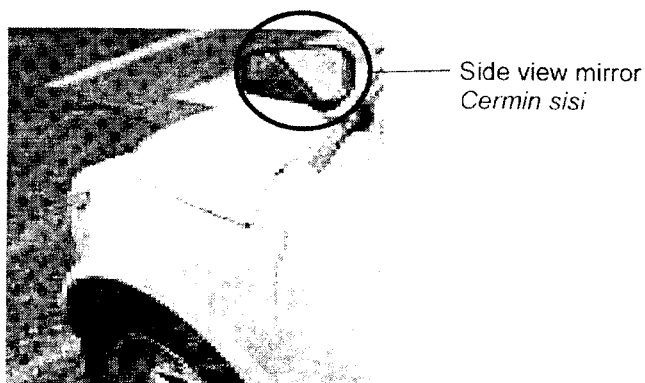
Diagram 20
Rajah 20

Which are the characteristics of the image formed by the mirror?
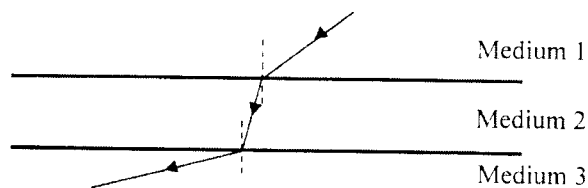*Yang manakah ciri-ciri image yang dibentuk oleh cermin sisi kereta itu?*

A Real and inverted
   Nyata dan songsang
B Real and magnified
   Nyata dan dibesarkan
C Virtual and same size
   Maya dan sama saiz
D Virtual and diminished
   Maya dan dikecilkan

26 Diagram 21 shows a light bulb placed at the focal point of a convex lens.
Rajah 21 menunjukkan sebuah mentol diletakkan pada titik focus sebuah kanta cembung.
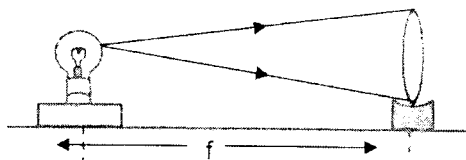
Diagram 21
Rajah 21

This set up will produces
Susunan ini akan menghasilkan

A a parallel beam of light
   sinar cahaya selari
B a diverging beam of light
   sinar cahaya mencapah
C a converging beam of light
   sinar cahaya menumpu

27   Which phenomenon is related to the principle of total internal reflection?
      Fenomena yang manakah berkaitan dengan prinsip pantulan dalam penuh?

A
      Cloud
      Awan   Observer
                                          Pemerhati

      Pool of air
      Lopak air

B
      Eye
      Mata

                                          Image
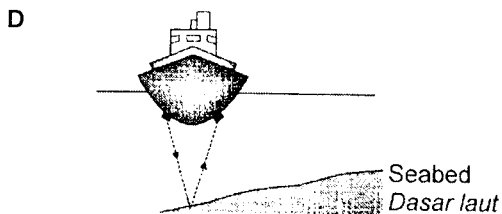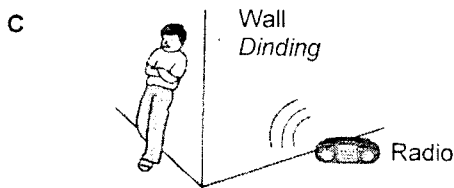   *Imej*

C   Wall
                     Dinding

                                    Radio

D

                                    Seabed
                                    Dasar laut
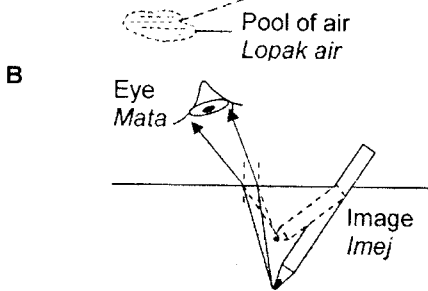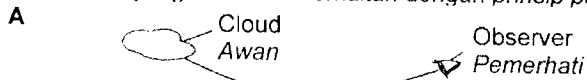
28   What is similar between microscope and telescope?
      Apakah persamaan antara mikroskop dengan teleskop?

      A   The final image seen is real and inverted
           Image akhir kelihatan nyata dan songsang
      B   Both microscope and telescope use concave lens
           Kedua-dua mikroskop dan teleskop menggunakan kanta cekung
      C   The objective lenses of both microscope and telescope form real images
           Kanta objektif bagi kedua-duanya menghasilkan imej nyata
      D   The distance between the two lenses is the sum of focal length of objective
           lens and eyepiece
           *Jarak di antara dua kanta ialah jumlah jarak fokus kanta objektif dan kanta
           mata*

29 Diagram 22 shows a spring is shaken sideway.
   Rajah 22 menunjukkan sebuah spring dihayunkan secara melintang.

Direction of oscillation
Arah ayunan

0.3 m
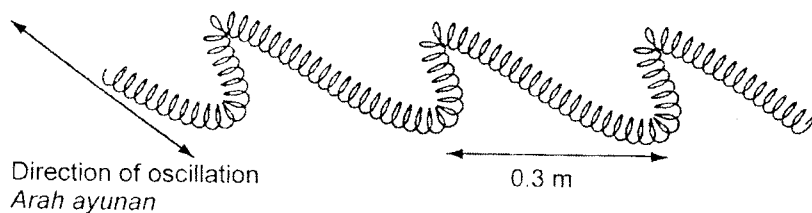
Diagram 22
Rajah 22

The velocity of the wave formed by the spring is 3.0 m s^{-1}.
Calculate the frequency of the oscillation.
Kelajuan gelombang yang dibentuk oleh spring ialah 3.0 m s^{-1}.
Hitungkan frekuensi ayunan spring.

A 0.3 Hz
B 0.9 Hz
C 5.0 Hz
D 10.0 Hz

30 Diagram 23 shows the displacement-time graph of an oscillating spring.
   Rajah 23 menunjukkan graf sesaran-masa untuk suatu spring yang berayun.

Displacement
Sesaran

Time
Masa

Load
Beban
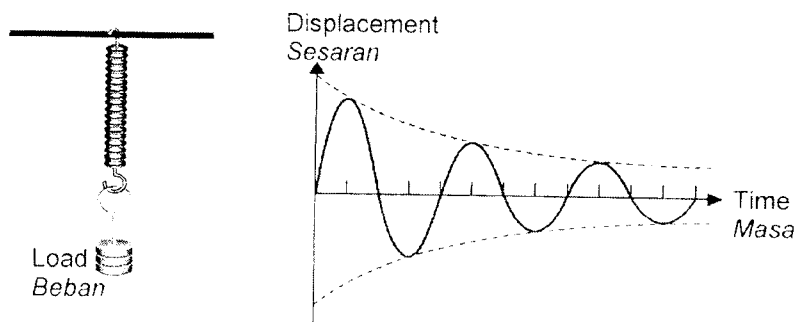
Diagram 23
Rajah 23

The oscillating spring undergoes
Spring berayun mengalami

A damping
   pelembapan
B resonance
   resonan
C interference
   interferen
D forced oscillation
   ayunan yang dipaksa

31   Diagram 24 shows water waves travelling from a deep area P to a shallow area Q.
     Rajah 24 menunjukkan gelombang air merambat dari kawasan dalam P ke kawasan cetek Q.

Shallow area Q
Kawasan cetek, Q

Deep area, P
Kawasan dalam.P
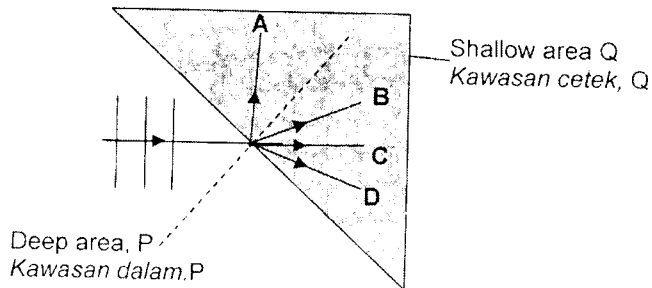
Diagram 24
Rajah 24

Which direction, **A, B, C** or **D** is correct?
*Arah yang manakah, **A, B, C** atau **D**, adalah betul?*

32   Diagram 25 shows water waves passes a wooden log.
     Rajah 25 menunjukkan gelombang air merambat melepasi sebatang balak.

Direction of water waves
Arah perambatan gelombang

Wooden log
Kayu balak
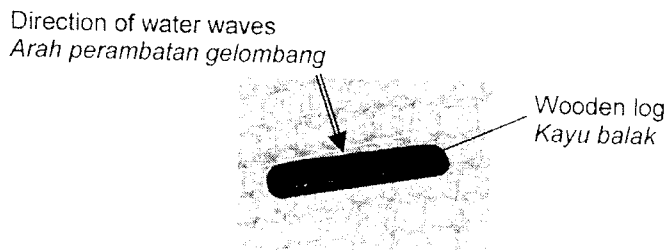
Diagram 25
Rajah 25

If the waves encounters a longer wooden log, the effect of diffraction is
Sekiranya gelombang menemui batang balak yang lebih panjang, kesan pembelauan adalah

A   more obvious
    lebih jelas
B   less obvious
    kurang jelas
C   unchanged
    tidak berubah

33   Diagram 26 shows the yellow fringes formed by Young's double-slits experiment.
      Rajah 26 menunjukkan pinggir-pinggir kuning yang dibentuk oleh eksperimen
      dwicelah Young.

Yellow fringes
Pinggir-pinggir kuning
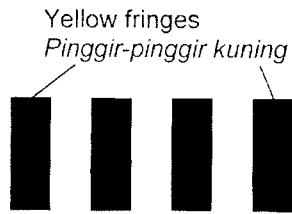
Diagram 26
Rajah 26

The separation between fringes can be increased by
Jarak antara jalur-jalur boleh ditingkatkan dengan

A   increasing the separation between slits
      meningkatkan jarak antara celah.
B   replacing the yellow light with red light
      menggantikan cahaya kuning dengan cahaya merah.
C   increasing the intensity of the yellow light
      meningkatkan keamatan cahaya kuning.
D   decreasing the distance between the double slits and the screen
   *mengurangkan jarak antara dwicelah dengan skrin.*

34   A transmitter emits ultrasonic waves to detect underwater objects.
      Diagram 27 shows the traces of a transmitted pulse and its echo.
      Suatu pemancar memancarkan gelombang ultrasonik untuk mengesan objek
      dalam air.
      Rajah 27 menunjukkan paparan denyutan yang dipancarkan dan gemanya.

Transmitted pulse
Denyut dipancar

Echo
Gema

2.5 s
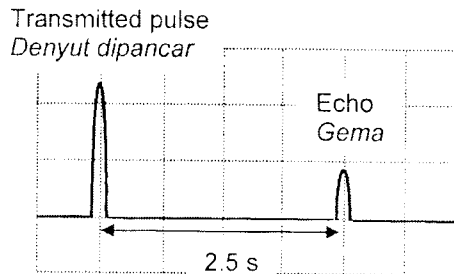
Diagram 27
Rajah 27

If the ultrasonic waves travels with a speed of 1500 m s⁻ in water, how far is the
object?
Jika gelombang ultrasonic merambat dengan halaju 1500 m s⁻¹ dalam air, berapa
jauhkah objek itu?

A   600 m
B   1200 m
C   1875 m
D   3750 m

35   Which graph shows the relationship between potential difference, V and current, I
      for an ohmic conductor?
      *Graf manakah yang menunjukkan hubungan antara beza keupayaan, V dan
      arus, I bagi suatu konduktor ohm?*
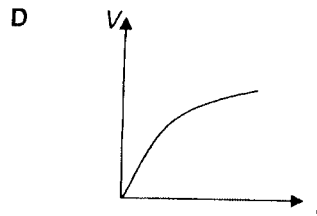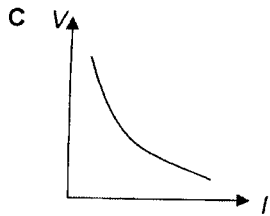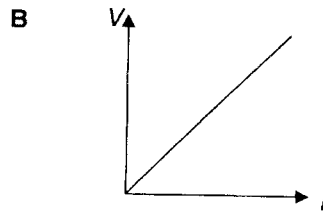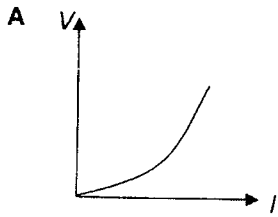
36   Which circuit can be used to determine the electromotive force a battery?
      *Litar manakah boleh digunakan untuk menentukan daya gerak elektrik suatu
      bateri?*
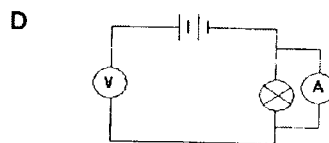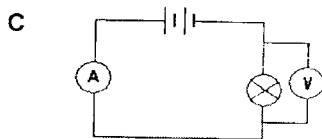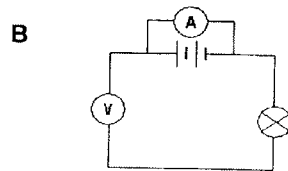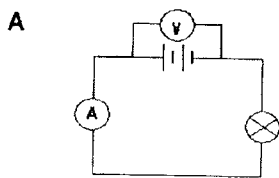
37 Diagram 28 shows a circuit.
Rajah 28 menunjukkan sebuah litar.
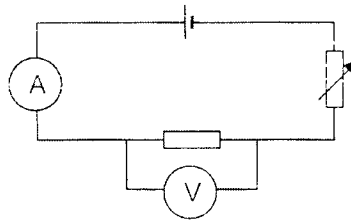
Diagram 28
Rajah 28

What happens to the reading of the ammeter and the reading of the voltmeter when the rheostat is adjusted?
Apakah yang berlaku kepada bacaan ammeter dan bacaan voltmeter apabila reostat itu dilaraskan?

	Ammeter	Voltmeter
A	Unchanged	Unchanged
	Tidak berubah	Tidak berubah
B	Changes	Unchanged
	Berubah	Tidak berubah
C	Changes	Changes
	Berubah	Berubah
D	Unchanged	Changes
	Tidak berubah	Berubah

38 Which of these electrical appliances consumes the greatest amount of energy?
Peralatan elektrik yang manakah menggunakan paling banyak tenaga?

A 0.6 kW, 1.5 hours

B 0.2 kW, 10 minutes
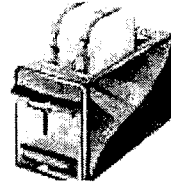
C 0.5 kW, 2 hours
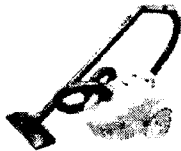
D 1.1 kW, 3 hours
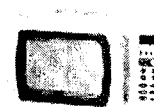
39 Diagram 29 shows current flowing through a solenoid.
Rajah 29 menunjukkan arus mengalir melalui satu solenoid.
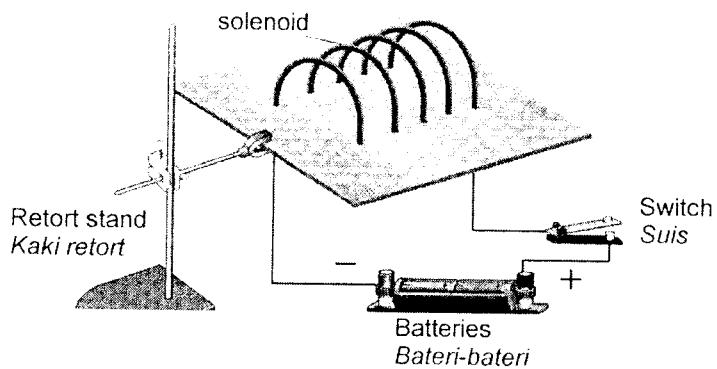
Diagram 29
Rajah 29

Which diagram shows the magnetic field produced by the current?
Rajah yang manakah menunjukkan medan magnet yang dihasilkan oleh arus itu?

A

B

C

D

40 Which diagram shows the application of the force on a current carrying conductor in a magnetic field?
Rajah manakah yang menunjukkan aplikasi daya yang bertindak ke atas konduktor pembawa arus dalam satu medan magnet?

A
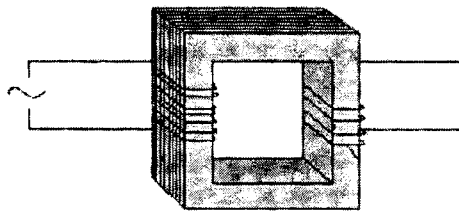
Transformer

B
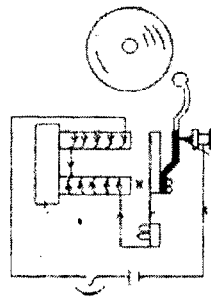
Electric bell
Loceng elektrik

C
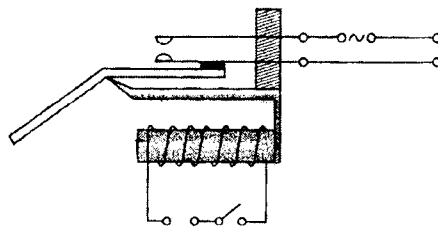
Relay switch
Geganti elektrik

D
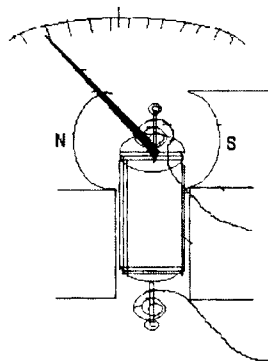
Moving coil ammeter
Ammeter gegelung bergerak

41   Diagram 30 shows an experiment to induce current in a magnetic field.
      *Rajah 30 menunjukkan satu ekperimen untuk mengaruh arus dalam suatu medan
      magnet.*

Galvanometer

Copper rod
Rod kuprum

Permanent magnet
Magnet kekal
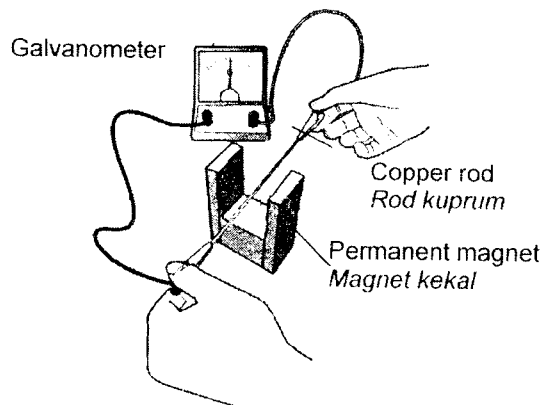
Diagram 30
Rajah 30

The direction of the current induced can be determined by
Arah arus aruhan boleh ditentukan oleh

A
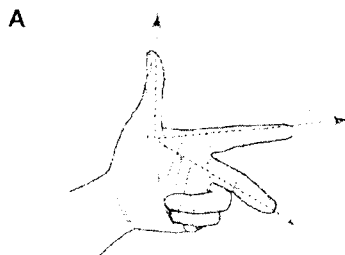
Fleming's Left Hand Rule
Petua Tangan Kiri Fleming

B
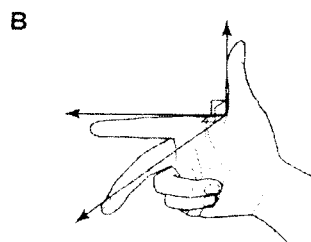
Fleming's Right Hand Rule
Petua Tangan Kanan Fleming

C
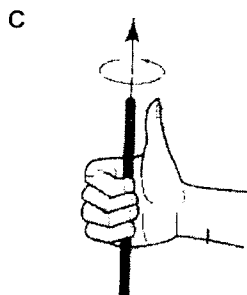
Right Hand Grip Rule
Petua Genggaman Tangan Kanan

D
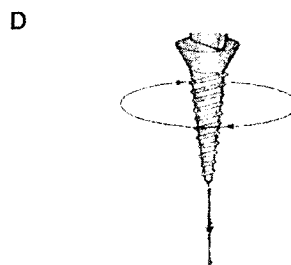
Maxwell's Screw Rule
Petua Tangan Kiri Fleming

42 Which type of current and voltage is used in the transmission of electricity over long distances?
Apakah jenis arus dan voltan yang digunakan dalam penghantaran bekalan elektrik melalui jarak jauh?

	Type of current *Jenis arus*	Voltage of cables *Voltan dalam kabel*
A	Alternating current *Arus ulangalik*	High voltage *Voltan tinggi*
B	Alternating current *Arus ulangalik*	Low voltage *Voltan rendah*
C	Direct current *Arus terus*	High voltage *Voltan tinggi*
D	Direct current *Arus terus*	High voltage *Voltan tinggi*

43 Diagram 31 shows a transformer.
Rajah 31 menunjukkan sebuah transformer.

a.c source
Sumber a.c

Secondary coil
Gegelung sekunder

Primary coil
Gegelung primer
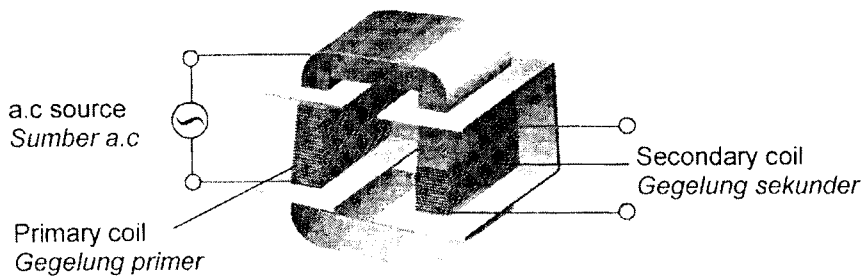
Diagram 31
Rajah 31

Which statement about the transformer is correct?
Pernyataan manakah yang betul mengenai transformer itu?

A Its output power is always greater than its input power
Kuasa outputnya selalu melebihi kuasa inputnya

B Its efficiency is increased by using laminated steel core
Kecekapannya ditingkatkan dengan menggunakan teras keluli berlamina

C Is used to alter the potential difference of direct current
Digunakan untuk mengubah beza keupayaan arus terus

D Its operating principle is based on electromagnetic induction
Prinsip operasinya berdasarkan aruhan electromagnet

44 Diagram 32 shows the display of a cathode ray oscilloscope.
Rajah 32 menunjukkan paparan osiloskop sinar katod.

Diagram 32
Rajah 32

Which statement is true about the display?
Pernyataan manakah yang betul tentang paparan tersebut?

	Type of current *Jenis arus*	Time-base *Dasar masa*
A	Direct current *Arus terus*	Off *Tutup*
B	Direct current *Arus terus*	On *Hidup*
C	Alternating current *Arus ulang-alik*	Off *Tutup*
D	Alternating current *Arus ulang-alik*	On *Hidup*

45 Diagram 33 shows the molecular structure of a p-type semiconductor.
Rajah 33 menunjukkan struktur molekul semikonduktor jenis p.

Key
Kunci
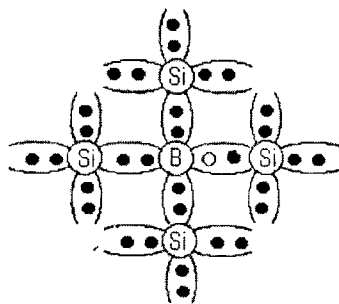
Si — Silicon atom / *Atom silicon*

B — Boron atom / *Atom boron*

● — Electron / *Elektron*

○ — Hole / *Lohong*

Diagram 33
Rajah 33

This process is known as
Proses ini dikenali sebagai

A doping
   pendopan
B modulation
   modulasi
C amplification
   amplifikasi
D rectification
   rektifikasi

[Lihat sebelah
SULIT

46 Diagram 34 shows a logic gate, A and its truth table.
Rajah 34 menunjukkan sebuah get logik A dan jadual kebenarannya.

P	Q	R
0	0	1
1	0	1
0	1	1
1	1	0
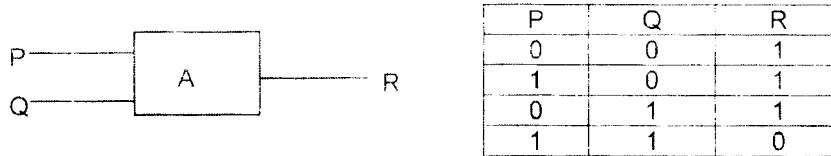
Diagram 34
Rajah 34

What is get logic A?
Apakah get logik A?

A   AND gate
    Get DAN
B   NOT gate
    Get TAK
C   NOR gate
    Get TAK ATAU
D   NAND gate
    Get TAK DAN

47 Diagram 35 shows an automatic switch circuit to light up a bulb during the day.
Rajah 35 menunjukkan litar suis automatik untuk menghidupkan lampu pada waktu siang.
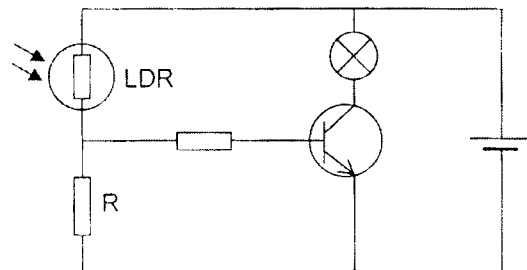
Diagram 35
Rajah 35

What happens if the position of the LDR and resistor, R is reversed?
Apakah yang akan berlaku jika kedudukan LDR dan peringtang, R diterbalikkan?

A   The bulb lights up during night time
    Lampu menyala pada waktu malam
B   The bulb lights up during day time
    Lampu menyala pada waktu siang
C   The bulb lights up all the time
    Lampu menyala sepanjang masa
D   The bulb will not lights up
    Lampu tidak akan menyala

48 Three types of radioactive emission move through an electric field.
    Tiga jenis sinaran radioaktif bergerak melalui satu medan elektrik.
    Which diagrams shows the correct path of the radioactive emission?
    Rajah manakah menunjukkan lintasan yang betul bagi sinaran radioaktif itu?

A

B

C

D
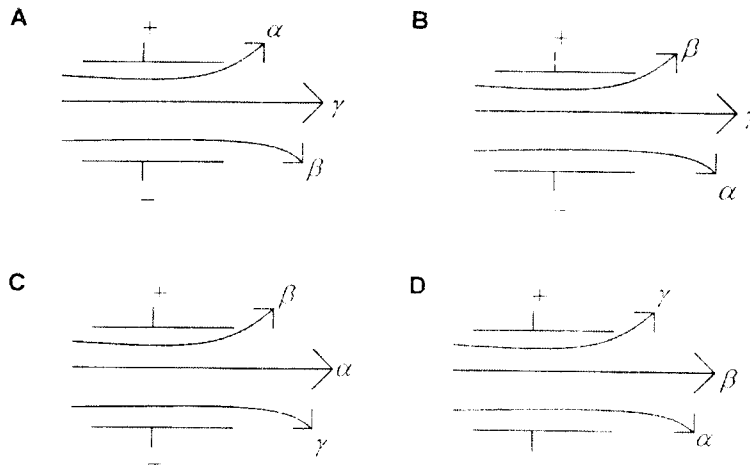
49 Diagram 36 shows how the thickness of aluminium sheet is standardised.
    *Rajah 36 menunjukkan proses bagaimana ketebalan keranjang aluminium
    dipiawaikan.*

Roller
Roda

Source of gamma particles
Sumber zarah gamma

Aluminium sheet
Keranjang aluminium

Detector
Pengesan
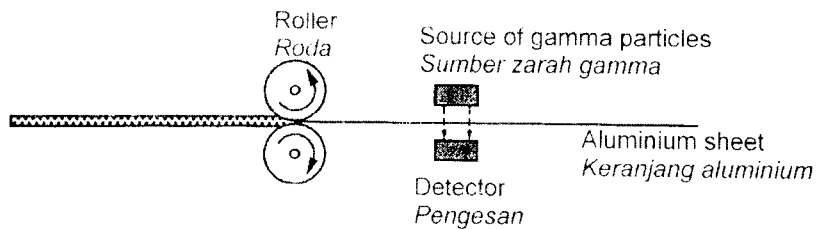
Diagram 36
Rajah 36

This process uses gamma rays because it
Proses ini menggunakan sinar gamma kerana ia

A has a long half-life
   mempunyai separuh hayat yang panjang
B will sterilise the aluminium sheet
   akan mensterilkan keranjang aluminium
C can penetrate aluminium sheet
   boleh menembusi keranjang aluminium
D makes the aluminium sheet stronger
   menjadikan keranjang aluminium lebih kuat

50   In the fission reaction for an atom of uranium-235, the total loss of mass in the
           reaction is 3.22 x 10^{-28} kg.
           *Dalam tindak balas pembelahan nukleus bagi satu atom uranium-235, jumlah
           kehilangan jisim dalam tindak balas itu ialah 3.22 x 10^{-28} kg.*

           What is the energy that is released?
           Berapakah tenaga yang dibebaskan?

           A 9.66×10^{-12} J
           B 2.90×10^{-11} J
           C 9.00×10^{16} J
           D 3.00×10^{8} J

<div align="center">

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

</div>

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009
PHYSICS
Kertas 1
Ogos/September

1	D		11	A		21	D		31	B		41	B
2	B		12	C		22	B		32	B		42	A
3	B		13	B		23	B		33	B		43	D
4	C		14	D		24	C		34	C		44	C
5	C		15	A		25	D		35	B		45	A
6	A		16	A		26	A		36	A		46	D
7	A		17	D		27	A		37	C		47	A
8	C		18	B		28	C		38	D		48	B
9	C		19	A		29	D		39	B		49	C
10	D		20	C		30	A		40	D		50	B

NO KAD PENGENALAN

ANGKA GILIRAN

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009   4531/2
PHYSICS
Kertas 2
September 2009
2 ½ jam   **Dua jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan* **nombor kad pengenalan** *dan* **angka giliran** *anda pada ruang yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

3. *Soalan dalam Bahasa Inggeris mendahului soalan yang sepadan dalam Bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Inggeris atau Bahasa Melayu.*

5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Kod Pemeriksa			
Bahagian	Soalan	Markah Penuh	Markah Diperoleh
A	1	4	
	2	5	
	3	7	
	4	7	
	5	7	
	6	8	
	7	10	
	8	12	
B	9	20	
	10	20	
C	11	20	
	12	20	
		Jumlah	

Kertas soalan ini mengandungi 27 halaman bercetak dan 1 halaman tidak bercetak

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

1. $a = \dfrac{v - u}{t}$

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

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

4. Momentum $= mv$

5. $F = ma$

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

7. Gravitational potential energy /
   Tenaga keupayaan graviti $= mgh$

8. Elastic potential energy /
   Tenaga keupayaan kenyal $= \dfrac{1}{2} Fx$

9. Power, $P = \dfrac{\text{energy}}{\text{time}}$

   Kuasa, $P = \dfrac{tenaga}{masa}$

10. $\rho = \dfrac{m}{V}$

11. Pressure / *Tekanan*, $P = \dfrac{F}{A}$

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

13. Heat / *Haba*, $Q = mc\theta$

14. Heat / *Haba*, $Q = ml$

15. $\dfrac{PV}{T} =$ constant / *pemalar*

16. $n = \dfrac{\sin i}{\sin r}$

17. $n = \dfrac{real\ depth}{apparent\ depth}$

    $n = \dfrac{dalam\ nyata}{dalam\ ketara}$

18. $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$

19. Linear magnification /
    Pembesaran linear, $m = \dfrac{v}{u}$

20. $v = f\lambda$

21. $\lambda = \dfrac{ax}{D}$

22. $Q = It$

23. $E = VQ$

24. $V = IR$

25. Power / *Kuasa*, $P = IV$

26. $g = 10\ ms^{-2}$

27. $\dfrac{N_s}{N_p} = \dfrac{V_s}{V_p}$

28. Efficiency / *Kecekapan*
    $= \dfrac{I_s V_s}{I_p V_p} \times 100\%$

29. $E = mc^2$

30. $c = 3.0 \times 10^8\ ms^{-1}$

Section A
BahagianA

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

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

1   Diagram 1 shows light rays parallel with the principal axis directed to a concave mirror.
Rajah 1 menunjukkan sinaran cahaya yang selari dengan paksi utama ditujukan ke sebuah cermin cekung.
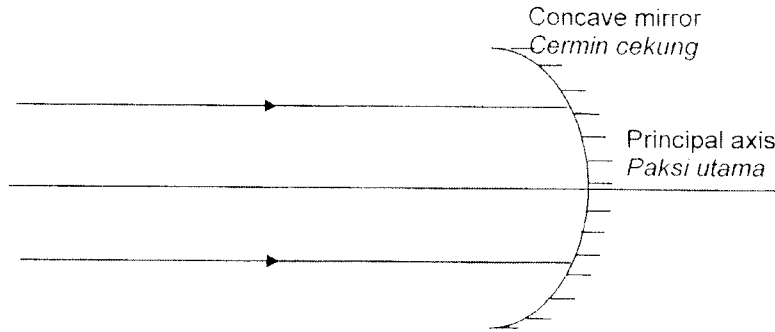
Diagram 1
Rajah 1

(a)   Complete the sentence below by ticking (√) the correct box.
Lengkapkan ayat di bawah dengan menanda (√) dalam kotak yang betul.

The light rays reflected by the mirror will
Sinaran cahaya yang dipantulkan oleh cermin itu akan

Converge at a point F.
Menumpu ke titik F.

Diverge from a point F.
Mencapah daripada titik F.

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

(b)   Complete the ray diagram on Diagram 1 and mark 'F' on the principal axis.
Lengkapkan rajah sinar pada Rajah 1 dan tandakan 'F' pada paksi utama.

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

(c)   What is the characteristic of image formed by the mirror in Diagram 1?
Apakah ciri-ciri imej yang dibentuk oleh cermin dalam Rajah 1?

....

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

2   Diagram 2.1 shows two constantan wires P and Q of the same length but of different cross-sectional area, being used to carry out an experiment.
Rajah 2.1 menunjukkan dua dawai konstantan P dan Q dengan panjang yang sama tetapi luas keratan rentas berbeza digunakan dalam menjalankan satu eksperimen.
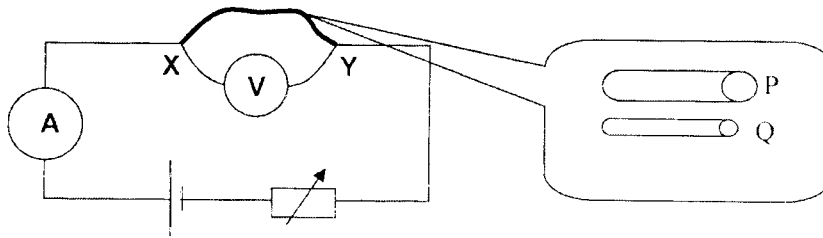
Diagram 2.1
Rajah 2.1

Initially, the experiment is carried out with P placed across XY. After that, P is replaced with Q and the experiment is repeated. The V-I graph in Diagram 2.2 shows the results obtained from the experiment.
Pada asalnya, P disambungkan merentasi XY. Kemudian, eksperimen diulang dengan menggunakan Q. Graf V-I dalam Rajah 2.2 menunjukkan hasil yang diperolehi dalam eksperimen tersebut.
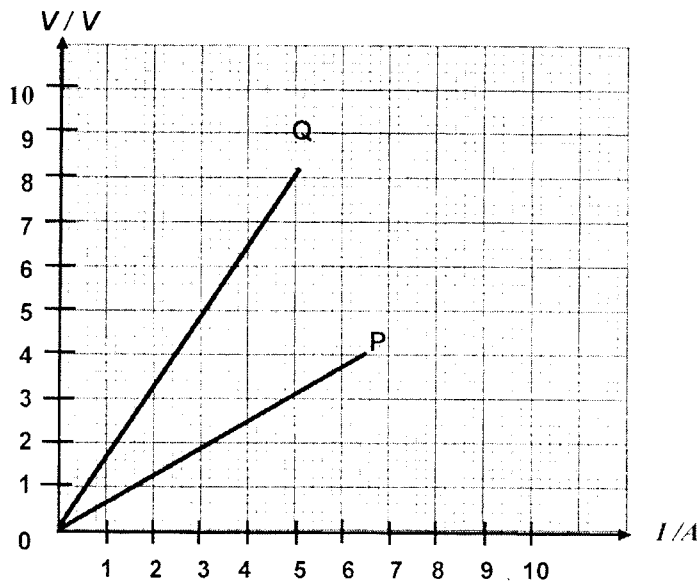
Diagram 2.2
Rajah 2.2

(a)   Based on Diagram 2.1, compare the cross-sectional area of wires P and Q.
Berdasarkan Rajah 2.1, bandingkan luas keratan rentas dawai P dan Q.

....

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

(b) Based on Diagram 2.2:
Berdasarkan Rajah 2.2:

(i) State how the resistance of the constantant wires can be obtained.
Nyatakan bagaimana rintangan dawai konstantan dapat ditentukan.

....

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

(ii) Determine the resistance of conductor Q. Show on your graph.
Tentukan rintangan bagi konduktor Q. Tunjukkan pada graf anda.

[3 *marks*]
[3 *markah*]

3 Diagram 3 shows two identical feeding bottles submerged in liquids P and Q respectively.
Rajah 3 menunjukkan dua botol susu yang sama dan masing-masing direndamkan dalam cecair P dan Q.

Liquid P   Liquid Q
Cecair P   *Cecair Q*
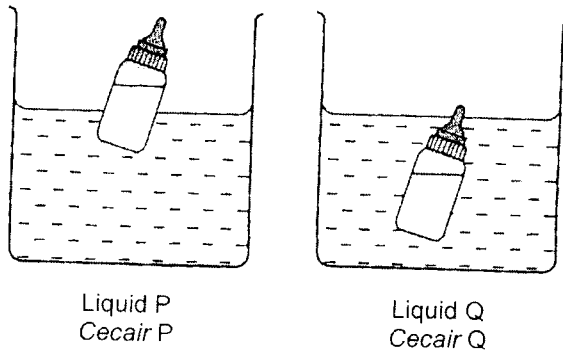
Diagram 3
Rajah 3

(a) (i) Draw and label two forces that act on the feeding bottles when they are submerged in liquid P.
Lukis dan labelkan dua daya yang bertindak ke atas botol susu apabila direndamkan dalam cecair P.

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

(ii) State the relationship between the two forces in your answer for 3(a)(i).
Nyatakan perhubungan di antara dua daya tersebut berdasarkan jawapan anda dalam 3(a)(i).

....

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

[Lihat sebelah
SULIT

(b) State the physical principle that involved in the situation given in diagram.
Nyatakan prinsip fizik yang berkaitan dengan situasi yang diberikan dalam rajah.

....

[1 mark]
[1 markah]

(c) Some content of the feeding bottle submerged in liquid P is poured out. The bottle is again submerged in liquid P.
Sedikit kandungan botol yang direndamkan dalam cecair P dikeluarkan. Botol itu direndamkan semula dalam cecair P.

(i) State what happens to the bottle.
Nyatakan apa yang berlaku kepada botol.

....

[1 mark]
[1 markah]

(ii) The bottle is put into a denser liquid. State what happens to the bottle. Explain your answer.
Botol dimasukkan ke dalam cecair yang lebih tumpat. Nyatakan apa yang berlaku kepada botol. Terangkan jawapan anda.

....

....

[2 marks]
[2 markah]

4 Diagrams 4.1 shows a pressure cooker for cooking food at high temperature.
Rajah 4.1 menunjukkan sebuah periuk tekanan untuk memasak makanan pada suhu tinggi.
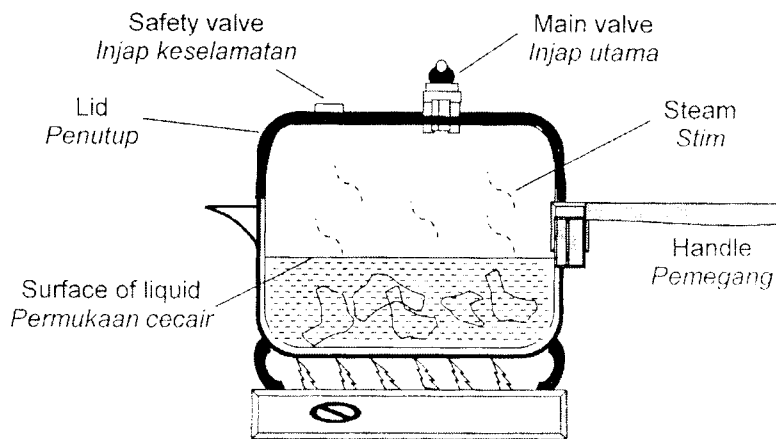
Diagram 4.1
Rajah 4.1

(a) What is meant by pressure?
Apakah yang dimaksudkan dengan tekanan?

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

(b) (i) Explain why the gas pressure increases with the increase of the temperature.
Terangkan mengapa tekanan gas meningkat dengan pertambahan suhu.

....
....
[2 *marks*]
[2 *markah*]

(ii) Based on the answer in 4(b)(i), state the gas law involved.
Berdasarkan jawapan dalam 4(b)(i), nyatakan hukum gas yang terlibat.

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

(iii) State the effect of high gas pressure on the boiling point.
Nyatakan kesan tekanan gas yang tinggi kepada takat didih.

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

(c) The air pressure of the pressure cooker is 1×10^5 Pa, at the temperature of 27 °C. What is the temperature of the air, when the air pressure is 1.5×10^5 Pa?
Tekanan udara dalam periuk tekanan ialah 1×10^5 Pa, pada suhu 27 °C. Berapakah suhu bila tekanan udara menjadi 1.5×10^5 Pa?

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

5 X-ray, microwave, ultraviolet and infra-red are different types of radiation in the electromagnetic spectrum.
Sinar-X , gelombang mikro, ultra-ungu dan infra-merah adalah jenis sinaran yang berlainan dalam spektrum gelombang elektromagnet.

(a) Arrange the electromagnetic wave given in ascending order of wavelength in Diagram 5.
Susun gelombang electromagnet yang diberikan dalam susunan menaik dalam Rajah 5.

Shortest wavelength
Panjang gelombang terpendek ──────────────────▶ Longest wavelength
Panjang gelombang terpanjang
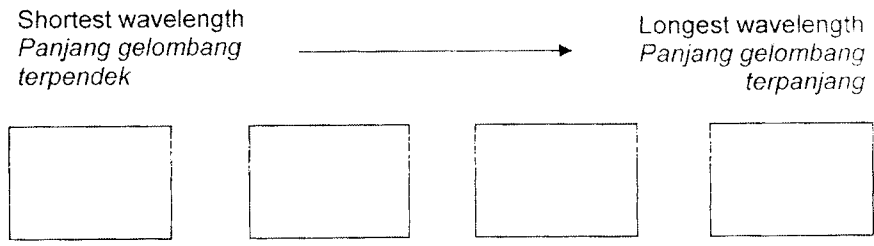
Diagram 5
Rajah 5

[2 marks]
[2 markah]

(b) State **two** common properties of all radiations in the electromagnetic spectrum.
*Nyatakan **dua** sifat yang sama bagi semua jenis sinaran dalam spektrum elektromagnet.*

1. ....

2. ....
[2 marks]
[2 markah]

(c) (i) State **one** application of microwave.
*Nyatakan **satu** aplikasi gelombang mikro.*

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

(ii) Explain the answer in 5(c)(i).
Terangkan jawapan dalam 5(c)(i).

....

....
[2 marks]
[2 markah]

6   Diagram 6 shows a circuit used as a safety system in a house.
     Rajah 6 menunjukkan litar yang digunakan untuk sistem keselamatan dalam rumah.
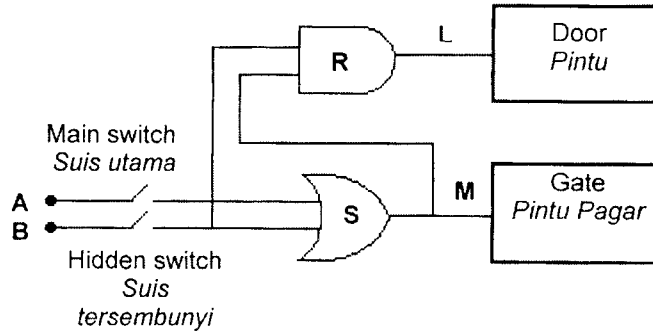
Diagram 6
Rajah 6

(a)   Name logic gate R.
      Namakan get logik R.

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

(b)   Using two switches, two dry cells and a bulb, draw a circuit that equivalent to
      logic gate S.
      *Menggunakan dua suis, dua sel kering dan sebiji mentol, lukis litar yang
      menyerupai get logik S.*

                                                                        [2 marks]
                                                                        [2 markah]

(c)   The truth table represents the logic gate in the Diagram 6 above.
      Jadual kebenaran di bawah mewakili get logik dalam Rajah 6 di atas.

A	B	L	M
0	0		
0	1		
1	0		
1	1		

Table 1
Jadual 1

(i)   Complete the truth table above.
       Lengkapkan jadual kebenaran di atas

                                                                    [2 marks]
                                                                    [2 markah]

(ii)   What happens to the door and the gate when the main switch is closed?
       Apa terjadi kepada pintu dan pintu pagar apabila suis utama ditutup?

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

(iii) State **two** methods to open the door and the gate simultaneously.
       *Nyata **dua** kaedah untuk membuka pintu dan pintu pagar serentak*

       1.   ....

       2.   ....
                                                                    [2 marks]
                                                                    [2 markah]

7   Diagram 7.1 shows two identical trolleys P and Q on a frictionless horizontal runway.
     Trolley P is loaded with steel bars.
     *Rajah 7.1 menunjukkan dua buah troli yang serupa P dan Q di atas landasan
     mengufuk tanpa geseran. Troli P diletakkan beberapa bongkah keluli di atasnya.*
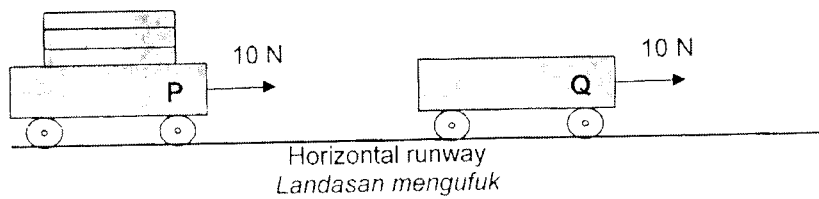
                              Diagram 7.1
                              Rajah 7.1

A horizontal force of 10 N act on trolley P and Q.
Daya mengufuk 10 N yang bertindak ke atas troli P dan Q.

(a) (i)   Trolley Q moves faster than trolley P.
           Explain your observation?
           Troli Q bergerak lebih laju daripada troli P.
           Terangkan pemerhatian anda.

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

     (ii) State the physical law that explains your answer in (a)(i).
           Nyatakan hukum fizik yang menerangkan jawapan anda dalam (a) (i).

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

(b) Trolley Q then moves down the frictionless slope as shown in Diagram 7.2.
There is air resistance acting on the trolley when it moves down the slope.
*Troli Q kemudiannya menuruni landasan condong tanpa geseran seperti dalam
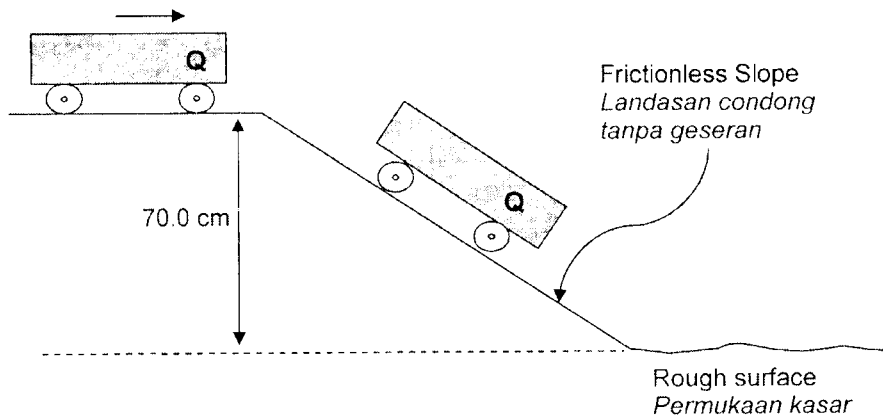Rajah 7.2. Rintangan udara bertindak ke atas troli ketika menuruni landasan.*

Frictionless Slope
*Landasan condong
tanpa geseran*

70.0 cm

Rough surface
Permukaan kasar

Diagram 7.2
Rajah 7.2

On the Diagram 7.2, when the trolley Q is moving down the frictionless slope,
label,
*Pada Rajah 7.2, ketika troli Q menuruni landasan condong terpampas geseran,
labelkan,*

(i) the direction of the force due to gravity.
arah daya disebabkan graviti.

(ii) the direction of the force due to air resistance.
arah daya disebabkan rintangan udara.

[1 mark]
[1 markah]

(c) State the effect of the air resistance to the motion of trolley Q along frictionless
slope in Diagram 7.2,
*Nyatakan kesan rintangan udara terhadap gerakan troli Q sepanjang landasan
condong tanpa geseran pada Rajah 7.2,*

....

[1 mark]
[1 markah]

[Lihat sebelah
SULIT

(d)   Compare the motion of trolley Q at the frictionless slope and the rough surface.
       Bandingkan pergerakan troli Q pada landasan condong tanpa geseran dan
       permukaan kasar

       ....

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

(e)   (i)   The mass of trolley Q is 500 g. Calculate the gravitational potential
              energy of trolley Q, at the top of the slope.
              Jisim troli Q ialah 500 g. Kirakan tenaga keupayaan graviti bagi troli Q ,
              pada kedudukan tertinggi landasan.

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

       (ii)   The kinetic energy of the trolley Q at the top of the slope is 3.0 J.
              Calculate the total energy of the trolley.
              Tenaga kinetic troli Q pada kedudukan atas cerun ialah 3.0 J. Kirakan
              jumlah tenaga troli itu.

                                                                              [3 *marks*]
                                                                              [3 *markah*]

8   Diagram 8 shows an underground water pipe that is leaking. The radioactive salt contains radioisotope is used to detect the leakage.
     Rajah 8 menunjukkan satu paip air di bawah tanah yang bocor. Garam radioaktif yang mengandungi radioisotop digunakan untuk mengesan kebocoran.
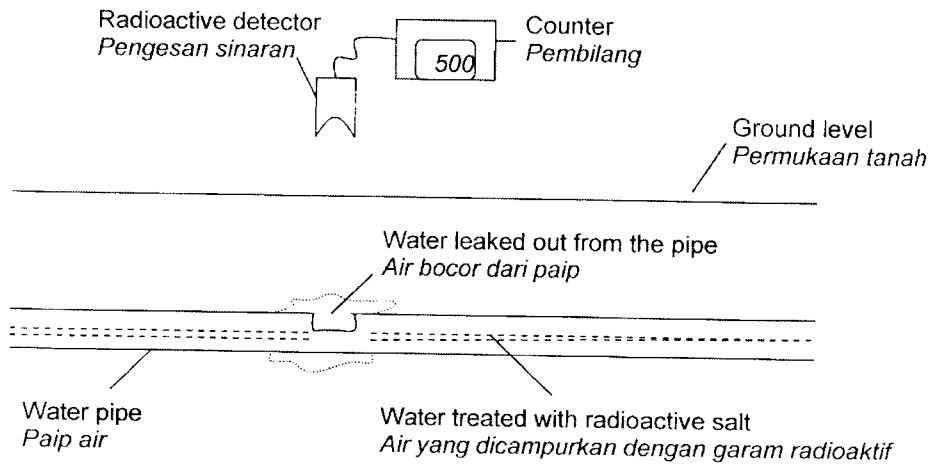

Diagram 8
Rajah 8

Table 8 shows four radioisotopes with their respective properties.
Jadual 8 menunjukkan empat radioisotop dengan sifat masing-masing.

Radioisotopes *Radioisotop*	Type of radiation *Jenis sinaran*	Half-life *Separuh hayat*	Physical state *Keadaan fizikal*
Cobalt-60 *Kobalt-60*	Gamma *Gama*	5.27 years *5.27 tahun*	Solid *Pepejal*
Strontium-90 *Strontium-90*	Beta *Beta*	28.5 years *28.5 tahun*	Solid *Pepejal*
Sodium-24 *Natrium-24*	Gamma *Gama*	15 hours *15 jam*	Liquid *Cecair*
Phosphorus-32 *Fosforus-32*	Beta *Beta*	14.3 days *14.3 hari*	Liquid *Cecair*

Table 8
Jadual 8

(a)   What is meant by half-life?
      Apakah yang dimaksudkan dengan separuh hayat ?

      ....

      ....

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

(b) Based on the Table 8, state the suitable properties of the radioisotope to detect the leakage.
Give reason for the suitability of the properties.
Berdasarkan Jadual 8, nyatakan sifat-sifat radioisotop yang sesuai untuk mengesan kebocoran pada paip.
Beri sebab mengapa sifat-sifat itu sesuai.

(i) Type of radiation / *Jenis sinaran*

....

Reason / *Sebab*

....
[2 marks]
[2 markah]

(ii) Half-life / *Separuh hayat*

....

Reason / *Sebab*

....
[2 marks]
[2 markah]

(iii) Physical state / *Keadaan fizikal*

....

Reason / *Sebab*

....
[2 marks]
[2 markah]

(c) Determine the most suitable radioisotope that can be used to detect the leakage.
Tentukan radioisotop yang paling sesuai digunakan untuk mengesan kebocoran pada paip.

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

(d)   The radioisotope in 8(c) has an initial count rate of 1600 counts per minute.
      Calculate the time taken for the radioisotope in the water to become 100 counts
      per minute.
      *Radioisotop dalam 8(c) mempunyai kadar bilang awal sebanyak 1600 bilang
      per minit. Kirakan masa untuk radioisotop dalam air menjadi 100 bilangan per
      minit.*

[2 marks]
[2 markah]

(e)   Cobalt-60 emits gamma ray.
             Kobalt-60 memancarkan sinar gama.

      (i)   State **one** property of the gamma ray.
             *Nyatakan **satu** sifat sinar gama.*

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

      (ii)   Compare the speed of gamma ray and speed of light in the vacuum.
             Bandingkan kelajuan sinar gama dan kelajuan cahaya dalam vakum.

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

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 a light ray passing from air into glass.
    Diagram 9.2 shows a light ray passing from air into water.
    [Refractive index : Glass = 1.50; Water = 1.33]

Rajah 9.1 menunjukkan satu sinar cahaya merambat dari udara ke dalam kaca.
Rajah 9.2 menunjukkan satu sinar cahaya merambat dari udara ke dalam air.
[Indeks biasa ; kaca = 1.5 ; air = 1.33]
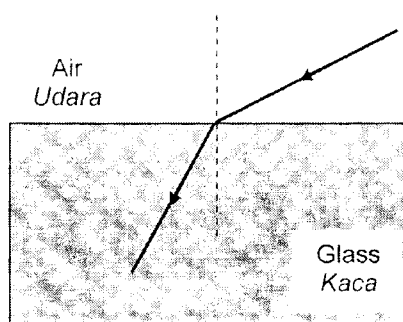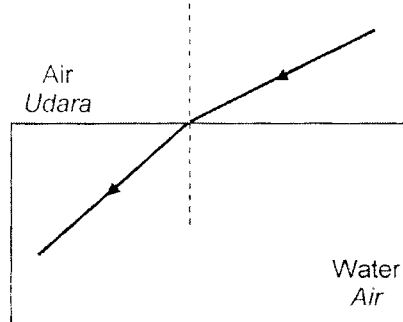
Diagram 9.1   Diagram 9.2
Rajah 9.1   *Rajah 9.2*

(a) (i)   Name the phenomenon of light as shown in Diagram 9.1 and Diagram
           9.2.   [1 *mark*]
           Namakan fenomena cahaya seperti yang ditunjukkan dalam Rajah
           9.1 dan Rajah 9.2.   [1 *markah*]

     (ii) What is the meaning of refractive index   [1 *mark*]
           Apakah maksud indeks biasan   [1 *markah*]

(b) Using Diagram 9.1 and Diagram 9.2,
     Menggunakan Rajah 9.1 dan Rajah 9.2,

     (i)   compare the refractive index of the glass and the water.   [1 *mark*]
           Bandingkan indek biasan bagi kaca dan air.   [1 *markah*]

     (ii) compare the refracted angle in the glass and that in the water.
                                                                     [1 *mark*]
           Bandingkan sudut biasan di dalam kaca dan di dalam air.
                                                                    [1 *markah*]

State the relationship between the refractive index with the angle of refraction. [1 *mark*]

Nyatakan hubungan antara indek biasan dengan sudut pembiasan.

[1 *markah*]

(c) Name the physics law that relates the angle of incidence and the angle of refraction. [1 *mark*]

Namakan hukum fizik yang menghubungkaitkan sudut tuju dengan sudut biasan. [1 *markah*]

(d) With the aid of label diagram, explain how the mirage occurs on the hot surface of a road. [4 *marks*]

Dengan bantuan gambar rajah berlabel, terangkan bagaimana logamaya boleh terbentuk di atas permukaan jalanraya yang panas. [4 *markah*]

(e) You are given two pieces of identical prism with internal angle 45^0, 90^0, 45^0 and two converging lenses to make a binocular.

Anda diberi dua keping prisma kaca serupa yang berukuran 45^0, 90^0, 45^0 dan dua kanta penumpu untuk membina sebuah binokular ringkas.

Using the materials stated above, explain how you are going to build a simple binocular. [6 *marks*]

Dengan menggunakan radas yang dinyatakan di atas, terangkan bagaimana anda membina sebuah binokular ringkas. [6 *markah*]

Suggest modifications need to be done on the simple binocular to produce brighter and bigger image. [4 *marks*]

Cadangkan pengubahsuaian yang perlu dilakukan terhadap binocular ringkas itu untuk menghasilkan imej yang lebih terang dan lebih besar. [4 *markah*]

10 Diagram 10.1 and Diagram 10.2 show magnets being pushed with the same speed into wire coils connected to galvanometers.

Rajah 10.1 dan Rajah 10.2 menunjukkan magnet sedang ditolak dengan kelajuan yang sama ke dalam gegelung dawai yang disambungkan kepada galvanometer.
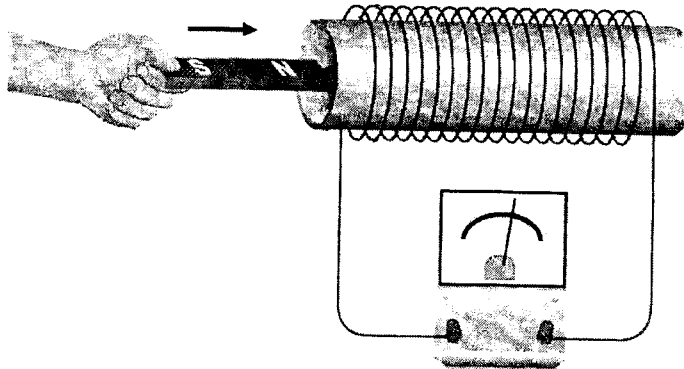
Diagram 10.1
Rajah 10.1
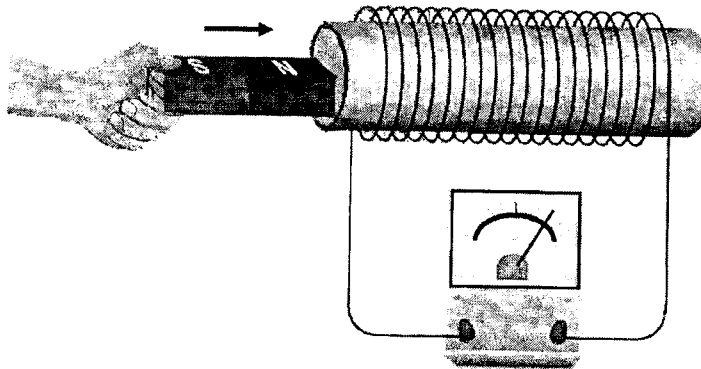
Diagram 10.2
Rajah 10.2

(a) What is the meaning of electromagnetic induction? [1 mark]
Apakah maksud aruhan elektromagnet? [1 markah]

(b) Using Diagram 10.1 and Diagram 10.2, compare the number of magnets, the density of the magnetic flux and angle of deflection of the galvanometer pointer.

[3 marks]

Menggunakan Rajah 10.1 dan Rajah 10.2, bandingkan bilangan magnet, ketumpatan fluks magnet dan sudut pesongan jarum penunjuk galvanometer.

[3 markah]

(c) State the relationship between
Nyatakan hubungan antara

(i) the number of magnets and the density of the magnetic flux,
bilangan magnet dengan ketumpatan fluks magnet,

(ii) the density of the magnetic flux and the magnitude of induced current flow.
ketumpatan fluks magnet dengan magnitud aliran arus aruhan.

[2 marks]
[2 markah]

(d) Diagram 10.3 shows the parts of a moving coil galvanometer.
Rajah 10.3 menunjukkan bahagian-bahagian suatu galvanometer gegelung bergerak.

Scale
Skala

Pointer
Jarum penunjuk

Soft iron core
Teras besi lembut

Permanent magnet
Magnet kekal

Wire coils
Gegelung dawai

N   S

Current
Arus

Control spring
Spring kawalan
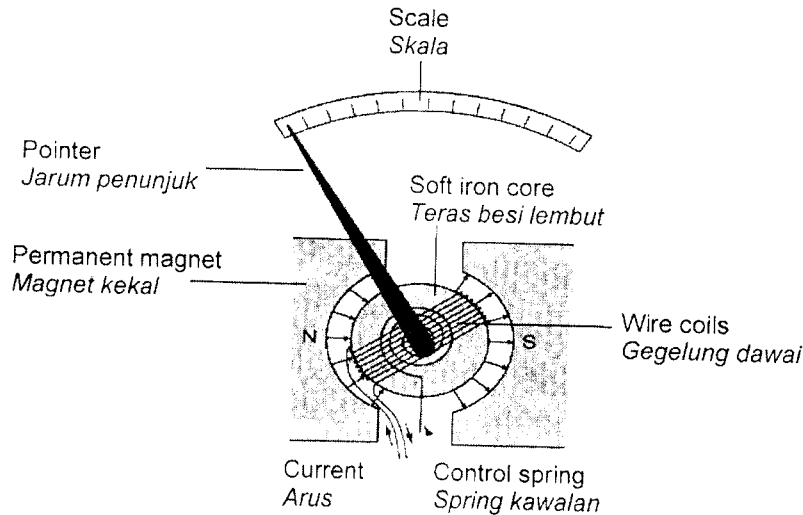
Diagram 10.3
Rajah 10.3

(i) Explain the working principle of the moving coil galvanometer.   [4 marks]
Terangkan prinsip kerja galvanometer gegelung bergerak itu.   [4 markah]

(ii) The moving coil galvanometer is found to be unable to detect small changes of induced current.

Galvanometer itu didapati tidak dapat mengesan perubahan arus aruhan yang kecil.

Suggest and explain the modifications that need to be done on the galvanometer to increase its sensitivity.

Cadang dan terangkan pengubahsuaian ke atas galvanometer untuk meningkatkan kepekaannya.

[10 marks]
[10 markah]

Section C
Bahagian C

[20 marks]
[20 markah]

Answer any **one** question from this section.
Jawab mana-mana **satu** soalan daripada bahagian ini.

11 Diagram 11.1 shows two archers shooting a target using the different bows, but with same initial length of elastic cords. The pulling force, *F* acting on the elastic cords is identical.

Rajah 11.1 menunjukkan dua orang pemanah memanah sasaran dengan menggunakan anak panah yang berlainan, tetapi panjang asal tali kenyal adalah sama. Daya tarikan, F, yang dikenakan ke atas kedua-dua tali kenyal adalah sama.

Bow A
Anak panah A

Force,*F*
Daya, F

Elastic cord A
Tali kenyal A

Bow B
Anak panah B

Force,*F*
Daya, F

Elastic cord B
Tali kenyal B

Diagram 11.1
Rajah 11.1
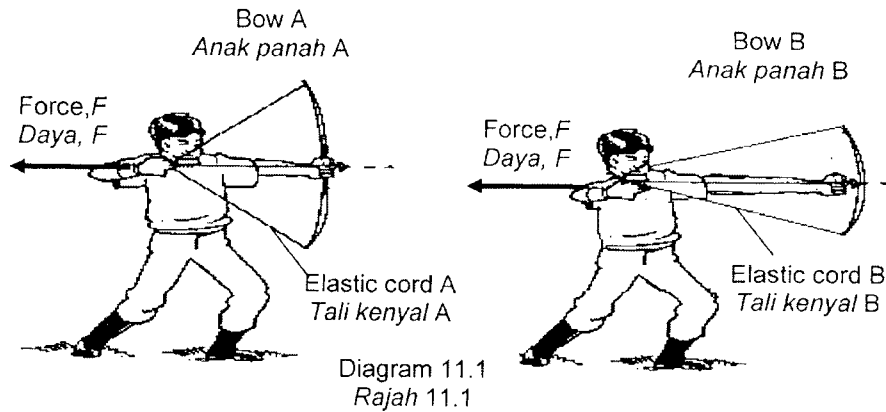
(a) What is meant by elasticity? [1 *mark*]

Apakah yang dimaksudkan dengan kekenyalan? [1 *markah*]

(b) (i) Using the concept of elasticity, identify the similarities and differences between the two situations. [4 *marks*]

Menggunakan konsep kekenyalan, kenalpasti kesamaan dan perbezaan di antara kedua-dua situasi. [4 *markah*]

(ii) Sketch on the same graph of force against extension for the two elastic cords A and B. [1 *mark*]

Pada graf daya melawan pemanjangan yang sama, lakarkan graf bagi kedua-dua tali kenyal A dan B. [1 *markah*]

(c)   Diagram 11.3 shows a catapult used to project an object. Force F pulls back the object, creating tension in the rubber cords.

Rajah 11.3 menunjukkan sebuah lastik digunakan untuk melastik objek. Daya F menarik objek ke belakang, menghasilkan regangan pada tali getah.

Rubber cord
Tali getah

Object
Objek
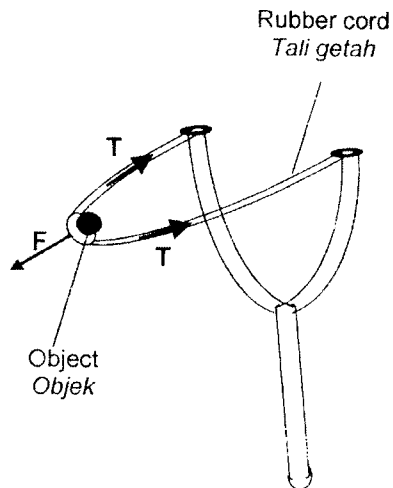
Diagram 11.3
Rajah 11.3
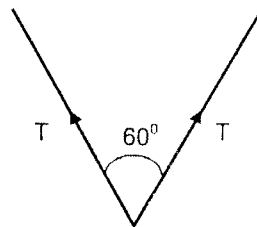
Diagram 11.4
Rajah 11.4

The tension force in each rubber cord is 20 N and the two cords are at 60° to each other as shown in Diagram 11.4.
Determine the magnitude and direction of the resultant force of these tension forces using parallelogram of forces method.
[Use the scale 1 cm : 2.5 N]   [4 marks]

Daya regangan pada setiap tali getah ialah 20 N dan kedua-dua tali berada pada 60° antara satu sama lain seperti yang ditunjukkan dalam Rajah 11.4.
Tentukan magnitud dan arah daya paduan untuk daya-daya regangan dengan menggunakan kaedah segiempat selari daya.
[Gunakan skala 1 cm : 2.5 N]   [4 markah]

(d) Table 11 shows four arm exercise equipments, P, Q, R and S, with different specifications.
You are asked to investigate the characteristics of the arm exercise equipment as shown in Table 11.

Jadual 11 *menunjukkan lima alat senaman tangan*, P, Q, R *dan* S, *dengan spesifikasi yang berbeza.*
Anda diminta untuk mengkaji ciri-ciri alat senaman tangan sebagaimana ditunjukkan dalam Jadual 11.

Explain the suitability of each feature of the arm exercise equipment in Table 11.
Determine the most suitable arm exercise equipment to be used.

Give reasons for your choice. [10 *marks*]

Terangkan kesesuaian setiap ciri alat senaman tangan dalam Jadual 11.
Tentukan alat senaman tangan yang paling sesuai untuk digunakan.
Beri sebab bagi pilihan anda.

[10 *markah*]
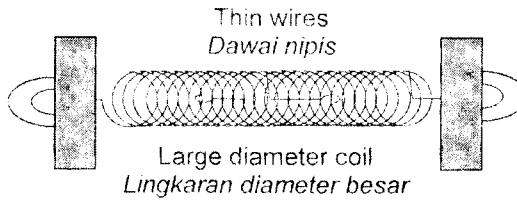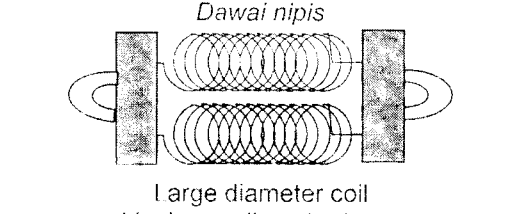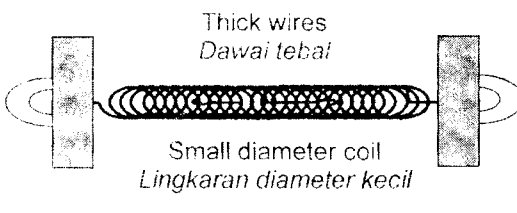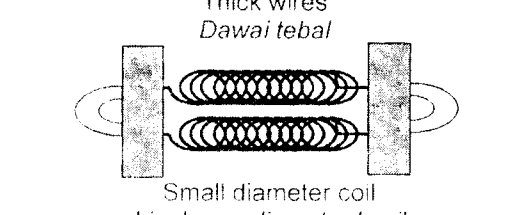
Arm exercise equipment, P *Alat senaman tangan, P* Spring metarial: Steel *Jenis bahan spring: Keluli* Spring arrangement: Series *Susunan spring: Sesiri*	Thin wires *Dawai nipis* Large diameter coil *Lingkaran diameter besar*
Arm exercise equipment, Q *Alat senaman tangan, Q* Spring metarial: Copper *Jenis bahan spring: Kuprum* Spring arrangement: Parallel *Susunan spring: Selari*	Thin wires *Dawai nipis* Large diameter coil *Lingkaran diameter besar*
Arm exercise equipment, R *Alat senaman tangan, R* Spring metarial: Copper *Jenis bahan spring: Kuprum* Spring arrangement: Series *Susunan spring: Sesiri*	Thick wires *Dawai tebal* Small diameter coil *Lingkaran diameter kecil*
Arm exercise equipment, S *Alat senaman tangan, S* Spring metarial: Steel *Jenis bahan spring: Keluli* Spring arrangement: Parallel *Susunan spring: Selari*	Thick wires *Dawai tebal* Small diameter coil *Lingkaran diameter kecil*

Table 11
Jadual 11

12   Diagram 12.1(a) and Diagram 12.1(b) show photographs of two electric circuits. Each circuit contains two identical dry cells of e.m.f 1.5 V, a resistor R and an ammeter.

Rajah 12.1(a) dan Rajah 12.1(b) menunjukkan fotograf bagi dua litar elektrik. Setiap litar mengandungi dua sel yang serupa dengan d.g.e 1.5 V, satu perintang R dan satu ammeter.

Diagram 12.1(a)
Rajah 12.1(a)

Diagram 12.1(b)
Rajah 12.1(b)
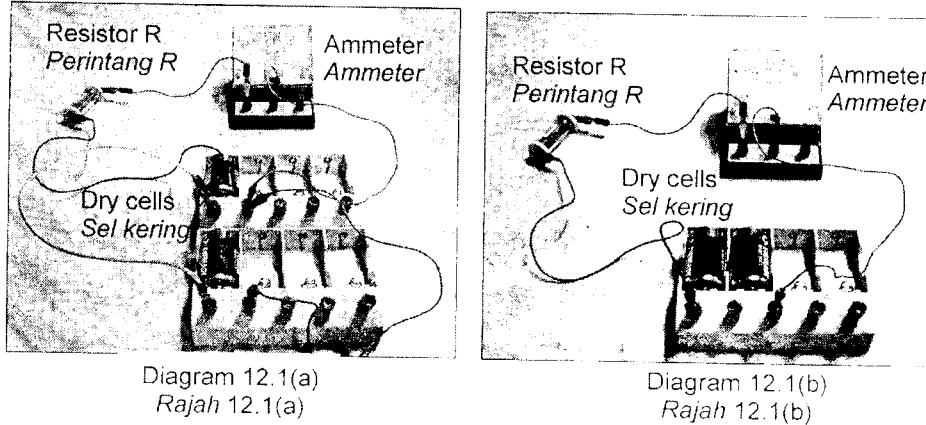
Diagram 12.1
Rajah 12.1

(a)   What is meant by e.m.f.?   [1 mark]

Apakah maksud d.g.e.?.   [1 markah]

(b)   (i)   Draw two electrical circuit diagrams for photographs in Diagram 12.1(a) and Diagram 12.1(b).   [2 marks]
Lukis dua rajah litar elektrik bagi fotograph dalam Rajah 12.1(a) dan Rajah 12.1(b).   [2 markah]

(ii)   Name the dry cells connection for Diagram 12.1(a).   [1 mark]
Namakan jenis sambungan sel kering dalam Rajah 12.1(a).   [1 markah]

(iii)   State the advantage of Diagram 12.1(b) as compared to Diagram 12.1(a).
[1 mark]
Nyatakan satu kelebihan Rajah 12.1(b) berbanding dengan Rajah 12.1(a).
[1 markah]

(c)   Table 12 shows four lamps P, Q, R and S with different specifications.
       You are asked to investigate the characteristics of the lamps as shown in Table 12.

       Jadual 12 menunjukkan lima lampu, P, Q, R dan S, dengan spesifikasi yang berbeza.
       Anda diminta untuk mengkaji ciri-ciri lampu sebagaimana ditunjukkan dalam Jadual 12.

       Explain the suitability of each feature of the lamp in Table 12. Determine the most
       suitable lamp to be used as a reading lamp.

       Give reasons for your choice.

                                                                                [10 *marks*]

       Terangkan kesesuaian setiap ciri lampu dalam Jadual 12.
       Tentukan lampu yang paling sesuai untuk digunakan sebagai lampu membaca.
       Beri sebab bagi pilihan anda.

                                                                                [*10 markah*]
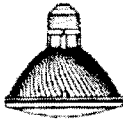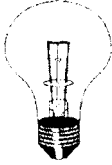
| Lamp P
Lampu P

Cost
Kos
RM 70 | Power rating
Kuasa elektrik
300 W, 240 V | | Efficiency 75 %
Kecekapan

Lifetime 4000 hours
Jangka hayat 4000 jam |
|---|---|---|---|
| Lamp Q
Lampu Q

Cost
Kos
RM 30 | Power rating
Kuasa elektrik
36 W, 240 V | | Efficiency 80 %
Kecekapan

Lifetime 8000 hours
Jangka hayat 8000 jam |
| Lamp R
Lampu R

Cost
Kos
RM 15 | Power rating
Kuasa elektrik
100 W, 240 V | | Efficiency 60 %
Kecekapan

Lifetime 6000 hours
Jangka hayat 6000 jam |
| Lamp S
Lampu S

Cost
Kos
RM 10 | Power rating
Kuasa elektrik
60 W, 240 V | | Efficiency 50 %
Kecekapan

Lifetime 1000 hours
Jangka hayat 1000 jam |

Table 12
Jadual 12

(d) The power rating of Lamp P is 200 W, 240 V.

Lampu P dilabel dengan kuasa elektrik 200 W, 240 V.

(i) State the change of energy in Lamp P   [1 mark]

Nyatakan perubahan tenaga dalam Lampu P   [1 markah]

(ii) Calculate the electric current and resistance for Lamp P   [4 marks]

Kirakan arus elektrik dan rintangan Lampu P   [4 markah]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009
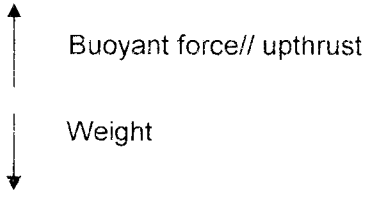
FIZIK
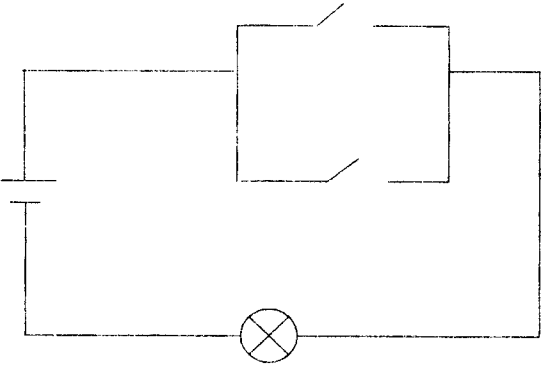
Kertas 2
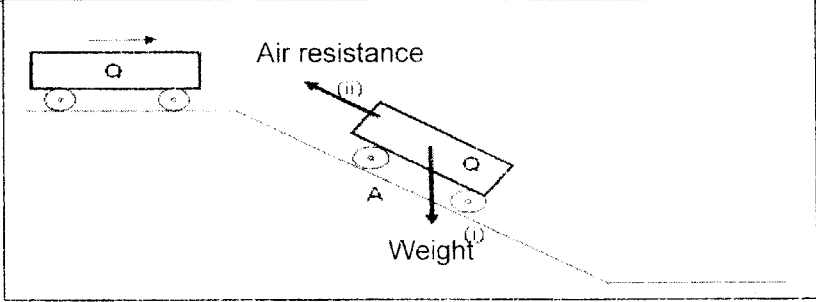
PERATURAN PEMARKAHAN
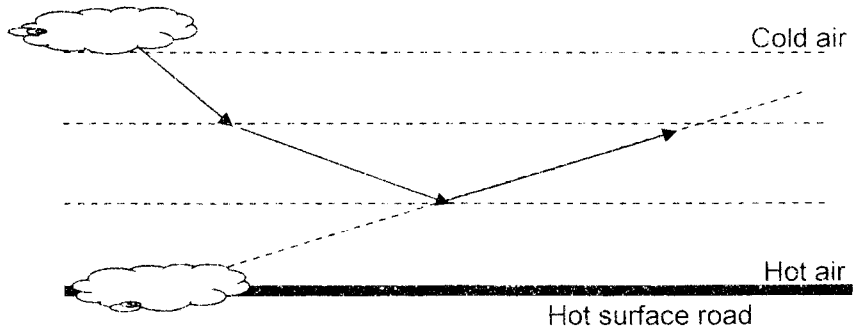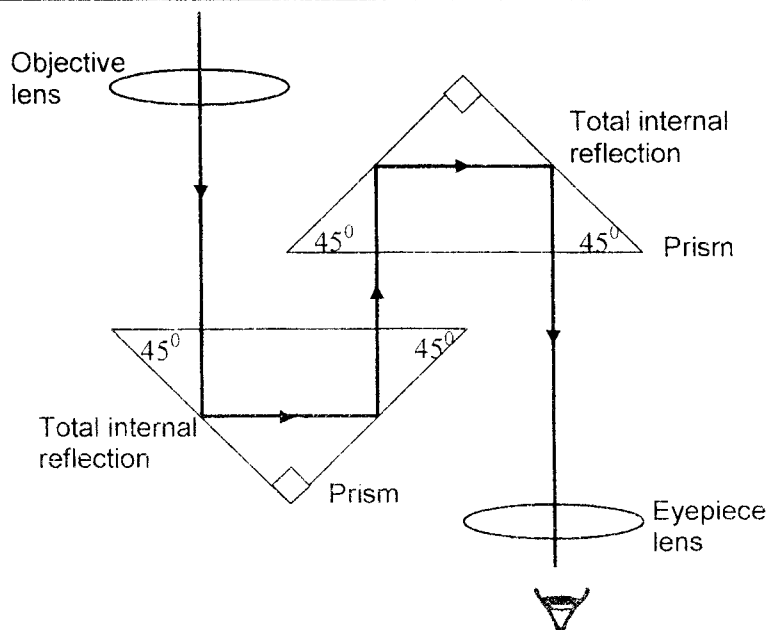
SECTION A				
1	(a)		Converge at a point F	1
	(b)		Any point at the principal axis in front of the mirror	1
	(c)		Real, inverted and diminished (3 √ - 2 marks, 2 √ - 1 mark, 1√ - 0 mark)	2
			Total	**4 marks**
2	(a)		Cross sectional of P > cross sectional of Q	1
	(b)	(i)	Gradient of V-I graph	1
		(ii)	Draw a triangle $(8.0 - 0)/(5.0 - 0)$ $= 1.6$ ohm//VA^{-1}	1 1 1
			Total	**5 marks**
3	(a)	(i)	Buoyant force// upthrust Weight	1 1 1
		(ii)	Buoyant force = weight of object.	1
	(b)		Archimedes' Principle	1
	(c)	(i)	The bottle is submerged deeper.	1
		(ii)	Submerged less The greater the density, the greater the buoyant force.	1
			Total	**7 marks**
4	(a)		Force per unit area	1
	(b)	(i)	Increase the temperature will increase the kinetic energy of molecules The rate of collision between the gas molecules and the walls increase, thus the pressure of the gas increase.	1 1
		(ii)	Pressure Law	1
		(iii)	high gas pressure will increase the boiling point	1
	(c)		$\dfrac{P_1}{T_1} = \dfrac{P_2}{T_2}$ $\dfrac{1 \times 10^5}{(273 + 27)} = \dfrac{1.5 \times 10^5}{T_2}$	1
			$T_2 = 450$ K // 177 °C	1
			Total	**7 marks**

5	(a)		x-rays, ultraviolet, infra-red and microwave (4√ - 2 marks, 3√ - 1 mark , 2√@ 1√ - 0 mark)	2
	(b)		1.the speed of light is 3.0×10^{-8} ms^{-1}	
			2. can transfer energy but do not require a medium	
			3.Transverse wave	
			4. the wave can produce interference effects, reflection, refraction and diffraction	Max :2
	(c)	(i)	Telecommunication /satellite communication.	1
		(ii)	Long wavelength Easy be diffraction	1 1
			Total	**7 marks**
6	(a)		AND	1
	(b)			2
	(c)	(i)	<table><tr><td>A</td><td>B</td><td>L</td><td>M</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	2
		(ii)	The door and the gate will open	1
	(d)		1. When switches A and B are closed 2. When switches A closed and B open	1 1
			Total	**8 marks**

7	(a)	(i)	Air resistance / Weight	1
		(ii)		1
	(b)	(i)		
		(ii)		
				1
	(c)		Air resistance decrease the acceleration of the trolley// trolley move slower	1
	(d)		Trolley move slower at rough surface than at frictionless slope	1
	(e)	(i)	$GPE = mgh$ $= 0.5 \times 10 \times 0.7$ $= 3.5 \text{ J}$	1 1
		(ii)	$\text{Total energy} = KE_{top} + GPE$ $= 3.0 + 3.5$ $= 6.5 \text{ J}$	1 1 1
			Total	**10 marks**
8	(a)		Time taken for the number of un decayed nuclei in a sample to be reduced to half of its original number	1
	(b)	(i)	Gamma High penetrating power, so can penetrate through the ground	1 1
		(ii)	Short half-life Provide enough time for investigation // Does not stay too long in the water	1 1
		(iii)	Liquid Can be mixed easily with water	1 1
	(c)		Sodium-24	1
	(d)		1600 to 100 : $4T_{1/2} = 4(15)$ $= 60 \text{ jam}$	1 1
	(e)	(i)	Electromagnetic wave//very high frequency//short wavelength	1
		(ii)	Gamma ray and light moving at same speed.	1
			Total	**12 marks**
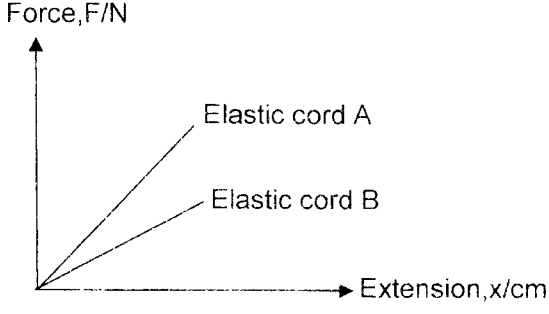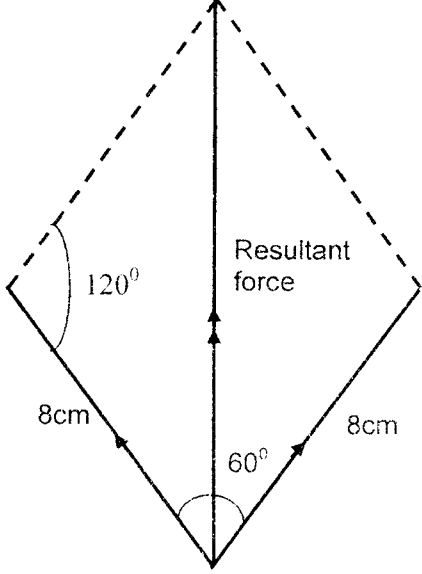
Paper 2 Section B

9	(a)	(i)	Refraction of light.	1
		(ii)	Refractive index is the ratio of sin angle of incidence to the sin of angle of refraction	1
	(b)	(i)	Refractive index for the glass is greater than the water // vice versa	1
		(ii)	The angle of refraction in water is larger than the angle of refraction in glass. // vice versa	1
			The grater the refractive index, the smaller the angle of refraction.	1
	(c)		Snell's Law	
	(d)			1
			– The layers of the air near the ground are hotter when heated by the sun // diagram	
			– The air at higher layers is cooler and denser compare to the air at lower layer.	1
			– Light from the sky passing through these difference density layers of air will refracted gradually toward the horizon.	1
			– Total internal reflection occur when critical angle larger than incidence angle	1

(e)

Distribution of marks:

1 mark -- Labeled 90^0 prism
1 mark -- Arrangement of prisms --- facing each other
1 mark -- Location of objective lens
1 mark -- Location of the eyepiece lens
1 mark -- Light ray with 2 times total internal reflection at the 1st prism
1 mark -- Light ray with 2 times total internal reflection at the 2nd prism

6

modification	Reason	
Objective lens with larger diameter.	More light passes through the lens	2
Eyepiece lens with higher power // shorter focal length	Shorter focal length// higher power // as strong magnifying glass	2

| | **Total** | **20** |

10	(a)	Electromagnetic induction is the production of an electric current by a changing of magnet flux // cutting of magnetic flux.	1
	(b)	- Diagram 10.2 has more magnets than Diagram 10.1	1
		- Density of magnetic flux in Diagram 10.2 is higher // more.	1
		- The angle of deflection in Diagram 10.2 is bigger.	1
	(c)	(i) - When the number of magnet increases, the magnetic flux has a higher density.	1
		(ii) - When the density of the magnetic flux increases, the magnitude of induced current flow also increases.	1
	(d)	(i) - When the **current flows** through the wire coils of the galvanometer, a **magnetic field is produced**.	1
		- This magnetic field then **interacts with the magnetic field of the permanent magnet** producing a pair of **forces** that turns the wire coils together with the pointer.	1
		- The control spring will produce forces **opposing the movement of the coil** forcing the coil to come to a stop.	1
		- When the current stops, the turning forces become zero, and the control springs **return the coil and the pointer back to its initial position.**	1
		(ii) The sensitivity of the moving coil galvanometer can be increased by	
		- increasing the strength of the radial magnetic field	1
		➤ increase the force between the current carrying coil and magnetic field.	1
		- using hairspring of lower stiffness	1
		➤ smaller opposing forces to stop the turning of the coil.	1
		- using a lighter pointer	1
		➤ smaller inertia, easier to move	1
		- using a coil of lighter mass	1
		➤ smaller inertia, able to move easily	1
		- increasing the area of the coil	1
		➤ more changes to the magnetic flux, a bigger force is produced.	1
		Total	**20**

Paper 2 Section C

11	(a)	Elasticity is a property of matter that enables an object to return to its original size and shape when the forces that acting on it are removed	1
	(b)	(i)	– Both the elastic cords have same natural length and pulled by the same amount of force.	1
			– The elastic cord for bow B is extended more than bow A.	1
			– For a same amount of force, the elastic cord for bow B is stretched more than bow A.	1
			– The elastic cord for bow A is stiffer than the elastic cord for bow B // Elastic cord for bow A has larger stiffness constant than the elastic cord for bow B.	1
		(ii)		1
	(c)		1 mark for correct parallelogram lines (measurement & angle). 1 mark for correct diagonal line. 1 mark for direction of the resultant force. 1 mark for magnitude with correct unit : 13.8cm X 2.5 = **34.5N**	4

(d)	Characteristics	Reason	
	Spring made of steel	The spring is stiffer // less extension // can withstand higher force // less elastic	2
	Spring arranged in parallel	The spring system is stiffer // Less extension // less elastic	2
	Spring with thicker wires	The spring is stiffer // Less extension // less elastic // wire not easily break	2
	Spring with smaller diameter of coil	Increase the stiffness of the spring // less extension // can withstand higher force // save space	2

S is the most suitable arm exercise equipment.   1

Spring S is made of steel, springs arranged in parallel, spring wire is thick and spring with smaller diameter of coil.   1

                                                                    Total   20

12	(a)	E.m.f as the work done by a source in driving a unit charge around a complete circuit // reading of the voltmeter across the battery when there is no current flow / open circuit.	1
	(b)	(i)	2

                                             2

(ii)   Parallel connection

(iii)   Diagram 12.1(b) provides higher voltage supply // higher total emf // higher current.   1

                                                     1

(c)	

Properties	explanation	
Low power rating	Consume less electrical energy // save energy	2
Low cost	Save money // cheaper	2
High efficiency	Produce high power output // less energy wasted	2
Long lifetime	Last longer // use for longer period	2

Lamp Q, It has lower power rating, low cost, high efficiency and long lifetime.   1   1

	(d)	(i)	Electrical energy $\longrightarrow$ light energy + heat energy		1
		(ii)	$I = \dfrac{200}{240}$ $= 0.83\ A$	Substitution – 1 mark Answer with correct unit – 1 mark	2
			$R = \dfrac{V^2}{P}$ $= \dfrac{240^2}{200}$ $= 288\ \Omega$	Substitution – 1 mark Answer with correct unit – 1 mark	2
				Total	20

END OF MARKING SCHEME

NO KAD PENGENALAN:

ANGKA GILIRAN:

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009   **4531/3**

PHYSICS
Kertas 3
Ogos/Sept. 2009
1 ½ jam   Satu jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tulis nombor kad pengenalan dan angka giliran anda pada ruang yang disediakan.*

2. *Kertas soalan ini adalah dalam dwibahasa.*

3. *Soalan di bahagian atas dalam bahasa Inggeris. Soalan di bahagian bawah yang sepadan dalam bahasa Melayu.*

4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

5. *Calon dikehendaki membaca maklumat di halaman 2 atau 3.*

| Untuk Kegunaan Pemeriksa			
Kod Pemeriksa:			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	16	
	2	12	
B	3	12	
	4	12	
Jumlah			

Kertas soalan ini mengandungi 14 halaman bercetak dan 2 halaman tidak bercetak

Section A
Bahagian A
[28 marks / 28 *markah*]

Answer **all** questions in this section.

*Jawab **semua** soalan dalam bahagian ini.*

1. A student carries out an experiment to investigate the relationship between the resistance, R, of a wire and the temperature, θ, of the resistor.
   Diagram 1.1 shows the circuit used in the experiment.

   Seorang pelajar menjalankan satu eksperimen untuk mengkaji hubungan di antara rintangan, R, bagi seutas dawai perintang dengan suhu,θ, bagi dawai itu.
   *Rajah 1.1 menunjukkan litar yang digunakan dalam eksperimen itu.*

Diagram 1.1 / *Rajah 1.1*
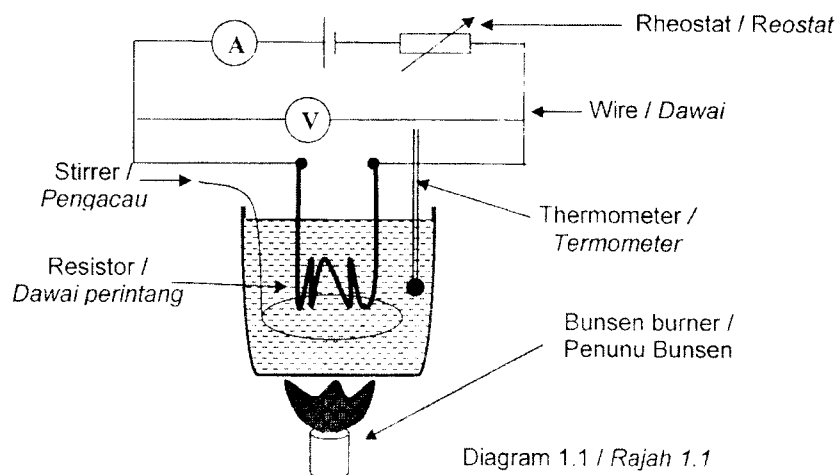
The Bunsen burner is used to heat up the water and the temperature of water is equal to the temperature of the resistor, θ = 20 °C. The rheostat is adjusted to obtain a suitable current. The current, I and the potential difference, V, across the wire are measured by an ammeter and a voltmeter respectively. Diagram 1.2 shows the readings of the ammeter and voltmeter.
The procedure is repeated for temperature of the resistor, θ = 30 °C, 40 °C, 50 °C and 60 °C. The corresponding readings of the ammeter and the voltmeter are shown in Diagrams 1.3, 1.4, 1.5 and 1.6.

*Penunu Bunsen digunakan untuk memanaskan air dan suhu air bersamaan dengan suhu dawai perintang, θ = 20 °C. Reostat dilaraskan untuk memperoleh satu nilai arus yang sesuai. Arus, I, dan beza keupayaan, V, merentasi dawai itu masing-masing diukur oleh ammeter dan voltmeter. Rajah 1.2 menunjukkan bacaan ammeter dan voltmeter. Prosedur itu diulang bagi suhu dawai, θ = 30 °C, 40 °C, 50 °C dan 60 °C. Bacaan-bacaan sepadan bagi ammeter dan voltmeter ditunjukkan dalam Rajah 1.3, 1.4, 1.5 dan 1.6.*
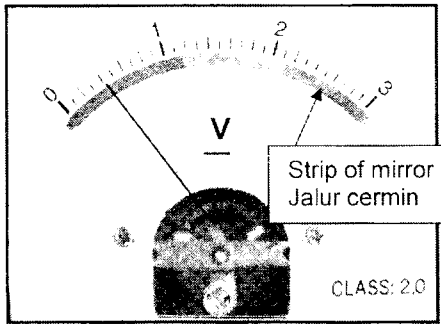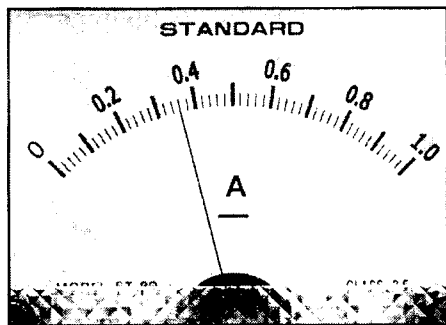
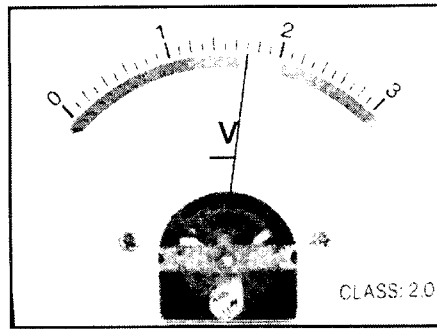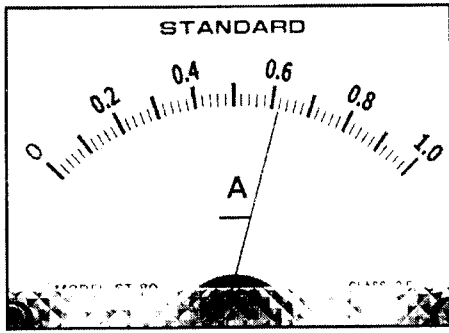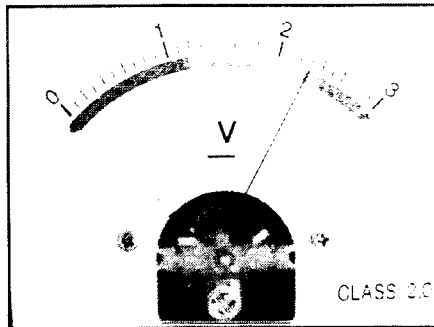Temperature / *Suhu*, θ = 20⁰C
Diagram 1.2 / *Rajah 1.2*
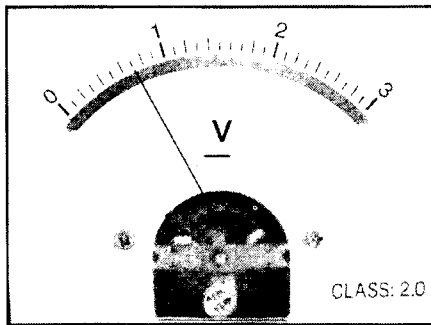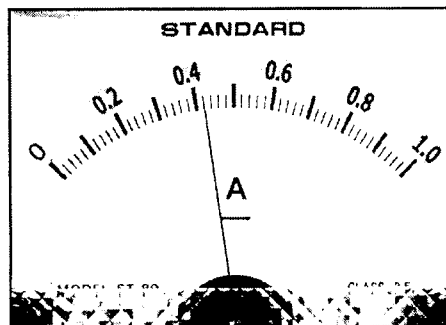
Temperature / *Suhu*, θ = 30°C
Diagram 1.3 / *Rajah 1.3*
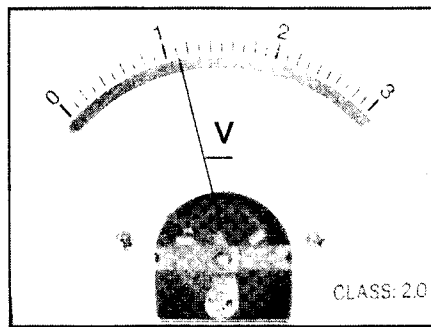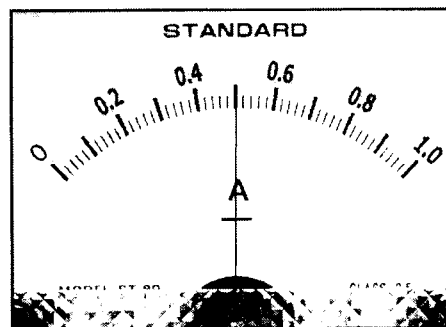
Temperature / *Suhu*, θ = 40°C
Diagram 1.4 / *Rajah 1.4*

Temperature / *Suhu*, θ = 50°C
Diagram 1.5 / *Rajah 1.5*
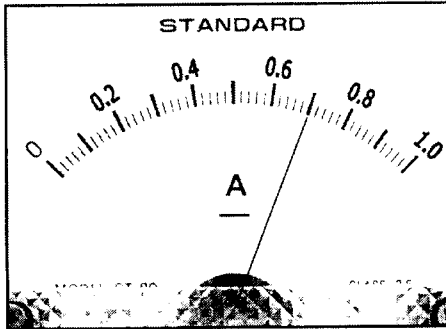
Temperature / *Suhu*, θ = 60°C
Diagram 1.6 / *Rajah 1.6*

(a) For the experiment described on page 2,3 and 4 identify:
     Bagi eksperimen yang diterangkan di halaman 2,3 dan 4 kenal pasti:

   (i) The manipulated variable,
        Pembolehubah dimanipulasikan,

        ....

        [1 mark]
        [1 *markah*]

   (ii) The responding variable,
         Pembolehubah bergerak balas,

        ....

        [1 mark]
        [1 *markah*]

   (iii) A constant variable.
          Satu pembolehubah dimalarkan.

        ....

        [1 mark]
        [1 *markah*]

(b) What is the function of the strip of mirror below the scale of the voltmeter as shown in Diagram 1.2?
Apakah kegunaan jalur cermin di bawah skala voltmeter itu seperti ditunjukkan pada Rajah 1.2?

....

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

(c) Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 3 and 4, determine the current, I and potential difference, V for the corresponding temperature of wire, θ. For each value of θ, calculate the resistance, R of the wire.

The resistance, R, is calculated using the formula, $R = \dfrac{V}{I}$

Tabulate your results for θ, I, V and R in the space below.

Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 dan 1.6 di halaman 3 dan 4, tentukan arus, I, beza keupayaan, V, yang sepadan dengan suhu dawai, θ. Bagi setiap nilai θ, hitungkan rintangan, R bagi dawai itu.

Rintangan, R, dihitung dengan menggunakan rumus, $R = \dfrac{V}{I}$

Jadualkan keputusan anda bagi θ, I, V dan R pada ruang di bawah.

[5 *marks*]
[5 *markah*]

(d) On the graph paper on Page 6, plot a graph of R against θ.
Pada kertas graf di halaman 6, lukiskan graf R melawan θ.

[5 *marks*]
[5 *markah*]

(e) Based on your graph, state the relationship between R and θ.
Berdasarkan graf anda, nyatakan hubungan antara R dan θ.

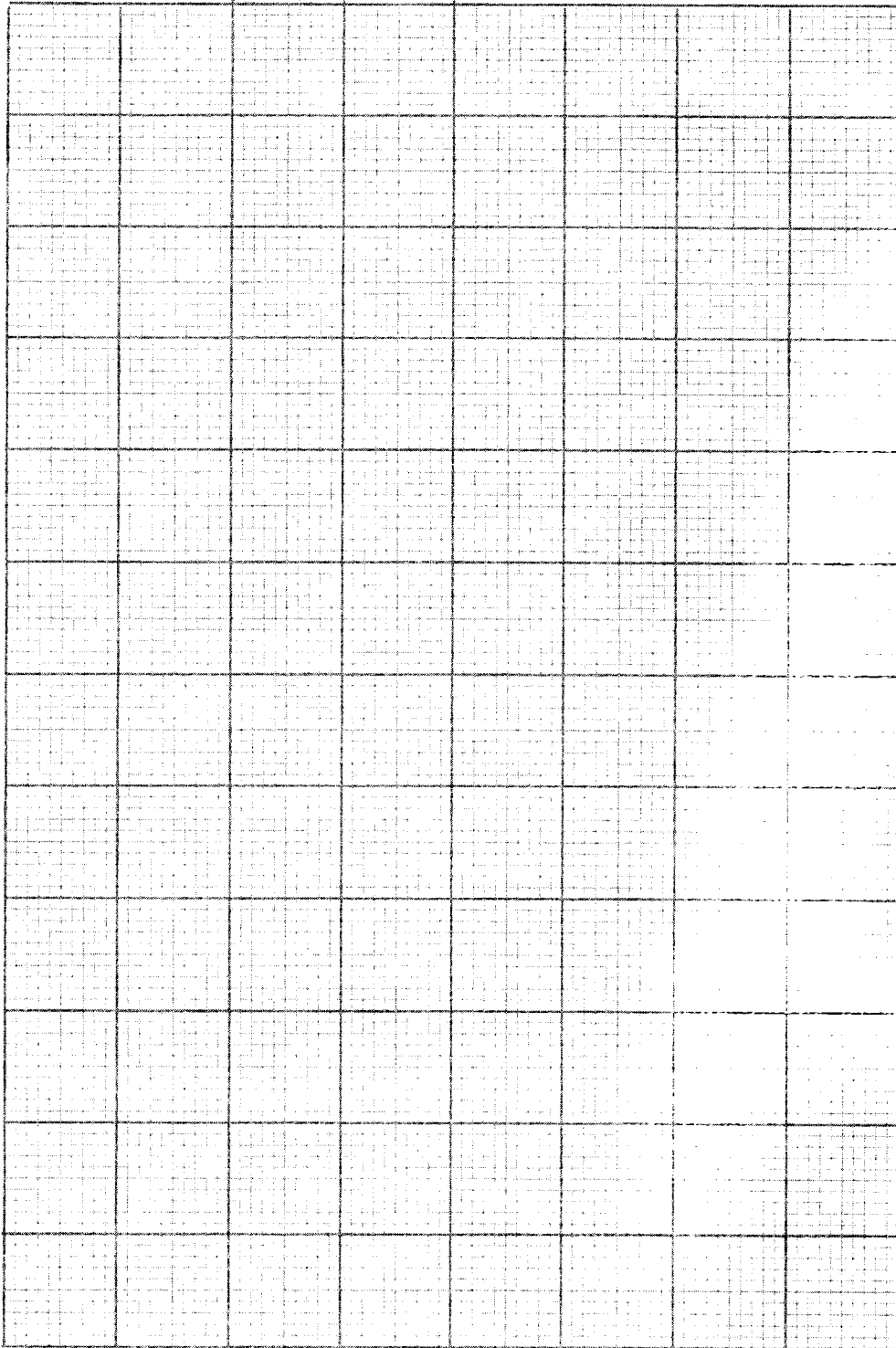...

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

(f) State one precaution that should be taken to obtain accurate readings of V.
Nyatakan satu langkah berjaga-jaga yang perlu diambil untuk mendapatkan bacaan V yang lebih jitu.

....

....

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

[Lihat sebelah

SULIT

Graph of R against θ /
Graf R melawan θ

2. A student carried out an experiment to investigate the relationship between the temperatures of a heated solid, θ, and the heating time t. The student used the same immersion heater to heat up the solid of a constant mass. The initial temperature of the solid, θ_o, and the final temperature of the solid after being heated, θ, are recorded.
Seorang pelajar menjalankan satu eksperimen untuk menyiasat perkaitan di antara suhu bagi suatu pepejal apabila dipanaskan dan masa pemanasan, t. Pelajar itu menggunakan pemanas rendam yang sama untuk pemanasan dan jisim pepejal itu adalah tetap. Suhu awal, θ_o, dan suhu akhir, θ, bagi pepejal itu dicatatkan.

The result of the experiment is shown in the graph of θ against t as shown in Diagram 2.1.
Keputusan eksperimen ini ditunjukkan dalam graf θ melawan t seperti Rajah 2.1.
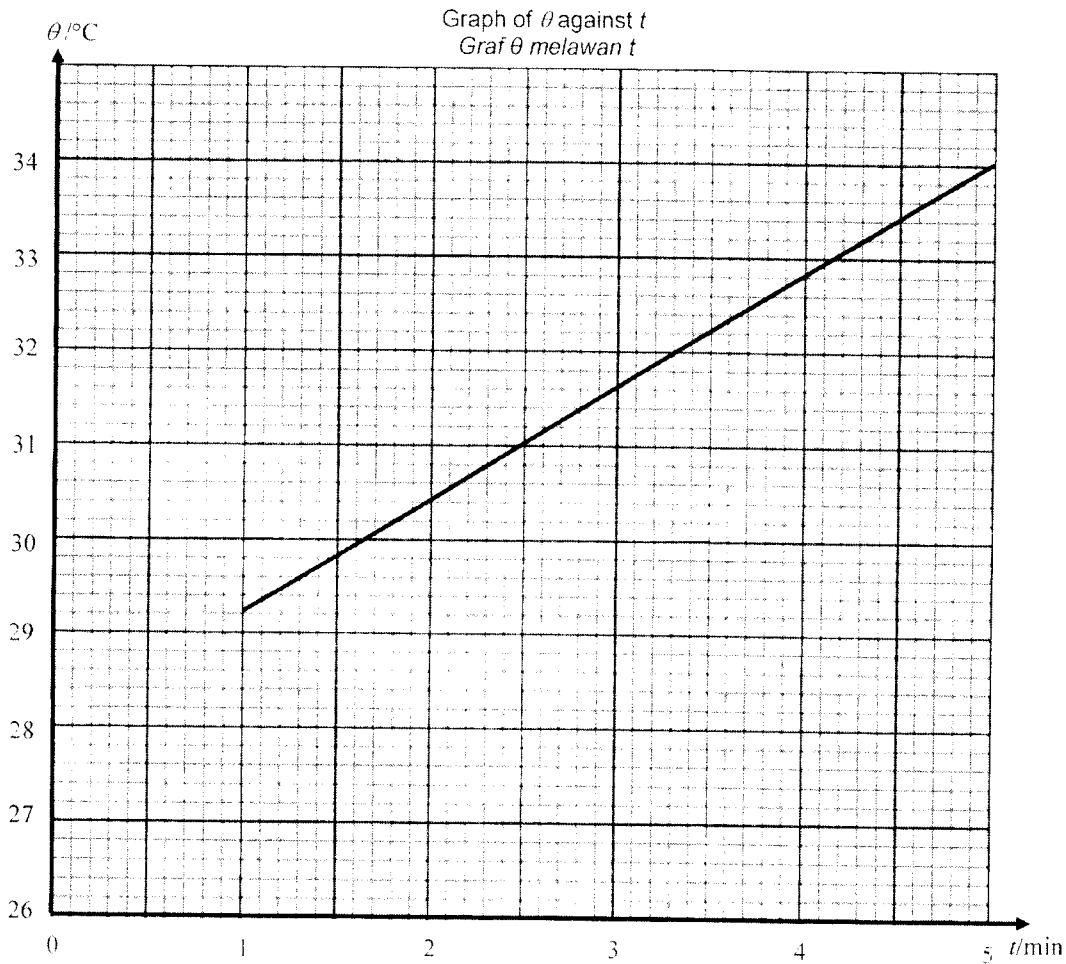

Graph of θ against t
Graf θ melawan t

Diagram 2.1
Rajah 2.1

(a) Based on the graph in Diagram 2.1:
Berdasarkan graf dalam Rajah 2.1:

    (i) Determine the initial temperature, θ_o, of the solid.
       Show on the graph how you determine θ_o and write the value below.
       Tentukan suhu awal, bagi pepejal itu. Tunjukkan pada graf bagaimana
       anda menentukannya dan tulis jawapan anda di bawah.

       θ_o =.................................   [2 marks]
                                                          [2 markah]

    (ii) What happen to θ when t increases?
       Apakah yang berlaku kepada θ apabila t meningkat?

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

    (iii) Determine the temperature, θ, of the heated solid when the heating time, t, is 2.5 min.
       Show on the graph how you determine the value of θ.
       Tentukan suhu, θ, bagi pepejal yang dipanaskan itu apabila masa
       pemanasan, t, ialah 2.5 minit.
       Tunjukkan pada graf bagaimana anda menentukan nilai θ.

       θ = ...   [2 marks]
                                                                 [2 markah]

(b) The specific heat capacity, c, of the solid is given by the equation;
Muatan haba tentu, c bagi pepejal diberikan oleh persamaan;

$$c = \frac{2.16 \times 10^3}{k}$$

where k is the gradient of the graph.
di mana k ialah kecerunan graf.

    (i) Calculate the gradient, k, of the graph θ against t.
       Show on the graph how you determine k.
       Kirakan kecerunan, k, bagi graf θ melawan t. Tunjukkan pada graf bagaimana
       kamu menentukan nilai k.

       k = ...   [3 marks]
                                                                  [3 markah]

(ii) Calculate the value of the specific heat capacity, c, of the solid.
Kirakan nilai muatan haba tentu, c, bagi pepejal itu.

$c = $ ....J kg^{-1} °C^{-1}

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

(c) State **two** precautions that can be taken to improve the accuracy of the readings in this experiment.
*Nyatakan **dua** langkah berjaga-jaga yang diambil untuk memperbaiki kejituan bacaan dalam eksperimen ini.*

1 ....

....

2 ....

....

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

Section B
Bahagian B

[12 marks]
[12 markah]

Answer any **one** question from this section
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

3. Diagram 3.1 shows a cylinder that is rolling down a wooden plank from a small lorry.
    Diagram 3.2 shows the same cylinder that is rolling down the same wooden plank from a
    big lorry. It is noticed that the cylinder is rolling faster from the big lorry.
    *Rajah 3.1 menunjukkan satu selinder plastik yang sedang bergolek turun dari sebuah lori
    kecil dengan menggunakan sekeping papan tebal.*
    *Rajah 3.2 menunjukkan satu selinder plastik yang sama yang bergolek turun dari sebuah
    lori besar dengan menggunakan papan tebal yang sama. Didapati bahawa selinder itu
    bergolek turun lebih laju dari lori besar.*
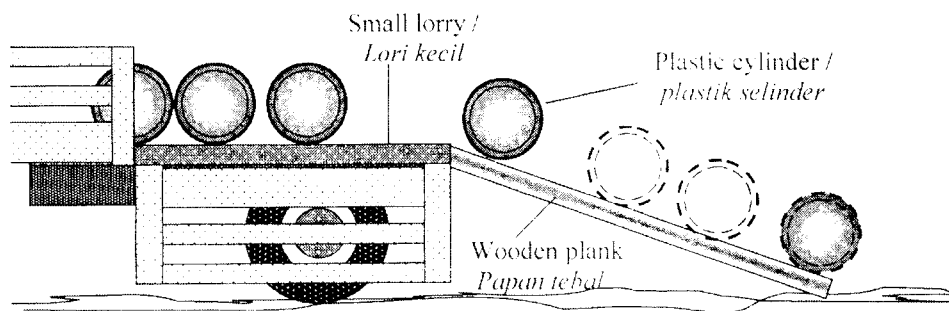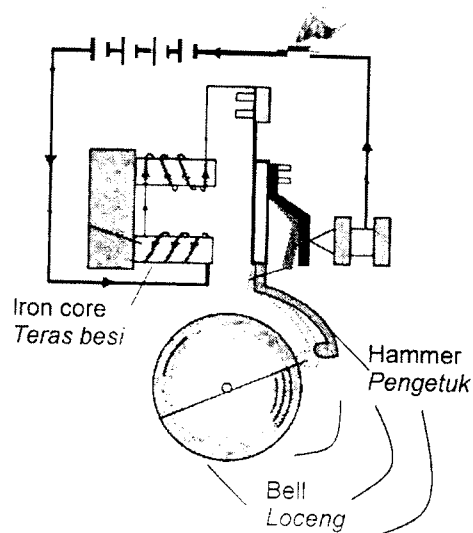

Diagram 3.1 / *Rajah 3.1*
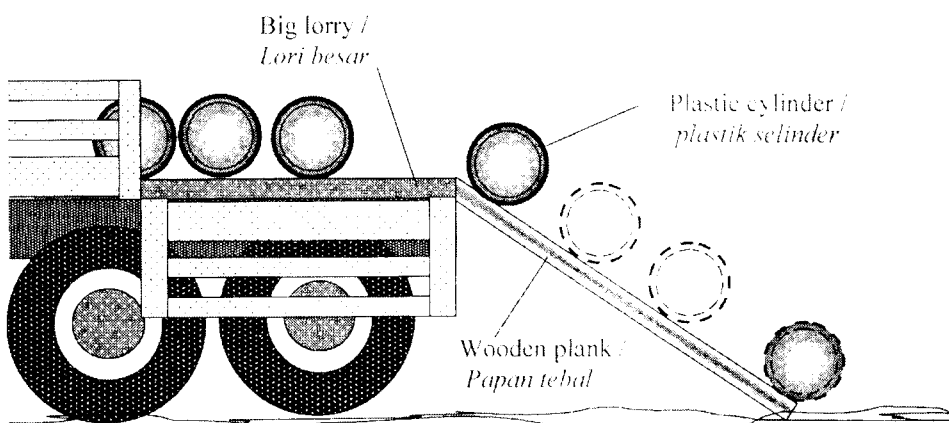
Diagram 3.1 / *Rajah 3.1*

Based on the information and observation above:
Berdasarkan maklumat dan pemerhatian di atas:

(a) State **one** suitable inference.
Nyatakan satu inferens yang sesuai.

[1 mark]
[1 markah]

(b) State **one** suitable hypothesis.
Nyatakan satu hipotesis yang sesuai.

[1 mark]
[1 markah]

(c) With the use of apparatus such as ticker timer, trolley and other apparatus, describe an experiment framework to investigate the hypothesis stated in 3(b).
Dengan menggunakan alat radas seperti jangka masa detik, troli dan lain-lain radas, terangkan satu rangka eksperimen untuk menyiasat hipotesis yang anda nyatakan di 3(b).

In your description, state clearly the following:
Dalam penerangan anda sila nyata dengan jelas perkara-perkara berikut:

(i)   The aim of the experiment.
Tujuan eksperimen.

(ii)   The variables in the experiment.
Pembolehubah dalam eksperimen.

(iii)   The list of apparatus and materials.
Senarai radas dan bahan.

(iv)   The arrangement of the apparatus.
Susunan radas.

(v)   The procedure of the experiment which should include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.
Prosedur eksperimen termasuk **satu** kaedah mengawal pemboleh ubah dimanipulasikan dan **satu** kaedah mengukur pemboleh ubah bergerak balas.

(vi)   The way you would tabulate the data.
Cara anda akan menjadualkan data.

(vii)   The way you would analyse the data.
Cara anda akan menganalisis data.

[10 marks]
[10 markah]

4. Diagram 4.1 and Diagram 4.2 shows an electric bell.
In Diagram 4.1, when it is connected to two batteries, the bell will ring.
In Diagram 4.2, when it is connected to four batteries, the bell will ring louder.
When the bell rings louder, the force exerted on the hammer is greater.

Rajah 4.1 dan Rajah 4.2 menunjukkan suatu loceng elektrik.
Dalam Rajah 4.1, bila disambungkan kepada dua bateri, loceng akan berbunyi.
Dalam Rajah 4.2, bila disambungkan kepada dua bateri, loceng akan berbunyi dengan lebih kuat.
Bila loceng berbunyi dengan lebih kuat, daya yang bertindak ke atas pengetuk adalah lebih besar.

Iron core
Teras besi
Hammer
Pengetuk
Bell
Loceng

Diagram 4.1
Rajah 4.1

Iron core
Teras besi
Hammer
Pengetuk
Bell
Loceng
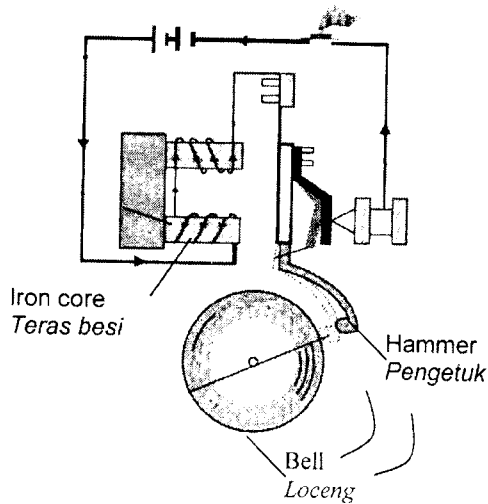
Diagram 4.2
Rajah 4.2

Based on the information and observation:
Berdasarkan maklumat dan pemerhatian tersebut::

(a) State **one** suitable inference.
*Nyatakan **satu** inferens yang sesuai*

[1 mark]
[1 markah]

(b) State **one** suitable hypothesis.
*Nyatakan **satu** hipotesis yang sesuai.*

[1 mark]
[1markah]

(c) With the use of apparatus such as batteries, iron core, insulated copper wire, connecting wires and others apparatus, describe **one** experiment to investigate the hypothesis stated in **4** (b).
*Dengan menggunakan radas seperti bateri, teras besi, dawai kuprum bertebat, dawai penyambung dan radas lain, terangkan **satu** eksperimen untuk menyiasat hipotesis yang dinyatakan di **4**(b).*

In your description, state clearly the following:
Dalam penerangan anda,nyatakan dengan jelas perkara berikut:

(i)   The aim of the experiment.
     Tujuan eksperimen.

(ii)   The variables in the experiment.
     Pembolehubah dalam eksperimen.

(iii)   The list of apparatus and materials.
     Senarai radas dan bahan.

(iv)   The arrangement of the apparatus.
     Susunan radas.

(v)   The procedure of the experiment, which should include **one** method of controlling the manipulated variable and **one** method of measuring the responding variable.
     *Prosedur eksperimen yang mesti termasuk **satu** kaedah mengawal pembolehubah dimasipulasi dan **satu** kaedah mengukur pembolehubah bergerak balas.*

(vi)   The way you tabulate the data.
     Cara anda menjadualkan data.

(vii)   The way you analyse the data.
     Cara anda menganalisis data.

[10 *marks*]
[10 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

JABATAN PELAJARAN NEGERI JOHOR

PEPERIKSAAN PERCUBAAN
SIJIL PELAJARAN MALAYSIA 2009

4531/3 (PP)

PHYSICS
Kertas 3
Peraturan Pemarkahan
Ogos/Sept. 2009

UNTUK KEGUNAAN PEMERIKSA SAHAJA

AMARAN

Peraturan pemarkahan ini **SULIT** dan **Hak Cipta Jabatan Pelajaran Negeri Johor.**
Kegunaannya khusus untuk pemeriksa yang berkenaan sahaja. Sebarang maklumat dalam peraturan pemerkahan ini tidak boleh dimaklumkan kepada sesiapa. Peraturan pemarkahan ini tidak boleh dikeluarkan dalam apa-apa bentuk media.

PEPERIKSAAN PERCUBAAN SPM 2009
PHYSICS 3
Question 1

1 (a)	(i)	1	**State the correct manipulated variable** Temperature //θ
	(ii)	1	**State the correct responding variable** Resistance / R // Potential difference / V // Current / I
	(iii)	1	**State one fixed variable correctly** Diameter of the wire // Cross-sectional area of the wire // Type of wire
(b)		1	**State the correct use of the mirror** Avoid parallax error
(c)		5	**Tabulate θ, I, V and R correctly** Give a tick (✓) based on the following: A • *Columns θ, I, V and R* ✓ B • *Correct units for θ, I, V and R* ✓ C • *All values of I correct* ✓ D • *All values of I consistent to 2 d.p.* ✓ E • *All values of V correct* ✓ F • *All values of V consistent to 1 or 2 d.p.* ✓ G • *All values of R correct* ✓ H • *All values of R consistent to 2, 3 or 4 d.p.* ✓
(d)		5	**Draw correctly a graph of R against L** Give a tick (✓) based on the following: A • R at the y-axis, θ at the x-axis ✓

Table inside (c):

θ / °C	I / A	V / V	R / Ω
20.0	0.36	0.4	1.11
30.0	0.42	0.7	1.67
40.0	0.50	1.1	2.20
50.0	0.62	1.7	2.74
60.0	0.70	2.3	3.29

Note for G : Accept e.c.f. from C and E

Marks awarded :

Number of ✓	Marks
8 ✓	5
6 - 7 ✓	4
4 - 5 ✓	3
2 - 3 ✓	2
1 ✓	1

Total marks : 5

			B • Correct units at both axes	✓	
			C • Uniform scale at both axes	✓	
			D • 5 points plotted correctly	✓✓	
			[Note : 3 or 4 points plotted correctly : ✓]		
			E • Best straight line	✓	
			F • Minimum size of graph 5 x 4 big squares (Big square : 2 cm x 2 cm) (From the origin to the last point)	✓	

Marks awarded :

Number of ✓	Marks
7 ✓	5
5-6 ✓	4
3-4 ✓	3
2 ✓	2
1 ✓	1

Total marks : 5

(e)	1	**State the correct relationship based on the straight line drawn** **For a straight line with positive gradient passing through the origin,** Resistance is directly proportional to temperature / R directly proportional to θ / $R \propto \theta$ **For a straight line with positive gradient that does not pass through the origin,** Resistance increases linearly with θ.	
(f)	1	**State one suitable precaution** Correct the zero error by calibrating the zero adjustment screw // Position of the eye must be perpendicular to the reading scale to avoid parallax error // Repeat experiment and calculate the average // All connection of the circuit must be tight	
	16		

QUESTION 2

No.	Marking criteria	Mark Sub	Mark Total
2(a)(i)	**State the value of θ_o within the acceptable range** - show graphical extrapolation correctly - state the value within 28 ± 0.2 °C - ignore unit and decimal places	1 1	2
(ii)	**State the changes correctly** - increases	1	1
(iii)	**State the value of θ within the acceptable range** - show graphical extrapolation correctly - state the value within 31°C - state the value / answer with correct unit	1 1	2

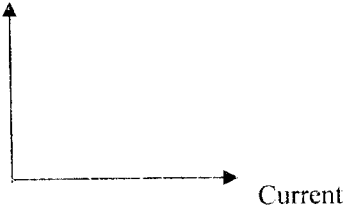| (b)(i)	Calculate the gradient, *k*, and state the value of k within the acceptable range - Draw sufficiently large triangle > 4 sq x 4 sq - Correct substitution (follow candidate's triangle) - State the value / answer with correct unit. $$\frac{34-28}{5} = 1.2^0C \ min^{-1}$$	1 1 1	3
(ii)	Calculate the value of c within the acceptable range $$c = \frac{2.16x10^3}{k}$$ $$c = \frac{2.16x10^3}{1.2}$$ $$= 1.8 \times 10^3 \quad (w/o \ unit)$$	1 1	2
(c)	State two correct precautions - Wrap the solid with wool / towel / polystyrene / tissue paper to prevent heat loss/released to the surrounding. - The eye must be perpendicular to the scale of the thermometer to avoid parallax error. - Repeat readings and calculate average. - Ensure the heater is fully immerse in the solid.	1 1 1 1 Max. 2	2
			12

QUESTION 3

No	Answer	Marks
3 a	The velocity//speed//acceleration of the boy depends on the height of the slop	1
b	The higher the height, the greater the velocity//speed//acceleration	1
c	(i) To investigate the relationship between velocity of the trolley and height of incline of a plane	1
	(ii) manipulated variable: Height Responding variable: Velocity Constant variable : mass of the trolley// friction	1 1 1
	(iii) Ticker timer, ticker tape, trolley, inclined plane, 12 V a.c power supply, metre rule, runway, wooden block	
	(iv)	1
	(v) • The trolley is placed on the inclined plane at height h = 20 cm • The ticker timer is switched on and the trolley is released. The ticker tape is analysed to determine the velocity, v. • The steps are repeated for the height, h = 25 cm, 30 cm, 35 cm and 40 cm	1 1 1 1

(vi)			

h/ cm	v/ cm s^{-1}
20	
25	
30	
35	
40	

(vii) A graph of v against h is plotted

		TOTAL	12

QUESTION 4

a)	1	The **strength** of the electromagnetic/magnet depends on the magnitude of the **current** flow.
b)	1	When the current increases, the strength of the electromagnetic/magnet increases.
c) (i)	1	To investigate the relationship between strength of the electromagnetic/magnet and current.
(ii)	1 (both)	MV : Current RV : Number of pins attracted
	1	RV : Number of coil/turns/ type of core/ diameter of wire/ diameter of solenoid
(iii)	1	batteries, battery holder, rheostat, insulated copper wires, connecting wires, ammeter, paper clips, soft iron core/ iron nail, beaker, retort stand, switch
(iv)	1	
(v)	1 1 1	1. The apparatus is set up as shown above 2. The switch is turned on, **adjust the rheostat so that the current flow is 0.1 A** 3. **The number of paper clips that are attracted to the iron core is counted.** 4. The steps above are repeated by using different values of current by adjusting the rheostat i.e: **0.2A, 0.3A, 0.4A and 0.5A (n ≥ 4 readings)**

(vi)	1	Current, I/ A	Number of paper clips attracted
		0.1	
		0.2	
		0.3	
		0.4	
		0.5	

(vii)	1	- Draw the graph: number of clips attracted against current.//

Number of paper clips

Current

Total	**12**	

END OF MARK SCHEME