MAJLIS PENGETUA
SEKOLAH MENENGAH KEDAH

PEPERIKSAAN PERCUBAAN SPM 2011   **4531/1**

PHYSICS
Kertas 1

$1\frac{1}{4}$ 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 **29** halaman bercetak

1 The radius of the orbit of a satellite is 7 500 km. What is this radius in Mm?

Jejari orbit sebuah satellit adalah 7 500 km. *Berapakah nilai jejari ini dalam* Mm*?*

A 7.5
B 75
C 750
D 7500

2 Diagram 1 shows the marks made by five shots on a target board.

Rajah 1 *menunjukkan tanda yang dibuat oleh lima tembakan pada sebuah papan sasar.*


Diagram 1 / *Rajah* 1

Which statement is correct about the accuracy and consistency of the shots?

Pernyataan manakah yang betul mengenai kejituan dan kepersisan tembakan itu?

A Accurate but not consistent
   Jitu tetapi tidak konsisten

B Consistent but not accurate
   Konsisten tetapi tidak jitu

C Accurate and consistent
   Jitu dan konsisten

D Not accurate and not consistent
   Tidak jitu dan tidak konsisten

3 Which graph shows a relationship of *V* increasing linearly with Θ?

Graf manakah menunjukkan hubungan V bertambah secara linear dengan Θ?
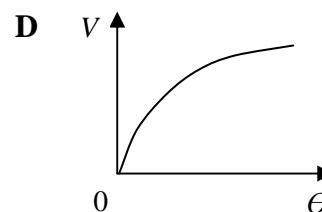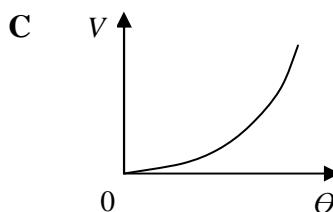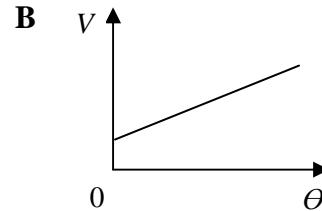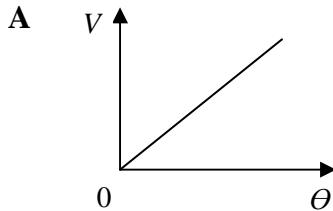
4 Diagram 2 shows a strip of ticker tape.

Rajah 2 menunjukkan satu keratan pita detik.
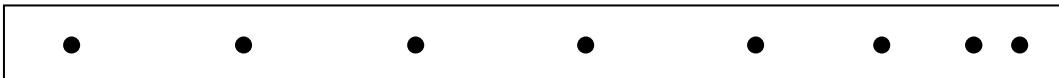
Diagram 2 / *Rajah 2*

Direction of motion
Arah pergerakan

Which statement describes the motion shown by the ticker tape?

Pernyataan manakah menghuraikan gerakan yang ditunjukkan oleh pita detik itu?

A Acceleration
Pecutan

B Deceleration
Nyahpecutan

C Uniform velocity followed by deceleration
Halaju seragam diikuti dengan nyahpecutan

D Acceleration followed by uniform velocity
Pecutan diikuti dengan halaju seragam

5 Diagram 3 shows a football hitting the face of a player.

Rajah 3 menunjukkan sebiji bola menghentam muka seorang pemain.


Diagram 3 / *Rajah 3*

A large force acts on the face of the player because

Satu daya yang besar bertindak pada muka pemain itu sebab

A the ball experiences a change in its mass when it hits the face
bola itu mengalami perubahan jisim apabila menghentam muka pemain

B the change in momentum of the ball occurs in a short period of time
perubahan momentum bola berlaku dalam tempoh masa yang pendek

C the change in momentum of the ball occurs in a long period of time
perubahan momentum bola berlaku dalam tempoh masa yang panjang

D some air escapes from the ball when it hits the face
sedikit udara terlepas keluar dari bola itu apabila menghentam muka pemain

6   Which graph shows motion with uniform velocity?

Graf manakah menunjukkan gerakan dengan halaju seragam?

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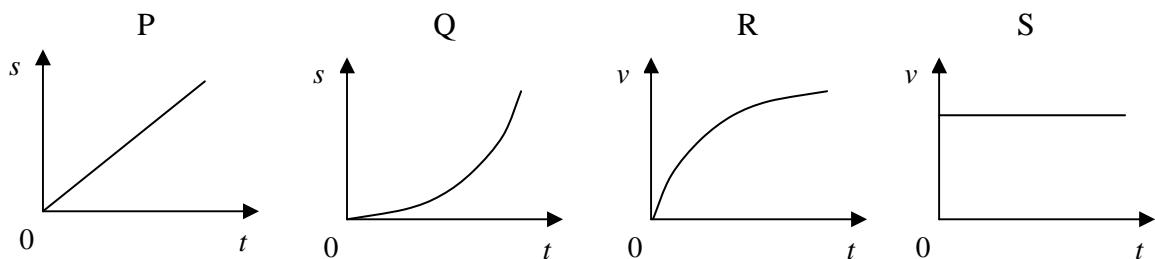
A   P and S   /   P *dan* S
B   P and R   /   P *dan* S
C   Q and S   /   Q *dan* S
D   Q and R   /   Q *dan* R

7   In which collision is total kinetic energy conserved?

Dalam perlanggaran manakah jumlah tenaga kinetik diabadikan?

Before collision   After collision
Sebelum perlanggaran   *Selepas perlanggaran*

A u Stationary / *Pegun*   Stationary / *Pegun* u

m m m m

B u Stationary / *Pegun* $\dfrac{u}{2}$ $\dfrac{u}{2}$

m m m m

C u u Stationary / *Pegun*

m m m | m

D u u $\dfrac{u}{2}$ $\dfrac{u}{2}$

m m m m
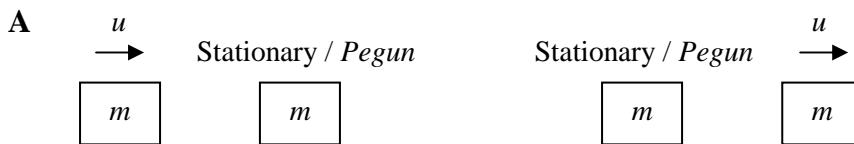
8 In which situation will the block move with an acceleration?

Dalam situasi manakah blok itu bergerak dengan suatu pecutan?

A 10 N ← □ → 10 N

B 10 N → □ → 10 N

C 10 N ↓ □ ↑ 10 N

D 10 N ↑ □ ↓ 10 N
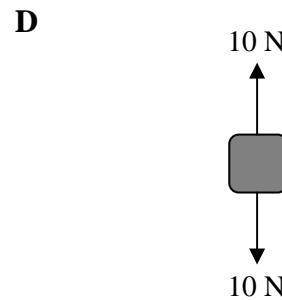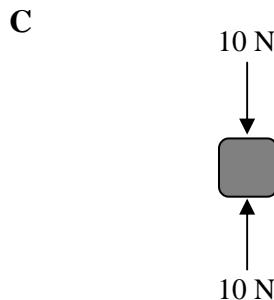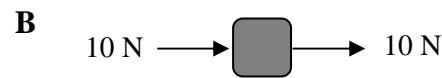
9 Which diagram shows three forces in equilibrium?

Rajah manakah menunjukkan tiga daya dalam keseimbangan?

A 3 N, 5 N, 4 N

B 3 N, 5 N, 4 N

C 3 N, 4 N, 5 N

D 5 N, 3 N, 4 N
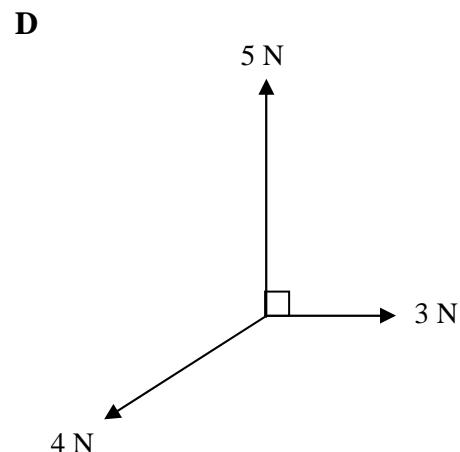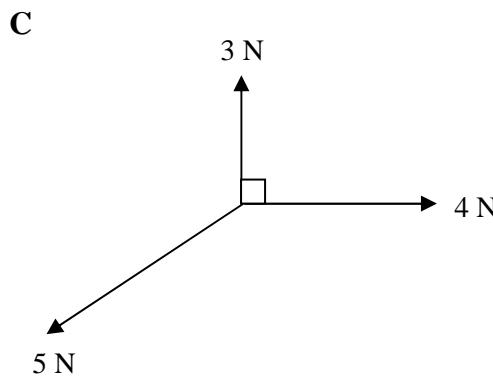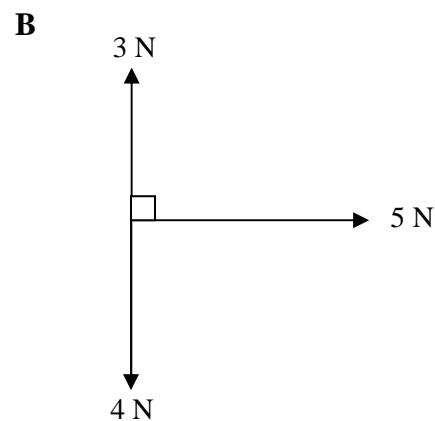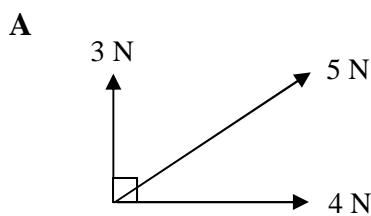
10 Diagram 4 shows two workers P and Q lifting identical loads through the same height using two different methods.

Rajah 4 *menunjukkan dua orang pekerja* P *dan* Q *mengangkat beban yang serupa melalui ketinggian yang sama dengan dua cara berbeza.*

Worker P
Pekerja P

Worker Q
Pekerja Q

Smooth plank
Papan licin
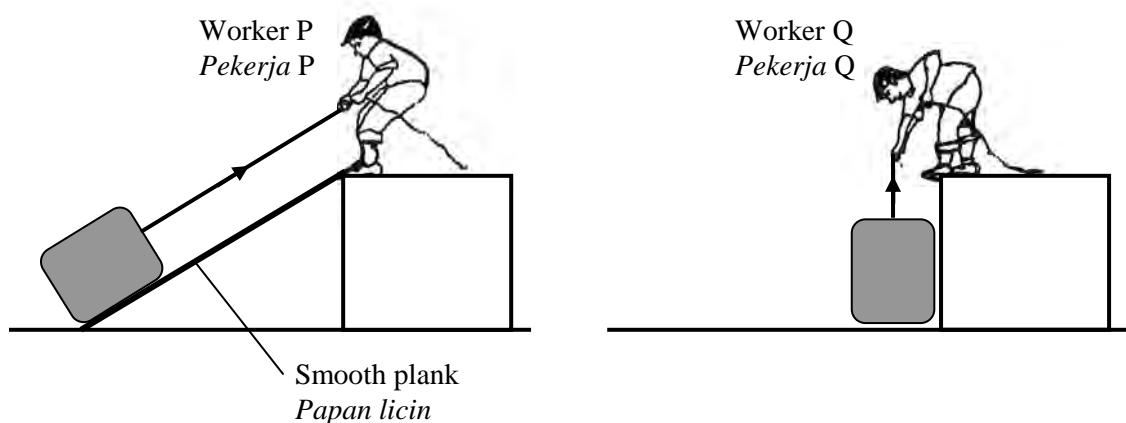
Diagram 4 / *Rajah* 4

Which statement is correct about the force applied and work done?

Pernyataan yang manakah benar mengenai daya yang dikenakan dan kerja yang dilakukan?

A The force exerted by worker P is greater than that of worker Q
Daya yang dikenakan oleh pekerja P *lebih besar daripada pekerja* Q

B The force exerted by worker P is smaller than that of worker Q
Daya yang dikenakan oleh pekerja P *lebih kecil daripada pekerja* Q

C The work done by worker P is greater than that of worker Q
Kerja yang dilakukan oleh pekerja P *lebih besar daripada pekerja* Q

D The work done by worker P is smaller than that of worker Q
Kerja yang dilakukan oleh pekerja P *lebih kecil daripada pekerja* Q

11 Diagram 5 shows a graph of force against extension for two springs, R and S. Both springs are made of the same material, and have the same length and diameter.

Rajah 5 *menunjukkan graf daya melawan pemanjangan bagi spring* R *dan* S. *Kedua-dua spring diperbuat daripada bahan yang sama, dan mempunyai panjang dan diameter yang sama.*

Force
Daya

R

S

0

Extension
Pemanjangan
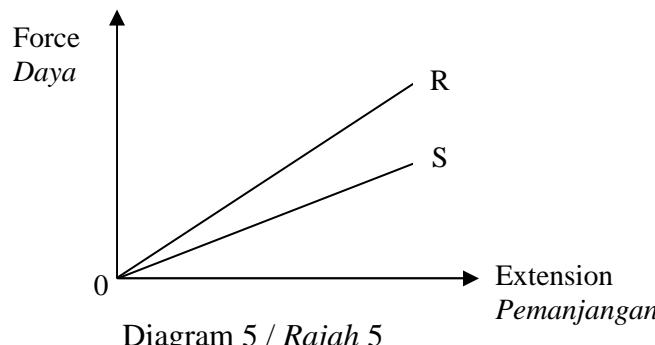
Diagram 5 / *Rajah* 5

Which statement about spring R and S is correct?

Pernyataan manakah mengenai spring R *dan* S *benar?*

A The diameter of the wire of spring S is greater than that of spring R
Diameter dawai spring S *lebih besar daripada spring* R

B Spring S stores more elastic potential energy than spring R
Spring S menyimpan tenaga keupayaan kenyal yang lebih besar daripada spring

R

C Spring S has a smaller stiffness than spring R
Spring S mempunyai kekerasan lebih kecil daripada spring R

D Spring S has a larger force constant than spring R
Spring S mempunyai pemalar daya yang lebih kecil daripada spring R

12 Diagram 6 shows four different postures of a person doing some exercises.
Which posture exerts the maximum pressure on the floor?

Rajah 6 menunjukkan empat postur yang berbeza bagi seorang yang sedang bersenam.
Postur manakah yang mengenakan tekanan yang maksimum ke atas lantai?
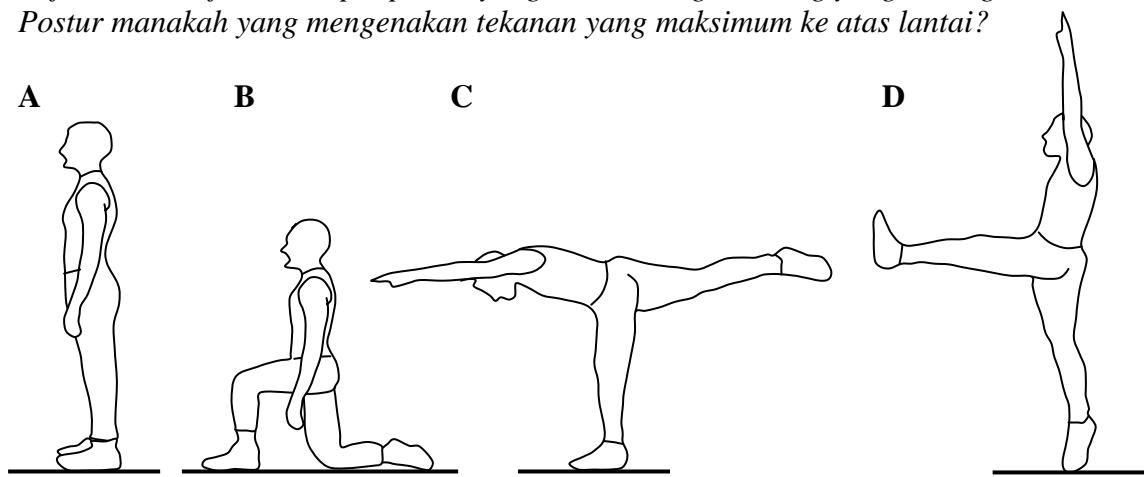
Diagram 6 / *Rajah* 6

13 Diagram 7 shows three containers filled with water to the same level. The pressure
caused by the water at points X, Y and Z are P_X, P_Y and P_Z respectively.

Rajah 7 menunjukkan tiga bekas diisi dengan air sehingga paras yang sama tinggi.
Tekanan yang disebabkan oleh air pada titik X, Y *dan* Z *ialah* P_X, P_Y *dan* P_Z *masing-*
masing.
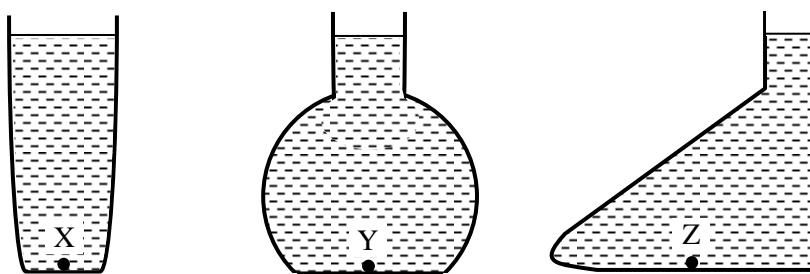
Diagram 7 / *Rajah* 7

Which comparison is correct?

Perbandingan manakah yang betul?

A $P_X = P_Y = P_Z$
B $P_X < P_Y < P_Z$
C $P_X > P_Y > P_Z$

14   Diagram 8 shows a mercury barometer. Which height shows the measurement of the atmospheric pressure?

Rajah 8 menunjukkan satu barometer merkuri. Ketinggian manakah menunjukkan ukuran bagi tekanan atmosfera?

Vacuum
Vakum
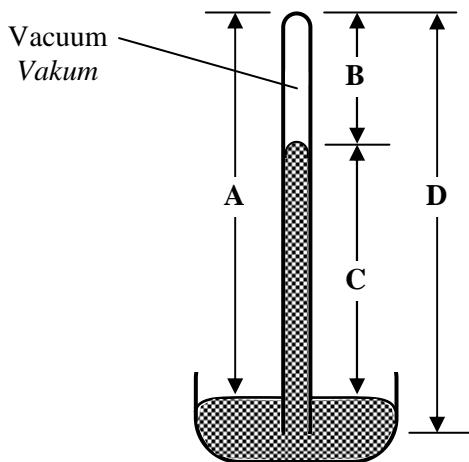
Diagram 8 / *Rajah* 8

15   Diagram 9 shows the random motion of the gas molecules inside a container.

Rajah 9 menunjukkan gerakan rawak bagi molekul-molekul gas di dalam sebuah bekas.
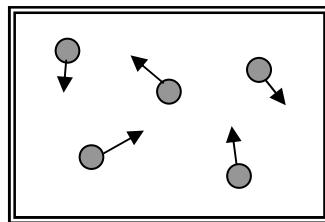
Diagram 9 / *Rajah* 9

The pressure of the gas **will not** increase if

*Tekanan gas **tidak akan** bertambah jika*

A   the number of molecules in the container is increased
bilangan molekul di dalam bekas ditambah

B   the mass of the molecules is increased / *jisim molekul ditambah*

C   the speed of the molecules is increased / *laju molekul ditambah*

D   the volume of the container is increased / *isipadu bekas ditambah*

16 Diagram 10 shows a hydraulic compressing machine.

Rajah 10 *menunjukkan sebuah mesin pemampat.*
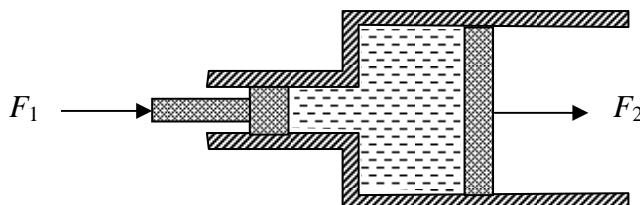
Diagram 10 / *Rajah* 10

Which comparison is true about the forces F_1 and F_2?

Perbandingan manakah betul mengenai daya-daya F_1 dan F_2?

A $F_1 = F_2$
B $F_1 > F_2$
C $F_1 < F_2$

17 Diagram 11 shows an oil drum of volume V floating with $\frac{3}{4}$ of its volume submerged under water.

Rajah 11 *menunjukkan sebuah tong minyak berisipadu* V *sedang terapung dengan* $\frac{3}{4}$ *daripada isipadunya tenggelam di bawah air.*
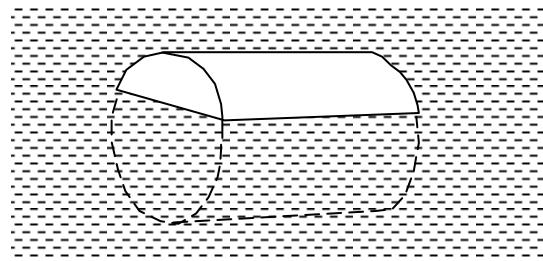
Diagram 11 / *Rajah* 11

If the density of water is ρ, the buoyant force acting on the oil drum is

Jika ketumpatan air ialah ρ, *daya julangan yang bertindak ke atas tong minyak ialah*

A $\frac{1}{4}V\rho g$

B $\frac{3}{4}V\rho g$

C $V\rho g$

D $V\rho$

18   Which diagram shows the correct liquid level in the U-tube?

Rajah manakah menunjukkan aras cecair yang betul di dalam tiub-U?

A

Air flow
Aliran udara

B

Air flow
Aliran udara

C

Air flow
Aliran udara

D

Air flow
Aliran udara
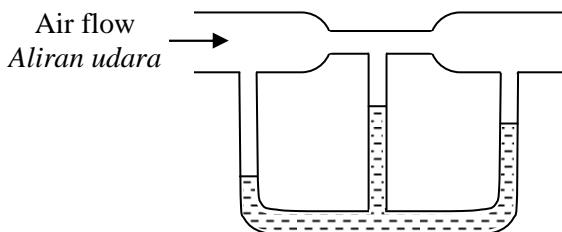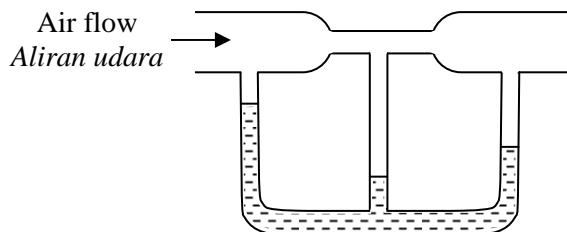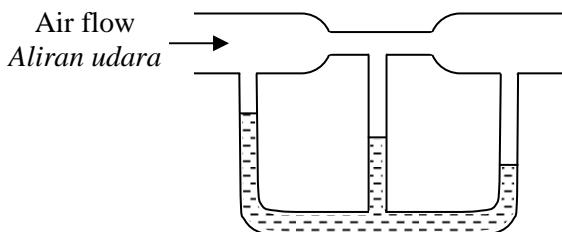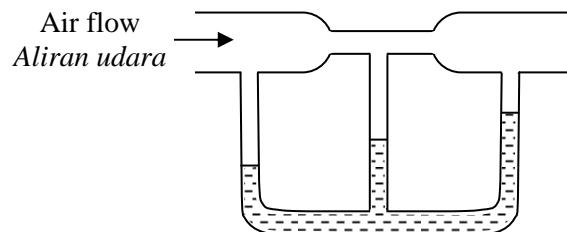
19   Diagram 12 shows two metal blocks P and Q that are placed in thermal contact.

Rajah 12 menunjukkan dua blok logam P dan Q yang diletak dalam sentuhan terma.
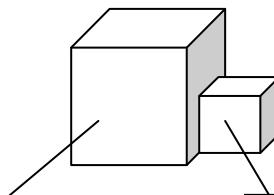
Block P / *Blok* P

Mass = 450 g / *Jisim* = 450 g
Temperature = 25 °C / *Suhu* = 25 °C

Block Q / *Blok* Q

Mass = 100 g / *Jisim* = 100 g
Temperature = 95 °C / *Suhu* = 95 °C

Diagram 12 / *Rajah 12*

Which statement is true about the heat transfer between P and Q?

Pernyataan manakah betul mengenai pemindahan haba antara P dan Q?

A   No heat is transferred between P and Q
       Tiada haba dipindah antara P dan Q

B   No net heat is transferred between P and Q
       Tiada haba bersih dipindah antara P dan Q

C   Net heat is transferred from P to Q
       Haba bersih dipindah dari P ke Q

D   Net heat is transferred from Q to P
       Haba bersih dipindah dari Q ke P

20 Diagram 13 shows 100 g of water at 20 ^{o}C is poured into a beaker containing 200 g of water at 80 ^{o}C.

Rajah 13 *menunjukkan* 100 g *air pada* 20 ^{o}C *dituang ke dalam bikar yang mengandungi* 200 g *air pada* 80 ^{o}C.
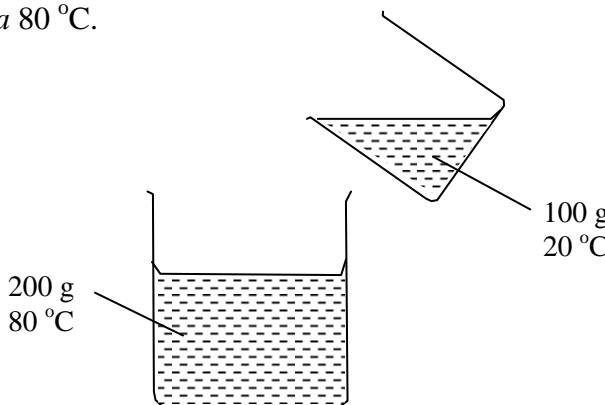
Diagram 13 / *Rajah* 13

What is the final temperature of the mixture?

Berapakah suhu akhir campuran itu?

A   30 ^{o}C
B   50 ^{o}C
C   60 ^{o}C
D   70 ^{o}C

21 Diagram 14 shows the variation of temperature with time when a solid X is heated.

Rajah 14 *menunjukkan perubahan suhu dengan masa apabila satu pepejal* X *dipanaskan*.
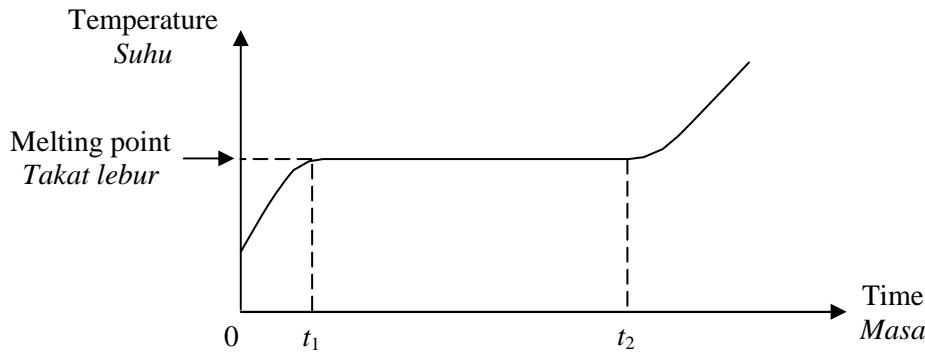
Diagram 14 / *Rajah* 14

What is the state of X from the time t_1 to t_2?

Apakah keadaan X *dari masa* t_1 *ke* t_2?

A   Solid only   / *Pepejal sahaja*
B   Liquid only   / *Cecair sahaja*
C   Liquid and gas   / *Cecair dan gas*
D   Solid and liquid / *Pepejal dan cecair*

22 Which graph shows the relationship between the pressure and volume of a gas that obeys Boyle's law?

Graf manakah menunjukkan hubungan antara tekanan dan isipadu bagi suatu gas yang mematuhi hukum Boyle?

A
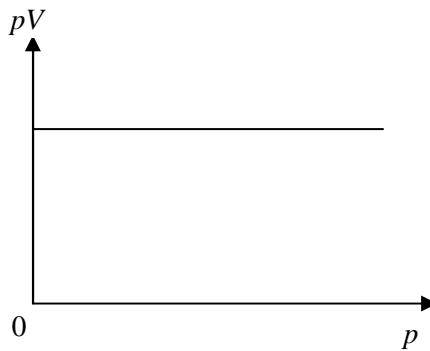
B
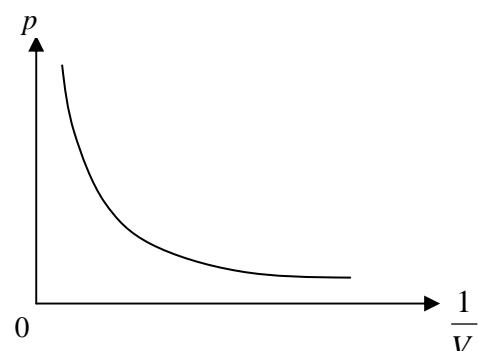
C
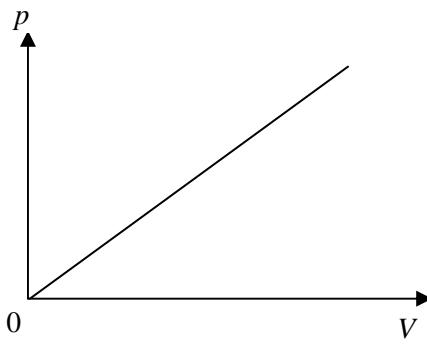
D
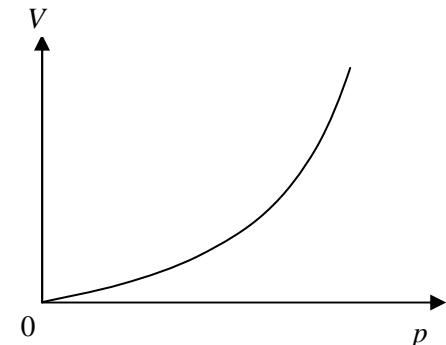
23 Diagram 15 shows the set up of apparatus used to study the properties of a gas.

Rajah 15 menunjukkan susunan radas untuk mengkaji ciri-ciri suatu gas.
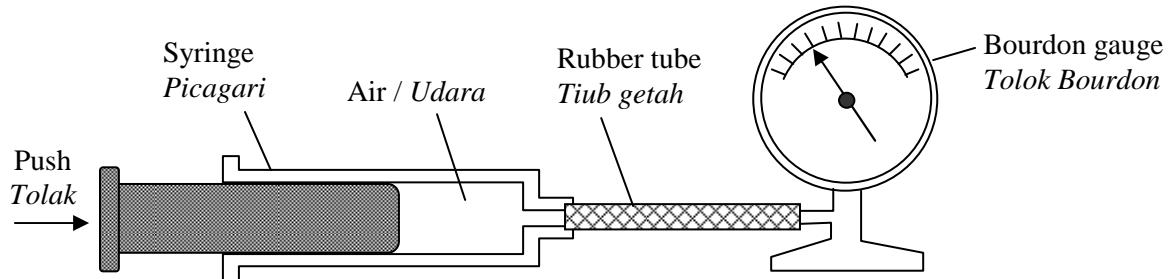
Diagram 15 / *Rajah* 15

The piston is pushed slowly to the right.
Which statement about the behaviour of the gas molecules in the cylinder is correct?

Omboh ditolak dengan perlahan ke kanan.
Pernyataan manakah betul mengenai perlakuan molekul gas di dalam silinder itu?

A   The speed of the molecules increases
       Laju molekul bertambah

B   The molecules collide more frequently with the walls of the cylinder
       Molekul-molekul berlanggar lebih kerap dengan dinding silinder

C   The average distance between the molecules remains the same
       Jarak purata antara molekul-molekul kekal malar

D   The molecules bounce back from the wall of the cylinder with a greater
       momentum
       *Molekul-molekul melantun balik dari dinding silinder dengan momentum yang
       lebih besar*

24   Diagram 16 shows an object O in front of a convex mirror. T is the centre of curvature
        of the mirror.

Rajah 16 *menunjukkan suatu objek* O *di hadapan sebuah cermin cembung.* T *ialah
pusat kelengkungan cermin itu.*

Diagram 16 / *Rajah* 16

The image is formed at

Imej dibentuk di

A   J
B   K
C   L
D   M

25 Diagram 17 shows a light ray moving from air into a glass block.

Rajah 17 *menunjukkan satu sinar cahaya bergerak dari udara ke dalam sebuah blok kaca.*
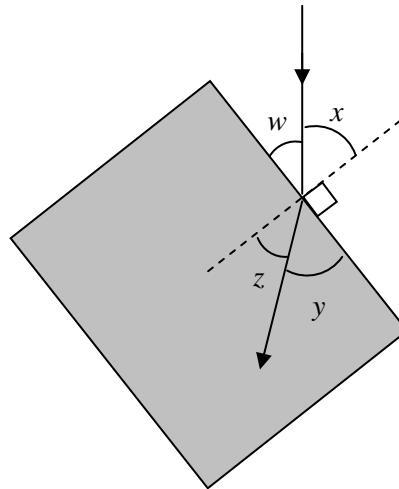
Diagram 17 / *Rajah* 17

Which angle is the angle of incidence and the angle of refraction?

Sudut manakah ialah sudut tuju dan sudut biasan?

	Angle of incidence / *Sudut tuju*	Angle of refraction / *Sudut biasan*
A	w	y
B	w	z
C	x	y
D	x	z

26 Which diagram shows the correct propagation of light through a 45°, 45°, 90° prism? c is the critical angle of the prism.

Rajah manakah menunjukkan perambatan cahaya yang betul melalui prisma 45°, 45°, 90°? c ialah sudut genting prisma itu.

A $c = 42^o$

B $c = 45^o$

C $c = 48^o$

D $c = 40^o$
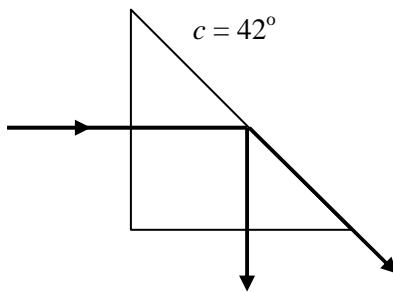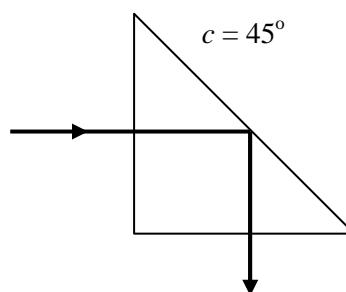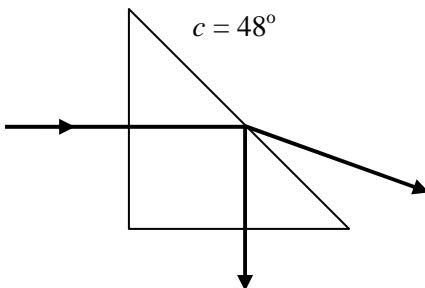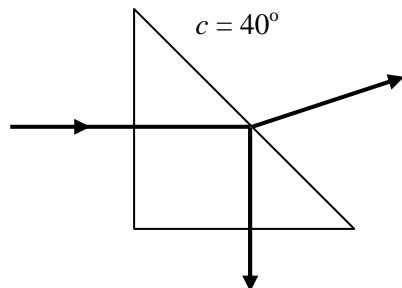
27 Diagram 18 shows the image, I, of an object, O, formed by a convex lens.

Rajah 18 *menunjukkan imej*, I, *bagi objek*, O, *yang dibentuk oleh sebuah kanta cembung.*
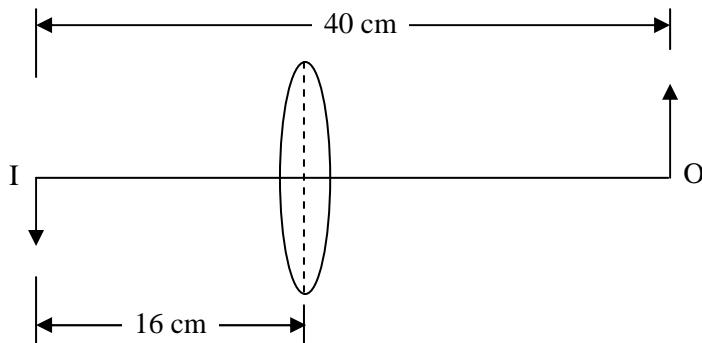
Diagram 18 / *Rajah* 18

What is the focal length of the lens?

Berapakah panjang focus kanta itu?

A 2.5 cm
B 9.6 cm
C 11.4 cm
D 24.0 cm

28 An astronomical telescope at normal adjustment consists of two convex lenses placed at a separation of 80 cm. The magnifying power of the telescope is 15. What is the focal length, f_O, of the objective lens and the focal length, f_E, of the eyepiece?

Sebuah teleskop astronomi pada pelarasan normal adalah terdiri daripada dua kanta cembung yang diletak pada jarak pemisahan 80 cm. *Kuasa pembesaran teleskop itu ialah* 15. *Berapakah panjang fokus*, f_O, *bagi kanta objek dan panjang focus*, f_E, *bagi kanta mata?*

	f_O	f_E
A	5 cm	75 cm
B	75 cm	5 cm
C	75 cm	15 cm
D	80 cm	15 cm

29 Which diagram shows a transverse wave with amplitude 4 cm and wavelength 8 cm?
Rajah manakah menunjukkan suatu gelombang melintang dengan amplitud 4 cm *dan panjang gelombang* 8 cm?

C

4 cm

8 cm

D

8 cm

4 cm
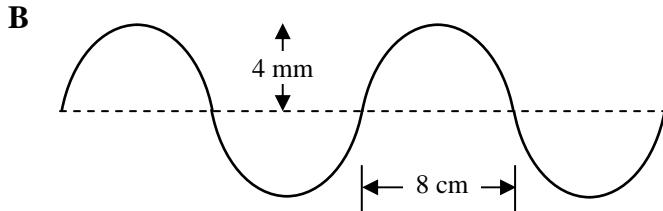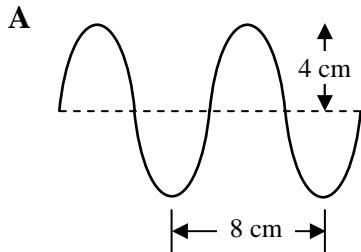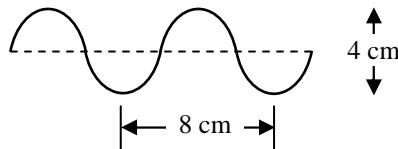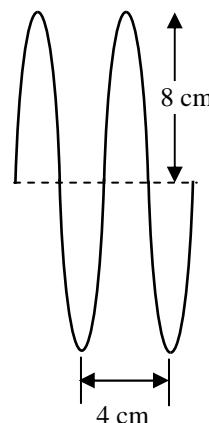
30 Diagram 19 shows wave patterns produced in a ripple tank with a sloping base by a circular vibrator at S.
Rajah 19 *menunjukkan corak gelombang yang dihasilkan di dalam sebuah tangki riak dengan dasar condong oleh penggetar bulat di* S*..*

X · S Y
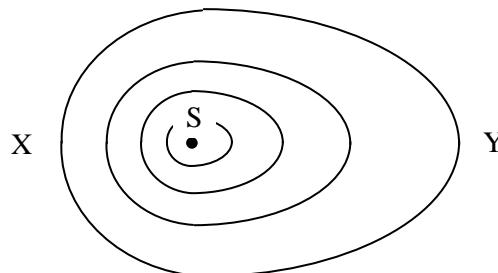
Diagram 19 / *Rajah* 19

Which statement is **true**?
*Pernyataan manakah **benar**?*

A Region X is deeper than region Y
Kawasan X *adalah lebih dalam daripada kawasan* Y

B Region Y is deeper than region X
Kawasan Y *adalah lebih dalam daripada kawasan* X

C Both regions X and Y have uniform depth
Kedua-dua kawasan X *dan* Y *mempunyai kedalaman yang seragam*

D The speed of the wave in region X is greater than the speed in region Y
Laju gelombang di kawasan X *adalah lebih besar daripada laju di kawasan* Y

31 Diagram 20 shows water waves being diffracted after passing through a slit.

Rajah 20 *menunjukkan gelombang air dibelau selepas melalui satu celah.*
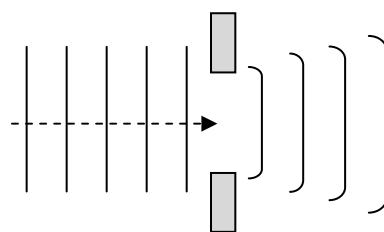
Diagram 20 / *Rajah* 20

Which action will produce circular diffracted waves?

Tindakan manakah akan menghasilkan gelombang terbelau membulat?

A Increase the frequency of the waves
Tambah frekuensi gelombang

B Increase the speed of the wave
Tambah kelajuan gelombang

C Decrease the wavelength
Kurangkan panjang gelombang

D Decrease the size of the slit
Kurangkan saiz celah

32 Diagram 21 shows the positions of loud and soft sounds produced along the line PQ when the audio signal generator is switched on.

Rajah 21 *menunjukkan kedudukan bunyi kuat dan bunyi perlahan yang dihasilkan sepanjang garisan* PQ *apabila penjana isyarat audio dihidupkan.*
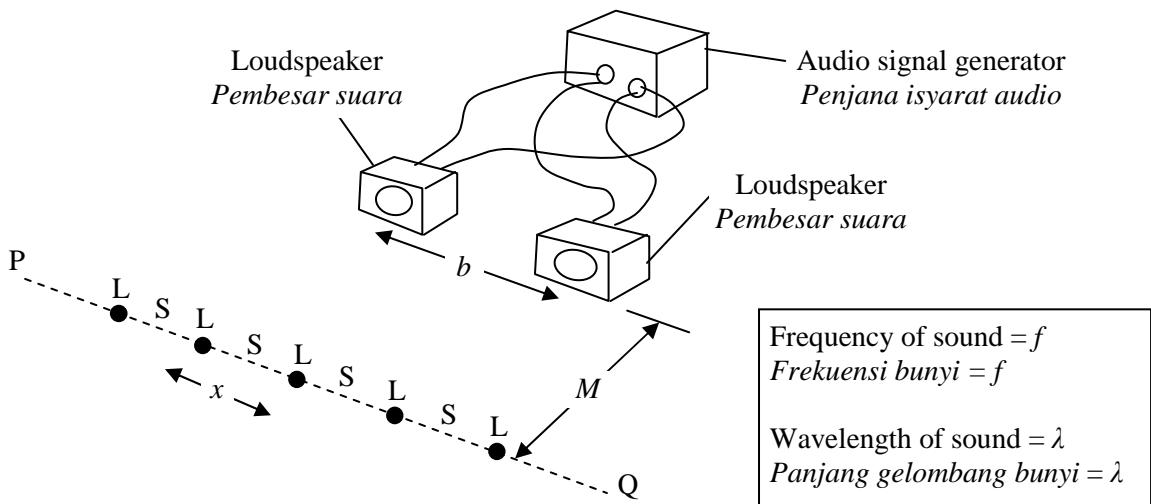
Diagram 21 / *Rajah* 21

The distance between consecutive loud sounds, *x*, will increase if

Jarak antara bunyi kuat berturutan, x, akan bertambah jika

A M is increased / *M ditambah*
B f is increased / *f ditambah*
C λ is decreased / *λ dikurangkan*
D b is increased / *b ditambah*

33 A phenomenon that occurs when a sound wave has been reflected off a surface and is heard after the original sound is known as

Fenomena yang berlaku apabila gelombang bunyi dipantulkan oleh suatu permukaan, dan kedengaran selepas bunyi yang asal dikenali sebagai

A echo / *gema*
B noise / *bising*
C disturbance / *gangguan*
D interference / *interferens*

34 Which statement is **not** a property of electromagnetic waves?

*Pernyataan manakah **bukan** sifat gelombang elektromagnet?*

A Travels at a speed of light / *Bergerak pada kelajuan cahaya*

B Obeys the wave equation, $v = f\lambda$ / *Mematuhi persamaan gelombang, $v = f\lambda$*

C Requires a medium to propagate / *Memerlukan medium untuk merambat*

D Can undergo interference / *Boleh mengalami interferens*

35 Which graph shows the highest resistance?

Graf manakah menunjukkan rintangan paling tinggi?
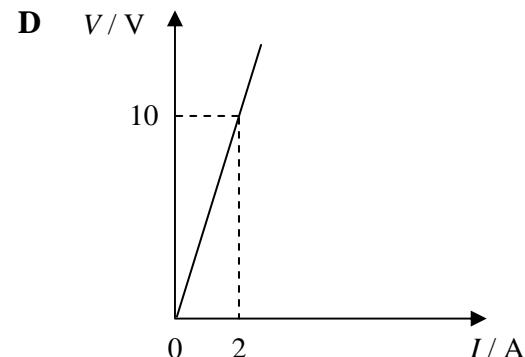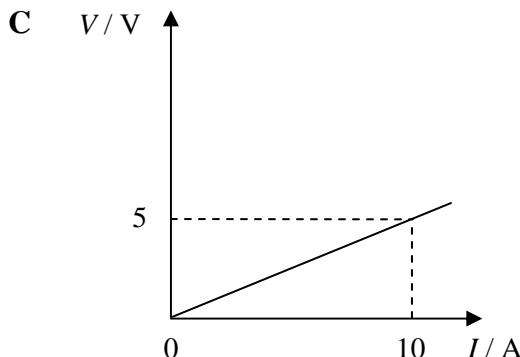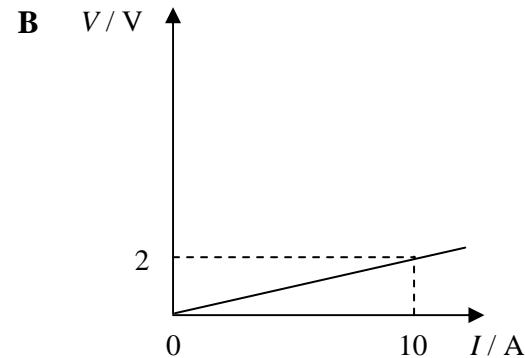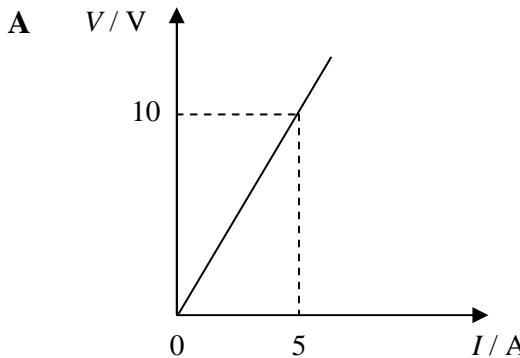
36 Diagram 22 shows 9 identical resistors connected in three different circuits, P, Q and R.
Rajah 22 menunjukkan 9 perintang serupa yang disambungkan dalam tiga litar berlainan P, Q *dan* R.
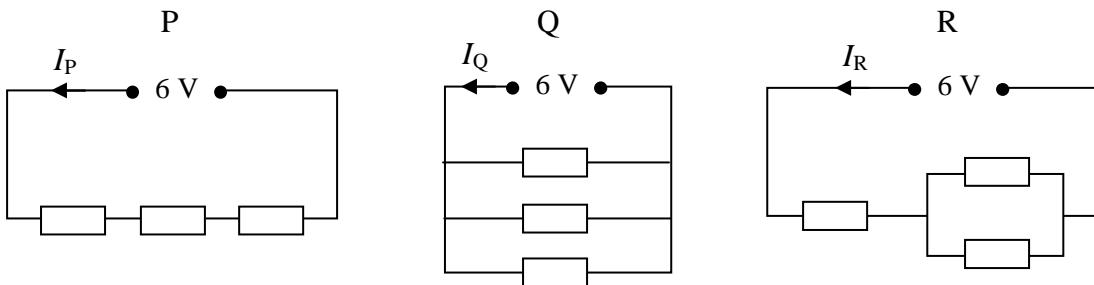
Diagram 22 / *Rajah* 22

Which statement is correct for I_P, I_Q and I_R ?

Pernyataan manakah betul mengenai I_P, I_Q *dan* I_R ?

A $I_P < I_R < I_Q$
B $I_P < I_Q < I_R$
C $I_Q < I_P < I_R$
D $I_Q < I_R < I_P$

37 Diagram 23 shows a circuit with a dry cell that has internal resistance.

Rajah 23 menunjukkan satu litar dengan sel kering yang mempunyai rintangan dalam.
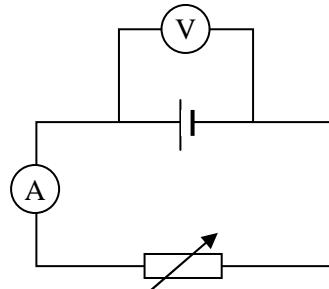
Diagram 23 / *Rajah* 23

What is the change in the ammeter and voltmeter reading when the resistance of the rheostat is reduced?

Apakah perubahan bacaan ammeter dan voltmeter apabila rintangan reostat dikurangkan?

	Ammeter reading / *Bacaan ammeter*	Voltmeter reading / *Bacaan voltmeter*
A	Decreases / *Berkurang*	Decreases / *Berkurang*
B	Decreases / *Berkurang*	Increases / *Bertambah*
C	Increases / *Bertambah*	Decreases / *Berkurang*
D	Increases / *Bertambah*	Increases / *Bertambah*

38 When an electric kettle with a voltage rating of 220 V is connected to a 220 V power supply, the water in the kettle boils in 10 minutes. What is the time taken for the water to boil if the electric kettle is connected to a 200 V power supply?

Apabila cerek elektrik dengan kadaran voltan 220 V *disambung kepada bekalan kuasa* 220 V, *air di dalam cerek itu mendidih dalam masa* 10 *minit. Berapakah masa yang diambil untuk air itu mendidih jika cerek elektrik itu disambung kepada bekalan kuasa* 200 V?

A   10 minutes   /   10 *minit*
B   Less than 10 minutes   /   *Kurang daripada* 10 *minit*
C   More than 10 minutes   /   *Lebih daripada* 10 *minit*

39 Diagram 24 shows the set-up of the apparatus to study the magnetic field due to a current in a solenoid. When the switch, K, is off, the needle of the compass points to the north.
Rajah 24 *menunjukkan susunan radas untuk mengkaji medan magnet disebabkan arus dalam sebuah solenoid. Apabila suis,* K, *dimatikan, jarum kompas menunjuk ke arah utara.*
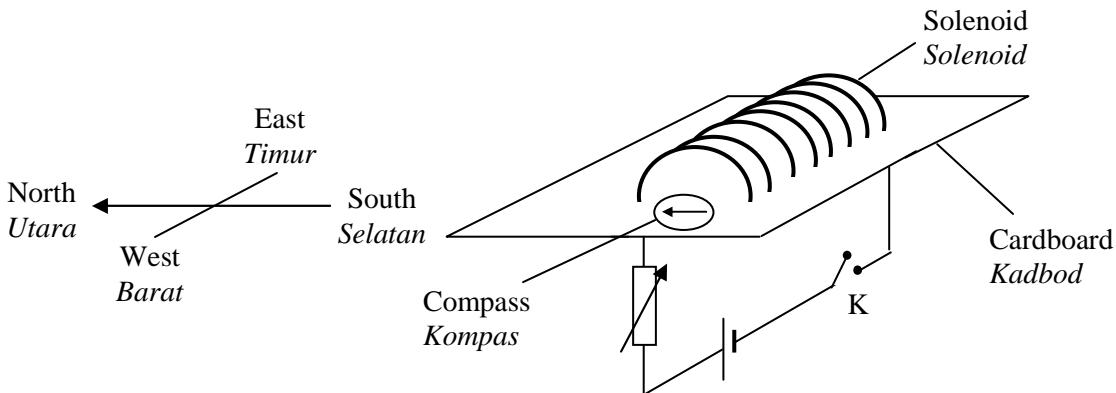
Diagram 24 / *Rajah* 24

Which direction will the compass needle point when switch S is on?

Arah manakah akan ditunjuk oleh jarum kompas apabila suis K *dihidupkan?*

A   North   /   *Utara*
B   South   /   *Selatan*
C   East   /   *Timur*
D   West   /   *Barat*

40 Diagram 25 shows a bare wire PQ placed on two parallel metal rods held at an angle with the horizontal.

Rajah 25 *menunjukkan seutas wayar tanpa penebat* PQ *diletakkan pada dua batang rod logam yang dipegang pada suatu sudut dengan ufukan.*
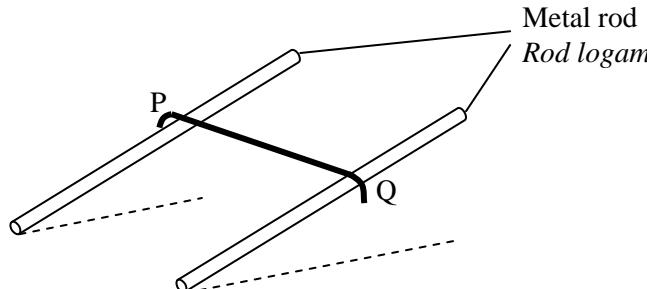
Diagram 25 / *Rajah* 25

Which diagram shows the correct connection of the battery and direction of magnetic field, **B**, to prevent PQ from sliding down?

Rajah manakah menunjukkan sambungan yang betul bagi bateri dan arah medan magnet, **B**, *untuk mencegah* PQ *daripada menggelongsor turun?*
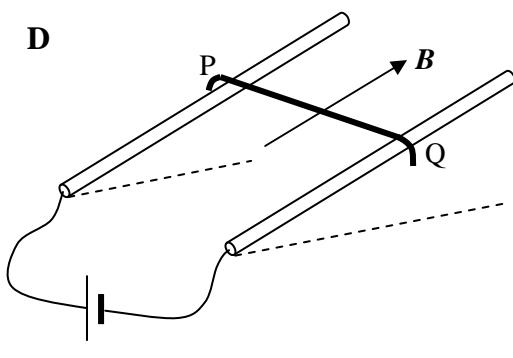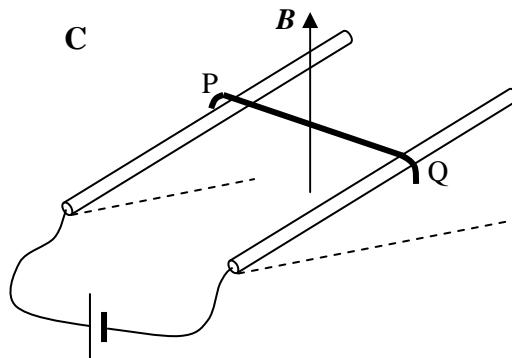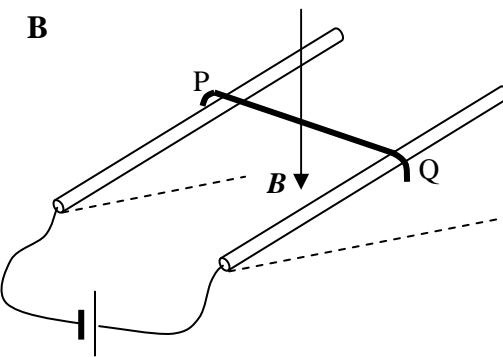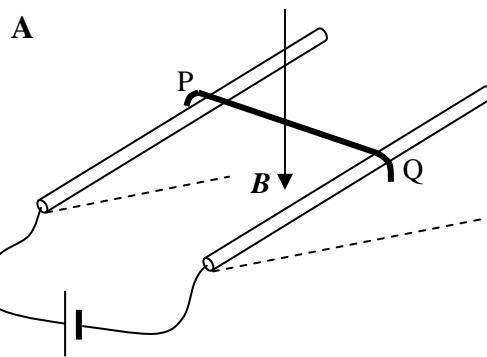
41 Diagram 26 shows wire a XY placed between magnet P and magnet Q.

Rajah 26 *menunjukkan satu wayar* XY *diletakkan antara magnet* P *dan magnet* Q.
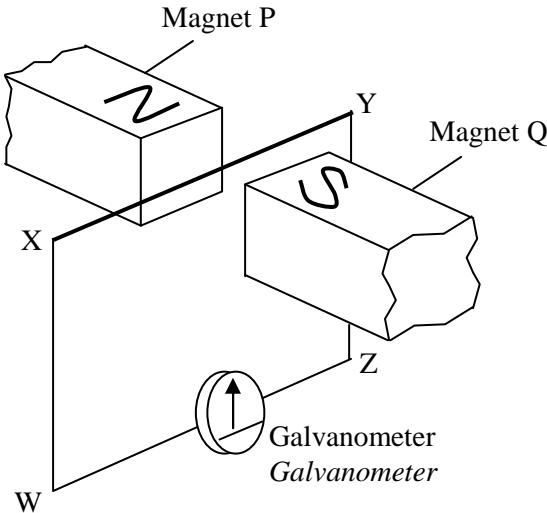
Diagram 26 / *Rajah* 26

Which direction of motion of wire XY will produce current flowing through the galvanometer from W to Z?

Arah gerakan manakah bagi wayar XY *yang akan menghasilkan arus melalui galvanometer dari* W *ke* Z?

A Towards magnet P / *Ke arah magnet* P
B Towards magnet Q / *Ke arah magnet* Q
C Upwards / *Ke arah atas*
D Downwards / *Ke arah bawah*

42 A multi-tap transformer consists of primary coil of 1200 turns and secondary coil of a total of 120 turns.
Which diagram shows the correct connection to light up a 12 V, 24 W bulb at normal brightness?

Sebuah transformer multi-tap terdiri daripada gegelung primer 1200 *lilitan dan gegelung sekunder dengan jumlah* 120 *lilitan.*
Rajah manakah menunjukkan sambungan yang betul untuk menyalakan sebuah mentol 12 V, 24 W *dengan kecerahan normal?*

A
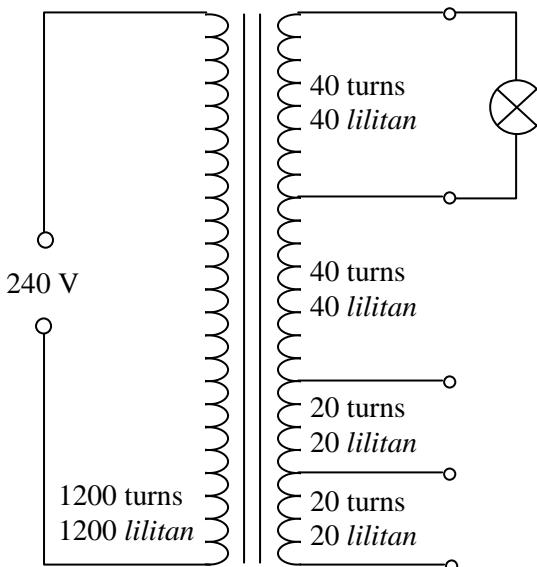
B
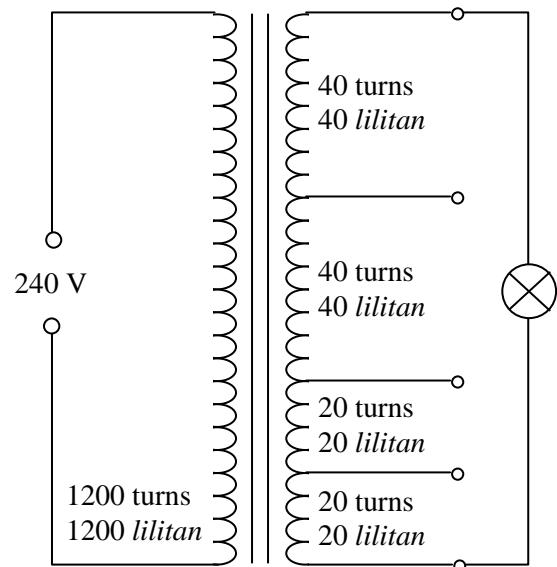
C
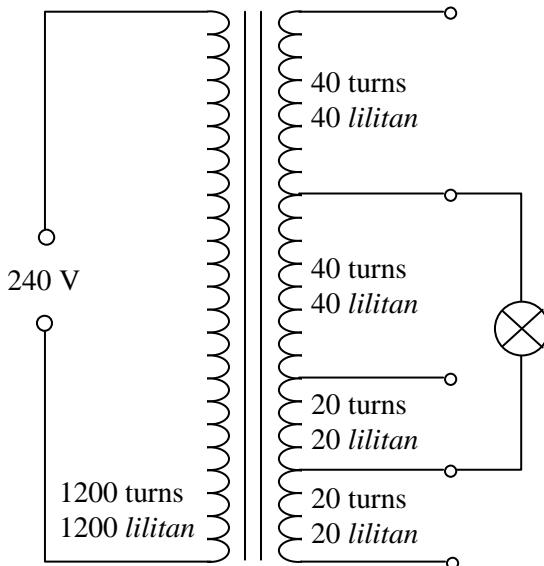
D
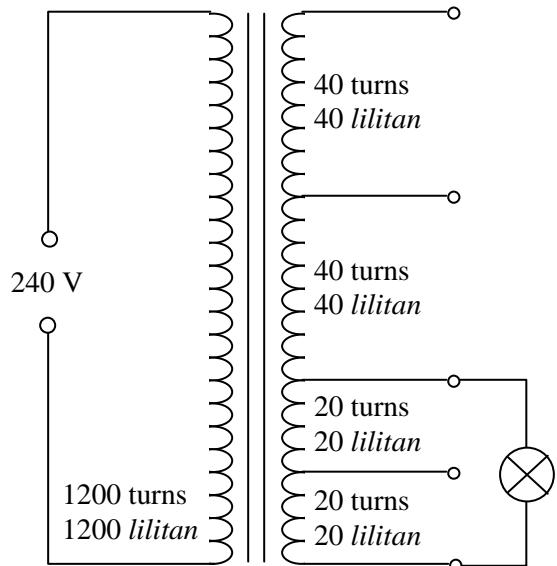
43 A regional power station supplies 220 kW of power at a voltage of 11 kV to a factory. The transmission cable connecting the power station to the factory has a total resistance of 50 Ω. Calculate the power received by the factory.

Sebuah stesen kuasa tempatan membekalkan kuasa 220 kW *pada voltan* 11 kV *kepada sebuah kilang. Kabel penghantaran yang menyambungkan stesen kuasa kepada kilang itu mempunyai jumlah rintangan* 50 Ω. *Hitungkan kuasa yang diterima oleh kilang itu.*

A 20 kW
B 200 kW
C 220 kW
D 240 kW

44 Diagram 27.1 shows that when a cathode ray oscilloscope (CRO) is connected across the 9 Ω resistor, the bright spot is deflected from the centre of the screen, O to P.

Rajah 27.1 *menunjukkan bahawa apabila sebuah osiloskop sinar katod (OSK) disambung merentasi perintang* 9 Ω, *tompok cerah dipesong dari pusat skrin,* O *ke* P.
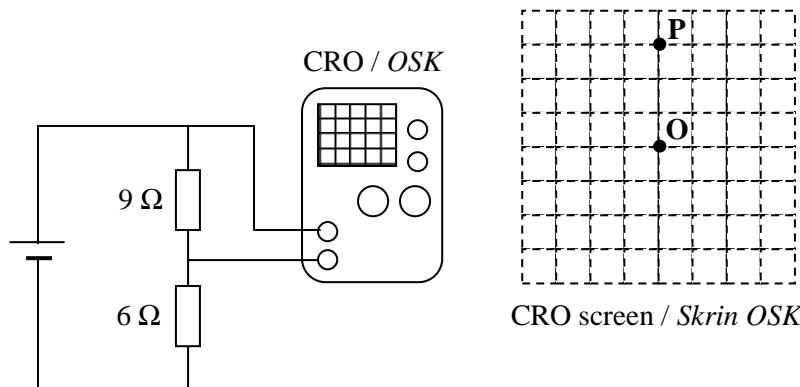
Diagram 27.1 / *Rajah* 27.1
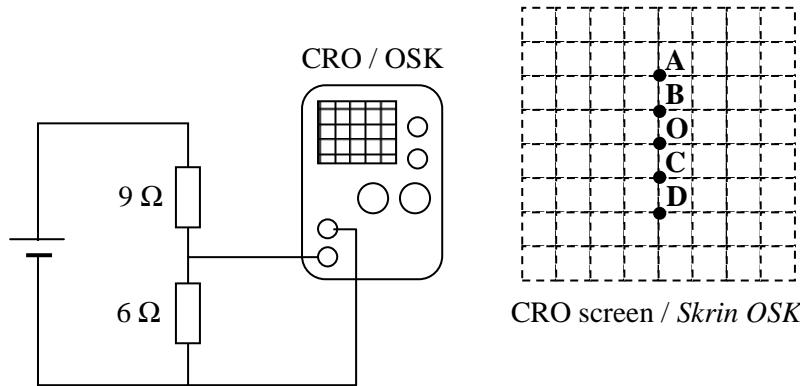
Diagram 27.2 / *Rajah* 27.2

What is the position of the bright spot when the CRO is connected across the 6 Ω resistor as shown in Diagram 27.2?

Apakah kedudukan tompok cerah apabila OSK itu disambung merentasi perintang 6 Ω *seperti ditunjukkan dalam Rajah* 27.2?

45 Diagram 28 shows five identical bulbs in a circuit.

Rajah 28 *menunjukkan lima buah mentol di dalam suatu litar.*
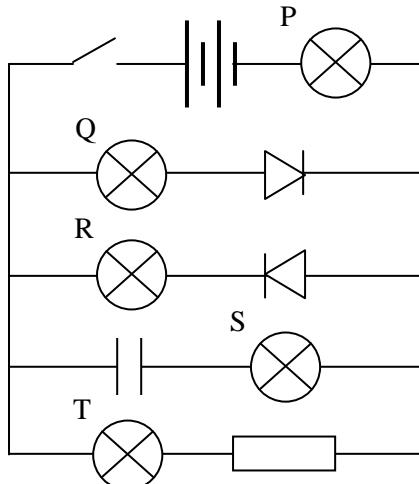
Diagram 28 / *Rajah* 28

Which bulbs light up continuously when the switch is on?

Mentol manakah menyala berterusan apabila suis dihidupkan?

A	P, Q and T only	/	P, Q *dan* T *sahaja*
B	Q and S only	/	Q *dan* S *sahaja*
C	R and S only	/	R *dan* S *sahaja*
D	P and R only	/	P *dan* R *sahaja*

46 Diagram 29 shows the voltage-time graphs at the inputs and output of a logic gate.
Rajah 29 *menunjukkan graf voltan-masa di input-input dan output sebuah get logic.*
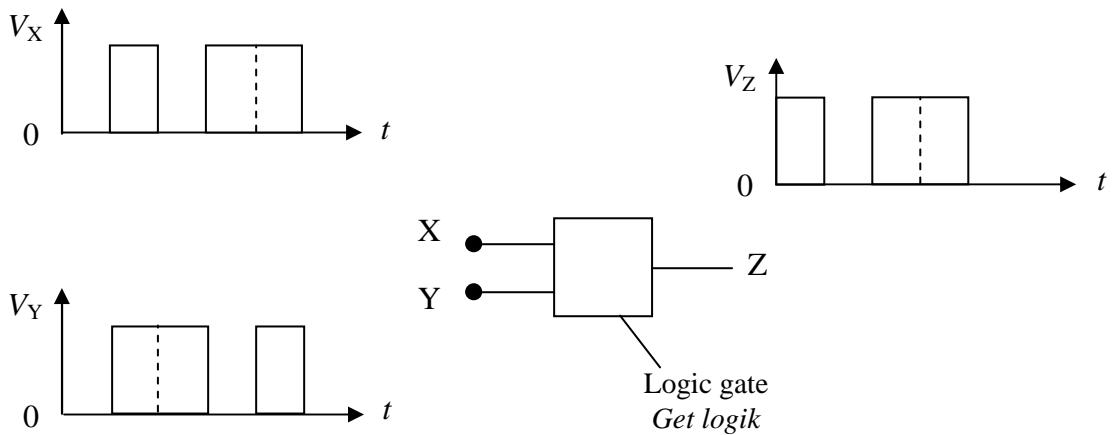
Diagram 29 / *Rajah* 29

Identify the logic gate. / *Kenal pasti get logik itu.*

A	OR gate	/	get ATAU
B	AND gate	/	get DAN
C	NOR gate	/	get TAKATAU
D	NAND gate	/	get TAKDAN

47 Diagram 30 shows a transistor circuit.

Rajah 30 *menunjukkan suatu litar transistor.*
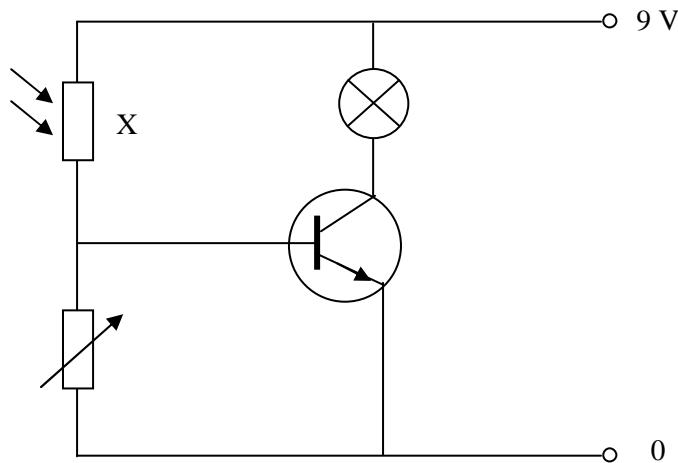
Diagram 30 / *Rajah* 30

What is component X and when will the bulb light up?

Apakah komponen X *dan bilakah mentol menyala?*

	Component X *Komponen* X	The bulb lights up during the *Mentol menyala pada waktu*
A	Light dependent resistor *Perintang peka cahaya*	Night *Malam*
B	Light dependent resistor *Perintang peka cahaya*	Day *Siang*
C	Heat dependent resistor *Perintang peka haba*	Night *Malam*
D	Heat dependent resistor *Perintang peka haba*	Day *Siang*

48 An unstable $^{238}_{92}$U nucleus decays to a stable $^{226}_{88}$Ra nucleus. What is the number of alpha particles and beta particles emitted during this process?

Suatu nucleus $^{238}_{92}$U *yang tak stabil mereput kepada nucleus* $^{226}_{88}$Ra *yang stabil. Berapakah bilangan zarah alfa dan zarah beta yang dipancar semasa proses ini?*

	Number of alpha particles *Bilangan zarah alfa*	Number of beta particles *Bilangan zarah beta*
A	2	3
B	3	2
C	4	1
D	1	1

49 In a nuclear reaction, 5.265×10^{-10} J energy is released.
What is the mass defect of this reaction?

Dalam suatu tindak balas nuclear, 5.265×10^{-10} J *tenaga dibebaskan.*
Berapakah cacat jisim bagi tindak balas ini?

A 4.74×10^{7} kg
B 1.58×10^{-2} kg
C 1.76×10^{-18} kg
D 5.85×10^{-27} kg

50 Diagram 31 shows the decay graph when radioisotope X decays to Y.
Initially there are 20 mg of X in a sample.

Rajah 31 *menunjukkan graf reputan apabila radioisotop* X *mereput kepada* Y.
Pada awalnya, terdapat 20 mg *bagi* X *dalam suatu sampel.*
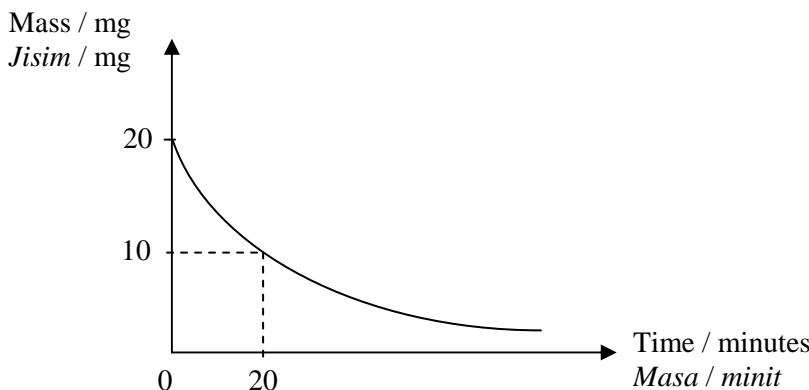
Diagram 31 / *Rajah* 31

Determine the mass of X and the mass of Y in the sample after 40 minutes.

Tentukan jisim X *dan jisim* Y *dalam sampel itu selepas* 40 *minit.*

	Mass of X *Jisim* X	Mass of Y *Jisim* Y
A	10 mg	5 mg
B	10 mg	10 mg
C	5 mg	5 mg
D	5 mg	15 mg

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

MAJLIS PENGETUA
SEKOLAH MENENGAH
NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2011

PHYSICS

PERATURAN PEMARKAHAN

Kertas 1

Peraturan pemarkahan ini mengandungi **2** halaman bercetak

j*k

PEPERIKSAAN PERCUBAAN SPM 2011
KEDAH DARUL AMAN

PERATURAN PEMARKAHAN

PHYSICS

PAPER		MARKS
Paper 1		50
Paper 2		100
Paper 3		40
	Total	**190**

Jumlah markah diskalakan kepada 100%

Paper 1

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

NO. KAD PENGENALAN | | | | | | | – | | | | – | | | | |

ANGKA GILIRAN | | | | | | | | |

NAMA: …….………......….............…….………. TINGKATAN: ……......………

MAJLIS PENGETUA
SEKOLAH MENENGAH KEDAH

PEPERIKSAAN PERCUBAAN SPM 2011   **4531/2**
PHYSICS
Kertas 2

$2\frac{1}{2}$ jam   Dua jam tiga puluh 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 dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

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

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

Kertas soalan ini mengandungi **27** halaman bercetak

Section A
Bahagian A
[60 *marks*]
Answer **all** questions in this section.
Jawab **semua** *soalan dalam bahagian ini*.

1 Diagram 1 shows a metal sphere being immersed in water. The initial temperatures of the metal sphere and water are 100 °C and 25 °C respectively.

Rajah 1 *menunjukkan sebiji sfera logam ditenggelamkan ke dalam air. Suhu awal sfera logam dan air ialah* 100 °C *dan* 25 °C *masing-masing*.

Water : Initial temperature = 25 °C
Air : *Suhu awal* = 25 °C
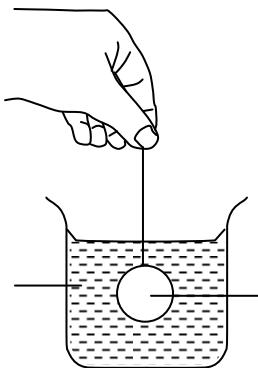
Metal sphere : Initial temperature = 100 °C
Sfera logam : *Suhu awal* = 100 °C

Diagram 1 / *Rajah* 1

(a) Name the physical quantity that is changing in Diagram 1.

Namakan kuantiti fizik yang sedang berubah dalam Rajah 1.

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

(b) Why does the physical quantity in 1(a) change?

Mengapakah kuantiti fizik di 1(a) *berubah*?

....

[1 mark / *markah*]

(c) After a few hours, is the physical quantity in 1(a) still changing?

Selepas dibiarkan beberapa jam, adakah kuantiti fizik di 1(a) *masih sedang berubah*?

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

(d) Name the situation in 1(c).

Namakan keadaan di 1(c).

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

2 Diagram 2 shows a transformer.

Rajah 2 *menunjukkan sebuah transformer*.
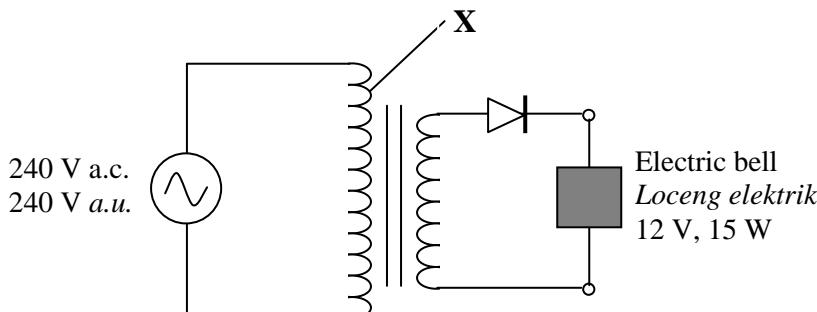
Diagram 2 / *Rajah* 2

(a) (i) Underline the correct word.

X is the (primary, secondary) coil.

Gariskan perkataan yang betul.

X *ialah gegelung (primer, sekunder).* [1 mark / *markah*]

(ii) State the type of transformer shown in Diagram 2.

Nyatakan jenis transformer dalam Rajah 2.

…………………………………………………………… [1 mark / *markah*]

(b) (i) What is the ratio of the number of turns of the primary coil to the number of turns on the secondary coil?

Berapakah nisbah bilangan lilitan gegelung primer kepada bilangan lilitan gegelung sekunder?

[1 mark / *markah*]

(ii) Calculate the current in coil X.
[Assume the efficiency of the transformer is 100%]

Hitungkan arus input dalam gegelung X.
[*Anggap kecekapan transformer itu ialah* 100%]

[2 marks / *markah*]

3 Diagram 3.1 shows a metal block hanging from a spring balance.

Rajah 3.1 menunjukkan satu blok logam tergantung dari sebuah neraca spring.

Diagram 3.2 shows the metal block immersed in eureka can filled with water.

Rajah 3.2 menunjukkan blok logam itu ditenggelamkan ke dalam bekas eureka berisi air.
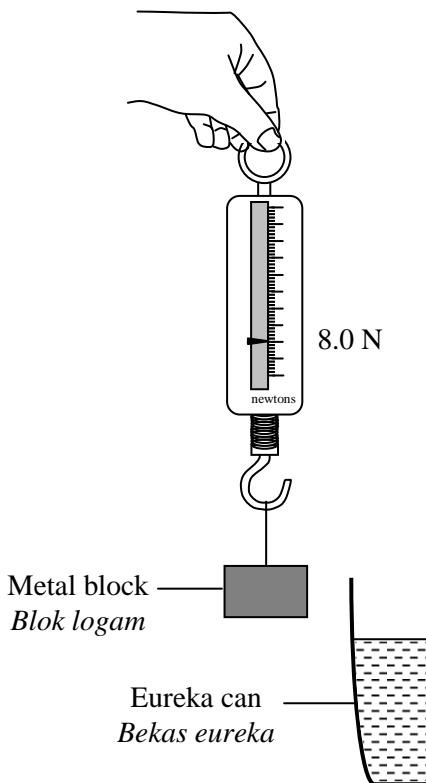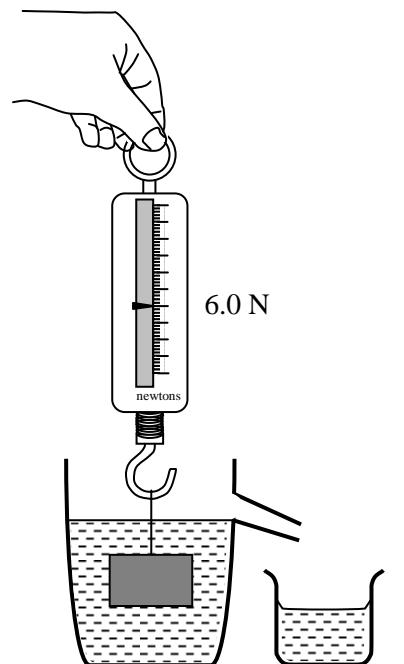
Diagram 3.1 / *Rajah 3.1*   Diagram 3.2 / *Rajah 3.2*

(a) What is the mass of the metal block?

Berapakah jisim blok logam itu?

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

(b) Based on Diagram 3.2:

Berdasarkan Rajah 3.2:

(i) What is the apparent loss in weight of the metal block?

Berapakah kehilangan ketara berat blok logam itu?

…………………………………………………………. [1 mark / *markah*]

(ii) Explain why the spring balance shows a smaller reading.

Terangkan mengapa neraca spring menunjukkan bacaan yang lebih kecil.

……………………………………………………………………………..

[1 mark / *markah*]

(c) Complete the following sentence by underlining the correct words.

The weight of the water displaced in Diagram 3.2 is
(less than, equal to, more than) the apparent loss in weight of the metal block.

Lengkapkan ayat berikut dengan menggariskan perkataan yang betul.

*Berat air yang tersesar dalam Rajah 3.2 adalah
(lebih kecil daripada, sama dengan, lebih besar daripada) kehilangan ketara
berat blok logam itu.*

[1 mark / *markah*]

(d) Calculate the volume of water displaced.
[Density of water = 1000 kg m^{-3}, g = 10 N kg^{-1}]

Hitungkan isipadu air yang disesarkan itu.
[*Ketumpatan air* = 1000 kg m^{-3}, g = 10 N kg^{-1}]

[2 marks / *markah*]

4 Diagram 4 shows a circuit which acts as a switch to switch on an air conditioner, M,
during the day only. P is a light dependent resistor which has a low resistance when its
surroundings is bright.

*Rajah 4 menunjukkan suatu litar yang bertindak sebagai suis untuk menghidupkan
sebuah pendingin hawa,* M, *pada waktu siang sahaja.* P *ialah sebuah perintang peka
cahaya yang mempunyai rintangan yang rendah apabila persekitarannya adalah cerah.*

Relay / *Geganti*
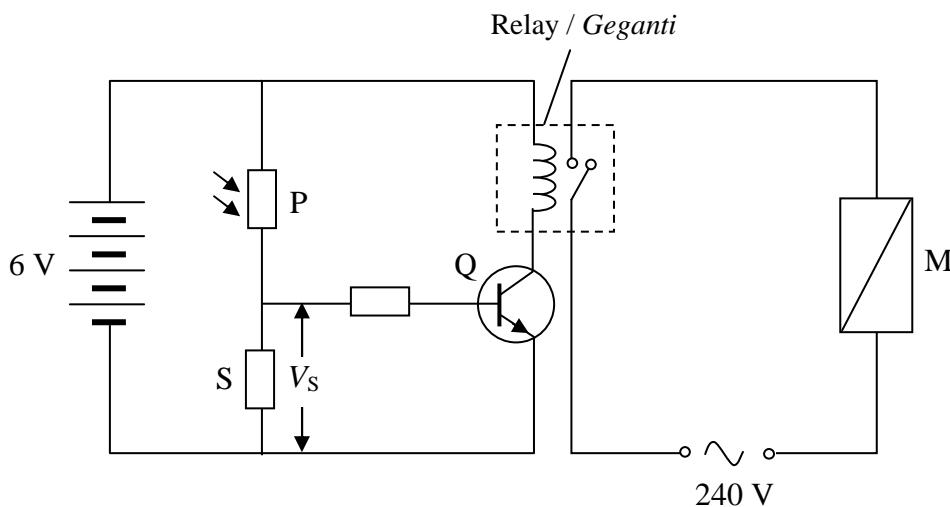
Diagram 4 / *Rajah* 4

(a) Name the type of transistor Q.

Nyatakan jenis transistor Q.

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

(b) (i) State the change to the potential difference, V_S, when the surroundings of P changes from dark to bright.

Nyatakan perubahan beza keupayaan, V_S, *apabila persekitaran* P *berubah daripada gelap ke cerah.*

………………………………………………………………… [1 mark / *markah*]

(ii) Explain how the change in 4(b)(i) causes the air conditioner, M, to be switched on.

Terangkan bagaimana perubahan dalam 4(b)(i) *menyebabkan pendingin hawa*, M, *dihidupkan.*

…………………………………………………………………………..

…………………………………………………………………………..

[2 marks / *markah*]

(c) The air conditioner, M, with power rating 240 V, 2 kW, is swiched on when V_S reaches 2.0 V. If the resistance of S is 10 kΩ, calculate the resistance of P.

Pendingin hawa, M, *dengan kadaran* 240 V, 2 kW, *dihidupkan apabila* V_S *mencapai* 2.0 V. *Jika rintangan bagi* S *ialah* 10 kΩ, *hitungkan rintangan bagi* P.

.

[2 marks / *markah*]

(d) Explain why the air conditioner is not connected directly to the transistor circuit.

Terangkan mengapa pendingin hawa itu tidak disambung terus kepada litar transistor.

……………………………………………………………………………..........

……………………………………………………………………………..........

[1 mark / *markah*]

5   Diagram 5.1 shows an electric circuit containing a solenoid.

Rajah 5.1 menunjukkan suatu litar elektrik yang mengandungi sebuah solenoid.
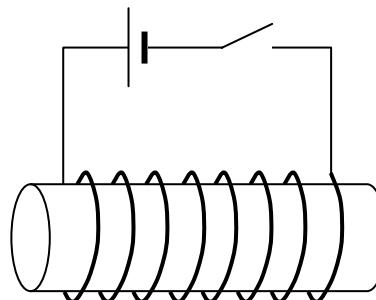
Diagram 5.1 / *Rajah* 5.1

When the current is switched on, the solenoid produces a magnetic field.

Apabila arus dihidupkan, solenoid menghasilkan suatu medan magnet.

(a)   What is the meaning of magnetic field?

Apakah maksud medan magnet?

…………………………………………………………………………………..

…………………………………………………………………………………..
[1 mark / *markah*]

(b)   (i)   In Diagram 5.2, draw the pattern of the magnetic field produced by the current-carrying solenoid.

Dalam Rajah 5.2, lukis *corak medan magnet yang dihasilkan oleh solenoid yang membawa arus itu.*

[2 marks / *markah*]
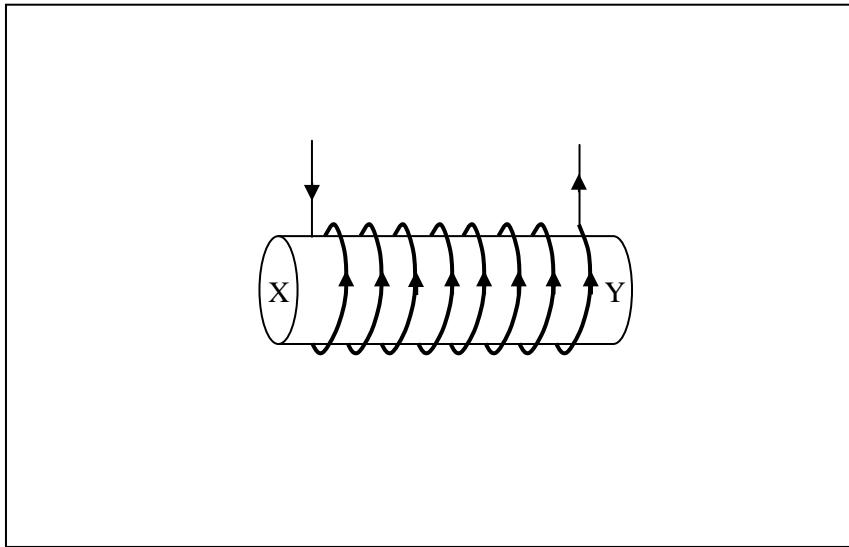
Diagram 5.2 / *Rajah* 5.2

(ii) State the polarity at the ends X and Y of the solenoid.

Nyatakan kekutuban di hujung X *dan* Y *solenoid itu.*

X : …………………… Y : …………………… [1 mark / *markah*]

(c) Diagram 5.3 and Diagram 5.4 show different solenoids connected to galvanometer A and galvanometer B, respectively. Identical bar magnets are pushed at the same speed towards each of the solenoids.

Rajah 5.3 *dan Rajah* 5.4 *menunjukkan dua solenoid yang berbeza disambung kepada galvnanometer* A *dan galvanometer* B *masing-masing. Magnet bar yang serupa ditolak pada kelajuan yang sama ke arah tiap-tiap satu solenoid.*

Galvanometer A
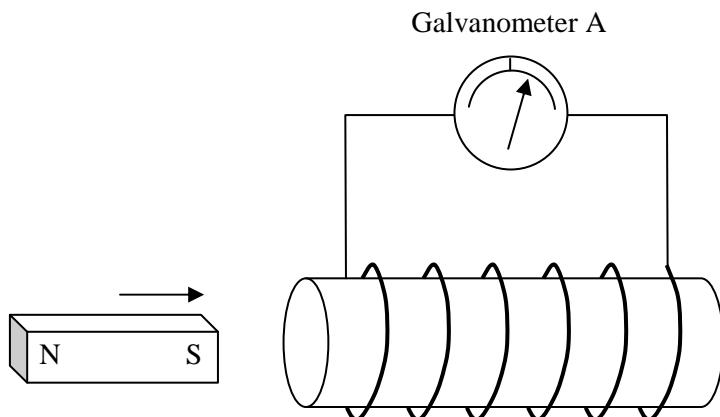
Diagram 5.3 / *Rajah* 5.3

Galvanometer B
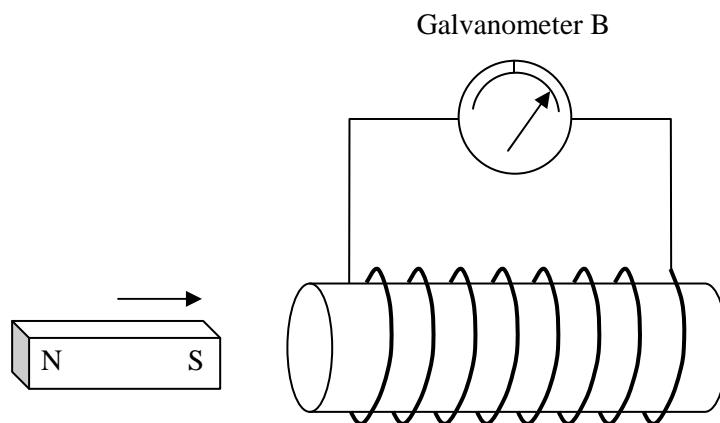
Diagram 5.4 / *Rajah* 5.4

Based on Diagram 5.3 and Diagram 5.4:

Berdasarkan Rajah 5.3 *dan Rajah* 5.4:

(i) Compare the number of turns of the solenoids.

Bandingkan bilangan lilitan solenoid-solenoid itu.

…………………………………………………………………………………….
[1 mark / *markah*]

    (ii)   Compare the magnitude of the induced current in the solenoids.

          Bandingkan magnitud arus teraruh dalam solenoid-solenoid itu.

………………………………………………………………………………….

[1 mark / *markah*]

    (iii)   Relate the number of turns of the solenoid to the magnitude of induced current.

          Hubungkaitkan bilangan lilitan solenoid kepada magnitud arus teraruh.

…………………………………………………………………………………

………………………………………………………………………………….

[1 mark / *markah*]

(d)   State one other factor that affects the magnitude of the induced current.

       Nyatakan satu lagi faktor yang mempengaruhi magnitud arus teraruh.

…………………………………………………………………………………..

[1 mark / *markah*]

6   Diagram 6.1 shows a light ray entering a glass prism.
      [Refractive index of glass = 1.51]

    Rajah 6.1 *menunjukkan satu sinar cahaya merambat ke dalam sebuah prisma kaca.*
    [*Indeks biasan kaca* = 1.51]
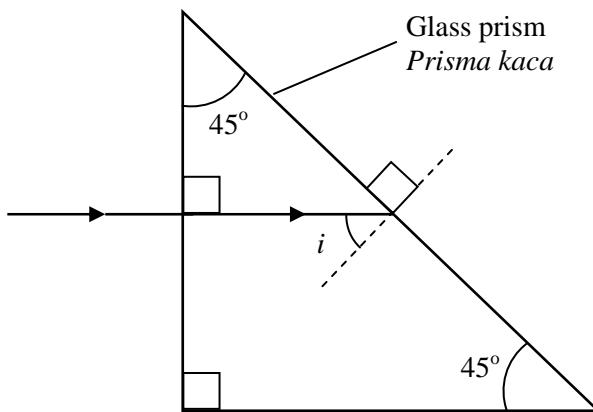
Diagram 6.1 / *Rajah* 6.1

(a)   (i)   Calculate the critical angle, *c*, of the glass prism.

          Hitung sudut genting, c, prisma kaca itu.

[2 marks / *markah*]

    (ii)   State the value of the incident angle, *i*.

        Nyatakan nilai sudut tuju, *i*.

…………………………………………………………… [1 mark / *markah*]

    (iii) Compare the critical angle, *c*, in 6(a)(i) with angle of incidence, *i*.

        Bandingkan sudut genting, c, dalam 6(a)(i) *dan sudut tuju, i.*

…………………………………………………………. [1 mark / *markah*]

    (iv) Complete the ray diagram in Diagram 6.1.

        Lengkapkan gambar rajah sinar dalam Rajah 6.1.

[1 mark / *markah*]

  (b)   (i)   Name the phenomenon that has occurred to the light ray in 6(a)(iv).

        Namakan fenomena yang telah berlaku kepada sinar cahaya di 6(a)(iv).

…………………………………………………………… [1 mark / *markah*]

    (ii)   State two conditions for this phenomenon to occur.

        Nyatakan dua syarat untuk fenomena ini berlaku.

………………………………………………………………………..

………………………………………………………………………..

[2 marks / *markah*]

  (c)   Diagram 6.2 shows an optical fibre which consist of two layers of glass with different refractive indices.

     Rajah 6.2 *menunjukkan keratan rentas sebuah serabut optik yang terdiri daripada dua lapisan kaca yang mempunyai indeks biasan yang berbeza.*
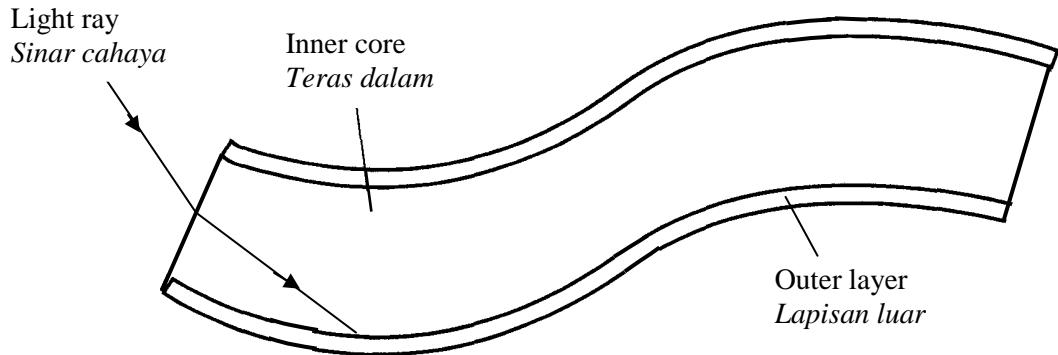
Diagram 6.2 / *Rajah* 6.2

Complete the ray diagram to show how light propagate through optical fibre.

 Lengkapkan rajah sinar untuk menunjukkan perambatan cahaya melalui gentian optik.

[1 mark / *markah*]

7 Diagram 7 shows a golfer getting ready to strike the golf ball.

Rajah 7 *menunjukkan seorang pemain golf bersedia untuk memukul bola golf.*

Golf club
Pemukul golf

Path of the golf ball
Lintasan bola golf

Range
Julat
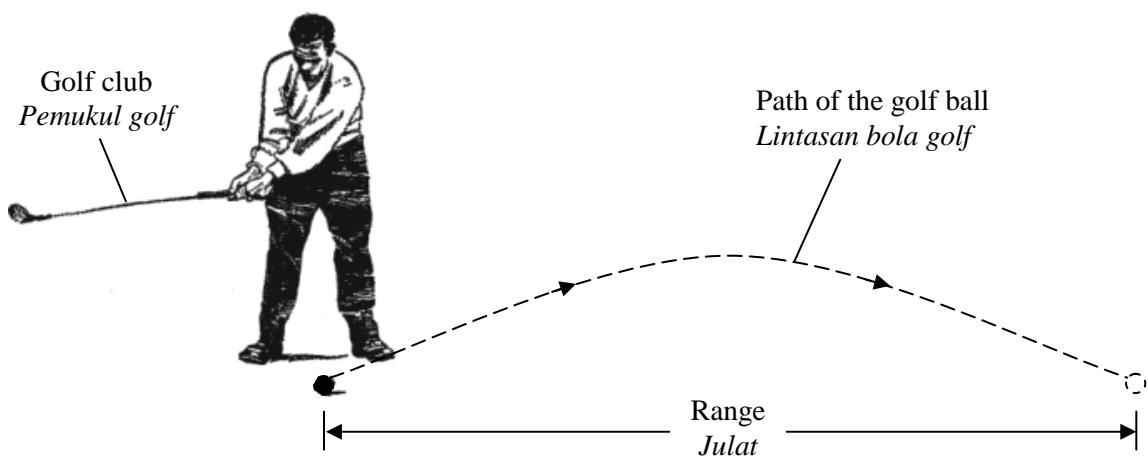
Diagram 7 / *Rajah* 7

(a) What is the meaning of energy?

Apakah maksud tenaga?

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

(b) The mass of a golf ball is 0.049 kg. It travels at 20 m s^{-1} when hit by the golfer. Calculate the kinetic energy of the golf ball.

Jisim sebiji bola golf ialah 0.049 kg. *Bola itu bergerak dengan kelajuan* 20 m s^{-1} *selepas dipukul. Hitungkan tenaga kinetik bola itu.*

[2 marks / *markah*]

(c) Explain the transformation of energy of the golf ball from the time it is hit until it lands on the ground.
Jelaskan transformasi tenaga bola golf itu dari ketika ia dipukul sehingga ia mendarat di tanah.

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

(d) Suggest two ways by which the golfer can increase the range of the golf ball. Give reasons for your answers.

Cadangkan dua cara pemain golf itu dapat menambahkan julat bola golf itu. Berikan sebab bagi jawapan anda.

Suggestion 1 / *Cadangan* 1

....

....

Reason / *Sebab*

....

Suggestion 2 / *Cadangan* 2

....

....

Reason / *Sebab*

....

[4 marks / *markah*]

(e) State one other factor that can affect the range of the golf ball.

Nyatakan satu faktor lain yang boleh mempengaruhi julat bola golf itu.

....

[1 mark / *markah*]

8 Diagram 8 shows a transmitter sending a sound signal to determine the thickness of a layer of oil below the ground.
Receiver X detects the sound signal 0.4 s after transmission.
Receiver Y detects the sound signal 1.2 s after transmission.

Rajah 8 *menunjukkan sebuah pemancar mengeluarkan satu isyarat bunyi untuk menentukan ketebalan lapisan minyak di bawah tanah.*
Penerima X *mengesan isyarat bunyi itu* 0.4 s *selepas pemancaran.*
Penerima Y *mengesan isyarat bunyi itu* 1.2 s *selepas pemancaran.*
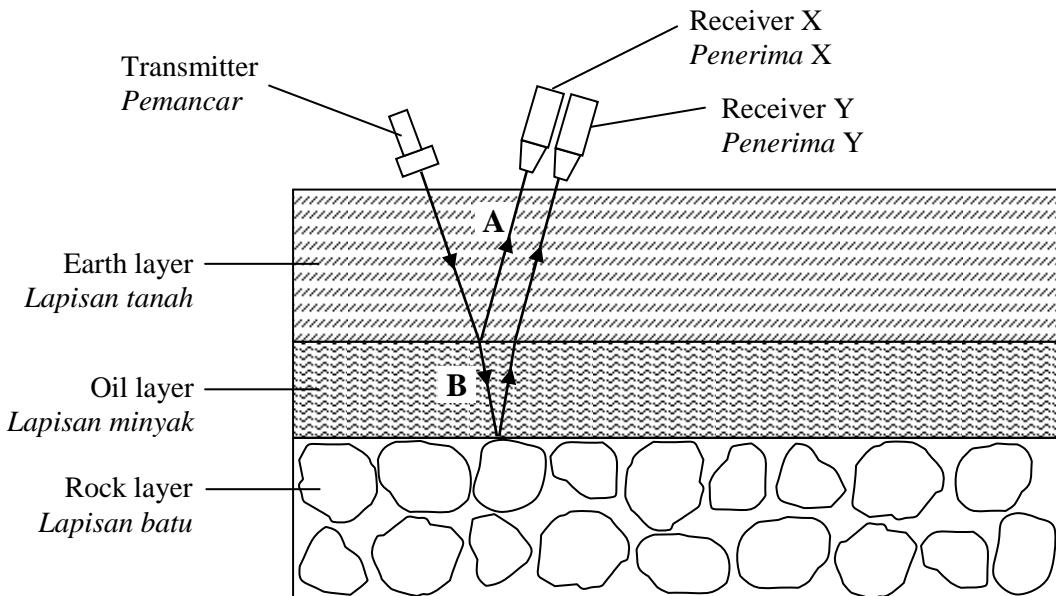
Diagram 8 / *Rajah* 8

(a) State the wave phenomenon which produces:

Nyatakan fenomena gelombang yang menghasilkan:
(i)   the signal A / *isyarat* A

………………………………………………………… [1 mark / *markah*]

(ii) the signal B / *isyarat* B.

………………………………………………………… [1 mark / *markah*]

(b) The speed of sound in the oil layer is 1500 m s^{-1}.
Calculate

Kelajuan bunyi dalam lapisan minyak ialah 1500 m s^{-1}.
Hitungkan

(i)   the total time for the sound signal to travel through the oil layer.

jumlah masa untuk isyarat bunyi itu bergerak melalui lapisan minyak.

[2 marks / *markah*]

(ii)   thickness of the oil layer.

ketebalan lapisan minyak.

[3 marks / *markah*]

(c)   Table 8 shows the characteristics of four types of sound waves that could be used to determine the thickness of the layer of oil.

Jadual 8 menunjukkan ciri-ciri bagi empat jenis gelombang bunyi yang boleh digunakan untuk menentukan ketebalan lapisan minyak itu.

Type of wave / *Jenis gelombang*	Frequency / *Frekuensi*	Energy / *Tenaga*
P	High / *Tinggi*	High / *Tinggi*
Q	Low / *Rendah*	Low / *Rendah*
R	High / *Tinggi*	Low / *Rendah*
S	Low / *Rendah*	High / *Tinggi*

Table 8 / *Jadual* 8

Based on Table 8, explain the suitability of each characteristic of the wave to determine the thickness of the oil layer.

Berdasarkan Jadual 8, terangkan kesesuaian setiap ciri gelombang itu untuk menentukan ketebalan lapisan minyak itu.

(i)   Frequency / *Frekuensi* :

………………………………………………………………………………..

………………………………………………………………………………..

[2 marks / *markah*]

(ii)   Energy / *Tenaga* :

………………………………………………………………………………..

………………………………………………………………………………..

[2 marks / *markah*]

(d)   Which is the most suitable type of wave determine of thickness of the oil layer?

Apakah jenis gelombang yang paling sesuai untuk menentukan ketebalan lapisan minyak?

……………………………………………………………….………… [1 mark / *markah*]

Section B
Bahagian **B**
[20 marks]
Answer any **one** question from this section.
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

9   Diagram 9.1 shows two beakers A and B containing water at 0 ^{o}C, with beaker A containing some pieces of ice.

Rajah 9.1 *menunjukkan dua buah bikar* A *dan* B *yang berisi air pada* 0 ^{o}C, *dengan bikar* A *mengandungi beberapa ketul ais.*
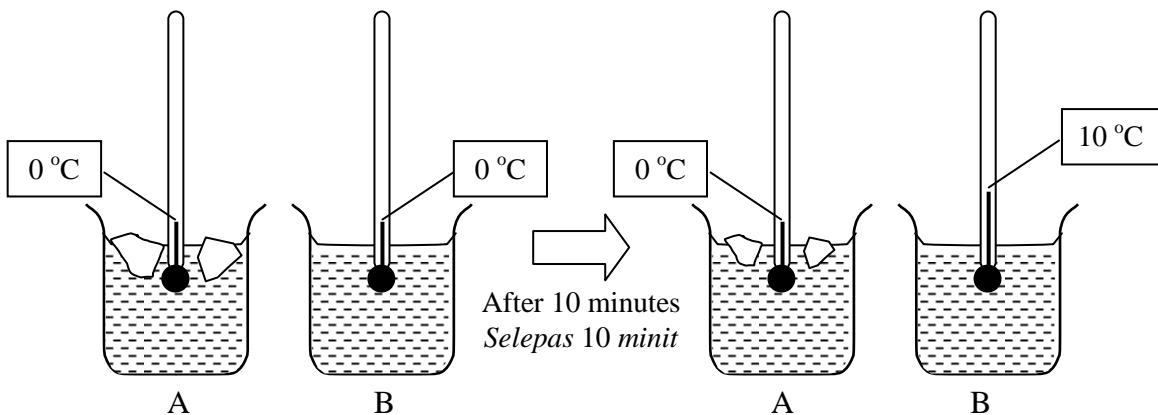
Diagram 9.1 / *Rajah* 9.1   Diagram 9.2 / *Rajah* 9.2

Diagram 9.2 shows the temperature of the water in beaker A and beaker B after 10 minutes.
Rajah 9.2 *menunjukkan suhu bagi air dalam bikar* A *dan bikar* B *selepas* 10 *minit.*

(a)   What is the meaning of temperature?
       Apakah maksud suhu?

[1 mark / *markah*]

(b)   (i)   Name the physical quantity involved in the melting of the ice.
              Namakan kuantiti fizik yang terlibat dalam peleburan ais.

[1 mark / *markah*]

       (ii)   Using the kinetic theory of matter:

              Dengan menggunakan teori kinetik jirim:

              •   Explain why the temperature of the water in beaker A remains constant at 0 ^{o}C

                   Terangkan mengapa suhu air dalam bikar A *kekal malar pada* 0 ^{o}C

              •   Explain why the temperature of the water in beaker B has risen.

                   Terangkan mengapa suhu air dalam bikar B *telah naik.*

[4 marks / *markah*]

(c) Relate the temperature increase of a substance to its specific heat capacity. Use this relationship to explain why a piece of iron becomes hotter than a piece of wood of the same mass when both absorb the same amount of heat.

Hubungkaitkan kenaikan suhu suatu bahan dengan muatan haba tentunya. Gunakan hubungan ini untuk menerangkan mengapa seketul besi menjadi lebih panas daripada seketul kayu yang mempunyai jisim yang sama selepas kedua-duanya menyerap kuantiti haba yang sama.

[4 marks / *markah*]

(d) Diagram 9.3 shows food being fried in a wok of cooking oil.

Rajah 9.3 menunjukkan makanan digoreng dalam sebuah kuali yang mengandungi minyak masak.
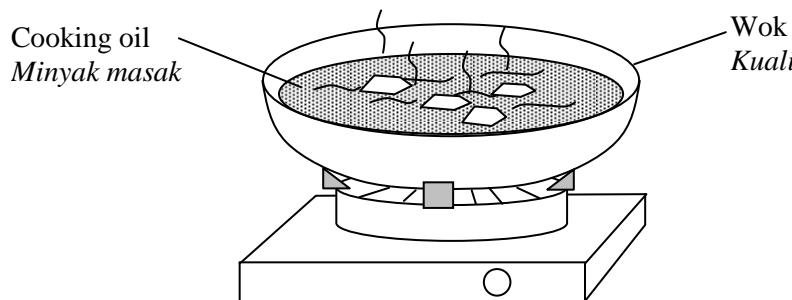
Diagram 9.3 / *Rajah* 9.3

Suggest and explain how the food to be fried can be cooked in a short time based on the following aspects of the material of the wok and the cooking oil.

Cadang dan terangkan bagaimana makanan yang digoreng boleh menjadi masak dalam masa yang singkat berdasarkan aspek-aspek berikut mengenai bahan kuali dan minyak masak.

Material of the wok / *Bahan kuali:*

- specific heat capacity / *muatan haba tentunya*
- thermal conductivity / *kekonduksian termanya*
- melting point / *takat leburnya*

Cooking oil / *Minyak masak:*

- specific heat capacity / *muatan haba tentunya*
- boiling point / *takat didihnya*

[10 marks / *markah*]

10 (a) Diagram 10.1 shows an experiment to observe the pattern of the electric field for two point charges.

Rajah 10.1 *menunjukkan suatu eksperimen untuk memerhati corak medan elektrik bagi dua cas titik.*
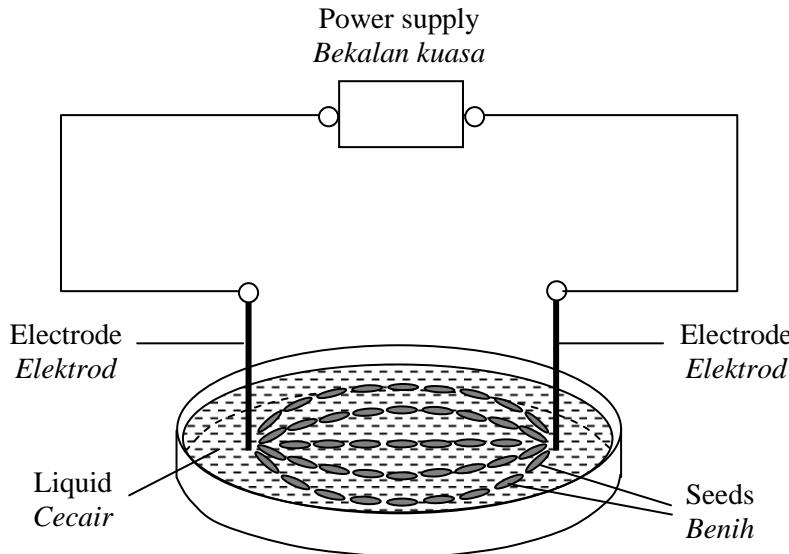
Diagram 10.1 / *Rajah* 10.1

(i) What is the function of the seeds?

Apakah fungsi benih itu?

[1 mark / *markah*]

(ii) Suggest and explain modifications that can be made to the set up in Diagram 10.1 to produce and display more clearly a stronger and uniform electric field between two electrodes.

Cadang dan terangkan pengubahsuaian yang boleh dibuat kepada susunan radas dalam Rajah 10.1 *untuk menghasil dan memaparkan dengan lebih jelas suatu medan elektrik yang lebih kuat dan seragam antara dua elektrod.*

Your answer should include the following aspects:

Jawapan anda perlu meliputi aspek berikut:

- Shape of the electrode / *Bentuk elektrod*
- Size of the electrode / *Saiz elektrod*
- Distance between the electrodes / *Jarak antara elektrod*
- Magnitude of the power supply / *Magnitud bekalan kuasa*
- Size of the seeds / *Saiz benih*

[10 marks / *markah*]

(b) Diagram 10.2 shows two electrical circuits, A and B consisting of identical dry cells and light bulbs. The connecting wires in both circuits are made of the same material and are of the same length.

Rajah 10.2 *menunjukkan dua litar elektrik* A *dan* B *yang mengandungi sel kering dan mentol yang serupa. Wayar penyambung dalam kedua-dua litar diperbuat daripada bahan yang sama dan mempunyai panjang yang sama.*
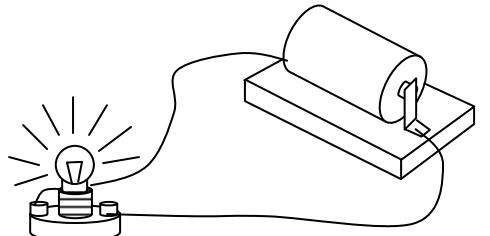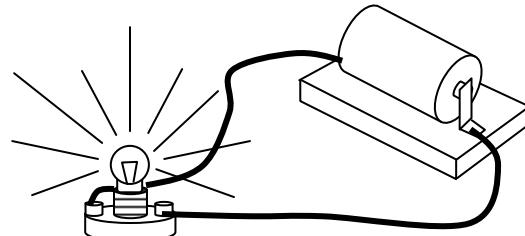
Circuit A / *Litar* A   Circuit B / *Litar* B

Diagram 10.2 / *Rajah* 10.2

Compare the brightness of the bulbs and the thickness of the connecting wires.
Relate the brightness of the bulb to the current in the circuit.
Relate the current in the circuit to the resistance of the connecting wire.
Hence, state the relationship between the thickness of the connecting wire to its resistance.

Bandingkan kecerahan mentol dan ketebalan wayar penyambung.
Hubungkaitkan kecerahan mentol kepada arus dalam litar.
Hubungkaitkan arus dalam litar kepada rintangan wayar penyambung.
Dengan itu, nyatakan hubungan antara ketebalan wayar penyambung kepada rintangannya. [5 marks / *markah*]

(c) Diagram 10.3 shows the graph of potential difference, *V*, against current, *I*, for a filament lamp.

Rajah 10.3 *menunjukkan graf beza keupayaan*, *V*, *melawan arus*, *I*, *bagi sebuah lampu filamen.*
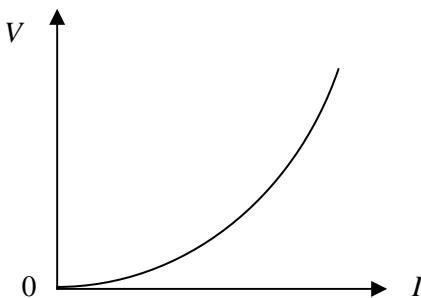
Diagram 10.3 / *Rajah* 10.3

(i) Explain whether the filament lamp obeys Ohm's law.

Terangkan sama ada lampu filamen itu mematuhi hukum Ohm.

(ii) What happens to the resistance of the filament when the current increases?
Explain your answer.

Apakah yang berlaku kepada rintangan filamen apabila arus bertambah?
Terangkan jawapan anda. [4 marks / *markah*]

Section C
Bahagian **C**
[20 marks]
Answer any **one** question from this section.
Jawab mana-mana **satu** *soalan daripada bahagian ini.*

11   Diagram 11.1 shows the air pressure in the tyre of a car being measured by a pressure gauge.

Rajah 11.1 *menunjukkan tekanan udara di dalam tayar sebuah kereta diukur oleh sebuah tolok tekanan.*

Pressure gauge
Tolok tekanan
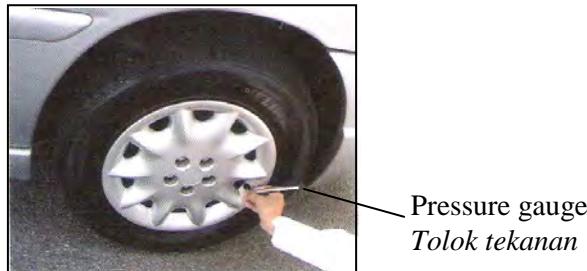
Diagram 11.1 / *Rajah* 11.1

(a)   What is the meaning of pressure?

Apakah maksud tekanan?

[1 mark / *markah*]

(b)   Based on kinetic theory of gases, explain why the air pressure in the tyre increases

Berdasarkan teori kinetik gas, terangkan mengapa tekanan udara di dalam tayar bertambah

(i)   when more air is pumped into it

apabila lebih banyak udara dipam ke dalamnya

(ii)   after the car has completed a long journey.

selepas kereta menamatkan perjalanan yang jauh.

[4 marks / *markah*]

(c)   Diagram 11.2 shows a sheet of glass being lifted by a vacuum suction cup. Air is removed from the cup by a vacuum pump to produce a partial vacuum inside the cup. Atmospheric pressure outside pushes the glass onto the cup.

Rajah 11.2 *menunjukkan sekeping kaca diangkat oleh sebuah mangkuk penyedut vakum. Udara dikeluarkan daripada mangkuk oleh sebuah pam vakum untuk menghasilkan vakum separa di dalam mangkuk itu. Tekanan atmosfera di luar menolak kepingan kaca pada mangkuk itu.*

Handle
Pemegang

Suction cup
Mangkuk penyedut

To vacuum pump
Ke pam vakum

Glass sheet
Kepingan kaca

Seal lining
Lapik kedap
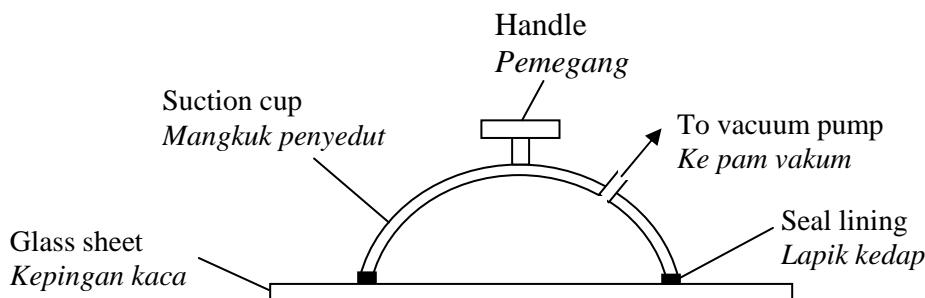
Diagram 11.2 / *Rajah* 11.2

The area of the glass sheet covered by the suction cup is 0.0025 m^2. The pressure inside the cup is reduced to 45000 Pa. The atmospheric pressure outside is 100 000 Pa.

Luas kepingan kaca yang diliputi oleh mangkuk penyedut ialah 0.0025 m^2. *Tekanan di dalam mangkuk dikurangkan kepada* 45 000 Pa. *Tekanan atmosfera di luar ialah* 100 000 Pa.

(i) What is the difference between the atmospheric pressure and the pressure inside the cup?

Berapakah perbezaan antara tekanan atmosfera dan tekanan di dalam mangkuk?

[1 mark / *markah*]

(ii) Calculate the force exerted on the glass sheet due to the difference of pressure in 11(c)(i).

Hitungkan daya yang dikenakan pada kepingan kaca disebabkan oleh beza tekanan di 11(c)(i).

[2 marks / *markah*]

(iii) Calculate the maximum mass of glass sheet that can be lifted with this cup.
Hitungkan jisim maksimum kepingan kaca yang boleh diangkat oleh mangkuk ini.

[2 marks / *markah*]

(d) Diagram 11.3 shows two different glass lifters which are used to lift heavy glass panels. When the hinged levers are pushed down, air is forced out of the sucker cup and a lifting force is produced. The glass lifters can hold tightly on a glass panel by pressing it onto the glass.

Rajah 11.3 *menunjukkan dua jenis pengangkat kaca yang digunakan untuk mengangkat panel kaca yang berat. Apabila tuas berengsel ditolak ke bawah, udara dipaksa keluar daripada mangkuk penyedut dan daya angkat dihasilkan. Pengangkat kaca itu boleh melekap dengan kuat pada panel kaca dengan cara menekannya ke atas kaca itu.*

Hinged lever
Tuas berengsel

Sucker cup
Mangkuk penyedut

Seal lining
Lapik kedap

Double-sucker cup
Mangkuk penyedut ganda dua

Triple-sucker cup
Mangkuk penyedut ganda tiga

Diagram 11.3 / *Rajah* 11.3

Table 11 shows the characteristics of four different types of glass lifters.

Jadual 11 *menunjukkan ciri-ciri empat jenis pengangkat kaca.*

Type of glass lifter *Jenis pengangkat kaca*	Pressure in cup after hinged lever is pressed down *Tekanan dalam mangkuk selepas tuas berengsel ditolak ke bawah*	Diameter of cup *Diameter mangkuk*	Seal lining *Lapik kedap*	Number of cups *Bilangan mangkuk*
W	6.47×10^4 Pa	120 mm	Plastic *Plastik*	Three *Tiga*
X	6.47×10^4 Pa	105 mm	Rubber *Getah*	Two *Dua*
Y	2.06×10^4 Pa	120 mm	Rubber *Getah*	Three *Tiga*
Z	2.06×10^4 Pa	105 mm	Plastic *Plastik*	Two *Dua*

Table 11 / *Jadual* 11

You are required to determine the most suitable glass lifter that can be used for lifting large and heavier pieces of glass safely.

Anda dikehendaki menentukan pengangkat kaca yang paling sesuai untuk mengangkat kepingan kaca yang besar dan berat dengan selamat.

Study the properties of all the four glass lifters based on the following aspects:

Kaji ciri-ciri keempat-empat pengangkat kaca itu berdasarkan aspek-aspek berikut:

(i) Pressure in cup after hinged lever is pressed down.

Tekanan dalam mangkuk selepas tuas berengsel ditolak ke bawah.

[2 marks / *markah*]

(ii) Diameter of cup

Diameter mangkuk. [2 marks / *markah*]

(iii) Seal lining.

Lapik kedap. [2 marks / *markah*]

(iv) Number of cups.

Bilangan mangkuk. [2 marks / *markah*]

Explain the suitability of each property and then determine the most suitable glass lifter.
Give the reasons for your choice.

Terangkan kesesuaian setiap ciri dan seterusnya tentukan pengangkat kaca yang paling sesuai.
Beri sebab untuk pilihan anda. [2 marks / *markah*]

12 Diagram 12.1 shows a water detection system designed by a student to detect the level of water in a storage tank so that an outlet valve can be opened automatically when the water level is too high.

Rajah 12.1 menunjukkan satu sistem pengesan air yang direkabentuk oleh seorang pelajar untuk mengesan aras air di dalam tangki supaya injap keluar boleh dibuka secara automatik apabila aras air menjadi terlalu tinggi.
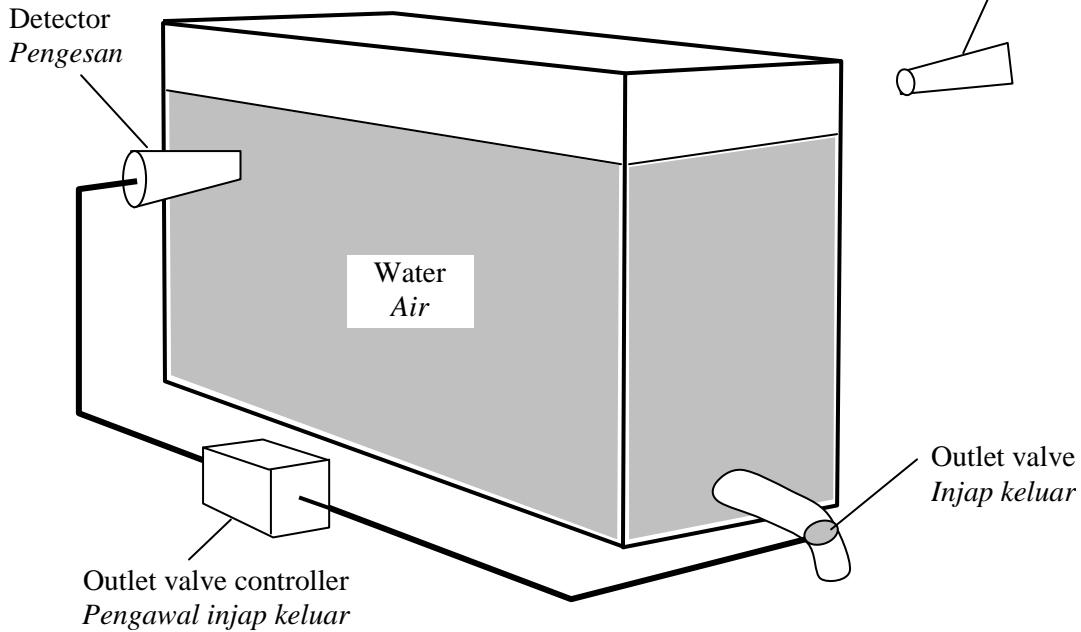
Diagram 12.1 / *Rajah 12.1*

The radioactive source and detector are used to detect the level of water in the tank. The radioactive source contains a radioisotope.

Sumber radioaktif dan pengesan digunakan untuk mengesan aras air di dalam tangki. Sumber radioaktif itu mengandungi suatu radioisotop.

(a)   What is the meaning of radioisotope?

Apakah maksud radioisotop?

[1 mark / *markah*]

(b)   Explain how the outlet valve opens when the water level is too high.

Terangkan bagaimana injap keluar dibuka apabila aras air adalah terlalu tinggi.

[4 marks / *markah*]

(c)   Diagram 12.2 shows the properties of five radioisotopes.

Rajah 12.2 menunjukkan ciri-ciri lima jenis radioisotop.

P	Q
Iodine-133, $^{133}_{53}I$	Radon-222, $^{222}_{86}Rn$
Initial activity : 40 counts per minute *Aktiviti awal* : 40 *pembilangan per minit*	Initial activity : 560 counts per minute *Aktiviti awal* : 560 *pembilangan per minit*
Radioactive emission : β *Sinaran radioaktif :* β	Radioactive emission : α *Sinaran radioaktif :* α
Half-life : 20.8 hours *Setengah hayat* : 20.8 *jam*	Half-life : 3.8 days *Setengah hayat* : 3.8 *hari*
Changes from solid to liquid at 114 °C *Berubah dari pepejal ke cecair pada* 114 °C	Changes from liquid to gas at –62 °C *Berubah dari cecair ke gas pada* –62 °C

R	S
Iron-60, $^{60}_{26}Fe$	Cobalt-60, $^{60}_{27}Co$
Initial activity : 542 counts per minute *Aktiviti awal* : 542 *pembilangan per minit*	Initial activity : 300 counts per minute *Aktiviti awal* : 300 *pembilangan per minit*
Radioactive emission : β *Sinaran radioaktif :* β	Radioactive emission : γ *Sinaran radioaktif :* γ
Half-life : 1.5×10^6 years *Setengah hayat* : 1.5×10^6 *tahun*	Half-life : 5.3 years *Setengah hayat* : 5.3 *tahun*
Changes from solid to liquid at 1538 °C *Berubah dari pepejal ke cecair pada* 1538 °C	Changes from solid to liquid at 1495 °C *Berubah dari pepejal ke cecair pada* 1495 °C

T

☢ Bromine-83, $^{83}_{35}Br$

Initial activity : 384 counts per minute
Aktiviti awal : 384 *pembilangan per minit*

Radioactive emission : β
Sinaran radioaktif : β

Half-life : 2.4 hours
Setengah hayat : 2.4 *jam*

Changes from liquid to gas at 59 °C
Berubah dari cecair ke gas pada 59 °C

Diagram 12.2 / *Rajah* 12.2

You are required to determine the most suitable radioisotope that can be used as the radioactive source in the water detection system.

Anda dikehendaki menentukan radioisotop yang paling sesuai untuk digunakan sebagai sumber radioaktif dalam sistem pengesan air itu.

Study the properties of all the five radioisotopes based on the following aspects:

Kaji ciri-ciri kelima-lima radioisotop itu berdasarkan aspek-aspek berikut:

(i)   Initial activity.

    Aktiviti awal.   [2 marks / *markah*]

(ii)   Type of radioactive emission.

    Jenis sinaran radioaktif.   [2 marks / *markah*]

(iii) Half life of the radioisotope.

    Setengah hayat radioisotop itu.   [2 marks / *markah*]

(iv)   The physical state of the radioisotope.

    Keadaan fizikal radioisotop itu.   [2 marks / *markah*]

Explain the suitability of each property and then determine the most suitable radioisotope.
Give the reasons for your choice.

Terangkan kesesuaian setiap ciri dan seterusnya tentukan radioisotop yang paling sesuai.
Beri sebab untuk pilihan anda.   [2 marks / *markah*]

(d) (i) State the number of neutrons in an atom of radioisotope T.

Nyatakan bilangan neutron di dalam satu atom radioisotop T.

[1 mark / *markah*]

(ii) The proton numbers of selenium and krypton are 34 and 36 respectively. Which element is produced by the decay of radioisotope T?

Nombor proton bagi selenium dan krypton ialah 34 *dan* 36 *masing-masing. Unsur manakah dihasilkan oleh reputan radioisotop* T?

[1 mark / *markah*]

(iii) Write the decay equation for radioisotope T.

Tuliskan persamaan reputan bagi radioisotop T.

[1 mark / *markah*]

(iv) What is the activity of radioisotope T after 9.6 hours?

Berapakah aktiviti bagi radioisotop T *selepas* 9.6 *jam*?

[2 marks / *markah*]

END OF QUESTION PAPER

KERTAS SOALAN TAMAT

j*k

MAJLIS PENGETUA
SEKOLAH MENENGAH
NEGERI KEDAH DARUL AMAN

PEPERIKSAAN PERCUBAAN SPM 2011

PHYSICS

PERATURAN PEMARKAHAN

Kertas 2

Peraturan pemarkahan ini mengandungi **9** halaman bercetak

2

SECTION A

NO.		MARKING CRITERIA	MARK	
			SUB	TOTAL
1(a)		**State the physical quantity correctly** - temperature	1	
(b)		**State the reason correctly** - heat is transferred	1	
(c)		**State the situation correctly** - No	1	
(d)		**Name the situation correctly** - thermal equilibrium	1	**4**
2(a)	(i)	**Underline the word correctly** - primary	1	
	(ii)	**State the type of transformer correctly** - step-down (transformer)	1	
(b)	(i)	**State the ratio correctly** - $\dfrac{240}{12}$ // 20 : 1 // 20	1	
	(ii)	**Correct expression** - $I \times 240 = 15$	1	
		Correct answer and correct unit - 0.0625 A // 0.063 A	1	**5**
3(a)		**State the mass correctly** - 0.8 kg	1	
(b)	(i)	**State the apparent loss in weight correctly** - 2.0 N	1	
	(ii)	**State the reason correctly** - buoyant force // upthrust (acts on the metal block)	1	
(c)		**Underline the correct words** - equal to	1	
(d)		**Correct expression** - $V \times 1000 \times 10 = 2$	1	
		Correct answer and correct unit - 0.0002 m^3	1	**6**

NO.		MARKING CRITERIA	MARK	
			SUB	TOTAL
4(a)		**Name the transistor correctly** - npn (transistor)	1	
(b)	(i)	**State the change correctly** - increases	1	
	(ii)	**State the explanation correctly** - p.d. across P decreases // p.d. across S increases - collector current is switched on	2	
(c)		**Correct expression** - $\left(\dfrac{10}{10+P}\right) \times 6 = 2$ **Correct answer and correct unit** - 20 kΩ	2	
(d)		**State the explanation correctly** - A large current flows through the air conditioner // The p.d. across the air conditioner is high	1	**7**
5(a)		**State the meaning correctly** - region around a magnet or current-carrying conductor where magnetic forces can be detected	1	
(b)	(i)	**Draw the magnetic field correctly** - correct pattern with at least 5 lines of force - correct direction labelled	2	
	(ii)	**State the polarity correctly** - X : North // N - Y : South // S	1	
(c)	(i)	**Compare the number of turns correctly** - Coil in Diagram 5.4 has more turns	1	
	(ii)	**Compare the induced currents correctly** - Current in Diagram 5.4 is bigger than in Diagram 5.3	1	
	(iii)	**State the relationship correctly** - The bigger the number of turns, the bigger the induced current	1	
(d)		**State the factor correctly** - Speed of the magnet // Strength of the magnet	1	**8**

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
6(a) (i)	**Correct expression** - $1.51 = \dfrac{1}{\sin c}$ **Correct answer** - 41.47^{o} // 41.5^{o} // 41°	2	
(ii)	**State the value correctly** - 45°	1	
(iii)	**State the comparison correctly** - $c < i$	1	
(iv)	**Draw the ray correctly** - Draw the reflected ray	1	
(b) (i)	**Name the phenomenon correctly** - total internal reflection	1	
(ii)	**State the two conditions correctly** - light travels from a denser medium towards a less dense medium - angle of incidence > critical angle	1	
(c)	**Draw the ray correctly** - at least two total internal reflections	1	**8**
7(a)	**State the meaning correctly** - the capacity to do work	1	
(b)	**Correct expression** - $\dfrac{1}{2} \times 0.049 \times 20^{2}$	1	
	Correct answer - 9.8 J	1	
(c)	**State the transformation correctly** - Kinetic energy → potential energy → kinetic energy	2	
(d)	**State a suitable suggestion and reason** - bigger force - ball has more kinetic energy / momentum	2	
	State a suitable suggestion and reason - use a heavier golf club // raise the golf club higher / at a bigger angle - more energy is transferred to the golf ball	2	
(e)	**State the correct factor** - angle of projection // any suitable factor not mentioned above	1	**10**

NO.		MARKING CRITERIA	MARK	
			SUB	**TOTAL**
8(a)	(i)	**State the phenomenon correctly**	1	
		- reflection		
	(ii)	**State the phenomenon correctly**	1	
		- refraction		
(b)	(i)	**Correct expression**	1	
		- 1.2 – 0.4		
		Correct answer	1	
		- 0.8 s		
	(ii)	**Correct match between thickness and time taken**	1	
		- $2T$ with 0.8 s // T with 0.4 s		
		Correct expression	1	
		- $2T = 1500 \times 0.8$ // $T = 1500 \times 0.4$		
		Correct answer	1	
		- 600 m		
(c)	(i)	**State the correct suitability and reason**	2	
		- high		
		- can penetrate the earth and oil // less loss of energy		
	(ii)	**State the correct suitability and reason**	2	
		- high		
		- stronger signal will be received		
(d)		**State the correct type of wave**	1	**12**
		- P		

SECTION B

NO		MARKING CRITERIA	MARK	
			SUB	TOTAL
9(a)		**State the meaning correctly** - Degree of hotness	1	1
(b)	(i)	**Name the physical quantity correctly** - Latent heat of fusion	1	1
	(ii)	**Explain the concept correctly in beaker A** - Heat is used to break the bonds between ice molecules // weaken the forces of attraction between molecules - Kinetic energy of the ice molecules remains unchanged	2	
		Explain the concept correctly in beaker B - Heat is used to increase the kinetic energy of the water molecules - Temperature depends on kinetic energy	2	4
(c)		**State the specific heat capacity with the heat correctly** - Substance with higher specific heat capacity requires more heat to change the temperature of 1 ^{o}C	1	
		State the specific heat capacity with the temperature change correctly - The higher the specific heat capacity, the smaller the temperature change	1	
		Compare the specific heat capacity of iron and wood correctly - Specific heat capacity of wood is higher/vice versa	1	
		Give the explanation correctly - If the amount of heat absorb is the same, the change in temperature for wood is smaller / vice versa	1	4
(d)		**State aspect of specific heat capacity of the wok correctly** - low	1	
		State reason for aspect of specific heat capacity of the wok correctly - can heat up faster/temperature increase faster	1	
		State aspect of thermal conductivity of the wok correctly - high	1	
		State reason for aspect of thermal conductivity of the wok correctly - can conduct heat faster	1	
		State aspect of melting of the wok correctly - high	1	
		State reason for material for the wok correctly - can withstand high temperature	1	
		State aspect of specific heat capacity of the oil correctly - low	1	
		State reason for aspect of specific heat capacity of the oil correctly - heat up faster	1	
		State aspect of boiling point of oil correctly - high	1	
		State reason for boiling point of oil correctly - it will not change to vapour easily	1	10
				20

NO		MARKING CRITERIA	MARK	
			SUB	**TOTAL**
10(a)	(i)	**State the reason correctly** - To show the pattern of the electric field	1	1
	(ii)	**Suggest the aspect of the shape of the electrode correctly** - Rectangular	1	
		Give the reason correctly - To produce parallel electric field	1	
		Suggest the size of the electrode correctly - Bigger	1	
		Give the reason correctly - To produce a stronger electric field	1	
		Suggest the distance between the electrodes correctly - Closer	1	
		Give the reason correctly - Electric field will be stronger	1	
		Suggest the magnitude of the power supply correctly - Higher	1	
		Give the reason correctly - To produce a stronger electric field / magnitude of the electric field depends on the voltage / potential difference across the plate	1	
		Suggest the size of the grain correctly - smaller / smaller mass	1	
		Give the reason correctly - Can move faster	1	10
(b)		**Compare the brightness of the bulbs correctly** - The bulb in Circuit A is dimmer / vice versa	1	
		Compare the thickness of the connecting wire correctly - The connecting wire in Circuit A is thinner / vice versa	1	
		Relate the brightness of the bulb and the current correctly - The higher the current, the brighter the bulb / vice versa	1	
		Relate the current and the resistance of the wire correctly - The higher the current, the lower the resistance / vice versa	1	
		State the relationship between the thickness of the connecting wire and resistance correctly - The thicker the wire, the smaller the resistance / vice versa	1	5
(c)	(i)	**State the reason correctly** - No, because the graph is not a straight line	1	
	(ii)	**State the answer to the resistance correctly** - The resistance of the filament increases	1	
		Relate the temperature and the current correctly - The higher the current, the higher the temperature of the filament bulb	1	
		Relate the resistance of the filament and the gradient of the graph correctly - As the current increases, the gradient of the graph / the ratio of the voltage and current increases	1	
		State the relationship between resistance and gradient of the graph correctly - Resistance is the gradient of the graph [Any 4 marks]	1	4
				20

SECTION C

NO		MARKING CRITERIA	MARK	
			SUB	TOTAL
11(a)		**State the meaning correctly**	1	1
		- Force exerted per unit area		
(b)	(i)	**Explain why air pressure increases when more air is pumped in correctly**	2	
		- The number of molecules per unit volume increases		
		- The number of collisions per unit time increases / rate of collisions increases		
	(ii)	**Explain why air pressure increases when the car has completed a long journey correctly**	2	
		- The temperature of the air molecules increases, the kinetic energy of the air molecules increases		
		- The force exerted on the tyre increases		4
(c)	(i)	**Give the correct value of difference in pressure with unit correctly** 55 000 Pa	1	1
	(ii)	**Correct substitution for force** $F = 55000 \times 0.0025$	1	
		State the answer with unit correctly 137.5 N	1	2
	(iii)	**Correct substitution for mass** $m = \dfrac{137.5}{10}$	1	2
		State the answer with unit correctly 13.75 kg	1	
(d)		**State the choice and reason of pressure in cup after hinged lever is pressed down correctly** 1 low 2 to produce higher difference in pressure	1+1	
		State the choice and reason of diameter of cup correctly 3 big 4 to produce higher force acting on the cup	1+1	
		State the choice and reason of seal lining correctly 5 rubber 6 can be compressed / air tight / good contact	1 + 1	
		State the choice and reason of number of cups correctly 7 triple 8 to create higher force // to lift a bigger piece of glass	1 + 1	
		State most suitable glass lifter and justification correctly 9 Y 10 Low pressure in cup after hinged lever is pressed down, big diameter of cup, rubber seal lining and triple cups	1+1	10
				20

9

NO.	MARKING CRITERIA	MARK	
		SUB	TOTAL
12(a)	**State the meaning correctly** - Unstable isotope	1	1
(b)	**State the explanation correctly** - When the water level is high, radioactive rays pass through the water - Water absorbs part of the radiation - Detector shows reading decreases - Detector activates the outlet valve controller to open the outlet valve	4	4
(c)	**State the suitable initial activity and reason correctly** 1　High 2　Much higher than the background radiation	1+1	10
	State the suitable radioactive emission and reason correctly 3　Beta 4　High penetrating power and less dangerous to the user	1+1	
	State the suitable half-life and reason correctly 5　Long 6　Can last longer / no need to change often	1+1	
	State the suitable physical state and reason correctly 7　High 8　Always in solid state which is easier to handle	1+1	
	State most suitable choice of radioisotope and justification correctly 9　R // Iron-60 10　High initial activity, emission of beta particle with long half-life, and changes from solid to liquid at 1538 °C.	1+1	
(d)　(i)	**State the number of neutrons correctly** - 83-35 // 48	1	5
(ii)	**State the element produced correctly** - krypton	1	
(iii)	**State the decay equation correctly** - $^{83}_{35}Br \rightarrow\ ^{83}_{36}Kr +\ ^{0}_{-1}e$	1	
(iii)	**State the number of half-life correctly** - $\dfrac{9.6}{2.4}$ // 4 // 4 decays by showing 4 arrows in the substitution	2	
	Correct answer with unit - 24 counts per minute		
			20

NO. KAD PENGENALAN

ANGKA GILIRAN

NAMA: …….………......……...........……..………. TINGKATAN: ……......………

MAJLIS PENGETUA
SEKOLAH MENENGAH KEDAH

PEPERIKSAAN PERCUBAAN SPM 2011   **4531/3**
PHYSICS
Kertas 3

$1\frac{1}{2}$ jam   Satu jam tiga puluh 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 dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*

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

Untuk Kegunaan Pemeriksa			
Bahagian	Soalan	Markah penuh	Markah diperoleh
A	1	16	
	2	12	
B	3	12	
	4	12	
Jumlah			

Kertas soalan ini mengandungi **14** halaman bercetak

Section A
Bahagian **A**
[28 marks]
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 diameter, *d*, of a metal cylinder and its mass, *m*.
Diagram 1.1 shows the five cylinders that were prepared.

Seorang pelajar menjalankan satu eksperimen untuk menyiasat hubungan antara diameter, d, suatu silinder logam dengan jisimnya, m.
Rajah 1.1 *menunjukkan lima silinder yang disediakan.*

$m = 5$ g $m = 10$ g $m = 15$ g $m = 20$ g $m = 25$ g
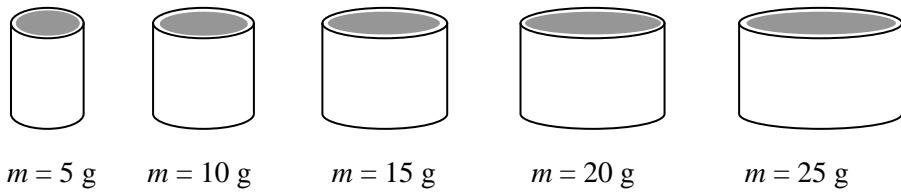
Diagram 1.1 / *Rajah* 1.1

A micrometer screw gauge is used to measure the diameter of the cylinder.
Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 show the reading, *d*, of the micrometer screw gauge when the diameter of each cylinder is measured.

Sebuah tolok skru mikrometer digunakan untuk mengukur diameter silinder itu.
Rajah 1.2, 1.3, 1.4, 1.5 *dan* 1.6 *menunjukkan bacaan, d, bagi tolok skru mikrometer apabila diameter setiap silinder diukur.*
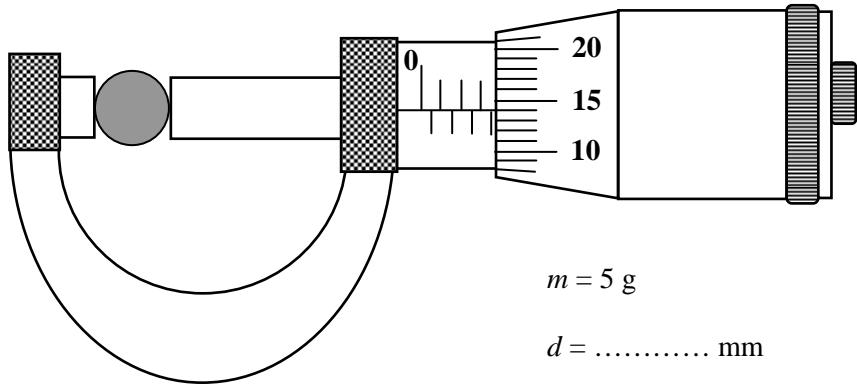
$m = 5$ g

$d = $ ………… mm

Diagram 1.2 / *Rajah* 1.2

m = 10 g

d = ………… mm

Diagram 1.3 / *Rajah* 1.3

m = 15 g

d = ………… mm

Diagram 1.4 / *Rajah* 1.4

m = 20 g

d = ………… mm

Diagram 1.5 / *Rajah* 1.5

$m = 25$ g

$d = \ldots\ldots\ldots$ mm
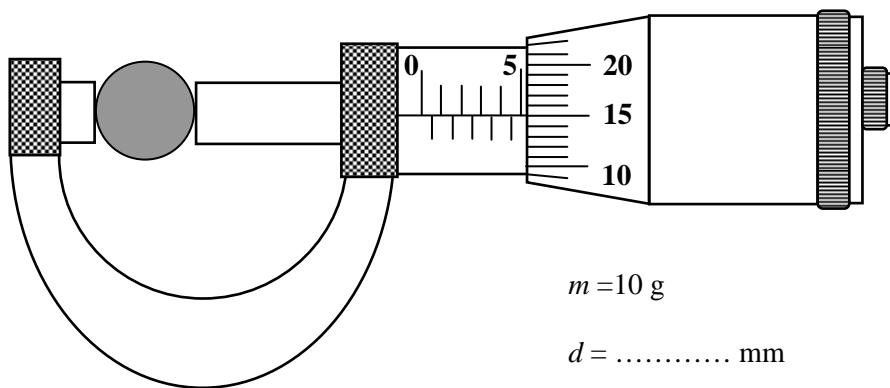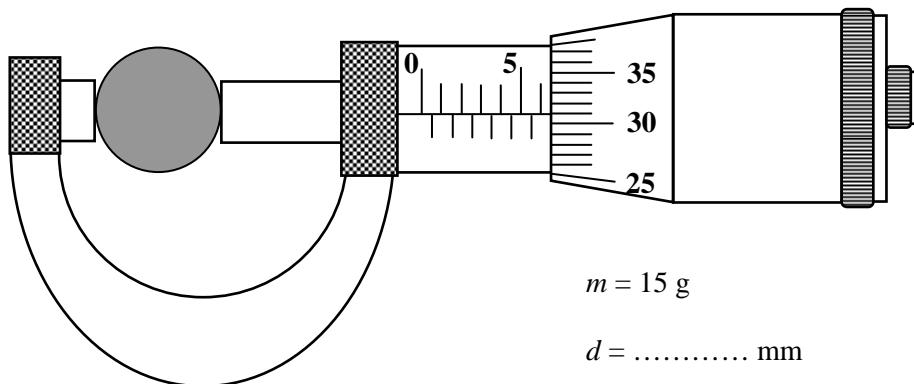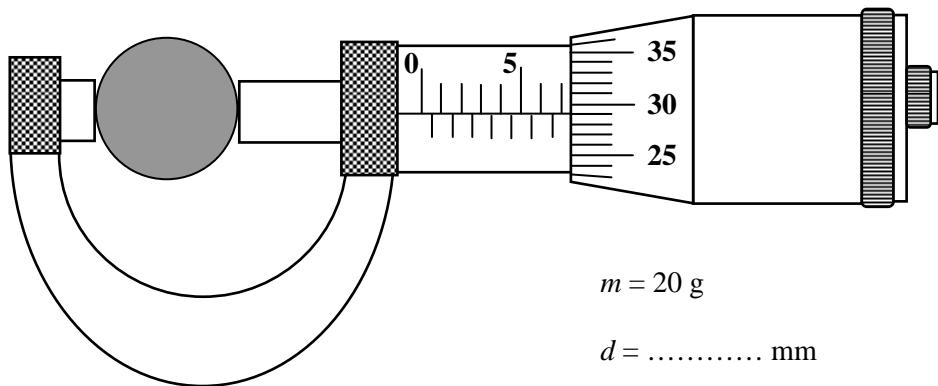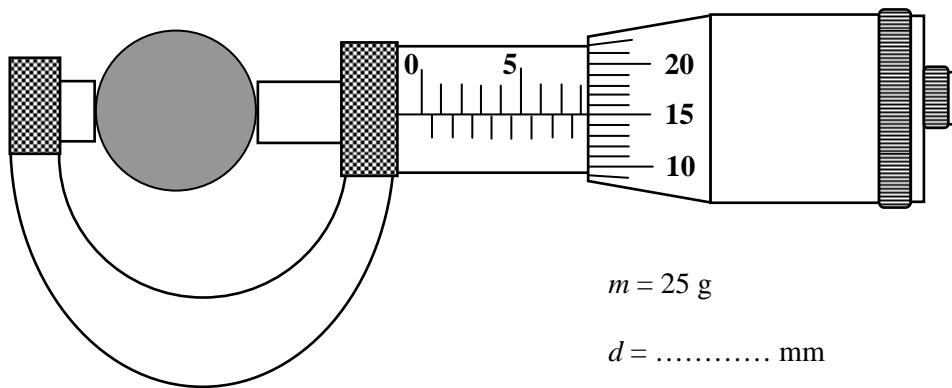
Diagram 1.6 / *Rajah* 1.6

(a) For the experiment described on page 2 identify:

Bagi eksperimen yang diterangkan pada halaman 2, *kenal pasti*:

    (i) The manipulated variable

    Pembolehubah dimanipulasikan

    ……………………………………………………… [1 mark / *markah*]

    (ii) The responding variable

    Pembolehubah bergerak balas

    ……………………………………………………… [1 mark / *markah*]

    (iii) The constant variable

    Pembolehubah dimalarkan

    ……………………………………………………… [1 mark / *markah*]

(b) (i) Based on Diagrams 1.2, 1.3, 1.4, 1.5 and 1.6 on pages 2, 3 and 4, determine and record the diameter of the cylinder, *d*.

    Berdasarkan Rajah 1.2, 1.3, 1.4, 1.5 *dan* 1.6 *pada halaman* 2, 3, *dan* 4, *tentukan dan rekod diameter silinder*, *d*.

    (ii) For each value of *d* in 1(b)(i)*,* calculate d^2.
Tabulate your data for all values of *m*, *d*, and d^2 in the space on page 5.

    Bagi setiap nilai d dalam 1(b)(i), *hitung* d^2.
Jadualkan data anda bagi semua nilai m, *d dan* d^2 *dalam ruang pada halaman* 5.

[7 marks / *markah*]

(c)   On the graph paper on page 6, draw a graph of d^2 against *m*.

Pada kertas graf pada halaman 6, *lukis graf d ^{2} melawan m.*

[5 marks / *markah*]

(d)   Based on the graph in 1(c), state the relationship between d^2 and *m*.

Berdasarkan graf di 1(c), *nyatakan hubungan antara d ^{2} dan m.*

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

Graph of d^2 against m

Graf d ^{2} melawan m
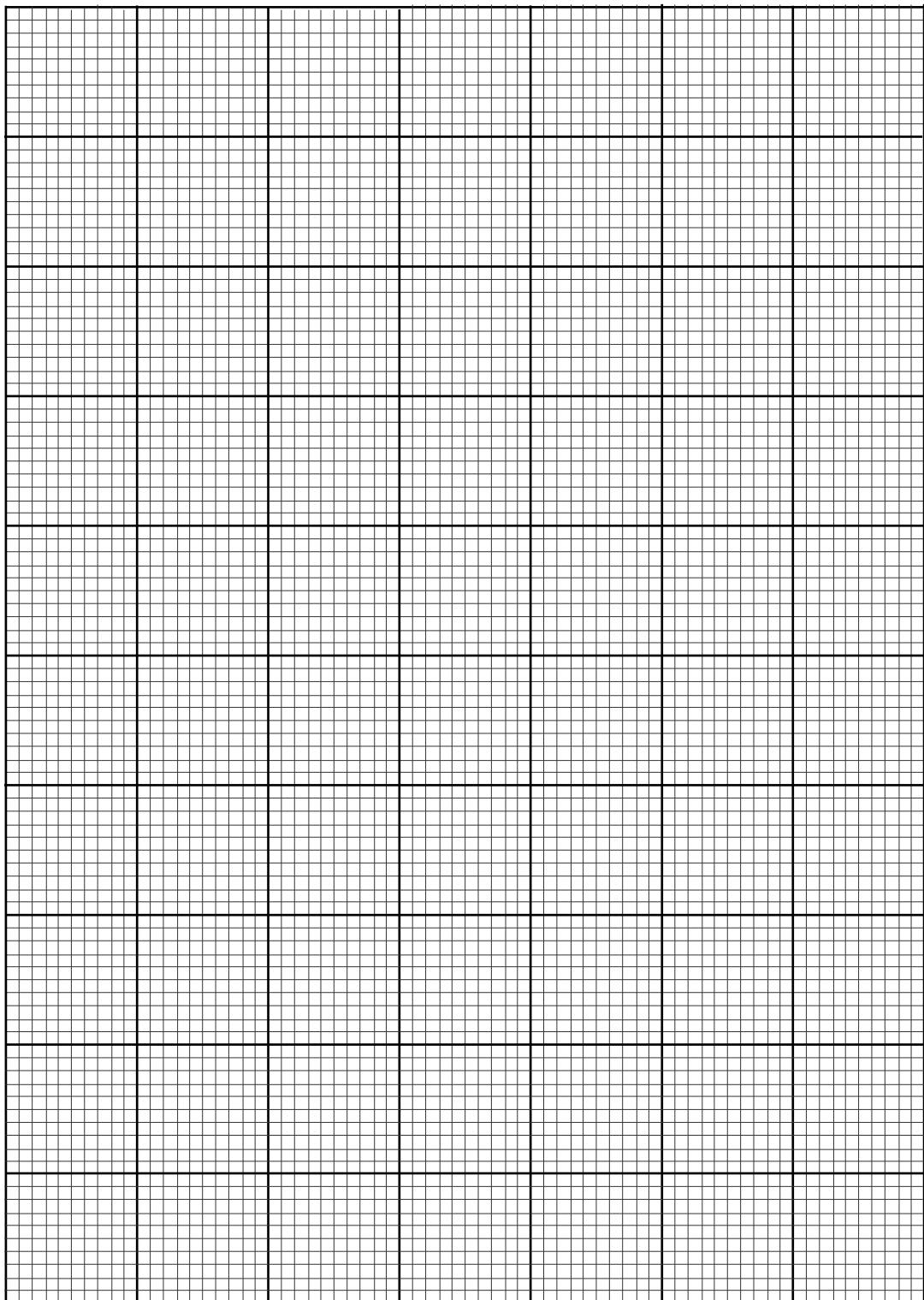
2 A student carries out an experiment to investigate the relationship between the object distance, u, and linear magnification, M, of the image formed by a convex lens.

The results of this experiment are shown in a graph of u against $\dfrac{1}{M}$ in Diagram 2 on page 9.

The results are used to determine the focal length of the convex lens.

Seorang pelajar menjalankan suatu eksperimen untuk menyiasat hubungan antara jarak objek, u, dan pembesaran linear, M, bagi imej yang dibentuk oleh sebuah kanta cembung.

Keputusan eksperimen ini ditunjukkan dalam suatu graf u melawan $\dfrac{1}{M}$ dalam Rajah 2 pada halaman 9.

Keputusan eksperimen ini digunakan untuk menentukan panjang fokus kanta cembung itu.

(a) Based on the graph in Diagram 2:

   Berdasarkan graf di Rajah 2:

   (i) State the relationship between u and M..

   Nyatakan hubungan antara u dan M.

   ……………………………………………………………………………..

   [1 mark / *markah*]

   (ii) Determine the value of u when $M = 2.5$.
   Show on the graph, how you determine the value of u.

   Tentukan nilai u apabila M = 2.5.
   Tunjukkan pada graf, bagaimana anda menentukan nilai u.

   u = …………….. [3 marks / *markah*]

(b) The relationship between u and $\dfrac{1}{M}$ is given by the formula

   $$u = f\left(\dfrac{1}{M}\right) + f,$$

   where f is the focal length of the lens.

   Hubungan antara u dan $\dfrac{1}{M}$ diberikan oleh formula

   $$u = f\left(\dfrac{1}{M}\right) + f,$$

   di mana f ialah panjang fokus kanta itu.

(i) Determine the value of *f* from the *u*-intercept.
Show on the graph how you determine the value of *f*.

Tentukan nilai f daripada pintasan-u.
Tunjukkan pada graf bagaimana anda menentukan nilai f.

f = ………………   [2 marks / *markah*]

(ii) Calculate the gradient of the graph.

Hitungkan kecerunan graf itu.

[3 marks / *markah*]

(iii) From your answers in 2(b)(i) and 2(b)(ii), calculate the average value of the focal length, *f*, of the lens.

Daripada jawapan anda kepada 2(b)(i) *dan* 2(b)(ii), *hitungkan nilai purata bagi panjang fokus*, *f*, *bagi kanta itu*.

[2 marks / *markah*]

(c) State **one** precaution that should be taken to improve the accuracy of the readings in this experiment.

Nyatakan **satu** *langkah berjaga-jaga yang perlu diambil untuk memperbaik ketepatan bacaan dalam eksperimen ini.*

………………………………………………………………………………...

………………………………………………………………………………...
[1 mark / *markah*]

Graph of u against $\dfrac{1}{M}$

Graf u melawan $\dfrac{1}{M}$
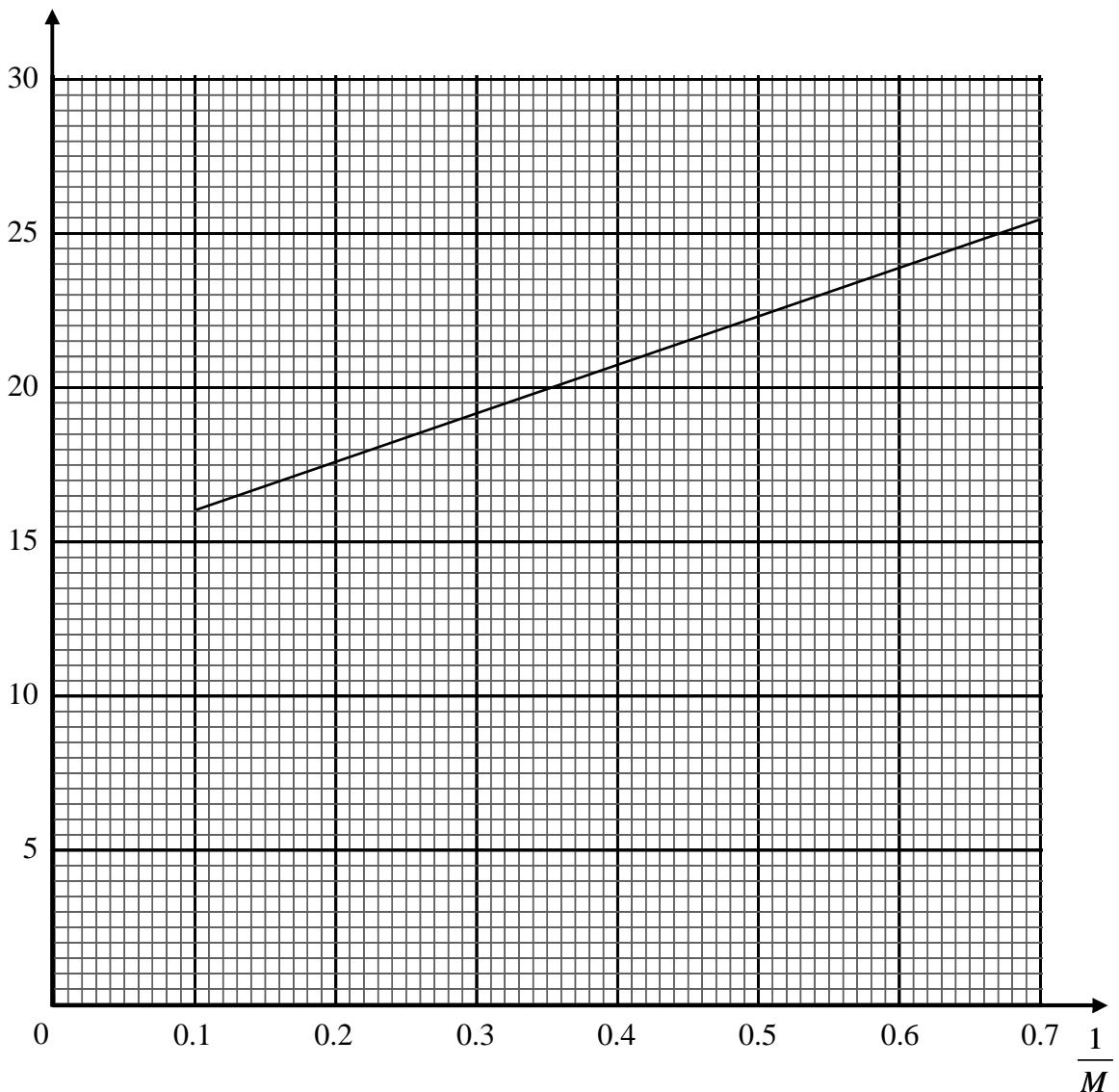
Section B

Bahagian B

[12 *marks*]

Answer any **one** question from this section.

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

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

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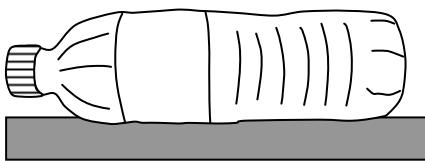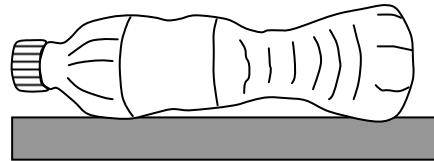

Diagram 3.1 / *Rajah 3.1*   Diagram 3.2 / *Rajah 3.2*

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

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

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

(a)   State one suitable inference.

Nyatakan satu inferens yang sesuai.   [1 mark / *markah*]

(b)   State one suitable hypothesis.

Nyatakan satu hipotesis yang sesuai.   [1 mark / *markah*]

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

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

Sulphuric acid
Asid sulfurik

Trapped air
Udara terperangkap

Glass tube
Tiub kaca
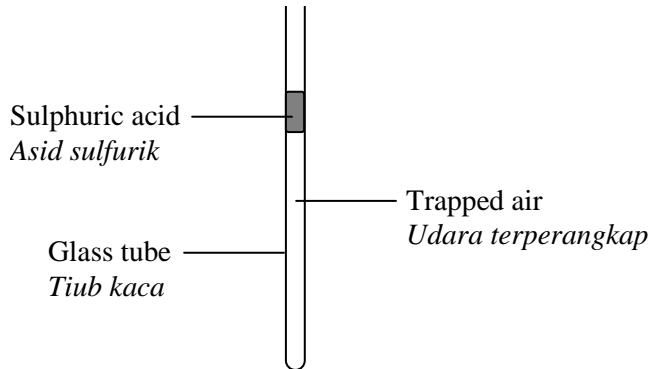
Diagram 3.3 / *Rajah 3.3*

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 dimanipulasikan dan satu kaedah mengukur pembolehubah bergerak balas.

(vi)   The way to tabulate the data.

        Cara untuk menjadualkan data.

(vii)   The way to analyse the data.

        Cara untuk menganalisis data.   [10 marks / *markah*]

4 Diagram 4.1 shows shed A lighted up by a lamp connected to a battery using a short connecting wire.

Rajah 4.1 *menunjukkan pondok* A *disinari oleh lampu yang disambung ke bateri oleh wayar penyambung yang pendek.*

Diagram 4.2 shows shed B lighted up by a lamp connected to a battery using a long connecting wire.

*Rajah* 4.2 *menunjukkan pondok* B *disinari oleh lampu yang disambung ke bateri oleh wayar penyambung yang panjang.*
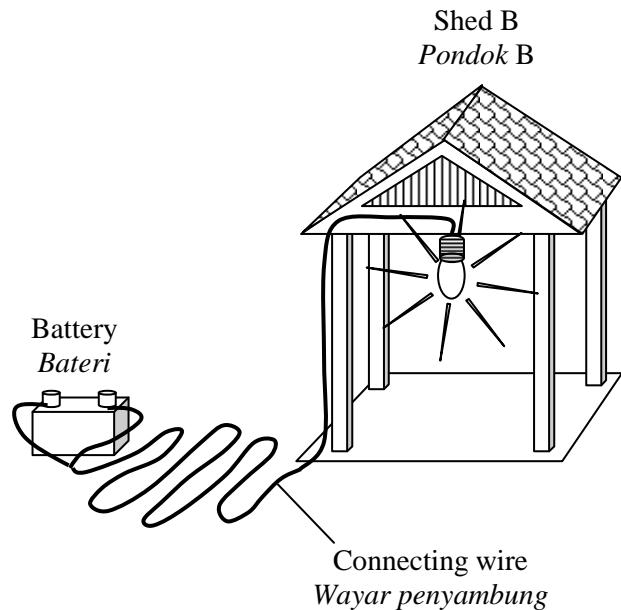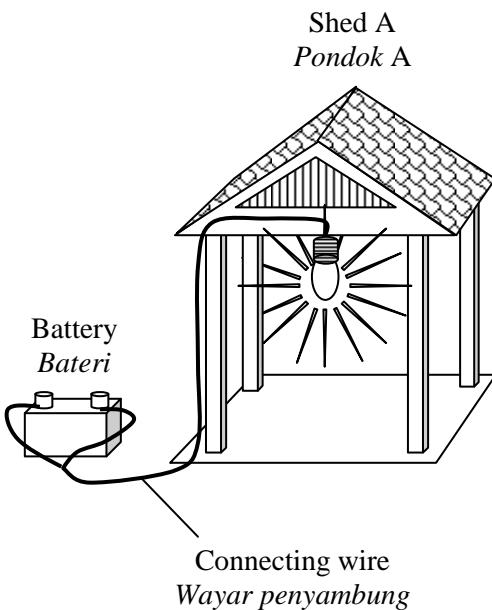

Diagram 4.1 / *Rajah* 4.1   Diagram 4.2 / *Rajah* 4.2

Based on the information and observation:

Berdasarkan maklumat dan pemerhatian itu:

(a) State one suitable inference.

    Nyatakan satu inferens yang sesuai.   [1 mark / *markah*]

(b) State one suitable hypothesis.

    Nyatakan satu hipotesis yang sesuai.   [1 mark / *markah*]

(c) With the use of apparatus such as an ammeter, constantan wire and other apparatus, describe one experiment to investigate the hypothesis stated in 4(b).

    Dengan menggunakan radas seperti ammeter, dawai konstantan 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 dimanipulasikan dan satu kaedah mengukur pembolehubah
       bergerak balas.*

(vi)   The way to tabulate the data.

       Cara untuk menjadualkan data.

(vii) The way to analyse the data.

       Cara untuk menganalisis data.   [10 marks / *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

**MAJLIS PENGETUA
SEKOLAH MENENGAH
NEGERI KEDAH DARUL AMAN**

PEPERIKSAAN PERCUBAAN SPM 2011

# PHYSICS

PERATURAN PEMARKAHAN

Kertas 3

Peraturan pemarkahan ini mengandungi **5** halaman bercetak

SECTION A

NO		MARKING CRITERIA	MARK SUB	MARK TOTAL
1(a)	(i)	**Able to state the manipulated variable** - mass / m	1	1
	(ii)	**Able to state the responding variable** - diameter / d	1	1
	(iii)	**Able to state a constant variable** - height // density // material of cylinder	1	1
(b)	(i)	**Able to read the value of d** All 5 readings of d correct: 3.64, 5.15, 6.31, 7.29, 8.15 3 or 4 correct Consistency to 2 decimal places	2 1 1	3
	(ii)	**Able to calculate the value of d^2** 4 or 5 correct: 13.25, 26.52, 39.82, 53.14, 66.42 Consistency in 1, 2, or 3 decimal places	1 1	2
(c)		**Able to tabulate m, d, and d^2** **Tick ($\checkmark$) based on the following aspects:** **A** • Quantities m, d and d^2 shown in heading **B** • Units g, mm and mm^2 shown in heading	$\checkmark$ $\checkmark$	2

m / g	d / mm	d^2 / mm^2
5	3.64	13.25
10	5.15	26.52
15	6.31	39.82
20	7.29	53.14
25	8.15	66.42

NO	MARKING CRITERIA	SUB	TOTAL
(d)	**Able to draw a complete graph of d^2 against m** Tick $\checkmark$ based on the following aspects: **A** • Show d^2 on Y-axis and m on the X-axis **B** • State the units of the variables correctly **C** • Both axes are marked with uniform scale **D** • All five points are plotted correctly [**Note : 3 to 4 points plotted correctly** : $\checkmark$] **E** • Best straight line is drawn **F** • Show the minimum size of graph at least 5 x 4 (2 cm x 2 cm) square (counted from the origin until furthest point)	$\checkmark$ $\checkmark$ $\checkmark$ $\checkmark\checkmark$ $\checkmark$ $\checkmark$	5

Score :

Number of $\checkmark$	Score
7 $\checkmark$	5
5-6 $\checkmark$	4
3-4 $\checkmark$	3
2 $\checkmark$	2
1 $\checkmark$	1

NO	MARKING CRITERIA	SUB	TOTAL
(e)	**Able to state the correct relationship between d^2 and m** d^2 is directly proportional to m	1	1
			16

3

NO			MARKING CRITERIA	MARK	
				SUB	TOTAL
2(a)	(i)		**Able to state the relationship between u and M** u increases linearly with $\dfrac{1}{M}$	1	1
	(ii)		**Able to show the method to read value of u** - Calculate $\dfrac{1}{2.5} = 0.4$	1	
			- Show the intrapolation line from $\dfrac{1}{M} = 0.4$ to the u-axis	1	
			- State the value of u = 20.75 cm (within range 20.5 – 21.0 cm)	1	3
(b)	(i)		**Able to show the method to read value of f** - Draw the extrapolation line to the u-axis - State the value of f = 14.5 cm	1 1	2
	(ii)		**Able to calculate the gradient of the graph** - Draw a sufficiently large triangle / 3 x 3 - Correct substitution (Follow candidate's triangle)	1	
			$\underline{\text{Sample answer}}$: $\dfrac{25.5 - 14.5}{0.7 - 0}$ // corresponding values	1	
			Answer without unit 15.7 (within range 15.5 – 15.9)	1	3
	(iii)		**Able to calculate the average value of f and state the value correctly** - Correct expression $\dfrac{14.5 + 15.7}{2}$	1	
			- Accept error carried forward (e.c.f.) (b)(i) and (b)(ii) - Answer with correct unit 15.1 cm (within range 15.0 – 15.2)	1	2
(c)			**Able to state one correct precaution** $\underline{\text{Sample answer}}$ - Carry out the experiment in a darkened room so that the image can be seen clearly - Position of the eyes must be directly above the scale of the metre rule to avoid parallax error - Repeat the experiment and take the average reading	1	1
					12

SECTION B

NO		MARKING CRITERIA	MARK	
			SUB	TOTAL
3 (a)		**Able to state a suitable inference** $\underline{\text{Sample answer}}$ The temperature of a gas affects its volume // The volume of a gas depends on its temperature	1	1
(b)		**Able to state a suitable hypothesis** $\underline{\text{Sample answer}}$ The higher the temperature of a gas, the bigger the volume of the gas	1	1

(c)		**Able to describe a complete experimental framework** Sample answer		
	(i)	State the aim of experiment To investigate the relationship between the temperature of a gas and its volume	1	
	(ii)	State the manipulated variable and the responding variable Manipulated variable : temperature Responding variable : volume // length of air column Constant variable : mass // pressure	1 1 1	
	(iii)	State the complete list of apparatus and materials Glass tube, ruler, beaker, thermometer, tripod stand, wire gauze, bunsen burner, water, ice, sulphuric acid	1	
	(iv)	Draw a functionable arrangement of the apparatus 	1	
	(v)	State the method to control the manipulated variable The water is heated slowly until it reaches a temperature of 20 ^{o}C State the method to measure the responding variable The length of the air column is taken and recorded. Repeat the experiment at least four times The above steps are repeated for temperatures of 30 ^{o}C, 40 ^{o}C, 50 ^{o}C, 60 ^{o}C	1 1 1	
	(vi)	State how the data is tabulated		
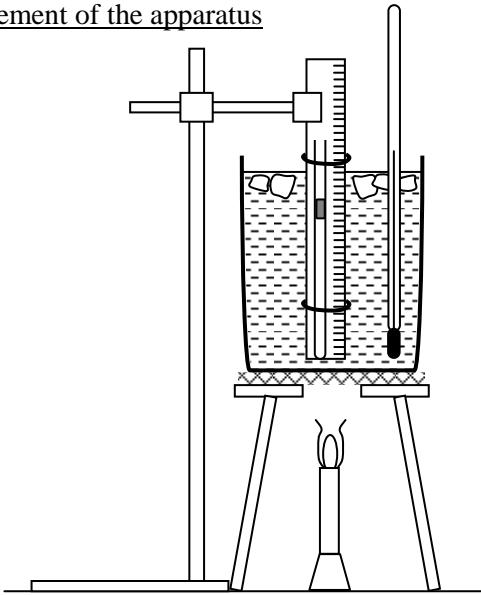
Temperature / ^{o}C	Length / cm
20	
30	
40	
50	
60	

			1	
	(vii)	State how the data is analysed Plot a graph of length of air column against temperature of the air.	1	11 Max. 10
				12

NO	MARKING CRITERIA	MARK	
		SUB	TOTAL
4 (a)	**Able to state a suitable inference** Sample answer The length of a wire affects the current in the wire // The length of a wire affects the resistance of the wire // The length of the wire affects the brightness of the bulb	1	1
(b)	**Able to state a suitable hypothesis** Sample answer The longer the length of a wire, the smaller the current in the wire	1	1
(c) (i)	**Able to describe a complete experimental framework** Sample answer State the aim of experiment To investigate the relationship between the length of a wire and the current in the wire	1	
(ii)	State the manipulated variable and the responding variable Manipulated variable : length Responding variable : current Constant variable : diameter of wire	1 1 1	
(iii)	State the complete list of apparatus and materials Constantan wire, metre rule, ammeter, battery, connecting wires	1	
(iv)	Draw a functionable arrangement of the apparatus A Sliding contact // Crocodile clip L Constantan wire	1	
(v)	State the method of controlling the manipulated variable The circuit was set up with length, L = 20.0 cm of constantan wire State the method of measuring the responding variable The current, I, was measured with an ammeter. Repeat the experiment at least four times The procedure was repeated with values of, L = 30.0 cm, 40.0 cm, 50.0 cm and 60.0 cm	1 1 1	
(vii)	Tabulate the data | Length, L / cm	Current, I / A | | --- | --- | | 20.0 | | | 30.0 | | | 40.0 | | | 50.0 | | | 60.0 | |	1	
(vii)	State how data is analysed A graph of I against L is drawn	1	11 Max.10
	*Accept description of experiment for other relevant pairs of variables : resistance-length, brightness-length		**12**
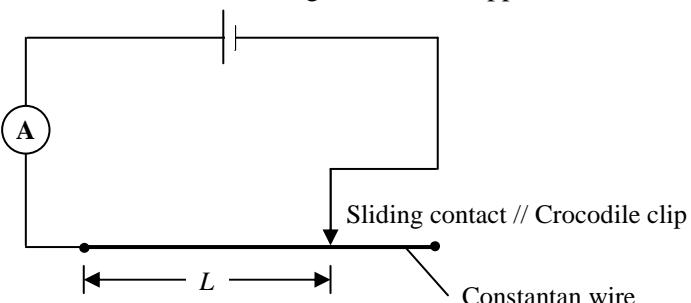
Note : Length → Resistance → Current → Brightness