NAMA : ……...……

TINGKATAN : ……...

PEPERIKSAAN PERCUBAAN SPM TAHUN 2021
TINGKATAN 5

FIZIK
PHYSICS

KERTAS 2
PAPER 2

Dua jam tiga puluh minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Tuliskan nama, dan angka giliran pada ruang yang disediakan.*
2. *Kertas soalan ini dalam dwibahasa.*
3. *Soalan dalam Bahasa Melayu mendahului soalan yang sepadan dalam Bahasa Inggeris.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam Bahasa Melayu. dan Bahasa Inggeris.*

Kod Pemeriksa:			
Bahagian	Soalan	Markah Penuh	Markah Diperolehi
A	1	4	
	2	5	
	3	6	
	4	9	
	5	9	
	6	9	
	7	9	
	8	9	
B	9	20	
	10	20	
C	11	20	
Jumlah		**100**	

*Kertas soalan ini mengandungi **30** halaman bercetak.*

The following information may be useful. The symbols have their usual meaning.

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

1. $a = \frac{v-u}{t}$
2. $v^2 = u^2 + 2as$
3. $s = ut + \frac{1}{2}at^2$
4. Momentum, p = mv
5. $F = ma$
6. Daya Impuls, $F = \frac{mv - mu}{t}$ / *Impulsive force*, $F = \frac{mv - mu}{t}$
7. Berat, W = mg / *Weight*, W = mg
8. Daya graviti, $F = \frac{Gm_1 m_2}{r^2}$ / Gravitational force, $F = \frac{Gm_1 m_2}{r^2}$
9. Daya memusat, $F = \frac{mv^2}{r}$ / *Centripetal force*, $F = \frac{mv^2}{r}$
10. Jisim bumi, $m = \frac{4\pi^2 r^3}{GT^2}$ / *Mass of Earth*, $m = \frac{4\pi^2 r^3}{GT^2}$
11. Laju linear satelit, $v = \sqrt{\frac{GM}{r}}$ / *Linear speed of satellite*, $v = \sqrt{\frac{GM}{r}}$
12. Halaju lepas, $v = \sqrt{\frac{2GM}{r}}$ / *Escape velocity*, $v = \sqrt{\frac{2GM}{r}}$
13. $\frac{T_1^2}{T_2^2} = \frac{r_1^3}{r_2^3}$
14. Haba, $Q = mc\Delta\theta$ / *Heat*, $Q = mc\Delta\theta$
15. Haba, $Q = m\ell$ / *Heat*, $Q = m\ell$
16. $P_1V_1 = P_2V_2$
17. $\frac{P_1}{T_1} = \frac{P_2}{T_2}$
18. $\frac{V_1}{T_1} = \frac{V_2}{T_2}$
19. $v = f\lambda$
20. $\lambda = \frac{ax}{D}$
21. $n_1 \, Sin\,\theta_1 = n_2 \, Sin\,\theta_2$
22. $n = \frac{\text{dalam nyata, } H}{\text{dalam ketara, } h}$ / $n = \frac{real\ depth, H}{apparent\ depth, h}$
23. $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$
24. Pembesaran linear, $m = \frac{h_i}{h_o} = \frac{v}{u}$ / *Linear magnification*, $m = \frac{h_i}{h_o} = \frac{v}{u}$

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

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

27. Tenaga keupayaan kenyal, $E_P = \frac{1}{2}Fx = \frac{1}{2}kx^2$ / *Elastic potential energy*, $E_P = \frac{1}{2}Fx = \frac{1}{2}kx^2$

28. Kuasa, $P = \frac{\text{Tenaga}, E}{\text{masa}, t}$ / *Power*, $P = \frac{Energy, E}{time, t}$

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

30. Tekanan cecair, $P = h\rho g$ / *Liquid pressure*, $P = h\rho g$

31. Cas, $Q = It$ / *Charge*, $Q = It$

32. Beza keupayaan, $V = \frac{E}{Q}$ / *Potential difference*, $V = \frac{E}{Q}$

33. Tenaga elektrik, $E = VIt$ / *Electrical energy*, $E = VIt$

34. Rintangan, $R = \frac{V}{I}$ / *Resistance*, $R = \frac{V}{I}$

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

36. Tenaga keupayaan elektrik, $E = eV$ /*Electric potential energy*, $E = eV$

37. $\frac{V_S}{V_P} = \frac{N_S}{N_P}$

38. Kecekapan = $\frac{I_S V_S}{I_P V_P} \times 100\ \%$ / *Efficiency* = $\frac{I_S V_S}{I_P V_P} \times 100\ \%$

39. Tenaga nuklear, $E = mc^2$ / Nuclear energy, $E = mc^2$

40. Tenaga foton, $E = hf$ / *Photon energy*, $E = hf$

41. Panjang gelombang de Broglie, $\lambda = \frac{h}{p}$ / *de Broglie wavelength*, $\lambda = \frac{h}{p}$

42. $P = nhf = \frac{nhc}{\lambda}$

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

44. $W = hf_o$

45. g = 9.81 m s^{-1}

46. Pemalar graviti, G = 6.67 ´ 10^{-11}N m^2 kg^{-2}/ *Gravitational constant*, G = 6.67 ´ 10^{-11}N m^2 kg^{-2}

47. $1u = 1.66 \times 10^{-27}$ kg

48. Pemalar Planck, $h = 6.63 \times 10^{-34}$ J s / *Planck constant*, $h = 6.63 \times 10^{-34}$ J s

49. $1eV = 1.60 \times 10^{-19}$ J

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

51. Jisim matahari = 1.99×10^{30} *kg* / *Mass of the sun* = 1.99×10^{30} *kg*

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

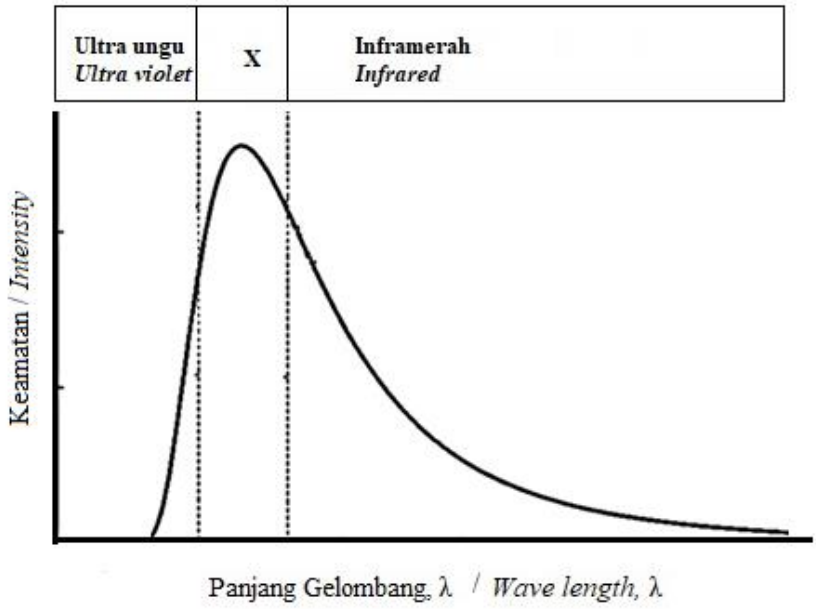
53. Jejari bumi, $R = 6.37 \times 10^6$ *m* / *Radius of earth*, $R = 6.37 \times 10^6$ *m*

Bahagian A
Section A

[60 markah]
[60 *marks*]

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

1. Rajah 1 menunjukkan lengkung pancaran jasad hitam.
Diagram 1 *shows the black body radiation curved*.



Rajah 1
Diagram 1

(a) Tanda (√) bagi jawapan yang betul di petak yang disediakan
Mark with (√) for the correct answer in the box provided.

Jasad hitam adalah …… yang unggul bagi sinaran elektromagnet.
Black bodies are the ideal ..... of electromagnetic radiation.

☐ penyerap
absorbers

☐ pemancar
radiators

☐ penyerap dan pemancar
absorbers and radiators

[1 markah]
[1 *mark*]

(b) Berdasarkan Rajah 1, namakan sinaran di dalam kotak X.
Based on Diagram 1*, name the radiation in the box* X.

…….

[1 markah]
[1 *mark*]

(c) (i) Keputusan eksperimen yang melibatkan sinaran jasad hitam telah menunjukkan percanggahan dengan teori fizik klasik.
Berdasarkan Rajah 1, apakah percanggahan yang membawa kepada tercetusnya teori fizik kuantum?
Experimental results involving black-body radiation are inconsistent with classical physics theory.
Based on Diagram 1*, what was the controversy that sparked the theory of quantum physics?*

……..……..…..

……..……...…….

[1 markah]
[1 *mark*]

(ii) Apakah yang telah dicadangkan oleh Max Planck untuk menyelesaikan masalah dalam (c)(i)?
What did Max Planck propose to solve the problem in (c)(i)?

…….

[1 markah]
[1 *mark*]

Total A1

4

2. Rajah 2 menunjukkan seperiuk besar mi yang dimasak dalam jumlah air panas yang banyak.
Diagram 2 *shows a large pot with noodles being cooked in a large amount of hot water.*

Rajah 2
Diagram 2

(a) (i) Apakah yang dimaksudkan dengan haba?
What is the meaning of heat?

…….

[1 markah]
[1 *mark*]

(ii) Mengapakah mi dimasak dalam jumlah air panas yang banyak?
Why is the noodle being cooked in a large amount of hot water?

…….

…….

[2 markah]
[2 *marks*]

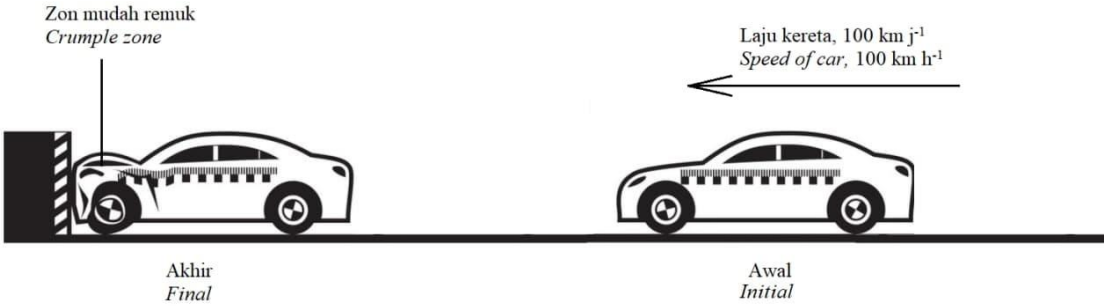
(b) 2 kg air pada suhu 30 °C ditambah ke dalam air panas berjisim pada suhu 95 °C. Berapakah suhu akhir air tersebut apabila mencapai keseimbangan terma?
2 kg *of water at* 30˚C *is added to* 9 kg *of hot water at* 95˚C. *What is the final temperature of the mixture when thermal equilibrium is achieved?*

[2 markah]
[2 *marks*]

Total A2

5

3. Dalam satu ujian perlanggaran kereta berjisim 1500 kg dengan laju 100 km j^{-1} berlanggar dengan dinding seperti dalam Rajah 3.
In a crash test, a car of mass 1500 kg *and speed* 100 km h^{-1} *collides with a wall as shown in Diagram* 3.



Rajah 3
Diagram 3

(a) Apakah maksud daya impuls?
What is the meaning of impulsive force?

……..
[1 markah]
[1 *mark*]

(b) Terangkan bagaimana zon mudah remuk mengurangkan kesan hentaman?
Explain how the crumple zone reduces the impact?

……..

……..
[2 markah]
[2 *marks*]

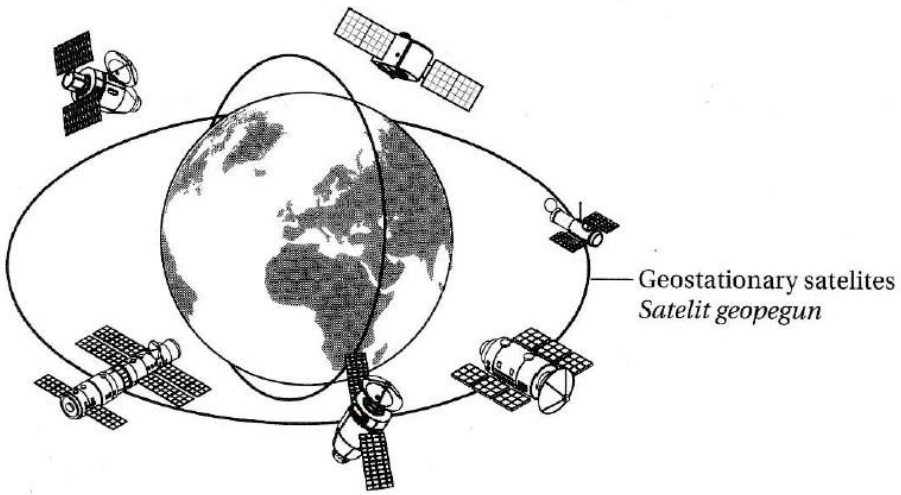
(c) Jika kereta dalam Rajah 3 berhenti dalam masa 15 s, hitung daya impuls yang bertindak pada kereta.
If the car in Diagram 3 *stops in* 15 s, *calculate the impulsive force acting on the car.*

[3 markah]
[3 *marks*]

Total A3

6

4. Rajah 4 menunjukkan beberapa satelit buatan manusia daripada pelbagai negara.
Diagram 4 *shows a few man-made satellites from various countries.*



Rajah 4
Diagram 4

(a) Apakah maksud satelit geopegun?
What is meant by geostationary satellites?

……..
[1 markah]
[1 *mark*]

(b) Nyatakan **dua** ciri satelit geopegun.
*State **two** characteristics of a geostationary satellite.*

……..

……..
[2 markah]
[2 *marks*]

(c) Sebuah satelit geopegun berjisim 1200 kg diletakkan sejauh 4.23×10^7 m dari pusat Bumi.
A geostationary satellite of mass of 1200 kg *is placed at* 4.23×10^7 m *from the centre of the Earth.*
Hitungkan:
Calculate:

(i) Laju linear satelit itu.
Linear speed of satellite
[Pemalar kegravitian, $G = 6.67 \times 10^{-11}$ N m^2 kg^{-2}, jisim Bumi = 5.97×10^{24} kg]
[*Gravitational constant*, $G = 6.67 \times 10^{-11}$ N m^2 kg^{-2}, *mass of Earth* = 5.97×10^{24} kg]

[2 markah]
[2 *marks*]

(ii) Daya tarikan graviti Bumi terhadap satelit itu.
The Earth's gravitational pull on the satellite.

[2 markah]
[2 *marks*]

(d) Apakah yang berlaku ke atas satelit jika lajunya kurang daripada laju mengorbitnya?
What happens to the satellite if the speed is lower than the orbital speed?

……..

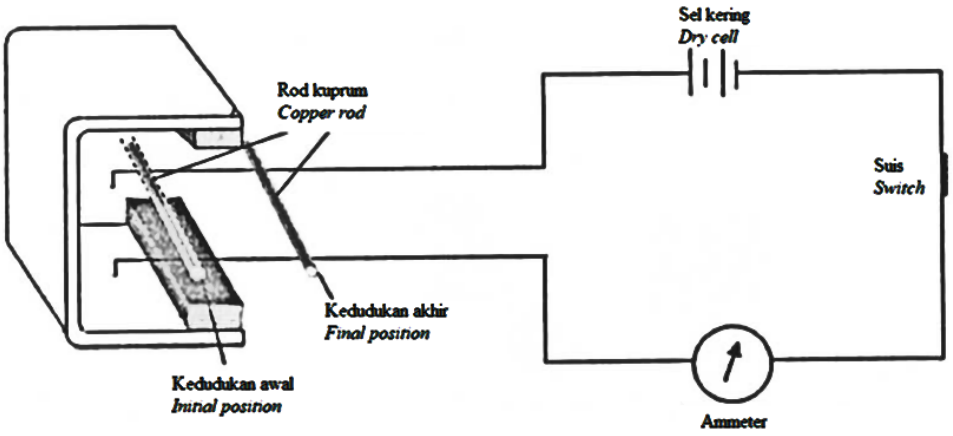
……..

……..
[2 markah]
[2 *mark*]

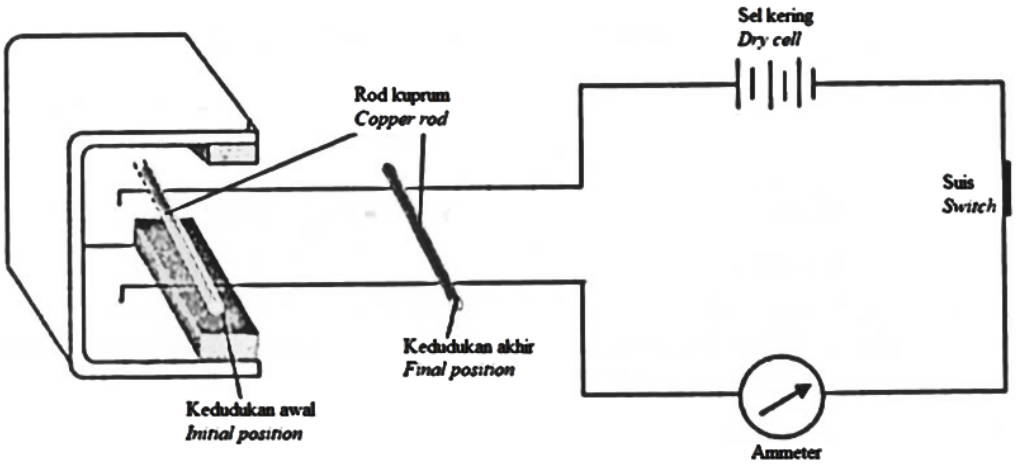
Total A4

9

5. Rajah 5.1 dan Rajah 5.2 menunjukkan rod kuprum yang serupa diletakkan di atas dawai kuprum tidak bertebat di dalam medan magnet.
Diagram 5.1 *and Diagram* 5.2 *show identical copper rod placed on bare copper wires in a magnetic field.*



Rajah 5.1
Diagram 5.1



Rajah 5.2
Diagram 5.2

Apabila suis ditutup, jarum ammeter terpesong dan rod kuprum bergerak ke kedudukan akhir.
When the switch is closed, the pointer of the ammeter deflects and the copper rod moves to the final position.

(a) Apakah maksud medan magnet?
What is the meaning of magnetic fields?

……..
[1 markah]
[1 *mark*]

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

(i) bilangan sel kering yang digunakan
the number of dry-cell used.

…….
[1 markah]
[1 *mark*]

(ii) sudut pesongan bagi penunjuk ammeter.
the angle of deflection of the ammeter pointer.

…….
[1 markah]
[1 *mark*]

(iii) kedudukan akhir rod kuprum itu.
the final positions of the copper rod.

…….
[1 markah]
[1 *mark*]

(c) Nyatakan satu kuantiti fizik yang menyebabkan rod itu bergerak.
State a physical quantity that causes the rod to move.

……..
[1 markah]
[1 *mark*]

(d) (i) Hubungkaitkan bilangan sel kering yang digunakan dengan magnitud arus elektrik yang mengalir.
Relate the number of dry cells used and the magnitude of electric current flow.

…….
[1 markah]
[1 *mark*]

(ii) Hubungkaitkan magnitud arus elektrik dan magnitud kuantiti fizik dinyatakan dalam 5 (c).
Relate the magnitude of electric current and magnitude of physical quantity stated in 5 (c).

…….
[1 markah]
[1 *mark*]

(e) Namakan peraturan yang digunakan untuk menentukan arah gerakan rod kuprum.
Name the rule used to determine the direction of movement of the copper rod.

……..

[1 markah]
[1 *mark*]

(f) Nyatakan cara lain yang membolehkan rod tersesar lebih jauh.
State another way that enable the rod displaced further.

……..

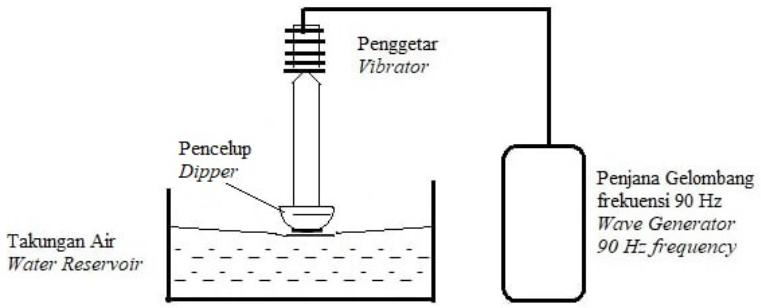
[1 markah]
[1 *mark*]

Total A5

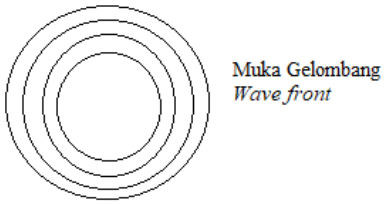
9

6. Rajah 6.1 (a) dan Rajah 6.2 (a) menunjukkan rekaan sebuah mesin pembina ombak membulat yang sedang diuji. Sebuah pencelup disambungkan pada penggetar yang bergetar masing – masing pada frekuensi 90 Hz dan 60 Hz. Pencelup ini diletakkan pada permukaan air di dalam takungan air.
Diagram 6.1 (a) *and Diagram* 6.2 (a) *shows the design of a circular wave generator machine being tested. A dipper is attached to vibrator that vibrates at a frequency of 90 Hz and 60 Hz respectively. The dipper is placed on the surface of the water in a water reservoir.*

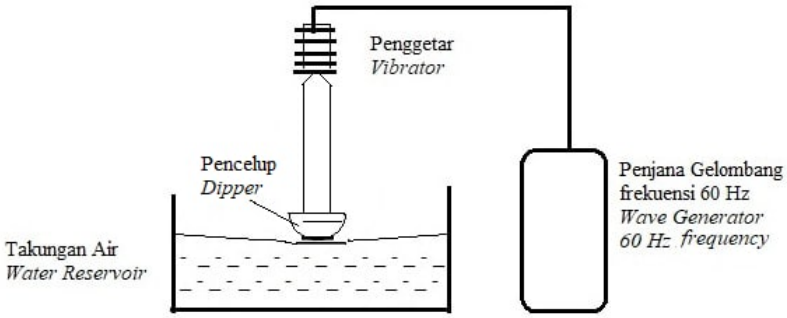
Rajah 6.1 (b) dan Rajah 6.2 (b) menunjukkan permukaan gelombang bulat yang dihasilkan apabila pencelup itu mencecah permukaan air di dalam takungan tersebut.
Diagram 6.1 (a) *and Diagram* 6.2 (a) *shows the surface of the circular wave produced when the dipper hits the surface of the water in the water reservoir.*



Rajah 6.1 (a)
Diagram 6.1 (a)



Rajah 6.1 (b)
Diagram 6.1 (b)



Rajah 6.2 (a)
Diagram 6.2 (a)

Rajah 6.2 (b)
Diagram 6.2 (b)

(a) Gariskan jawapan yang betul dalam kurungan untuk melengkapkan ayat di bawah.
Underline the correct answer to complete the sentence below.

Muka gelombang adalah satu garisan yang menghubungkan semua titik yang mempunyai sama (fasa, laju).
A wavefront is a line that connects all points that have the same (phase, velocity).

[1 markah]
[1 *mark*]

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

(i) bandingkan kedalaman air di dalam takungan.
compare the depth of water in the reservoir.

…….
[1 markah]
[1 *mark*]

(ii) bandingkan frekuensi pencelup tersebut.
compare the frequencies of the dipper.

…….
[1 markah]
[1 *mark*]

(iii) bandingkan panjang gelombang bagi gelombang membulat.
compare the wavelengths of a circular wave.

…….
[1 markah]
[1 *mark*]

(iv) Hubungkait frekuensi pencelup dengan panjang gelombang bagi gelombang membulat.
Relate the frequency of the dipper to the wavelength of the circular wave.

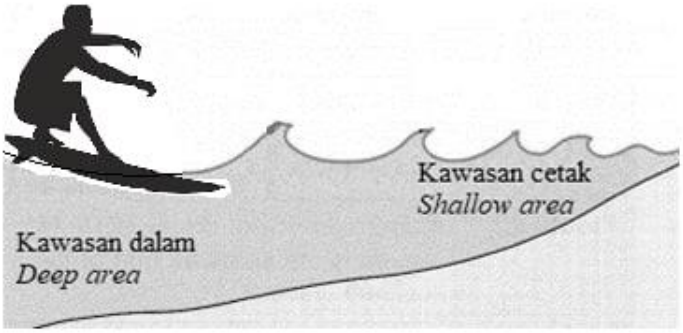
…….
[1 markah]
[1 *mark*]

(c) Terangkan apakah yang akan berlaku kepada panjang gelombang sekiranya kedalaman air dalam takungan air pada Rajah 6.1 (a) dikurangkan? Berikan satu sebab.
Explain what will happen if the water depth in the water reservoir Diagram 6.1 (a) *reduced? Give one reason.*

……..

……..
[2 markah]
[2 *marks*]

(d) Rajah 6.3 menunjukkan seorang peluncur sedang meluncur ombak yang mempunyai panjang gelombang 1.5 m dan halaju 1.2 ms^{-1} di kawasan yang dalam. Apabila peluncur itu tiba di kawasan yang lebih cetek, halajunya menjadi 0.6 ms^{-1}.
Diagram 6.3 *shows a surfer surfing a wave having a wavelength of* 1.5 m *and a velocity of* 1.2 ms^{-1} *in a deep region. When the surfer reaches a shallower area, its velocity becomes* 0.6 ms^{-1}.



Rajah 6.3
Diagram 6.3

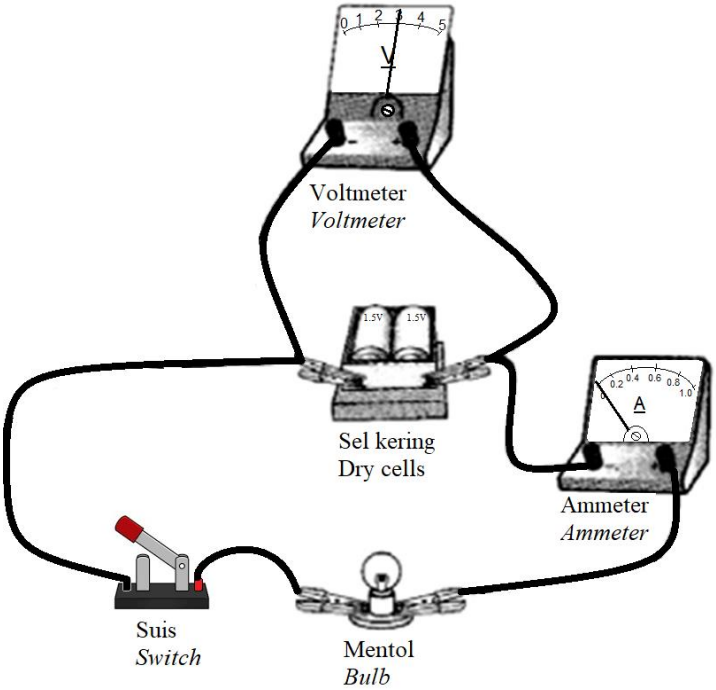
Hitung panjang gelombang itu di kawasan yang lebih cetek.
Calculate the wavelength in the shallower region.

[2 markah]
[2 *marks*]

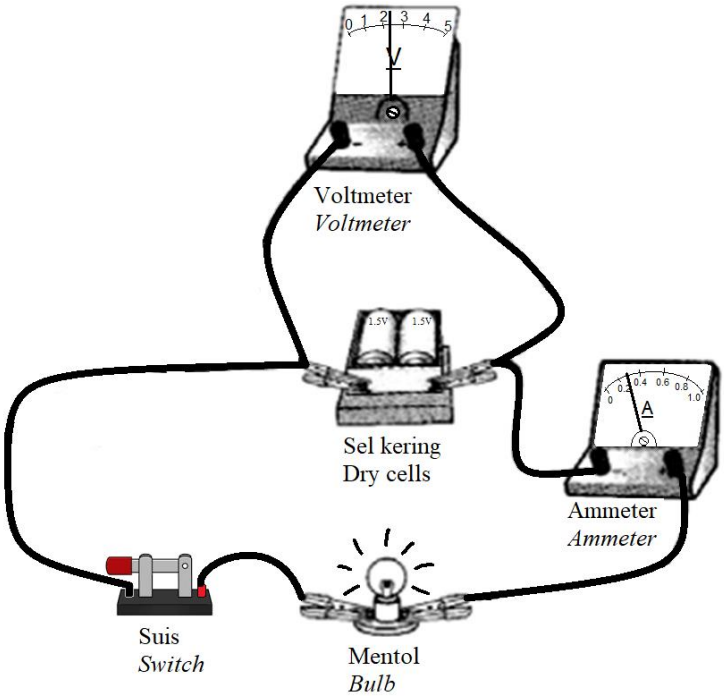
Total A6

9

7. Rajah 7.1(a) menunjukkan sebuah litar elektrik mengandungi dua sel kering 1.5 V dalam keadaan suis terbuka.
Rajah 7.1(b) menunjukkan litar yang sama dalam keadaan suis tertutup.
Figure 7.1 (a) *shows an electrical circuit containing two 1.5 V dry cells in the open switch state.*
Figure 7.1 (b) *shows the same circuit in the closed switch state.*



Rajah 7.1(a)
Diagram 7.1(a)



Rajah 7.1(b)
Diagram 7.1(b)

(a) Apakah maksud 1.5 V yang dilabel pada sel kering?
What is meant by 1.5V *that is labelled on a dry cell?*

……...

……...

[1 markah]
[1 *mark*]

(b) Berdasarkan Rajah 7.1(a), Rajah 7.1(b) dan konsep fizik yang sesuai, terangkan mengapakah terdapat perbezaan bacaan ammeter dan voltmeter dalam litar-litar tersebut?
Based on Diagram 7.1(a), *Diagram* 7.1(b) *and relevant physics concept, explain why there is difference in the ammeter readings and voltmeter readings in the circuits?*

……...

……...

……...

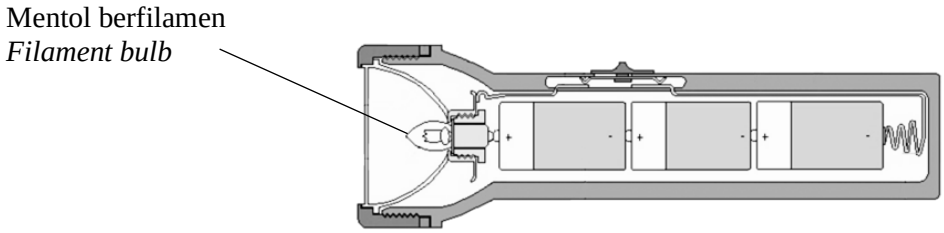
……...

……...

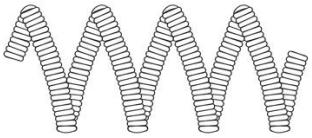
……...

[3 markah]
[3 *marks*]

(c) Rajah 7.2 menunjukkan sebuah lampu suluh bermentol filamen.
Diagram 7.2 *shows a torch light with filament bulb.*



Rajah 7.2
Diagram 7.2

Mentol *Bulb*	Bahan filamen *Filament material*	Dawai filamen *Filament wire*
P	Tungsten *Tungsten*	 Filamen gegelung tunggal *Single coil filament*
Q	Tembaga *Copper*	 Filamen gegelung bergegelung *Coiled coil filament*
R	Tungsten *Tungsten*	 Filamen gegelung bergegelung *Coiled coil filament*

Jadual 7
Table 7

Anda dikehendaki untuk mengkaji ciri-ciri bagi tiga mentol berfilamen P, Q dan R yang akan digunakan dalam lampu suluh seperti ditunjukkan dalam Jadual 7.
You are required to investigate the characteristic of three filament bulbs P, Q *and* R *that will be used in the torch light as shown in Table* 7.

Terangkan kesesuaian setiap ciri mentol dan tentukan mentol yang boleh memenuhi operasi kerja supaya lebih terang untuk digunakan pada waktu malam.
Beri sebab untuk pilihan anda.
Explain the suitability of each characteristic of the bulb and determine the bulb which can serve a brighter torch light for used at night.
Give reasons for your choice.

(i) Bahan filamen.
Filament material.

…….
Sebab:
Reason:

…….
[2 markah]
[2 *marks*]

(ii) Dawai filamen.
Filament wire.

…….
Sebab:
Reason:

…….
[2 markah]
[2 *marks*]

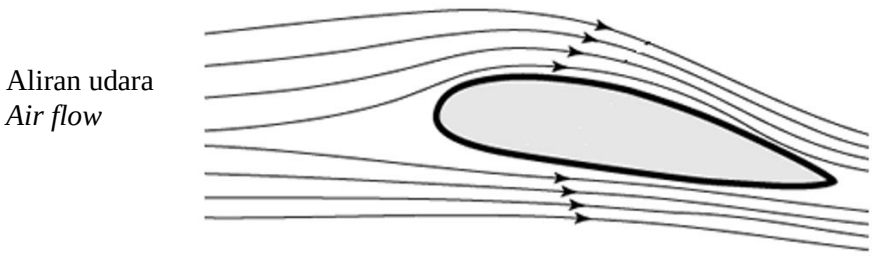
(d) Berdasarkan jawapan anda dalam 7(c), tentukan mentol yang paling sesuai digunakan dalam lampu suluh tersebut.
Based on your answer in 7(c), *determine the most suitable bulb to be used in the torchlight.*

……..…….
[1 markah]
[1 *mark*]

Total A7

9

8. Rajah 8.1 menunjukkan keratan rentas sayap kapal terbang.
Diagram 8.1 *shows the cross section of the wing of an aeroplane.*



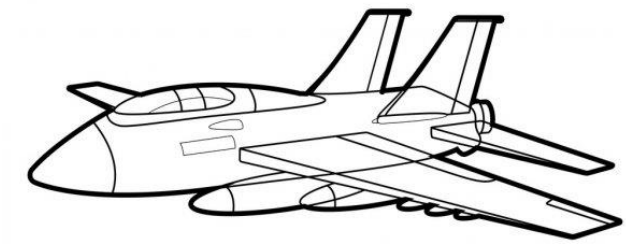
Rajah 8.1
Diagram 8.1

(a) Namakan prinsip fizik yang terlibat.
Name the physics principle involved.

.....

[1 markah]
[1 *mark*]

(b) Rajah 8.2 menunjukkan sebuah jet yang berjisim 2 000 kg yang sedang terbang pada ketinggian malar.
Diagram 8.2 *shows a jet of mass* 2 000 kg *is flying at constant height.*



Rajah 8.2
Diagram 8.2

Hitung daya angkat yang bertindak ke atas jet itu.
Calculate the lift force acting on the jet.

[2 markah]
[2 *marks*]

(c) Berdasarkan aspek berikut, beri cadangan bagaimana jet dalam Rajah 8.2 boleh terbang lebih tinggi.
Based on the following aspects, give suggestions on how the jet in Diagram 8.2 *can fly higher.*

(i) Sudut serangan.
Angle of attack.

……..
Sebab:
Reason:

……...
[2 markah]
[2 *marks*]

(ii) Tujahan.
Thrust.

……..
Sebab:
Reason:

……..
[2 markah]
[2 *marks*]

(iii) Luas permukaan sayap kapal terbang.
Surface area of the wings.

……..
Sebab:
Reason:

……...
[2 *markah*]
[2 *marks*]

Total
A8

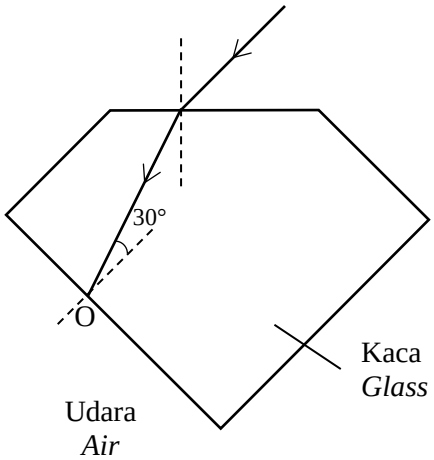
9

Bahagian B
Section B

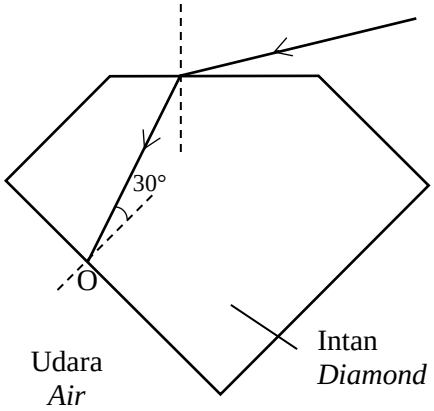
[20 markah]
[20 *marks*]

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

9. Rajah 9.1 dan Rajah 9.2 masing-masing menunjukkan satu sinar cahaya melalui kaca dan intan.
[Indeks biasan: Kaca = 1.50; Intan = 2.42]
Diagram 9.1 *and* 9.2 *show a ray of light passing into glass and diamond respectively.*
[*Refractive index: Glass* = 1.50; *Diamond* = 2.42]



Rajah 9.1
Diagram 9.1



Rajah 9.2
Diagram 9.2

(a) Apakah maksud sudut genting?
What is the meaning of critical angle?

[1 markah]
[1 *mark*]

(b) (i) Dengan menggunakan nilai indeks biasan intan, hitung sudut genting bagi intan.
By using the refractive index of diamond, calculate the critical angle of diamond.

[2 markah]
[2 *marks*]

(ii) Bagi menunjukkan berlian lebih berkilau berbanding kaca, anda dikehendaki:

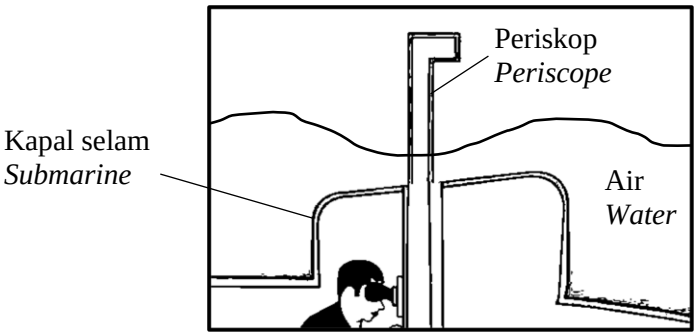
- Salin Rajah 9.1 dan Rajah 9.2.
- Berdasarkan jawapan anda di (b)(i), lukis anak panah untuk mewakili lintasan sinar cahaya selepas melalui titik O.
  [Diberi sudut genting kaca = 42°]

To show diamond is more sparkle than glass, you are required to:

- *Copy Diagram* 9.1 *and Diagram* 9.2.
- *Based on your answer in* (b)(i), *draw arrows to represent the path of ray of light after passing through point* O.
  [*Given the critical angle of glass* = 42°]

[3 markah]
[3 *marks*]

(c) Rajah 9.3 menunjukkan sebuah kapal selam yang menggunakan periskop prisma kaca untuk melihat objek di atas permukaan air.
Diagram 9.3 *shows a submarine which uses a glass prism periscope to see objects above the water surface.*

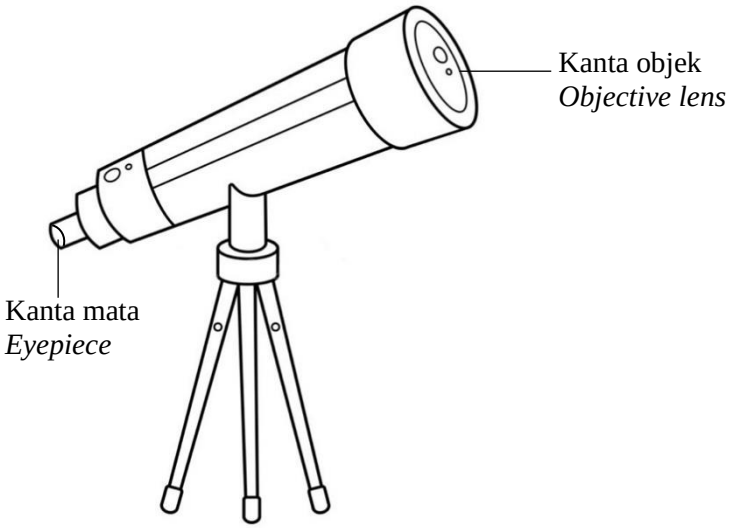


Rajah 9.3
Diagram 9.3

Dengan bantuan gambarajah, terangkan bagaimana pemerhatian dalam Rajah 9.3 boleh melihat objek yang berada di atas permukaan air.
With the help of a diagram, explain how the observer in Diagram 9.3 *can see objects above the water surface.*

[4 markah]
[4 *marks*]

(d) Rajah 9.4 menunjukkan sebuah teleskop astronomi.
Diagram 9.4 *shows an astronomical telescope.*



Rajah 9.4
Diagram 9.4

Jadual 9 menunjukkan empat set kanta cembung J, K, L dan M dengan spesifikasi yang berbeza.
Table 9 *shows four sets of convex lenses* J, K, L *and* M *with different specifications.*

Set kanta *Set of lenses*	Kanta objek *Objective lens*		Kanta mata *Eyepiece*	
	Panjang fokus/ cm *Focal length/ cm*	Diameter/ cm *Diameter/ cm*	Jenis kanta *Type of lens*	Kuasa/ D *Power/D*
J	50.0	6.0	Cembung *Convex*	30
K	30.0	3.0	Cembung *Convex*	25
L	50.0	3.0	Cekung *Concave*	25
M	30.0	6.0	Cekung *Concave*	30

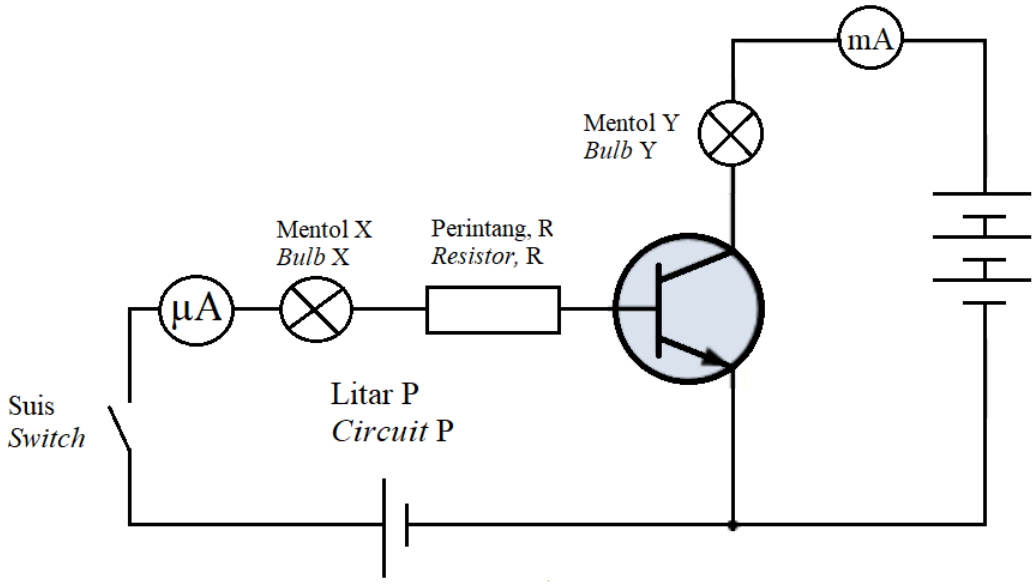
Jadual 9
Table 9

Anda dikehendaki menentukan set kanta yang paling sesuai untuk membina sebuah teleskop astronomi yang boleh menghasilkan imej yang jelas.
You are required to determine the most suitable set of lenses to construct an astronomical telescope that can produce a clear image.

Terangkan kesesuaian aspek-aspek itu dan tentukan set kanta yang paling sesuai. Beri sebab bagi pilihan anda.
Explain the suitability of the aspects and determine the most suitable set of lenses. Give reasons for your choice.

[10 markah]
[10 *marks*]

10. Rajah 10.1 menunjukkan sebuah litar transistor npn.
Rajah 10.1 *shows a npn transistor circuit.*



Rajah 10.1
Diagram 10.1

(a) (i) Namakan litar P dalam litar transistor dalam Rajah 10.1.
Name circuit P *in the transistor circuit in Diagram* 10.1

[1 markah]
[1 *mark*]

(ii) Apabila suis ditutup, kecerahan mentol X dan mentol Y berbeza. Terangkan bagaimana keadaan ini berlaku.
When the switch is closed, brightness of bulb X *and bulb* Y *is different. Explain how this situation occur.*

[4 markah]
[4 *marks*]

(b) Jika bacaan mikroammeter dan milliammeter dalam Rajah 10.1 adalah masing-masing 40 μA *and* 64 mA, tentukan faktor penggandaan arus dalam litar transistor tersebut.
If the reading of microammeter and milliammeter in Diagram 10.1 *are* 40 μA *and* 64 mA *respectively, determine the amplification factor of the current in the transistor circuit.*

[2 markah]
[2 *marks*]

(c) Transistor dalam Rajah 10.1 diganti dengan transistor pnp. Lukis satu litar transistor yang baharu yang boleh berfungsi secara normal.
The transistor in Diagram 10.1 *is replaced with a pnp transistor. Draw a new transistor circuit that can work normally.*

[3 markah]
[3 *marks*]

(d) Rajah 10.2 menunjukkan empat litar elektronik W, X, Y dan Z dengan spesifikasi yang berbeza. Anda dikehendaki menentukan litar elektronik yang paling sesuai untuk menyalakan ketiga-tiga lampu jalan 100 W, 240 V secara automatik dengan kecerahan normal apabila keadaan persekitaran gelap.
Diagram 10.2 *shows four electronic circuits* W, X, Y *and* Z *with different specifications. You are required to determine the most suitable electronic circuit to light up three street lights,* 100 W, 240 V *automatically with normal brightness when the surrounding is dark.*

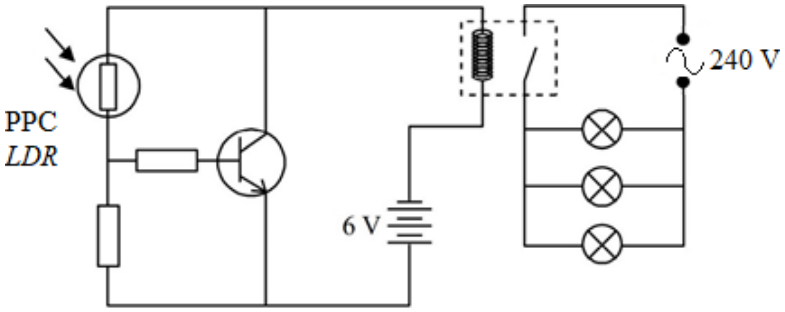
Kaji semua spesifikasi tersebut berdasarkan aspek-aspek berikut:
Study the specifications of all the four circuits based on the following aspects:

- Kedudukan perintang peka cahaya (PPC).
  The position of the light dependent resistor (LDR).
- Penyambungan bateri.
  The connection of the batteries.
- Susunan litar lampu-lampu jalan.
  The arrangement of the street lights circuit.
- Penggunaan suis geganti dalam litar.
  The use of a relay switch in the circuit.

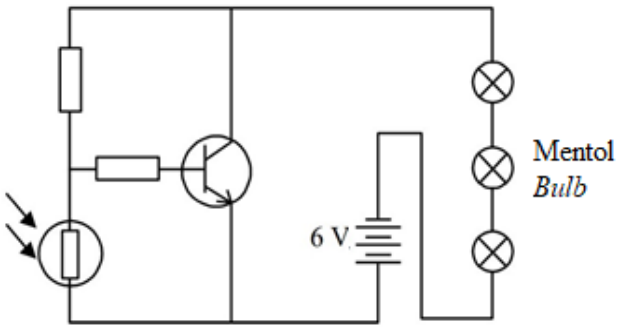
Tentukan litar elektronik yang paling sesuai dipilih dan berikan sebab-sebab bagi pilihan anda.
Determine the most suitable electronic circuit to be chosen and give your reasons.

[10 markah]
[10 *marks*]

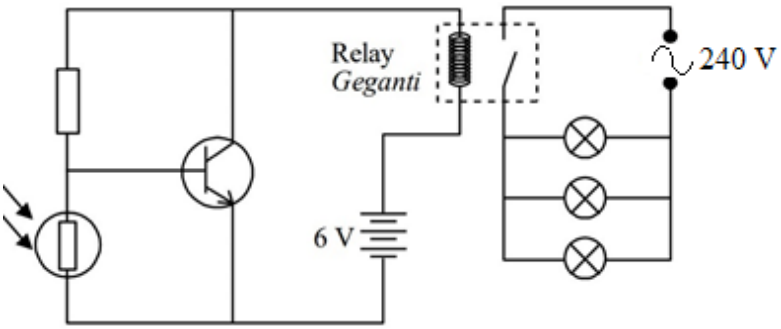
Litar W
Circuit W



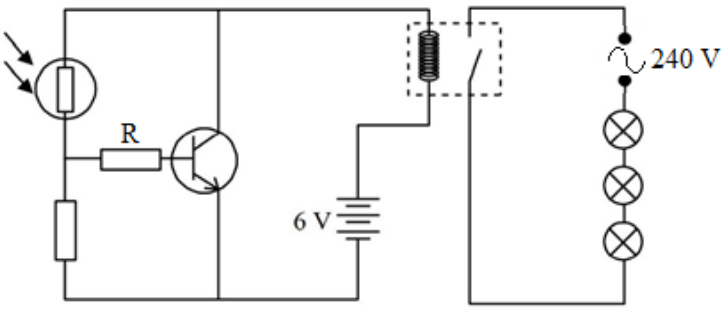
Litar X
Circuit X



Litar Y
Circuit Y



Litar Z
Circuit Z



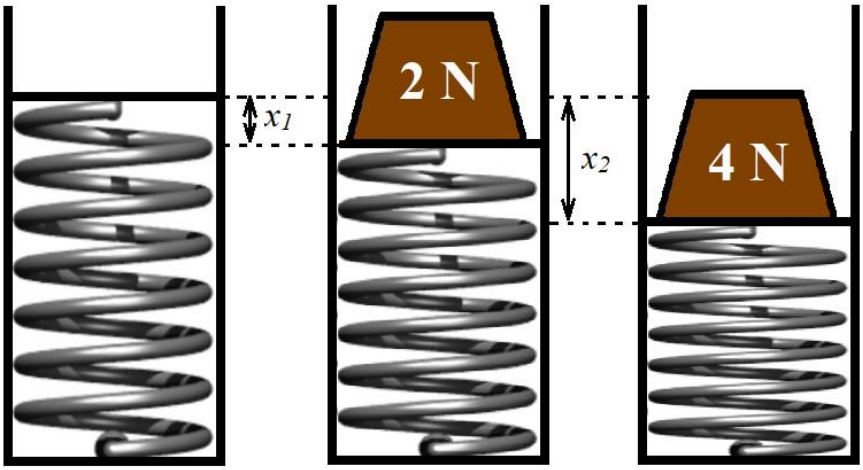
Rajah 10.2
Diagram 10.2

Bahagian C
***Section* C**

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

Jawab soalan yang diberikan dalam bahagian ini.
Answer the question given in this section.

11. Satu eksperimen dijalankan untuk mengkaji kekenyalan satu spring mampatan.
Rajah 11.1(a) menunjukkan keadaan asal spring mampatan.
Rajah 11.1(b) dan Rajah 11.1(c) masing-masing menunjukkan keadaan spring yang sama apabila pemberat 2 N dan 4 N diletakkan di atasnya.
An experiment is carried out to the elasticity of a compression spring.
Diagram 11.1(a) s*hows the original state of the compression spring.*
Diagram 11.1(b) *and Diagram* 11.1(c) *shows the state of the same spring when a load of* 2 N *and* 4 N *is placed on them respectively.*



(a) (b) (c)

Rajah 11.1
Diagram 11.1

(a) Apakah yang dimaksudkan dengan kekenyalan?
What is the meaning elasticity?

[1 markah]
[1 *mark*]

(b) Berdasarkan Rajah 11.1 (b) dan Rajah 11.1 (c)
Based on Diagram 11.1 (b) and Diagram 11.1 (c)

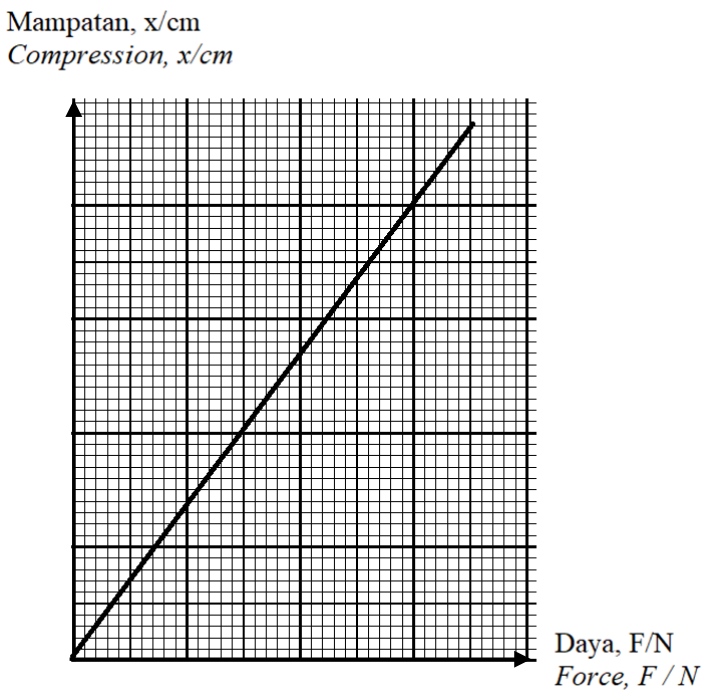
(i) Bandingkan pemalar spring, daya mampatan spring dan pemampatan spring, x.
Compare the spring constant, force of compression and the compression of the spring, x.

[3 markah]
[3 *marks*]

(ii) Hubungkait daya mampatan dan pemampatan spring dan seterusnya deduksikan hubungan antara pemampatan spring dengan tenaga yang tersimpan di dalam spring.
Relate the force of compression and the compression of the spring and make a deduction of the relationship between the compression of the spring and the energy stored in the spring.

[2 markah]
[2 *mark*]

(c) Rajah 11.2 menunjukkan graf pemampatan, *x* melawan daya mampatan, *F* bagi eksperimen dalam Rajah 11.1.
Diagram 11.2 *shows a graph of compression, x against force, F of the experiment in Diagram* 11.1.

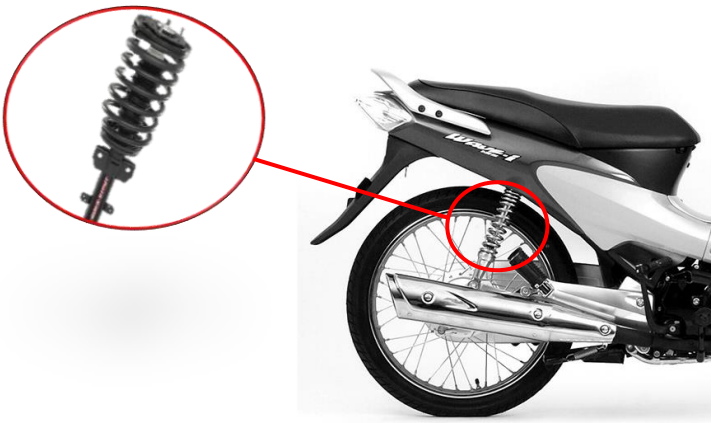


Rajah 11.2
Diagram 11.2

Berdasarkan graf dalam Rajah 11.2 dan persamaan yang sesuai, terangkan bagaimana pemalar spring dan tenaga yang tersimpan di dalam spring diukur.
Based on Diagram 11.2 *and suitable formula, explain how the spring constant and the elastic potential energy stored in the spring is measured.*

[4 markah]
[4 *marks*]

(d) Rajah 11.3 menunjukkan spring pada sistem suspensi sebuah motosikal.
Diagram 11.3 *shows a spring of suspension system of a motor.*



Rajah 11.3
Diagram 11.3

Berdasarkan pengetahuan anda tentang konsep kekenyalan, cadangkan ciri-ciri spring yang boleh digunakan sebagai penyerap hentakan yang berkesan. Terangkan cadangan anda berdasarkan aspek seperti bahan spring, keadaan fizikal spring, pemalar spring dan kadar pelembapan spring.
By using the knowledge of elasticity, suggest characteristics of spring which enable it to absorb shock efficiently. Explain your suggestion based on the following aspects such as material of the spring, physical condition of the spring, spring constant and rate of damping of the spring.

[10 markah]
[10 *marks*]

KERTAS SOALAN TAMAT
END OF QUESTION PAPER