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MODUL PINTAS
TINGKATAN 5

4531/2

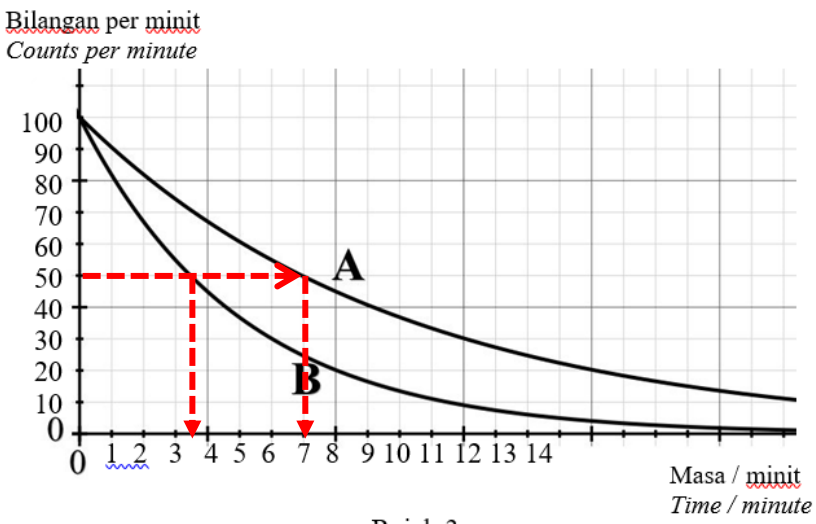
FIZIK
Kertas 2

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

Dua jam tiga puluh minit

PERATURAN PEMARKAHAN
FIZIK K2
4531/2

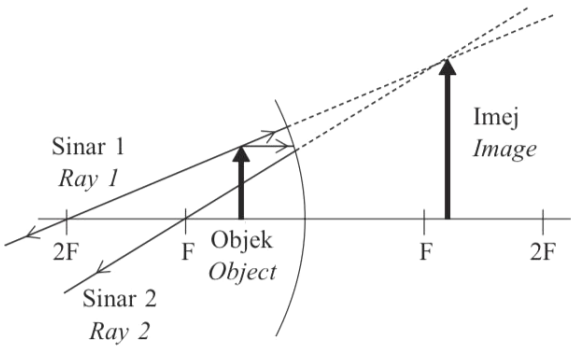
No		Answer	Sub Mark	Total Mark
1	(a)	Proses di mana elektron dibebaskan daripada permukaan logam panas *Process where electrons are released from a heated metal surface.*	1	1
	(b)	6 V	1	1
	(c)(i)	Tiada perubahan / *No change*	1	1
	(c)(ii)	Menjadi sifar / *Becomes zero*	1	1
		Total		**4**
2	(a)	Hukum Kepler Pertama *Kepler's First Law* Planet bergerak lebih laju apabila berhampiran dengan matahari *Planets move faster when closer to the sun* Hukum Kepler Ketiga *Kepler's Third Law* Membandingkan tempoh orbit bagi dua planet berlainan *Compares the orbital periods of two different planets* Matahari berada di salah satu fokus orbit planet *The sun is on one of the foci of the planet's orbit* Hukum Persamaan Luas *Law of Equal Areas*	1 betul-0m 2 betul-1m 3 betul-2m	2
	(b)	Menggunakan Hukum Kepler Ketiga: *Using Kepler's Third Law:* $(T_B)^2/(R_B)^3 = (T_p)^2/(R_p)^3$ Menyusun semula untuk mencari T_p *Rearranging to solve for Tp:* $(T_p)^2=[(T_B)^2 / (R_B)^3] \times (R_p)^3$ $(T_p)^2 = (T_B)^2 \times [(R_p) / (R_B)]^3$, $(R_p) / (R_B) = 14$ Maka, $(T_p)^2 = (T_B)^2 \times [14]^3$ di mana T_B=1 tahun $(T_p)^2 =(1 \text{ tahun})^2 \times [14]^3 = 2744 \text{ tahun}^2$ $T_p = \sqrt{(2744 \text{ tahun}^2)}$ Answer: $T_{planet} = 52.4$ tahun	1 1 1	3
		Total		**5**

No		Answer	Sub Mark	Total Mark
3	(a)	Masa yang diambil untuk separuh daripada bilangan asal nukleus radioaktf bagi suatu sampel radioaktif mereput *Time taken for a sample of radioactive nuclei to decay to half of its initial number.*	1	1
	(b) (i)	 Rajah 3 *Diagram 3* $T_{1/2}$ A = 7 minit / *minute* $T_{1/2}$ B = 3.5 minit / *minute*	1 (show on the graph) 1 1	3
	(b)(ii)	A	1	1
	(b)(iii)	Kerana separuh hayatnya lebih lama *Because the half-life is longer*	1	1
		Total		**6**

No		Answer	Sub Mark	Total Mark
4	(a)	 Daya apungan / *Buoyant force* Berat / *Weight* **reject if force symbols are used* **direction and name correct, award 1 mark for each force*	1 1	2
	(b)	Daya apungan = Berat cecair tersesar / Daya apungan = Berat / Keseimbangan daya *Buoyant force =Weight of water displaced /Buoyant force = Weight Balanced forces*	1	1
	(c)(i)	**Penggantian yang betul** ***Correct substitution*** $F = \rho Vg$ $mg = \rho Vg$ $V = \frac{mg}{\rho g}$ $V = \frac{45\ kg}{1000\ kg\ m^{-3}}$ **Jawapan yang betul bersama unit** ***Correct answer with unit*** **$V = 0.045\ m^3$**	1 1	2
	(c)(ii)	Berkurang *Decreased*	1	1
	(c)(iii)	Ketumpatan air laut lebih tinggi Berat cecair yang tersesar lebih tinggi/ Daya apungan bertambah *Density of sea water is higher* *Weight of fluid displaced increases / Buoyant force increases*	1 1	2
	(d)	Prinsip Archimedes *Archimedes' Principle*	1	1
	Total			**9**

No		Answer	Sub Mark	Total Mark
5	(a)	Kuantiti haba yang diperlukan untuk menaikkan suhu 1 kg bahan sebanyak 1 ˚C. *Heat quantity needed to increase temperature of 1 kg substances by 1 ˚C.*	1	1
	(b)(i)	Muatan haba tentu, c, Rajah 5.1 < 5.2. *Specific heat capacity,c, Diagram 5.1 < Diagram 5.2.*	1	1
	(b)(ii)	Tenaga haba yang dibekalkan pada Rajah 5.1 = Rajah 5.2 *Heat energy supplied in Diagram 5.1 = Diagram 5.2*	1	1
	(b)(iii)	Kadar kenaikan suhu, ΔΘ, Rajah 5.1 >Rajah 5.2 *Rate increase of temperature, ΔΘ, Diagram 5.1 > Diagram 5.2*	1	1
	(b)(iv)	Semakin tinggi muatan haba tentu, c, semakin kecil kadar kenaikan suhu, ΔΘ. *The greater the specific heat capacity, c, the smaller the rate of increase of temperature, ΔΘ.*	1	1
	(c)(i)	Muatan haba tentu yang tinggi/ Takat didih tinggi *High specific heat capacity/ High boiling point*	1	1
	(c)(ii)	• Air digunakan untuk menyimpan dan membawa tenaga haba keluar dari enjin./ *Water is used to store and carry heat energy out of the engine.* • Muatan haba tentu yang tinggi membolehkan air menyerap tenaga haba yang besar./ *High specific heat capacity enables large thermal energy to be absorbed.* • Air mempunyai takat didih yang tinggi dan tidak akan menukar fasa apabila menyerap haba yang tinggi./ *Water has high boiling point and will not change phase when large amount of heat is absorbed.* • Tenaga haba yang diserap oleh air akan dibebaskan ke udara sekeliling./ *Heat energy absorbed by water is released to the surrounding air.*	1 1 1 1 Max 3	3
	Total			**9**

No		Answer	Sub Mark	Total Mark
6	(a)	Apabila suatu permukaan logam disinari oleh alur cahaya yang mempunyai frekuensi tertentu, elektron daripada permukaan logam itu dapat dipancar keluar. *When a metal surface is illuminated by a beam of light at a certain frequency, electrons can be emitted from the metal surface.*	1	1
	(b)(i)	Panjang gelombang cahaya merah > cahaya ungu. *The wavelength of red light > violet light.*	1	1
	(b)(ii)	Cahaya merah, tiada elektron dibebaskan. Cahaya ungu membebaskan elektron. *Red light, no electrons emitted. Violet light releases electrons.*	1	1
	(b)(iii)	Frekuensi cahaya merah < cahaya ungu. *The frequency of red light < violet light.*	1	1
	(b)(iv)	Apabila frekuensi cahaya adalah tinggi, elektron dibebaskan dari permukaan logam. *When the frequency of light is high, electrons are emitted from the metal surface.*	1	1
	(c)(i)	$c = f\lambda$ $f = \frac{c}{\lambda}$ $f = \frac{3 \times 10^{8}}{580 \times 10^{-9}}$ $f = 5.17 \times 10^{14}\text{Hz}$	2	2
	(c)(ii)	Terdapat elektron dibebaskan dari permukaan logam ini disebabkan frekuensi cahaya kuning melebihi frekuensi ambang. *There will be electrons emitted from the metal surface as the frequency of the yellow light is higher than the threshold frequency.*	2	2
	Total			**9**

No		Answer	Sub Mark	Total Mark
7	(a)	Pantulan *Reflection*	1	1
	(b)	Dibesarkan/Tegak/Maya *Magnified/Upright/Virtual*	1	1
	(c)	 Sinar 1 = 1 m *Ray* 1 Sinar 2 = 1 m *Ray* 2 Lukis imej = 1 m *Draw image* 1	Max 2	2
	(d)(i)	Cermin cembung *Convex mirror* Sebab : Medan penglihatan yang luas/ Imej dikecilkan *Reason : Large field of vision / Image is diminished*	1 1	2
	(ii)	Diameter besar *Big diameter* Sebab : Banyak cahaya dipantulkan / Imej lebih cerah *Reason : More light reflected / Brighter image formed*	1 1	2
	(e)	Cermin G / *Mirror G*	1	1
		Total		**9**
8	(a)	Gelombang elektromagnet terdiri daripada gabungan medan elektrik dan magnet berayun berserenjang antara satu sama lain. *Electromagnetic waves consist of a combination of electrical and magnetic fields oscillating perpendicular to each other.*	1	1
	(b)(i)	Gelombang mikro / *Microwaves*	1	1
	(b)(ii)	Gelombang mikro mempunyai panjang gelombang pendek dan berfrekuensi tinggi/ Ia boleh dipantulkan/ Ia boleh menembusi jerebu/ Ia boleh menembusi hujan atau salji/ Ia boleh menembusi awan *Microwaves have short wavelengths and high frequencies/ It can be reflected/ It can penetrate haze/ It can penetrate rain or snow/ It can penetrate clouds*	1	1

	(c)(i)	Gelombang mikro *Microwaves* Boleh tembus atmosfera *Can penetrate through the atmosphere*	1 1	2
	(c)(ii)	Diameter penerima lebih besar *Larger diameter of the receiver* Untuk menangkap/memantul lebih banyak isyarat *To capture/reflect more signals*	1 1	2
	(c)(iii)	Diletakkan di puncak bukit /*Located on the top of the hill* Julat penerimaan yang besar /*Wide receiving range*	1 1	2
	TOTAL			**9**

Section B

No		**Answer**	**Sub Mark**	**Total Mark**
9	(a)	Momentum ialah hasil darab jisim dan halaju. *Momentum is a product of mass and velocity.*	1	1
	(b)	- Katak melompat ke hadapan dengan suatu halaju. *The frog jumped forward with a velocity.* - Katak mempunyai momentum ketika melompat. *The frog has momentum while jumping.* - Mengikut prinsip keabadian momentum. *According to principle of conservation of momentum.* - Jumlah momentum sebelum dan selepas lompatan bagi katak dan daun adalah sifar. *Total momentum before and after the jump for the frog and leaf is zero* - Satu momentum dengan magnitud yang sama dalam arah bertentangan dihasilkan ke atas daun. *A momentum of equal magnitude but opposite direction is produced on the leaf.* - Menyebabkan daun bergerak ke belakang. *Causes the leaf moves backward.*	1 1 1 1 1 1 Max 4	4

<table>
<tr><td></td><td>(c)</td><td>
<table>
<tr><th>Ciri-ciri/ Characteristics</th><th>Penerangan/ Explanation</th></tr>
<tr><td>Jisim kecil
Small mass</td><td>Roket mempunyai pecutan tinggi
Rocket will have higher acceleration</td></tr>
<tr><td>Bentuk aerodinamik
Aerodynamic shape</td><td>Mengurangkan rintangan udara
Reduce the air resistance</td></tr>
<tr><td>Isipadu air ialah $\frac{1}{3}$ daripada isi padu botol

Volume of water is $\frac{1}{3}$ of the volume of bottle</td><td>Untuk meningkatkan momentum dan daya impuls
To increase momentum and impulsive force</td></tr>
<tr><td>Sudut pelancaran ialah 45°
Launching angle is 45°</td><td>Komponen ufuk daya pelancaran dapat menggerakan botol dalam arah mengufuk yang jauh.
The horizontal component of the launch force is able to propel the rocket further horizotally.</td></tr>
<tr><td>Roket botol air jenis S dipilih
Water bottle rocket type S is choosen</td><td>Kerana roket S mempunyai jisim kecil, berbentuk aerodinamik, isipadu air ialah $\frac{1}{3}$ daripada isipadu botol dan sudut pelancaran ialah 45°.

Water bottle rocket S has small mass, aerodynamic shape, volume of water is $\frac{1}{3}$ of the volume of bottle and launching angle is 45°.</td></tr>
</table>
</td><td>2

2

2

2

2</td><td>10</td></tr>
<tr><td></td><td>(d)(i)</td><td> </td><td>1</td><td>1</td></tr>
<tr><td></td><td>(ii)</td><td>Jisim peluru / Mass of bullet = $\frac{50}{1000}$ = 0.05 kg

Momentum ke kanan = Momentum ke kiri
Momentum to the right = Momentum to the left

$m_r v_r = m_p V_p$
$(6)v = (0.05)(350)$
$v = \frac{(0.05)(350)}{6}$
$= 2.92 \text{ m s}^{-1}$</td><td>1

1

1</td><td>3</td></tr>
<tr><td></td><td>(iii)</td><td>Prinsip keabadian momentum
Principle of conservation of momentum</td><td>1</td><td>1</td></tr>
<tr><td colspan="4">TOTAL</td><td>20</td></tr>
</table>

<table>
<tr><th colspan="2">No</th><th>Answer</th><th>Sub Mark</th><th>Total Mark</th></tr>
<tr><td>10</td><td>(a)</td><td>Daya gerak elektrik/ d.g.e.
Electromotive force/ e.m.f.</td><td>1</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td>1. Bacaaan voltmeter berkurangan.
The voltmeter reading decreases.
2. Susutan voltan disebabkan oleh rintangan dalam sel kering.
The voltage drop is due to the internal resistance of the batteries.
3. Mentol akan menyala.
The bulb will light up.
4. Terdapat arus merentasi metol tersebut / litar adalah lengkap.
There is current flowing through. / The circuit is complete.</td><td>1
1
1
1</td><td>4</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th>Ciri-ciri
Characteristics</th><th>Penerangan
Explanation</th></tr><tr><td>Kapasiti yang tinggi
High capacity</td><td>Boleh menyimpan lebih banyak tenaga/ mengecas telefon bimbit banyak kali/ guna untuk masa yang lebih lama.
Can store more energy/ recharge handphone more times/ can be used for a longer time.</td></tr><tr><td>Ketumpatan yang rendah
Low density</td><td>Ringan/ Mudah alih
Lighter/ portable.</td></tr><tr><td>Rintangan dalam yang rendah
Low internal resistance</td><td>Kurang menjadi panas ketika digunakan.
Does not heat up easily when in use.
Kehilangan tenaga berguna dapat dikurangkan.
Less energy loss.</td></tr><tr><td>Permukaan bertekstur
Textured surface</td><td>Cengkaman yang lebih baik/ Tidak mudah tergelincir.
Better grip/ Does not slip easily.</td></tr><tr><td>Y dipilih
Y is chosen</td><td>Kerana Y mempunyai kapasiti yang tinggi, ketumpatan yang rendah, mengunakan bahan lithium polimer dan kadar kehilangan kuasa adalah rendah.
Because Y has high capacity, low density, using lithium polymer and has low rate of power loss.</td></tr></table></td><td>10</td><td>10</td></tr>
<tr><td></td><td>(d)</td><td>(i) $P = VI$
$I = \frac{P}{V}$
$I = \frac{77}{3.85}$ Penggantian / Substitution
= 20 A Jawapan dan unit betul / Answer with correct unit

(ii) $E = VIt$
Menukar/ Convert 1 j = 60x60 s
$= 3.85 \times 20 \times 60 \times 60$
Penggantian/ Substitution
$= 277200$ J
Jawapan dan unit betul / Answer with correct unit</td><td>1
1

1
1
1</td><td>5</td></tr>
</table>

TOTAL	20

No		Answer	Sub Mark	Total Mark
11	(a)	Penghasilan d.g.e. aruhan merentasi suatu konduktor apabila terdapat gerakan relatif antara konduktor itu dengan suatu medan magnet atau apabila konduktor itu berada di dalam medan magnet yang berubah. *Production of an induced e.m.f. across a conductor when there is relative motion between the conductor and a magnetic field or when the conductor is in a changing magnetic field.*	1	1
	(b) (i)	Bilangan lilitan solenoid Rajah 11.1 > 11.2 *Number of turns of solenoid in Diagram 11.1 > 11.2* Saiz persongan galvanometer Rajah 11.1 > 11.2 *The size of deflection of the galvanometer in Diagram 11.1 >11.2* Kadar pemotongan fluks magnet pada Rajah 11.1 > 11.2 *The rate of cutting of magnetic flux in Diagram 11.1 > 11.2*	1 1 1	3
	(b) (ii)	Semaking banyak bilangan lilitan solenoid, semakin tinggi kadar pemotongan fluks magnet *The higher number of turns of turns of the coil the higher the rate of cutting of magnetic flux* Semakin tinggi kadar pemotongan fluks magnet semakin tinggi magnitud arus aruhan *The higher rate of cutting of magnetic flux, the higher magnitude of induced current*	1 1	2
	(c)	(i) Transformer injak turun *Step-down transformer* (ii) - Apabila arus ulang alik mengalir melalui gegelung primer ia menghasilan medan magnet yang berubah-ubah (dari segi magnitud dan arah) - *When alternating current flows through the primary coil it produces a magnetic field that changes (in magnitude and direction)* - Fluks magnet daripada gegelung primer dipautkan kepada gegelung sekunder melalui teras besi lembut - *The magnetic flux from the primary coil is linked to the secondary coil through a soft iron core* - Medan magnet yang berubah-ubah menyebabkan pemotongan garis medan magnet di gegelung sekunder, menghasilkan arus aruhan di dalam gegelung sekunder. - *The changing magnetic field causes the magnetic field line to be cut in the secondary coil, producing an induce current in the secondary coil.*	1 1 1 1	4

	(d)	**Aspek / *Aspect***	**Sebab / *Reason***		
		Menggunakan magnet yang lebih kuat/ Neodymium *Use stronger magnet/Neodymium*	Menghasilkan medan magnet yang kuat / menghasilkan dge/arus aruhan yang tinggi *Produces strong magnetic field / high emf/current will be induced.*	1,1	10
		Menggunakan teras besi lembut *Use soft iron core*	Mudah dimagnetkan dan dinyahmagnetkan / Mempunyai kebolehtelapan magnet yang sangat baik, yang memfokuskan garis daya magnet dan mengurangkan kehilangan tenaga. *Can be easily magnetized and demagnetized. / Has excellent magnetic permeability, which focuses magnetic lines of force and reduces energy loss.*	1,1	
		Menggunakan teras besi berlamina (berlapis-lapis) *Use laminated iron core*	Mengurangkan pengaliran arus pusar / mengurangkan penghasilan haba *To reduce the flow of eddy current, / reduce production of heat.*	1,1	
		Diameter dawai tebal *Thick diameter of wire*	Rintangan rendah *Low resistance*		
		Kuasa mentol lebih tinggi *High power of bulb*	Mentol menyala lebih terang *Bulb lights up brighter*	1,1	
		Putar roda lebih laju *Turns the wheel faster*	Meningkatkan kadar pemotongan fluks magnet *Increase the rate of cutting of magnetic flux*	1,1 max 10	
	Total				**20**