

MARKING SCHEME PHYSICS PAPER 2 FOR TRIAL SPM 2010

SECTION A

QUESTION 1	Mark	Answer	Note
(a)	1	<i>State the correct name of the physical quantity</i> Potential difference // Voltage	
(b)	1	<i>State the correct smallest scale division</i> 0.5 V	
(c)	1	<i>State the correct instrument</i> Instrument Y	
(d)	1	<i>Tick the correct box</i> Parallel in a circuit	

QUESTION 2	Mark	Answer	Note
(a)	1	<i>State the correct meaning of momentum</i> The products of mass and velocity.	Reject: speed
(b)	1 1	<i>Correct substitution</i> 1.5 x 2 <i>Answer with the correct unit</i> 3.0 kg m s ⁻¹	
(c)	1	<i>Give the correct answer</i> The impact time is shorter.	
(d)	1	<i>Give the reason correctly</i> High impulsive force	
TOTAL	5		

QUESTION 3	Mark	Answer	Note
(a)	1	<i>State the change of energy involved correctly</i> Electrical energy → Heat energy	
(b)	1 1	<i>Give the correct comparison regarding to density</i> $Q = 0.5 \times 4200 \times (100 - 28)$ <i>Answer with the correct unit</i> $1.512 \times 10^5 \text{ J}$	
(c)	1 1	<i>Give the correct substitution</i> $\frac{(600)(160)}{0.04}$ <i>Answer with the correct unit</i> $2.4 \times 10^6 \text{ J kg}^{-1}$	
(d)	1 1	<i>State what happen to the heat at boiling point</i> Heat is used to overcome the attraction force between molecules <i>State the relationship between temperature and kinetic energy molecules</i> Kinetic energy of molecules unchanged , so the temperature unchanged	
TOTAL	7		

QUESTION 4	Mark	Answer	Note
(a)	1	State type of sound waves correctly Longitudinal// mechanical wave	
(b)	1	State the correct wave X-ray	
(c)	1	State the correct relationship between f and λ f is inversely proportional with λ // λ smallest	
(d)(i)	1	Correct substitution $v = 2500 \times 0.5$	
	1	Answer with the correct unit $= 1.25 \times 10^3 \text{ m/s}$	
(d)(ii)	1	Correct substitution $d = \frac{1}{2} vt = \frac{1}{2} (1.25 \times 10^3 \text{ m/s})(2.0 \text{ s})$	
	1	Answer with the correct unit $= 1.25 \times 10^3 \text{ m}$	

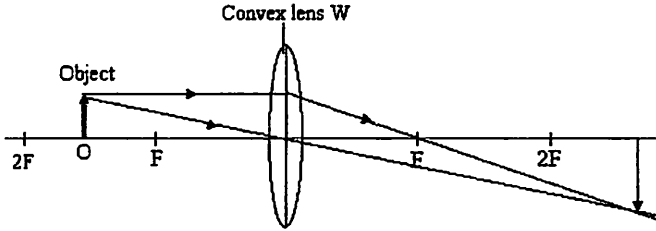
QUESTION 5	Mark	Answer	Note
(a)(i)	1	Give the correct meaning of density Mass per volume // $\frac{\text{mass}}{\text{Volume}}$ // symbol	Define the symbol
(a)(ii)	1	Give the correct comparison regarding to the density Density of water > oil // water > oil	Vice versa
(b)(ii)	1	Give the correct comparison regarding to the distance $d_1 > d_2$	Vice versa
(b)(iii)	1	Give the correct comparison regarding to the pressure Pressure of water > oil // water > oil	Vice versa
(c)	1	Give the correct relationship between density and pressure As the density increases the pressure increases // directly proportional	
(d)	1	State the correct relationship between depth and pressure The deeper the water the higher the pressure // $P = h\rho g$ // $P \propto h$	
	1	Give the correct comparison between the pressure in the tank and in the house (in the tap) The pressure in the tank > in the house (in the tap)	
	1	State the relationship between pressure and force The difference pressure produce force to flow the water // $F = PA$	
TOTAL	8		

QUESTION 6	Mark	Answer	Note
(a)(i)	1	<i>State the correct physical quantity</i> Potential difference across the cell	
(a)(ii)	1	<i>Give the correct comparison regarding to the voltmeter reading</i> The voltmeter reading in 6.1 > 6.2 // 6.1 > 6.2	Vice versa
(a)(iii)	1	<i>Give the correct comparison regarding to the brightness of the bulbs</i> The brightness of the bulbs in 6.2 > 6.1 // 6.2 > 6.1	Vice versa
(a)(iv)	1	<i>Give the correct comparison regarding to the ammeter reading</i> The ammeter reading in 6.2 > 6.1 // 6.2 > 6.1	Vice versa
(b)	1	<i>Give the correct relationship between the ammeter reading and the voltmeter reading</i> As the ammeter reading increases the voltmeter reading decreases // The larger the ammeter reading the smaller the voltmeter reading	
(c)(i)	1	<i>State the correct observation about the voltmeter reading</i> The voltmeter reading shows the highest reading	
(c)(ii)	1	<i>Give the reason correctly</i> The current not flow // open circuit // no load to the cell	
	1	Voltmeter shows the e.m.f of the cell	
TOTAL	8		

QUESTION 7

Part	Mark	Answer	Note
(a)	1	Unstable isotope	
(b)	1	8 days	
(c)	1	Decrease	
(d)	1	${}_{53}^{131}\text{I} \longrightarrow {}_{54}^{131}\text{Xe} + {}_{-1}^0\text{e}$	
(e)(i)	1	200 → 100 → 50 → 25 // 3T _{1/2}	
	1	15 hours	
(ii)	1	R	
(iii)	1	The highest reading // highest amount of radioactive is detected	
	1	Minus the reading before moves the GM tube	

Total | 10

QUESTION 8	Mark	Answer	Note
(a)	1	State the correct meaning of refraction The changes of direction and speed of light when it crosses the boundary between two materials of different optical densities.	
(b)	1 1 1	Complete the ray diagram correctly Line parallel principle axis bending through F, Straight from object pass through optical centre of the lens, Show / draw an image at correct position (intercept). 	
(c)	1	State the correct characteristics Real, inverted and magnified.	State all three characteristics
(d)(i)	1 1 1	Correct calculation or answer X: $m = 4$ Y: $m = 10$ Z: $m = 20$	
(d)(i)	1	Give the correct choice Y and Z	
(d)(ii)	1	Give the correct choice X and Z	
(e)(i)	1	State the correct choice Lens Z	
(e)(ii)	1	Give the correct reason Larger and clearer image.	
TOTAL	12		

SECTION B

QUESTION 9	Mark	Answer	Note	
(a) (i)	1	Force per unit area		
(ii)	1	Pressure on piston Q = pressure on piston R		
	1	Cross sectional area of piston Q < Cross sectional area of piston R		
	1	Force acted on piston Q < force acted on piston R		
	1	The greater the area, the greater the force		
	1	Pascal's principle		
(b)	1	aerofoil shape		
	1	The air speed on the upper surface > the air speed on the lower surface.		
	1	The pressure on the lower surface > pressure on the upper surface.		
	1	Different in pressure produce lift force.		
(c)	1,2 3,4 5,6 7,8 9,10 11,12 max 10	Design	Reasons	
		Thick wall	Water pressure increase with depth	
		High density material	Increase mass / can submerge easily	
		Strong material	Does not break easily	
		Aerodynamic shape	Reduce water resistance	
		Ballast tank	To increase or reduce weight	
		Sonar transmitter and receiver	To estimate distance and depth	
Total	20			

Part	Marks	Answer	Notes												
Question 10															
(a)	1	Circuit consists transistor, resistor and cell													
(a) (i)	1	10.1 : Microammeter no reading // 0 A, milliammeter no reading // 0 A													
(ii)	1	10.2 : Microammeter has a reading // 1×10^{-6} A , milliammeter has a reading // 1×10^{-3} A													
(iii)	1	Change in microammeter reading small, change in milliammeter reading is bigger													
(iv)	1 1	I_b Increase, I_c increase // I_c depends on I_b A small change in I_b caused a big change in I_c													
(b)	1 1 1 1	At night resistance LDR increases V_{BE} increases I_b increases and switch on transistor I_c increases and lights up bulb													
(c)	1,2 3,4 5,6 7,8 9,10	<table><tr><th>Modification</th><th>Explanation</th></tr><tr><td>Replace LDR with thermistor</td><td>To detect heat when temperature is high</td></tr><tr><td>Replace bulb with siren / bell</td><td>To produce sound</td></tr><tr><td>Connect relay switch to output transistor</td><td>To switch on the siren</td></tr><tr><td>Interchange the position of resistor R and thermistor</td><td>To increase base voltage // voltage across R // base current</td></tr><tr><td>Use 240 V power supply</td><td>Siren is function at high voltage</td></tr></table>	Modification	Explanation	Replace LDR with thermistor	To detect heat when temperature is high	Replace bulb with siren / bell	To produce sound	Connect relay switch to output transistor	To switch on the siren	Interchange the position of resistor R and thermistor	To increase base voltage // voltage across R // base current	Use 240 V power supply	Siren is function at high voltage	Accept any reasonable modification
Modification	Explanation														
Replace LDR with thermistor	To detect heat when temperature is high														
Replace bulb with siren / bell	To produce sound														
Connect relay switch to output transistor	To switch on the siren														
Interchange the position of resistor R and thermistor	To increase base voltage // voltage across R // base current														
Use 240 V power supply	Siren is function at high voltage														
	20 marks														

SECTION C

Bhg	Mrk	Jawapan	Catatan
Soalan 11			
(a)	1	The distance from the primary focus to the optical center	
(b)	1 2 3 4 5 6 7 8 9 10	It should be convex The magnified image can be obtained Percentage of light of the lenses should be high The image would be brighter and clearer Its focal length should be short The power of lens will be high and can be focused at a short distance diameter of lens should be large it gives a bigger display the most suitable brand is J type of lens is convex, percentage of light is high , focal length is short and size is bigger	
(c) (i)	1 2	$1/f = 1/v + 1/u$ $1/5 = 1/2 + 1/v$ $v = -3.33\text{cm}$	
(ii)	1 2	magnification = v/u $3.33/2$ 1.67 times Or $5/3$ times	
(d)	1 2 3 4 5	The lens is directed to a distant object such as tree The screen was adjusted behind the lens until a sharp image formed the distance between the lens and the screen measured The power of the lens are determined using $1/f$ The shorter the focal length the more the power of lens.	
Total	20 M		

QUESTION 12

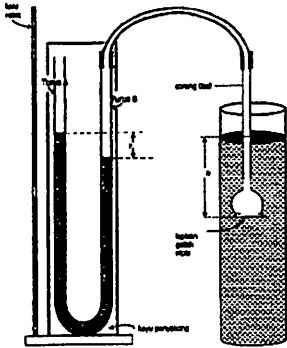
Part	Mark	Answer	Note
(a)(i)	1	Step-down	
(ii)	1	An alternating current flows through coil.	
	1	The soft -iron core is magnetized.	
	1	The magnet produced varies in magnitude and direction.	
	1	This causes a changing magnetic flux to pass through the secondary coil.	
	1	An induced e.m.f across the secondary coil is produced.	
		Max 4	
(b)	1	$I = 24/12$	
	1	$= 2A$ (with unit)	
	1	Efficiency = $\frac{\text{Output power}}{\text{Input power}} \times 100 \%$	
	1	$\frac{24 \times 100}{40}$	
	1	60W	
	1,2	Thick	Reduce the resistance of the coil
	3,4	Soft iron	Reduce the hysteresis loss// can be magnetized and demagnetized easily// Little energy used to be magnetized and demagnetized .
	5,6	Laminated	Make the iron core as insulation. Eddy current are not able to flow through the layers of insulation// reduce eddy current
	7,8	Low// near//shorter	Reduce leakage of magnetic flux
	9,10	Choose P because copper wire thick, soft iron core, laminated core and distance is low.	
Total	20		

SKEMA FIZIK KERTAS 3 4531/3
PEPERIKSAAN PERCUBAAN SPM 2010

No	Mkh	Jawapan																																							
Soalan 1																																									
(a) (i)	1	Daya (***)oleh terima ujikaji menggunakan tali kenyal)																																							
(ii)	1	pecutan																																							
(iii)	1	jisim troli / tinggi penggantung dan jisimnya dari lantai.																																							
(b) (i)		<table><tr><th>F / N</th><th>x/cm</th><th>y/ cm</th><th>$a/ cm s^{-1}$</th></tr><tr><td>0.5</td><td>2.6</td><td>4.6</td><td>10.0</td></tr><tr><td>1.0</td><td>3.5</td><td>7.9</td><td>22.0</td></tr><tr><td>1.5</td><td>4.6</td><td>10.8</td><td>31.0</td></tr><tr><td>2.0</td><td>5.0</td><td>12.7</td><td>38.5</td></tr><tr><td>2.5</td><td>5.8</td><td>16.0</td><td>51.0</td></tr></table> <p>** (Perhatian untuk pemeriksa: sila ukur semula x dan y kerana kemungkinan saiz kertas berubah)</p> <p><u>Pengukuran (3 markah)</u></p> <p>1 -semua bacaan x dan y diukur dgn betul</p> <p>1 -minimum 3 set bacaan x dan y betul (terima jawapan tanpa tempat perpuluhan</p> <p>1 - tekal pada 1 t.p</p> <p>**pelajar tidak perlu tunjukkan pengiraan, lihat terus dalam jadual.</p> <p><u>penjadualan (4 markah)</u></p> <p>1 -rangka $F / N, x/ cm, y/cm, a/ cm s^{-1}$ (simbol/nama) dpt 1 markah</p> <p>1 -menyatakan unit bagi F, x, y dan a dgn betul dpt 1 markah</p> <p>1 -semua nilai a dihitung dengan betul dpt 1 markah</p> <p>1 -tekal dpt 1 markah</p> <p>(c)</p> <p><u>melukis graf (5 markah)</u></p> <p>beri \checkmark pada perkara berikut</p> <p>-menyatakan unit pembolehubah dgn betul (ecf unit dpd jadual) \checkmark</p> <p>-pembolehubah bergerakbalas (acceleration) pd paksi-x dan pembolehubah dimanipulasi (force) pd paksi-y \checkmark</p> <p>-kedua-dua paksi mempunyai skala seragam dan genap \checkmark</p> <p>-5 titik diplot dgn betul \checkmark</p> <p>atau 3-6 titik diplot dgn betul (0-2 dapat 0 markah) \checkmark</p> <p>-garis lurus penyesuaian terbaik (dari asalan) \checkmark</p> <p>-saiz minimum 5X4 petak 2 cm x 2 cm \checkmark</p> <table><tr><th>Bilangan /</th><th>skor</th></tr><tr><td>7</td><td>5</td></tr><tr><td>5-6</td><td>4</td></tr><tr><td>3-4</td><td>3</td></tr><tr><td>2</td><td>2</td></tr><tr><td>1</td><td>1</td></tr></table> <p>(d)</p> <p>1 a berkadar langsung dgn F (berdasarkan graf dilukis)</p> <tr><td>Jumlah</td><td>16</td><td></td></tr>	F / N	x/cm	y/ cm	$a/ cm s^{-1}$	0.5	2.6	4.6	10.0	1.0	3.5	7.9	22.0	1.5	4.6	10.8	31.0	2.0	5.0	12.7	38.5	2.5	5.8	16.0	51.0	Bilangan /	skor	7	5	5-6	4	3-4	3	2	2	1	1	Jumlah	16	
F / N	x/cm	y/ cm	$a/ cm s^{-1}$																																						
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5-6	4																																								
3-4	3																																								
2	2																																								
1	1																																								
Jumlah	16																																								

Question 2

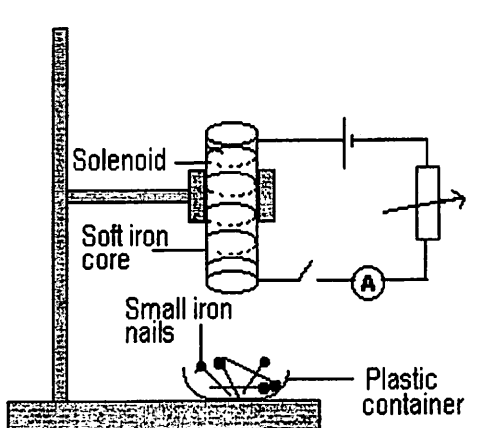
Section	Mark	Marking scheme
2 (a)(i)	1	V decreases linearly with I
(ii)	1	Extrapolate the graph
	1	3.5 V
(iii)	1	Electromotive force//e.m.f.//d.g.e.
(b)	1	Draw a sufficient large triangle (minimum size is 8 cm x 8 cm)
	1	* Correct substitution(follow candidate's triangle)
	1	$\frac{1.5 - 3.5}{1.2 - 0}$
(ii)	1	State the value /answer with unit $1.67 \text{ VA}^{-1} / \Omega$
(c)	1	Show the vertical line from I = 0.60 A until touch the graph then horizontal line until it touches the V-axis
	1	V = 2.5 V
(d)	1	E = I(R+r)
	1	3.5 = 0.6(1.67 + R)
	1	R = 4.16 Ω
(d)	1	-Repeat the experiment and take average// -switch of the circuit when not taking any reading// -Eye position must be perpendicular to scale of meter ruler
total	12	

Question 3		
Mark	Section	Answer
1 st	3 (a)	<u>State a suitable inference</u> The density of the water affects the pressure.
1 st	(b)	<u>State relevant hypothesis (with direction)</u> as the density increase , the different level/pressure increase.
1	(c)	Describe a complete and suitable experimental framework
1 st		<u>State the aim of the experiment</u> To investigate the relationship between the density of liquid and the pressure/ different level.
2 nd		<u>State the manipulated variable and the responding variable</u> Manipulated variable : density Responding variable : pressure/ different level
3 rd		<u>State the constant variable</u> Constant variable : Depth
4 th		<u>List out the important apparatus and materials</u> Tall beaker, small thistle funnel, flexible tube, manometer, meter rule, retort stand, liquids.
5 th		<u>State a function arrangement of the apparatus</u> A manometer is connected to thistle funnel with rubber tube 
6 th		<u>State the method of controlling the manipulated variable</u> Insert the thistle funnel vertically down to the bottom of the beaker of liquid density of 1.2 gcm^{-3}
7 th		<u>State the method of measuring the responding variable</u>

		Measure the different level in manometer, l .												
8 th		<u>Repeat the experiment at least 4 times with different values</u> Repeat the experiment 4 time using another liquid with different density such as 1.5 gcm^{-3} . 2.0 gcm^{-3} . 3.0 gcm^{-3} 3.5 gcm^{-3} and 4.0 gcm^{-3}												
9 th		<u>Tabulate the data</u> Records the data . <table><tr><th>Density/ gcm^{-3}</th><th>Pressure (different level) ,l/Pa</th></tr><tr><td>1.2</td><td></td></tr><tr><td>1.5</td><td></td></tr><tr><td>2.0</td><td></td></tr><tr><td>3.0</td><td></td></tr><tr><td>3.5</td><td></td></tr></table>	Density/ gcm^{-3}	Pressure (different level) , l/Pa	1.2		1.5		2.0		3.0		3.5	
Density/ gcm^{-3}	Pressure (different level) , l/Pa													
1.2														
1.5														
2.0														
3.0														
3.5														
10 th		<u>State how data will be analysed (sketch graph/statement)</u> Plot graph pressure against density.												
Total	12													

Question 4

Section	Mark	Answer
4 (a)	1	<i>State a suitable inference</i> The electric current affects the loudness of the bell // The loudness of the bell depends on the electric current
4 (b)	1	<i>State relevant hypothesis (with direction)</i> The strength of an electromagnet increases as the current increases
4(c)		<i>Describe a complete and suitable experimental framework (10 marks)</i>
4 c (i)	1	<u>State the aim of the experiment(M1)</u> To investigate the relationship between electric current and the strength of an electromagnet
4c (ii)	1	<u>State the manipulated variable and the responding variable(M2)</u> Manipulated variable : electric current Responding variable : strength of an electromagnet
	1	<u>State the constant variable (M3)</u> Constant variable : number of turn solenoid // soft iron core
4 c(iii)		<u>List out the important apparatus and materials (M4)</u>

	1	Ammeter, connection wires, rheostat, retort stand, ,switch, d.c. supply , soft iron core, solenoid, small iron nails and plastic container.												
4 c(iv)	1	<p><u>State a functionable arrangement of the apparatus (M5)</u></p> 												
4 c(v)	1	<p><u>State the method of controlling the manipulated variable (M6)</u></p> <p>The switch is closed. The reading of the ammeter is recorded = I The end of the solenoid is dipped into the plastic container full of small iron nails.</p>												
4 c(vi)	1	<p><u>State the method of measuring the responding variable (M7)</u></p> <p>The plastic container is removed and the number of nails attached to the electromagnet is counted = N</p>												
4c(vii)	1	<p><u>Reapeat the experiment at least 4 times with different values (M8)</u></p> <p>The experiment is repeated 5 times with different value of current by adjusting the rheostat.</p>												
4c(viii)	1	<p><u>Tabulate the data (M9)</u></p> <table><tr><th>Current, I/A</th><th>Number of small iron nail,N</th></tr><tr><td>0.1</td><td></td></tr><tr><td>0.2</td><td></td></tr><tr><td>0.3</td><td></td></tr><tr><td>0.4</td><td></td></tr><tr><td>0.5</td><td></td></tr></table>	Current, I/A	Number of small iron nail,N	0.1		0.2		0.3		0.4		0.5	
Current, I/A	Number of small iron nail,N													
0.1														
0.2														
0.3														
0.4														
0.5														
4c(ix)	1	<p><u>State how data will be analysed (sketch graph/statement) (M10)</u></p> <p>Plot graph N against I</p>												
TOTAL	12													