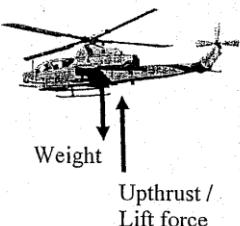
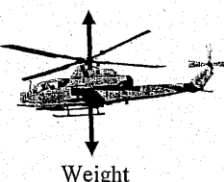


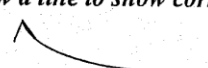
MAKTAB RENDAH SAINS MARA
SPM TRIAL EXAMINATION 2012
ANSWERS : PAPER 1

Question No.	Answer
1	C
2	B
3	D
4	B
5	B
6	A
7	C
8	B
9	C
10	A
11	D
12	C
13	D
14	A
15	B
16	A
17	C
18	A
19	C
20	A
21	D
22	B
23	D
24	C
25	B

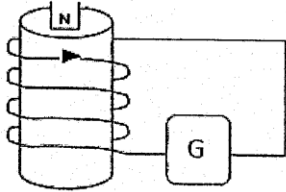
Question No.	Answer
26	D
27	A
28	C
29	A
30	B
31	D
32	D
33	A
34	B
35	C
36	C
37	D
38	B
39	D
40	A
41	B
42	B
43	C
44	D
45	B
46	C
47	A
48	D
49	B
50	D

MAKTAB RENDAH SAINS MARA
SPM TRIAL EXAMINATION 2012
PHYSICS PAPER 2

Question No.	Mark	Suggested Answer	Note
1	(a)	1 <i>Tick the correct box</i> <input checked="" type="checkbox"/> Transverse waves	
	(b)	1 <i>State the correct point</i> OQ	
	(c)(i)	1 <i>Tick the correct box</i> <input checked="" type="checkbox"/> remains unchanged	
	(c) (ii)	1 <i>State the answer correctly</i> Energy	
TOTAL A1 = 4 marks			
2	(a)	1 <i>State the meaning correctly</i> Rate of change of <u>displacement</u>	Reject : distance
	(b)	1 1 <i>Mark and label the two forces correctly</i> U : Upthrust W : Weight <div style="display: flex; align-items: center; justify-content: center;">  or  </div>	Reject Normal reaction
	(c)	1 st <i>Calculate the value of the final velocity correctly</i> Show substitution $v^2 = u^2 + 2as$ $v^2 = 0 + 2(10)(120)$ 2 nd State correct answer, with correct unit $v = \sqrt{2400}$ $v = 48.99 \text{ m s}^{-2}$	Reject No unit
TOTAL A2 = 5 marks			

Question No.	Mark	Suggested Answer	Note
3	(a)(i)	1 <i>Name the correct physical quantity</i> Length // Volume	
	(a)(ii)	1 <i>State the correct physical properties.</i> Opaque // expands uniformly // does not stick to glass	
	(b)	1 <i>Calculate the temperature correctly</i> Show calculation $= \frac{10}{25} \times 100^{\circ}\text{C}$	
		1 State answer with unit $= 40^{\circ}\text{C}$	Reject No unit
	(c)	1 <i>State one method to improve thermometer sensitivity correctly</i> Reduce the cross section of capillary tube // Reduce the thickness of bulb wall	
	(d)	1 <i>State type of liquid correctly</i> Alcohol	
TOTAL A3 = 6 marks			
4	(a)	1 <i>State the meaning of thermionic emission correctly</i> A <u>process</u> whereby electrons escape from the surface of heated metal	Reject if no word "process"
	(b)(i)	1 <i>Name the structure X correctly</i> Cathode	Reject Filament
	(b) (ii)	1 <i>Draw a line to show correct deflection of the electron beam</i>  (towards the positive plate)	
	(b) (iii)	1 <i>State the correct change of deflection</i> Increases	
	(c)(i)	1 <i>Calculate the kinetic energy correctly</i> Show substitution $E = e V$ $= 1.6 \times 10^{-19} \text{ C} \times 3000 \text{ J C}^{-1} // 1.6 \times 10^{-19} \text{ C} \times 3000 \text{ V}$ State answer and unit $= 4.8 \times 10^{-16} \text{ J}$	
	(c)(ii)	1 <i>State the change and reason correctly.</i> The kinetic energy of electron decreases. Reason : Principle of Conservation of Energy	
TOTAL A4 = 7 marks			

Question No.	Mark	Suggested Answer	Note
5	(a)	1 <i>Name the wave phenomenon correctly</i> Refraction of light wave	
	(b)(i)	1 <i>State the comparison correctly</i> Angle r in Diagram 5.1 (a) is smaller	
	(b)(ii)	1 <i>State the comparison correctly</i> Speed of light in diagram 5.1(b) is smaller	
	(c)(i)	1 <i>State the relationship between angle r and speed of light in medium X correctly</i> The greater the angle r , the greater the speed of light in medium X	
	(c)(ii)	1 <i>State the relationship speed of light and medium density between correctly</i> The smaller // lower the medium density, the greater the speed of light	
	(d)	1 <i>State the correct deduction</i> The greater the angle r , the smaller // lower the medium density	
	(e)	1 <i>State of the changes in the speed of light correctly</i> Increases 1 <i>Explain the reason correctly</i> Air density is smaller // lower <u>OR</u> Light travels from dense medium to less dense medium	
TOTAL A5 = 8 marks			

Question No.	Mark	Suggested Answer	Note
6	(a)	1 State the definition of electromagnetic induction correctly. The production of induced e.m.f./ current in a conductor/wire when there is cutting/ changing of magnetic flux/field	Must have word : 1) induced 2) wire or conductor
	(b)(i)	1 Compare the number of turns correctly The number of turns in Diagram 6.1 is greater than in Diagram 6.2	
	(b)(ii)	1 Compare the deflection of the galvanometer pointer correctly The deflection of the galvanometer pointer in Diagram 6.1 is greater than in Diagram 6.2	
	(b)(iii)	1 Relate the number of turns and the deflection of the galvanometer pointer correctly When the number of turns increases, the deflection of pointer increases	
	(b)(iv)	1 Relate the rate of cutting of flux and the induced current correctly When the rate of cutting of magnetic flux increase, the induced current produced increases	
	(c)	1 Name the law correctly Faraday's Law	
	(d)(i)	1 State the polarity of X correctly North	
	(ii)	1 Draw the direction of the induced current correctly 	
TOTAL A6 = 8 marks			

Question No.	Mark	Suggested Answer	Note
7	(a)	1 <i>Name the detector correctly</i> Geiger Muller tube // GM tube	Reject : gm tube
	(b)(i)	1 <i>Name the radiation correctly</i> Beta particle // β particle // β radiation	Must have particle
	(ii)	1 <i>Name the nature of the radiation correctly</i> High energy electron // fast moving electron	Reject : electron
	(ii)	1 <i>Draw correctly the deflection of radiation correctly</i> β particle – deflected downwards <div data-bbox="577 714 1062 1003" data-label="Image"> </div>	
	(d)(i)	1 <i>State the type of radiation used correctly</i> Gamma ray // γ ray 1 <i>State reason correctly</i> Can kill germs/ insects/ fungus/ bacteria// High penetrating power/ High energy	Must have the word “ray”
	(d)(ii)	1 <i>State desired half-life correctly</i> Long 1 <i>State reason correctly</i> Long lasting	
	(d)(iii)	1 <i>State state desired physical state correctly</i> Solid 1 <i>State reason correctly</i> Easy to handle // Not easily spilled // Does not vaporise easily	
TOTAL A7 = 10 marks			

Question No.		Mark	Suggested answer	Note				
8	(a)	1	State the principle correctly Archimedes'// Floatation// Buoyancy					
	(b)	1	State the relationship correctly Buoyant force is equal to weight of object // Buoyant Force = Weight of object	Reject formula				
	(c)(i)	1 1	Calculate the buoyant force correctly Show substitution $F_b = mg$ $= 0.05 \text{ kg} \times 10 \text{ N kg}^{-1}$ Answer with unit $= 0.5 \text{ N}$	Reject No unit				
	(c)(ii)	1 1	State the depth change correctly Increases Explain the answer correctly Density is smaller // Buoyant force is smaller					
	(d)(i)	1 1	State the shape of sampan correctly Aerodynamic // streamline State the reason correctly Low resistance // low water resistance	Reject aerofoil				
	(d)(ii)	1 1 1	Calculate the mass correctly Correct equation $F_b = \rho V g$ $mg = \rho (Ah) g$ Correct substitution $m + 100 = 1000 \times 2 (0.5-0.12)$ Answer with unit $m = 660 \text{ kg}$ <u>OR</u> <table border="1"><tr><td>$F_b = mg$ $F_b = (m + 100)10$ \checkmark^1</td><td>$F_b = \rho V g$ $F_b = \rho Ahg$ $= 1000(2)(0.5-0.12)(10)\checkmark^2$ $= 7600 \text{ N}$</td></tr><tr><td colspan="2">$(m + 100)10 = 7600 \text{ N}$ $m = 660 \text{ kg}$ \checkmark^3</td></tr></table>	$F_b = mg$ $F_b = (m + 100)10$ \checkmark^1	$F_b = \rho V g$ $F_b = \rho Ahg$ $= 1000(2)(0.5-0.12)(10)\checkmark^2$ $= 7600 \text{ N}$	$(m + 100)10 = 7600 \text{ N}$ $m = 660 \text{ kg}$ \checkmark^3		
$F_b = mg$ $F_b = (m + 100)10$ \checkmark^1	$F_b = \rho V g$ $F_b = \rho Ahg$ $= 1000(2)(0.5-0.12)(10)\checkmark^2$ $= 7600 \text{ N}$							
$(m + 100)10 = 7600 \text{ N}$ $m = 660 \text{ kg}$ \checkmark^3								
	(d)(iii)	1	State the choice correctly Q					
TOTAL A8 = 12 marks								

Question No.	Mark	Suggested answer	Note												
9	(a)	1 <i>State the definition correctly</i> Momentum is the product of mass and velocity	Reject : symbol Accept : symbol with explanation												
	(b)(i)	1 <i>Compare the number of passengers correctly</i> The number of passenger in Diagram 9.1.1 is greater than Diagram 9.1.2 // 9.1.1 Two/2 persons, 9.2.1 One/1 person													
	(b)(ii)	1 <i>Compare the damage of the tyres correctly</i> The damage of tyre in Diagram 9.1.2 is more than Diagram 9.2.2													
	(b)(iii)	1 <i>Relate damage of the tyres and the total mass correctly</i> The number of passenger increases, the total mass increase.													
	(b)(iv)	1 <i>Relate the damage of the tyres & the impulsive force correctly</i> The higher the damage, the higher the impulsive force.													
	(b)(v)	1 <i>Deduce the corerect relationship between mass & impulsive force correctly</i> When the mass increase, the impulsive force also increases													
	(c)	1 st 2 nd 3 rd 4 th <i>Explain how helmet prevents serious head injury in an accident correctly</i> The inner part of helmet is made of soft material Reduces impulsive force // Increase time of impact/collision The outer part of helmet made of strong material Does not easily break during collision													
	(d)	1 st 2 nd 3 rd 4 th 5 th 6 th 7 th 8 th 9 th 10 th <i>State the suitable modification and justifications correctly</i> <table><tr><th>Modification</th><th>Reason</th></tr><tr><td><u>Frame</u> Strong//Lighter//Low mass</td><td>Does not easily break // Bigger acceleration // Lighter</td></tr><tr><td><u>Shape</u> Aerodynamic//Diamond// Pear shape</td><td>Less resistance//Increases speed//Increase acceleration</td></tr><tr><td><u>Engine</u> High power</td><td>High speed//High acceleration</td></tr><tr><td><u>Wet condition</u> Tyre tread/Tyre made of soft compound // Tyre has more grooves</td><td>More friction // More grip // More traction</td></tr><tr><td><u>Type of brake</u> Disc brake</td><td>Less heat to the brakes // Shorter braking distance // Avoids skidding</td></tr></table>	Modification	Reason	<u>Frame</u> Strong//Lighter//Low mass	Does not easily break // Bigger acceleration // Lighter	<u>Shape</u> Aerodynamic//Diamond// Pear shape	Less resistance//Increases speed//Increase acceleration	<u>Engine</u> High power	High speed//High acceleration	<u>Wet condition</u> Tyre tread/Tyre made of soft compound // Tyre has more grooves	More friction // More grip // More traction	<u>Type of brake</u> Disc brake	Less heat to the brakes // Shorter braking distance // Avoids skidding	Max : 10 marks
Modification	Reason														
<u>Frame</u> Strong//Lighter//Low mass	Does not easily break // Bigger acceleration // Lighter														
<u>Shape</u> Aerodynamic//Diamond// Pear shape	Less resistance//Increases speed//Increase acceleration														
<u>Engine</u> High power	High speed//High acceleration														
<u>Wet condition</u> Tyre tread/Tyre made of soft compound // Tyre has more grooves	More friction // More grip // More traction														
<u>Type of brake</u> Disc brake	Less heat to the brakes // Shorter braking distance // Avoids skidding														
TOTAL B9 = 20 marks															

Question No.	Mark	Suggested answer	Note																		
10	(a)(i)	1 <i>State the meaning of electric field correctly</i> Electric field is a region in which an electric charge experiences a force																			
	a)(ii)	1 st 2 nd 3 rd 4 th 5 th <i>Compare the voltage between the plates P and Q correctly</i> The voltage between the plates in 10.1 is equal / same with 10.2 <i>Compare the distance between the plates P and Q correctly</i> The distance between P & Q in 10.1 is shorter//smaller than 10.2 <i>Compare the frequency of oscillations of the ball correctly</i> The frequency in Diagram 10.1 is greater / higher than in 10.2 <i>State the relationship between the distance between the plates P and Q with the frequency of oscillations of the ping-pong ball correctly</i> The longer the distance the higher the frequency <i>Deduce the relationship between distance between plates and electric field strength correctly</i> The longer the distance between the plates, the higher the strength of the electric field																			
	(b)	1 st 2 nd 3 rd 4 th <i>Explain the reason correctly</i> - Friction between the tanker and air molecules - produces electrostatic charge on the tanker body. - The charge on the tanker body is neutralized /discharged by the surrounding air via the metal chain. - No danger of electric sparks which can cause fire during loading or unloading of fuel/petrol																			
	(c)	<i>State the features and the explanations correctly</i> <table><thead><tr><th>Suitable Feature</th><th>Explanation</th></tr></thead><tbody><tr><td>Use parallel circuit</td><td>The bulbs can switched on and off individually/separately</td></tr><tr><td>Lightning conductor</td><td>Transfers lightning charges to the ground / earth</td></tr><tr><td>Fuse</td><td>Melts when short circuit occurs</td></tr><tr><td>Circuit breaker</td><td>Switches off current when overloaded</td></tr><tr><td>Separate circuit for heavy duty & frequently used appliances</td><td>To protect electrical appliances from damage</td></tr><tr><td>Solar panel</td><td>Less electrical usage//Solar power converted to electrical energy</td></tr><tr><td>Thermostat</td><td>Automatic switch to respond to temperature changes</td></tr><tr><td>Sensor(s)</td><td>Switches off electrical appliances when not in use</td></tr></tbody></table>	Suitable Feature	Explanation	Use parallel circuit	The bulbs can switched on and off individually/separately	Lightning conductor	Transfers lightning charges to the ground / earth	Fuse	Melts when short circuit occurs	Circuit breaker	Switches off current when overloaded	Separate circuit for heavy duty & frequently used appliances	To protect electrical appliances from damage	Solar panel	Less electrical usage//Solar power converted to electrical energy	Thermostat	Automatic switch to respond to temperature changes	Sensor(s)	Switches off electrical appliances when not in use	Focus is on building design ∴ Reject energy saver appliances eg. Fluorescent lamp Green tech.: Must be specific to building design Max : 10 marks
Suitable Feature	Explanation																				
Use parallel circuit	The bulbs can switched on and off individually/separately																				
Lightning conductor	Transfers lightning charges to the ground / earth																				
Fuse	Melts when short circuit occurs																				
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Solar panel	Less electrical usage//Solar power converted to electrical energy																				
Thermostat	Automatic switch to respond to temperature changes																				
Sensor(s)	Switches off electrical appliances when not in use																				
TOTAL B10 = 20 marks																					

Question No.	Mark	Suggested answer	Note									
11	(a)	1 <i>Name the process of energy transfer correctly</i> Radiation										
	(b)(i)	1 st 2 nd 3 rd 4 th <i>Explain the reason correctly</i> <ul style="list-style-type: none"> - Sand and sea water receive same amount of heat. - Specific heat capacity of sand is low. - Specific heat capacity of sea water high. - Sand become hot faster than sea water // Temperature of sand higher than temperature of sea water// Sand hotter than sea water// Sea water cooler than sand										
	(c)	1 st , 2 nd 3 rd , 4 th 5 th , 6 th 7 th , 8 th 9 th 10 th <i>States the suitable characteristics & justifications correctly</i> <table border="1"> <thead> <tr> <th>Characteristics</th><th>Explanations</th></tr> </thead> <tbody> <tr> <td>Glass cover</td><td>Reduces heat loss // Traps heat/infrared radiation</td></tr> <tr> <td>Black panel</td><td>Absorbs most of visible light // Absorbs more solar energy // Little reflection of light energy</td></tr> <tr> <td>Large number of turns (for pipe coils in water tank)</td><td>Bigger surface area for heat transfer // More efficient heat transfer // Transfers more heat/energy // Heats up water (in water tank) faster</td></tr> <tr> <td>Low specific heat capacity (water pipes)</td><td>Transfers heat faster// Absorbs and releases heat faster//</td></tr> </tbody> </table> <i>State the suitable solar heater correctly</i> Q <i>State the reasons correctly</i> Because it has glass cover, black panel, the water pipe has a large number of turns and of medium specific heat capacity.	Characteristics	Explanations	Glass cover	Reduces heat loss // Traps heat/infrared radiation	Black panel	Absorbs most of visible light // Absorbs more solar energy // Little reflection of light energy	Large number of turns (for pipe coils in water tank)	Bigger surface area for heat transfer // More efficient heat transfer // Transfers more heat/energy // Heats up water (in water tank) faster	Low specific heat capacity (water pipes)	Transfers heat faster// Absorbs and releases heat faster//
Characteristics	Explanations											
Glass cover	Reduces heat loss // Traps heat/infrared radiation											
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Large number of turns (for pipe coils in water tank)	Bigger surface area for heat transfer // More efficient heat transfer // Transfers more heat/energy // Heats up water (in water tank) faster											
Low specific heat capacity (water pipes)	Transfers heat faster// Absorbs and releases heat faster//											
(d)(i)	1 st 2 nd <i>Show the calculation for the amount of heat absorbed by the water correctly</i> Showing correct substitution $Q = mc\theta = 2 \times 4200 \times (50 - 30)$ States correct answer with unit $Q = 400 \text{ J}$	Reject No unit										
(d) (ii)	1 st 2 nd 3 rd <i>Show the calculation for specific heat capacity correctly.</i> $Q_{\text{metal}} = Q_{\text{water}} // mc\theta_{\text{metal}} = mc\theta_{\text{water}}$ $400 = 0.5 \times c \times 40$ $c = 20 \text{ J kg}^{-1} \text{ } ^\circ\text{C}^{-1}$											

TOTAL C11 = 20 marks

Question No.	Mark	Suggested answer	Note										
12	(a)(i)	1 <i>State the meaning of longitudinal waves correctly</i> The longitudinal waves are waves in which the vibration of the particles in the medium is parallel to the direction of propagation of the waves // Waves in which the vibrations are parallel to the direction of the waves travel											
	(ii)	1 <i>State one difference between the propagation of longitudinal waves and transverse waves correctly</i> Longitudinal waves propagate in the same direction as its vibrations while transverse waves propagate perpendicular to the direction of the vibrations.											
	(iii)	1 st 2 nd 3 rd <i>State how to produce guitar sound that is louder & higher pitched, correctly</i> Pluck the string harder Vibration/Wave <u>amplitude increases</u> Use thinner / shorter guitar string String vibrates at higher frequency	Max: 3 marks										
	(b)	<i>States the suitable characteristics and the explanations correctly</i> <table border="1"><thead><tr><th>Characteristic</th><th>Explanation</th></tr></thead><tbody><tr><td>High speed</td><td>Information can be sent and received quickly</td></tr><tr><td>Short wavelength</td><td>Less diffraction</td></tr><tr><td>Less / low energy dissipated</td><td>Receive information clearly // Less loss of information to surrounding</td></tr><tr><td>Reflected by ionosphere</td><td>Signal reaches receiver / antenna / radio clearly</td></tr></tbody></table>	Characteristic	Explanation	High speed	Information can be sent and received quickly	Short wavelength	Less diffraction	Less / low energy dissipated	Receive information clearly // Less loss of information to surrounding	Reflected by ionosphere	Signal reaches receiver / antenna / radio clearly	
	Characteristic	Explanation											
High speed	Information can be sent and received quickly												
Short wavelength	Less diffraction												
Less / low energy dissipated	Receive information clearly // Less loss of information to surrounding												
Reflected by ionosphere	Signal reaches receiver / antenna / radio clearly												
	9 th <i>State the suitable wave correctly</i> S												
	10 th <i>State the reasons correctly</i> Wave has high speed, moderate range of wavelength, less energy dissipated and is reflected by the ionosphere.												

Question No.	Mark	Suggested answer	Note
12	(c)(i)	<p><i>Show calculation of wavelength of sound waves correctly.</i> <i>Show correct substitution</i></p> $v = f \lambda \quad // \quad \lambda = \frac{v}{f}$ <p>1st</p> $\lambda = \frac{330}{100}$ <p>2nd</p> <p><i>State the answer with the correct unit</i> $\lambda = 3.3 \text{ m}$</p>	
	(c) (ii)	<p><i>Show the calculation of distance of ship from cliff correctly.</i> <i>Show correct substitution</i></p> $s = \frac{v t}{2}$ $= \frac{330 \times 4}{2}$ <p>1st</p> <p>2nd</p> <p><i>State the answer with the correct unit</i> $s = 660 \text{ m}$</p>	
	(c) (iii)	<p>1</p> <p><i>State the answer correctly</i> <u>No</u>, the ship will not collide with the cliff</p>	
TOTAL C12 = 20 marks			

PEPERIKSAAN PERCUBAAN SPM 2012 MRSM

Corrections : Physics Mark Scheme

	Question	Answer			
Paper 1	20	B			
Paper 2	9(b)(iii)	<i>Relate damage of the tyres and the total mass correctly</i> When the total mass increases, the damage increases			
	10 a)(ii)	<i>State the relationship between the distance between the plates P and Q with the frequency of oscillations of the ping-pong ball correctly</i> The smaller the distance the higher the frequency			
	11(b)(i)	Reject explanation using concept of pressure			
	11(d)(i)	<i>Show the calculation for the amount of heat absorbed by the water correctly</i> Showing correct substitution $Q = mc\theta = 2 \times 4200 \times (50 - 30)$ States correct answer with unit $Q = 168\,000 \text{ J}$			
	11(d)(i)	<i>Show the calculation for specific heat capacity of metal correctly .</i> $Q_{\text{metal}} = Q_{\text{water}} // mc\theta_{\text{metal}} = mc\theta_{\text{water}}$ $168\,000 \text{ J} = 0.5 \times c \times 40$ $c = 8400 \text{ J kg}^{-1}\text{C}^{-1}$ (I'm not happy with the value of c here. Value is too big for metal)			
	12	<i>States the suitable characteristics and the explanations correctly(3rd & 4th marks)</i> <table border="1"><thead><tr><th>Characteristic</th><th>Explanation</th></tr></thead><tbody><tr><td>Long wave</td><td>More diffraction</td></tr></tbody></table>	Characteristic	Explanation	Long wave
Characteristic	Explanation				
Long wave	More diffraction				
P3	1 (b) & (c)	Please measure y for all Diagrams and modify the values of y and a accordingly I believe our diagrams for each chart & graph may be different in size (mine not the same as Rozi's). Problem due to inaccurate printing reproduction by the printer appointed by BAP) (TQ Rozilawati of MRSM Kuala Berang for preparing the corrections for P1, P2 and P3)			
	2(b)(iii)	<i>Calculate the current correctly.</i> $E = I(R + r)$ $1.5 = I(20 + 0.6)$ $\therefore I = 0.0728 \text{ A}$			

HK/BPM/13September2012