Question	Answer		Mark	
1 (a)(i)	Manipulated variable = Depth of the rod immersed // d		1	
(ii)	Responding variable = Reading of spring bala	ance // Bouyant Force // F	1	
(iii)	Constant variable = Cross sectional area of Gravitational Force, g	rod // Density of liquid //	1	
(b) (i)	$W_0 = 0.10 N$		1	
(ii)	W = 0.88, 0.76, 0.64, 0.52, 0.40 All correct : 2 marks At least 3 correct : 1 mark		2	
(iii)	F = 0.12, 0.24, 0.36, 0.48, 0.60		1	
(c)	d/cm W/N 5.0 0.88 10.0 0.76 15.0 0.64 20.0 0.52 25.0 0.40 1 mark – 3 columns for d, W and F 1 mark – correct units for each d, W and F	F/N 0.12 0.24 0.36 0.48 0.60	3	
	1 mark – all values W and F are consistent 2 d.p			

(d)	Draw the graph of F against d .	5	
	A - Label y-axis and x-axis correctly $$		
	B - States the unit at the axis correctly $$		
	- Both axes with the even and uniform scale $$		
	- 5 points correctly plotted: $\sqrt{}$		
	- at least 3 points correctly plotted $$		
	E - a smooth best straight line $$		
	F - minimum size of the graph is 5 x 4 squares of $2 \text{ cm x } 2 \text{ cm}$.		
	7° - 5 marks 6.5 $\sqrt{4}$ marks		
	$3-4\sqrt{-3}$ marks		
	$2\sqrt{-2}$ marks		
	$1\sqrt{-1}$ marks		
	State the correct relationship based on the candidate's graph		
(e)	F is directly proportional d	1	
	Total marks	16	
Question	Answer	Mark	
2 (a)(i)	<i>f</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin	1	
2 (a)(i)	<i>t</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8	1	
2 (a)(i) (ii)	<i>f</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph	1	
2 (a)(i) (ii)	<i>*</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph	1 1 1	
2 (a)(i) (ii)	<i>*</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit)	1 1 1	
2 (a)(i) (ii)	<i>*</i> is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit)	1 1 1 1	
2 (a)(i) (ii)	F is directly proportional to $1/x$ * must show extrapolation line pass through origin $1/x = 1/1.25 = 0.8$ straight line from $x = 0.8$ to the graph $f = 500$ Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm)	1 1 1 1 1 1	
2 (a)(i) (ii)	* is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 = 0 * Correct substitution (follow candidate's triangle)	1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	* is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0	1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	* is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0	1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	* is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit)	1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	F is directly proportional to 1/x * must show extrapolation line pass through origin $1/x = 1/1.25 = 0.8$ straight line from $x = 0.8$ to the graph $f = 500$ Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) $1000 - 0$ * Correct substitution (follow candidate's triangle) $1.6 - 0$ $= 625$ Hz m// ms ⁻¹ (with correct unit) $fx = k$	1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	f is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$	1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii)	f is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$	1 1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii) (b)	T is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$ $= \frac{625}{4.0}$	1 1 1 1 1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii) (b)	f is directly proportional to $1/x$ * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$ $= \frac{625}{1.8}$	1 1 1 1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii) (b)	f is directly proportional to 1/x * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$ $= \frac{625}{1.8}$ $= 347.22 \text{ m s}^{-1}$	1 1 1 1 1 1 1 1 1 1 1 1 1	
2 (a)(i) (ii) (iii) (b)	f is directly proportional to 1/x * must show extrapolation line pass through origin 1/x = 1/1.25 = 0.8 straight line from $x = 0.8$ to the graph f = 500 Hz (with correct unit) Draw a sufficient large triangle (minimum size 6 x 8 cm) 1000 - 0 * Correct substitution (follow candidate's triangle) 1.6 - 0 = 625 Hz m// ms ⁻¹ (with correct unit) $v = \frac{fx}{D} = \frac{k}{D}$ $= \frac{625}{1.8}$ $= 347.22 \text{ m s}^{-1}$	1 1 1 1 1 1 1 1 1 1 1 1	

(c)	v increases	1	
(d)	 position of the must be perpendicular to scale of meter ruler experiment must be carried out at open space 	1	
	Total marks	12	

Question		Answer	Mark	Total Mark
3	(a)	State a suitable inference	1	1
		Acceleration is influenced by the mass		
	(b)	State a relevant hypothesis	1	1
	. ,	When the mass increased, the acceleration will be decreased.	1	1
	(c)(i)	(c)(i) State the aim of experiment		1
	~ / ~ /	To investigate the relationship between the acceleration and the mass.		
		State the manipulated variable and the responding variable	1	1
	(::)	Demonding : mass(m)		1
	(11)	Responding : acceleration(a)	1	1
		State ONE variable that kept constant		1
		Complete list of encountry and motorials	1	1
	(;;;)	5 Trollays ticker timer ticker tone a muchar hand a wooden munuou 12 V	L	1
	(111)	a c power supply ruler		
	a.c power supply, futer		1	1
	(iv)	Trolley rubber band Ticker Timer Ticker tape Friction compensated runway Power supply		
	(v)	State the method of controlling the manipulated variable 1. The apparatus is set up as shown in the diagram. The ticker-timer is switched on and a trolley is pulled using a rubber band. The extension of the rubber band is ensured to be of the same length State the method of measuring the responding variable Acceleration of the trolley is calculated using the ticker-tape. a = (v-u) / t Repeat the experiment at least 4 times	1	3
		4. The experiment is repeated by using 2, 3, 4 and 5 trolleys.		

Q	uestion	Answer	Mark	Total Mark
			1	
	(vi)	Tabulation of data: m a	1	1
	(vii)	Analyze the data.	1	1
		Total marks	13	Max 12

Questi on	Answer		
4 (a)	Inference: Resistance// brightness of bulb depends on the diameter/thickness of the conductor wire	1	
4 (b)	Hypothesis When the diameter/thickness increase, the resistance decrease	1	
4 (c) (i)	Aim : To investigate the relationship between the diameter /thickness of the conductor wire and resistance	1	
(c) (ii)	Variables : Manipulated : diameter / thickness Responding : resistance / voltage	1	

(c) (iii) Apparatus and material: 1 (c) (iii) Dry cells, constantan wire, connector wire, ammeter, voltmeter, rheostat , switch, meter rule, micrometres screw gauge 1 (c) (iv) Set up apparatus : draw a functional diagram 1 (c) (iv) Image: constantan wire functional diagram 1 (c) (iv) Image: constantan wire functional diagram 1 (c) (iv) Procedur 1 (c) (v) A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constantan wire of conductor using equation R = V/I 1 Adjust the rheostat and until the ammeter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V 1 Calculate the resistance, R of conductor using equation R = V/I 1 Repeat the experiment with the diameter of constantan wire , 0.2 mm , 0.3 mm, 0.4 mm and 0.5 mm. 1 (c) (vi) Tabulating data 1 0.1 0.1 1 0.2 0.3 0.4 0.4 0.5 0.4		Fixed : length of conductor / temperature	1	
(c) (iii)Apparatus and material: Dry cells, constantan wire, connector wire, ammeter, voltmeter, rheostat , switch, meter rule, micrometres screw gauge1(c) (iv)Set up apparatus : draw a functional diagram1(c) (iv) $\begin{array}{c} \hline \\ \hline $		Tixed . length of conductor / temperature		
(c) (iii) Improved the constant and wire, connector wire, ammeter, voltmeter, rheostat, switch, meter rule, micrometres screw gauge Improved the constant and wire, connector wire, ammeter, voltmeter, rheostat, switch, meter rule, micrometres screw gauge (c) (iv) Set up apparatus : draw a functional diagram Improved the constant and wire, connector wire, ammeter, voltmeter, rheostat, switch, meter rule, micrometres screw gauge Improved the constant and the constand the constant and the constant and the cons		Apparatus and material:	1	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	(c) (iii)	Dry cells, constantan wire connector wire ammeter voltmeter rheostat	1	
Set up apparatus : draw a functional diagram 1 (c) (iv) Import Impo		switch, meter rule, micrometres screw gauge		
(c) (iv) Image: Constant a were provided of the second and the s		Set up apparatus : draw a functional diagram		
(c) (iv) Image: Constant and with the procedur of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constantan wire of diameter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V 1 Calculate the resistance, R of conductor using equation R = V/I 1 (c) (vi) Tabulating data 1 (c) (vi) Tabulating data 1 (c) (vi) Diameter, d/mm Resistance, R/ Ω (0.1 0.1 1 (0.2 0.3 1 (0.4 0.5 1				
(c) (iv) Image: Constant and with the diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constant and wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed. 1 (c) (v) A 10 cm length of constant and until the ammeter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V 1 (c) (vi) Adjust the rheostat and until the ammeter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V 1 (c) (vi) Repeat the experiment with the diameter of constant and wire , 0.2 mm , 0.3 mm, 0.4 mm and 0.5 mm. 1 (c) (vi) Tabulating data 1 (c) (vi) Tabulating data 1 (c) (vi) Diameter, d/mm Resistance, R/ Ω (0.1 0.1 1 (0.2 0.3 1 (0.3 0.4 0.5				
(c) (ii) Constants were provident constants with the provident constant of the provident cons	(c) (iv)		1	
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(c) (v)A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a circuit as shown in diagram above. Switch is closed.1Adjust the rheostat and until the ammeter reading is I = 0.2A. Measure the corresponding reading on the voltmeter, V Calculate the resistance, R of conductor using equation R = V/I1Repeat the experiment with the diameter of constantan wire , 0.2 mm , 0.3 mm, 0.4mm and 0.5mm.1(c) (vi)Tabulating data10.1 0.2 0.3 0.4 0.51		Procedur		
circuit as shown in diagram above. Switch is closed. 1 Adjust the rheostat and until the ammeter reading is $I = 0.2A$. Measure the corresponding reading on the voltmeter, V 1 Calculate the resistance, R of conductor using equation $R = V/I$ 1 Repeat the experiment with the diameter of constantan wire , 0.2 mm , 0.3 mm , 0.4 mm and 0.5 mm . 1 (c) (vi) Tabulating data 1 0.1 0.1 1 0.2 0.3 1 0.3 0.4 0.5	(c) (v)	A 10 cm length of constantan wire of diameter of 0.1 mm is connected to a		
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Repeat the experiment with the diameter of constantan wire , 0.2 mm , 0.3 mm , 0.4mm and 0.5mm . 1 (c) (vi) Tabulating data 1 0.1 0.1 1 0.2 0.3 1 0.4 0.5 1		Calculate the resistance. R of conductor using equation $R = V/I$		
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(c) (vi)Tabulating dataResistance, R/Ω 1Diameter, d/mmResistance, R/Ω 10.10.110.20.310.30.410.50.5		mm, 0.4mm and 0.5mm.		
Diameter,d/mm Resistance,R/ Ω 1 0.1 1 0.2 1 0.3 1 0.4 1	(c) (vi)	Tabulating data		
0.1 1 0.2 1 0.3 1 0.4 1 0.5 1		Diameter,d/mm Resistance,R/ Ω		
0.2 0.3 0.4 0.5		0.1	1	
0.2 0.3 0.4 0.5				
0.3 0.4 0.5				
0.4 0.5		0.3		
0.5		0.4		
		0.5		

	(Accept : swg as a scale of diameter)		
(c) (vii)	Analyzing data:		
	p		
	Î Î	1	
	→ a		
	TOTAL MARKS	13	Max 12
			14