

Science (Physics) – Set II
Marking Scheme

Paper 1: 20 marks

1	2	3	4	5
B	D	D	A	D
6	7	8	9	10
B	A	B	C	C
11	12	13	14	15
C	B	D	D	B
16	17	18	19	20
C	A	B	C	B

Paper 2 – Section A: 55 marks

Qn. No.	Scoring Points	Marks	Max. Marks
1a	1. Read the volume of the water , V_1 in the measuring cylinder. 2. Tie the rock to a string, gently lower the rock into the measuring cylinder until it is completely submerged in the water. 3. Read the volume of the water and the rock , V_2 4. Calculate volume of the rock , $V = V_2 - V_1$ Or 1. Tie the rock to a string, gently lower the rock into a displacement can filled with water until it is completely submerged in the water. 2. Measure volume of overflow with measuring cylinder.	1 1 1 1	2
1b	$D = m/V$ $= 400 / 51$ $= 7.84 \text{ g/cm}^3$	1 1	2
1c	Density of copper $D = m/V$ $= 350 / 39$ $= 8.97 \text{ g/cm}^3$ $\text{mass} = D \times V$ $= 8.97 \times 51$ $= 457.5 \text{ g}$	1 1	2
1d	The density of the iron object decreases . Since $d = m/V$, the volume of the iron object will increase when it is heated, the density will decrease given that the mass of the object remains unchanged.	1 1	2
2a	$a = (v-u)/t$ $= (28.5 - 0) / 3.0$ $= 9.5 \text{ m/s}^2$	1 1	2
2b	distance = area under the graph $= \frac{1}{2} \times 28.5 \times 3$ $= 42.8 \text{ m}$ allow ECF from (a)	1 1	2

2c	When speed of plastic ball increase, the air resistance that acting on the plastic ball increases. When eventually the air resistance equals the weight of the plastic ball , the resultant force acting on the ball is zero , hence ball falls with zero acceleration or constant speed.	1 1	2
3a	The perpendicular distance of the rubber band to pivot is smaller than the perpendicular distance of the mass to the pivot.	1	1
3b	total clockwise moment = total anti clockwise moment $4 \times 18 = F \times 2$ $72 = F \times 2$ $F = 36 \text{ N}$	1 1	2
3c	The force will be greater . The weight of section XY will create a greater clockwise moment . Since total clockwise moment and total anti clockwise moment is equal, the anti clockwise moment exerted by the rubber band will also increase in order to balance the clockwise moment .	1 1	2
4a	$W = mg$ $= 60 \times 10$ $= 600 \text{ N}$ $P = F / A$ $= 600 / (2.4 \times 10^{-3})$ $= 2.5 \times 10^5 \text{ Pa}$	1 1 1	3
4b	Since pressure = force / area, the area of stone in contact with the ground in Fig. 3.2 is smaller compared to the area of tyre in contact with the ground in Fig. 3.1, pressure exerted on the ground increases when the tyre goes over a small stone.	1 1	2
5ai	The energy from the chemical store of the battery is transferred electrically to the kinetic store of the scooter.	1	1
5aii	$KE = \frac{1}{2} mv^2$ $= \frac{1}{2} \times 70 \times 4^2$ $= 560 \text{ J}$	1 1	2
5bi	$E = P \times t$ $0.35 = (70 / 1000) / t$ $T = 5 \text{ h}$	1 1	2
5bii	Cost = 0.35×29 $= 10.2 \text{ cents}$	1	1
6a	Wire 2 to P Wire 3 to Q	1	1
6b	fuse When current is too large, the fuse will melt and break the circuit , to protect the appliance from overheating causing an electric fire	1 1 1	3
7a	$V = f \lambda$ $1500 = 3\,000\,000 \times \lambda$ $\lambda = 0.0005 \text{ m}$	1 1	2

7b	distance travelled by ultrasound = $1500 \times (2.5 \times 10^{-4})$ = 0.375 m distance = $37.5 / 2$ = 18.8 cm	1 1	2
8a	<u>parallel</u> $R_T = (1/6 + 1/12)^{-1}$ = 4 Ω $R_T = 4 + 16$ = 20 Ω	1 1	2
8b	$I = V/R$ = $12 / 20$ = 0.6 A	1	1
8c	$V = IR$ = 0.6×16 = 9.6 V ECF is allowed	1	1
8d	$V = 12 - 9.6$ = 2.4 V	1	1
8e	$V = IR$ $2.4 = I \times 6$ $I = 0.4$ A	1 1	2
9a	For currents up to 0.60 A, the solenoid is not magnetised strong enough to attract the iron arm but when the current exceeds 0.60 A, the magnetic force produced becomes strong enough to attract the iron arm and the contacts open.	1 1	2
9b	When the current is more than 0.60 A, the iron arm will be attracted to the iron core causing the circuit to be opened. Since it is an open circuit, the iron core loses its magnetism. The spring causes the iron arm to move up and close the circuit. This process is repeated. Iron is a soft magnetic material, it magnetise and demagnetise easily. [award 1 m if students only write this]	1 1	2
9ci	Decrease the number of turns of the solenoid. Or Increase the distance between contact and the electromagnet.	1 1	1
9cii	With the decrease in the number of turns in the solenoid, the strength of electromagnet decreases. A larger current is needed to increase the strength of the electromagnet to produce the same force to break the contacts. Or With the increased distance, the force required to break the contact increases. A larger current is needed to increase the strength of the electromagnet to produce a larger force to break the contacts.	1	1
9di	A to B	1	1
9dii	arrow pointing to the right	1	1
9diii	When the power supply is switched on, magnetic field of current in P interacts with the magnetic field of the horse magnet. By Fleming's Left-Hand rule, a force is produced on P.	1 1	2

Section B: 10 marks

Qn. No.	Scoring Points	Marks	Max. Marks
10a	For fair comparison / fair test	1	1
10b	Change the type of material Temperature drops for polystyrene cup compared to paper pulp is greater than adding a lid vs without a lid. Reducing the rate of heat loss is more effective when changing the material.	1 1	2
10c	The hot less dense air cannot escape and the cooler denser air cannot sink into the cup.	1 1	2
10d	Polystyrene contains air pockets , trapping air which are poor conductors of heat .	1 1	2
10ei	White polystyrene cup	1	1
10eii	White surfaces are poorer emitters of radiation so it will lose heat at a slower rate .	1 1	2