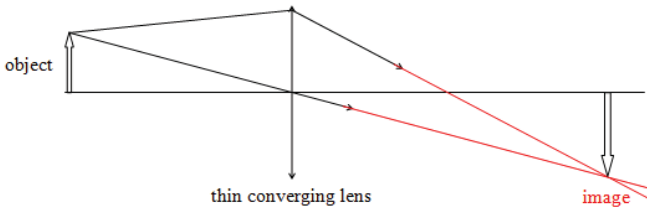


4E5N Sc(Physics) Prelim Marking Scheme 2019

Paper 1: MCQ [20]

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

Section a: Short Structured Questions [45]

Qn	Ans	Marks
1a	use of appropriate scale (1 cm : 10 N or 1 cm : 5 N) parallelogram method resultant force = 78 N (accept answers between 70 N to 86 N)	C1 C1 A1
b	tension = 78 N (same ans as 1a)	B1 ECF
2a	The driver took 1.5 s to react.	B1
b	distance = $25 \times 1.5 = 37.5 \text{ m}$	B1
c	deceleration = $25/(5-1.5)$ $= 7.14 \text{ m/s}^2$	C1 A1
d	braking distance = $0.5(25)(3.5) = 47.25 \text{ m}$ Total distance = $37.5 + 47.25 \text{ m} = 81.25 \text{ m}$ Car did not manage to stop in time, pedestrian will be knocked down by the car.	C1 A1
3a	Draw an arrow from the 1 m mark of the plank and label it W. Distance between A and W is 1.0m	B1
b	$T \times 1.5 = 54 \times 0.5$ $T = 18 \text{ N}$	C1 A1
c	T increases.	B1
4a	When the metal pan is heated, the molecules at the base gained kinetic energy, collided with the neighbouring molecules and transferred energy in the process. This process is called conduction.	B1 B1
bi	arrow pointing downwards.	B1
bii	water above the hotplate gets heated and expands, resulting in a lower density and hence rises. the cooler water at X hence sinks to replace the water above the hotplate.	B1 B1
c	Polished and shiny surface is a poor radiator/emitter of heat, hence heat loss is minimised.	B1
5ai	 object thin converging lens image	B1

	B1-complete the paths of the two rays correctly. B1- The image I is marked correctly.	B1
aii	The full image would still be seen but appear dimmer	B1
bi	$n = \frac{c}{v}$ $= \frac{3.0 \times 10^8 \text{ m s}^{-1}}{1.9 \times 10^8 \text{ m s}^{-1}}$ $= 1.58$	C1 A1
bii	$\sin c = 1 / n$ $\sin c = 1 / 1.58$ $c = 39.3^\circ$ ECF	B1
6a	p.d. = $E/Q = 900/150$ $= 6 \text{ V}$.	C1 A1
b	$I = Q/t = 150/100$ $= 1.5 \text{ A}$	C1 A1
c	$P = VI = 6 \times 1.5$ $= 9 \text{ W}$ ECF <u>OR</u> $P = E/t = 900/100$ $= 9 \text{ W}$	C1 A1 or C1 A1
7a	effective resistance of A and B in parallel $= (1/3 + 1/3)^{-1}$ $= 1.5 \Omega$ effective resistance of A, B and C $= 1.5 + 4.5$ $= 6 \Omega$	C1 C1 A1
b	zero.	B1
c	S_1 , S_2 and S_3 .	B1
8ai	Live (brown) and neutral (blue)	B1 B1
aii	<u>Lamp is made of plastic which is an electrical insulator,</u> lamp casing would never become 'live' OR current cannot flow to the user through the casing.	B1 B1
bi	current in cable, $I = P/V = 100/230 = 0.435 \text{ A}$ 1A fuse rating (accept 0.5 A, 1.0 A)	C1 A1

bii	Electrical energy = $0.1\text{ kW} \times 0.5\text{ h}$ = 0.05 kWh Cost = 0.05×26.70 = 1.34 cents	C1 A1
9ai	1400 N or 1450 N	B1
aii	$2500 - 1400 = 1100\text{ N}$ ECF	B1
aiii	$a = 1100 / 850$ 1.29 m/s^2	C1 A1
bi	Friction at this time is <u>equal</u> to the driving force and so the <u>acceleration becomes zero</u>	B1 B1
bii	200 m	B1
biii	$W = 2500 \times 200$ 500 kJ ECF	C1 A1
biv	Remaining energy has been converted into <u>sound and heat energy</u>	B1
10a	3 (accept range between 2.75 to 3.25)	B1
b	$T = 0.5\text{ s}$ OR $f = 3 / 1.5$ 2 Hz (accept range between 1.83 Hz to 2.17 Hz)	C1 A1
ci	Amplitude decreases. As the wave propagates from A to D, energy is lost to the surroundings, hence the amplitude decreases.	B1 B1
cii	$2\text{ Hz} \times 0.35\text{ m}$ = 0.70 m/s ECF but accept values between 0.63 m/s and 0.77 m/s The speed of the wave <u>would not change</u> because <u>both frequency and wavelength of the wave do not change</u>	C1 A1 B1
ciii	Duck at D1 would <u>never hit</u> the other two ducks because All three ducks would only <u>move vertically at the same position</u>	B1 B1
11a	Thicker wire is used because it has lower resistance and it <u>carries a larger current</u> .	B1
bi	South pole	B1
bii	Iron core is a soft magnetic material that can be <u>demagnetized easily</u> When the push button is pushed, the iron core has to be demagnetized so as to <u>allow the iron lever arm to return to original position</u> to switch off the motor	B1 B1
biii	Current flows in the relay circuit to <u>magnetise the iron core</u> <u>Iron lever arm is induced</u> to be a magnet to be attracted to the iron core <u>Contacts in the motor circuit closes</u> as iron lever arm swings clockwise <u>Current flows in the motor circuit</u> to run the motor	B1 B1 B1 B1
c	The motor can <u>no longer be switched on</u> because Current in the relay circuit would be reduced which <u>lowers the magnetic strength</u> of the iron core and <u>unable to cause the iron lever to turn clockwise</u> OR iron core <u>may not be magnetized</u> to attract the iron lever	B1 B1

