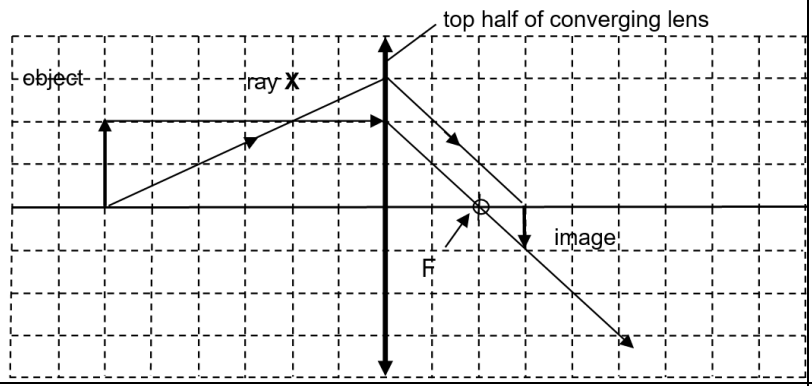
2025 4G3 Phy Prelim ans

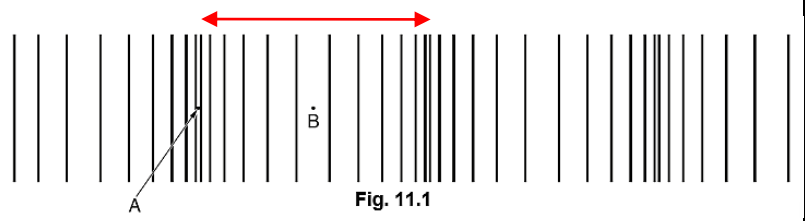
Paper 1

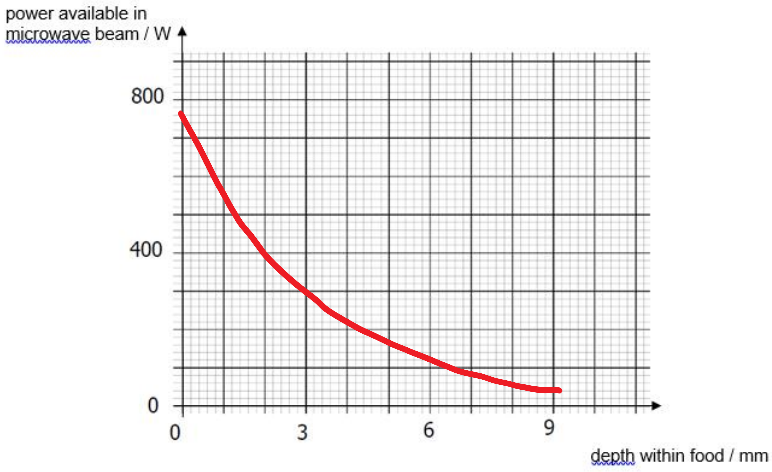
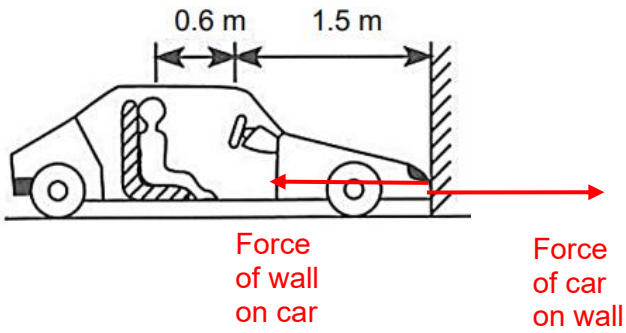
1	C	9	C	17	B	25	B	33	B
2	A	10	C	18	B	26	C	34	C
3	D	11	A	19	A	27	C	35	B
4	D	12	D	20	C	28	D	36	D
5	A	13	A	21	A	29	D	37	B
6	A	14	B	22	D	30	C	38	C
7	C	15	B	23	B	31	D	39	A
8	C	16	D	24	C	32	A	40	C

Paper 2

Qn	Ans	Marks	Remarks
1a	$W = mg = 1.2 \times 10^5 (10)$ $= 1.2 \times 10^6$ N	 B1	
1b	6.0 s. It is the time at which the thrust is equal to the weight of the rocket. From 6.0 s onwards thrust is greater than the weight.	B1 B1	
1c	At 30 s, thrust = 4.8×10^6 N $F_{net} = ma$ $4.8 \times 10^6 - 1.2 \times 10^6 = (1.2 \times 10^5)(a)$ $a = 30$ m/s^2 (2sf)	 M1 A1	
1d	When the total weight decreases significantly, the upward resultant force increases. The rocket will move with increasing acceleration	 B1	
2a	Fuse and switch on live wire Live, neutral and earth wires connected correctly	B1 B1	
2b	The metal case of kettle is earthed. When the metal casing becomes live, a large current flows through the low resistance earth wire instead of the user. This causes the fuse to melt. Thus, the metal case is isolated from high voltage and the user does not get an electric shock.	B1 B1 B1	
3a	Gas particles are in constant random motion. When they collide with the walls, they apply a force, which results in a pressure.	B1	
3b	85 cmHg	B1	
3c	$P_{GAS} = 85 - 78$ 7.0 cmHg (2sf)	C1 A1	
4ai	Centre of Gravity is the point in a body or object at which the whole weight of the body can be considered to act.	B1	
4aii	0.50 m (2sf)	B1	
4b	Taking moments about the left support, Sum of CM = Sum of ACM S x 100 = (5000 x 10)(100/3) + (1000 x 10)(50) 100 S = 5000000/3 + 500000 S = 50000/3 + 5000 = 21 667 = 21 700 N (3sf) By resultant forces R + S = 10000 + 50000 R = 60000 – 21 667	 M1 A1	

	R = 38 300 N (3sf)	A1	
5a	It reduces heat loss from the water in the pipe by conduction to the solar panel when the Sun is not shinning.	B1	
5b	Spiral increase surface area to allow more heat to be transferred to water by radiation/ conduction. Black is a good emitter of infra-red radiation which allow smore heat to be transferred to water by radiation	B1 B1	
5c	Heat is transferred from the hot water to the cooler metal walls of the tank. This continues until thermal equilibrium is reached, where both are at the same temperature.	B1 B1	
6a	When light from the torchlight is blocked by the card, the resistance of the LDR increases. When the light is not blocked by the card and reaches the LDR, the resistance of the LDR decreases.	B1 B1	
6b	When light is blocked by the card, the brightness around the LDR is low, hence the resistance of the LDR increases and the potential difference across the LDR also increases. Since the variable resistor is in series with the LDR, when p.d. of LDR increases, the p.d. across the variable resistor will decreases to 0.50 V.	B1 B1	
6c	The top of the card passes through the LDR level faster than the bottom of the card. When the top of the card reaches the LDR level, the speed of the card is faster due to acceleration caused by gravity, hence the shorter time in interval 2.	B1 B1	
7ai		B1	correct ray drawing correct marking of F
7aii	8.0 cm	B1	
7aiii	correct subsequent ray drawing for ray X	B1	
7b	The image is still formed as all the rays from the object can still be refracted through the bottom part of the lens.	B1 B1	
8a	An electric field is a region of space where an electric charge experiences a force	B1	
8b	Sphere S could be positively charged since unlike charges attract. It could be neutral as well. When negatively charged plate P is brought near to sphere S, negative charges in S are repelled to the left side of S, leaving right side of S positively charged. S will hence be attracted to P.	B1 B1 B1	[1] for positively charged with

			explanation [2] for neutral with explanation
9a	An <u>opposite pole was induced at the end of the paper clip that was closer/facing the magnet</u> while a like pole was induced at the farther end. Since the unlike poles of the paper clip and magnet are nearer than the like poles, <u>a net attractive force is exerted on the paper clip</u>.	B1 B1	
9b	The paper clip is likely made of <u>iron</u>. Iron is a magnetic material and <u>can be temporarily magnetised when placed near a magnet.</u>	B1 B1	
10a	8000/ 2^6 = 125 counts per min	C1 A1	
10b	Source Y Able to last the examination period but not to remain in the blood for too long.	B1 B1	
10c	Alpha radiation cannot penetrate through the body for detection. It has high ionising power, thus it is harmful to the body's cells.	B1 B1	
10d	$^{0}_{-1}\beta$	B1	
11a	Compression Rarefaction	B1	
11b	 **Fig. 11.1**	B1	
11c	Wave motion is the <u>transfer of energy</u> from one point to another <u>without the transfer of matter</u>.	B1	
11d	A wavefront is an imaginary line that connects points on a wave that are in phase	B1	
11e	The <u>compressions will more closely packed</u>, and the <u>rarefactions more spread out</u>, indicating <u>increased amplitude.</u>	B1 B1 B1	
11f	The wave <u>travels faster in water but frequency of the sound wave stays the same</u>, so the <u>wavelength increases</u> The <u>compressions and rarefactions become more widely spaced</u>	B1 B1 B1	
12a	2500 000000 complete oscillations are being made in 1s.	B1	
12b	V = fλ λ = v / f = 3.0 x 10^8/ 2500 000000 = 0.12m	 C1 A1	

12c		B3	d=3, P= 750 [1] d=6, P= 300 [1] d=6, P = 120 [1]
12d	Pt = mc ΔΘ + ml 750 x t = 0.25(2100)(18) [1] + 0.25 l t = 130 s	M2 A1	
	Section B		
13a	E_k = 1/2 mv^2 = 1/2 (1200)$(15)^2$ = 135 000J	C1 A1	
13bi		B1	
13bii	Work done on car = Loss in E_k F x d = 135 000 F x (0.5) = 135 000 F = 270 000 N	M1 A1	
13bii i	F = ma -270 000 = 1200 ($v-u\ t$) -270 000 = 1200 (0−15 t) t = 0.0667 s	M1 A1	
13ci	Every object <u>will continue in its state of rest or uniform motion in a straight line unless a resultant force acts on it</u>. Hence the dummy will <u>continue in its state of motion as there is no resultant force</u> to stop / slow down the motion.	B1 B1	
13cii	As the dummy exerts a force on the belt when it moves forwards, the belt will also <u>exert a force on the dummy in the opposite direction</u> to prevent it from moving further forward.	B1	
14a	E.m.f is defined as the <u>work done by an electrical energy source in driving a unit charge around a complete circuit</u>.	B1	
14bi	The <u>gradient of the graph decreases with increasing voltage</u> Or	B1	

	The graph is a curve instead of a straight line that passes though the origin.		
14bii	The <u>resistance of the lamp increases as the lamp heats</u> up hence the resistance is not constant.	B1	
14ci	From graph, lamps have p.d. of 2.7 V R = (4.5 – 2.7) / 0.24 = 7.5 Ω	 M1 A1	
14cii	R = ρ l / A RP / RQ = [(2.7 / 0.15) / (2.7 / 0.09)] = 0.60 ratio = 0.60 ×2^2 = 2.4	 M1 M1 A1	
14ciii	Pd across resistor P increases, gradient at higher pd is smaller. Since gradient of graph = 1/R, R increases.	B1 B1	