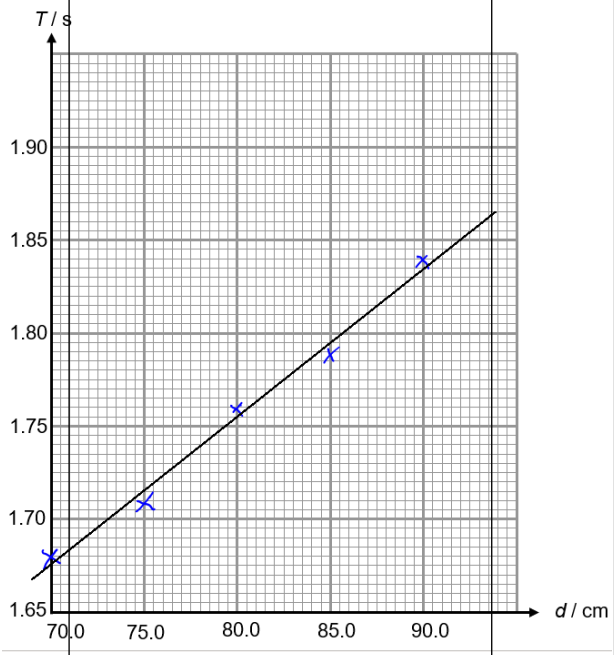
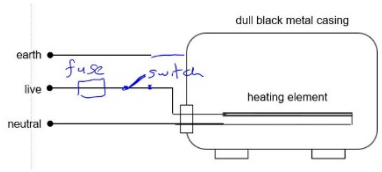
PRELIM 2022
4N Science Physics
MARK SCHEME

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

1a	Electronic **mass** balance (or any acceptable apparatus)	B1
1b	8.4 g/cm^3	B1
2a	1.68 1.76	B1
2b	Correctly plotted points (allow only one incorrect plotted point – minus 1 mark) Balanced line 	G2 G1
2c	79.5 cm Note: According to graph of candidate	G1
2d	No change in period. Mass does not affect the	B1
	period of pendulum	B1
3a	60 / 1.5 = 40 N/cm^2	M1 A1
3b	20 000 N/cm^2	B1
3c	Force will be lesser. Pressure required to push pin in soft wall is lesser.	B1 B1
4a	BC – non-uniform deceleration	B1
4b	(8 x 12) + ½ (12 + 20) x 8 = 96 + 128 = 224 m	M1 A1
4c	1.92 x 10^6 Nm	B1
4d	1 m/s^2	B1
4ei	Radiowave	B1
4eii	3 x 10^8 = 900 x 10^6 x λ Wavelength, λ = 0.333 m	M1 A1
5ai	 3 correct drawings (2 correct drawings – B1)	B2
5aii	heating element heats air causing <u>hot air to rise</u> due to it being <u>less dense</u>	B1
5aii i	Metal casing – shiny/silver OR casing made of insulated material Does not allow heat to lose to surroundings easily Note: focus responses to metal casing only according to question statement	B1 B1
5bi	B = liquid D = solid Note: Both terms need to be correct for mark	B1
5bii	change of state, no change in	

	temperature energy released to form bonds, no change in internal kinetic energy	B1 B1
6a	Switch to close by connecting to R	 B1
6bi	Q = It = 0.3 x 30 x 60 = 540 coulombs	 M1 A1
6bii	potential difference = 6 V current = 0.15 A	B1 B1
6c	If one bulb is short circuited, the other bulb can still light up.	 B1
6d	Power = I x V = 0.3 x 6 = 1.8 W = 0.0018 kW Cost = 0.0018 x 15 x 24 x 22 = 14.26 cents	 M1 A1