4NA Prelim Science (Physics) Paper 2022

Paper 1 (20 marks)

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

Paper 2 Section A (14 marks)

1a	Nm or Ncm	[1]
1b	A because it is further away from the hinge of the door.	[1]
	Total	[2]
2a	Using a rubber creates a better grip due to friction .	[1]
2b	Pour hot water over the cap only.	[1]
	The hot water will expand the cap as matter expands when heated .	[1]
	Total	[3]
3a i.	The speed of the car increases .	[1]
3a ii.	The speed of the car is a constant.	[1]
3b	average speed = 60 000 / (40 x 60)	[1]
	= 25 m/s	[1]
	Total	[4]
4a	The water at the bottom near the heater is heated and expands. It becomes	[1]
	less dense and rises. The relatively denser cooler water at the top will sink.	
	Convection currents are set up.	[1]
4b	Air is a poor conductor of heat. Lagging minimize heat lost by the hot water	[1]
	to the surrounding.	
4c	Shiny surfaces are poor emitters of radiation/poor radiators of heat .	[1]
4d	Water is heated up faster.	[1]
	Total	[5]

Paper 2 Section B (16 marks)

5a	Vibration from the source displaced the air particles next to it.			
	The air particles will move closer and further apart from each other continuously.			
	/ A series of alternate compressions and rarefactions travel through the air from			
	the source.			
5b i	The number of complete waves produced in one second.	[1]		
5b ii	wavelength = 320 / 1000			
	=0.32 m	[1]		
	distance btw Pt A and D = 0.32 (3) = 0.96 m = 96 cm	[1]		
5b iii	5.0 ms = 0.005 s			
	frequency = 1/0.005 = 200 Hz	[1]		
		[8]		
6a	Energy can neither be created nor destroyed in any process.	[2]		
	It can be converted from one form to another			
	but the total amount remains constant. [1m for any 2 points stated]			
6b	h = 6 cm = 0.06 m	[1]		
	GPE = 0.008 (10) (0.06) = 0.0048 J	[1]		
6c	0.0048 J	[1]		
6d	$0.5 (0.008) v^2 = 0.0048$	[1]		
	v ² = 1.2			
	v = 1.1 m/s	[1]		
6e	There are resistive forces such as friction on the track and air resistance	[1]		
		[8]		
7a	A: ammeter	[1]		
	B: voltmeter	[1]		
7b	axis correctly labelled with correct intervals	[1]		
	all 5 points plotted clearly with crosses	[1]		
	straight line drawn through the crosses neatly	[1]		
7c	all 5 points plotted clearly with crosses			
	straight line drawn through the crosses neatly	[1]		
7d	Resistor Y has a lower resistance than resistor X.	[1]		
		[1]		

The gradient for resistor Y is smaller than resistor X. / For each value of current,	
voltage for resistor Y is smaller. (V=RI)	
Total	[8]