4NA Prelim Science (Physics) Paper 2022

Paper 1 (20 marks)

1	2	3	4	5	6	7	8	9	10
A	C	A	B	C	A	D	A	D	B
11	12	13	14	15	16	17	18	19	20
D	C	D	B	C	B	A	A	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. The hot water will expand the cap as matter **expands when heated**.	[1] [1]
	Total	[3]
3a i. 3a ii.	The speed of the car **increases.** The speed of the car is a **constant.**	[1] [1]
3b	average speed = 60 000 / (40 x 60) = 25 m/s	[1] [1]
	Total	[4]
4a	The water at the bottom near the heater is **heated and expands**. It becomes **less dense** and **rises**. The relatively **denser cooler water** at the top will **sink**. **Convection currents** are set up.	[1] [1]
4b	**Air is a poor conductor of heat**. Lagging minimize heat lost by the hot water to the surrounding.	[1]
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.	[1] [1]
5b i 5b ii 5b iii	The **number of complete waves produced in one second.** wavelength = 320 / 1000 =0.32 m distance btw Pt A and D = 0.32 (3) = 0.96 m = 96 cm 5.0 ms = 0.005 s frequency = 1/0.005 = 200 Hz	[1] [1] [1] [1] [1] [1]
		[8]
6a	Energy can neither be created nor destroyed in any process. It can be converted from one form to another but the total amount remains constant. [1m for any 2 points stated]	[2]
6b	h = 6 cm = 0.06 m GPE = 0.008 (10) (0.06) = 0.0048 J	[1] [1]
6c	0.0048 J	[1]
6d	0.5 (0.008) v^2 = 0.0048 v^2 = 1.2 v = 1.1 m/s	[1] [1]
6e	There are resistive forces such as friction on the track and air resistance	[1]
		[8]
7a	A: ammeter B: voltmeter	[1] [1]
7b	axis correctly labelled with correct intervals all 5 points plotted clearly with crosses straight line drawn through the crosses neatly	[1] [1] [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. The gradient for resistor Y is smaller than resistor X. / For each value of current,	[1] [1]

	voltage for resistor Y is smaller. (V=RI)	
	Total	[8]