Name:

Register/Index Number:

Class:

PRESBYTERIAN HIGH SCHOOL



SCIENCE (PHYSICS)

PAPER 2

26 July 2022 minutes

Monday

1 hour 15

Papers 1 and 2

5105/02

PRESBYTERIAN HIGH SCHOOL PRESBYTERIAN HIGH SCH PRESBYTERIAN HIGH SCHOOL PRESBYTERIAN HIGH SCHOOL PRESBYTERIAN HIGH SCHOOL PRESBYTERIAN HIGH SCHOOL

2022 SECONDARY FOUR NORMAL (ACADEMIC) PRELIMINARY EXAMINATION

INSTRUCTIONS TO CANDIDATES

Write your class, register number and name on all the work you hand in. Write in dark blue or black pen. Do not use correction fluid.

Section A

Answer all questions. Write your answers in the spaces provided on the question paper.

Section B

Answer any two questions. Write your answers in the spaces provided on the question paper.

At the end of the examination, fasten all your work securely together. The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use					
Section A	14				
Section B	16				
Total	30				

Setter: Mr Edmund Choo Vetted by: Mr Sherman See

This question paper consists of <u>12</u> printed pages. Section A

Answer **all** the questions in the spaces provided.

1 Fig. 1.1 shows a child on a swing. The child starts from X, swings to Y, to Z and then back to Y and to X again.



Fig. 1.1

(a) At which point of the swing is the speed maximum?

speed = m / s [1]

Fig. 1.2 shows how the speed of a child, playing on a swing, changes with time.



Fig. 1.2

(b) What is the maximum speed of the child?

speed = m / s [1]

(c) Describe the motion of the child from (i) t = 0.0 s to t = 0.1 s[1] (ii) and from t = 0.2 s to t = 0.3 s. [1]

2 A cup made from plastic, containing a hot drink, is shown in Fig. 2.1.



Fig. 2.1

(a) State two ways how energy is transferred from the hot drink to the surrounding.

.....

3

.....[2]

(b) Explain how the plastic material used for the cup helps to reduce the energy transfer to the surrounding.

 	 	 	 	 	 	 	 	 	 	1
 	 	 	 	 ••••	 	 	 	 	 [1]

(c) Suggest one modification to the cup so that the drink may remain hot for a longer time.

.....[1]

3 Fig. 3.1 shows a submarine sending a signal directed to a ship to determine its position.





(a) Describe how the sound wave is transmitted in water.

(b) The signal takes 1.2 s to be received by the submarine after being sent. Given that the speed of sound in water is 1500 m / s, calculate the distance of the ship from the submarine.

distance = m [2]

4 Fig 4.1 shows a charger for a mobile (cell) phone.





A child notes that there are only two pins in the charger.

(a) State the wires that the two pins connect to.

pin 1:

pin 2:

[1]

(b) Draw the symbol for *double insulation* in the space below.

[1]



5 Fig. 5.1 shows a speed-time graph for a vehicle starting to move.



Fig. 5.1

(a) Calculate the acceleration of the vehicle in section A of the graph.

acceleration = m / s^2 [2]

(b) Calculate the distance travelled by the vehicle in the first 5 minutes of motion.

distance = m [2]

[Turn over

The total frictional force acting on the vehicle for the up to t = 5 minutes is 10 000 N. The vehicle weighs 6 000 kg (the gravitational field strength is 10 N / kg).

(c) Calculate the weight of the vehicle?

weight = kg [1]

(d) State the driving force of the vehicle during section B of the motion. Explain how you arrived at your answer.

.....[2]

(e) State how the frictional force acting at section D compares with the frictional force at section B of the motion.

 	 [1]

6 A student measured the temperature of a liquid as it cooled and solidified at regular intervals. Fig. 5.1 shows the apparatus used by the student.



(a) The results obtained at each time interval are as shown in Tab. 6.2 below.

Time/ minutes			0	2	4	6	8	10	12	14	16
Temperature/ °C		°C	90	70	65	63	63	63	63	58	54
Tab. 6.2											
(i) Plot a graph of the results, marking each point with a cross (X).[1]							(X).				
	(ii)	Dra [1]	Draw a best-fit line, taking into account all the plotted points. [1]								
	(iii)	Use of th	Use your graph to determine the temperature of the substance at the start of the experiment.							e start	
							tempe	rature =		(°C [1]
	(iv)	Det	ermine t	he melti	ng point	of the s	ubstanc	e.			
							melting	point =			°C [1]
(b)	Usin	ng the	e kinetic	model c	of matter	,					
	(i) e	explain why liquids have fixed volume but not have fixed shapes.									
] ii)explain why solids have fixed volume and shapes.									
	(ii)e										

.....[2

temperature/ °C

]



time / minutes

[Turn over

7 The left-hand column of Tab. 7.1 shows some possible speeds of a sound wave.

speed of sound wave	medium
m/s	
1500	
5000	
300	



- (a) In the right-hand column, write down the medium in which a sound wave has this speed. Choose from solid, liquid or gas.
 [2]
- (b) Fig. 7.2 represents a series of wavefronts of a sound wave drawn to scale.



Fig. 7.2

(i) Explain what is meant by the term *wavefront*.
[1]
On Fig. 7.2,
(ii) mark, with the letter C, the mid-points of two compressions.
[1]
(iii) mark, with the letter R, the mid-points of two rarefactions.
[1]
(iv) use a ruler to measure one wavelength.
wavelength = cm [1]
(c) State how the wavelength will be affected if
(i) the speed of the wave increases;

[Turn over

[1] (ii) the amplitude increases.

[1]

END OF PAPER

PRESBYTERIAN HIGH SCHOOL SCIENCE DEPARTMENT SUGGESTED ANSWERS

Subject:SCIENCE (PHYSICS)Setter:Edmund ChooLevel:SEC 4 NA

Exam: PRELIM EXAM Year: 2022

SECTION A (14 marks)								
Qn	Suggested Answer	Sub	Tota					
		- 4-4-1	I					
1	(a) V							
1	(a) 1	1						
		1						
	(C)	1						
	(i) increasing acceleration of the acceleration is increasing. (no	1	4					
	(ii) decreasing appeleration or appeleration is decreasing (no	1						
	(ii) decreasing acceleration of acceleration is decreasing. (no	1						
0	(a) any five below	0						
2	(a) any two below:	2						
	- through conduction through the plastic (must specify from where)							
	- through evaporation of the liquid							
	- through convection currents above the not drink (must specify							
	through the readiction							
	- Inrough inermal radiation	1	4					
	(b) plastic is a poor conductor of neat.	1						
	(c) Any method below (not exhaustive)	Ĩ						
	lid over the cup							
	Net eccenteble: put a bester in use a sleth to urren the our							
2	Not acceptable: put a neater in, use a cloth to wrap the cup	1						
3	(a) when the submarine vibrates, it pushes the water in from of it	Ĩ						
	forward, causing an area of compression and then pulls							
	backwards causing an area of rarefaction .	4						
	I his body of water further pushes and pulls the body of water in	Ĩ						
	the water		4					
	(h) distance – speed v fine							
	(b) distance = speed x time $= 1500 \text{ m/s} \times 1.2$	1						
	- 1500 m/s x 1.2	1						
4		1						
4	(a) pin 1. neutrai	1						
	(b)	1						
		1	2					
	total		14					



	SECTION B (16 marks)							
Qn	Suggested Answer	Sub	Tota					
		-	1					
		total						
5	(a) acceleration = gradient of section $A = 3/2$	1						
	= 1.5 m/s ²	1						
	(b) distance travelled = area under graph = $\frac{1}{2} \times 2 \times 3 + 2 \times 2$	1						
	= 7.0 m/s	1						
	(2sf)							
	(c) weight of vehicle = 6000 kg x 10 N/kg		8					
	= 60 000 N	1						
	(d) Driving force is 10 000 N.	1						
	Since the speed is constant, there is no resultant force	1						
	acting on the vehicle, therefore the driving force = frictional force.							
	(e) The frictional force in D is higher than the frictional force in B.	1						
6	(a) (i) Points correctly plotted – allow one error.	1						
	(ii) Best- fit is a curve as shown at attached graph.	1						
	(iii) temperature at start is between 78 – 90 °C	1						
	(iv) melting point = 63 °C	1						
	(b) (i) liquids have fixed volume because they are closely	1						
	packed.	1	8					
	Liquids do not have fixed shape because they have							
	enough energy to overcome the strong attractive forces and thus							
	have movements within the liquid.	1						
	(ii) solids have fixed volume because they are closely	1						
	packed.							
	Solids have fixed shapes because they are held by							
	strong attractive forces and have fixed positions.							
7	(a) liquid, solid, gas – solid is fastest, gas is slowest – 1 mark for	2						
	each correct answer.							
	(b)							
	(i) An imaginary line connecting points with the same phase in	1						
	adjacent waves.		_					
	(ii) C – marked in the middle of the closest lines	1	8					
	(iii) R – marked in the middle of the lines furthest apart	1						
	(iv) 3.0 cm to 3.2 cm	1	4					
	(C)							
	(i) wavelength increases	1						
	(II) no effect	1						
	total		24					

٦

time / minutes

