SINGAPORE SPORTS SCHOOL
PRELIMINARY EXAMINATION 2022
SECONDARY 4
NORMAL (ACADEMIC)

CANDIDATE NAME			
CLASS	**4D / 4A2**	INDEX NUMBER	

SCIENCE **5105/02**

Paper 2 Physics **18 August 2022**

Papers 1 and 2: 1 hour 15 minutes

Candidates answer on the Question Booklet.

Additional Materials: Nil

READ THESE INSTRUCTIONS FIRST

Write your class and name on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a pencil for any diagrams or graphs.
Do not use correction fluid.

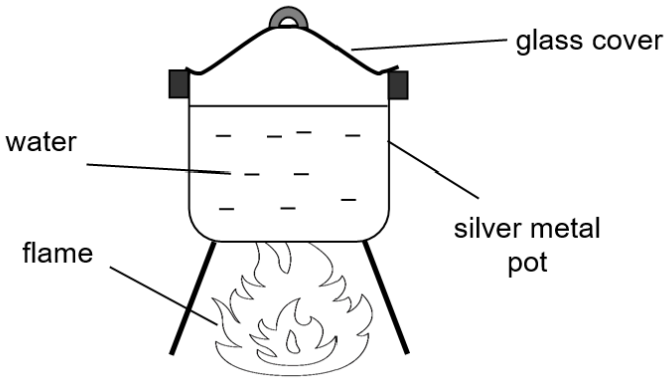
Answer **all** questions in Section A and any **two** questions in Section B.
The use of an approved scientific calculator is expected, where appropriate.
In calculations, you should show all the steps in your working, giving your answer at each stage.
You are advised to spend no longer than 30 minutes on Paper 1.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.

At the end of the examination, hand in your answers to Paper 1 and Paper 2 separately.
The number of marks is given in brackets [ ] at the end of each question or part question.

Section A

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

1 The diagram shows a silver metal pot filled with water and placed directly above a flame that heats the water until it boils.



(a) Describe how heat is transferred throughout the water by convection.

……

……

……

……

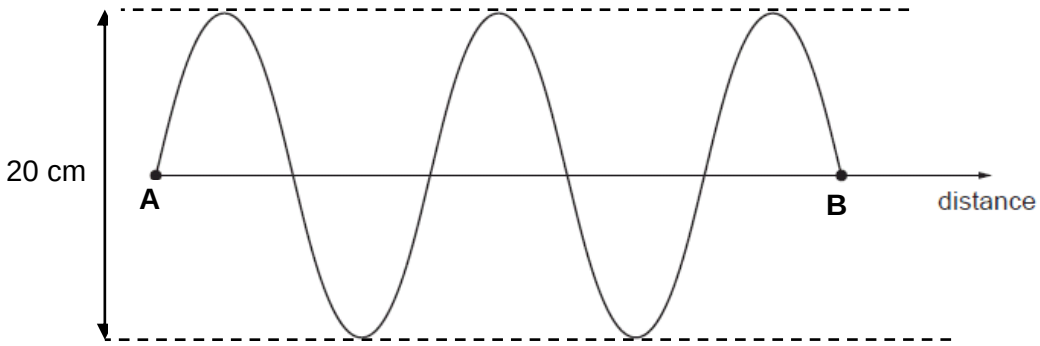
……[3]

(b) What is the advantage of having a silver-coloured pot when boiling water?

……

……[1]

2 The diagram shows a transverse wave travelling in air through points A and B.



The distance between **A** and **B** is 40 cm and wave speed is 3.2 m/s.

Determine

(a) the wavelength

wavelength = …….. cm [1]

(b) the amplitude,

amplitude = …….. cm [1]

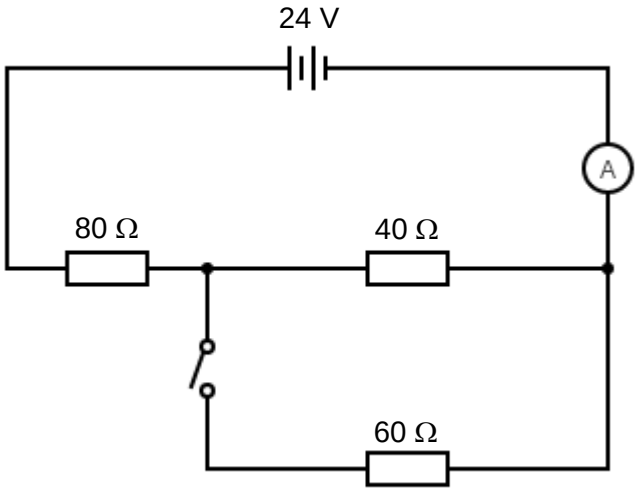
(c) the frequency,

frequency = ……... Hz [2]

(d) the time taken for the wave to travel from **A** to **B**.

time = ……. s [1]

3 A circuit is set up as shown.



(a) When switch S is opened,

(i) calculate the total resistance in the circuit.

resistance = …….. Ω [1]

(ii) determine the current flowing through the ammeter.

current = …….. A [1]

(b) Switch S is then closed.

(i) Calculate the total resistance in the circuit.

resistance = …… Ω [2]

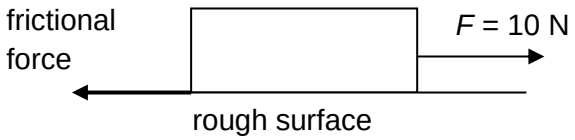
(ii) Will the reading of the ammeter be smaller, greater or the same as that in **(a)(ii)**?

…….[1]

Section B

Answer any **two** questions from this section in the spaces provided.

4 A box of mass 2.0 kg is pushed horizontally on a rough surface by a 10 N force. The box moves at constant speed.



(a) State the magnitude of the frictional force acting on the box. Explain your answer.

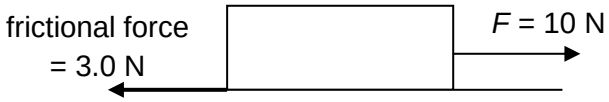
……

……

……

……[2]

(b) The box of mass 2.0 kg is then pushed horizontally on a smoother surface by the same 10 N force. The frictional force on this surface is 3.0 N.



(i) Determine the resultant force acting on the box.

resultant force = …….. N [1]

(ii) Calculate the acceleration produced by the resultant force in **b(i)**.

acceleration = ……. m/s^2 [1]

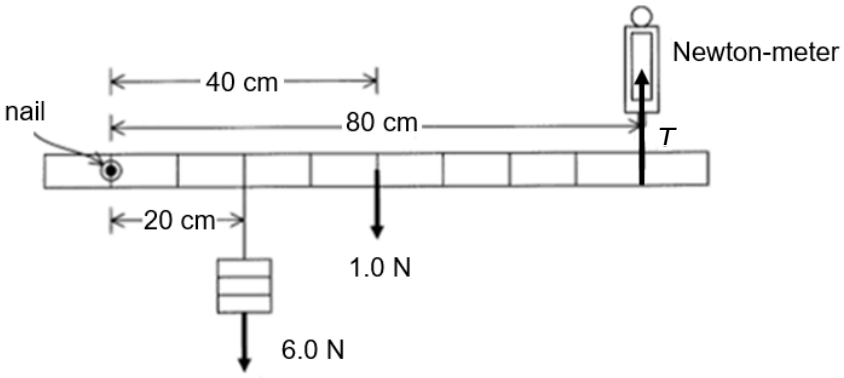
(iii) Given that the initial speed of the box is 2.0 m/s, calculate the time needed for the box to reach a speed of 16 m/s.

time = …… s [2]

(iv) Calculate the distance moved by the box as its speed increases from 2.0 m/s to 16 m/s.

distance = …… m [2]

5 **(a)** The diagram shows a metre rule of weight 1.0 N being pivoted on a nail passing through a hole drilled at the 10 cm mark. A weight of 6.0 N is suspended at the 30 cm mark. A Newton-meter supports the rule at the 90 cm mark so that it is horizontal.



(i) Using the principle of moments, calculate the magnitude of force *T* needed to keep the rule horizontal.

force *T* = …… N [3]

(ii) State and explain what happens to the force, *T,* when the 6.0 N weight is shifted further away from the nail.

……...

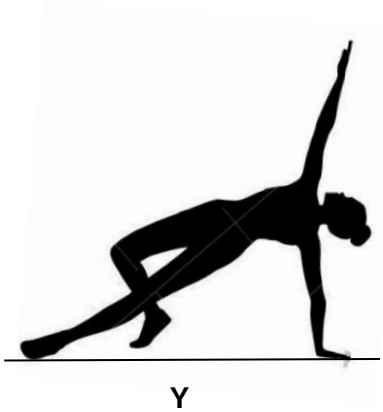
……...

……...

……[2]

(b) The diagram shows a dancer in two different positions.

X



Y

Which position, **X** or **Y**, is more stable?

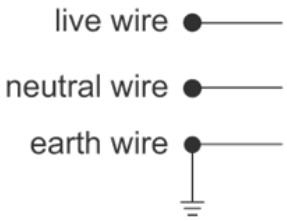
……[1]

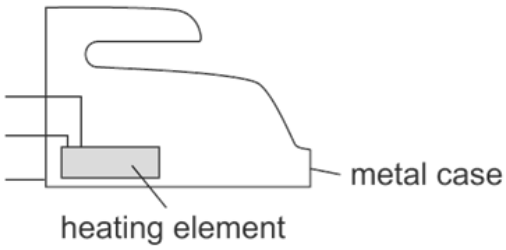
Give two reasons for your choice.

reason 1 ……..

reason 2 ……[2]

6 The diagram shows an electric kettle, which has a label '240 V, 1 440 W' marked on it. The kettle is connected to a 240 V mains supply by the live, neutral and earth wires.





(a) Complete the diagram by drawing suitable wires to connect the kettle to the mains supply. Also, draw a fuse and a switch for the kettle. [3]

(b) The live, neutral and earth wires are connected to a three–pin plug. Complete the table to show the correct colour of the insulation for live and neutral wires.

wire	colour of insulation
live	
neutral	

[1]

(c) **(i)** Calculate the current flowing in the live wire.

current = …….. A [1]

(ii) Suggest a suitable fuse rating for this kettle based on your answer in (c)(i).

fuse rating = …….. A [1]

(d) Describe one fault that may cause the fuse to melt and break the circuit.

……

……[2]

END OF PAPER