NAME		INDEX NO.		CLASS	

NORTHLAND SECONDARY SCHOOL
PRELIMINARY EXAMINATION
Secondary 4 Normal Academic

SCIENCE (PHYSICS) 5105/01

Paper 1 Physics **17 August 2022**

Paper 1 and 2: 1 hour 15 minutes

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and index number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **twenty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Answers to Paper 1 and Paper 2 must be handed in separately.
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
You are advised to spend no more than **30 minutes** on **Paper 1**.
You may proceed to answer Paper 2 as soon as you have completed Paper 1.
Any rough working should be done in this booklet.
The use of an approved scientific calculator is expected, where appropriate.

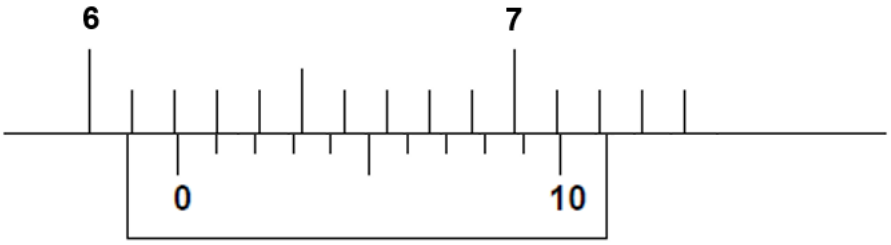
Setter: Mr Lim Yong Liang

Vetter: Mr Aaron Rajoo

1 What is 70 mm expressed in metres?

A 0.00007 m
B 0.0007 m
C 0.007 m
D 0.07 m

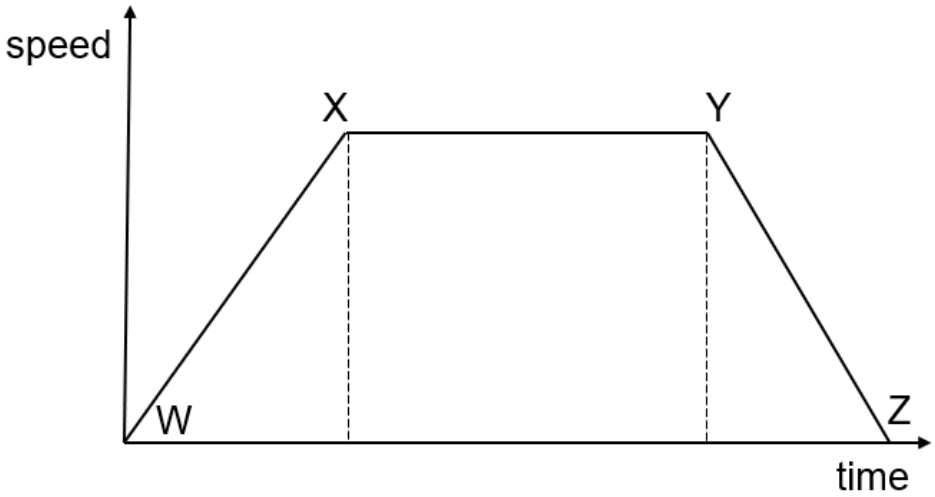
2 The inner diameter of a cylinder was measured using a pair of vernier calipers.



What is the inner diameter of the cylinder?

A 6.01 cm
B 6.03 cm
C 6.21 cm
D 6.23 cm

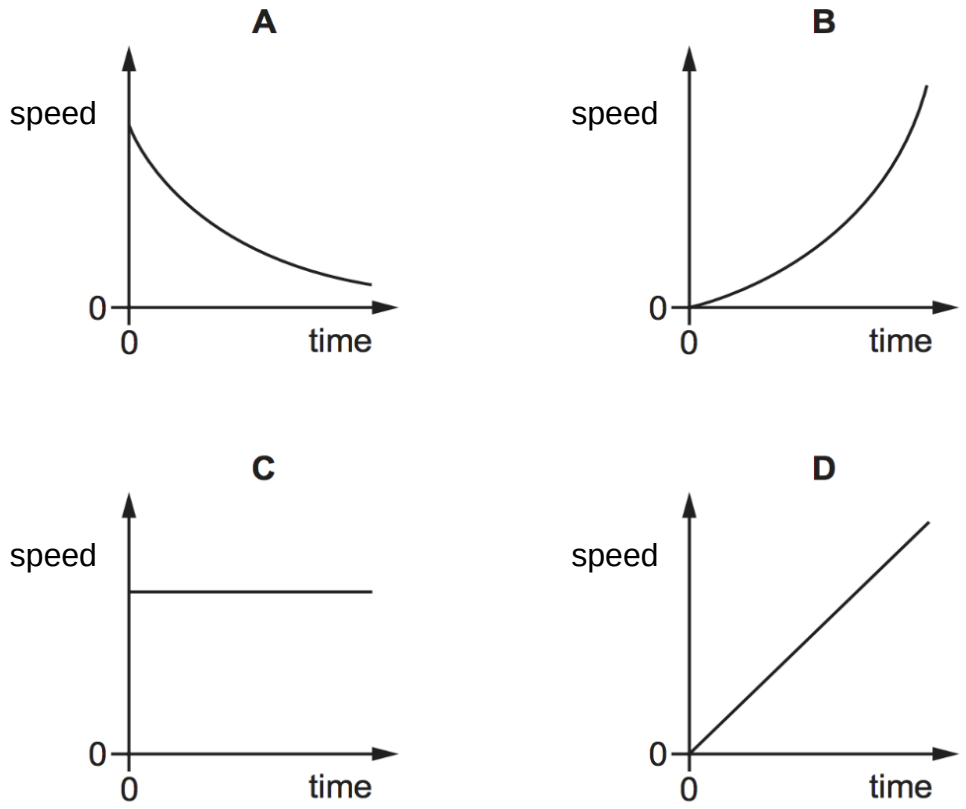
3 The graph shows how the speed of the bicycle changes over a period of time.



What is used to find the distance travelled by the cyclist when he is travelling at constant speed?

A the area under line WX
B the area under line XY
C the gradient of line WX
D the gradient of line XY

4 Which graph shows the speed of a rock free-falling over time above the surface of planet Earth?



5 A block of mass 3.5 kg has three forces acting on it.

Which row shows the correct direction and description of the motion of the block?

	direction of motion	description of motion
A	left	constant acceleration of 2 m/s^2
B	left	constant speed of 2 m/s
C	right	constant acceleration of 2 m/s^2
D	right	constant speed of 2 m/s

6 Two forces act on an object.

In which situation is it **not** possible for the object to be in equilibrium?

A The two forces act in the same direction.
B The two forces act through the same point.
C The two forces are of the same type.
D The two forces are the same size.

7 A uniform block of material has a volume of 200 cm^3 and a mass of 500 g.

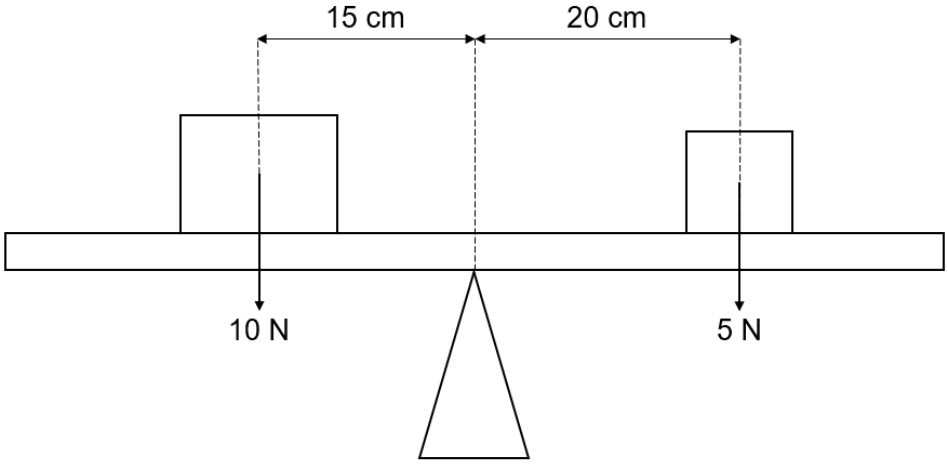
In scenario 1, the block is heated. Upon heating, it expands.

In scenario 2, the block is cut into 8 smaller blocks of similar size.

What happens to the density of the block in both scenarios?

	scenario 1	scenario 2
A	density decreases	density increases
B	density decreases	density remains the same
C	density remains the same	density increases
D	density remains the same	density remains the same

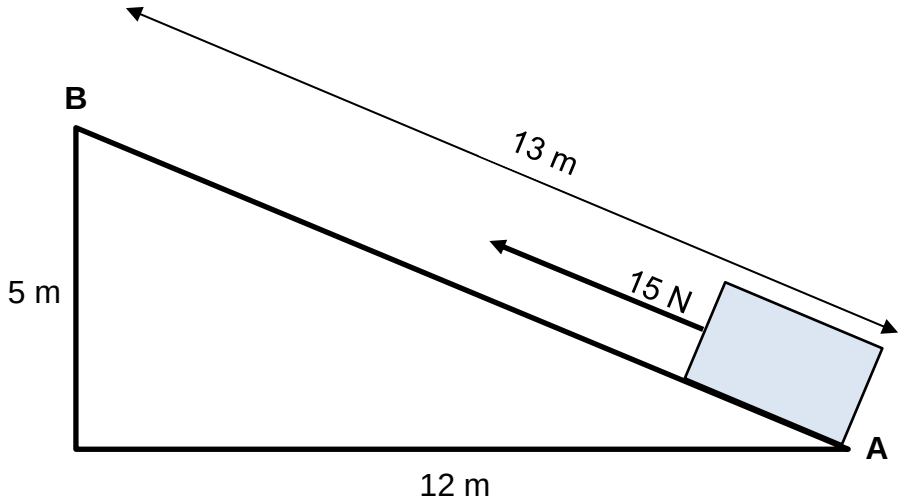
8 The uniform beam in the diagram is **not** balanced.



Which change would result in the beam achieving equilibrium?

A moving the 5 N weight 10 cm to the right
B moving the 10 N weight 5 cm to the left
C replacing the 5 N weight with a 10 N weight
D replacing the 10 N weight with a 6 N weight

9 A box is being pulled up a smooth inclined plane from point A to point B by a constant force of 15 N.



What is the work done on the box?

A 75 J
B 180 J
C 195 J
D No work is done on the box.

10 Four cars are driven along the road.

The table shows the work done by the engine in each car and the time taken by each car.

Which engine produces the most power?

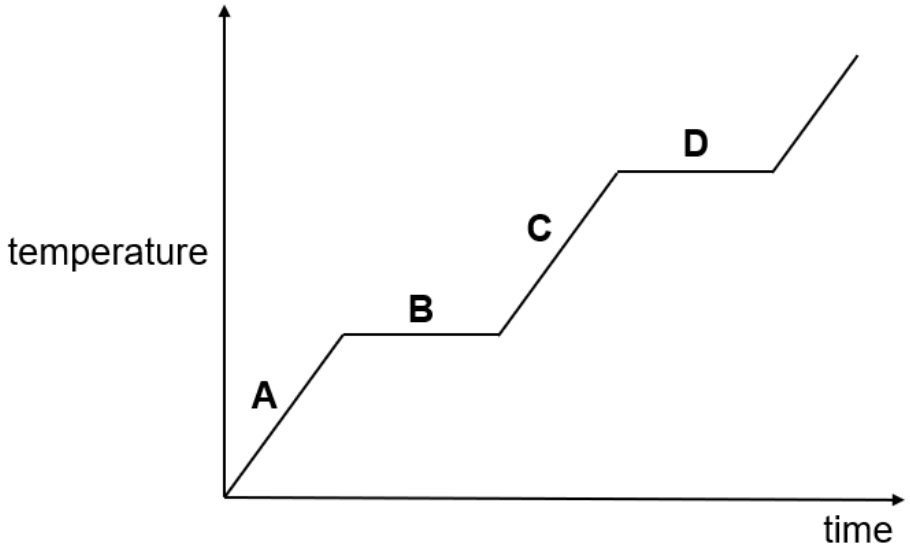
	work done by engine / J	time taken / s
A	75 000	30
B	75 000	70
C	150 000	30
D	150 000	70

11 Which statement best explains why gases are compressible?

A Particles in gases are arranged randomly.
B Particles in gases are arranged very far apart from each other.
C Particles in gases are held together by weak forces of attraction.
D Particles in gases are moving at very high speeds.

12 A pot of pure ice is placed on an electric heater and heated at a steady rate.

At which part of the graph is melting observed?



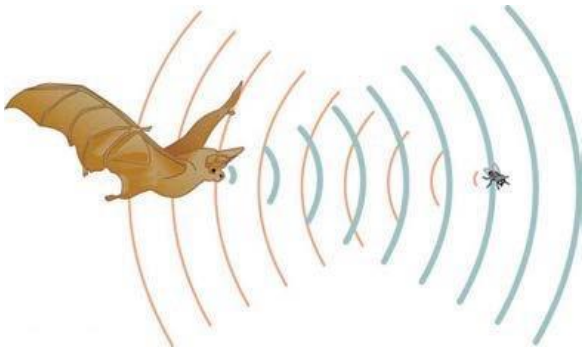
13 Which component of the electromagnetic spectrum is used in a remote control to change the channels on a television?

A gamma ray
B infra-red
C microwave
D ultra-violet

14 Which row correctly represents a transverse wave and a longitudinal wave?

	transverse wave	longitudinal wave
A	gamma ray	sound wave
B	microwave	ultra-violet radiation
C	radio wave	light wave
D	sound wave	X-ray

15 Bats produce echolocation by emitting high frequency sound pulses through their mouth or nose and listening to the echo. With this echo, the bat can detect its prey.

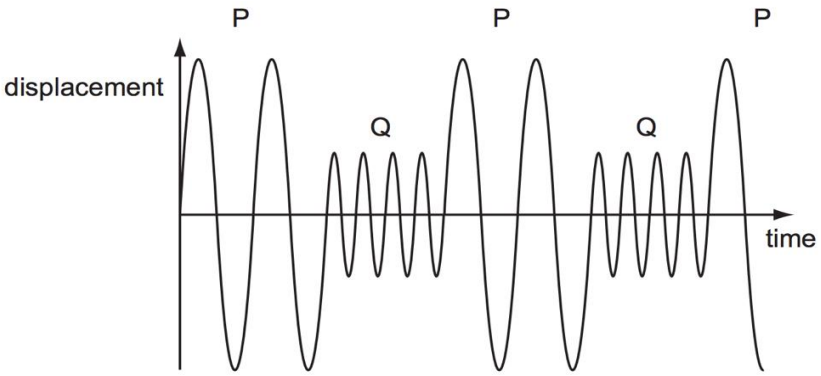


The bat detects an echo 0.70 s after emitting a high frequency sound pulse.

If the speed of sound in air is 330 m/s, how far is the prey from the bat?

A 115.5 m
B 231 m
C 235.7 m
D 471.4 m

16 During an emergency, ambulances are allowed to emit a siren to alert drivers to give way. Two different sounds P and Q are produced alternately.



Which sound is louder and which sound produces a lower pitch?

	louder	lower pitch
A	P	P
B	P	Q
C	Q	P
D	Q	Q

17 The table shows the specifications of four copper wires.

copper wire	length / m	diameter / mm
W	2	1.0
X	2	2.5
Y	5	1.0
Z	5	2.5

Which piece of copper wire has the greatest resistance?

A copper wire W
B copper wire X
C copper wire Y
D copper wire Z

18 A 20V battery drives a quantity of charge around a circuit. The total work done is 860 J.

How much charge does the battery drive around the circuit?

A 0.02 C
B 43 C
C 880 C
D 17 200 C

19 The following label was found on a sound bar.

MODEL NUMBER 30942

230 V **65 Hz** **300 W**

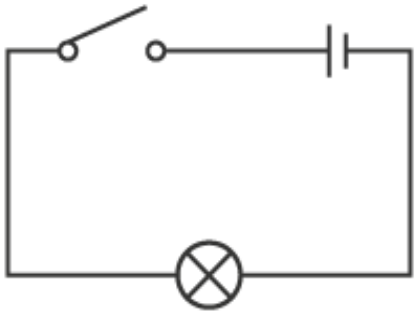
HOUSEHOLD USE ONLY

A fuse is to be fitted in its plug.

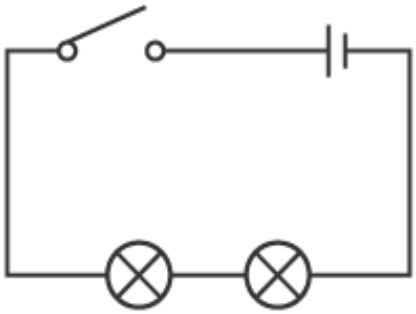
Which fuse rating is the most suitable?

A 1 A
B 2 A
C 4 A
D 5 A

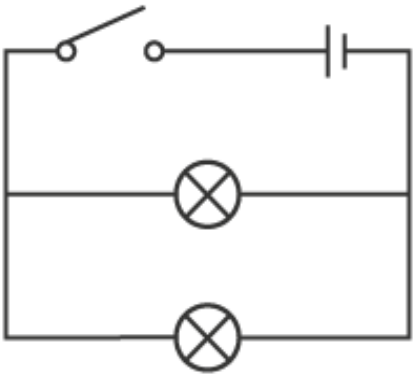
20 Given that the electromotive force of the cells in the circuits are the same, which statement(s) is/are true?



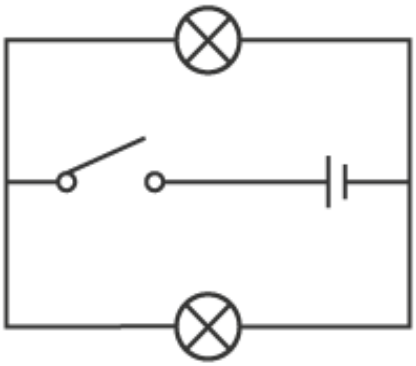
circuit K



circuit L



circuit M



circuit N

1 The current flowing through the cell in circuit K is the highest amongst all the circuits.

2 The current flowing through the cell in circuit L is the lowest amongst all the circuits.

3 The current flowing through the cell in circuits M and N are the same.

A statements 1 and 2
B statements 1 and 3
C statements 2 and 3
D statements 1, 2 and 3

[End of Paper 1]