Name: ..... Register/Index Number: ..... Class: .....
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PRESBYTERIAN HIGH SCHOOL

SCIENCE (PHYSICS) **5105/01**

Paper 1 Multiple Choice

July 2022 **Wednesday** **1 hour 15 minutes**
Papers 1 and 2

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2020 SECONDARY FOUR NORMAL (ACADEMIC)
PRELIMINARY EXAMINATION

INSTRUCTIONS TO CANDIDATES

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, class and register number on the Answer Sheet in the spaces provided.

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.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

Setter: Mr Edmund Choo
Vetted by: Mr Sherman See

This question paper consists of **10** printed pages.

1 A student measures the volume of a cork. He puts some water into a measuring cylinder and then one glass ball. He puts the cork and then a second, identical glass ball into the water as shown.

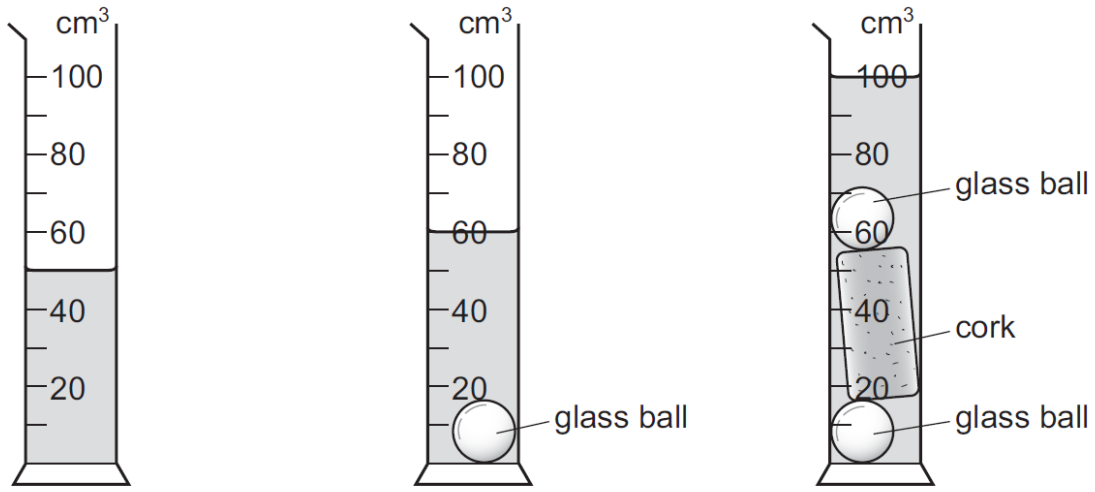


diagram 1 diagram 2 diagram 3

Diagram 1 shows the first water level.
Diagram 2 shows the water level after one glass ball is added.
Diagram 3 shows the water level after the cork and the second glass ball are added.

What is the volume of the cork?

A 30 cm^3

B 40 cm^3

C 50 cm^3

D 100 cm^3

2 The world record timing for the 800 m race is 1 min 41 seconds.

What is the average speed of the runner in m / s ?

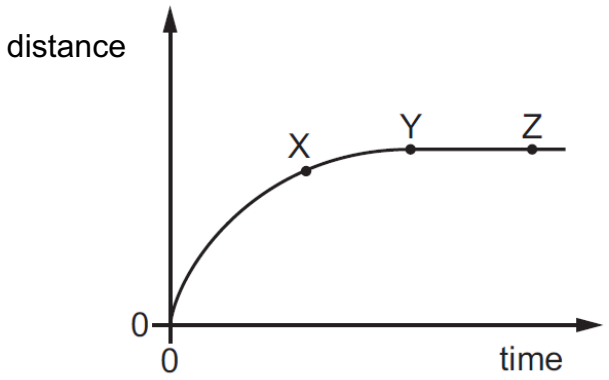
A 5.67

B 7.92

C 19.5

D 567

3 The graph shows how the distance of a car varies over a period of 10 s.

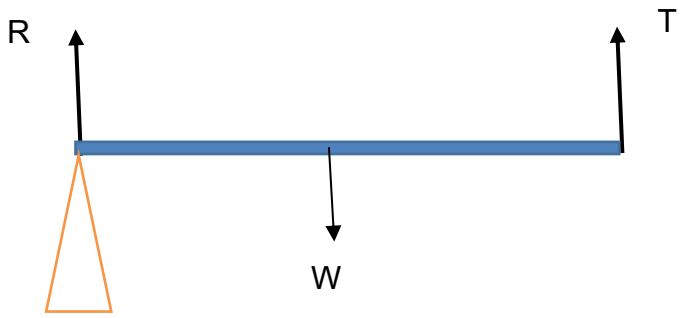


Which describes the motion of the object between X and Y, and between Y and Z?

	between X and Y	between Y and Z
A	accelerating	constant speed
B	constant speed	at rest
C	decelerating	at rest
D	decelerating	constant speed

4 A metal rod rest in equilibrium and is supported by a pivot and a string as shown.

Three forces of size R, W and T act on the rod.



How are the sizes of the forces related?

A R + T = W

B R = W + T

C T = R + W

D W = T

5 A piece of uniform cardboard is cut into two pieces, labelled as X and Y as shown.

Which statement about X and Y is not true?

A X has a greater density than Y

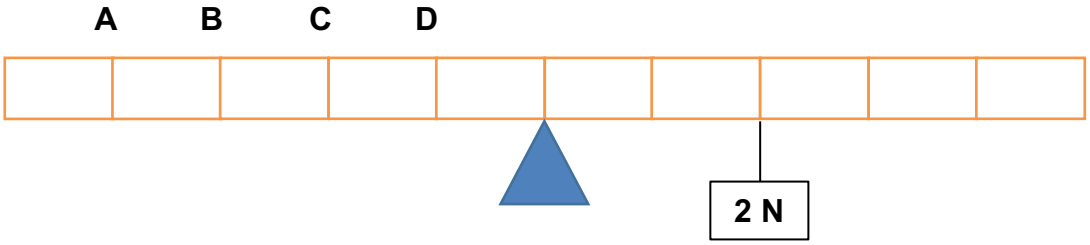
B X has a greater mass than Y

C X has a greater volume than Y

D X has a greater weight than Y

6 The diagram shows a beam. Without any weight, the beam balances at its centre. Three weights are hung as shown.

At which point should a load of 1 N balance the beam?



7 Two cubes are made from the same material. One has sides of length 1 cm while the other has sides of length 2 cm.

Which statement about the pressure exerted by these cubes on the ground is correct?

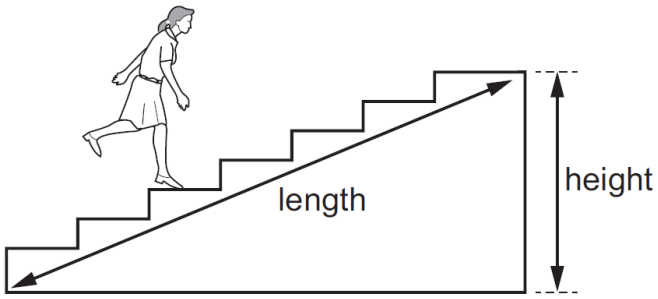
A both the cubes have the same pressure

B cannot de determined when density is unknown

C the bigger cube has higher pressure

D the smaller cube has higher pressure

8 A student runs up a flight of stairs.



Which information is **not** needed to calculate the power of the student?

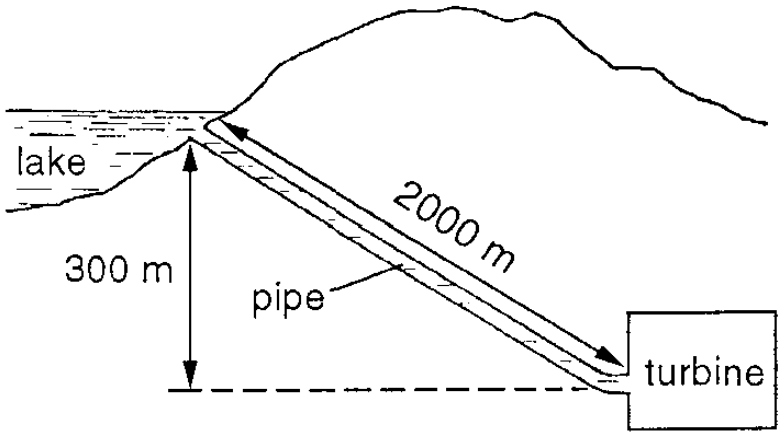
A the height of the flight of stairs

B the length of the flight of stairs

C the time taken to run up the stairs

D the weight of the student

9 The turbine of a hydro-electric power station is built below the level of a lake as shown in the diagram.



Calculate the energy gained by the turbine as 1000 kg of water falls down the pipe to the turbine? (The gravitational field strength is given as 10 N/kg.)

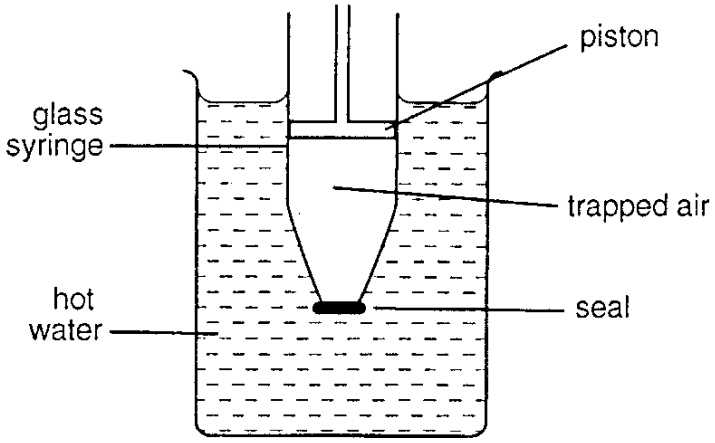
A 300 000 J

B 2 000 000 J

C 3 000 000 J

D 20 000 000 J

10 The outlet of a glass syringe is sealed so that air is trapped below the piston.



Which of the following explains why the piston begins to rise when the syringe is placed in hot water?

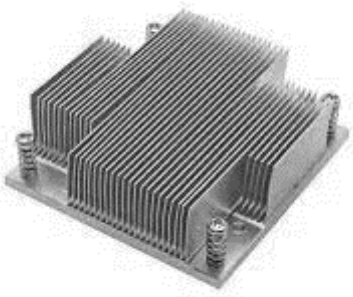
A convection currents in the syringe cause the piston to move upwards

B the gas molecules expands and become bigger

C the gas molecules move faster and collides with the piston more frequently

D the piston becomes heated and rises up

11 The diagram shows a heat sink used for keeping computer components cool.



Why are these heat sink make of metals?

A metals are good conductors

B metals are good radiator

C metals have more surface area

D metals make convection more efficient

12 Which of the following results in a decrease of internal energy of a piece of metal?

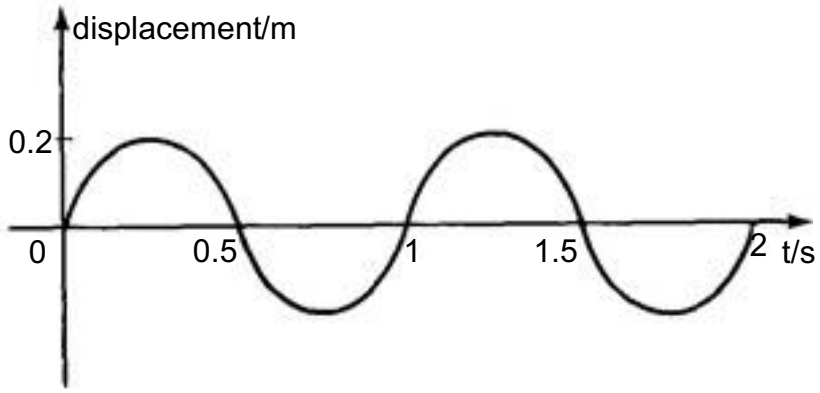
A metal absorbs energy from the sun

B metal changes from liquid to gas

C metal changes from liquid to solid

D metal is heated up by a Bunsen burner

13 A wave travels at a speed of 10 m / s. The diagram below shows how the displacement of the wave changes with time.



What is the wavelength of the wave?

A 1.0 m

B 2.0 m

C 10 m

D 20 m

14 Which of the following is an example of a longitudinal wave?

A infra-red waves

B ultra-sound waves

C ultra-violet waves

D water waves

15 Which of the following component of the electromagnetic spectrum has the highest frequency?

A infra-red waves

B radio waves

C microwaves

D violet light

16 When sound waves are propagated through air, areas of increased and decreased pressure are created.

What is the area of increased pressure known as?

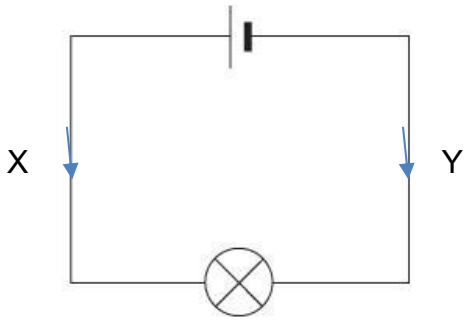
A amplitude

B compression

C period

D rarefaction

17 A dry cell is connected to a light bulb as shown.

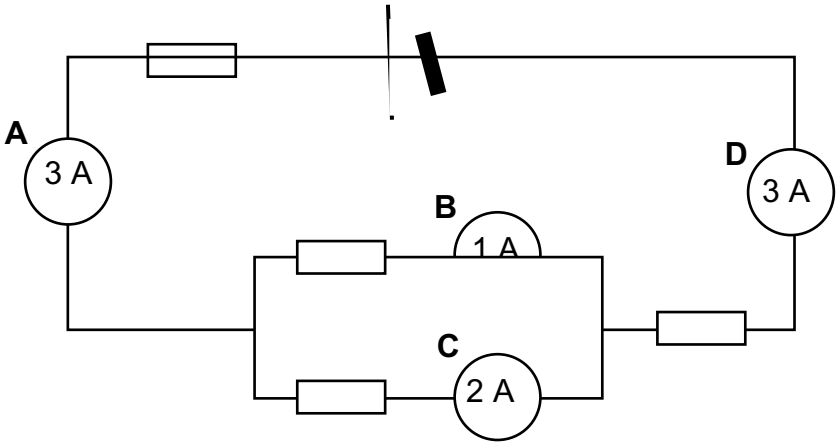


What do the directions of X and Y refer to?

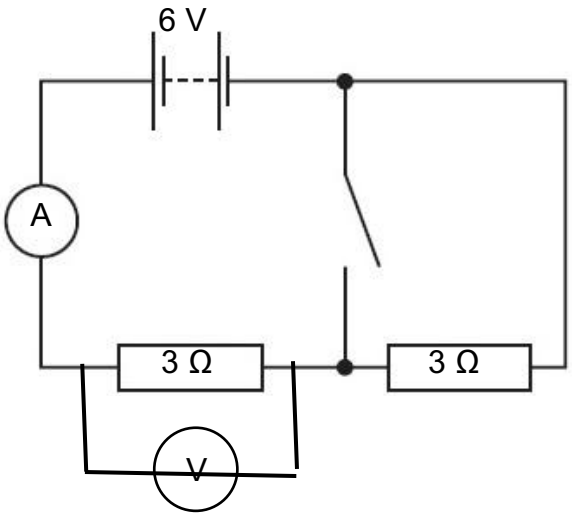
	X	Y
A	conventional current	conventional current
B	conventional current	electron flow
C	electron flow	conventional current
D	electron flow	electron flow

18 The diagram below shows ammeter readings in a circuit showing four identical resistors connected to a dry cell.

Which ammeter reading is not correct?



19 The diagram shows a circuit.



What is the reading on the voltmeter when the switch is opened, and the reading when it is closed?

	voltmeter reading when switch is opened /V	voltmeter reading when switch is closed /V
A	3	3
B	3	6
C	6	3
D	6	6

20 An electrical appliance has an input rating of 240 V, 180 W.

What is a suitable fuse for the appliance?

A 0.1 A
B 1 A
C 13 A
D 180 A

END OF PAPER

PRESBYTERIAN HIGH SCHOOL
SCIENCE DEPARTMENT
SUGGESTED ANSWERS

Subject: SCIENCE (PHYSICS) Exam : PRELIM
Setter: Edmund Choo Year: 2022
Level: SEC 4 NA

Q/N	
1	A Each glass ball is 10 cm^3. Therefore the volume of the cork is 100 – 2x10 – 50 = 30 cm^3
2	B The time take is 1 min 41 s which is actually 60 +41 = 101 s. Average speed is dist / time = 800 / 101 = 7.92 m/s
3	C The slope of the graph represents speed. From X to Y, there is a decreasing gradient which implies decreasing speed or deceleration. From Y to Z, there is no gradient or no speed which means at rest.
4	A When the metal rod is in equilibrium, not only is the resultant moment = 0, but the sum of forces is also = 0. Therefore, the sum of upward forces = sum of downward forces. nR and T are upward forces while W is a downward force.
5	A They are both made from the same material so they have the same density. The rest of the options are true.
6	A At equilibrium, sum of CW momenets = sum of ACW moments. Taking moments at the centre, F_A x distance = 2 N x 2 1N x distance = 4 Distance = 4 spaces
7	C Mass is directly proportional to volume. The volume of the bigger cube is 8 times bigger, but the area occupied by the bigger cube is only 4 times bigger. P_B = 8xdensity/4cm^2 = 2 x density. P_A = 1 x density/1 cm^2 = 1 x density. P_B = 2 P_A
8	B Power = WD/t = gain in GPE/ t What is needed is only mass, height and time.
9	C

	Energy gained = GPE lost = 1000 x 10 x 300 = 3 000 000 J
10	C When temperature increases, the particles in the trapped air moves faster so they collide with the piston more frequently and with more force.
11	A Metals are good conductors.
12	C All matter will lose energy when they change from liquid state to solid state. All the other examples result in an increase in internal energy of the metal.
13	C Frequency is 1/T = 1 Hz. Wavelength = speed / freq = 10 m
14	B Ultra-sound is a sound wave. All others are EM waves which are transverse.
15	D X rays are the most energetic and therefore the highest frequency.
16	B Compression results in an increase in air pressure.
17	B Conventional current flows from the +ve terminal of the cell to the – ve terminal. Electron flow is in the opposite direction.
18	B The sum of current in the branches always equals the current in the main circuit. Since the current in the main circuit is 2 A, the current in the branches can only be less than 2 A since there are two branches with resistors inside.
19	B When the switch is opened, the EMF is divided equally over the two resistors, so the reading will be 3V. When the switch is closed the current bypasses on 3 Ohm resistor, thus the PD across is equal to the EMF or 6V.
20	B The current flowing in the appliance is only 0.75 A, The best option is 1A. 13A and above is too high.