



## Geylang Methodist School (Secondary) Preliminary Examination 2017

**SCIENCE (PHYSICS, CHEMISTRY)**

**5076/01**

Paper 1 Multiple Choice

**Sec 4 Express  
Sec 5 Normal (A)**

Additional materials: Optical Answer Sheet

**1 hour**

**Setter :** Mr Kelvin Tay, Ms Ng Sio Ying

**18 August 2017**

### READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, index number and class on the Optical Answer Sheet in the spaces provided.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

**Read the instructions on the Optical Answer Sheet very carefully**

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.

**Gravitational field strength is assumed to be 10 N/kg unless otherwise specified.**

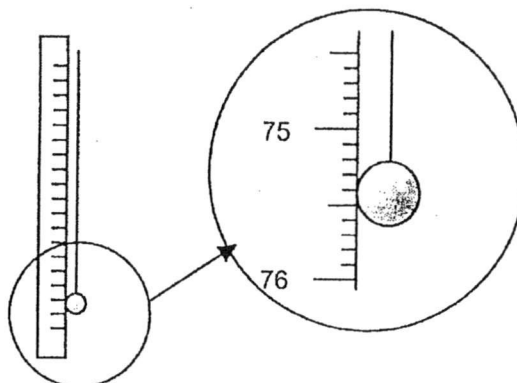
A copy of the Periodic Table is printed on page 18.

This document consists of **18** printed pages.

[Turn over

2 GMS(S)/Sci(P/C)/P1/Prelim2017/4E/5NA

- 1 A student attempts to measure the length of a pendulum as shown in the diagram.



What is the reading?

- A 75.2 cm      B 76.3 cm      C 75.4 cm      D 76.6 cm
- 2 A rectangular block of wood has length 6.0 cm, width 5.0 cm and height 10.0 cm. Its mass is 150 g.

What is the density of the wood in  $\text{kgm}^{-3}$ ?

- A  $2.0 \times 10^2 \text{ kgm}^{-3}$   
 B  $5.0 \times 10^2 \text{ kgm}^{-3}$   
 C  $2.0 \times 10^3 \text{ kgm}^{-3}$   
 D  $5.0 \times 10^3 \text{ kgm}^{-3}$
- 3 A parachutist is falling at constant speed with his parachute opened.
- Which of the following describes the resultant force acting on, and the acceleration of, the parachutist at that instant?

	resultant force	acceleration
A	decreasing	increasing
B	increasing	decreasing
C	downward	increasing
D	zero	zero

- 4 In order to increase the stability of a body, what should the relationship between its base area and the height of its centre of gravity be?

	base area	height of centre of gravity
A	decreased	increased
B	decreased	decreased
C	increased	increased
D	increased	decreased

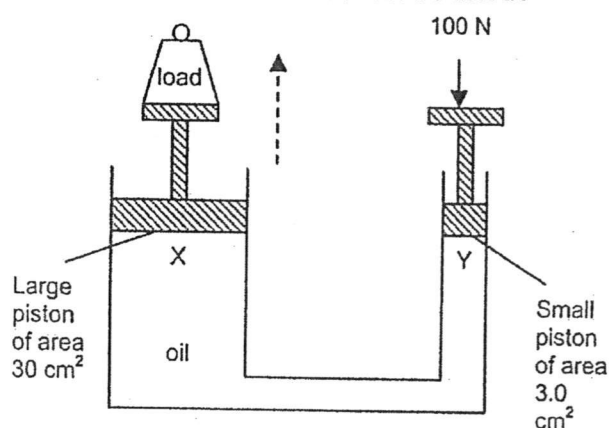
- 5 An astronaut has a mass of 80 kg on Earth. He can jump 1 m high off the surface of the Earth, but when he is on the Moon he can jump higher. This is because, on the Moon,

- A his weight is less than on Earth.  
 B his weight is the same as on Earth.  
 C his weight is greater than on Earth.  
 D his mass is less than on Earth.

- 6 A man runs up a flight of stairs in 3 seconds. If the man weighs 600 N and the stairs is 4 m high, what is the power exerted by the man in raising himself?

- A 2 400 W      B 450 W      C 200 W      D 800 W

- 7 In a hydraulic press as shown, the small piston of 100 N is pushed down and this is just sufficient to raise a heavy load in the large piston. Neglecting the weight of the pistons, what is the maximum load that can be lifted?

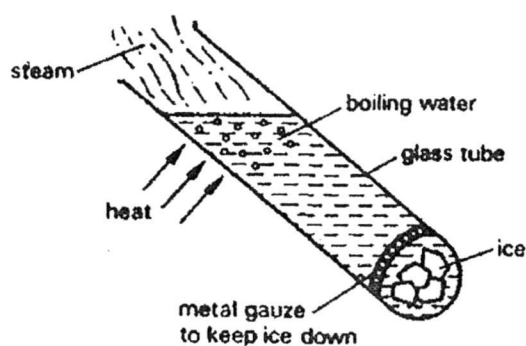


- A 10 N  
 B 1000 N  
 C 100 N  
 D 10 000 N

- 8 A stone of weight 100 N is thrown vertically upwards from the ground with an initial kinetic energy of 160 J. Ignoring air resistance, the kinetic energy, the gain in potential energy and the work done against gravity when the stone is at 1.00m above the ground will be

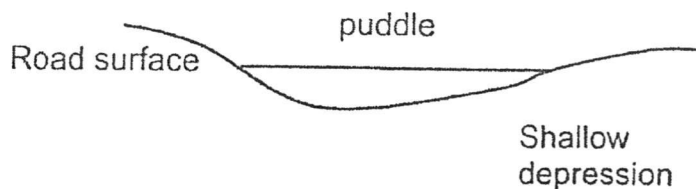
	kinetic energy	gain potential energy	work done
A	60 J	60 J	60 J
B	60 J	100 J	60 J
C	60 J	100 J	100 J
D	100 J	160 J	100 J

- 9 When heated, the volume of a gas increases much more than the volume of a solid or a liquid because
- A the particles of solids and liquids cannot move.  
 B the particles of a gas are bigger.  
 C the molecules of gas are lighter.  
 D the attractive force between particles of gas is weaker.
- 10 An experiment is carried out as shown in the diagram. The ice takes a long time to melt even though the water at the top of the tube has begun to boil. Why does this happen?



- A Water is a poor conductor of heat.  
 B Convection does not occur in water.  
 C There is not enough heat to melt the ice.  
 D Ice is poor conductor of heat.

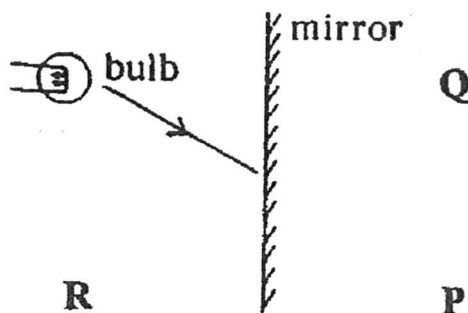
- 11 The diagram shows a cross-section through a rain-water puddle formed in a shallow depression in a road surface.



Over a period, air temperature, wind speed and wind direction remains constant.

What happens to the rate of evaporation of water from the puddle?

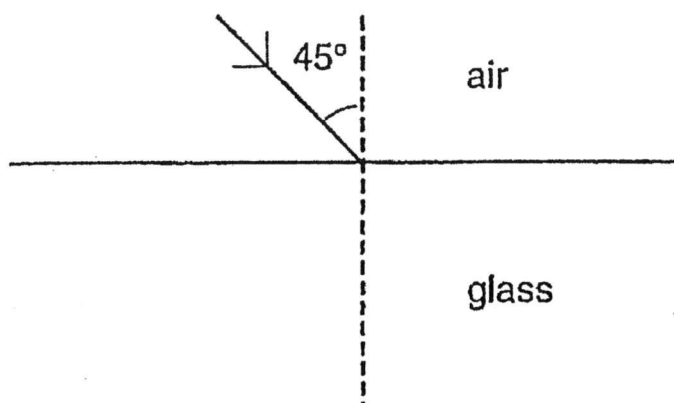
- A It decreases, because the puddle gets shallower.
  - B It increases, because the puddle gets shallower.
  - C It decreases, because the surface area decreases.
  - D It increases, because the surface area decreases.
- 12 A ray of light from a small light bulb strikes a plane mirror as shown in the diagram below.



Where is the image of the bulb formed?

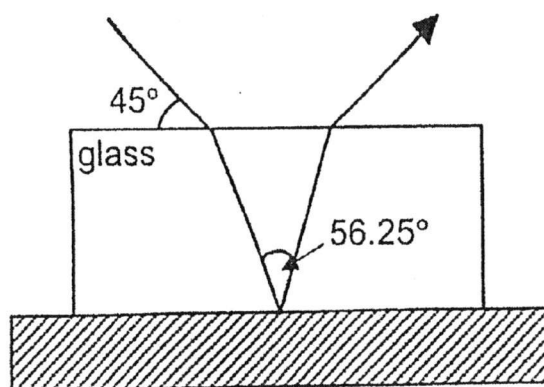
- A At Q and virtual
  - B At P and virtual
  - C At R and real
  - D At P and real
- 13 What affects the refractive index of a sample of glass?
- A The angle of incidence.
  - B The shape of the glass.
  - C The thickness of the glass.
  - D The type of the glass.

- 14 The diagram shows a ray of light entering a glass block of refractive index 1.41 at an angle of incidence of  $45^\circ$ .



By how many degrees does the light ray change direction when entering the glass?

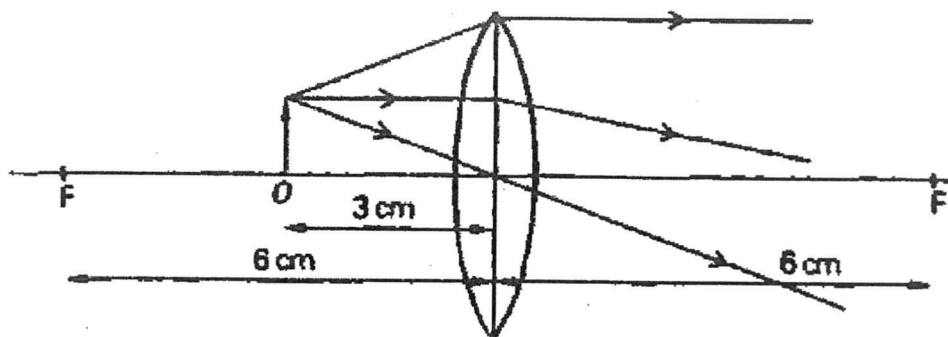
- A 15  
 B 30  
 C 45  
 D 90
- 15 A piece of glass was placed on top of a polished mirrored surface as shown in the diagram below.



What is the critical angle of glass?

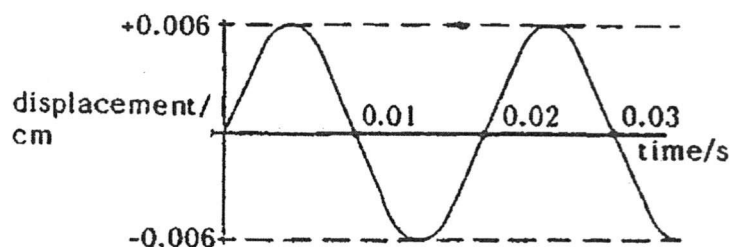
- A  $28.13^\circ$   
 B  $41.81^\circ$   
 C  $45^\circ$   
 D  $56.25^\circ$

- 16 An object  $O$  is placed 3 cm away from converging lens of focal length 6 cm. (see diagram below.)



What type of image is produced?

- A Virtual, erect and magnified  
 B Virtual, erect and diminished  
 C Real, inverted and magnified  
 D Real, inverted and diminished
- 17 Below is a graph that shows the displacement of a particle on the surface of a liquid by a passage of waves. The speed of these waves is 2 cm/s.

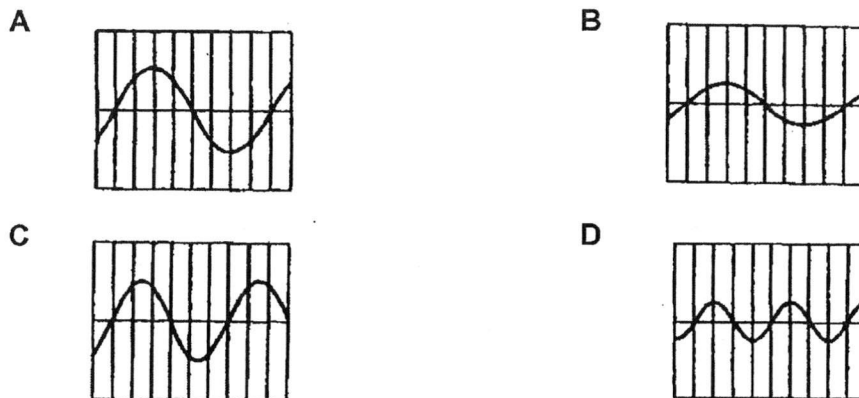


What are the correct figures for the amplitude and the wavelength?

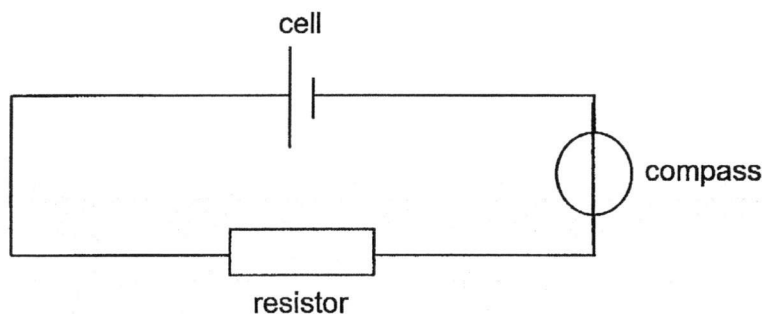
	Amplitude in cm	Wave length in cm
A	0.04	0.012
B	0.04	0.006
C	0.02	0.006
D	0.012	0.04

- 18 The diagrams show oscilloscope traces of sounds picked up by microphones. The oscilloscope controls are set in the same positions for all the traces.

Which trace shows the loudest, lowest-pitched, sound?



- 19 The diagram shows a compass placed below a current carrying wire.



At which direction will the compass point towards? Ignore effects of the Earth's magnetic field.



A



B



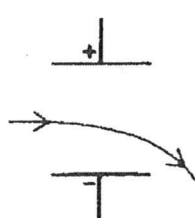
C



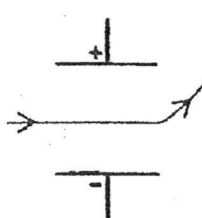
D

- 20 The diagrams below show paths taken by electrons. Name the diagram that shows the correct path taken by the electrons when they pass between a pair of charged deflection plates.

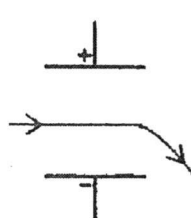
A



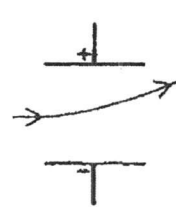
B



C

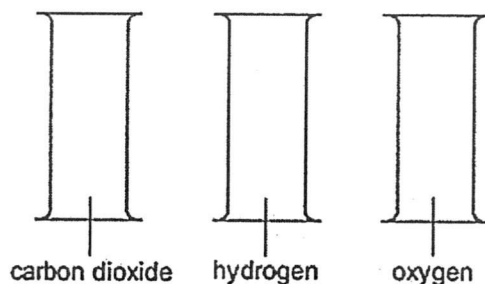


D



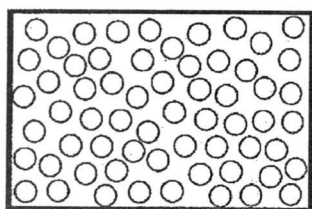


- 21 Three gas jars contain carbon dioxide, hydrogen and oxygen, as shown.

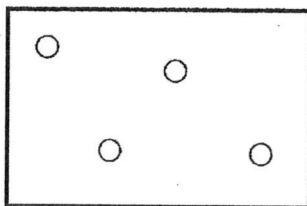


Which one of the following tests could be used to identify the gases in each jar?

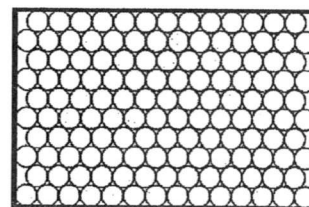
- A a glowing splint
  - B a lighted splint
  - C damp blue litmus paper
  - D limewater
- 22 The diagrams show the arrangement of particles in three different physical states of substance X.



state 1



state 2

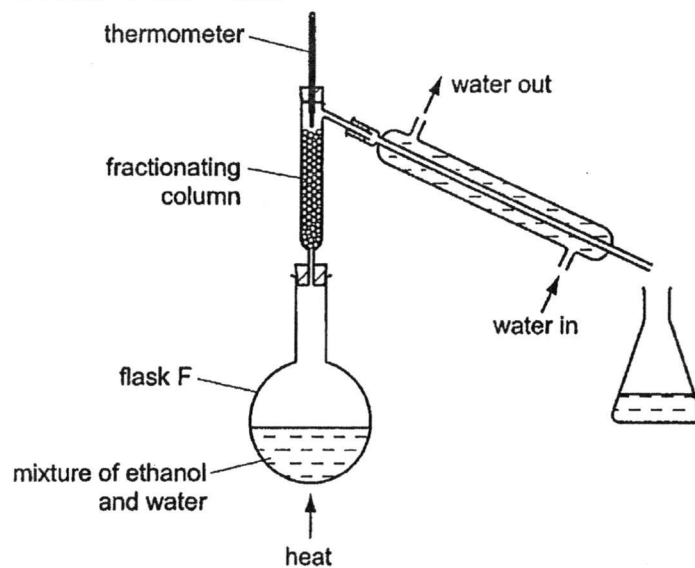


state 3

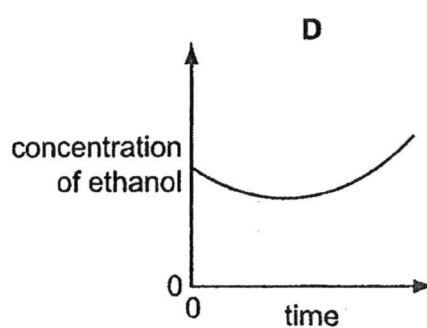
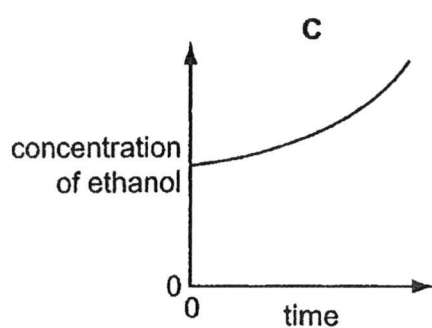
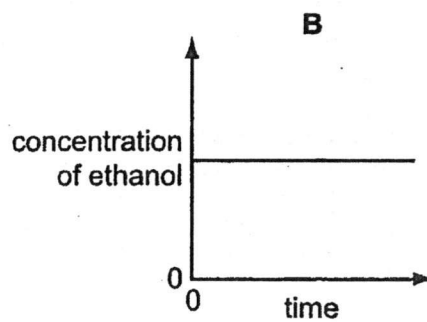
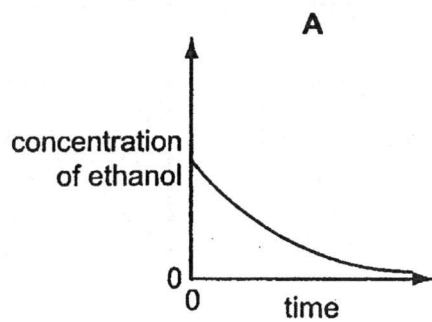
Which statement about the physical states of substance X is correct?

- A Particles in state 1 vibrate about fixed positions.
- B State 1 changes to state 2 by diffusion.
- C State 2 changes directly to state 3 by sublimation.
- D The substance in state 3 has a fixed volume.

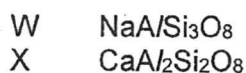
- 23 The apparatus shown is used to distil ethanol (boiling point  $78\text{ }^{\circ}\text{C}$ ) from a mixture of ethanol and water.



Which graph shows the change in concentration of the ethanol in flask F as the distillation proceeds?



- 24 What can be deduced from the symbol  ${}^9_4\text{Be}$ ?
- A An atom of beryllium contains 4 electrons.  
 B An atom of beryllium has 4 protons and 9 neutrons in its nucleus.  
 C Beryllium has a proton (atomic) number of 9.  
 D Beryllium exists as a diatomic molecule.
- 25 The chemical formula of two substances, W and X, are given.



Which statements are correct?

- |   |  |
|---|--|
| 1 | W and X contain the same amount of oxygen.   |
| 2 | W contains three times as much silicon as X. |
| 3 | X contains twice as much aluminium as W.     |
- A 1 and 2  
 B 1 and 3  
 C 2 and 3  
 D 1, 2 and 3
- 26 The table shows four elements W, X, Y and Z with their proton numbers.

element	W	X	Y	Z
proton number	6	8	11	17

Which of the following shows the correct formula of likely ionic and covalent compounds formed from the four elements shown above?

	formula of ionic compound	formula of covalent compound
<b>A</b>	WX	YZ
<b>B</b>	YW	WZ <sub>4</sub>
<b>C</b>	YZ	ZX
<b>D</b>	Y <sub>2</sub> X	WX <sub>2</sub>

- 27 Which of the following could be an ionic compound?

	melting point / °C	boiling point / °C	electrical conductivity of		
			solid	liquid	solution in water
<b>A</b>	1610	2230	poor	poor	insoluble
<b>B</b>	660	2470	good	good	insoluble
<b>C</b>	-112	-83.7	poor	poor	good
<b>D</b>	801	1413	poor	good	good

- 28 For the reaction shown, which volume of 1.0 mol/dm<sup>3</sup> hydrochloric acid is required to react completely with 5 g of calcium?



- A** 5 cm<sup>3</sup>      **B** 10 cm<sup>3</sup>      **C** 125 cm<sup>3</sup>      **D** 250 cm<sup>3</sup>

- 29 The diagram shows the positions of elements L, M, Q, R and T in the Periodic Table. These letters are not the chemical symbols of the elements.

																R	T	
L																		
M	Q																	

Which statement about the properties of these elements is correct?

- A** L reacts more vigorously with water than does M.  
**B** L, M and Q are all metals.  
**C** T exists as diatomic molecules.  
**D** T is more reactive than R.

- 30 In the Periodic Table, element X is in the same group as chlorine but has a lower boiling point.

Which statement about X is correct?

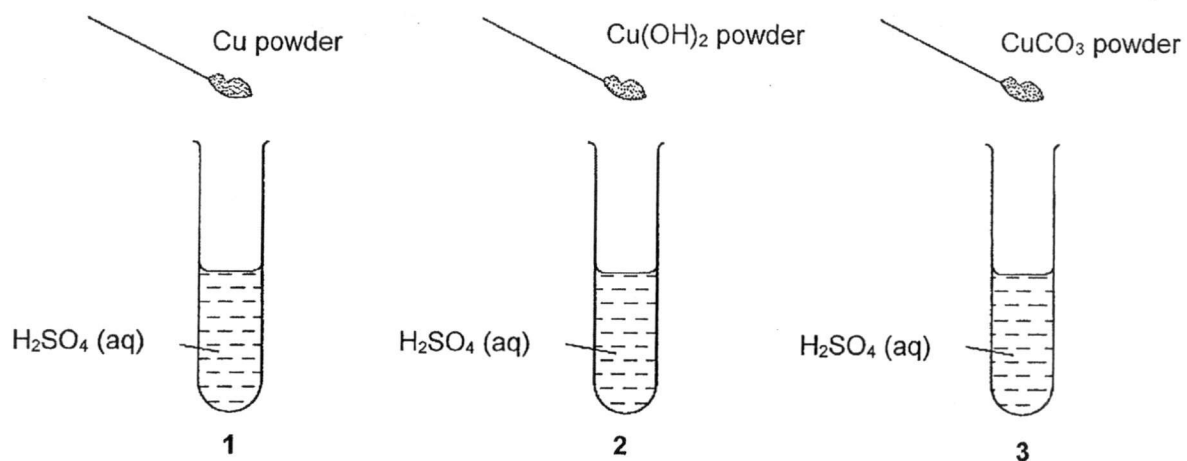
- A It has a lighter colour than chlorine.  
 B It is a liquid at room temperature.  
 C It has an atomic number greater than 17.  
 D It loses an electron when it reacts with metal.
- 31 W, X, Y and Z are four metals.  
 Some properties of these metals are listed below.

- 1 Only X and Y can be extracted by electrolysis.
- 2 X reacts more vigorously with cold water than Y.
- 3 Only Z can be found free in nature.

What are metals W, X, Y and Z?

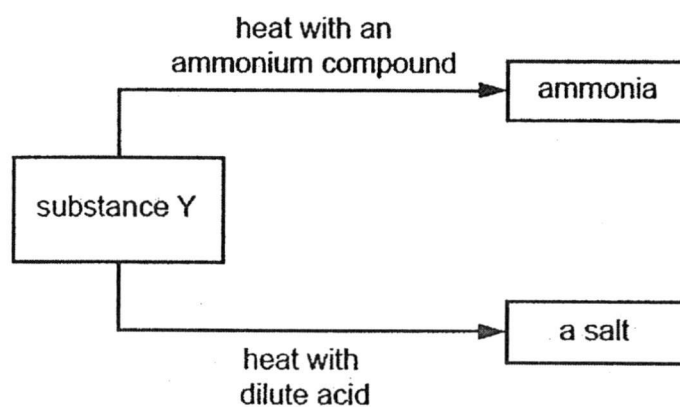
	W	X	Y	Z
A	calcium	aluminium	silver	iron
B	iron	potassium	aluminium	silver
C	silver	calcium	potassium	gold
D	aluminium	silver	iron	potassium

- 32 The diagrams show three experiments using dilute sulfuric acid. Three different powders are added to the acid. The mixtures are stirred.



Which test tubes now contain  $\text{Cu}^{2+}(\text{aq})$  ions?

- A 3 only  
 B 1 and 2 only  
 C 2 and 3 only  
 D 1, 2 and 3
- 33 The diagram shows some reactions of substance Y.

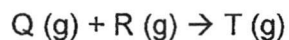


Which type of substance is Y?

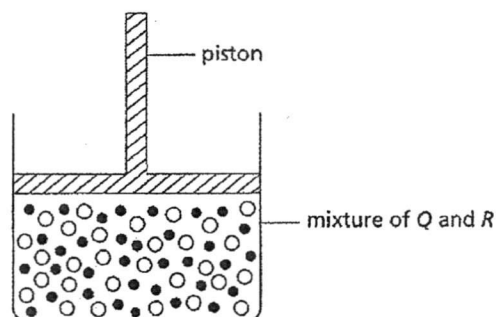
- A an alcohol  
 B an alkali  
 C a catalyst  
 D a metal

- 34 Which process is **not** exothermic?
- A obtaining lime from limestone
  - B condensation of water vapour
  - C reacting hydrogen with oxygen
  - D burning a fossil fuel

- 35 Gases Q and R react according to this equation:



The reaction mixture is placed in a container at room temperature as shown in the figure below.



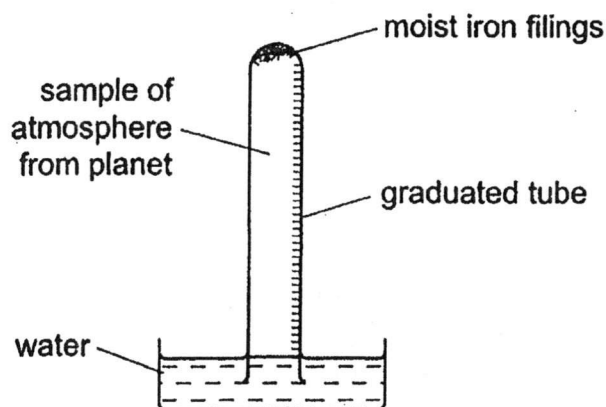
Which of the following actions can increase the speed of reaction?

- A placing the container in a dark room
- B lowering the piston in the container
- C placing the container in water at  $0^{\circ}\text{C}$
- D using a bigger container

- 36 The atmosphere of a newly discovered planet contains the following gases.

carbon dioxide	20%
nitrogen	40%
noble gases	10%
oxygen	30%

The apparatus below was set up with a 100 cm<sup>3</sup> sample of the atmosphere of the planet in the graduated tube. The volume of the sample was measured at intervals until no further change in volume took place.



What volume of the sample of the atmosphere would remain?

- A 20 cm<sup>3</sup>      B 30 cm<sup>3</sup>      C 70 cm<sup>3</sup>      D 80 cm<sup>3</sup>

- 37 These statements are about a gas.

- 1 It is produced by thermal decomposition of a carbonate.
- 2 It is produced by the fermentation of glucose.
- 3 It makes up 1% of unpolluted air.
- 4 It is produced during the production of iron from iron(III) oxide.

Which statements are correct for carbon dioxide?

- A 1 and 2 only  
 B 1, 2 and 3  
 C 1, 2 and 4  
 D 1, 3 and 4



- 38 Which statement about petroleum is **not** correct?
- A It can be separated into useful substances by fractional distillation.
- B It consists mainly of hydrocarbons.
- C It is found underground in many parts of the world.
- D Its main use is for making lubricants and polishes.
- 39 A hydrocarbon P is cracked to be Q and hydrogen.  
Compound R is formed by the addition polymerisation of Q.

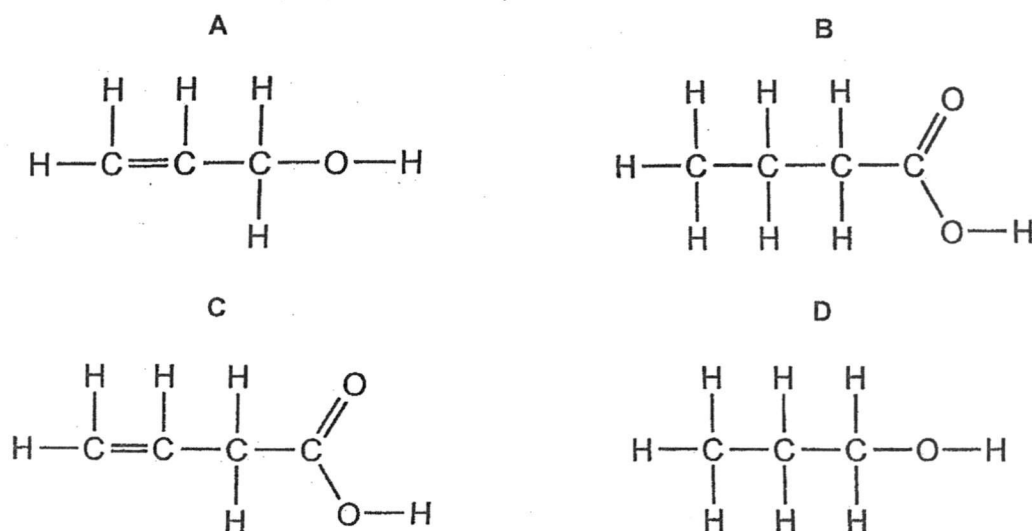
To which homologous series do P, Q and R belong?

	P	Q	R
A	alkene	alkane	alkane
B	alkane	alkene	alkane
C	alkane	alkane	alkene
D	alkane	alkene	alkene

- 40 The results of two tests on compound Z are shown.

test	result
add bromine water	turns colourless
add aqueous sodium carbonate	carbon dioxide formed

Which of the following represents compound Z?



End of Paper

**DATA SHEET**  
**The Periodic Table Of The Elements**

		Group																																	
I	II	III	IV	V	VI	VII	0																												
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10																											
23 Na Sodium 11	24 Mg Magnesium 12	13 Al Aluminium 13	27 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18																												
39 K Potassium 19	40 Ca Calcium 20	21 Sc Scandium 21	45 Ti Titanium 22	48 V Vanadium 23	51 Cr Chromium 24	52 Mn Manganese 25	55 Fe Iron 26	56 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36																		
85 Rb Rubidium 37	88 Sr Strontium 38	37 Y Yttrium 39	89 Zr Zirconium 40	91 Nb Niobium 41	93 Mo Molybdenum 42	96 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54																		
133 Cs Caesium 55	137 Ba Barium 56	57 La Lanthanum 57	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86																		
87 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																																	
*58-71 Lanthanoid series																		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71					
+90-103 Actinoid series																		90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103				

Key  $\begin{matrix} a \\ X \\ b \end{matrix}$

a = relative atomic mass  
X = atomic symbol  
b = proton (atomic) number

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).



## Geylang Methodist School (Secondary) Preliminary Examination 2017

Candidate Name			
Class		Index Number	

**SCIENCE****5076/02**

Paper 2 Physics

**Sec 4 Express**  
**Sec 5 Normal (A)**

Additional materials : Writing papers

1 hour 15 minutes

**Setter :** Mdm Sharifah Noor Osman**15 August 2017****READ THESE INSTRUCTIONS FIRST**

Write your name, index number and class on all the work you hand in.  
 Write in dark blue or black pen on both sides of the paper.  
 Do not use staples, paper clips, highlighters, glue or correction fluid.

**Section A**Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**Answer any **two** questions on the writing papers provided. Write your answers in the spaces provided on the question paper.

The number of marks is given in brackets [ ] at the end of each question or part question.

At the end of the examination, hand in both Sections A and B separately.

Acceleration due to gravity,  $g$ , is assumed to be  $10 \text{ ms}^{-2}$  unless otherwise specified.

For Examiner's Use	
Section A	/ 45
Section B	/ 20
<b>Total</b>	<b>/ 65</b>

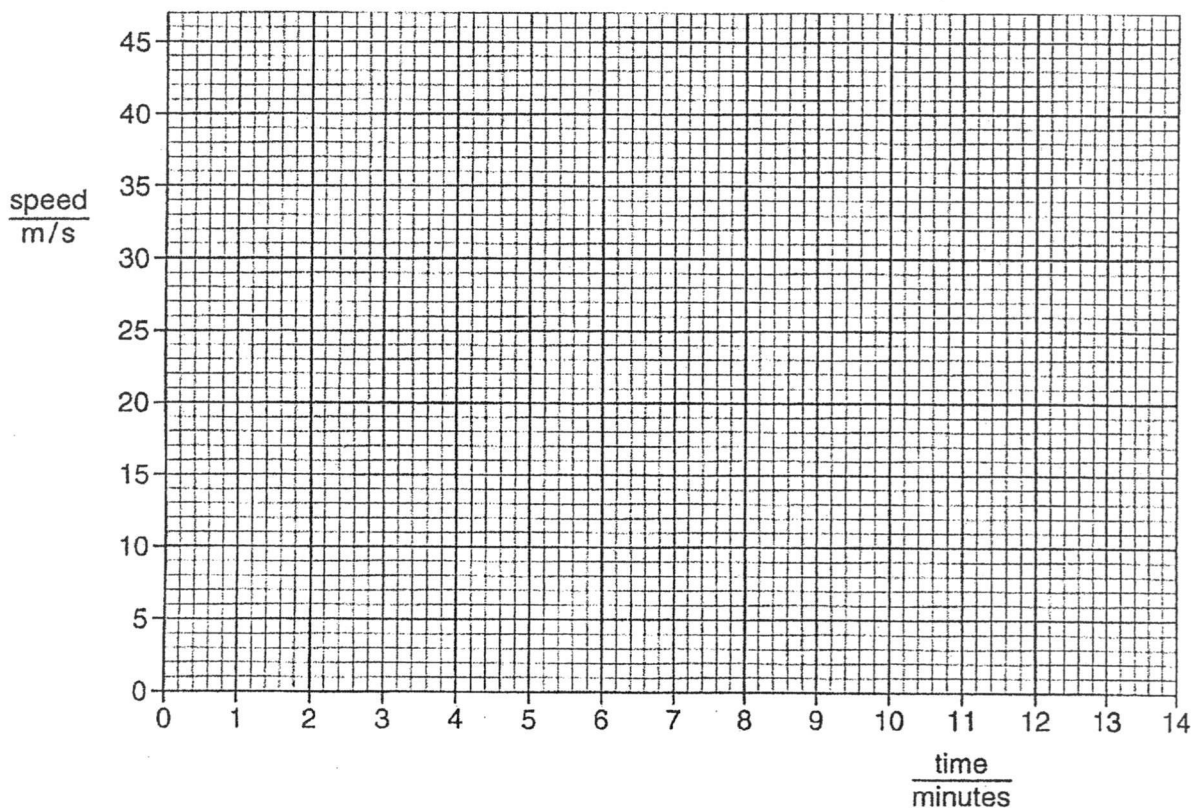


**SECTION A**

Answer **ALL** questions in this section in the spaces provided.

**1** A car travels at  $15 \text{ ms}^{-1}$  for 2.0 minutes. It then accelerates uniformly to a speed of  $40 \text{ ms}^{-1}$  in 1.5 minutes. It travels at a uniform speed of  $40 \text{ ms}^{-1}$  for a further 7.0 minutes before decelerating non-uniformly to rest in 2.5 minutes.

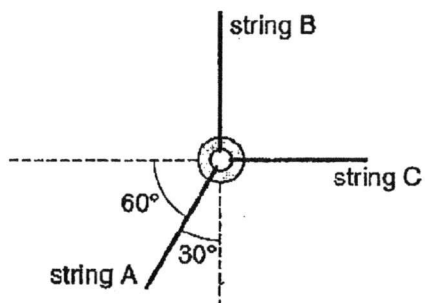
(i) In the figure, plot a graph to show the variation with time of the speed of the car. [2]



(ii) Calculate the distance moved by the car before it decelerated.

distance = .....[2]

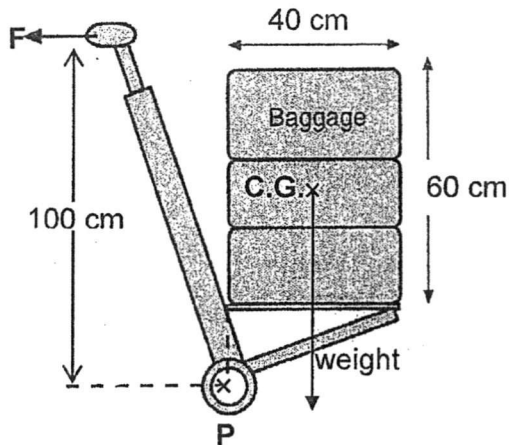
- 2 The figure shows three strings attached to a ring. The ring and the strings lie in a horizontal plane and are at rest.



The tension in string A and string C are 200 N and 100 N respectively. Using a scale of 1 cm to represent 50 N, draw a scaled diagram to determine the tension in string B.

tension in string B = ..... [4]

- 3 An airplane passenger places his baggage, of total mass 20 kg, onto a trolley as shown in the figure. He applies a force  $F$  at the handle to raise the baggage to the position shown.



- (a) Calculate the weight of the baggage.

weight = ..... [1]

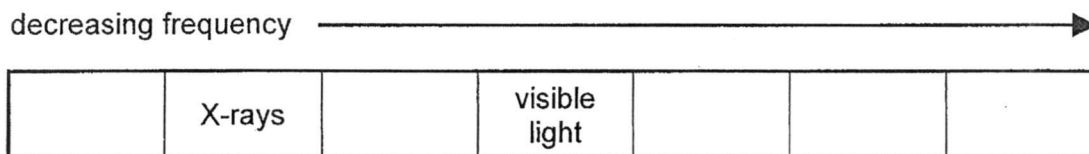
- (b) The axle of the wheels,  $P$ , acts as a pivot. By taking moments about  $P$ , calculate the force  $F$  required on the handle to keep the baggage in the position shown.

$F$  = ..... [2]

- (c) Explain how the design of the trolley makes it easier to support the load.

.....  
 .....  
 ..... [2]

- 4 The figure shows some parts of the electromagnetic spectrum.



- (a) State one application of X-rays.  
 ..... [1]
- (b) Name two electromagnetic waves that have a lower frequency than visible light.
1. ....
2. .... [2]
- (c) All waves in the EM spectrum travel at a speed of  $3.0 \times 10^8$  m/s in vacuum.  
 State two other properties that are common to all electromagnetic waves.
1. ....  
 ....
2. ....  
 ..... [2]
- (d) Given that X-rays have a frequency of  $5 \times 10^{18}$  Hz, determine its wavelength.

wavelength = ..... [2]



- 5 Fig 5.1 and Fig 5.2 show a ray of red light being refracted at a glass surface at different angles of incidence.

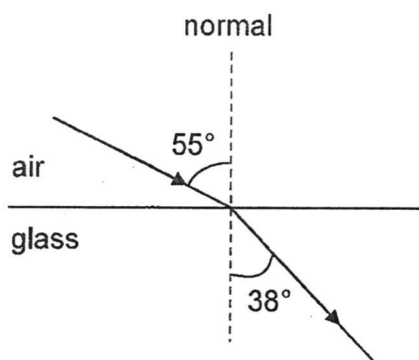


Fig 5.1

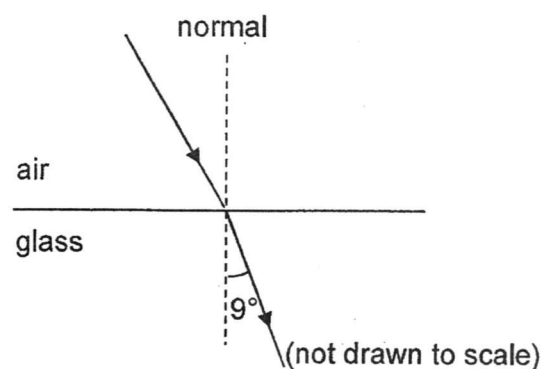


Fig 5.2

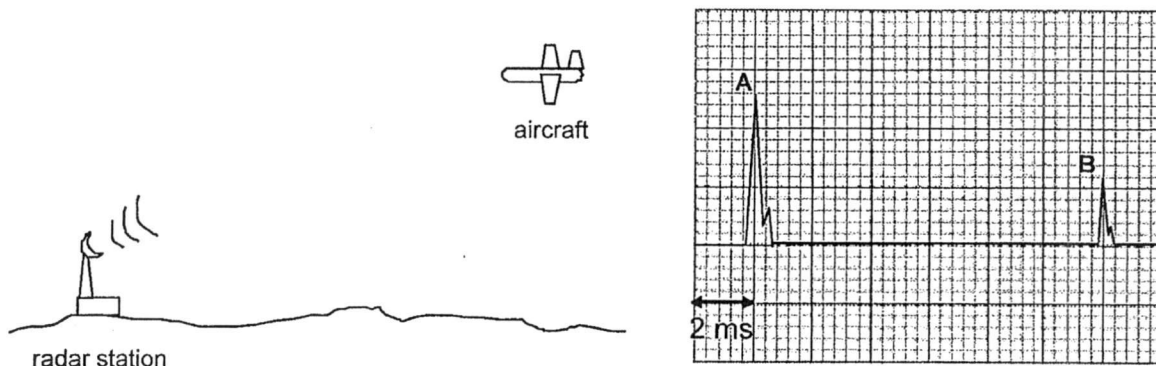
- (a) Calculate the angle of incidence in Fig 5.2.

Angle of incidence = ..... [3]

- (b) State the angle of incidence at which the angle of refraction is zero.

..... [1]

- 6 **RADAR**, short for **RA**dio **D**etection **A**nd **R**anging has many applications. It is a system used to detect and determine the distance of objects such as aircrafts. Strong radio waves are transmitted and a receiver listens for any echoes. The figure shows a radar station that has detected an incoming aircraft.



On the right shows the display of the wave. **A** represents the pulse of the emitted radio waves while **B** represents the pulse of the echo.

- (a) Using information in the display, find the time taken for the radar waves to go out to the aircraft and back.

time taken = ..... [1]

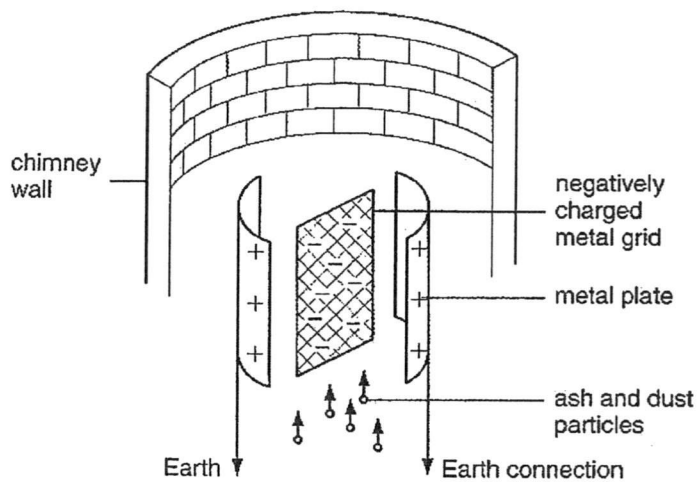
- (b) Determine the distance of the aircraft from the radar station.  
(Radio waves travels at a speed of  $3 \times 10^8$  m/s)

distance = ..... [2]

- (c) One minute later, pulses **A** and **B** are only 5 divisions apart. Determine the speed of the aircraft.

speed = ..... [2]

- 7 The figure shows an arrangement of an electrostatic precipitator in a chimney which removes ash and dust from the waste gases produced in coal-powered power stations.



The metal grid is given a very large negative charge. When the ash and dust particles pass through the metal grid, they are given a negative charge.

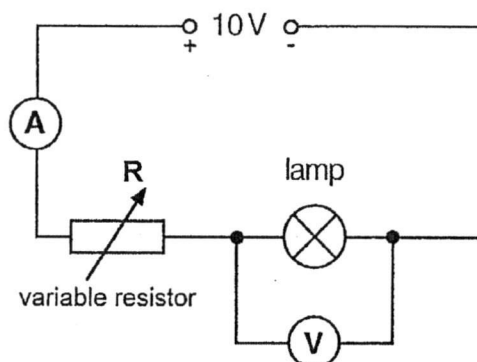
Describe and explain what happens to the ash and dust particles as they pass up the chimney.

.....

.....

..... [2]

- 8 The battery in the circuit below has an e.m.f. of 10 V and negligible resistance. The variable resistor  $R$  is adjusted until the voltmeter reading is 2.5 V and the ammeter reading is 0.5 A.



- (a) Determine the resistance of the light bulb.

resistance = ..... [2]

- (b) Calculate the resistance of the variable resistor  $R$ .

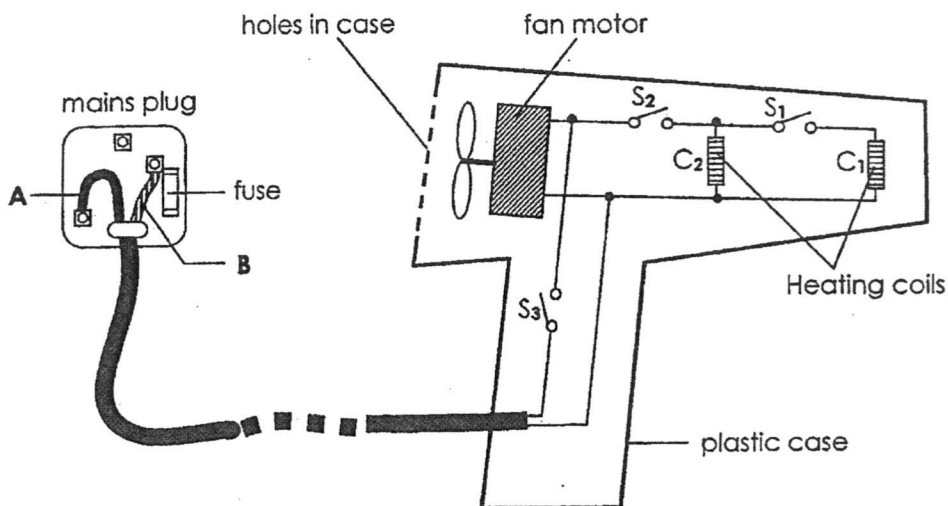
resistance = ..... [2]

- (c) The resistance of the variable resistor  $R$  is now increased to  $45 \Omega$ .

Assuming that the resistance of the light bulb in (a) remains unchanged, state and explain what happens to the brightness of the light bulb.

.....  
 .....  
 ..... [2]

9 The figure shows a 240 V electric hairdryer with a plastic case.



(a) Label the wires **A** and **B** and their respective colours in a mains plug.

wire	name	colour
<b>A</b>		
<b>B</b>		

[2]

(b) One pin in the plug is not used. Explain whether this will make the hairdryer dangerous when it is switched on.

.....  
 .....  
 ..... [1]

(c) State the switch(es) that need to be closed to turn on the following:

(i) the fan alone

.....

(ii) the fan and only one of the heating coils

..... [2]

- (d) When the hair dryer is working at full power, the voltage is 240 V. The current in each heating coil is 2 A and the fan motor takes a current of 0.5 A.
- (i) What is the total current from the supply when both heating coils and the fan are in use?

total current = ..... [1]

- (ii) Which is the most suitable fuse, 1 A, 3 A, 7 A or 10 A, when both heating coils and fan are in use?

..... [1]

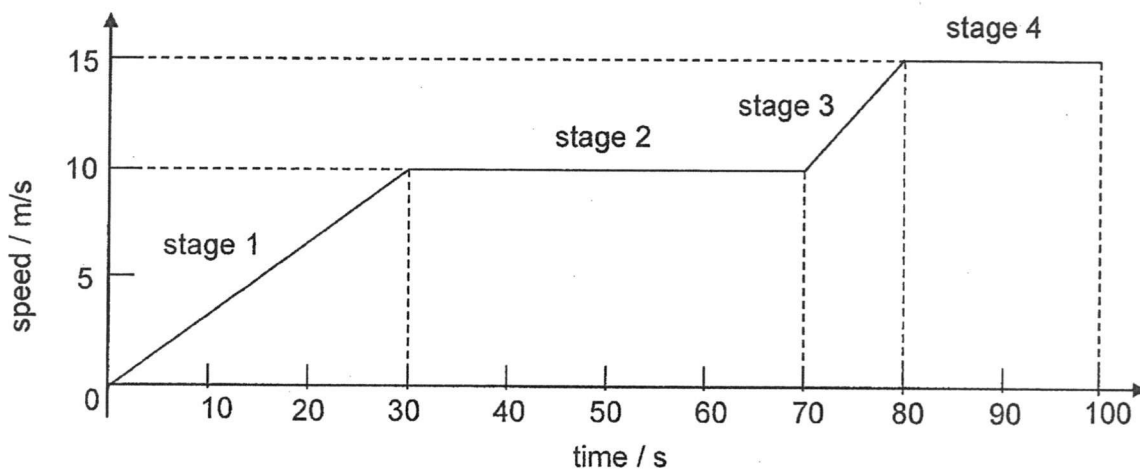
- (iii) Why is it dangerous to use a 13 A fuse in the plug?

.....  
..... [1]

**SECTION B**Answer any **two** questions.

Write your answers in the spaces provided on the question paper.

- 10 A motor car of mass 500 kg travels along a straight level road. The speed-time graph of its motion is shown below.



- (a) Calculate the greatest acceleration of the car.

greatest acceleration = ..... [2]

- (b) What is the resultant force acting on the car when it was at its greatest acceleration?

resultant force = ..... [2]

- (c) Calculate the greatest kinetic energy of the car.

greatest kinetic energy = ..... [2]

(d) What is the resultant force acting on the car in stage 2?

..... [1]

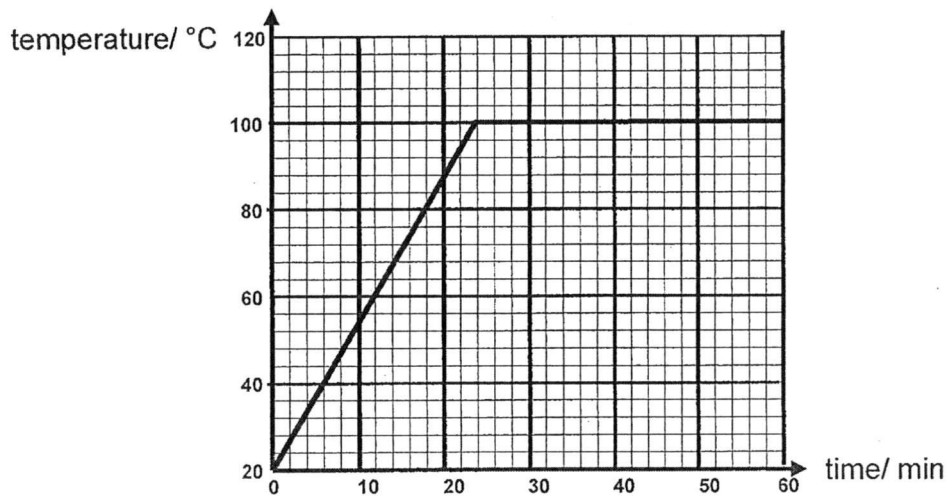
(e) While travelling at its greatest speed, the driver applies the brakes in an emergency stop. The average braking force on the car is 2 000 N. Calculate the stopping distance.

stopping distance = ..... [2]

(f) If the car was full of passengers, so that its mass was doubled, how would this affect the stopping distance of the car if the braking force remained constant at 2000 N? You can assume that the driver applied the brakes while it was travelling at the same greatest speed as in part (e).

..... [1]

11 (a) A small metal pan was filled with water and placed over a flame for heating. A thermometer was placed in the water. The figure shows the temperature-time graph of the water.



(i) Explain why the temperature remained at 100 °C after 24 minutes.

.....  
 .....  
 .....  
 ..... [3]



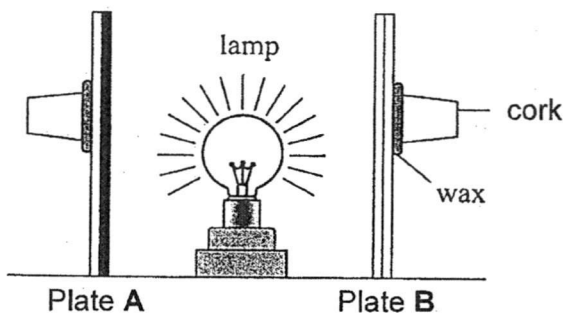
- (ii) Some water was found to have disappeared between 0 and 24 minutes. State the process that has occurred.

..... [1]

- (iii) State a difference between the process stated in part (ii) and the process that occurred after 24 minutes.

.....  
..... [1]

- (b) The figure shows two identical metal plates of the same size placed at equidistance away from filament lamp. Plate A is painted dull black on the side facing the lamp while plate B is painted silver. Two identical corks are struck to the plates with some candle wax.



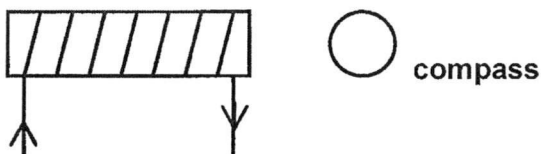
- (i) Why do the plates heat up?

.....  
..... [2]

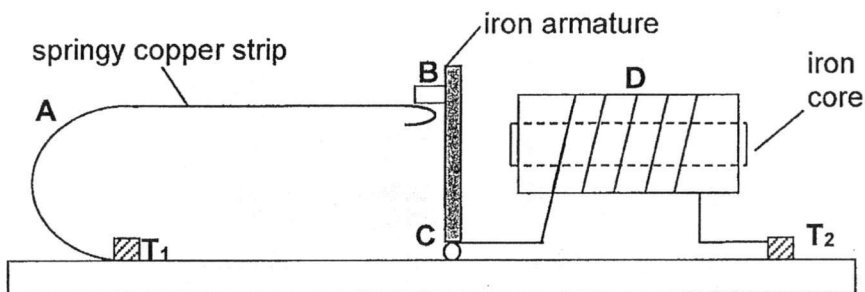
- (ii) Which cork will drop first? Explain.

.....  
.....  
.....  
..... [3]

- 12 (a) The figure shows a length of wire wound around a soft iron core. A current is passed through the coil in the direction indicated by the arrows.



- (i) Mark, on the figure, the **N** and **S** poles produced in the iron core. [1]
- (ii) In the figure, draw an arrow to indicate the direction in which the compass needle would point when placed at the position shown. [1]
- (b) The figure shows a model circuit breaker designed to switch off the current in a circuit when it exceeds a certain value. The current enters the circuit breaker at **T<sub>1</sub>**, passes along the copper strip **A**, the iron armature **BC**, the coil **D**, and leaves at terminal **T<sub>2</sub>**. The iron armature **BC** is pivoted at **C**.



- (i) Describe how the circuit breaker works and state how it is reset.  
 .....  
 .....  
 ..... [4]
- (ii) Explain if a steel armature can be used to replace the iron armature.  
 .....  
 ..... [1]

- (c) The figure shows a current carrying wire placed in between the North and South poles of a permanent magnet.
- (i) Indicate on the wire the direction of force clearly. [1]
- (ii) In the figure, draw magnetic field lines of the magnetic field produced by current flowing through the wire only. [2]



END OF PAPER

**ANSWER:**

## Physics

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
C	B	D	D	A	D	B	C	D	A
<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>
C	A	D	A	B	A	B	A	D	D

## Chemistry

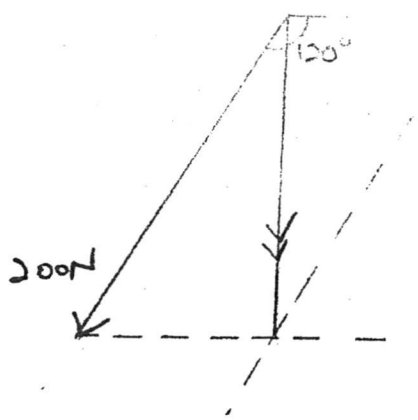
<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>
B	D	A	A	B	D	D	D	B	A
<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>
B	C	B	A	B	C	C	D	B	C

<b>Geylang Methodist School (Sec)</b> <b>PRELIMINARY EXAMINATIONS 2017</b>	
<b>SUBJECT</b> :	<b>SCIENCE(PHYSICS)</b>
<b>LEVEL</b> :	<b>SECONDARY 4 EXPRESS / 5 NORMAL (ACADEMIC)</b>

## ANSWER SCHEME

**PAPER 2**

<b>1</b>	<p><b>(a)</b></p> <p style="text-align: center;"> <math>\frac{1}{2}</math> m for each section with correct values and shape.          Accept decreasing curve.       </p>	2
	<p><b>(b)</b> Distance moved by the car before it decelerated = <math>15 \times 3.5(60) + \frac{1}{2}(1.5)60 \times 25 + (40 \times 7 \times 60) = 3150 + 1125 + 16800 = 21075</math> m</p>	2

2	 <p data-bbox="368 793 838 907"> <math>T_A</math> and <math>T_C</math> correctly drawn.  Resultant force correctly drawn  <math>T_B = 173 \text{ N}</math> (accept 168 N to 178 N) </p>	2 1 1
3	<p data-bbox="227 963 462 1077">(a) <math>W = mg</math>  <math>= 20 \times 10</math>  <math>= 200 \text{ N}</math></p> <p data-bbox="227 1088 548 1168">(b) <math>F \times 100 = 200 \times 20</math>  <math>F = 40 \text{ N}</math></p> <p data-bbox="227 1179 1254 1292">(c) The perpendicular distance from <math>F</math> to <math>P</math> is greater than the distance from the line of action of weight to <math>P</math>.  Less force is needed to produce the same moment produced by the load.</p>	1 1 1 1
4	<p data-bbox="227 1326 1254 1394">(a) Screening of baggage in airports or diagnostic of medical condition or any others.</p> <p data-bbox="227 1417 885 1485">(b) Any 2:  Radiowave, microwave and infrared radiation</p> <p data-bbox="227 1496 972 1712">(c) Any 2:  They are transverse waves. OR  They transfer energy from one place to another. OR  They obey wave equations. OR  They obey the laws of reflection and refraction. OR  They carry no electric charge.</p> <p data-bbox="227 1723 572 1837">(d) <math>v = (f)(\lambda)</math>  <math>3 \times 10^8 = (5 \times 10^{18})(\lambda)</math>  <math>\lambda = 6 \times 10^{-11} \text{ m}</math></p>	1 2 2 1 1

5	(a)	$\text{refractive index} = \frac{\sin i}{\sin r}$ $= \frac{\sin 55^\circ}{\sin 38^\circ}$ $= 1.33$ $1.33 = \frac{\sin i}{\sin 9^\circ}$ $\angle i = 12.0^\circ$	1 1 1
	(b)	0°	1
6	(a)	$\text{Time} = 6 \times 2 \times 10^{-3}$ $= 0.012 \text{ s}$	1
	(b)	$\text{Distance} = \text{speed} \times \text{time}$ $= 3 \times 10^8 \times 0.012/2$ $= 1\,800\,000 \text{ m}$	1 1
	(c)	$\text{Distance after one minute} = (3 \times 10^8) \times (5 \times 2 \times 10^{-3}) / 2$ $= 1\,500\,000 \text{ m}$ $\text{Speed} = (1\,800\,000 - 1\,500\,000) / 60$ $= 5000 \text{ m/s}$	1 1

7	The negatively charged ash and dust particles are attracted to the positively charged metal plate.			1								
	This is because unlike charges attract.			1								
8	(a)	$R = V/I$ $= 2.5/0.5$ $= 5 \Omega$	1 1									
	(b)	$\text{P.d. across variable resistor} = 7.5 \text{ V}$ $R = V/I$ $= 7.5/0.5$ $= 15 \Omega$	1 1									
	(c)	The potential difference of the lamp will decrease / current decrease This leads to a decrease in the brightness of the lamp.		1 1								
9	(a)	<table border="1"> <thead> <tr> <th>cable</th> <th>name</th> <th>colour</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>neutral</td> <td>blue</td> </tr> <tr> <td>B</td> <td>live</td> <td>brown</td> </tr> </tbody> </table>	cable	name	colour	A	neutral	blue	B	live	brown	1 1
	cable	name	colour									
	A	neutral	blue									
B	live	brown										
(b)	No, as the hairdryer is having double insulation. Or the hairdryer is made of plastic and no risk of electric shock.			1								
(c)	(i)	S <sub>3</sub>	1									
	(ii)	S <sub>2</sub> and S <sub>3</sub>	1									
(d)	(i)	$\text{Total current} = 2 \times 2 + 0.5$ $= 4.5 \text{ A}$	1									
	(ii)	7 A	1									
	(iii)	A 13A fuse will not be able to prevent the hairdryer from overheating.		1								

10	(a)	Greatest acceleration = $(v-u)/t$ = $(15 - 10) / 10$ = $0.5 \text{ m/s}^2$	1 1
	(b)	Resultant force = $ma$ = $500 \times 0.5$ = $250 \text{ N}$	1 1
	(c)	Greatest K.E. = $\frac{1}{2} mv^2$ = $\frac{1}{2} (500)(15)^2$ = $56300 \text{ J}$	1 1
	(d)	0 N	
	(e)	Work Done = $F \times d$ $56250 = 2000 \times d$ $d = 28.1 \text{ m}$	1 1
	(f)	The stopping distance of the car will be <b>doubled</b> . (do not accept increase)	1
			1

11	(a)	(i)	It has reached boiling point, there is a change of state from liquid to vapour. All the heat supplied by flame is used to change its state/ break intermolecular forces or increase the potential energy of the particles There is no change in the kinetic energy of the particles and so the temperature remains constant.	1 1 1
		(ii)	Evaporation	1
		(iii)	Any acceptable answer.	1
	(b)	(i)	Heat travels from the lamp to the plate by radiation The plate absorbed the radiation and cause the atoms to vibrate more vigorously and the temperature increased as a result.	1 1
		(ii)	Cork on plate A. Black surface is a better absorber of thermal energy. Hence temperature of plate A will increase more rapidly causing the wax to melt faster.	1 1 1
12	(a)	(i)	N is left, S is right.	1
		(ii)	Points towards the iron core.	1
	(b)	(i)	When current becomes too large, the electromagnet becomes strong and attracts the iron armature more. This will cause the springy copper strip to be released, resulting in an open circuit. The iron armature will then return to its original position.	1 1 1 1
		(ii)	No, as steel reacts slowly to become a magnet and thus is not able to break the circuit fast enough.	1
	(c)	(i)	Force pointing upwards	1
		(ii)	Magnetic field lines in an anti-clockwise direction. Magnetic field lines closer when nearer the wire.	1 1



