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Chong Boon Secondary School

Preliminary Examination 2016
Secondary 4 Express / 5 Normal (Academic)
Science (Physics, Chemistry)
Paper 1 Multiple Choice **5076/01**

31 Aug 2016 (Wednesday) | **1 hour**

Additional Materials: Multiple Choice Answer Sheet

READ THIS INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

There are **forty** 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.

Read the instructions on the 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.
Periodic Table is printed on **page 17**.
The use of an approved scientific calculator is expected, where appropriate.
The total marks of this paper is 40.

For Examiner's Use
40

This document consists of 17 printed pages and 3 blank pages.

1 A vernier caliper is used to measure a wooden block. With the jaws closed and no wooden block, the vernier caliper reading is shown in Fig.1.1 With the jaws closed around the wooden block, the vernier caliper reading is shown in Fig. 1.2.

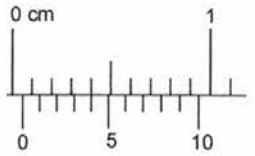


Fig 1.1

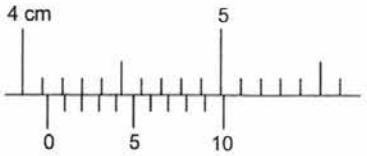


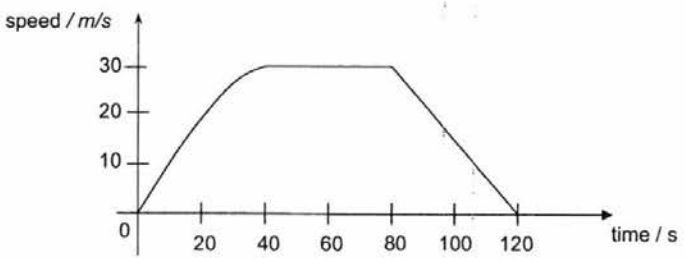
Fig 1.2

What is the diameter of the wooden block?

A 4.08 cm **B** 4.09 cm

C 4.13 cm **D** 4.16 cm

2 The speed-time graph shows the journey of a train from one station to another station. What is the distance travelled by the train after its brakes are applied?



A 0.75 m **B** 600 m

C 1200 m **D** 3600 m

3 A truck of mass 3000 kg travelling at 22 m/s brakes to a standstill in 10 s. Find the braking force of the truck.

A 3.2 kN **B** 4.5 kN

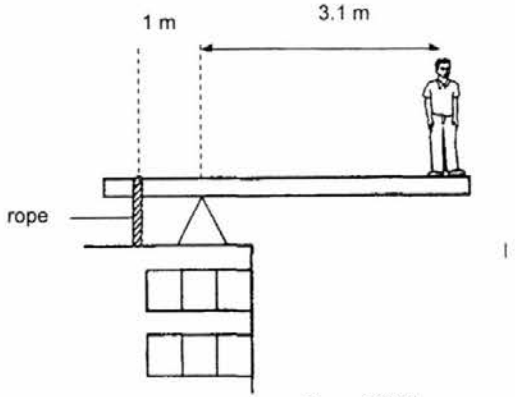
C 6.6 kN **D** 9.0 kN

4 1300 cm^3 of liquid A of mass 900 g is mixed with 500 cm^3 of liquid B of mass 650 g. What is the final density of the mixture?

A 0.608 g/cm^3 B 0.861 g/cm^3

C 1.16 g/cm^3 D 1.99 g/cm^3

5 A stunt man weighing 600 N stands at the edge of a horizontal board as shown in the diagram. Assuming that the board is weightless, what is the tension in the rope?



A 245 N B 600 N

C 1470 N D 1860 N

6 A 2 kW electric motor is used to operate a winding machine. If it raises the load vertically up by 10 m in 2 s, what is the weight of the load?

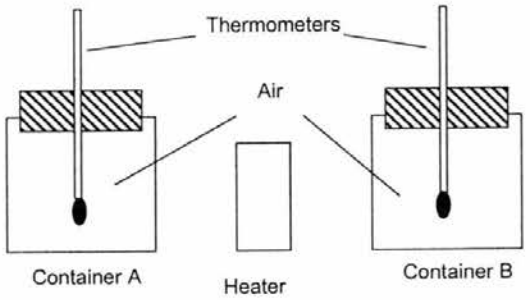
A 200 N B 400 N

C 20 000 N D 40 000 N

7 When a liquid evaporates, some molecules escape from it and its temperature is affected. From where do the molecules escape and what is the effect on the temperature of the liquid?

	molecules escape from	temperature of liquid
A	all parts of the liquid	decreases
B	all parts of the liquid	increases
C	only the liquid surface	decreases
D	only the liquid surface	increases

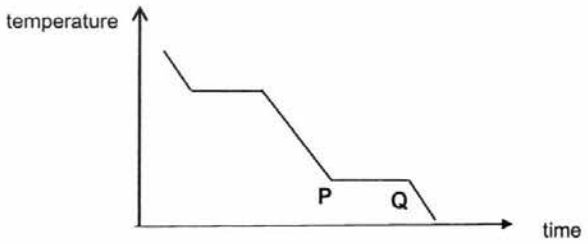
8 A heater is placed in the middle of two enclosed containers A and B as shown in the diagram below. After 5 minutes of heating, the temperature in container A appears to be higher than in container B.



Which of the following best describes the surfaces of the two containers?

	Container A	Container B
A	smooth	rough
B	black in colour	white in colour
C	shiny	dull
D	silver in colour	dark blue in colour

9 A substance was heated in an enclosed space until it became a gas. After the heater was removed, the temperature of the substance was recorded at regular intervals. The graph shows the temperature plotted against time.

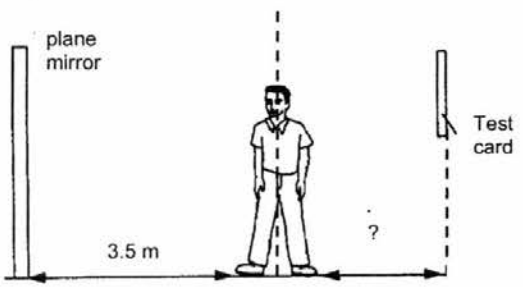


What does the section **PQ** represent?

A boiling **B** condensation

C melting **D** solidifying

10 An optician's test card is placed a distance behind a man who is standing 3.5 m away from a plane mirror. The distance from the man's eyes to the image of the test card is 8.5 m.

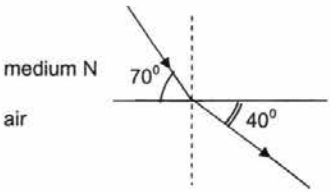


What is the distance of the test card from the man?

A 1.5 m **B** 3.0 m

C 3.5 m **D** 5.0 m

11 The diagram below shows a light ray travelling from medium N into air.



What is the refractive index of medium N?

A 0.446 **B** 0.684

C 1.46 **D** 2.24

12 Which of the following statements is not true about all electromagnetic waves?

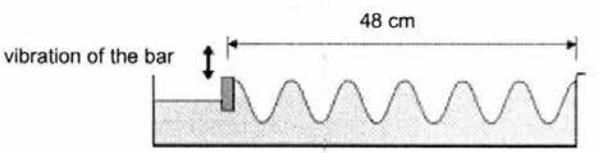
A They are transverse waves.

B They can travel in vacuum.

C They carry with them energy.

D They travel at the same speed in liquids.

13 The diagram below shows a bar in a dipper tank vibrating at 5 Hertz.



Find the speed of the wave.

A 0.4 m/s **B** 2.4 m/s

C 40 m/s **D** 240 m/s

14 A sonic 'tape measure' is used to measure the length of the room. It measures a time interval of 0.060 s between transmitting a sound pulse and receiving the echo. The speed of sound in air is 330 m/s. How far is the reflecting wall from the tape measure?

A 5.5 m B 9.9 m
C 11.0 m D 19.8 m

15 If particle *W* and *X* exert no force on each other, *Y* and *Z* repel each other, we can conclude that

A *X* is neutral.

B *W* is negatively charged.

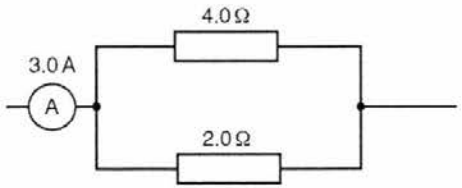
C *Y* and *Z* has similar charges.

D *X* carries a charge which is opposite to that of *Y*.

16 A 1 m wire of radius, *r* has a resistance of 10 Ω. If another similar wire, twice the length but with radius 0.5*r* is used, what is the new resistance of the wire?

A 5 Ω B 10 Ω
C 40 Ω D 80 Ω

17 The diagram shows part of an electrical circuit.



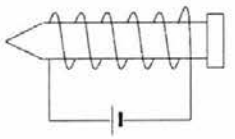
The current in the ammeter is 3.0 A. What is the potential difference across the 2.0 Ω resistor?

A 2.0 V B 3.0 V C 4.0 V D 6.0 V

18 An electrical appliance is rated at 240 V, 1.38 kW. What is the current that flows through the live, neutral and earth wires during normal operation?

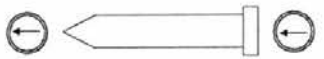
	Live	Neutral	Earth
A	5.75 A	0 A	0 A
B	5.75 A	0 A	5.75 A
C	5.75 A	5.75 A	0 A
D	5.75 A	5.75 A	5.75 A

19 A steel nail is placed in a current-carrying solenoid. The nail is removed from the solenoid after some time, and two compasses are placed near the ends of the nail.



Which diagram shows the correct directions at which the compasses point?

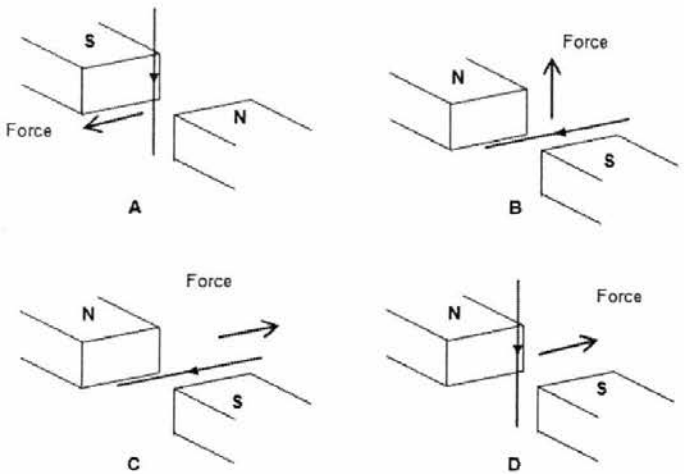
A 

B 

C 

D 

20 Four current carrying wires are placed between two magnets as shown in the diagrams below. Which of the following diagrams shows the correct direction of the force experienced by the wire?



21 Which statement about the molecules in ice is correct?

A The molecules all move with the same speed.

B The molecules are diatomic.

C The molecules move randomly.

D The molecules vibrate about fixed positions.

22 A liquid is thought to be pure ethanol. What is the best way to test its purity?

A burns it completely in oxygen

B measure its boiling point

C reacts it with ethanoic acid

D shake the liquid with water

23 A test tube containing solid **X** was placed in a beaker of boiling water. The solid **X** started to melt immediately.

What is the melting point of the solid **X**?

A above 100°C

B between room temperature and 100°C

C exactly 100°C

D less than 0°C

24 "*Solid **M** is blue and dissolves in water. Its solution can be separated into three dyes by chromatography.*"

Classify **M**.

A **M** is a mixture.

B **M** is a nucleon.

C **M** is a sodium salt.

D **M** is an alkali.

25 The nucleon number of an isotope of bromine is 81.

How many protons, neutrons and electrons are present in an atom of this isotope?

	protons	neutrons	electrons
A	35	46	35
B	35	46	46
C	37	44	35
D	37	44	37

26 The element with electronic configuration 2, 8, 5 .....

A forms a covalent compound with calcium.

B forms an ion of charge -3.

C is a metal.

D reacts only with non-metals.

27 25.0 cm^3 of aqueous 0.1 mol/dm^3 hydrochloric acid exactly neutralises 20.00 cm^3 of aqueous sodium hydroxide.

The equation for this reaction is

$$NaOH + HCl \rightarrow NaCl + H_2O$$

What is the concentration of the sodium hydroxide solution?

A 0.080 mol/dm^3

B 0.800 mol/dm^3

C 0.125 mol/dm^3

D 1.25 mol/dm^3

28 Which compound is a base?

A carbon dioxide

B magnesium oxide

C water

D zinc carbonate

29 In which reaction is a salt not formed?

A copper(II) oxide with dilute hydrochloric acid

B copper(II) oxide with hydrogen

C copper(II) sulfate with barium chloride

D copper(II) sulfate with sodium hydroxide

30 Which equation represent a redox reaction?

A $Ag^+ + Cl^- \rightarrow AgCl$

B $Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$

C $H^+ + OH^- \rightarrow H_2O$

D $H_2O + SO_3 \rightarrow H_2SO_4$

31 The table gives information about five chemical elements.

element	density (g/cm^3)	melting point (°C)	electrical conductivity
A	0.97	97.8	good
B	1.00	0	poor
C	3.12	-7.2	poor
D	8.96	1083	good

Which element could be copper?

32 The results of adding a halogen to halide solutions are shown in the table below.

experiment	halogen added	halide solution containing		
		X^-	Y^-	Z^-
1	X_2		Y_2 displaced	Z_2 displaced
2	Y_2	no reaction		no reaction
3	Z_2	no reaction	Y_2 displaced	

What were the halogens, **X**, **Y** and **Z**?

	X	Y	Z
A	Br	Cl	I
B	Br	I	Cl
C	Cl	Br	I
D	Cl	I	Br

33 Which one of the following is a correct statement about an endothermic reaction?

A It is a reaction which cools down the surroundings.

B Light is given out during the reaction.

C More molecules are formed than are used in the reaction.

D Water is needed for the reaction to take place.

34 What would be the best way of slowing down the reaction between magnesium and hydrochloric acid?

A dilute the acid used in the reaction

B stir the reagents

C heat up the acid

D use magnesium powder instead of ribbon

35 *"A catalyst is a substance which increases the speed of a chemical reaction and remains chemically unchanged at the end of the reaction."*

Copper(II) oxide catalyses the decomposition of aqueous hydrogen peroxide.

$$2\,H_2O_2 \rightarrow O_2 + 2\,H_2$$

Aqueous hydrogen peroxide was shaken with copper(II) oxide in a test-tube.

What did the test-tube contain when the reaction was complete?

A a black solid

B a black solid and a blue liquid

C a blue liquid only

D a light blue solid and a colourless liquid

36 Which of the following, when burnt, is most likely to cause an increase in the concentration of 'acid rain' in the atmosphere?

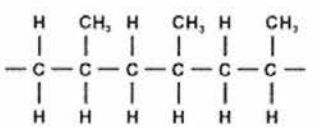
A hydrogen

B lead

C magnesium

D sulfur

37 The structure of a polymer molecule may be shown as:



From which of the following hydrocarbons can the polymer be made?

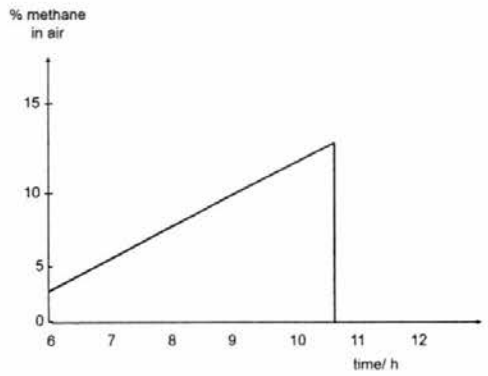
A C_2H_4

B C_3H_6

C C_3H_8

D C_4H_8

38 In coal mines, the percentage of methane in the air is continually checked.



What is most likely to have caused the sudden fall in the methane percentage shown on the graph?

A The temperature in the mine was lowered.

B The ventilator fans were switched on.

C An explosive mixture of methane and air ignited.

D Methane stopped seeping into the mine.

39 An organic compound **U** is boiled in acidified potassium manganate(VII) to give a compound with molecular formula CH_3COOH. What is compound **U**?

A butene

B ethanol

C propane

D propanoic acid

40 Which reaction does not produce carbon dioxide?

A combustion of methane

B fermentation of sugar

C poly(ethene) production

D reaction of ethanoic acid with calcium carbonate

END OF PAPER

The Periodic Table of the Elements

Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											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											27 Al aluminium 13	28 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	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 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	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	– 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	139 La lanthanum 57 *	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	– Po polonium 84	– At astatine 85	– Rn radon 86
– Fr francium 87	– Ra radium 88	– Ac actinium 89 †															

*58-71 Lanthanoid series

†90-103 Actinoid series

140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	– Pm promethium 61	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
232 Th thorium 90	– Pa protactinium 91	238 U uranium 92	– Np neptunium 93	– Pu plutonium 94	– Am americium 95	– Cm curium 96	– Bk berkelium 97	– Cf californium 98	– Es einsteinium 99	– Fm fermium 100	– Md mendelevium 101	– No nobelium 102	– Lr lawrencium 103

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

Answers

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

Candidate Name: _____

Class:	
Index No:	

Chong Boon Secondary School
Preliminary Examination 2016
Secondary 4 Express/5 Normal (Academic)

Science (Physics) **5076/02**

Paper 2

13th Sep 2016 (Tuesday) | **1 hour 15 minutes**

Additional Materials:

READ THESE INSTRUCTIONS FIRST

Do not open this booklet until you are told to do so.

1. There are two sections in this paper

   Section A
   Answer all questions
   Write your answers in the spaces provided

   Section B
   Answer any **two** questions.
   Write your answers on the spaces provided.

Information to Candidates
1. The number of marks is given in brackets [ ] at the end of each question or part question.
2. Candidates are reminded that all quantitative answers should include appropriate units.
3. Candidates are advised to show all working in a clear and orderly manner, as marks are awarded for sound use of physics than for correct answers.
4. Electronic calculators are allowed to be used.
5. Unless otherwise stated, you are to take g, the acceleration due to gravity, to be 10 m s^{-2}

For Examiner's Use
65

SECTION A [45 Marks]
Answer **ALL** questions. Write your answers in the spaces provided.

1 A car has a mass of 1400 kg. It can accelerate from rest to 30 m s^{-1} in 12 s.

(a) Calculate the acceleration of the car.

acceleration = ... [2]

(b) Calculate the force needed to give this acceleration.

force = ...[2]

(c) At a speed of 40 m/s, the driving force is 5500 N and the car travels 350 m at this speed.

(i) Calculate the work done by the driving force on the car.

work done = ...[2]

(ii) Determine the frictional force acting on the car for this 350 m.

frictional force = ...[1]

2 Fig. 2.1 shows a ball of weight 80 N hanging in equilibrium from a string that is pulled to one side by a horizontal force *F* of magnitude 60 N

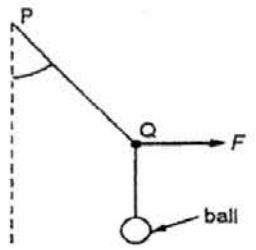


Fig. 2.1

(a) In the space below, draw a vector diagram to determine the resultant of *F* and the weight of the ball.
State clearly the scale that you have used.

scale = ...

magnitude of resultant force = ...[3]

(b) State the direction of the resultant force with respect to force **F**.

direction = ...[1]

3 Fig. 3.1 shows a skier of mass 85 kg skiing down a very steep slope.

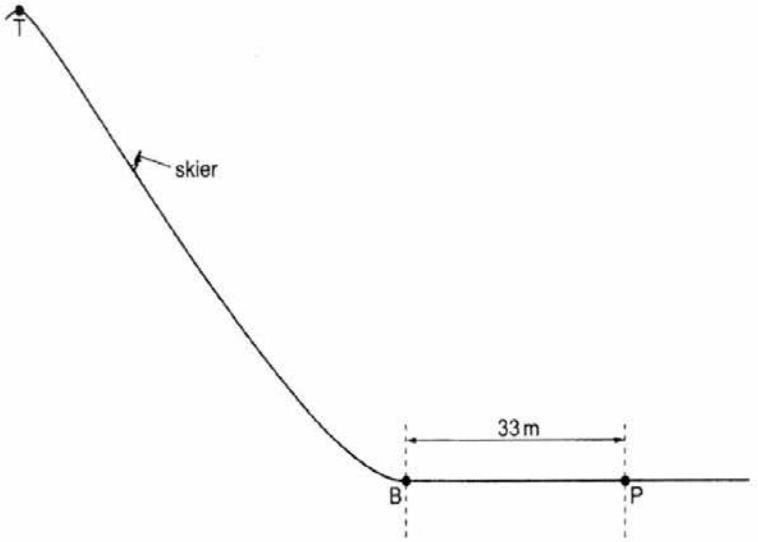


Fig. 3.1 (not to scale)

The skier starts from rest at the top **T** of the slope. The force of gravity accelerates him down the slope. When he reaches the bottom **B** of the slope, his kinetic energy is 5.5 x 10^4 J.

(a) The gravitational field strength is 10 N/kg. Calculate

(i) the weight of the skier,

weight = ... [1]

(ii) the minimum possible difference in height between **T** and **B**.

height difference = ... [2]

3 **(b)** At **B**, the skier digs into the snow and stops at point **P** after travelling 33 m horizontally. Calculate the average horizontal force that acts on the skier between **B** and **P**.

force = ... [2]

4 Fig. 4.1 shows food being cooked in an electric grill.

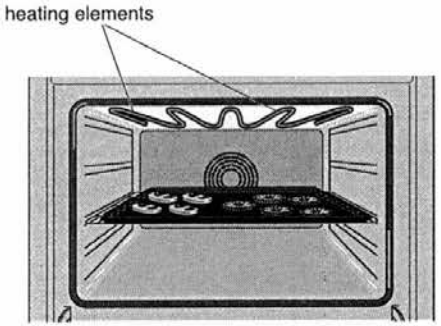


Fig. 4.1

There are red-hot heating elements above the food and thermal energy is transmitted to the food by radiation.

(a) Explain what is meant, in this case, by *radiation*.

.....[1]

(b) Explain why little thermal energy is transmitted to the food by

(i) conduction,

.....

.....[1]

(ii) convection.

.....

.....[1]

5 A light source emitting red light is placed in water as shown in Fig. 5.1.

The laser is incident on the water-air interface, making an angle of 35° with the water surface. The refractive index of water is 1.3.

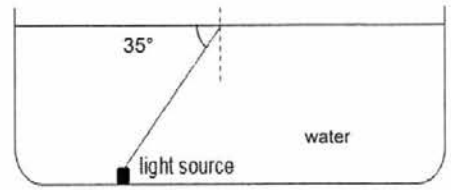


Fig 5.1

(a) Calculate the critical angle of water.

critical angle =.....[2]

(b) On Fig. 5.1, draw the light ray after it hits the water-air interface. [1]

(c) Explain why the light ray travels in the direction indicated in part **(b)**.

.....

.....

.....

.....

.....[2]

6 Fig. 6.1 shows the displacement-time graphs for sound waves produced by three different sources **A**, **B** and **C**.

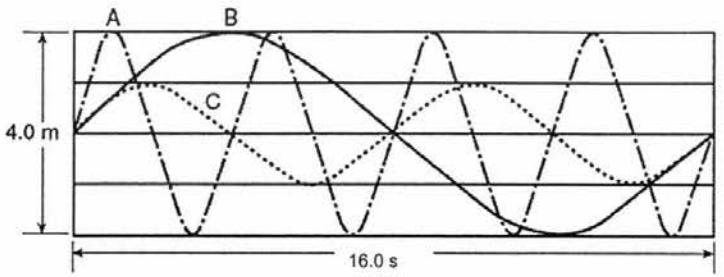


Fig. 6.1

(a) State the amplitude of sound wave produced by source **C**.

amplitude =.....[1]

(b) Calculate the frequency of the sound wave produced by source **A**.

frequency =.....[2]

(c) Compare the sound waves produced by sources **A** and **B** in terms of pitch and loudness.

.....

.....

.....

.....[2]

7 In Fig. 7.1, instruments on a ship send out an ultrasonic sound wave at a certain frequency and detects an echo from the sea bed exactly 6.0 s later. The water is 4500 m deep.

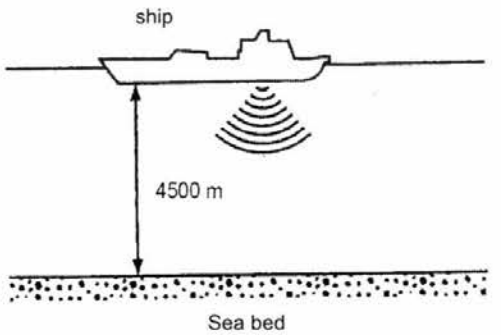


Fig. 7.1

(a) Describe how sound waves are transmitted through sea water.

.....

.....

.....[2]

(b) Calculate the speed of sound in the sea water.

speed of sound in sea water = ... [2]

(c) Given that the frequency of the sound is 250 Hz, calculate the wavelength of the sound in sea water.

wavelength of sound in sea water: ..... [2]

8 Fig. 8.1 shows a part of a device called a gold leaf electroscope. The plate, rod and leaf are all made of metal. Fig. 8.2 shows what happens to the gold leaf when a positively charged strip is held close to the plate.

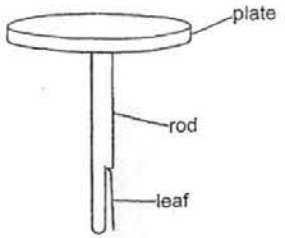


Fig 8.1

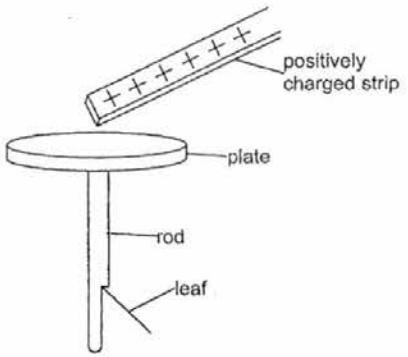


Fig 8.2

(a) State the nature of the charge at the plate in Fig 8.2 .....[1]

(b) Explain why the leaf moves away from the rod in Fig 8.2.

.....

.....

.....

.....

.....[3]

9 Fig. 9.1 shows a workman using a cordless electric drill.

Fig. 9.1

The motor of the drill is powered by a rechargeable battery with an electromotive force (e.m.f.) of 24 V. When the drill is used, the power supplied to the motor is 450 W.

(a) Calculate the operating current of the power drill.

operating current = ... [2]

(b) The workman uses the drill for two hours. The cost of electricity is $0.20 per kWh

Calculate

(i) the electrical energy supplied to the motor, expressing your answer in joules

energy = ... [2]

(ii) the cost of electricity during the usage of the drill for 2 hours

cost of electricity = ... [2]

Section B [20 Marks]
Answer **two** out of three questions.
Write your answers in the spaces provided.

10 Fig. 10.1 shows a diving-board at a swimming pool. The diving board is of negligible mass and is pivoted at **P**. A diver of weight 600 N stands at a point 1.5 m from **P** as shown. A spring **S** holds the diving board in a horizontal position. The distance between the spring **S** and the pivot **P** is 0.3 m.

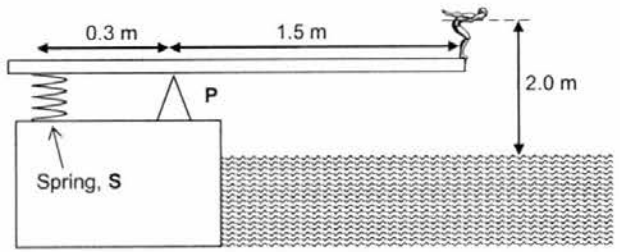


Fig. 10.1

(a) State the *principle of moments*.

.....

.....

.....[1]

(b) Calculate the moment of the weight of the diver about the pivot **P**.

moment = ... [1]

(c) Calculate force on the spring which will hold diving board in horizontal position when the diver is at the edge of the diving board.

force on spring = ... [2]

10 As the diver stands on the edge, both feet are in full contact with the board. The area of each foot in contact with the board is 0.025 m^2.

(d) Calculate the pressure exerted by the diver on the diving board.

pressure = ...[2]

When the diver enters the water, 0.061 m^3 of water is displaced from the swimming pool.

(e) State what is meant by the *mass* of a body.

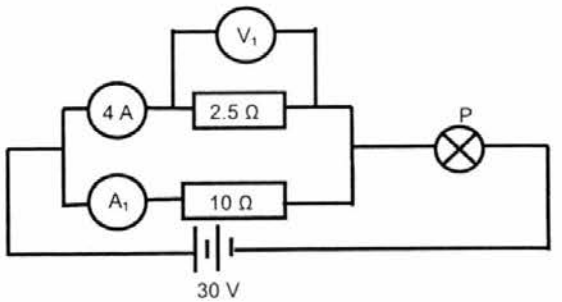
.....

.....[1]

(f) Calculate the average density of the diver. Take g = 10 N/kg

density = ...[3]

11 The diagram below shows a circuit.



(a) Calculate the reading of the voltmeter V_1.

reading of voltmeter V=..... [2]

11 **(b)** Calculate the value of A_1.

A_1= ..... [1]

(c) Calculate the resistance of light bulb P.

resistance of resistor P= .....[2]

(d) Calculate the overall resistance of the circuit.

resistance of the circuit = ... [2]

(e) Calculate the power dissipated from the 2.5 Ω resistor.

power = ... [2]

(f) The 10 Ω resistor is now replaced with a 2.5 Ω resistor. State and explain how this affects the brightness of the light bulb P (if any).

.....

.....[1]

12 **(a)** A student sets up the apparatus as shown in Fig. 12.1 to demonstrate how a door bell works.

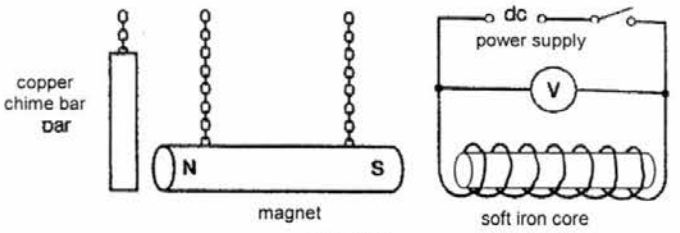


Fig. 12.1

(i) On Fig. 11.1, mark the positive terminal of the dc power supply with letter '**P**' such that the magnet will hit the copper chime bar when the switch is closed. [1]

(ii) Explain why the magnet hits the copper chime bar when the switch is closed.

.....

.....

.....[2]

(iii) Describe and explain what happens to the magnet when the switch is opened.

.....

.....

.....[2]

(iv) The direct current power supply is now replaced with alternating current power supply. Describe what will happen to the magnet when the switch is closed.

.....

.....[2]

12 **(b)** An aluminium wire is placed between the poles of a magnet. It is rested on two wooden blocks which stand on a balance as shown in Fig.12.2.

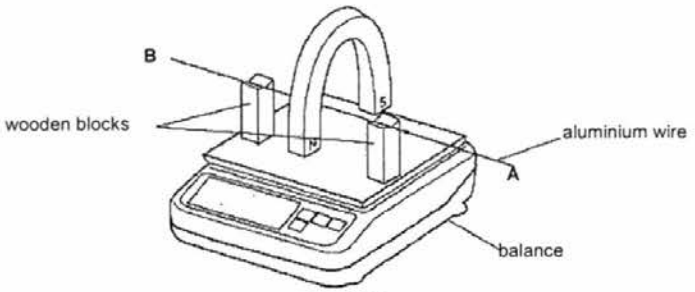


Fig. 12.2

(i) On Fig. 12.3, draw the magnetic field lines around the aluminium wire when the current flows from point **A** to **B**. [1]

Fig. 12.3

(ii) State and explain the change in the balance reading when the current flows from point **A** to **B**.

.....

.....

.....

.....

.....[2]

END OF PAPER

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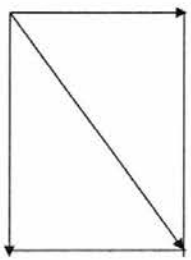
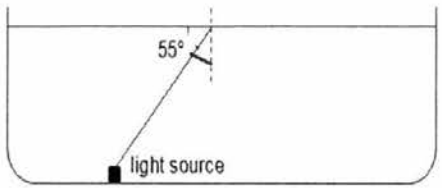
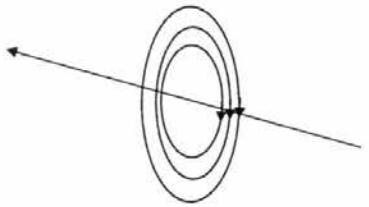
Sec 4E/5 N(A) Science (Phy) End-Of-Year 2016
Answer Scheme

Paper 2

Section A		Teacher's remarks
1(a)	$a=\frac{30}{12}$ [M1] = 2.5 ms² [A1]	
1(b)	F = ma [M1] = 1400 x 2.5 = 3500 N [A1]	
1(ci)	Work done = 5500 x 350 = 1925 000 J [A1]	
1(cii)	Frictional force = 5500 N [B1]	
2	(a)  drawing [1] Scale = 1 : 10 N [B1] Magnitude = 10 N ±1 N [B1] (b) Resultant is 54° clockwise to Force F [B1]	
3(ai)	W = mg = 85x10 = 850 N [B1]	
3(aii)	mgh = 5.5 X 10^4 [M1] $h=\frac{5.5\times10^4}{85\times10}$ = 64.7 m [A1]	
3(b)	Work done = F x d = 5500 [M1] F = 1670 N [A1]	
4(a)	Radiation is the transfer of heat without the use of medium in the form of electromagnetic waves [B1]	
4(bi)	**Air** is a **poor conductor** of heat [B1]	
4(bii)	Air near heating element is on **top of food and will not sink as it is less dense**. Hence no convection current is set up [B1]	
5 (a)	$\text{sinc}=\frac{1}{n}=\frac{1}{1.3}$ [M1]	

	= 0.769 C = 50.3°[A1]	
5 (b)	 	
5 (c)	The angle of incidence at the water-air boundary is **more than the critical angle**.[B1] Hence it undergoes **total internal reflection [B1]** [1]	
6 (a)	Amplitude = 1.0 m [B1]	
6 (b)	T = 4s [M1] f = 1/T = ¼ = 0.25 Hz [A1]	
6 (c)	Sources A and B have the same loudness. [B1] Source A has a higher pitch than source B. [B1]	
7(a)	Sound waves travel in the form of longitudial waves [B1] with a series of compresssions and rarefactions of water particles.[B1]	
7(b)	$v=\frac{2d}{t}=\frac{9000}{6}$ [M1] = 1500 m/s [A1]	
7 (c)	V = fλ $\Lambda=\frac{1500}{250}$ [M1] = 6 m [A1]	
8(a)	Negative [B1]	
8(b)	**Electrons are attracted to the positively charged rod** [B1]leaving the **bottom end of the rod and leaf positive charged**. [B1]Since bottom end of rod and leaf **are of the same charge**, they **repel [B1]**	
9 (a)	I = 450/24 [M1] = 18.75 A [A1]	
9 (b)	E = Pt = 450 x 2 x 3600 [M1] = 3240 000 J [A1]	
9(c)	E = 2 x 0.45 = 0.9 kwh [M1] Cost = 0.9 x \$0.20= \$ 0.18 [A1]	
Section B		
10 (a)	When a body is equilibrium, the sum of clockwise momentss about the pivot is equal to the sum of anti-clockwise moments about the same pivot. [B1]	

10 (b)	Moment = 600 x 1.5 = 900 Nm [A1]	
10 (c)	F x 0.3 = 900 [M1] F = 900/0.3 = 3000 N [A1]	
10(d)	$P = \frac{F}{A} = \frac{600}{0.05}$ [M1] = 12000 Pa [A1]	
10(d)	Mass of a body is the amount of matter in a body [B1]	
10 e	$\rho = \frac{m}{v}$ [M1] $= \frac{60}{0.061}$ [M1] = 983 kg/ m³ [A1]	
11 a	V = IR = 4 x 2.5 [M1] = 10 V [A1]	
11 (b)	A1 = $\frac{10}{10}$ = 1 A [A1]	
11 (c)	$R = \frac{V}{I} = \frac{20}{5}$ = 4Ω [A1]	
11 (d)	For parallel connections $\frac{1}{R} = \frac{1}{2.5} + \frac{1}{10}$ $= \frac{12.5}{25}$ R = 2 Ω [M1] R Total = 2 + 4 = 6 Ω [A1]	
11 (e)	$P = I^2R$ = 16 x 2.5 [M1] = 40 W [A1]	
11 (f)	The resistance of the parallel branch decreases. Hence current increases and light bulb P becomes brighter.[B1]	
12 (aii)	**Left side** of iron core is the **South pole**.[B1] Hence it **repels the magnet** and it hits the copper chime bar. [B1]	
12 (aiii)	The soft iron bar **de-magnetises**[B1] Magnet now **attracts** the soft iron core. [B1]	
12 (aiv)	The soft iron core alternates between being North and South pole. Hence the magnet oscillates giving rise to a continuous chime. [B1]	

12 (bi)	 [1]	
12 (bii)	Using Fleming's Left Hand rule, force acts **downwards** on [B1] conductor. This casues an increase in balance reading. [B1]	