

JURONGVILLE SECONDARY SCHOOL PRELIMINARY EXAMINATION 2019 Secondary 4 Express / 5 Normal (Academic)



STUDENT NAME		
CLASS	INDEX NUMBER	

SCIENCE (PHYSICS/CHEMISTRY)

Paper 1 Multiple Choice

5076/01

30 August 2019

1 hour

Additional Materials: Multiple Choice Answer Sheet.

READ THESE INSTRUCTIONS FIRST

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

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue, correction tape or correction fluid. Write your name, index number and class in the spaces at the top of this page.

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 multiple choice answer sheet.

Each correct answer will score one mark. No mark will be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Data Sheet is printed on page 16.

A copy of the Periodic Table is printed on page 17.

The use of an approved scientific calculator is expected, where appropriate.

Take acceleration due to gravity on Earth, g, to be $10 \text{ m}/\text{s}^2$ unless stated otherwise.



Setter: Ms Toh P.B. & Ms Karine Nai

This document consists of 17 printed pages.

1 The diagram below shows part of a micrometer screw gauge used to measure the diameter of a ball bearing. It is known that the micrometer screw gauge has a zero error of – 0.02 mm.



What is the diameter of the ball bearing?

- **A** 8.563 mm **B** 8.523 mm **C** 8.91 mm **D** 8.95 mm
- 2 The graph shows how the displacement of a car changes over time.



Which of the following statements is true?

- A The car accelerates and then moves with a steady velocity.
- **B** The car accelerates at a decreasing rate.
- **C** The car decelerates then moves with a steady velocity.
- **D** The car decelerates until it stops.
- 3 An elevator, with a mass of 500 kg, is moving upwards at a constant speed of 11 m / s. What is the tensional pulling force in the cable that is pulling the lift upwards? (Take g = 10 N / kg)

A 0 N	В	500 N	С	5000 N	D	5500 N
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4 The table shows the mass and weight of some objects on the surface of four different planets. Which planet has the greatest gravitational field strength?

planet	mass / kg	weight / N
Α	0.5	20
В	0.5	40
С	2.0	20
D	2.0	40

5 The diagram below shows a uniform wooden beam of weight W hinged at X. A force, P, of 70 N acts on it.



What is the weight, W, of the wooden beam?



6 The diagram shows a hydraulic system used to lift heavy loads in a workshop.



Given that the pressure throughout the liquid is constant, if a downward force of 1000 N is exerted on piston K, what will be the load supported by piston L?

A 40 N B 1000 N C	25000 N D 50000 N
--	--------------------------

7 A woman of weight 490 N runs up a flight of stairs in 8 seconds. The vertical height of the stairs is 12 m. The horizontal distance that she covers is 9 m.



What is the average useful power developed by the woman?

Α	735 W	В	919 W	С	4410 W	D	5880 W

8 Why is the conduction of thermal energy generally slower in liquids than in solids?

- A Liquid molecules are larger than solid molecules.
- **B** Liquids generally have higher densities than solids.
- **C** The average distance between molecules in a liquid is larger than that in a solid.
- **D** The speed of molecules moving in a liquid is slower than that in a solid.
- **9** Adam places a flat plastic lid over the cup to reduce the rate of evaporation from a cup of water, as shown below.



How does this help to reduce the rate of evaporation?

- **A** The plastic lid creates a vacuum which prevents evaporation.
- **B** The plastic lid helps to increase the boiling point of the water in the cup.
- **C** The plastic lid is a good insulator of heat.
- **D** The plastic lid reduces the wind moving across the water surface.

10 The diagram below shows the temperature-time graph of a liquid placed into a refrigerator and cooled steadily.



Which point would the substance be a mixture of solid and liquid?

11 Visible light, X-rays and microwaves are all part of the electromagnetic spectrum. Which of the following shows these waves in order of increasing frequency?

	low frequency	\longrightarrow	high frequency
Α	microwaves	visible light	X-rays
В	microwaves	X-rays	visible light
С	X-rays	microwaves	visible light
D	X-rays	visible light	microwaves

12 A person stands at a point **Z** as shown.



Which of the pin's (1, 2, 3, 4 or 5) images will the person be able to see in the mirror?

D

A pins 1 and 3 only

С

- B pins 2 and 4 only
- pins **2**, **3** and **5** only
- pins **3**, **4** and **5** only

[Turn over

13 A ray of light is incident on a piece of glass block as shown below.



Which one of the following expressions should be used to calculate the refractive index of the glass block?

- **A** $\frac{\sin 30^{\circ}}{\sin 40^{\circ}}$ **B** $\frac{\sin 30^{\circ}}{\sin 50^{\circ}}$ **C** $\frac{\sin 40^{\circ}}{\sin 30^{\circ}}$ **D** $\frac{\sin 50^{\circ}}{\sin 30^{\circ}}$
- 14 The graph illustrates the vibration of a molecule in the air caused by two sounds, P and Q.



Which statement about P and Q is correct?

- **A** P has a higher pitch and is louder than Q.
- **B** P has a lower pitch and is softer than Q.
- **C** Q has a higher pitch and is softer than P.
- **D** Q has a lower pitch and is louder than P.
- **15** A negatively charged rod repels a suspended rod. Which of the following statements about the suspended rod is correct?
 - A It is negatively charged.
 - **B** It is positively charged.
 - **C** It is uncharged.
 - **D** It may be uncharged or negatively charged.

16 In the circuit, the reading on the ammeter is 2 A.



What is the value of the potential difference across resistor X?

A 1.5 V **B** 2 V **C** 3 V **D** 6 V

17 Which of the following appliances is likely to blow its fuse when connected to a 240 V supply?

	appliance	fuse rating
Α	150 W lamp	1 A
В	1 kW vacuum cleaner	5 A
С	2.5 kW heater	10 A
D	3 kW electric fire	13 A
		1

18 Two resistors, X and Y, are made of the same material. Resistors X and Y have the same cross-sectional area but X is twice as long as Y.





The two resistors are connected to the same power supply differently in the circuit 1 and circuit 2 shown above. What are the ammeter readings in circuit 1 and circuit 2?

	circuit 1	circuit 2
Α	1.20 A	0.80 A
В	1.20 A	0.53 A
С	2.40 A	0.80 A
D	2.40 A	0.53 A

19 Two iron needles hanging from the ends of a bar magnet are observed as shown.



Which of the following statements best explains the observation?

- **A** The ends of the needles are both north poles.
- **B** The ends of the needles are both south poles.
- **C** The needles are induced temporary magnets.
- **D** The needles have become permanently magnetised.
- 20 An electron beam is directed into a uniform magnetic field that is flowing into the paper.

\times	×	×	\times	\times	×	×	×	
Х	Х	×	×	×	×	\times	Х	Magnetic
Х	Х	Х	×	\times	×	\times	Х	field into
Х	Х	Х	Х	Х	Х	×	Х	the paper
×	×	×	×	\times	×	×	Х	
			Î	ele	ctro	ns		

How would the electron beam be affected?

- A It will deflect out of the paper.
- **B** It will deflect to the left.
- **C** It will deflect to the right.
- **D** It will slow down but will not change direction.

21 Which apparatus is most appropriate to measure exactly 24.5 cm³ of a liquid?

- A beaker
- B burette
- C measuring cylinder
- D pipette

22 A scientist suspects that some canned drinks contain a mixture of two toxic dyes, P and Q. He analyses the mixtures using chromatography with three different solvents. The results of the analysis are shown below.



acetone as solvent

What can you conclude about the solubility of P and Q?

- **P** is insoluble in water but **Q** is soluble. Α
- В **P** is more soluble in ethanol than in acetone.
- С **Q** is soluble in ethanol but insoluble in acetone.
- **Q** is less soluble in acetone than in ethanol. D
- 23 Solution **X** contains two anions. Tests were carried out as shown in the diagram below.



What are the two anions found in solution X?

- carbonate ions and nitrate ions Α
- В carbonate ions and sulfate ions
- С chloride ions and nitrate ions
- chloride ions and sulfate ions D

24 A student uses his understanding of particles to explain the properties of solids, liquids and gases.

Which of his explanations is correct?

- A Gases are less dense than liquids because the particles in a gas move randomly.
- **B** Liquids flow because the particles in a liquid are closer than in a gas.
- **C** Solids are rigid because the particles in a solid vibrate.
- **D** Solids, liquids and gases become less dense when heated because the average separation between the particles increases.
- **25** Chlorine exists as isotopes, ${}^{35}_{17}Cl$ and ${}^{37}_{17}Cl$.

Which of the following is a property of the isotopes of chlorine?

- **A** They have the same boiling point.
- **B** They have the same density.
- **C** They have the same solubility in a given solvent.
- **D** They react chemically in the same way.
- 26 Which statement is true of a pure compound?
 - **A** A pure compound can be separated by distillation.
 - **B** A pure compound consists of one type of atoms chemically combined.
 - **C** A pure compound has a different property from the constituents it is made up of.
 - **D** A pure compound melts and boils over a range of temperature.

27 The equation shows the reaction between oxide of metal **M** and dilute sulfuric acid.

 $\textbf{MO}(aq) + H_2SO_4(aq) \rightarrow \textbf{MSO}_4(aq) + H_2O(I)$

Which particles are responsible for the electrical conductivity in M, MO and MSO₄?

	metal M	MO	MSO ₄
Α	electrons	electrons	ions
В	electrons	ions	ions
С	ions	electrons	electrons
D	ions	ions	ions

28 An element **X** has an electronic structure of 2.8.8.1. Element **Y** has an electronic configuration of 2.8.6.

	type of compound	formula of compound
Α	covalent	X ₂ Y
В	covalent	XY ₂
С	ionic	X ₂ Y
D	ionic	XY ₂

What type and formula of compound is formed when X and Y react?

29 The diagram shows three balloons filled with different gases.



Which statements are correct?

- 1 The mass of gases in the three balloons is different.
- 2 The number of moles of gases in the three balloons is the same.
- 3 The number of molecules in the three balloons is different.
- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- **D** 1, 2 and 3

30 Which reagent, when mixed and heated with ammonium sulfate would liberate ammonia?

- **A** acidified potassium dichromate(VI)
- B aqueous bromine
- **C** dilute hydrochloric acid
- **D** potassium hydroxide solution

31 Most salts can be prepared by reacting a carbonate with an acid.

Which salt cannot be prepared by the above method?

- A calcium nitrate
- **B** lead(II) chloride
- **C** potassium sulfate
- D zinc chloride
- **32** How does the property change when going across a period of the Periodic Table from Group I to Group VII?
 - A acidic oxides to basic oxides
 - B less reactive to more reactive
 - C metallic characteristic to non-metallic characteristics
 - **D** negative ions to positive ions
- **33 P**, **Q** and **R** are three metals that form cations P^{2+} , Q^{2+} and R^+ respectively.

Given the following information

P ²⁺	+	R	\rightarrow	no reaction		
2 R ⁺	+	Q	\rightarrow	Q ²⁺	+	2 R
Q ²⁺	+	Ρ	\rightarrow	Q	+	P ²⁺

Which of the following is the correct order of decreasing reactivity of the metals?

- A P, Q, R
 B Q, P, R
 C Q, R, P
 D R, Q, P
- **34** Metal **M** is placed between zinc and iron in the reactivity series.

Which prediction made about metal **M** is correct?

- A Metal M displaces magnesium from an aqueous solution of a magnesium salt.
- **B** Metal **M** forms a hydroxide which is soluble in water.
- **C** Metal **M** is extracted from its ores by electrolysis.
- **D** Metal **M** reacts with dilute hydrochloric acid to produce hydrogen.

35 The reaction between calcium and aqueous zinc nitrate gives out heat energy.Which energy level diagram accurately represents the reaction?



36 In which substance does carbon have the smallest oxidation number?

- **A** C
- B CO
- **C** CO₂
- D CaCO₃

37 In the graph shown below, curve **Y** represents the results of reacting excess of magnesium powder with 25 cm³ of 1.0 mol / dm³ sulfuric acid at 40 °C.



Which changes could produce curve Z?

- A Using 12.5 cm³ of 1.0 mol / dm³ sulfuric acid at 20 °C.
- **B** Using 12.5 cm³ of 1.0 mol / dm³ sulfuric acid at 60 °C.
- **C** Using 25 cm³ of 1.0 mol / dm³ sulfuric acid at 20 °C.
- **D** Using 25 cm³ of 1.0 mol / dm³ sulfuric acid at 60 °C.
- **38** The table shows some gases found in polluted air and their possible effects.

Which row is not correct?

	gas	effect							
Α	CH ₄	increases greenhouse effect							
В	CO ₂	leads to global warming							
С	CO	prevents breathing in of oxygen							
D	NO ₂	forms acid rain							

39 The apparatus shown below was set up and a sample of decane, C₁₀H₂₂, was heated strongly in the presence of aluminium oxide. The products obtained were a mixture of gaseous compounds and a diatomic gas.



Which row correctly indicates the process that occurred and the equation for the change that took place?

	process	equation
Α	cracking	$C_{10}H_{22} \rightarrow 3C_2H_4 + C_4H_{10}$
в	cracking	$C_{10}H_{22} \rightarrow 3C_2H_4 + C_4H_8 + H_2$
С	reduction	$C_{10}H_{22} \rightarrow 2C_2H_4 + 2C_3H_6 + H_2$
D	subsitution	$C_{10}H_{22} \rightarrow 3C_2H_4 + C_4H_8 + H_2$

40 2-phenylethanol is responsible for the fragrance of roses. The structure of 2-phenylethanol is shown below.



Which statement about this molecule is correct?

- A It can be oxidised by acidified potassium dichromate(VI).
- **B** It can react with a metal carbonate to liberate carbon dioxide.
- **C** It does not decolourise bromine water under any conditions.
- **D** It is a saturated organic compound.

End of Paper

DATA SHEET

Colours of Some Common Metal Hydroxides

Calcium hydroxide	white						
Copper(II) hydroxide	light blue						
lron(II) hydroxide	green						
Iron(III) hydroxide	red-brown						
Lead(II) hydroxide	white						
Zinc hydroxide	white						

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		Hydrogen							26	Бе	lron 56	44	Ru	Ruthenium 101	76	Os	Osmium 190	108	Hs	Hassium -		61	Рш	Promethium -	93	ЧN	Neptunium -	ture and p																																				
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The Periodic Table of the Elements

17

[Turn over



Paper 2

27 August 2019

1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces at the top of this page.Write in dark blue or black pen on both sides of the paper.You may use a soft pencil for any diagrams, graphs, tables or rough working.Do not use staples, paper clips, highlighters, glue, correction tape or correction fluid.The use of an approved scientific calculator is expected, where appropriate.Units should be stated in the answer where required.

There are two sections in this paper.

Section A:

Answer **ALL** the questions. Write your answers in the spaces provided on the question paper.

Section B:

Answer any **two** questions. 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. *Take acceleration due to gravity on Earth, g, to be 10 m / s² unless stated otherwise.*

DO NOT OPEN THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

For Exa	miner's Use						
Section A	/ 45						
Section B							
	/ 10						
	/ 10						
Total	/ 65						

Setter: Mr Lam Seng Tat

Section A (45 marks)

Answer all questions

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

1 Fig. 1.1 below shows an electric scooter used by Danial to travel from home to school. He accelerates uniformly from rest to 2.5 m / s in 3 s. He continues at this speed for 9 s on a straight horizontal path before decelerating uniformly in 5 s.







(b) Calculate the average speed of the electric scooter for the journey.

2 Fig. 2.1 below shows a bobby, commonly found in ice skating rink to aid beginners in ice skating. Fig 2.2 shows the top view of two forces, P and Q, acting on the handle of the bobby. Magnitude of force P is 50 N while magnitude of force Q is 80 N.



(a) Draw a scaled vector diagram to determine the resultant force of P and Q acting on the bobby.
 [1]

- scale of vector diagram:[1]
- magnitude of resultant force =N [1]
- (b) The mass of the bobby is 6 kg. If the friction acting against the bobby is negligible, determine the acceleration of the bobby due to the resultant force determined in **2(a)**.

acceleration =m / s² [2] [Total: 5] [Turn Over **3** Fig. 3.1 and 3.2 below show Liang Qi jumping on a trampoline. Fig. 3.1 shows her at the lowest point on the trampoline while Fig. 3.2 shows her at the highest point.



(a) If Liang Qi has a mass of 48 kg, calculate the gain in her gravitational potential energy when she is jumping on the trampoline.

gain in gravitational potential energy =J [2]

(b) Explain, in terms of conversion of energy, why Liang Qi is momentarily stationary when she is at the highest point in Fig. 3.2.

 4 Fig. 4.1 shows a fireman standing next to his fire engine. The fireman is wearing a mesh T-shirt and holding to his fire-protective jacket.



Fig. 4.1

(a) Describe and explain how the loosely woven mesh T-shirt helps to keep the fireman cool when he is close to the fire.



5 Fig. 5.1 shows a cylinder with a movable piston. Air is trapped inside the cylinder by the piston.



Fig. 5.1

(a) Describe the arrangement and motion of the molecules of the air in the cylinder.

(b) State how, in terms of energy, the arrangement and motion of the molecules of air in the cylinder change when it is heated.

6 Fig. 6.1 shows a boy swimming inside a swimming pool. A light source at the bottom of the swimming pool shines light onto the surface of the water. The boy is able to see the light source as shown by the path of the light ray.



-[1]
- (b) Describe the condition required for angle θ needed such that the boy can see the light source.

.....

.....[1]

(c) Given that the speed of light in water is 2.25 x 10⁸ m / s, calculate the refractive index of water.

(d) Mark on Fig. 6.1 with 'x' the position of the image of the light source as seen by the boy. [1]

[Total: 5]

[Turn Over

7 Fig. 7.1 shows a thundercloud approaching a building with a lightning rod at the top of the building. The lightning rod is connected to the ground with a lightning conductor.





Fig. 7.1

(a) State the charge that will form at the top end of the lightning rod if the thundercloud is negatively charged. Explain your answer.



8 Fig. 8.1 shows an electrical circuit with a fixed resistor and light bulb connected to a 20 V battery in parallel. The fixed resistor has a resistance of 100 Ω and the light bulb has resistance of 50 Ω .



(a) Calculate the effective resistance of the fixed resistor and light bulb connected in parallel.

effective resistance = $\dots \Omega$ [1]

(b) Determine the reading of the ammeter when the electrical circuit is switched on.

ammeter reading =A [2]

(c) If the light bulb becomes spoilt and does not light up, state if the current will flow through the fixed resistor when the electrical circuit is switched on. Explain your answer.

[2] [Total: 5] [Turn Over 9 Fig. 9.1 shows a magnet and two iron nails attracted to the north pole of the magnet.



- Fig. 9.1
- (a) State the magnetic pole at the pointed end of the second iron nail. Describe what has occurred to the two iron nails.

(b) Describe the difference in the magnetic effect if steel nails were used instead of iron nails.
 (c) Draw on Fig. 9.2 the magnetic field pattern between the two magnets.



10 Fig. 10.1 shows an electrical circuit consisting of a straight conducting wire connecting a variable resistor with a battery.



- (a) Draw the direction of the compass needle on Fig. 10.1 when current is flowing in the straight conducting wire. [1]
- (b) Explain how the increase in variable resistor value will affects the magnetic field around the straight conducting wire.



Fig. 10.2

Fig. 10.2 shows the same electrical circuit as in Fig. 10.1 but the compass has been replaced by a magnet. The poles of the magnet are placed between the straight conducting wire **AB**. Describe, if any, the force acting on the conducting wire between the poles of the magnet.

[1] [Total: 4] [Turn Over

Section B (20 marks)

Answer any two questions in the spaces provided.

11 Fig. 11.1 shows a face towel, a pair of jeans and a t-shirt. The face towel has a mass of 100 g. The pair of jeans has a mass of 1.2 kg while the mass of the t-shirt has a mass of 400 g.



Fig. 11.1

(a) State which item has the greatest amount of inertia. Explain the reason for your answer.

(b) Calculate the total weight of the three items.

11 (c) Derrick was tasked to place the three items onto a bamboo pole for them to dry. Fig. 11.2 shows the arrangement of the three items on the bamboo pole. The position of the centre of gravity of the individual item to the left end of the pole is indicated.



Fig. 11.2

(i) Explain what is meant by the centre of gravity of an object.



(ii) Calculate the moment of the three items on the bamboo pole about the left end of the pole. State the unit.

[Total: 1 [Turn Ov	0] ver
	[2]
(iii) Describe and explain how the items can be arranged on the bamboo pole such that t moment about the left end of the pole is the smallest.	the
moment about the left end of pole =	[3]



12 (a) Fig. 12.1 shows a pressure-time graph of a sound wave.

(i) From the graph, state the period of the sound wave. Hence determine the frequency of the wave.

- period of wave =[1]
- frequency of wave =[1]
- (ii) Draw on Fig.12.1 another wave that has the same frequency but twice as loud. [2]
- (iii) Describe the relationship between pressure of the wave in terms of compression and rarefaction.

.....[1]

12 (b) Fig. 12.2 shows a portable counterfeit currency detecting device.



Fig. 12.2

(i) State the electromagnetic wave used by the device to detect counterfeit currency.

.....[1]

(ii) The electromagnetic wave given out by the device has a wavelength of 2×10^{-7} m and frequency of 1.48 x 10^{15} Hz. Calculate the speed of the wave.

speed of wave =[2]

(iii) State two property differences between the electromagnetic wave and sound wave.

Difference 1:....
Difference 2:....
[2]
[Total: 10]

13 Fig. 13.1 shows an electrical circuit for an oven and a toaster connected to 240 V supply. The oven has a power rating of 2500 W while the toaster has a power rating of 1 kW.





(a) State the name for wires P and Q. Explain how you deduce your answer.

(b) Determine the current flowing through the oven when it is switched on. Hence select a suitable fuse at **R**. Available fuse are 3 A, 5 A, 10 A and 13 A.

current flowing through oven =[1]

suitable fuse at **R** =[1]

(c) Explain why the oven and toaster are connected in parallel in the circuit.

.....[1]

13 (d) Describe the function of the fuse as a safety device.

 	[2]

13 (e) (i) The oven was switched on for five hours while the toaster was switched on for two hours. Calculate the electrical energy consumed for both oven and toaster.

electrical energy consumed for oven and toaster =[2]

(ii) Hence calculate the cost of electricity used by the oven and toaster if each unit of electrical energy cost \$0.30.

total cost of electricity for oven and toaster =[1]
[Total: 10]

End of paper



Jurongville Secondary School Science Department 2019 Marking Scheme & Marker's Report

Assessment: _			Prelim Examination									Level: Sec 4E / 5N						N	
PAPE	R 1																		
Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans	Qn	Ans
1	D	2	D	3	С	4	В	5	С	6	С	7	Α	8	С	9	D	10	В
11	Α	12	D	13	D	14	Α	15	Α	16	C	17	С	18	D	19	С	20	С
21	В	22	D	23	В	24	D	25	D	26	C	27	B	28	C	29	Α	30	D
31	B	32	С	33	Α	34	D	35	D	36	Α	37	В	38	C	39	В	40	Α



Jurongville Secondary School Science Department 2019 Marking Scheme & Marker's Report

Assessment: Preliminary Examination Sc(Physics) (5076) Level: 4 Express / 5NA



Qn	Marking Scheme	Remarks	Marks	Marker's Report
2a		Correct vector	B1	Most were able to draw vector
		diagram		diagram correctly. A few students did
	Scale 1 cm rep 10 N	Correct scale	B1	not draw orientation of forces
	114 N ± 1 N	Correct magnitude	B1	correctly and were penalized. A few
	Info – direction is 38° anticlockwise from horizontal			students drew wrong direction arrows
				and were also penalized.
				Common mistake was to write scale
				as 1cm = 10 N which was penalized.
				Another error was to write as scale as
				10 N : 1 cm which was also not
				Magnitude out of range was rejected
	Resultant			Maginitude out of range was rejected.
	force			
	// 80 N			
	50 N			
26	Desultant force = mass x caseleration	Accept of from a	<u>C1</u>	Maatwara able to de this guestion A
20	Resultant force – mass x acceleration	Correct answer with		few students left this blank
	114 - 0.7 d a = 10 m/s ²	working	AI	
3a	Gain in gravitational potential energy = $48 \times 10 \times (31 - 14)$	Correct answer with	C:1	Most students were able to do this A
04	= 816.1	working	Δ1	few students did not include a in
		working.	7.1	calculation. A few use either 3.1 m or
				1.4 m height instead of the difference
3b	As she rises from the trampoline, the kinetic energy decreases	OWTTE	B1	Some students wrote that
	and is converted to gravitational potential energy. At the			gravitational potential energy has
	highest point, all the kinetic energy has been converted to		B1	converted to kinetic energy instead. A
	gravitational potential energy. Thus she is momentarily			few students stated Principle of
	stationary at the highest point.			Conservation of energy without
				applying to this situation.

Qn	Marking Scheme	Remarks	Marks	Marker's Report
4a	The loosely woven mesh T-shirt traps air which is a bad thermal	OWTTE	B1	Many students did not state that air is
	conductor. This reduces the transfer of thermal energy by		B1	a bad conductor. Many wrote that air
	conduction from the fire to the fireman's body and thus			cools the fireman down without
41-	Keeping nim cool.	A	D4	explaining correctly.
40	I ne fireman's jacket should be silver in colour as silver colour is a		B1 B1	Some students wrote bright and shiny
	thermal energy by radiation.	OWTE	BI	colour. Accepted shiny as BOD.
5a	The molecules of air in the cylinder are far apart from each	OWTTE	B1	Some students did not state that air
	other and moving randomly at high speed.		B1	particles are far apart from each
				other. Some students also did not
				state that the air particles are moving
				at high speed.
5b	When air is heated, the air molecules gain kinetic energy. This	OWTTE	B1	Some students wrote about energy
	would cause the air molecules to move even further apart and		B1	needed to break the intermolecular
	move even faster.			bonds and was penalized.
6a	Total internal reflection	(CAO)	B1	A few students wrote 'reflection'. A
				few wrote 'total internal refraction'.
6b	The angle θ must be greater than critical angle of water.	OWTTE	B1	A few students wrote 'lesser'.
6c	Refractive index of water = 3×10^8 / 2.25 x 10^8	Correct calculation.	C1	Most students were able to do this
	= 1.33	Must show speed of	A1	question.
		light in air.		
6d	Position of 'x' at same distance perpendicularly above the surface	Accept tolerance of 5	B1	Most were not able to answer this.
	of water as the light source is at distance below the surface of	mm		Some students placed the image at
	water.			point on water surface at normal.
7a	Since the cloud is negatively charged, the top end of the	OWTTE	B1	Many students wrote that the
	lightning rod should be positively charged. This is because the			lightning rod is negatively charged.
	electrons on the lightning rod would be repelled by the		B1	Some thought that negatively
	electrons on the thundercloud leaving protons behind.			charged rod will repel the
				thundercloud. Only a few students
				can explain correctly.
7b	If lightning occurs, the electrons in the thundercloud would	OWTTE	B1	Most students did not mention the
	travel through the air and hit the building at the lightning rod.			electrons from the thundercloud
	The electrons would transfer to the ground through the		B1	flowing to the ground through the
	lightning conductor			lightning conductor. A few students
				were penalized for not stating clearly

Qn	Marking Scheme	Remarks	Marks	Marker's Report
				that electrons flow from thundercloud to lightning rod.
8a	Effective resistance = $(1/100 + 1/50)^{-1} = 33.3 \Omega$	Correct working and	B1	Some students did not write working
		answei		students made wrong calculation.
				Some wrote 100 + 50.
8b	Ammeter reading = 20 / 33.3 = 0.6 A	Allow for ecf in (a)	B1	Most students were able to do this. A
	Or	Correct working and	54	few students used the wrong formula.
	Ammeter reading = $(20/100) + (20/50) = 0.2 + 0.4 = 0.6 \text{ A}$	answer	<u>B1</u>	
80	The current in the fixed resistor will still flow because the	OWITE	B1	Most students can answer correctly.
	current flow would not be affected by the spoilt light bulb.		B1	But a few students left this blank.
9a	The pointed end of the second nail is north pole since the iron	OWTTE	B1	Most students can identify that the
	nails has become induced magnets. The magnetic domains in		B1	pole is North. But only some students
	the iron nail has aligned itself with north pole pointing away			correctly stated the iron nails
	from the north pole of the magnet.			becoming induced magnets. Some
				wrote that the Iron halls had become
Ob	Iron noile are easily magnetized but loss its magnetism easily		D1	Some students wrote that steel is not
90	while steel nails are not as easily magnetized but lose its magnetism easily	OWITE	B1	a magnetic material and thus will not
	lose its magnetism easily		ы	be attracted to the magnet. Some
				students were confused by stating
				steel is stronger magnet because it is
				used as permanent magnet. Some
				students were penalized for not
				stating the difference between
				magnetic effect of iron and steel.
9c	Correct pattern of magnetic field lines with arrows pointing from	Correct arrow	B1	Most students indicated the correct
	north to south pole	Correct pattern	B1	direction of arrow.
				But most students are not able to
	N ST			lines correctly
	the second secon			
	× N S ←			

Qn	Marking Scheme	Remarks	Marks	Marker's Report
10a	Compass needle with arrow pointing downwards using right-hand	Correct direction of	B1	Most students indicated arrow
				current. Need to revise such
				questions with students
10b	By increasing the variable resistor value, the current in the	OWTTE	B1	Most students answered correctly, A
	circuit will decrease. This will cause the magnetic effect		B1	few students did not state that current
	around the straight conducting wire to decrease.			had decreased.
10c	The force will be acting into the paper.	OWTTE	B1	Many students wrote downwards and
		Reject 'downwards'		was penalized.
		1	1	
11a	The pair of jeans has the greatest amount of inertia because	OWTTE	B1	Most students answered jeans
	inertia is dependent on mass of object.	Accept if student state	B1	correctly. But only some students
		jeans has 'greatest		stated that inertia is dependent on
446	$T_{abcl} = (0.4 \pm 4.0 \pm 0.4) \times 40$	mass'.	D 4	mass of object.
did	$1 \text{ otal weight} = (0.1 + 1.2 + 0.4) \times 10$	Convert g to kg		Many students did not multiply by g.
			A.J.	Many students wrote kg instead of N.
11CI	Centre of gravity is the point where the whole weight of object	OWITE	84	Many students wrote about balance
	appears to act.			or equilibrium.
11cii	Moment = $(0.4 \times 10 \times 0.4) + (0.1 \times 10 \times 1.0) + (1.2 \times 10 \times 2.2)$	Allow for ecf in (b)	C1	Most students are not able to
	= 1.6 + 1.0 + 26.4 = 29 N m	Correct working with	A1	calculate this as they did not use the
		answer	B1	correct distance from the left end.
		Correct unit		Many students did not write the
110	The isans should be placed pearest to the left and. The t shift		P 1	Many students left this blank. Some
TICIII	is placed in the centre while face towel is place furthest from			students did not explain why moment
	the left end. This is because the heaviest item is nearest to the		B1	is smallest
	pivot while the lightest is furthest from the pivot to reduce the			
	moment about the left end.			
12ai	Period = 2 ms = 0.002 s	Accept 2 ms	B1	Most students did not write the
	Frequency = 1 / 0.002 = 500 Hz	Correct working with	B1	correct unit for period. Most students
		answer. Correct unit		did calculate frequency correctly.
12aii	Same period but with twice the amplitude	Correct amplitude	B1	Most students were able to answer
		Correct period	B1	this correctly.
12aiii	The higher pressure is the compression region while the lower	OWTTE	B1	Many students are not able to answer
	pressure region is the rarefaction region.			this correctly. Need to revise this.

Qn	Marking Scheme	Remarks	Marks	Marker's Report
12bi	Ultraviolet radiation	CAO	B1	Many students are not able to answer
				this correctly. Need to revise this.
12bii	Speed = 1.48 x 10 ^{15 x} 2 x 10 ⁻⁷	Correct working with	C1	Most students can calculate this.
	= 2.96 x 10 ⁸ m/s	answer. Correct unit	A1	Some students did not write the unit.
12biii	Electromagnetic waves are transverse waves while sound waves	Any suitable answer	B1	Many students wrote that
	are longitudinal waves.			electromagnetic waves are
	Electromagnetic waves can travel through vacuum but sound		B1	longitudinal and sound is transverse.
	waves cannot travel through vacuum.			Some students describe longitudinal
				and transverse waves as second
				difference.
13a	P is the live wire while Q is the neutral wire. This is because the	OWTTE	B1	Some students wrote that Q is earth
	fuse and switch are on the live wire.		B1	wire. Most students were able to
				state that fuse and switch is on the
				live wire.
13b	Current flowing through oven = $2500 / 240 = 10.4 A$	Correct answer and	B1	Most students can answer this. A
	Suitable fuse would be 13 A fuse	unit with working.	B4	few students selected the lower rating
4.0			54	fuse.
13C	I he oven and toaster are connected in parallel so that if there is a	OWITE	B1	Most students answered this
	fault in the oven of toaster, the appliance will still work.			correctly. A few gave wrong answers
				like current being shared to prevent
13d	The fuse consist of a thin wire which will malt when it excess		R1	Most students can answer this
TSU	the amount of current allowed in the fuse rating. This will but	OWINE	DI	
	current flow to the appliance thus protecting it		R1	question.
13ei	Electrical consumption for oven = $(2.5 \times 5) + (1 \times 2)$	Correct answer and	C1	Most students are able to answer this
	= 14.5 kWh	unit with working	A1	question
		Correct unit	,,,,	4
13eii	Total cost of electrical consumption = 14.5 x 0.3 = \$4.35	Correct answer and	B1	
		unit with working		