

SERANGOON GARDEN SECONDARY SCHOOL END-OF-YEAR EXAMINATION 2022

CANDIDATE NAME

CLASS

INDEX NUMBER

LOWER SECONDARY SCIENCE

Secondary 1 Express

Candidates answer on the Question Paper. No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class register number and class on in the spaces at the top of this page You may use an HB pencil for any diagrams, graphs, tables or rough working. Write in dark blue or black pen. Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate. You may lose marks if you do not show your working or if you do not use appropriate units.

Section A [30 marks]

There are **thirty** questions in this section. Answer **all** questions. For each question, there are four possible answers **A**, **B**, **C** and **D**. Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Choose the answer you consider correct and shade your answer in the Optical Answer Sheet (OTAS).

Section B [30 marks]

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

Section C [40 marks]

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

A copy of the Periodic Table is provided on page 26.

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

For Examiner's UseA30B30C40Total100

This question paper consists of <u>**26**</u> printed pages and <u>**0**</u> blank page.

10 Oct 2022 2 hours 0820 - 1020

Section A (30 marks)

1 Which of the following S.I. units is incorrectly matched to its physical quantity?

	physical quantity	S.I. unit
Α	time	hour (h)
В	length	metre (m)
С	volume	cubic metre (m ³)
D	mass	kilogram (kg)

2 Marie Curie is the first female Nobel Prize winner for her work on radioactivity.

Before her success, Marie Curie was unable to attend university in Poland. However, she did not give up on learning. She worked and eventually saved enough money to pursue higher education in France.

What attitude is illustrated here?

- **A** Integrity
- **B** Objectivity
- C Open-mindedness
- **D** Perseverance
- 3 A chemical in the laboratory is known to be toxic and corrosive.

Which hazard symbols should be labelled on the bottle containing this chemical?



D III and IV

4 Which of the following group of substances are good conductors of heat?

- A copper, magnesium, calcium
- B carbon, calcium, fluorine
- C nitrogen, phosphorus, chlorine
- **D** sulfur, bromine, copper

- 5 The following information about an electric water heater is provided.
 - I It has a metal casing.
 - II It is taller than a piece of A4 paper.
 - III It has a capacity of 5 litres.
 - IV It has a black plastic handle.

Which of the above are examples of quantitative data?

- A I and III
- B II only
- C II and III
- D III only
- **6** Three balls have densities of 0.9 g/cm³, 1.0 g/cm³ and 1.4 g/cm³ respectively. They are immersed in four beakers carrying liquids of different densities.

Which of the following beakers contains a liquid of density 1.1 g/cm³?







С



D

7 The table below shows the scale of hardness of different materials M to Q. The greater the value, the harder the material is.

material	М	Ν	0	Р	Q
hardness value	7	3	9	2	1

Which of the following statements can be correctly deduced from the scale about these five materials?

- A N can scratch material P but not O.
- **B** M can scratch material O and P.
- **C** P can scratch M but not Q.
- **D** Q can scratch all the other materials shown in the table.
- 8 Which of the following consists of an element, a compound and a mixture?
 - A air, petroleum, seawater
 - **B** carbon dioxide, pure water, neon
 - **C** magnesium, sugar, seawater
 - D pure water, hydrogen, magnesium
- 9 Which element is found in Group 16 and Period 4 of the Periodic Table?
 - A Chromium
 - **B** Hafnium
 - **C** Molybdenum
 - ${\bf D} \hspace{0.1in} {\rm Selenium}$
- **10** Which of the following methods is most effective in separating a mixture of copper filings and water?
 - **A** filtration
 - **B** magnetic attraction
 - **C** simple distillation
 - D reverse osmosis

11 The table below shows the various melting and boiling points of four different substances, P, Q, R and S.

	melting point / °C	boiling point / °C
Р	-45	13
Q	12	47
R	19	98
S	26	120

Which of the following pairs of substances are best separated by distillation?

Assume that the experiment is carried out at 25 °C.

A P and Q

- **B** P and S
- $\boldsymbol{C}~Q~and~R$
- D R and S
- **12** Separate samples of the same mass of coarse sugar and fine sugar are both dissolved in 50 cm³ of water as shown below. The mixture was stirred until no more sugar dissolved.



Three statements are made about the experiment above.

- 1 The fine sugar dissolves faster than the coarse sugar.
- 2 After stirring, there will be a larger mass of undissolved coarse sugar than fine sugar.
- 3 Using more water will cause both sugars to dissolve faster.

Which of the following statements about the above experiment is true?

- A 1 only
- **B** 1 and 2
- **C** 1 and 3
- **D** 2 and 3

- P
 Q

 R
 Q

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- **13** The diagram shows parts of the Period Table.

Which two elements have similar chemical properties?

- A P and RB Q and T
- C R and Q
- D S and T
- 14 Which of the following correctly represents a mixture of an element and a compound?



15 Calcium carbonate is a compound that can be found in egg shells. Its chemical formula is CaCO₃.

Which statement is true about calcium carbonate?

- A Calcium carbonate contains calcium and carbon dioxide.
- **B** Calcium carbonate and its constituent elements have the same physical properties.
- **C** Calcium cannot be obtained from calcium carbonate by physical methods.
- **D** The mass of each constituent element in calcium carbonate is the same.

16 The following table shows the solubilities of three substance, M, N and O.

solid	solubility in water	solubility in ethanol
М	Insoluble	soluble
N	insoluble	insoluble
0	soluble	insoluble

Some steps could be taken to obtain pure M from a mixture of M, N and O.

- I add ethanol
- II add water
- III filter
- IV evaporate to dryness

Which method is the most effective?

- A I, II, III, IV
 B II, I, IV, III
 C II, III, IV
 D I, III, IV
- 17 Which method is used to obtain pure water from salt solution?
 - A chromatography
 - **B** distillation
 - ${\boldsymbol{\mathsf{C}}}$ evaporation
 - **D** filtration
- **18** The diagram shows a ray of light reflected on a plane mirror.



What is the angle of reflection?

- **A** 40°
- **B** 50°
- **C** 80°
- **D** 100°

19 An optician's test card is fixed 50 cm behind the eyes of a patient who looks into a plane mirror 300 cm in front of her, as shown in the diagram below.



What is the distance from her eyes to the image of the card?

- A 350 cm
- **B** 400 cm
- **C** 650 cm
- **D** 700 cm
- 20 Which of the following is an application of a concave mirror?
 - A dentists' mirror
 - **B** security mirror in shops
 - C rear view mirror in the vehicle
 - **D** periscope
- **21** A ray of light strikes the surface of a glass block as shown in the diagram below. Which of the following shows the path of light after striking the surface?



22 A ring is placed at the bottom of a beaker and viewed from a position in the air, as shown in the diagram. Which of the following best describes the image of the ring seen by the observer in the air?



- A appears smaller
- **B** remains at the same location
- **C** appears nearer
- **D** appears further
- 23 The diagram shows a picture of the root hair cell. Which part of the cell is responsible for controlling movement of substances in and out of the cell?



- 24 Which statement(s) regarding the division of labour is/are false?
 - I The nucleus carries out all the necessary jobs within the cell.
 - II In multicellular organisms, different types of cells perform the same function.
 - III An organ is made up one type of tissue, and performs one specific job only.
 - IV A system is made up of different organs, working together to perform a specific function.
 - A I and III
 - **B** II and III only
 - **C** II, III and IV only
 - **D** I, II and III only
- **25** Cancer is caused by the uncontrollable growth of cells in the body.

Which part of a cell is not functioning appropriately in patients suffering from cancer?

- A cell membrane
- **B** cytoplasm
- C vacuole
- D nucleus
- 26 Molten lava flows down the slopes of a volcano and gradually solidifies. Which of the following does not take place?
 - **A** A change of state
 - **B** A new substance is formed
 - **C** Heat is lost from the lava to the surroundings.
 - **D** Particles in the lava slide past one another.
- 27 Which statement best explains why liquids do not have fixed shape?
 - **A** The particles have a lot of energy
 - **B** The particles have low density
 - **C** The particles slide past one another and are not fixed in position
 - **D** The attractive forces between particles are very weak
- 28 Which of the following statements about atoms is true?
 - **A** A neutron has a relative charge of zero.
 - **B** All atoms contain protons, neutrons and electrons.
 - **C** Atoms of the same element can contain different numbers of protons
 - **D** The nucleus of an atom can consist of only neutrons.

- **29** Which piece of information cannot be deduced from the Periodic table?
 - A Number of electrons
 - B Number of isotopes
 - C Number of nucleons
 - **D** Number of protons
- **30** Which of the following atoms have 16 electrons?
 - A Fluorine
 - B Oxygen
 - $\boldsymbol{C} \ \ \mathsf{Phosphorus}$
 - D Sulfur

Section B (30 marks) Answer all questions in the space provided.

1 Fig 1.1 shows a cooking pot made of three types of materials.





(a) State one advantage and disadvantage of using glass as the material for part A.(i) Advantage:

	(1)	Advantage:
		[1]
	(ii)	Disadvantage:
		[1]
(b)	Sta	te the general class of materials suitable for part B and C .
	(i)	part B:[1]
	(ii)	part C :[1]
(c)	Exp	elain your choice for (b)(ii) .
		[1]

- 2 A plastic bottle cap has a density of 0.92 g/cm³.
 - (a) Fig 2.1 shows a set-up used to determine the density of sea water. Calculate the density of sea water using information from Fig 2.1.



Fig 2.1

		density =[3]
(b)	(i)	Hence, state whether the plastic bottle cap will float or sink in sea water.
		[1]
	(ii)	Explain your answer in (b)(i) .
		[1]
(c)	Imp one the	proper disposal of waste can have a negative impact on the environment. State way in which the plastic cap will affect the marine animals if it is disposed into sea.
		[1]

3 Fig 3.1 shows a representation of a molecule of glycine. The lines represent the bonds between the atoms.



Fig 3.1

(a) State the total number of atoms in a molecule of glycine.
[1]
(b) Name the elements present in a molecule of glycine.
[1]
(c) (i) State whether glycine is an element or compound.
[1]
(ii) Explain your answer in (c)(i).
[1]

4 Food scientists carried out an analysis on a sample of food to determine which proteins, R, S, T and U, are present in it. Fig. 4.1 shows the results obtained.





5 Table 5.1 below shows the melting and boiling points of three substances, fluorine, chlorine and bromine.

substance	melting point/ °C	boiling point/ °C
fluorine	- 220	- 188
chlorine	-101	- 34
bromine	-7	59

Table 5.1

(a) On the axis below, sketch the temperature-time graph of bromine, as it is heated from -10°C to 70°C. Label melting point and boiling point clearly, where applicable.



(i)	fluorine:[1]
(ii)	chlorine:[1]
(iii)	bromine:[1]

(c) Draw the arrangement of bromine particles at -60 °C.



(d) Explain the process of a solid melting into liquid, using the particulate model of matter.

 	 [2]

[2]

Section C (40 marks) Answer all questions in the space provided.

1 In an experiment, the solubility of three salts, salt A, salt B and salt C in water were investigated. The salts were dissolved in 50 cm³ of water at different temperatures.

The results are plotted on a graph as shown in Fig. 1.1.

70 60 mass of solute dissolved in 50 cm³ of water / g 50 salt B 40 30 salt A 20 10 0 salt C 0 20 40 60 80 100 temperature / °C

Fig 1.1

(a) Define solubility.

.....[1]

(b) Based on Fig. 1.1, describe **two** ways in which the solubility of salt C differs from the solubility of salt A and salt B as temperature increases.

......[2]

(c) (i) By extending the line in Fig 1.1 for salt A, predict the mass of salt A soluble in 50 cm³ of water at 100 °C.

Mass of salt A =[1]

(ii) Calculate the mass of salt B that is soluble in 150 cm³ of water at 40 °C. Show your working clearly.

Mass =[2]

(d) (i) Describe how you would separate salt C that was contaminated with sand.

(ii) Draw a diagram of the apparatus used, with clear labels.

[1]

2 Table 2.1 shows some information about five particles, A, B, C, D and E.

	particle	number of protons	number of electrons	mass number	
	А	1	1	3	
	В	6	6	12	
	С	6	6	13	
	D	9	10	19	
	E	13	10	27	
	(ii) Explain	your answer in (a)	(i).		[1]
					[1]
(h)	Mith roforou	and to the Deviadie '	Tabla identify norti	ala E	
(a)	with referen		rable, identify parti		
					[1]
(c)	(i) Which t	wo particles belong	to the same eleme	ent?	
. ,			-		[4]
					[1]
	(ii) Explain	your answer in (c)	(i).		
					[1]

Table 2.1

(d) (i) State the electronic configuration of particle C.

[1]

(ii) Draw the electronic structure of particle C, showing all electrons and shells clearly.

[2]

(iii) State the Group that particle C belongs to in the Periodic Table.
[1]
(iv) Explain your answer in (d)(iii).
[1]

3 (a) Fig. 3.1 shows a ray of light reflected by 2 mirrors.





(i) State two characteristics of images formed by a plane mirror.

(ii) Using letters P, Q and R, identify the incident and reflected rays for mirror 1 and mirror 2.

mirror	incident ray	reflected ray	
1			
2			[2]

(iii) Determine the angles of incidence and reflection for mirror 1.

angle of incidence =[1]

angle of reflection =[1]

(b) Fig. 3.2 shows a ray of light travelling from Medium X to Medium Y.





(i) Table 3.3 shows the speed of light in medium X and Y. Explain why light travels at different speeds in medium X and medium Y.

Table 3

	medium X	medium Y
speed of light	199 000 000 m/s	300 000 000 m/s

.....[1]

(ii) Complete the ray diagram in Fig. 3.2 to show the path of light as it travels from medium X to medium Y, drawing and labelling the angle of incidence and the angle refraction clearly.

[2]

(iii) State an example of an observation in our daily lives that can be explained by refraction of light.

 	 [1]

4 (a) Fig. 4.1 shows the drawing of a cell.



Fig 4.1

A virus works by first "hijacking" a normal functioning cell. After it invades the cell, it causes the cell to stop its normal cell activities. The cell becomes unable to perform its original function and may even start producing more virus particles that proceed to invade neighbouring cells. Based on how viruses work, which part of a cell does a virus most likely target? Explain your answer.

.....[2]

(c) Explain why yellowing of the leaves results in slowed down plant growth.

.....[2]

(d) Animals and plants are both considered multicellular organisms, whereby cells are organised into tissues, organs and systems.

Read the following passage about the human nervous system.

The basic units of the nervous system are called neurons. They are specialised cells that communicate through electrical signals. In the nervous system, the neurons can combine to form grey matter and white matter. These matter are mainly situated in the brain, spinal cord and other bones to help coordinate body movement in a human.

Using the terms found in the passage, state one example each of a cell, tissue, organ and system found in humans. An example has been done for you.



End of Paper

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