Centre Number	Candidate Number

MINISTRY OF EDUCATION AND HUMAN RESOURCE DEVELOPMENT

SOLOMON ISLANDS SCHOOL CERTIFICATE

2017

SCIENCE

FRIDAY 3rd NOVEMBER 9.00AM   **TIME: 3 HOURS PLUS**
                                                                          10 Minutes Reading Time

SECTION	CONTENT	MARKS	TIME
A	MULTIPLE CHOICE	20	30 mins
B	SHORT ANSWER QUESTIONS	35	60 hours
C	LONG ANSWER QUESTIONS	45	90 mins
	TOTAL	**100**	**180**

INSTRUCTION TO CANDIDATES

1. Do not open this booklet until you are told to do so.
2. Write your Centre Number and Candidate Number at the top right hand corner of this page.
3. All Sections are Compulsory.
4. All Questions are to be answered on the space provided in this Booklet.
5. There are three (3) Sections in this paper.

THIS BOOKLET CONTAINS 24 NUMBERED PAGES.

Formula and Data

1. List below are some formulae that you may use.

$F = ma$	$E_{Potential} = mgh$	$A_1V_1 = A_2V_2$
$W = Fd$	$E_{Kinetic} = \frac{1}{2} mv^2$	$v = \lambda f$
$V = IR$	$\rho \text{ (density)} = m/v$	$Q_{heat} = mc\Delta T$
$Power = VI$	$Power = \dfrac{Work\ done}{Time\ taken}$	$P_{pressure} = \rho hg$
$E_{electrical} = VIt$	$a = \dfrac{\Delta v}{\Delta t}$	$Pressure = A/F$
$Wt = mg$	$Speed = Distance/Time$	

2. Take $g = 10 \text{ ms}^{-2}$, where appropriate
3. The mass number and atomic number of the first 20 elements of the periodic table are provided.

Element	Atomic number	Mass number
Hydrogen	1	1
Helium	2	4
Lithium	3	7
Beryllium	4	9
Boron	5	11
Carbon	6	12
Nitrogen	7	14
Oxygen	8	16
Fluorine	9	19
Neon	10	20
Sodium	11	23
Magnesium	12	24
Aluminum	13	27
Silicon	14	28
Phosphorus	15	31
Sulfur	16	32
Chlorine	17	35
Argon	18	40
Potassium	19	39
Calcium	20	40

SECTION A: MULTIPLE CHOICE QUESTIONS   (20 MARKS)

WRITE THE LETTER OF THE MOST CORRECT ANSWER IN THE FOLD OUT FLAP OF THIS BOOKLET.

Study the diagram and answer questions 1 & 2 below.
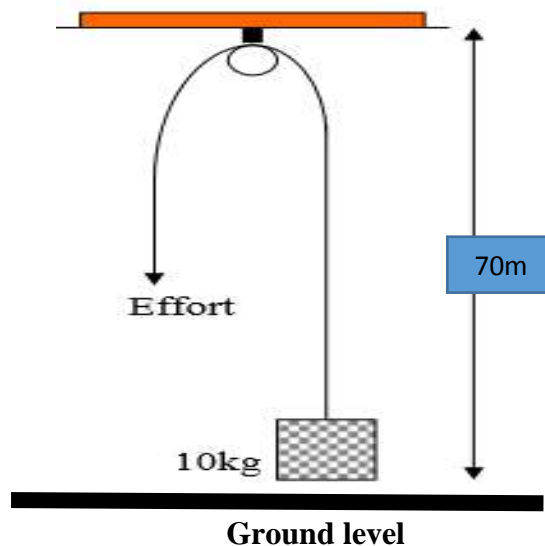
Ground level

1.   What is the name of the force that pushes the 10 Kg mass on the ground level?

   A.   Force of friction
   B.   Gravitational force
   C.   Central force
   D.   Ground force.

2.   The amount of force needed to lift the 10 Kg mass up to the top the pulley is,

   A.   70 newton
   B.   170 newton
   C.   1170 newton
   D.   1700 newton.

3. Two resistors of 3.0 ohms and 6 ohms are connected in parallel with 9V battery. The power supply by the battery is closed to,

    A. 3.0 W
    B. 6.0 W
    C. 9.0 W
    D. 12.0 W.

4. A cube of diamond that has mass of **115.00 kg**, displace 1.15 **m³** of water. What is the density of the diamond?

    A. $1.15 \, Kg/m^3$
    B. $11.5 \, Kg/m^3$
    C. $100.0 \, Kg/m^3$
    D. $150.5 \, Kg/m.^3$

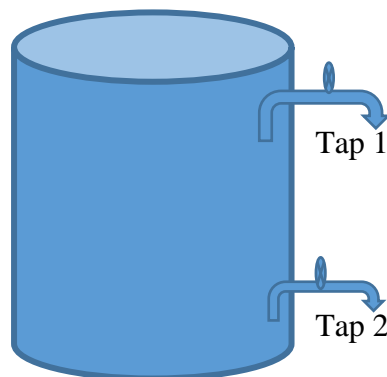**Study the diagram below and answer the questions.**

Tap 1

Tap 2

Figure 2. Shows water tank full of water which has two opening as indicated by the arrows on the side of the water tank

5. According to the Pascal Principle. The pressures exerted at tap 1 and tap 2,

    A. are the same
    B. Tap 1 is greater than in 2
    C. Tap 1 is less than tap 2
    D. Tap 2 is more than tap 1.

6. A girl sings with a very high pitch at the school choir competition. This is due to,

    A. Frequency
    B. Wavelength
    C. Period
    D. Amplitude.

The diagram below show a light ray **P** passes from air through point **O** into glass medium.
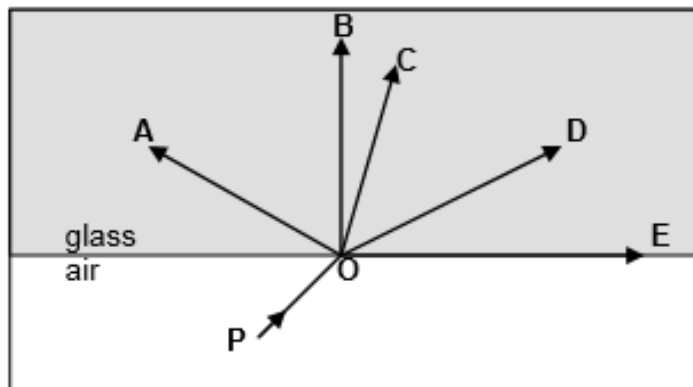
7. The correct path of the refracted ray is,

    A. P, O, C
    B. P, O, E
    C. P, O, D
    D. P, O, A.

8. The correct ratio of the aluminum atom to oxygen atom in aluminum oxide is,

    A. 2 : 2
    B. 3 : 2
    C. 2 : 3
    D. 2 : 1

9. Rate of chemical reaction is,

    A. Proportional to increase temperature of the system
    B. Inversely proportional to increase temperature of the system
    C. Inversely proportional to increase surface area of reactants
    D. Proportional to decrease surface area of the reactants.

10. Solution from the Ant's mouth was tested and showed that its pH is 14. This indicates that it is a,

    A. Weak acid
    B. Weak base
    C. Strong base
    D. Strong acid.

11. The following materials are alloys **except,**

    A. Brass
    B. Bronze
    C. Iron
    D. Stainless steel.

Below is a table of some organic compounds.Use the table to answer questions 12 &
13

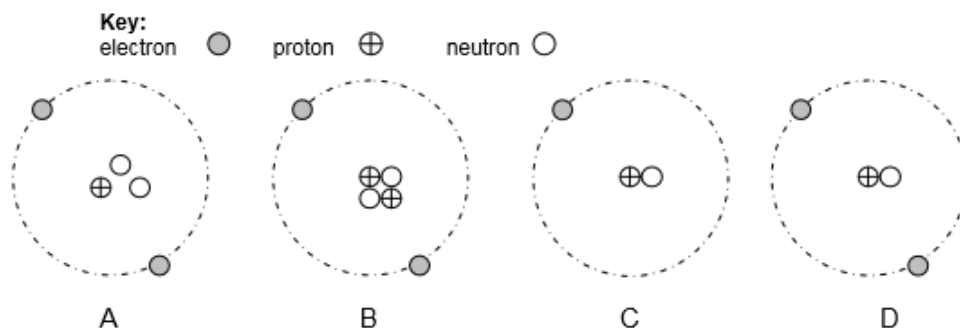| I. CH_4	II. C_2H_4
III. C_3H_4	IV. C_4H_{10}

12. What is the general formula for compound II?

    A. C_nH_{2n}

    B. C_nH_{n-2}

    C. C_nH_{n+2}

    D. $C_{n-1}H_{2n}$

13. Which of the organic compounds is said to be unsaturated?

    A. Compound I only
    B. Compound II only
    C. Compound II & III
    D. Compound III & IV.

14. Which of the elements below represent isotope of hydrogen?

Key:
electron ○   proton ⊕   neutron ○

A   B   C   D

15. At the end of the process of meiosis the number of chromosomes is,

    A. Doubled
    B. Half
    C. Triple
    D. 4 times more.

16. Virus are tiny organisms that causes disease such as,

    A. Malaria
    B. Common cold
    C. Leprosy
    D. Tuberculosis.

17. Raw materials needed for the process of photosynthesis are,

    A. Light energy, water, chlorophyll, and oxygen
    B. Light energy, water, chlorophyll and nitrogen
    C. Light energy, water, chlorophyll, oxygen
    D. Light energy, water, chlorophyll, and carbon dioxide.

18. The main product of anaerobic respiration in animal cell is,

    A. Alcohol
    B. ATP
    C. Lactic acid
    D. Acetic acid.

19. Solomon Island is among the highest population growth in the world. This is due to,

    A. High birth rate and high motility rate
    B. High birth rate and low motility rate
    C. Low birth rate and high motility rate
    D. Low birth right and low motility.

20. An ecologist is studying the number of birds in the wild for a 5 year period. At which **level** is he doing his study?
    A. Organism
    B. Community
    C. Population
    D. Ecology.

SECTION B: SHORT ANSWER QUESTIONS (35 MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION. WRITE YOUR ANSWERS ON THE SPACE PROVIDED.

Question 21: Chemistry

A. Sodium chloride is an ionic compound while carbons oxide is a covalent compound. Using the concept of electron transfer describe how the compounds formed.

    i.   Ionic compound

    _____

                                                1 mark

    ii. Covalent compound

    _____

                                                1 mark

B. Write down **two** (**2) physical properties** of ionic compounds

    i. _____

    ii._____

                                             2 marks

C. Pure metals and alloys are useful materials to make bridge and wharf structures. Engineers prefer to use **alloys,** than pure metals because they are much stronger.

    i.   With reference to atomic structure of metal and alloys explain why alloys are stronger than their pure original metals.

    _____
    _____
   _____

                                           2 marks

D. Below is part of the **periodic table** showing, **group and period** number of some common elements. Study the table and answer the following questions.

Period	Group number		
	V	VI	VII
II	Nitrogen	Oxygen	Fluorine
III	Phosphorus	Sulfur	Chlorine

i. Name two elements with similar chemical properties and justify your answer.

_____

_____

2 marks

E. Below are structures of allotropes of carbon atom. Study the structures of graphite and diamond and answer the following questions.

A. Graphite	B. Diamond
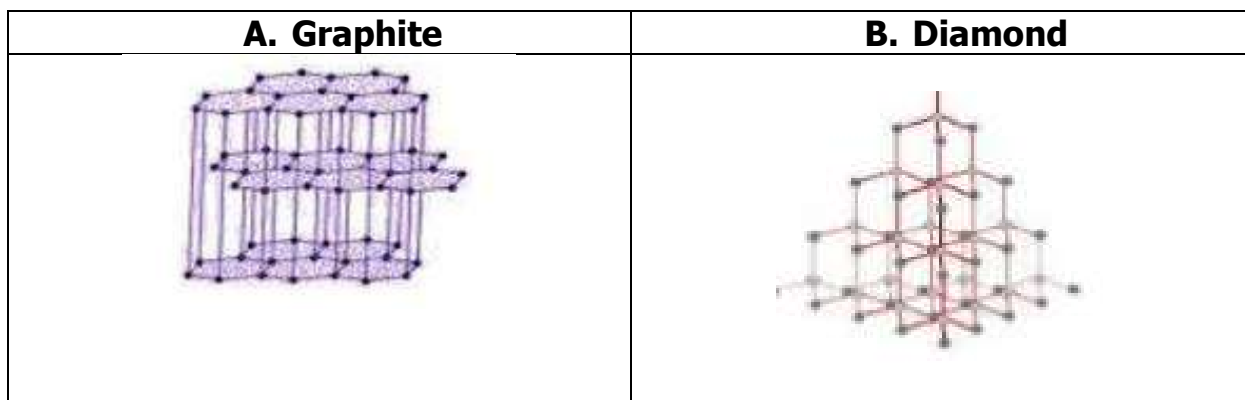
i. Explain why diamond is harder than graphite.

_____

_____

_____

_____

_____

2 marks

9

ii.   Explain why graphite conducts electricity and diamond does not.

_____

_____

_____

_____

_____

2 marks

Question 21. Marks	
	12

Question22:   Physic

A.   A person applies a force of 100 newton to push his car but it did not move.

i.   What is the work done to the car?

_____
_____

1 mark

B.   A car of 1000 kg is rolling 5.0 m/s freely. If the force of friction on the wheels is 100 N.

i.   Calculate the acceleration of the car?

_____
_____
_____
_____
_____

2 marks

C.   Archimedes is a scientist who studies about density and pressure in liquids?

i.   Using the Archimedes Principle of buoyancy explain why objects float and sink if they are placed in water.

_____
_____
_____
_____
_____

2 marks

D. A student is sitting on a wharf measuring the passing waves with the wavelength of 5 meters. Given the velocity of the passing waves is 10 ms^{-1}.

    i. Calculate the period of the wave.

2 marks

    ii. Calculate the frequency of the wave.

_____
_____
_____

2 marks

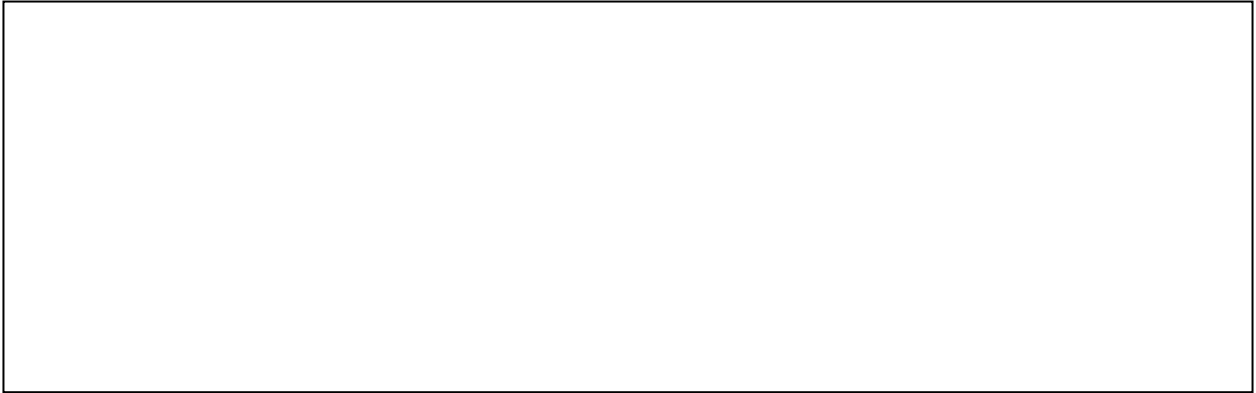E. Describe and give an example of a transverse wave.

    i. Transverse wave and example.

_____
_____
_____

2 marks

Question 22. Marks	
	11

Question 23:   **Biology**

A.   Bacteria growth is by binary fission.

    i.   In the space below sketch a diagram to show the process of binary fission showing at least 3 stages.
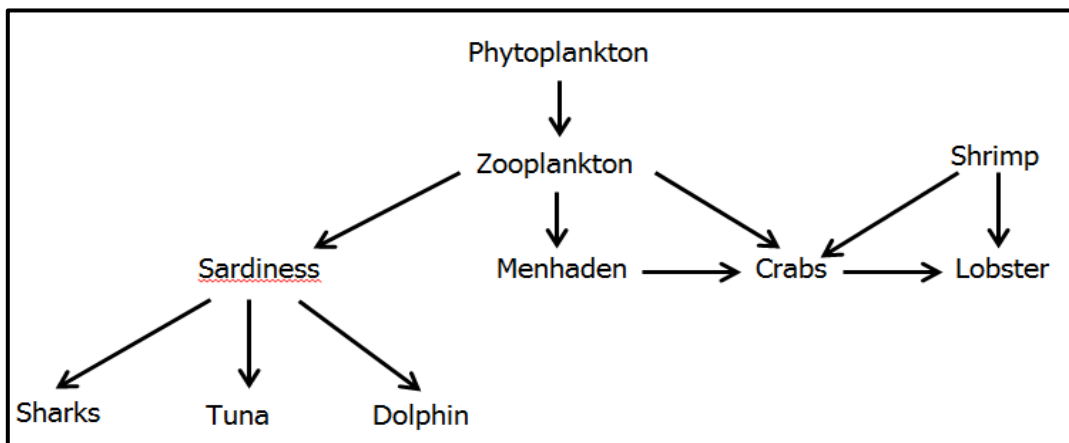
        2 marks

B.   Virus and bacteria are both micro-organisms.

    i.   State ONE major structural difference between **virus and bacteria**

_____

_____

_____

        1 mark

C.   Study the food web below and answer the following questions.

i. Use the food web above and **draw** a diagram to show a **food chain** that contains 4 organisms.

2 marks

D. Brown algae and sea grass are classified under plants; and can be found in the marine ecosystem.

i. Explain why algae and sea grass are usually found near the surface of the ocean; and NOT in the deep ocean floor.

_____
_____
_____

2 marks

E. Homeostasis is a process where our body controls a **balance** of nutrients to maintain the correct level in the blood.

i. Describe how the body maintains glucose when there is low glucose level in blood.

_____
_____
_____
_____
_____

2 marks

F. Bacteria played an important role in the nitrogen cycle.

   i.   State the role of bacteria in the nitrogen cycle.

   _____

   _____

                                                         1 mark

   ii. Describe the term population.

   _____

   _____

   _____

                                                         2 marks

Question 23. Marks	
	12

SECTION C: LONG ANSWER QUESTIONS   (45 MARKS)

Question 24:   Physics

A. A house hold electrical circuit is protected with a 10.0A **fuse**. This section has the television set (1200 ohms), and electric heater (1,200.0W), and a two light bulb 100.0 W fitting operating at **present.** Assuming the voltage of 240V is available to the house hold.

Calculate **the total current and determine** whether you are able to connect the video screen **(800 ohms)** safely to the circuit.

                                                                              5 marks

B. Study the diagram below and answer the following question.
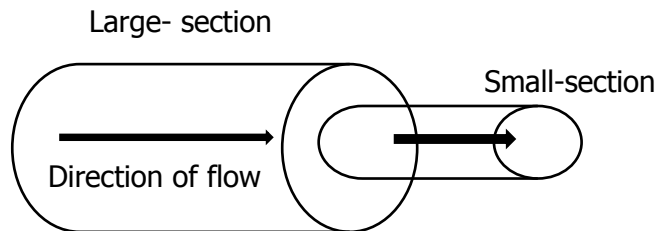
A Liquid (density is 1.0g/cm3) **flow** through a horizontal section of a 2 tubes joined **end to end.** The first part is a **larger** section with the cross section area of **10.0 cm²**. It has a flow speed of **200 cm/s,** and the pressure of 1000 Pa. In the second smaller section, the cross section area is **5 cm²**.
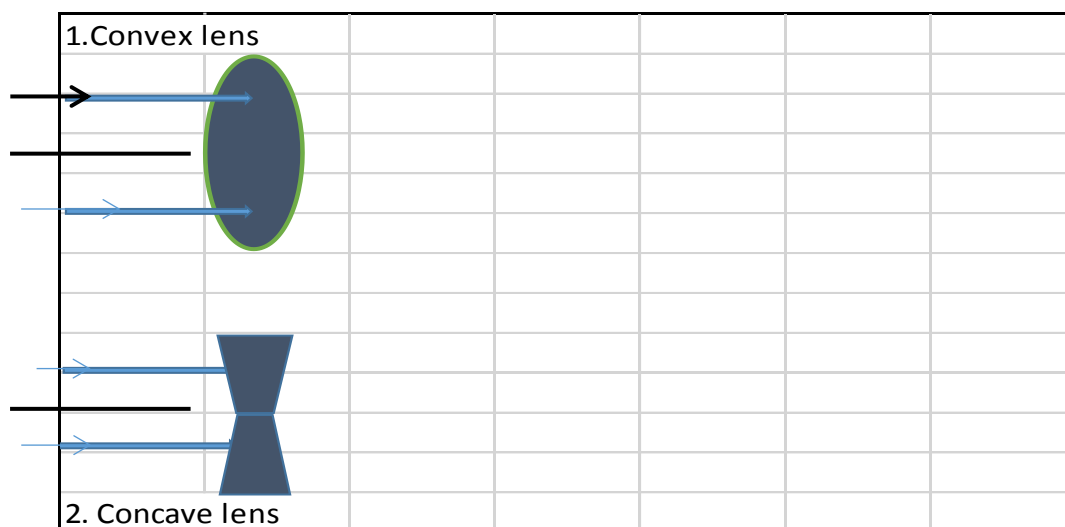
i.   Calculate the flow rate (flow speed) of the smaller section.

2 marks

ii. Suggest the amount of pressure you expect in the smaller section of the pipe.

_____

_____

_____

1 mark

C.   Below is a diagram of a **pair** of parallel light rays **directed at** the two lenses, a convex and concave lens, placed at equal distance from the source of light rays.

1.Convex lens

2. Concave lens

i. Sketch the subsequent path of the pair of rays as they leave the 2 types of lens.

2 marks

ii. Discuss the cause of short-sightedness and how you would correct it.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

4 marks

Question 24. Marks	
	14

Question 25:   Chemistry

A.   Study element X below and answer the following questions.

$$^{24}_{12}X$$
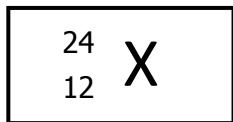
i.   Write down the electronic configuration of X

_____

1 mark

ii.   Write the number of neutrons of element X

_____

1 mark

iii.   Write the group number and period number of element X

_____

1 mark

iv.   In the space below draw the electron shell diagram of element X

3 marks

B. There are many types of reactions which you can do and easily predict their products in the laboratory. Predict the products of the following reactants and write their correct balance chemical equations.

i. Sulfuric acid and Sodium Hydroxide

_____

4 marks

ii. State the type of reaction in B (i) above and, justify your answer.

_____
_____

2 marks

C. **Chlorofluorocarbons** (CFC) compound is now banned from the Solomon Islands.

i. Discuss how the compound affects the ozone layer and human beings.

_____
_____
_____
_____
_____
_____
_____
_____

4 marks

Question 25. Marks	
	16

Question 26: Biology

A. A type of plant has red, white and pink flower color. The inheritance of the flower color is incomplete dominance.

Complete the punnett square below using capital letter [R] representing red flower alleles and small letter [r] representing white flower alleles and Rr for pink color.

i. Define incomplete inheritance

_____

_____

1 mark

Assuming that pure breeding red color flower is pollinated with pure breeding white flower.

ii. In the punnett square below write the alleles representing the colors and predict the genotypes and phenotype of the successive generations.

First Generation [1st Generation]

alleles		

2 marks

Phenotype ratio: _____

1 mark

iii.   In the first generation the flowers were allowed to self-pollinate to produce second generation of flowers. Use the punnett square below and predict their genotype and phenotype ratio.

Alleles		

2 marks

Phenotype ratio: _____

1 mark

B.   Mr. John Andrew has been diagnosed by a doctor and found to be resistance to antibiotics. Below is a summary of how Andrew is taking antibiotics for the last 4 months.

Medical History of Mr. John Andrew

Date	illness	Prescribed dose	Medicine taken
1st Jan 2017	Head ache	Panadol	Antibiotics for 7 days
2nd Feb 2017	Malaria	Co-artem	Antibiotic for 7 days
3rd March 2017	Head ache	Panadol	Antibiotics for 7 days But patient stop taking the drugs after 2 days when the headache stops.
4th April	Cough	Septrine	Antibiotics 7 days
12 April	Dry Cough	amoxicillin	Antibiotics incomplete dose
13th April	Diagnosed with pneumonia	amoxicillin	**Resistance to antibiotics**

i.   Study Mr. John Andrew's medical record and explain why he becomes **resistance to antibiotics.**

_____
_____
_____
_____
_____
_____

2 marks

C. Carbon monoxide [CO] is a colorless gas found in exhaust of car, trucks and cigarette smoke. Carbon monoxide binds 210 times more tightly than oxygen [O_2].

   i.   Explain why carbon monoxide is such a deadly gas.

   _____
   _____
   _____
   _____
   _____

<div align="right">2 marks</div>

D. Greenhouse gases are important to life on Earth.

   i.   Discuss the effects of using too much fossil fuel on small island countries in the Pacific Ocean?

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

<div align="right">4 marks</div>

Question 26. Marks	
	15

SISC – SCIENCE 2017

SECTION A
MULTIPLE CHOICE   (20 MARKS)

Write the letter of the correct answer in the box provided. Make sure your answer is put alongside the right question number.

Example: If you consider A is the correct answer, write it like this: A

To change your answer from A to C, Cross out A and write the new answer **C** by the box, like this: ☒A   C

FOR MARKERS USE ONLY

SECTION		MARK	ACTUAL MARK
A		20	
B	Q.21	12	
	Q.22	11	
	Q.23	12	
C	Q.24	14	
	Q.25	16	
	Q.26	15	
TOTAL		100	
Markers Initial			

1 ☐   11 ☐

2 ☐   12 ☐

3 ☐   13 ☐

4 ☐   14 ☐

5 ☐   15 ☐

6 ☐   16 ☐

7 ☐   17 ☐

8 ☐   18 ☐

9 ☐   19 ☐

10 ☐   20 ☐