NAME	CLASS	INDEX NO.

Parent's / Guardian's Signature: _____ Date: _____

ST. PATRICK'S SCHOOL
END-OF-YEAR EXAMINATIONS 2016

Subject : GENERAL SCIENCE **Date** : 10 OCTOBER 2016

Level : SECONDARY 1 EXPRESS **Duration** : 2 HOUR

INSTRUCTIONS TO CANDIDATES

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

1. Write your name, class and index number on the **Question Paper** and the **Optical Answer Sheet** in the spaces provided. **It is also required that you SHADE your index number on the Optical Answer Sheet.**
2. This paper consists of **Three (3) Sections: Section A, Section B** and **Section C.**
3. Answer **ALL** questions in **Section A** on the **Optical Answer Sheet** provided.
4. Answer **ALL** questions in **Section B** in the spaces provided.
5. Answer **ANY THREE FULL** questions out of 4 in **Section C** on the **writing paper** provided. Start each question on a new sheet of paper.
6. Calculators may be used where necessary. **Give numerical answers to Three (3) significant figures.**
7. **DO NOT DETACH** any sections from this paper.
8. At the end of the examination, arrange your answers to **Section C in order.**
9. Submit the Optical Answer Sheet, this paper and answers to Section C **SEPARATELY.**

For Examiner's Use Only

Section	A (30 m)	B (40 m)	C (30 m)	Total (100 m)	Grade	Target Grade
Score						

This question paper consists of 24 printed pages including this cover page.
A copy of the Periodic Table is provided on page 24.

Section A [30 marks]:

*Each question is provided with **four** possible answers (**A, B, C,** and **D**). Select the most appropriate answer and **shade** your choice in the **Optical Answer Sheet** provided.*

1 Which one of the following statements is true about designing a scientific experiment?

A There should only be one constant variable.
B The experiment should only be conducted once.
C A hypothesis should be made before collecting evidence.
D The outcome of the experiment must always be the same as the original hypothesis.

2 Which one of the following apparatus is most suitable for measuring and containing approximately 15 cm^3 of alcohol?

A Boiling tube
B Measuring cylinder
C Evaporating dish
D Round-bottomed flask

3 Which of the following advance(s) in Science and Technology can bring about both positive and negative impacts to our society?

I Development of plastics
II Greater usage of nuclear energy
III Development of fertilisers and genetically modified plants

A II only
B I and II only
C I and III only
D I, II and III

4 A bottle of dilute ammonia solution was found in the laboratory. Which one of the following hazard symbols should the bottle be labelled with?

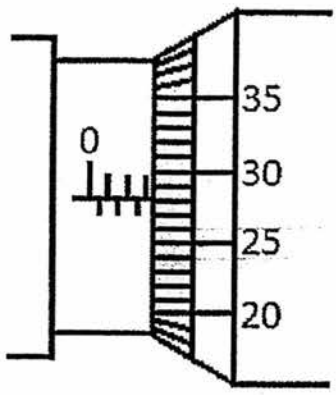
A 

B 

C 

D 

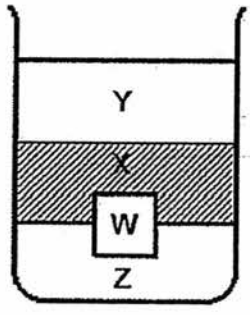
5 A micrometer screw gauge was used to measure the diameter of a rod.



What is the correct reading on the micrometer screw gauge?

A	2.78 mm	**B**	3.28 mm
C	3.78 mm	**D**	6.28 mm

6 The following diagram shows object **W** placed in a mixture of immiscible liquids **X**, **Y** and **Z**.



Which one of the following options shows a correct match of densities to the objects? (All values are given in g/cm^3)

	W	X	Y	Z
A	1.51	0.96	0.20	2.11
B	0.96	1.51	0.20	2.11
C	1.51	0.96	2.11	0.20
D	0.96	1.51	2.11	0.20

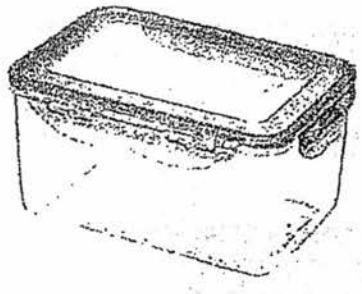
7 The table shows materials **J**, **K**, **L** and **M** and their value of hardness on the Moh's scale.

Material	J	K	L	M
Hardness value	7	4	9	2

Which one of the following statements is true for the materials?

A **J** is able to scratch **L**.
B **L** is the softest material.
C **K** is scratched by **J** and **L**.
D **M** can be used to scratch all of the other materials.

8 The diagram shows a plastic food container.



Which one of the following statements shows the advantage of using plastic to make the food container?

A It is flexible and hard.
B It is cheap and biodegradable.
C It is lightweight and transparent.
D It has a low melting point and high strength.

9 Which one of the following actions will cause the particles in a steel rod to increase in energy?

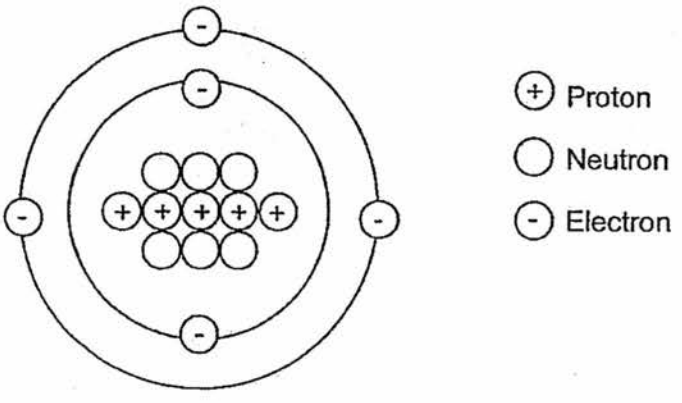
A Heating it over a flame
B Pulling it into a long wire
C Cutting it into smaller pieces
D Folding it into a different shape

10 The following table shows the substances **A**, **B**, **C** and **D**.

Substance	Melting Point (°C)	Boiling Point (°C)
A	−179	−3
B	−15	78
C	76	380
D	112	340

Which one of the substances is most likely a liquid at 100 °C?

11 The following diagram shows the arrangement of protons, neutrons, and electrons in an atom.



What is the mass number of the atom?

A 1
B 5
C 6
D 11

12 Ammonium sulfate has a chemical formula of $(NH_4)_2SO_4$. How many atoms are present in one molecule of ammonium sulfate?

A 4
B 5
C 10
D 15

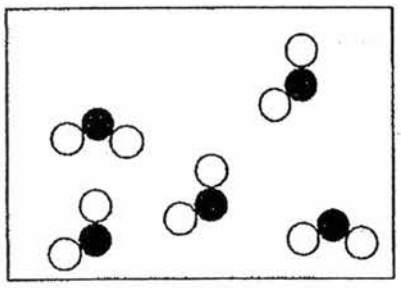
13 Two elements are found in the same group on the Periodic Table. They are likely to have similar _____.

I chemical symbols
II physical properties
III chemical properties

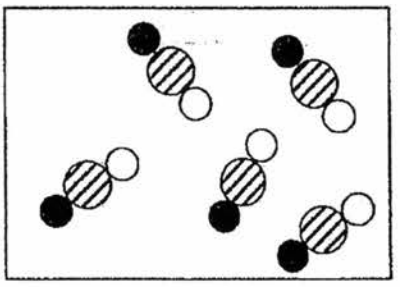
A I only
B III only
C II and III only
D I, II and III

14 Which one of the following substances is a mixture containing two different compounds?

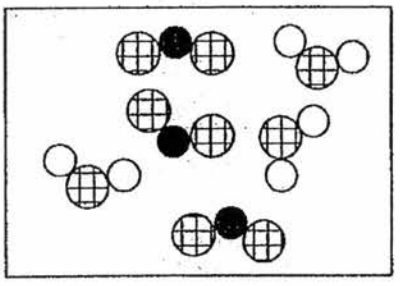
A



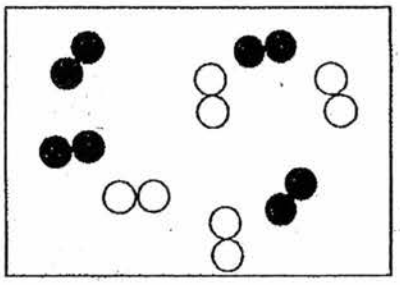
B



C



D



15 The composition of air is shown in the following table.

Component	Percentage by volume (%)
Nitrogen gas	78.0
Oxygen gas	20.9
Argon	0.9
Water vapour	Depends on local conditions
Other gases	0.2

Which one of the following statements best explains why air is a mixture?

A The components of air are not fixed.
B Air contains different types of elements.
C The components of air cannot be separated.
D The components of air do not react with each other.

Use the information from this table to answer questions **16** and **17**.

A series of experiments were designed to test the solubility of substance **P** in water. The following table shows the different variables used in each experiment.

Experiment	Maximum Mass of P dissolved (g)	Size of particles	Volume of water used (cm^3)	Temperature of water (°C)
1	10	Large lumps	50	30
2	10	Fine powder	50	30
3	15	Fine powder	50	45
4	18	Fine powder	75	30

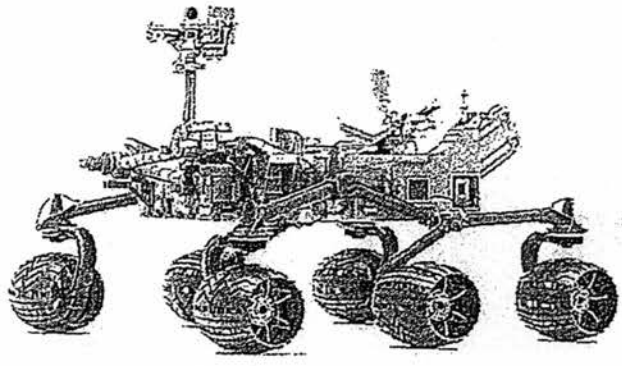
16 Which set of experiments can be used to show that solubility of **P does not** depend on the size of particles?

A **1** and **2**
B **1** and **3**
C **1** and **4**
D **2** and **3**

17 Which set of experiments can be used to show that the solubility of **P** increases with temperature?

A **1** and **2**
B **2** and **3**
C **2** and **4**
D **3** and **4**

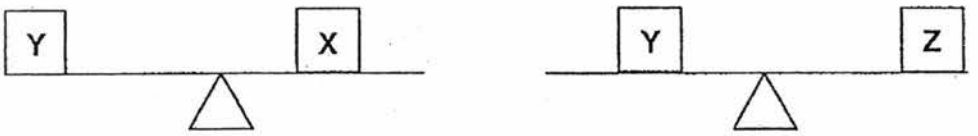
18 The diagram shows the Mars space rover. It has an estimated mass of 1060 kg.



Given that the gravity on Mars is 3.70 N/kg, what is the weight of the Mars space rover on Mars?

A 106 N
B 284.49 N
C 3922 N
D 10600 N

19 The following diagram shows wooden blocks **X**, **Y** and **Z** placed on levers.



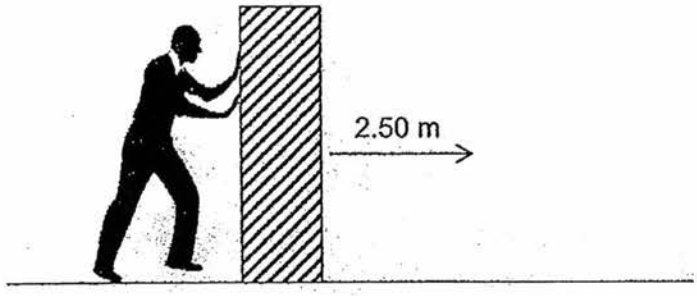
Given that all of the levers are balanced, what is the order of the mass of wooden blocks **X**, **Y** and **Z**?

	Lowest Mass	⟶	Highest Mass
A	X	Y	Z
B	X	Z	Y
C	Z	Y	X
D	Y	Z	X

20 Which one of the following objects does not possess any form of potential energy?

A A extended spring
B An AA battery
C A piece of chocolate
D A magnet placed on the ground

21 The following diagram shows a man pushing a shelf across a floor. The shelf has a mass of 8 kg. He exerts a force of 400 N.



What is the amount of work done by the man?

A 20 J
B 1000 J
C 2000 J
D 100000 J

22 Animal J has the following characteristics:

- Lay eggs
- Cold-blooded
- Breathe through lungs

What family of animals does J belong to?

A Bird
B Fish
C Mammal
D Reptile

23 Which one of the following statements is true about organisms in a food chain?

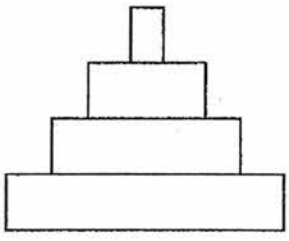
A The sun is considered a producer.
B Food chains can be very long, depending on the type of ecosystem.
C The number of organisms at each trophic level is relatively constant.
D Energy is passed down from tertiary consumers to secondary consumers.

24 The following food chain is found in a park. The number of each organism is also shown.

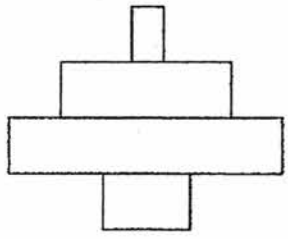
500 trees → 20 000 aphids → 6 000 beetles → 25 birds

Which one of the following pyramids of number correctly reflects this food chain?

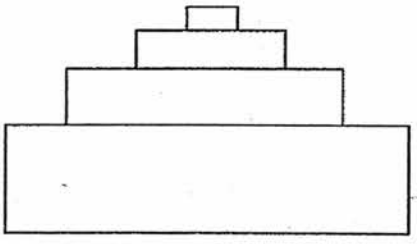
A



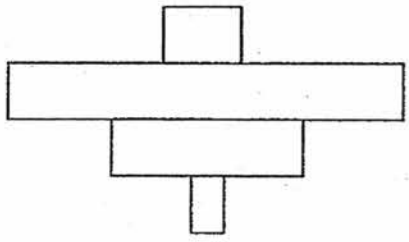
B



C



D



25 Which one of the following statements is true about respiration?

A Light energy is required for respiration.
B Water and carbon dioxide are produced.
C Food is stored in cells during respiration.
D Respiration does not take place in plants.

26 Which of the following option(s) show how organisms lose energy to the environment?

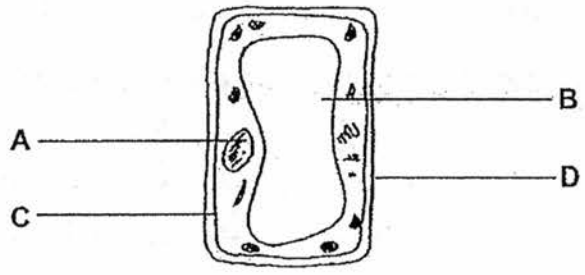
I Through sweat
II Through faeces
III Through decomposition

A I only
B III only
C I and II only
D I, II and III

27 Which one of the following statements shows a method to preserve biodiversity in our ecosystems?

A Clearing land for farming purposes
B Introducing new species of animals into the wild
C Hunting down predatory animals to protect other species
D Reduce dependence on wood and other natural materials

The following diagram shows a plant cell. Use the information in the diagram to answer questions **28** and **29**.



28 What is the function of component **C**?

A It maintains the shape of the cell.
B It contains genetic material of the plant cell.
C It controls substances entering or leaving the cell.
D It is the site where most chemical reactions take place.

29 Which component is present in the plant cell but not in an animal cell?

30 What is the function of a chloroplast in a plant cell?

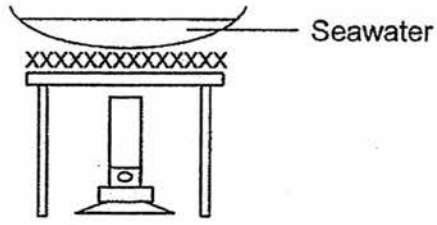
A It contains dissolved materials and water.
B It is the site where photosynthesis occurs.
C It allows all types of materials to pass through.
D It contains cellulose to give the plant its structure.

END OF SECTION A

SECTION B: [40 MARKS]

*Answer **ALL** the questions. Show your working and your answers in the space provided.*

1 A student wants to obtain some salt by evaporating seawater. The set-up for his experiment is shown in the following diagram.



(a) Explain why a non-luminous flame is more suitable for this experiment.

.....

..... [2]

(b) List the four steps involved in producing a non-luminous flame from a Bunsen burner.

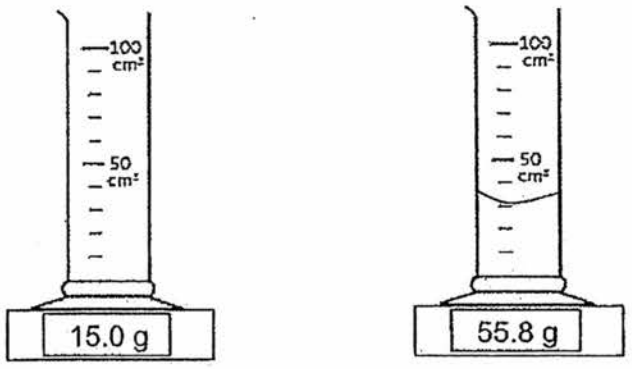
Step 1: .....

Step 2: .....

Step 3: .....

Step 4: ..... [2]

2 A source of pure water was suspected to be contaminated. A sample of the water at room temperature and pressure was obtained and investigated. The following diagram shows the measurement of the mass and volume of the water sample.



Before adding water sample After adding water sample

(a) **(i)** Calculate the mass of the water sample.

[1]

(ii) Calculate the volume of the water sample.

[1]

(iii) Hence, calculate the density of the water sample at room temperature. Leave your answer in g/cm^3.

[2]

(b) State the density of pure water at room temperature and pressure. Hence, using your answer in **(a)(iii)**, predict if the water sample is pure or contaminated.

.....

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

3 Carbon atoms naturally exist in several different forms. The normal form of carbon atom has a chemical symbol of $^{12}_{6}C$ while a radioactive form of carbon atom has a chemical symbol of $^{14}_{6}C$.

(a) State which period and group carbon belongs to.

Period: ..... **Group:** ..... **[1]**

(b) Complete the following table.

Atom	Number of Protons	Number of Neutrons	Number of Electrons
$^{12}_{6}C$			
$^{14}_{6}C$			

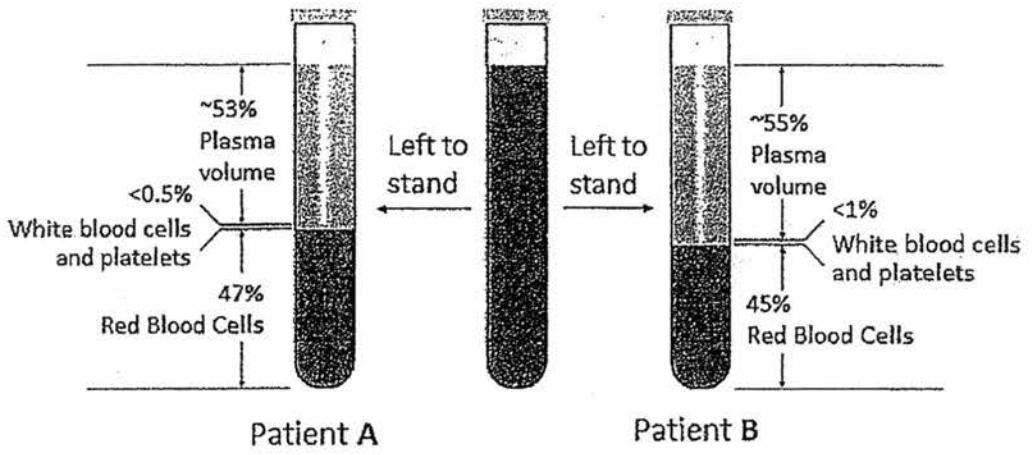
[3]

(c) Hence, state if there is any difference in the mass of one $^{12}_{6}C$ atom and one $^{14}_{6}C$ atom. Explain your answer.

.....

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

4 Human blood is an important part of the human circulatory system. It contains a mixture of red blood cells, white blood cells, blood plasma and platelets. The following diagram shows the separation of two blood samples obtained from Patient **A** and Patient **B**.



(a) Give two physical properties of blood that suggests that it is a suspension.

.....

..... [2]

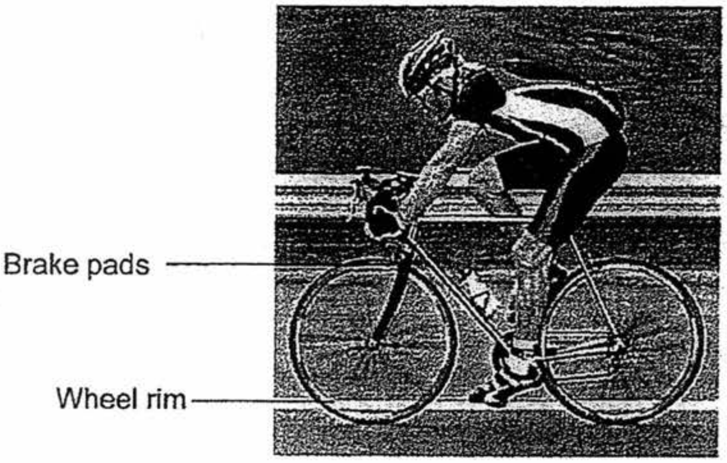
(b) State the role of red blood cells in the human body.

..... [1]

(c) Suggest a solvent that can be used to dissolve blood stains.

..... [1]

5 A bicycle has two rubber brake pads attached to both sides of each wheel. When the hand-brakes are applied, the brake pads compresses on the wheel rim, slowing down the bicycle.



(a) (i) Define friction.

.... [1]

(ii) On the diagram, draw the direction that friction is acting on when the bicycle is moving forward. [1]

(b) With reference to the brake pads of a bicycle, state one advantage and one disadvantage of friction.

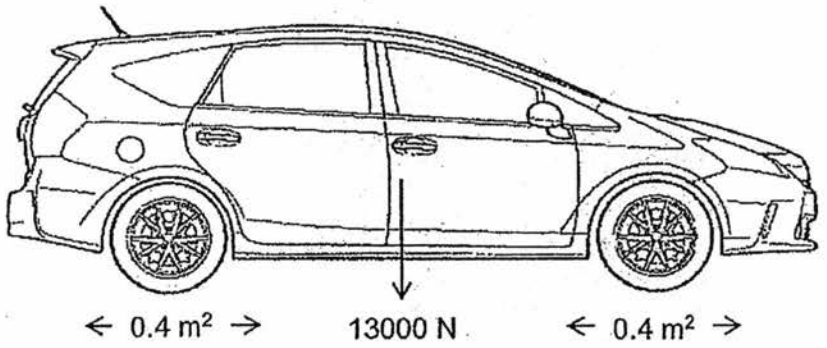
Advantage: ....

.... [1]

Disadvantage: ....

.... [1]

6 A Toyota Prius is an example of a hybrid energy car. It exerts a force of 13000 N on the ground. It has four tyres, each with a contact area of 0.4 m^2 with the ground.



(a) (i) Calculate the amount of pressure that the car exerts on the ground.

[2]

(ii) State how the pressure exerted on the ground will change when smaller tyres are used.

.....

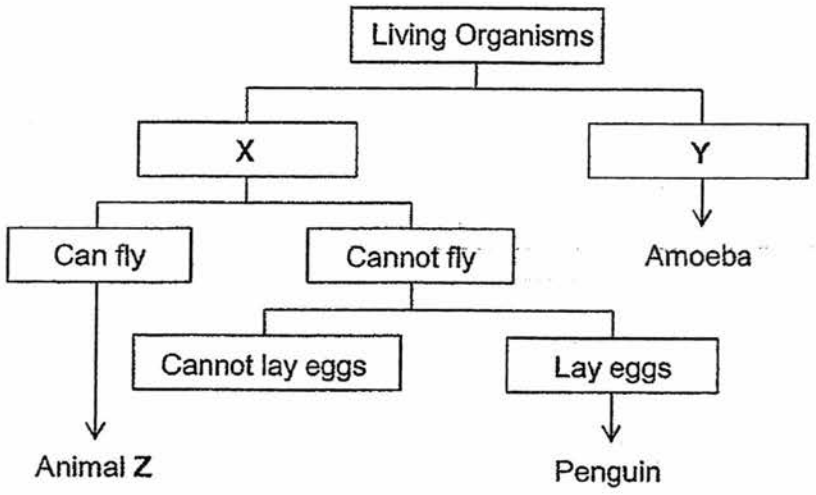
[1]

(b) Scientists have been researching on ways to reduce our dependence on fossil fuels to lessen the negative impact on the environment. Suggest a form of renewable energy that can be used to power our vehicles.

.....

[1]

7 The diagram shows a dichotomous key.



(a) **(i)** Suggest what characteristics **X** and **Y** are.

X: ..... Y: ..... [2]

(ii) Suggest what animal **Z** is.

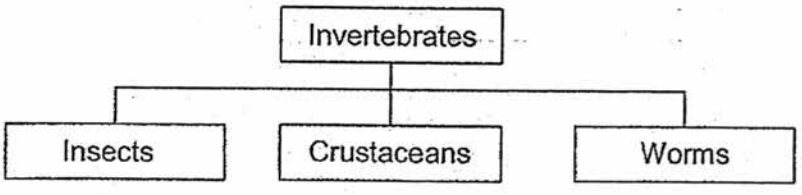
..... [1]

(b) Penguins are animals that live in the Antarctica region. List one adaptive feature of a penguin that helps it survive. Explain your answer.

.....

..... [2]

(c) In another dichotomous key, a student attempts to classify several invertebrate organisms.



State one reason why this is incorrect.

..... [1]

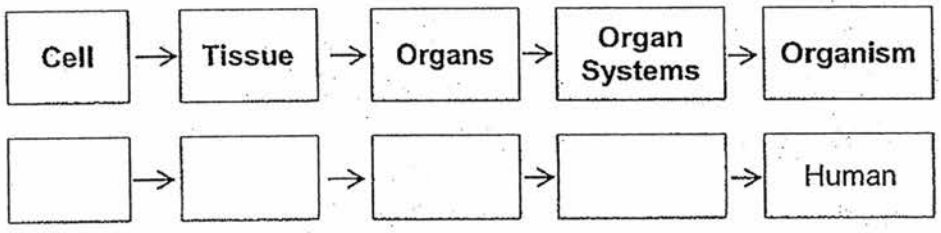
8 (a) Draw a typical animal cell. Label the organelles drawn.

[4]

(b) The human nervous system is a network of cells that helps to send messages throughout the body. It helps to coordinate our senses and our actions. The following passage contains some information about the human nervous system.

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

Based on the passage, fill in the blanks to show an example of cell organisation in the human body.



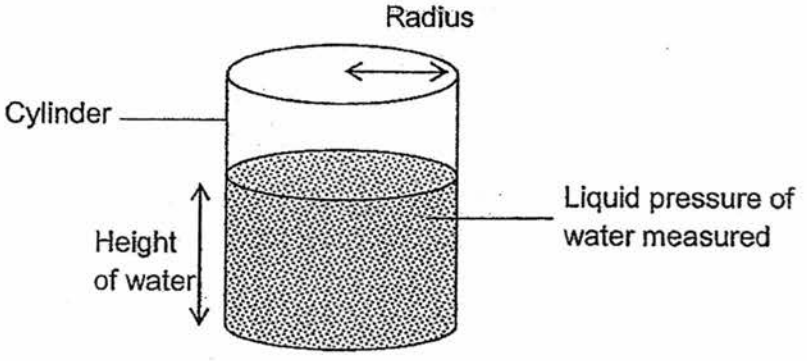
[2]

END OF SECTION B

SECTION C: [30 MARKS]

*Each question is worth **10 marks**. Answer any **THREE OUT OF FOUR** questions in this section. Write your working and answers in the writing paper provided. Start each question on a new piece of writing paper.*

1 Michael wishes to investigate the factors affecting liquid pressure. The set-up for his experiment is shown in the diagram.



Michael uses a cylinder and fills it up with water. He then measures the liquid pressure of the water at different heights. The results are recorded in the table below.

Height of water (cm)	Pressure (Pa)
15	1500
30	3000
45	4500
60	6000

(a) Define pressure. **[1]**

(b) **(i)** State the independent variable of the experiment. **[1]**

(ii) State the dependent variable of the experiment. **[1]**

(iii) Suggest two constant variables of the experiment. **[2]**

(c) Based on the experimental results, write down the conclusion of Michael's experiment on liquid pressure. **[1]**

In the next experiment, Michael uses cylinders of different radius and measures the liquid pressure. He hypothesises that the liquid pressure will increase when the radius decreases. He conducts the experiment at a constant height of 30 cm.

The results are recorded in the table below.

Radius (cm)	Pressure (Pa)
10	3000
20	3000
30	3000
40	3000

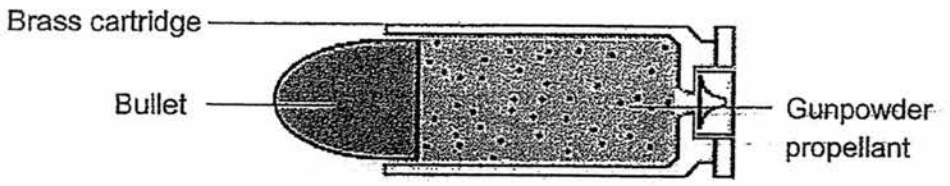
(d) Write down the conclusion of his experiment. **[1]**

Michael does not believe that his experiment results are correct. He changes the results of his experiment and submits it to his teacher.

(e) **(i)** State which scientific attitude he lacks and explain why. **[2]**

(ii) Suggest what Michael can do to check if his experiment results are correct. **[1]**

2 The Singapore Assault Rifle 21 (SAR 21) is an assault rifle used by military personnel in Singapore. The ammunition it uses is shown in the diagram.



The ammunition consists of a gunpowder propellant and a bullet, encased in a brass cartridge. When the rifle's trigger is pressed, the propellant burns and pushes the bullet forward.

(a) **(i)** State the form of energy that the gunpowder propellant contains. **[1]**

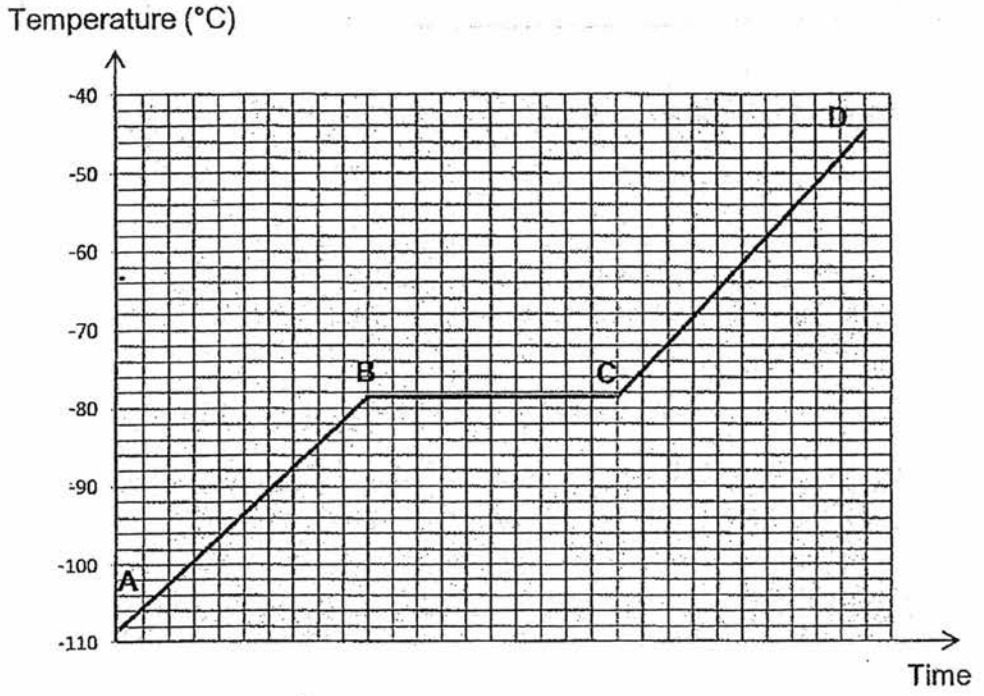
(ii) The energy stated in **(a)(i)** will be converted to other forms of energy when the bullet is fired. Identify two forms of energy it will be converted to and support your answers with evidence. **[4]**

(iii) Hence, explain why the bullet may not be able to hit a target at extremely long distances. **[1]**

(b) **(i)** The rifle is fired at a target 200 m away. The bullet strikes the target 0.26 s later. Calculate the average speed of the bullet. **[2]**

(ii) A man is standing next to the target when the rifle is fired. State whether he would first see the bullet hitting the target or hear the sound of the bullet being fired. Explain your answer. (Speed of sound = 300 m/s) **[2]**

3 Dry ice is a form of solidified carbon dioxide. At room temperature and pressure, it changes directly from a solid to a gas. The heating curve of dry ice is shown in the diagram.



(a) (i) Name the process when dry ice changes from a solid to a gas. [1]

(ii) State the physical state(s) of dry ice at stage **BC**. [1]

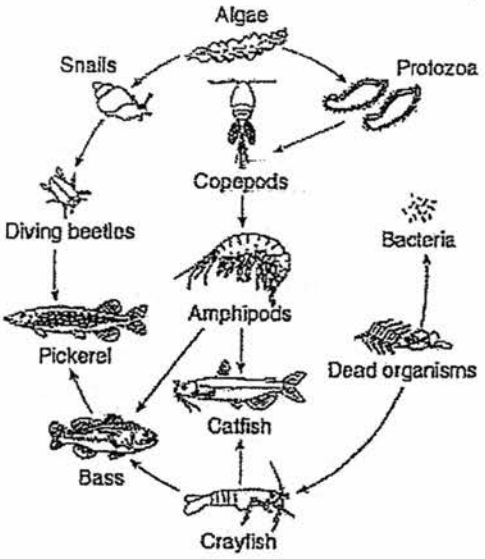
(iii) Based on the heating curve, estimate the temperature at which dry ice changes state. [1]

(b) Compare the differences, in terms of **movement of particles** and **forces of attraction,** between the particles of dry ice at stages **AB** and **CD**. [4]

(c) (i) State the chemical formula of dry ice. [1]

(ii) Hence, state **two** reasons why dry ice is considered a compound and not an element. [2]

4 The diagram shows a food web found in an ecosystem.



(a) (i) Suggest a habitat that this ecosystem exists in. [1]

(ii) Suggest **two** abiotic factors found in this ecosystem. [2]

(b) Write down a food chain consisting of **only four** organisms. [1]

(c) Given that the population of snails has 9000 J of energy, calculate the amount of energy found in the population of diving beetles. Show your working. [1]

(d) Algae can undergo photosynthesis in water. Write down the word equation for photosynthesis. [2]

(e) Explain the role of bacteria in the ecosystem. [3]

END OF PAPER

The Periodic Table of the Elements

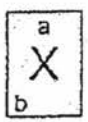
Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 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

ST. PATRICK'S SCHOOL

END OF YEAR EXAMINATIONS 2016

SUBJECT : GENERAL SCIENCE **DATE :** 10 OCTOBER 2016

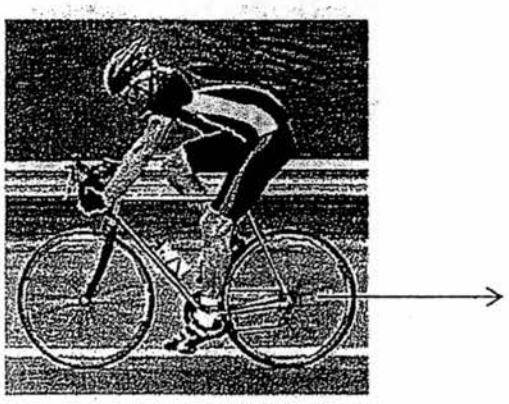
LEVEL : SECONDARY 1 EXPRESS **DURATION :** 2 HOUR

SECTION A MCQ: [30 MARKS]

1	2	3	4	5	6	7	8	9	10
C	B	D	C	B	A	C	C	A	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	D	C	C	A	A	B	C	C	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	C	B	B	D	D	C	D	B

SECTION B STRUCTURED QUESTIONS: [40 MARKS]

Qn	Answers	Total Marks
1(a)	• Produces less soot • Flame is stronger / helps to speed up evaporation process • Steady flame [1] each	[2]
(b)	1. Close air hole 2. Open gas tap 3. Use lighter to turn on flame 4. Open air hole [0.5] each Award marks for the correct order (e.g. air hole must be closed before opening gas tap)	[2]
2(a)(i)	Mass of water sample = 55.8 g – 15.0 g **[0.5]** = <u>40.8 g</u> **[0.5]** *Wrong units / no* working *deduct [0.5], maximum of [0.5]*	[1]
(ii)	Volume of water sample = <u>30 cm^3</u> **[1]** *Wrong units deduct [0.5]*	[1]

<table>
<tr><td>(ii)</td><td>  </td><td>[1]</td></tr>
<tr><td>(b)</td><td>Advantage: Allows the bicycle to <u>stop/slow down</u>. [1]

Disadvantage: Brake pads <u>wear off</u> over time. (no marks awarded if only state "heat is generated") [1]</td><td>[2]</td></tr>
<tr><td>6(a)(i)</td><td>Contact area = 4 × 0.4 m^2 [0.5]
= 1.6 m^2 [0.5]

Pressure = Force / area
= 13000 N ÷ 1.6 m^2 [0.5]
= 8125 Pa [0.5]

Deduct [0.5] for wrong units</td><td>[2]</td></tr>
<tr><td>(ii)</td><td>The pressure exerted on the ground <u>increases</u>.</td><td>[1]</td></tr>
<tr><td>(b)</td><td>Biofuels / solar energy / hydrogen fuel cell</td><td>[1]</td></tr>
<tr><td>7(a)(i)</td><td>X: Multicellular / can be seen without using a microscope
Y: Unicellular / seen only using a microscope

Award [1] each</td><td>[2]</td></tr>
<tr><td>(ii)</td><td>Any flying animal</td><td>[1]</td></tr>
<tr><td>(b)</td><td>Any one of the following features:

<table><tr><th>Adaptive feature [1]</th><th>Reason [1]</th></tr><tr><td>Thick layer of fat/blubber</td><td>Keep warm</td></tr><tr><td>Streamlined body</td><td>To swim in the ocean</td></tr><tr><td>Dark colours</td><td>Help them absorb heat from sun</td></tr><tr><td>Waterproof feathers</td><td>To help it swim and keep warm</td></tr><tr><td>Webbed feet</td><td>To swim in the ocean</td></tr></table>
Reason should be linked to adaptive feature to be awarded [1]</td><td>[2]</td></tr>
</table>

<table>
<tr><td>(d)</td><td>The radius of the cylinder <u>does not affect / change</u> the liquid pressure.
Or
Liquid pressure <u>remains constant at different radius.</u></td><td>[1]</td></tr>
<tr><td>(e)(i)</td><td>Any one of the following:
<table><tr><th>Scientific attribute [1]</th><th>Explanation [1]</th></tr><tr><td>Integrity / honesty</td><td>Changed his results before submission</td></tr><tr><td>Perseverance (do not accept objectivity)</td><td>Did not redo or check through his experiment again</td></tr></table>Reason should be linked to scientific attribute for [1]</td><td>[2]</td></tr>
<tr><td>(ii)</td><td>Any of the following:
• He can repeat the experiment.
• He can repeat the experiment using a different type of liquid / different height</td><td>[1]</td></tr>
<tr><td>2(a)(i)</td><td>Chemical potential energy (award [0.5] for potential energy)</td><td>[1]</td></tr>
<tr><td>(ii)</td><td>Any two of the following:
<table><tr><th>Energy [1]</th><th>Reasoning [1]</th></tr><tr><td>Kinetic energy</td><td>Bullet is moving at great speeds</td></tr><tr><td>Heat energy</td><td>Heat is produced when the gunpowder burns / friction of bullet travelling in air</td></tr><tr><td>Sound energy</td><td>A loud bang is produced / an explosion is heard</td></tr></table>Reason should be linked to energy type for [1]</td><td>[4]</td></tr>
<tr><td>(iii)</td><td>Kinetic energy of the bullet is <u>converted to other forms</u> as it travels.</td><td>[1]</td></tr>
<tr><td>(b)(i)</td><td>Speed = Distance / Time
= 200 m ÷ 0.26 s [1]
= <u>769 m/s</u> [1]

Deduct [0.5] for wrong units/ not 3.s.f</td><td>[2]</td></tr>
<tr><td>(ii)</td><td>He will see the target being struck first. [1]

That is because the speed of the bullet is faster than the speed of sound [1].

Note: Award full ECF mark based on (b)(i) for correct deduction and reasoning</td><td>[2]</td></tr>
</table>

(d)	Carbon dioxide + Water $\xrightarrow[\text{Light energy}]{\text{Chlorophyll}}$ Glucose + Oxygen *Correct reactants and products – **[1]*** *Correct conditions (light energy and chlorophyll) – **[1]*** *Equal sign instead of arrow deduct **[1]***	**[2]**
(e)	• Bacteria are <u>decomposers</u> **[1]** • They help to <u>break down</u> dead organisms **[0.5]** into <u>carbon dioxide, energy and mineral salts</u> **[0.5].** • These substances are <u>absorbed again by plants / transfer energy back to their organisms</u> **[1]**	**[3]**

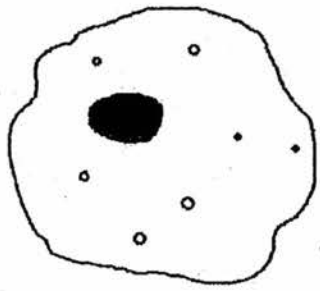
<table>
<tr><td>(iii)</td><td>Density = 40.8 g ÷ 30 cm^3 [1]
= 1.36 g/cm^3 [1]

Wrong units / no working deduct [0.5], maximum of [0.5]
ECF from part (i) and (ii), award full marks</td><td>[2]</td></tr>
<tr><td>(b)</td><td>Pure water has a density of 1 g/cm^3. [1]
Wrong or no units deduct [0.5]
The water sample is contaminated. [1]</td><td>[2]</td></tr>
<tr><td>3(a)</td><td>Period 2, Group 4/IV

Both must be present, no [0.5] awarded</td><td>[1]</td></tr>
<tr><td>(b)</td><td><table><tr><th>Atom</th><th>Number of Protons</th><th>Number of Neutrons</th><th>Number of Electrons</th></tr><tr><td>$^{12}_{6}C$</td><td>6</td><td>6</td><td>6</td></tr><tr><td>$^{14}_{6}C$</td><td>6</td><td>8</td><td>6</td></tr></table>[0.5] for each blank</td><td>[3]</td></tr>
<tr><td>(c)</td><td><u>Yes, there is a difference</u> in the mass of the two atoms. [1]

There is a <u>difference in their mass number</u> or <u>^{14}C has two more neutrons.</u> [1]

Reason to be tagged with conclusion for [1]</td><td>[2]</td></tr>
<tr><td>4(a)</td><td>Any two properties, [1] each:
• Components of blood settle out over time
• Blood appears cloudy
• Components can be separated using filtration / centrifugation / physical methods
• Components of blood are not in a fixed/variable ratio
• Non-homogenous mixture</td><td>[2]</td></tr>
<tr><td>(b)</td><td>Helps to transport oxygen in the human body
Do not accept transport food/water/nutrients</td><td>[1]</td></tr>
<tr><td>(c)</td><td>Sodium chloride solution / alcohol / detergent/ bleach / hydrogen peroxide</td><td>[1]</td></tr>
<tr><td>5(a)(i)</td><td>Friction is a force that <u>opposes motion.</u></td><td>[1]</td></tr>
</table>

(c)	A dichotomous key should not have three branches / should only have two branches at each level.	[1]
8(a)	Drawing **[0.5]** + Labels **[0.5]** of the four features: • Cell membrane • Nucleus • Cytoplasm • Vacuole (should have a few small vacuoles, smaller than the nucleus)  *Any plant organelle deduct [1]*	[4]
(b)	Nerve cell /neuron → Grey / white matter → Brain/spinal cord/ bones → Nervous system → Human **[0.5]** for each blank	[2]

SECTION C FREE RESPONSE QUESTIONS: [40 MARKS]

Qn	Answers	Total Marks
1(a)	Pressure is the amount of force acting perpendicularly per unit area.	[1]
(b)(i)	Height of water	[1]
(ii)	Pressure of water	[1]
(iii)	• Surface area / radius / shape / size of cylinder • Type of liquid / temperature of liquid	[2]
(c)	The greater the height of the liquid, the greater the liquid pressure. Or The lower the height of the liquid, the lower the liquid pressure.	[1]

<table>
<tr><td>3(a)(i)</td><td>Sublimation</td><td>[1]</td></tr>
<tr><td>(ii)</td><td>Solid + gas</td><td>[1]</td></tr>
<tr><td>(iii)</td><td>Any number from −78 °C to −80 °C (but excluding −78 °C and −80 °C)</td><td>[1]</td></tr>
<tr><td>(b)</td><td><table>
<tr><th>Point</th><th>Movement of Particles</th><th>Forces of Attraction</th></tr>
<tr><td>AB</td><td><u>Vibrating at fixed spot</u> (both points must be present [1])</td><td>Strong forces of attraction [1]</td></tr>
<tr><td>CD</td><td>Moving in random directions [0.5] at high speeds [0.5]</td><td>Weak forces of attraction [1]</td></tr>
</table></td><td>[4]</td></tr>
<tr><td>(c)(i)</td><td>CO_2</td><td>[1]</td></tr>
<tr><td>(ii)</td><td>Any two of the following: [1] each
• Dry ice consists of two different elements in a fixed ratio.
• Dry ice cannot be broken down to simpler substances using physical methods.
• Its properties are different from its constituent elements of carbon and oxygen.</td><td>[2]</td></tr>
<tr><td>4(a)(i)</td><td>Pond / sea / lake (any water-based environment)</td><td>[1]</td></tr>
<tr><td>(ii)</td><td>Any two of the following factors: [1] each
• pH of water
• Temperature of water
• Amount of sunlight
• Salinity of water
• Amount of dissolved air/oxygen</td><td>[2]</td></tr>
<tr><td>(b)</td><td>Algae → Snail → Diving beetles → Pickerel</td><td>[1]</td></tr>
<tr><td>(c)</td><td>Energy passed from snails to diving beetles = 10 % × 9000 J
= <u>900 J</u> [1]

Deduct [0.5] if no working shown/no units</td><td>[1]</td></tr>
</table>