North Sydney Boys High School

Science Faculty

Year 9

Assessment 4 - End of Year Exam

General Instructions: **Reading time – 5 minutes** **Working time – 1 hours and 30 minutes** • Write using black or blue pen • Draw diagrams using pencil • NESA approved calculators may be used • This paper has two parts • Write your student number at the top of every page		***Total Marks - 60*** **Part A: Multiple Choice** • 20 questions • 20 marks **Part B: Written Response** • 9 questions • 40 marks
Assessment Weighting: 30% total weighting • 20% Knowledge and Understanding • 10% Working Scientifically		***Outcomes Assessed:*** The following outcomes may be assessed in this examination: • Knowledge and Understanding - 10PW, 11PW, 12ES, 13ES, 14LW, 15LW, 16CW, 17CW. • Working Scientifically - 4WS, 5WS, 6WS, 7WS, 8WS, 9WS.

This paper MUST NOT BE REMOVED from the examination room

KU - Part A / 20	
Part B / 40	
KU Q22-27	**/20**
WS Q21, 28,29	**/20**
Total Mark / 60	

Student Number: _____

North Sydney Boys High School

Science Faculty

MULTIPLE CHOICE ANSWER SHEET

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

Student Number: _____

Part A – Multiple Choice (20 marks):
Attempt questions 1 - 20
Allow about 30 minutes for this section.

Use the answer grid to record your answer. Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Question 1

Which of the following makes up the body's second line of defence

(A) T and B lymphocytes

(B) skin, mucous membrane, urine, tears, cilia, chemical barriers

(C) inflammatory response, phagocytes and phagocytosis

(D) none of the above.

Question 2

What causes sea-floor spreading and continental drift?

(A) Varying sea levels

(B) Convection currents in the mantle

(C) Changes in Earth's magnetic field

(D) Contraction of the crust as Earth cools

Question 3

Which of the following options contains compounds ONLY?

(A) water (H_2O), glucose ($C_6H_{12}O_6$) and carbon dioxide (CO_2)

(B) tungsten (W), phosphorus (P) and chlorine (Cl_2)

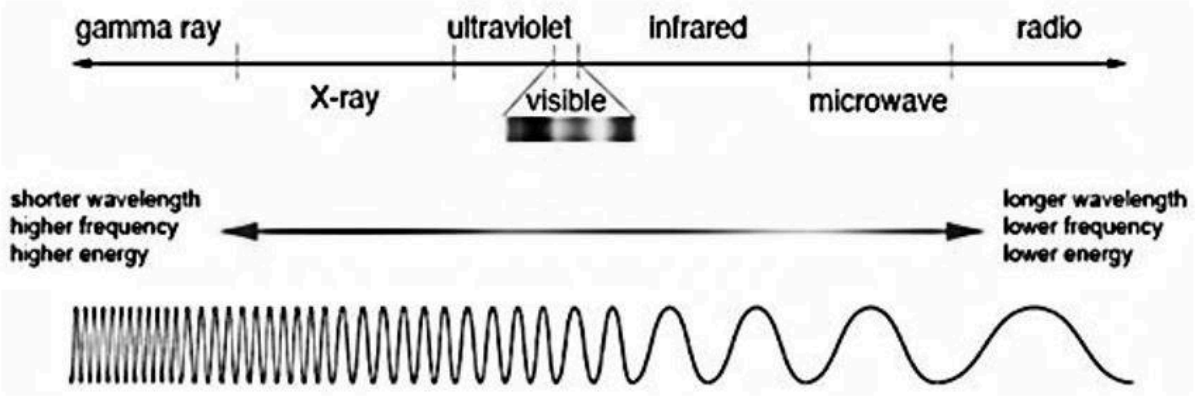
(C) Vegemite, limewater ($Ca(OH)_2$) and plutonium (Pu)

(D) salt (NaCl), air and iron (Fe)

Student Number: _____

Question 4

The diagram shows data about the electromagnetic spectrum.



Which statement about the components of the spectrum is correct?

(A) The lower the frequency, the longer the wavelength

(B) The longer the wavelength, the more energy the waves carry

(C) The lower the frequency, the more energy the waves carry

(D) The higher the frequency, the lower the energy the waves carry

Question 5

Rhizobacterium spp is an organism that lives in the soil and is responsible for converting atmospheric nitrogen into a usable form for plants.

Rhizobacterium spp would be part of which of the following?

(A) Atmosphere

(B) Asthenosphere

(C) Lithosphere

(D) Hydrosphere

Student Number: _____

Question 6

Which is the best explanation of the greenhouse effect?

(A) A decrease in carbon dioxide in the atmosphere traps more heat and allows more ultraviolet radiation to reach Earth's surface.

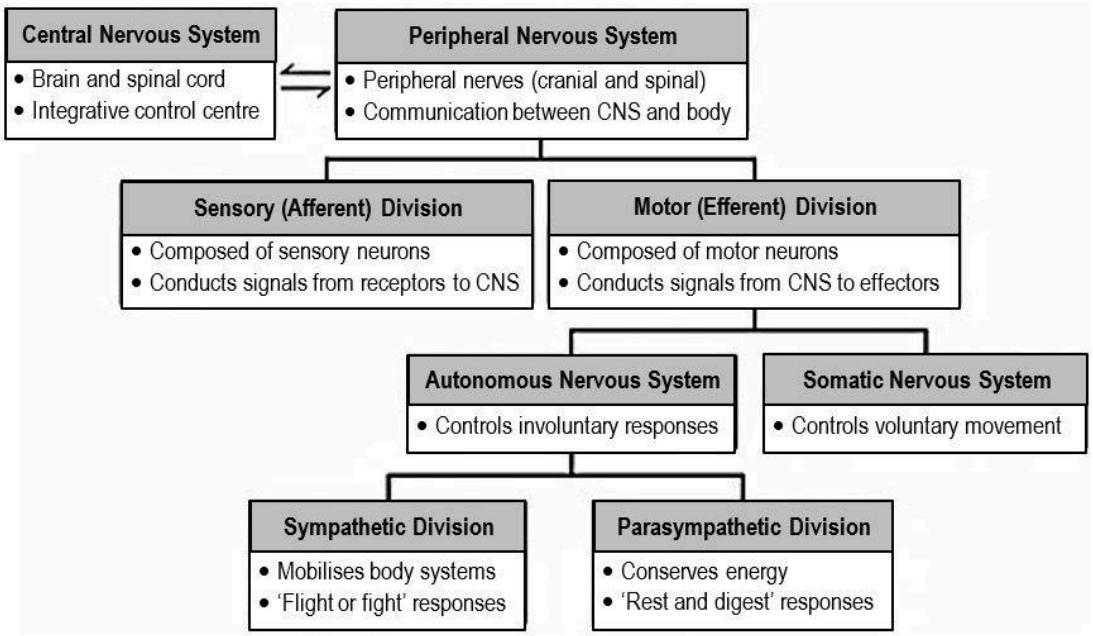
(B) An increase in the ozone layer decreases the amount of ultraviolet radiation that reaches Earth's surface.

(C) A decrease in the ozone layer allows more radiation to reach Earth's surface.

(D) An increase in carbon dioxide in the atmosphere traps more heat radiation from Earth.

Question 7

The diagram below groups the different parts of the human nervous system.



According to this diagram, which part of the nervous system directly controls your actions when you reach out and pick up your pencil?

(A) The sensory nervous system

(B) The motor division

(C) The autonomic nervous system

(D) The somatic nervous system

Student Number: _____

Question 8

Which of the following statements about waves is correct?

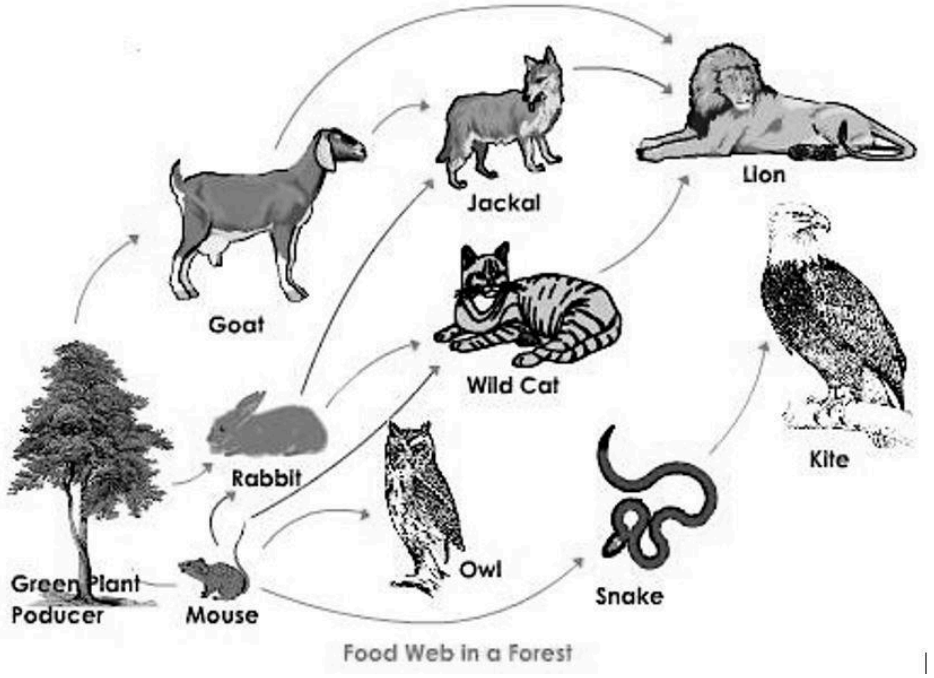
(A) All waves transfer matter

(B) All waves transfer energy

(C) Only electromagnetic waves transfer energy

(D) Only sound waves transfer energy

Question 9



In the food web above, what would happen if the mouse population became extinct?

(A) The goat population would become extinct.

(B) The lion population would become extinct.

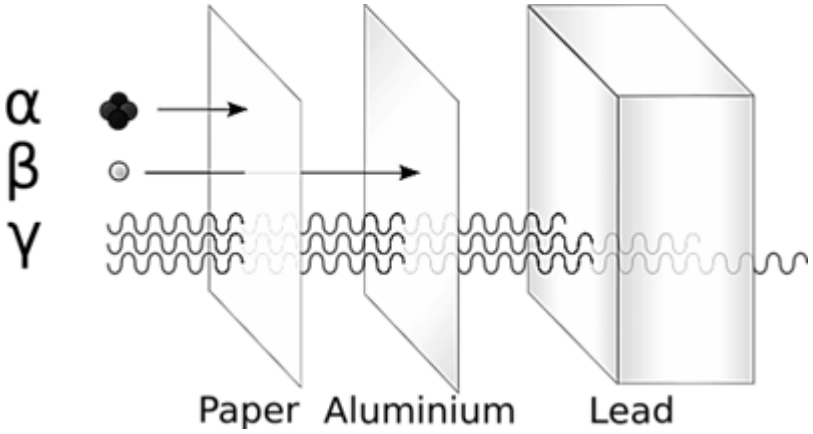
(C) The jackal population would become extinct.

(D) The kite population would become extinct.

Student Number: _____

Question 10

Consider the diagram, which shows information about three types of radiation from a radioactive substance.



Which statement about radiation is correct?

(A) Alpha radiation is the most dangerous because it has larger particles

(B) Beta radiation is quite safe because it cannot penetrate aluminium

(C) Gamma radiation will be least dangerous because it will go straight through our bodies

(D) Gamma radiation is more dangerous to humans because it has a high ability to penetrate

Question 11

Which of the following is an example of negative feedback in the human body?

(A) If you are cold, the body reacts by increasing core temperature.

(B) If we have a fever, the body reacts by increasing our temperature.

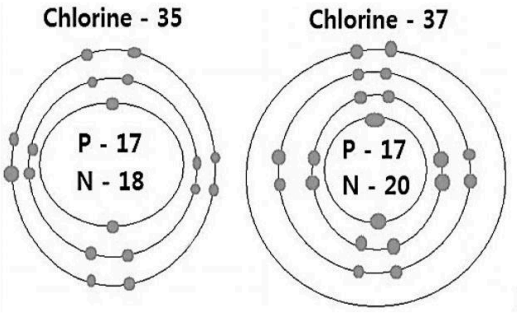
(C) When you cut yourself the body reacts by producing more platelets to clot the blood.

(D) When we eat, the stomach starts to produce digestive chemicals.

Student Number: _____

Question 12

The diagram shows the two main **isotopes** of chlorine.



What feature makes both of the above an isotope of chlorine?

(A) They have the same number of neutrons in the nucleus.

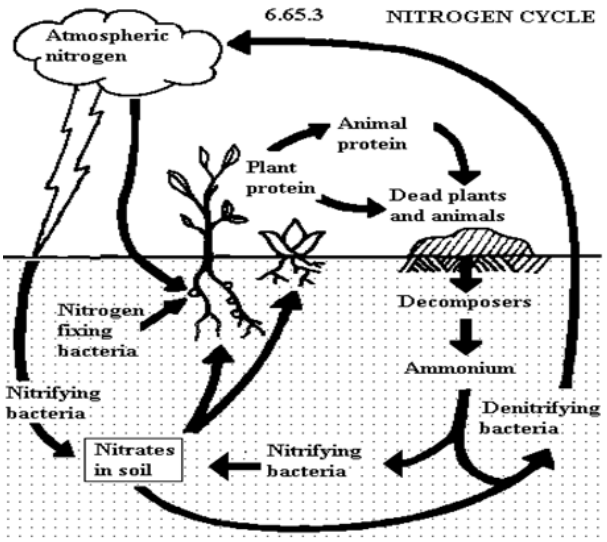
(B) They have the same number of protons in the nucleus.

(C) They have the same number of electrons in orbit.

(D) They have the same total number of protons and electrons.

Question 13

Energy and materials are cycled through our ecosystem. Below is a diagram showing how nitrogen is cycled through our ecosystem



What is the role of nitrifying bacteria?

(A) To release nitrogen into the atmosphere

(B) To fix nitrogen from the atmosphere into the soil

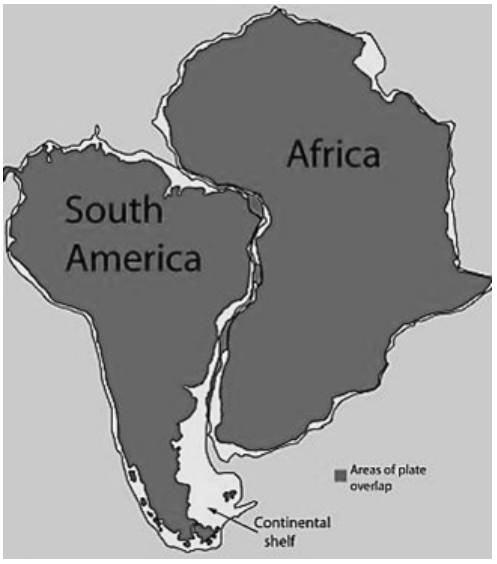
(C) To convert ammonium into nitrates in the soil

(D) Both (B) and (C)

Student Number: _____

Question 14

The edges of some continents appear to fit together like pieces of a jigsaw puzzle. For example, South America and Africa are shown.



What do scientists consider this "jigsaw" fitting of continents to be evidence for?

(A) Continental drift

(B) Pangea

(C) Plate tectonics

(D) All of the above

Question 15

Coordination in humans is controlled by the nervous and endocrine systems. Which of the following statements about these systems is correct?

(A) They both act at the same speed.

(B) They always act independently.

(C) They may interact to produce a response.

(D) They both use chemicals carried in the blood.

Student Number: _____

Question 16

Which of the following lists contains forms of electromagnetic radiation ONLY?

(A) Infrared, sound, ultraviolet

(B) Sound, x-rays, gamma rays

(C) Infrared, seismic, microwaves

(D) Gamma rays, ultraviolet, x-rays

Question 17

In a sound wave changing the amplitude and the frequency will affect the sound. If the amplitude is increased and the frequency is decreased, the resultant sound will have

(A) Increased volume and higher pitch

(B) Increased volume and lower pitch.

(C) Decreased volume and higher pitch

(D) Decreased volume and lower pitch

Question 18

Infectious diseases are caused by microorganisms which invade the body's tissues. An example of an infectious disease is

(A) Coronary heart disease.

(B) Lung cancer.

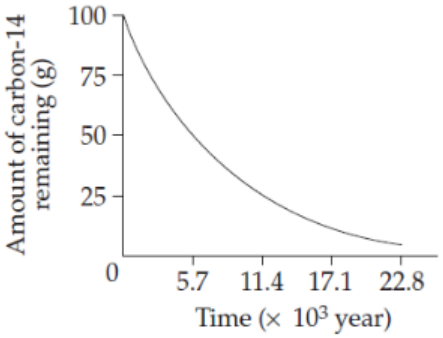
(C) Diabetes.

(D) Influenza.

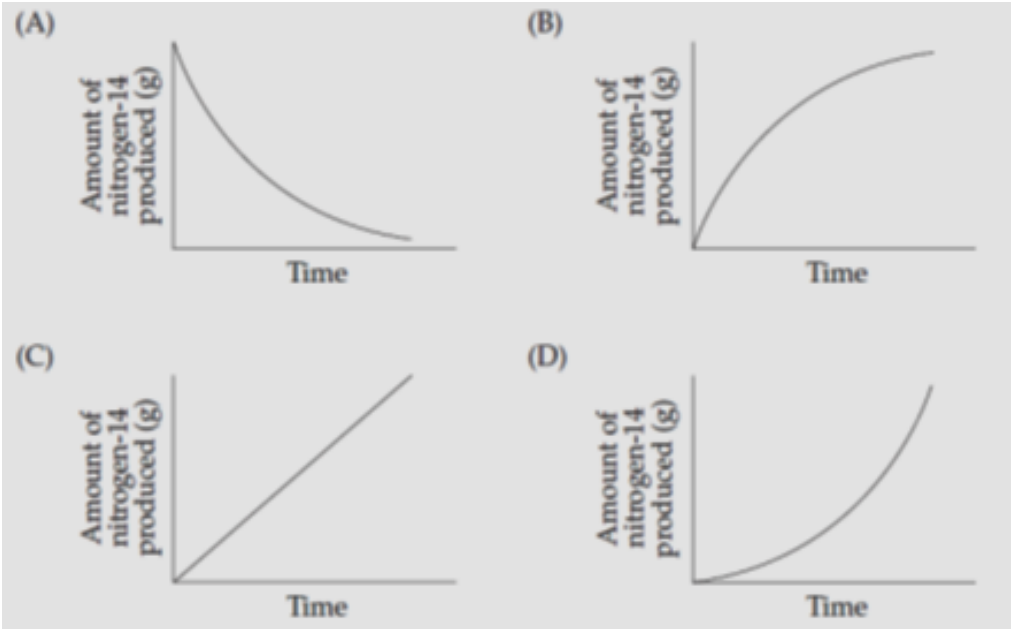
Student Number: _____

Question 19

When carbon-14 undergoes radioactive decay, it forms nitrogen-14. The graph below shows the amount of carbon-14 remaining over time. At time = 0, there was no nitrogen-14 present.



Which graph shows the amount of nitrogen-14 produced over the same period?



Question 20

Which of the following compounds contains covalent bonding?

(A) sodium chloride (NaCl)

(B) methane(CH_4)

(C) potassium chloride(KCl)

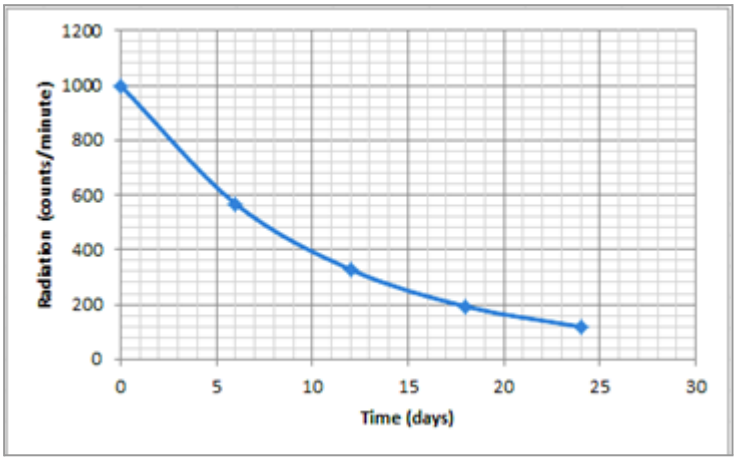
(D) Aluminium nitride AlN)

Student Number: _____

Part B – Written Response (40 marks):
Attempt questions 21 - 29.
Allow about 60 minutes for this section.

Question 21 (5 marks)

Below is a graph showing the amount of radiation given off by isotope X over time.



(a) From the graph, using extrapolation, predict the radiation counts/minute from the sample of X on day 28. Show the extrapolation on the graph. **2**

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Smoke detectors use Americium-241 which is a source of alpha radiation. Smoke will prevent the alpha particles from reaching the detector and the sensor detects a drop in radiation. This drop in radiation sets off the alarm.

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(b) Assuming that isotope X emits alpha radiation, could it be used in a smoke detector? Explain why or why not?

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Student Number: _____

Question 22 (5 marks)

Iodine is an important element both for healthy humans and the chemical industry. The thyroid gland in our necks uses iodine to make a hormone called thyroxine. The blood carries thyroxine to all parts of our bodies.
Thyroxine affects the way our cells work. Adults can become unwell through a lack of iodine in their diet. Iodine can come from the soil but richer sources of iodine are seafood and dairy products. Also some brands of table salt have iodine added to them.
The main source of iodine in the chemical industry is sea water. Iodine can be manufactured by reacting chlorine gas with sodium iodide (the salt) from sea water.

(a) Iodine deficiency is an example of a non-infectious disease. Why is iodine deficiency classified as non-infectious? **1**

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(b) Scientists have identified a lack of iodine in the diet of many Australians. Propose a possible cause of a lack of iodine in their diet. **1**

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(c) Explain how a healthy human body maintains a constant blood glucose level after eating a chocolate bar. **3**

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Question 23 (4 marks)

Complete and balance the following chemical equations using the correct chemical formulas:

(a) magnesium burns in oxygen

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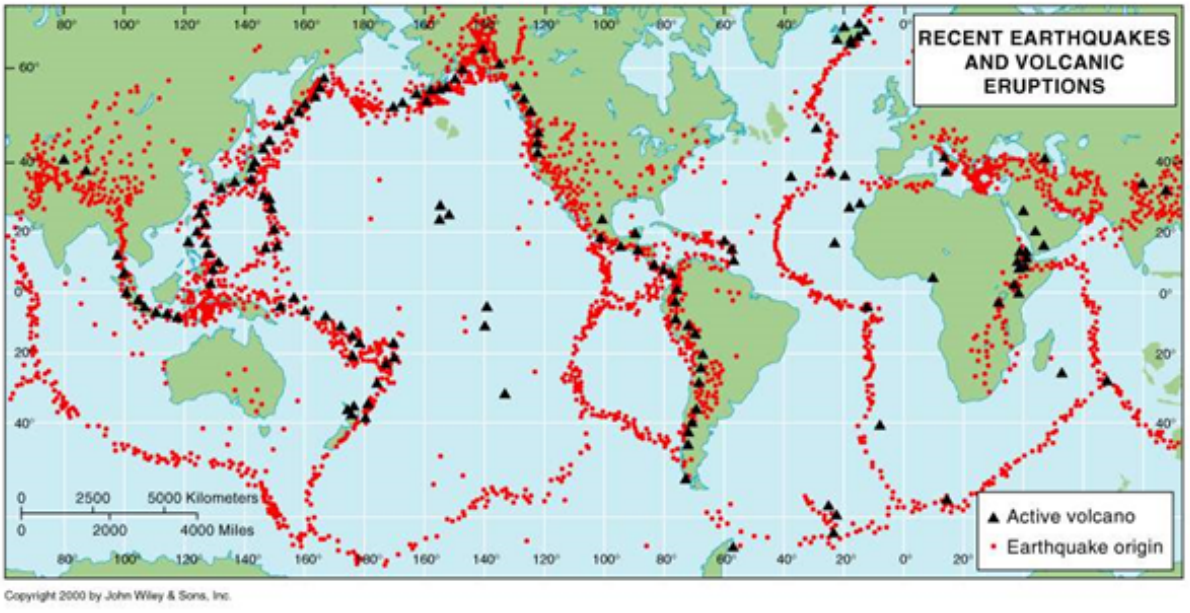
(b) hydrogen combines with oxygen to form water

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Question 24 (3 marks)

Below is a map of the locations of all the earthquakes and volcanic eruptions that have occurred in the last 100 years.



Copyright 2000 by John Wiley & Sons, Inc.

(a) Using this map, explain why there are no active volcanoes in Australia

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(b) Harry Hess proposed a theory that the movement of the continents was caused by seafloor spreading. Name two pieces of evidence to support Hess's theory.

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Question 25 (3 marks)

Refer to the periodic table of the elements shown below.

(a) Using a pen or pencil, clearly outline the following sections on the table:

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- Metals
- Non-metals
- Metalloids

(b) Name the classification given to the elements in the first 2 groups and the last 2 groups.

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(c) Which term is given to the outermost electrons in an atom?

1

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PERIODIC TABLE OF THE ELEMENTS

KEY

Atomic Number 79
Symbol Au
Standard Atomic Weight 197.0
Name Gold

1 H 1.008 Hydrogen																	2 He 4.003 Helium
3 Li 6.941 Lithium	4 Be 9.012 Beryllium											5 B 10.81 Boron	6 C 12.01 Carbon	7 N 14.01 Nitrogen	8 O 16.00 Oxygen	9 F 19.00 Fluorine	10 Ne 20.18 Neon
11 Na 22.99 Sodium	12 Mg 24.31 Magnesium											13 Al 26.98 Aluminium	14 Si 28.09 Silicon	15 P 30.97 Phosphorus	16 S 32.07 Sulfur	17 Cl 35.45 Chlorine	18 Ar 39.95 Argon
19 K 39.10 Potassium	20 Ca 40.08 Calcium	21 Sc 44.96 Scandium	22 Ti 47.87 Titanium	23 V 50.94 Vanadium	24 Cr 52.00 Chromium	25 Mn 54.94 Manganese	26 Fe 55.85 Iron	27 Co 58.93 Cobalt	28 Ni 58.69 Nickel	29 Cu 63.55 Copper	30 Zn 65.38 Zinc	31 Ga 69.72 Gallium	32 Ge 72.64 Germanium	33 As 74.92 Arsenic	34 Se 78.96 Selenium	35 Br 79.90 Bromine	36 Kr 83.80 Krypton
37 Rb 85.47 Rubidium	38 Sr 87.61 Strontium	39 Y 88.91 Yttrium	40 Zr 91.22 Zirconium	41 Nb 92.91 Niobium	42 Mo 95.96 Molybdenum	43 Tc Technetium	44 Ru 101.1 Ruthenium	45 Rh 102.9 Rhodium	46 Pd 106.4 Palladium	47 Ag 107.9 Silver	48 Cd 112.4 Cadmium	49 In 114.8 Indium	50 Sn 118.7 Tin	51 Sb 121.8 Antimony	52 Te 127.6 Tellurium	53 I 126.9 Iodine	54 Xe 131.3 Xenon
55 Cs 132.9 Caesium	56 Ba 137.3 Barium	57–71 Lanthanoids	72 Hf 178.5 Hafnium	73 Ta 180.9 Tantalum	74 W 183.9 Tungsten	75 Re 186.2 Rhenium	76 Os 190.2 Osmium	77 Ir 192.2 Iridium	78 Pt 195.1 Platinum	79 Au 197.0 Gold	80 Hg 200.6 Mercury	81 Tl 204.4 Thallium	82 Pb 207.2 Lead	83 Bi 209.0 Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89–103 Actinoids	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

Lanthanoids

57 La 138.9 Lanthanum	58 Ce 140.1 Cerium	59 Pr 140.9 Praseodymium	60 Nd 144.2 Neodymium	61 Pm Promethium	62 Sm 150.4 Samarium	63 Eu 152.0 Europium	64 Gd 157.3 Gadolinium	65 Tb 158.9 Terbium	66 Dy 162.5 Dysprosium	67 Ho 164.9 Holmium	68 Er 167.3 Erbium	69 Tm 168.9 Thulium	70 Yb 173.1 Ytterbium	71 Lu 175.0 Lutetium

Actinoids

89 Ac Actinium	90 Th 232.0 Thorium	91 Pa 231.0 Protactinium	92 U 238.0 Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

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Question 26 (5 marks)

(a) All electromagnetic waves travel at the speed of light (3×10^8 ms^{-1}). The radio station Nova 96.6 broadcasts at a frequency of 9.66×10^7 Hz. Using the formula $v = f\lambda$, find the wavelength of this radio wave. Show your working. **2**

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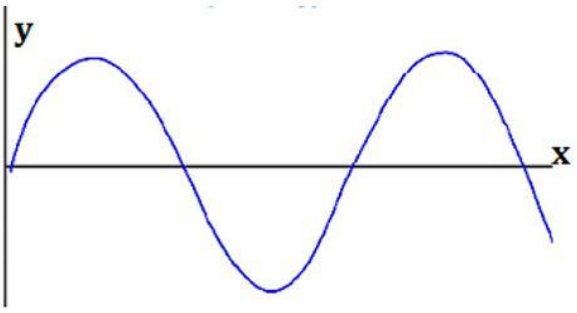
(b) The two diagrams below represent two waves.

Label the diagram below to identify the following terms:

- Wavelength (on both)
- Amplitude
- Peak/crest
- Trough

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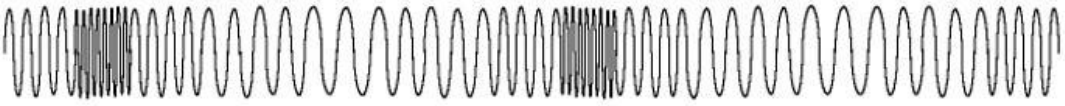
Student Number: _____



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(c) Label the diagram below to identify the following terms:

· Compression · Rarefaction



Question 27 (3 marks)

(a) On this diagram clearly label TWO main parts of the central nervous system. **2**



Student Number: _____

(b) The skier sees an obstacle in the way and decides to change direction. Describe the path of the message through the nervous system which allows this response to occur.

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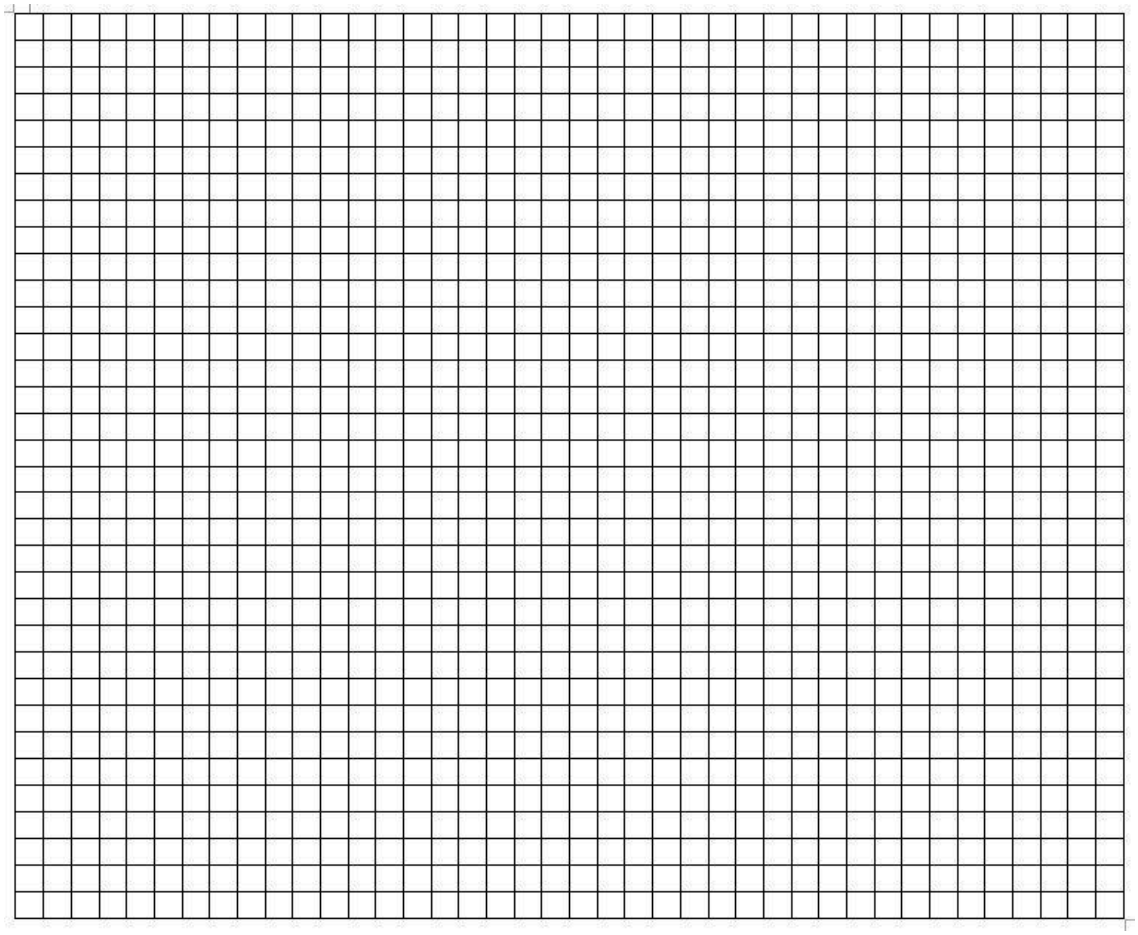
Question 28 (8 marks) **5**

Loudness of sound is measured in decibels (dB). For every 10dB increase in loudness, the intensity of a sound increases tenfold (ten times). An audiogram is a graph showing the minimum loudness of sounds at certain frequencies for a particular person to hear them. The table below gives a sound loudness (dB) vs sound frequency (Hz) for the left and right ear for a person.

Left Ear		**Right Ear**	
Sound frequency (Hz)	Sound loudness (dB)	Sound frequency (Hz)	Sound loudness (dB)
250	20	250	15
500	15	500	20
900	30	900	25
1300	40	1300	30
2000	50	2000	38
3000	60	3000	50
3500	70	3500	70
4000	80	4000	60
5000	65	5000	50

Student Number: _____

(a) Draw a graphical representation of the audiogram for this person showing left and right ear separately on the same axes.



2

1

Hearing loss is considered to have occurred when a sound within the normal hearing frequency range is not detected at a loudness of 20dB

(b) From the graph and data given, which ear has the greater hearing loss at 500Hz and which ear has the greater hearing loss at 800Hz?

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(c) How many times louder than 20dB does a sound of frequency 4000Hz have to be for this person to hear it with the right ear?

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Question 29 (4 marks)

Student Number: _____

During your course this year you learned about patterns of properties in the periodic table and how elements varied.

Design an experiment to compare the properties of metals and non-metals using an electric current.

You must include the following:

- Aim
- Hypothesis
- Variables
- Equipment list
- Method

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End of Exam

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