Year 9 Science

Semester One Examination - 2008

TIME ALLOWED
15 MINUTES READING
1 HOUR AND 15 MINUTES WRITING

Instructions to candidates:

1) Do not write or mark the examination script in any way during reading time.

2) Please check that, aside from this test booklet, you also have a multiple choice answer sheet.

3) There are 13 pages in this booklet including this one. Please check to ensure that this is so.

4) Note that the time allocated for the common test is 75 minutes and that 75 marks have been allocated: this should give you a guide as to how much time you should spend on each section.

5) There are 4 sections in this booklet: multiple choice, true/false, definitions and extended questions. Check the marks allocated to each section to work out how many minutes you should spend on each.

6) **Only a scientific calculator may be used. Graphic calculators or dictionaries must not be used.**

7) If you finish early please do not waste your time: you only get examination time once so it should not be wasted. Check your work thoroughly: calculations, grammar and spelling. Re-read the questions and check your answers to ensure that you have actually answered the questions asked.

8) When the signal to write is given fill in your name, teacher and form details on this booklet (below) **and** on the multiple choice answer sheet before you begin answering any questions.

Name.....

Form.....

Teacher.....

Section 1: Multiple Choice

Write your selections on the answer sheet supplied. Please place the answer sheet in this booklet when you hand in this exam. This section is worth 25 marks.

1. The first step of the scientific method involves:
A. forming a hypothesis.
B. making observations.
C. performing an experiment.
D. predicting the result of an experiment.

2. Which of the following is most correct?
A. You can accept or reject a hypothesis, but never prove it to be true.
B. You can prove a hypothesis to be true.
C. Accepting or rejecting a hypothesis is the same as proving whether or not the hypothesis is true.
D. You can prove a hypothesis to be false.

3. If you have a control group for your experiment, which of the following is true?
A. There can be more than one difference between the control group and the test groups, but not several differences or else the experiment is invalid.
B. The control group and the test groups may have several differences between them.
C. There can be more than one difference between the control group and the test groups, as long as the differences are noted.
D. The control group is identical to all test groups except for one variable.

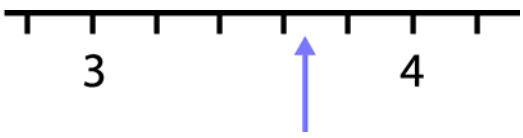
4. If the results of an experiment turn out differently from what you expected, then:
A. the experiment was a failure.
B. you should explore the possible reasons for this in the 'conclusions' section of your experimental write up.
C. you need to redo the experiment until you get the expected result.
D. you didn't follow the scientific method.

5. The table below is used to record the results of an experiment.

Type of Battery	Observations of torch		
	1st day	2nd day	3rd day
1.5V Eveready			
1.5V Duracell			
1.5V Energiser			

What is the most likely aim of this experiment?
A. To test how powerful the light is in 3 different torches.
B. To find out which battery lasts the longest.
C. To measure how long it takes to recharge a battery.
D. To see how different torches are affected by the same battery.

6. The most appropriate reading of the meter below is:



A. 3.3
B. 3.6
C. 4
D. 3.6667

7. The number 0.00470 is expressed in standard form (scientific notation) as:
A. 4.7^{-3}
B. 4.70×10^{-3}
C. 470×10^{-5}
D. 4.70×10^{3}

8. Which statement about green plants is true?
A. Most green plants do not need food.
B. Most green plants take in food through their roots.
C. Most green plants take in food through their leaves.
D. Most green plants manufacture their own food.

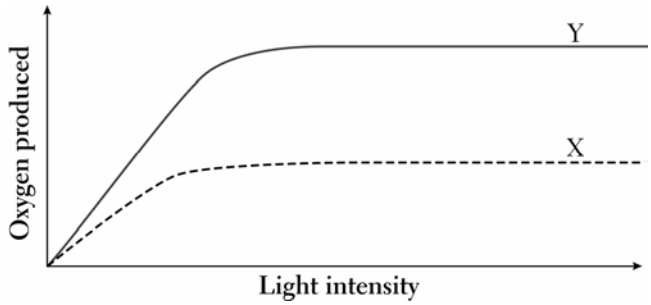
9. A sprig of Elodea plant was placed in a test tube. The test tube was then placed in sunlight for 6 hours. The bubbles of gas produced are mainly:
A. carbon dioxide.
B. carbon monoxide.
C. nitrogen.
D. oxygen.

10. Which of the following statements is FALSE?
A. Producers are at the first trophic level.
B. Bacteria and fungi are decomposers.
C. The original source of energy for consumers is the Sun.
D. All detritivores are herbivores.

11. Which is a correct representation of a food chain?
A. grass → grasshopper → frog → kookaburra
B. grass ← grasshopper ← frog ← kookaburra
C. kookaburra → frog → grasshopper → grass
D. kookaburra ← frog ← grass ← grasshopper

12. In the nitrogen cycle:
A. animals use nitrogen for respiration.
B. legumes increase nitrate production in the soil.
C. denitrification occurs when roots of plants interact with soil particles.
D. atmospheric nitrogen is absorbed by all plants.

13. The graph below shows the amount of oxygen produced by a plant as light intensity was increased under two different sets of conditions.

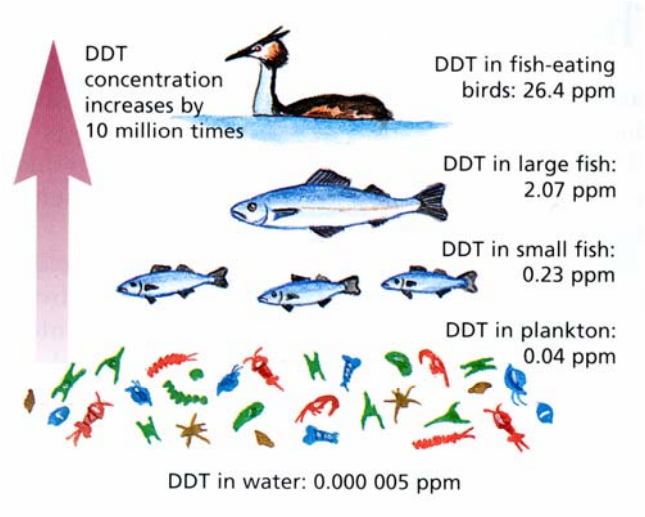


Which of the following would explain the difference between X and Y?
A. The data for X was obtained with the plant in orange light, the data for Y with the plant in red light.
B. The data for X was obtained with the plant at a higher temperature than for Y.
C. The data for X was obtained with the plant in a higher concentration of carbon dioxide than for Y.
D. The data for X was obtained using a larger mass of plant than for Y.

14. Which chemical equation shows cellular respiration?
A. glucose + lactic acid → carbon dioxide + water
B. glucose + carbon dioxide → oxygen + water
C. glucose + carbon dioxide → lactic acid + oxygen
D. glucose + oxygen → carbon dioxide + water.

15. Which of the following equations represents the process of fermentation by yeast cells?
A. $C_6H_{12}O_{6(aq)} + 6O_{2(g)} \rightarrow 6CO_{2(g)} + 6H_2O_{(1)}$ + energy
B. $C_6H_{12}O_{6(aq)} + 6O_{2(g)}$ + energy $\rightarrow 6CO_{2(g)} + 6H_2O_{(1)}$
C. $C_6H_{12}O_{6(aq)}$ + energy $\rightarrow 2CO_{2(g)} + 2C_2H_6O_{(aq)}$
D. $C_6H_{12}O_{6(aq)} \rightarrow 2CO_{2(g)} + 2C_2H_5OH_{(aq)}$ + energy

16. Using the diagram showing the concentration of the pesticide DDT in a food chain, choose the FALSE statement. (note ppm=concentration in parts per million)



A. Plankton absorbs DDT from water.
B. DDT concentrations in small fish are greater than in large fish.
C. The crested grebe is at the top of this food chain.
D. This process is called biomagnification.

17. A beryllium atom has 4 protons, 5 neutrons and 4 electrons. What is the mass number of this atom?
A. 4
B. 8
C. 9
D. 13

18. Which particles have approximately the same size and mass as each other?
A. Neutrons and electrons.
B. Electrons and protons.
C. Protons and neutrons.
D. None- they are all different in size and mass.

19. Sodium, lithium and potassium are all similar in that they:
A. are gases at room temperature.
B. form negative ions.
C. are relatively unreactive.
D. all have similar chemical properties.

20. According to atomic theory, electrons are usually found:
A. in the atomic nucleus
B. outside the nucleus, but very near as they are attracted to the protons.
C. outside the nucleus and often far from it – most of an atom's volume is its electron cloud.
D. either in the nucleus or around it – electrons are found anywhere in the atom.

21. Chlorine may be represented by an electron dot diagram which shows the symbol Cl surrounded by seven dots. An atom that has an identical electron dot diagram has the atomic number:
A. 7
B. 9
C. 15
D. 19

22. Use the information in the partial periodic table below, showing either the symbol or electron configuration to answer questions 22 to 24.

H							He
2, 1	Be	2, 3					2, 8
Na	Mg		Si			Cl	X
M	Ca						

The element labelled He is:
A. shown in period 8 and group VIII.
B. shown in period 8 and group I.
C. in group VIII, but does not fit in any period.
D. shown in period 1 and group VIII.

23. The element labelled M:
A. would be expected to be more reactive than Na.
B. is in period 1.
C. is a halogen.
D. is a non-metal.

24. The table below shows details of several particles.

Mass number	Atomic number	Number of neutrons	Number of electrons	Overall charge
39	W	19	X	+2
31	15	Y	17	Z

The numbers needed to complete the table in the order W, X, Y, Z are:
A. 20, 18, 16 and –2 B. 20, 22, 16 and +2
C. 21, 17, 15 and 0 D. 20, 18, 17 and –2

25. A precipitate is:
A. a clear and colourless solution.
B. a gas.
C. a solid lump.
D. a fine solid powder that forms when two solutions are mixed.

Section 2: True and False

Indicate whether the following statements are true or false by placing 'T' for true or 'F' for false in the boxes following each statement. This section is worth 5 marks.

1. The most accurate measurement is the one recorded to the most number of decimal places. | |
2. Data are the facts you collect from the experiment, while results are your interpretation of what the data means. | |
3. The abiotic environment is the place where all life as we know it exists. | |
4. Increasing production of carbon dioxide has led to the hole in the ozone layer. | |
5. The number of electrons in $^{14}_{6}C^{4-}$ is 8 | |

Section 3: Definitions

Give a term to fit each of the following definitions. This section is worth 5 marks.

1. A type of error that is caused by an incorrectly calibrated measuring device. | |
2. The type of variable plotted on the horizontal axis of a graph. | |
3. The source of energy for plants to convert carbon dioxide and water into glucose | |
4. Animals that eat dead organisms. | |
5. An atom that has the same atomic number but different mass number. | |

Section 4: Extended Questions

Give detailed answers to each question in the spaces provided. Answers that do not show all required mathematical working will not obtain full marks. This section is worth 40 marks.

1. Henry, an observant ice cream eater, made the following observations:

Observation 1: More ice cream is eaten in summer than in winter.
Observation 2: More people drown in summer than winter.

Based on these observations Henry hypothesised that eating ice cream causes people to drown. He predicted that there were would be more ice cream sales and drownings in January than June. He kept careful records of ice cream sales and drownings in Victoria for two months, and his findings showed, beyond doubt, that there were more ice cream sales and drowning in January than June. He concluded that his hypothesis was correct and started a campaign alerting people to the dangers of ice cream.

a) Explain why Henry should not conclude why his hypothesis is correct.

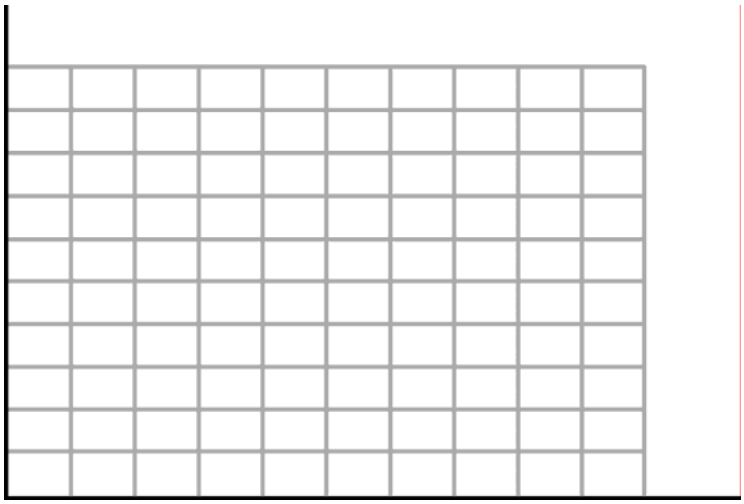
b) List two questions that Henry should investigate before commencing his campaign.

(1 + 2 = 3 marks)

2. Some inspired MHS students were conducting an experiment to determine how adding masses to the end of a spring would change its length. They recorded the following data.

Mass added (g)	Length of spring (cm)
50	3.0
100	4.5
150	6.1
200	7.5
250	8.9

a) Draw and label a graph of the data shown in the table above.



b) Use your graph to estimate:

i) the length of the spring with a mass of 125 g added.

cm

ii) the length of the spring with no masses added.

cm

(2 + 0.5 + 0.5 = 4 marks)

3. An observant student has noticed that when he accidentally put potatoes in the fruit basket in a warm, sunny spot near the window, they very quickly turned green. “It’s because of the temperature” commented his father. “Potatoes are grown in a cold environment”. His mother replied: “That’s wrong, it’s due to the light, potatoes are grown under the ground”. They both suggested in unison: “That would be a good experiment for you to try!”

Suggest a hypothesis for the student’s experiment.

List the series of steps needed for the student to reliably determine the cause of potato greening.

(1 + 2 = 3 marks)

4. Complete the following table of physical quantities and their SI units. (Full name or symbol)

Quantity	SI unit
length	
time	
area	
mass	

(2 marks)

5. Standard form is a simple way of representing large or small numbers.

Convert the following numbers into standard form

i) 1000000	
ii) 0.00003056	

Convert the following numbers from standard form

i) 1.7×10^{4}	
ii) 8.99×10^{-2}	

(2 marks)

6. Draw a food web which includes all the following species: eagle, goanna, magpie, snake, echidna, honeyeater, woodgrub, eucalypt tree (including flower nectar, leaves, seeds), parrot, fruit bat.

According to your diagram:

a) give an example of a first order consumer.

b) what proportion of the energy of the producer is available to a second order consumer.

(2 +1+1 = 4 marks)

7. Name a carbon compound:

that is a structural component of plant cell walls	
used as an energy store in plants	
that makes up approximately 0.04% of the gases in the atmosphere	
produced during photosynthesis	

(4 x 0.5 = 2marks)

8. Explain what is meant by the term enhanced greenhouse effect.

(1 mark)

9. State one direct use of biomass for energy production.

(1 mark)

10. Explain what is meant by the term decomposers.

(1 mark)

11. Explain what is meant by the term anaerobic respiration.

(1 mark)

12. Use the list of numbers below to assign a figure to each of the quantities listed below.(0.04, 10, 20, 65, 78, 98)

percentage of water on Earth found in the saltwater of the oceans	
percentage of oxygen in atmospheric gases	
percentage of the human body made up of water	
percentage of nitrogen in atmospheric gases	

(4 X 0.5 = 2 marks)

13. The periodic table has the elements arranged into groups and periods, based on similarities and differences between the chemical and physical properties of elements.

a) Name two elements in the second period of the periodic table.

Element	Symbol	Electron configuration

b) A silicon atom has the symbol ${}^{27}_{14}Si$. State how many protons and neutrons this atom has.

protons	neutrons

c) State what group and period silicon is found in.

group	period

(2 x 1 + 1 + 1 = 4 marks)

14. Give the chemical symbol for any element:

in the same group as fluorine (F)	
in the same period as Aluminium (Al)	
in the group known as the alkali metals	
that would form ions of charge -3	

(4 x 0.5 = 2 marks)

15. What is the most likely name of the compound $(NH_4)_2SO_4$?

(1 mark)

16. Complete the following table.

Number of protons	Number of electrons	Charge on the atom or ion	Symbol
10			Ne
12	10		
16		–2	

(6 x 0.5 = 3 marks)

17. Write the element from each pair that has the stated property.

a) High electronegativity—calcium (Ca) or chlorine (Cl)?	
b) Metalloid—silicon (Si) or sulfur (S)?	
c) Chemically unreactive—aluminium (Al) or argon (Ar)?	
d) Metallic lustre—Potassium (K) or carbon (C)	

(4 x 0.5 marks = 2 marks)

18. Complete the following table.

Atom and change	Name of ion formed	Symbol of ion formed
Copper (Cu) atom loses two electrons		
Oxygen (O) atom gains three electrons		

(4 x 0.5 = 2 marks)

Answers

Section 1:

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

Section 2: F, T, T, F, F. (1 mark each)

Section 3:
1. systematic 2. independent 3. sun 4. detrivores/scavengers 5. isotope (1 mark each)

Section 4

Question 1
a) He has not shown the factors are on each other by experiment showing a link between the two.
b) Did the people who drowned eat icecream before drowning?
What percentage of people who ate icecream drowned? (or similar)

(1 + 2 = 3 marks)

Question 2
a) graph should contain: i) labelled axes with units and quantities(mass on horizontal axis) ii) appropriate scale and line of best fit -ruled and using most of the grid iii) appropriate heading above graph
b) i) only accept within 5.1 - 5.5 cm ii) 1.5cm

(3 + 0.5 + 0.5 = 4 marks)

Question 3
a) Potatoes exposed to light turn green (or similar)
b) any reasonable series of steps that must include a number of trials (replication), only one variable.

(1 + 2 = 3 marks)

Question 4

QUANTITY	S.I.UNIT (symbol OK)
length	metre
time	second
area	square metre
mass	kilogram

(4 x 0.5 = 2 marks)

Question 5

a (i)	a (ii)	b (i)	b (ii)
1.0×10^{6}	3.056×10^{-5}	17000 or 176.8	0.0899

(4 x 0.5 = 2 marks)

Question 6

Any reasonable web with (i) eucalypt as the starting point, (ii) arrow pointing in the right direction to indicate "eaten by" (iii) all species listed once.

a) Possibilities include magpie, honeyeater, woodgrub, parrot, fruit bat.

b) 1%

(2 + 1 + 1 marks)

Question 7

that is a structural component of plant cell walls	cellulose
used as an energy store in plants	starch
that makes up approximately 0.04% of the gases in the atmosphere	carbon dioxide
produced during photosynthesis	glucose

(4 x 0.5 = 2 marks)

Question 8

The balance in carbon dioxide and oxygen levels upset by burning of fossil fuels, CO_2 from industry and the felling of rainforest trees. (1 mark)

Question 9

burning of wood for heating (1 mark)

Question 10

fungi, bacteria that breakdown organic matter into simple organic molecules (1 mark)

Question 11

When oxygen is not supplied quickly enough for the energy requirements resulting in the production of lactic acid and energy i.e. no oxygen needed in the breakdown of glucose (1 mark)

Question 12

percentage of water on Earth found in the saltwater of the oceans	98
percentage of oxygen in atmospheric gases	20
percentage of the human body made up of water	65
percentage of nitrogen in atmospheric gases	78

(4 x 0.5 = 2 marks)

Question 13

a) The group number equals the number of electrons in the outer shell. (except for hydrogen and helium)

a)

Element	Symbol	Electron configuration
From Boron	B	2,1
Neon	Ne	2,8

b) Protons = 14, Neutrons = 13

c) Group = 4 or 14 or IV, Period = 3

(2 x 1 + 1 + 1 = 4 marks)

Question 14.

in the same group as fluorine (F)	Cl, Br, I or At
in the same period as Aluminium (Al)	Mg, Na, Si, P, S, Cl or Ar
in the group known as the alkali metals	Li, Na, K, Rb, Cs or Fr
that would form ions of charge −3	N, P, As (might also answer Sb or Bi.)

(4 x 0.5 = 2 marks)

Question 15

ammonium sulphate (1 mark) if sulphite then ½

Question 16

Number of protons	**Number of electrons**	**Charge on the atom or ion**	**Symbol**
10	10	0	Ne
12	10	+2	Mg^{+2}
16	18	−2	S^{2-}

(6 x 0.5 = 3 marks)

Question 17

a) High electronegativity—calcium (Ca) or chlorine (Cl)?	Cl
b) Metalloid—silicon (Si) or sulfur (S)?	Si
c) Chemically unreactive—aluminium (Al) or argon (Ar)?	Ar
d) Metallic lustre—potassium (K) or carbon (C)	K

(4 x 0.5 marks = 2 marks)

Question 18

Atom and change	Name of ion formed	Symbol of ion formed
copper atom loses two electrons	Copper (II) Must have II	Cu^{2+}
Oxygen atom gains three electrons	oxide	O^{2-}

(4 x 0.5 = 2 marks)