STUDENT NAME	

Victorian Certificate of Education 2010

ENVIRONMENTAL SCIENCE

Trial Written Examination 2
October 2010
Time allowed 1.5 hours [90 minutes]

QUESTION AND ANSWER BOOK

Structure of book

Section	Number of questions	Number of questions to be answered	Number of marks
A	20	20	20
B	5	5	70
			Total 90

Materials

- Question and answer book of 20 pages.
- Answer sheet for multiple-choice questions.
- Writing materials.
- One approved scientific calculator

Instructions

- Write your **student name** and **class** in the space provided on this book
- Write your student name and class in the space provided on your answer sheet for multiple-choice.
- All written responses must be in English.
- Time allowed: 15 minutes reading time, 90 minutes writing time

At the end of the examination

- Place the answer sheet for multiple choice questions inside the front cover of this question and answer book

Please note this is a practice exam only and its degree of difficulty and content is different to the end of year Unit 4 exam. VAEE takes no responsibility for your success in completing the actual VCE Environmental Science Unit 4 exam.

ENVIRONMENTAL SCIENCE
Trial Written Examination October 2010
Section A answer sheet

Student:	Teacher:

Specific instructions for Section A

- Answer all questions
- All questions should be answered on the answer sheet for multiple-choice questions, in Pencil.
- Choose the response that is **correct** or **best answers** the question, and shade the square on the multiple choice answer sheet below.
- A correct answer is worth 1 mark, an incorrect answer is worth no marks.
- No marks will be given if more than one answer is shown for any question.
- Marks will not be deducted for incorrect answers

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**

SECTION A – Multiple-choice questions

Specific instructions for Section A

Answer all questions.
All questions should be answered on the answer sheet for multiple-choice questions, in pencil.
Choose the response that is **correct** or **best answers** the question, and shade the square on the multiple-choice answer sheet according to the instructions given on that sheet. A correct answer is worth 1 mark; an incorrect answer is worth no marks. No marks will be given if more than one answer is shown for any question. Marks will not be deducted for incorrect answers.

Question 1
All of the following are toxic atmospheric pollutants, with the exception of
- **A.** sulfur dioxide.
- **B.** methyl mercury.
- **C.** carbon monoxide.
- **D.** nitrogen dioxide.

Question 2
A broken sulfur dioxide scrubber at a coal-burning power station results in
- **A.** a point source of pollution.
- **B.** a diffuse source of pollution.
- **C.** a pollutant sink.
- **D.** a carbon sequestration mechanism.

The following information relates to questions 3 to 5:

Compound A causes damage to the respiratory system when vapour is inhaled consistently over a period of weeks, but a single dose is insufficient to cause measurable harm. Compound B causes significant damage to the digestive system when ingested, even at low doses.

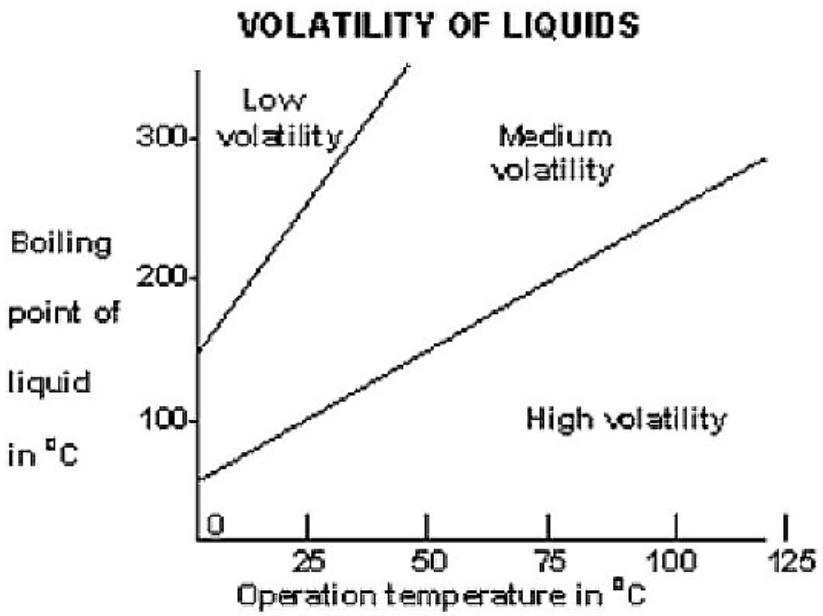
Question 3
The toxic mechanism of compound A is best described as
- **A.** synergistic.
- **B.** acute exposure.
- **C.** a lethal dose.
- **D.** chronic toxicity.

Question 4
Compound B is toxic after
- **A.** acute exposure.
- **B.** chronic inhalation.
- **C.** bioaccumulation.
- **D.** airborne transport.

Question 5
Compound A and B could be said to result in a synergistic effect if both compounds cause
- **A.** damage to the digestive and respiratory systems after a single low dose.
- **B.** more than 50% of people experience digestive discomfort after chronic exposure.
- **C.** bioaccumulation of fatty compounds in adipose tissue.
- **D.** significant damage to the digestive system when ingested.

The following graph relates to questions 6 to 8:

The graph below shows the volatility of liquids with increasing boiling point at different industrial machinery operation temperatures:



Source: http://www2.warwick.ac.uk/services/safety/health_and_safety/policy/6/4/graph_1.jpg

Question 6

The relationship represented in the above graph is

- **A.** the higher the boiling point, the higher the volatility.
- **B.** the more volatile a liquid is, the more likely it is to bond to other materials.
- **C.** the more volatile a liquid, the more soluble it is in water.
- **D.** the lower the boiling point, the higher the volatility.

Question 7

Machinery operating at 25°C will release a liquid of medium volatility if the boiling point of the liquid is

- **A.** 51°C
- **B.** 321°C
- **C.** 201°C
- **D.** 500°C

Question 8

The boiling point of octane, a principal component of petrol, is 125°C. Octane is toxic upon chronic exposure. The boiling point of water is 100°C. Choose the correct statement.

- **A.** octane is highly volatile.
- **B.** water is more volatile than octane.
- **C.** at an operation temperature of 125°C, octane has medium volatility.
- **D.** water has low volatility at an operation temperature of 0°C.

Question 9
Which of the following pollutants has the lowest boiling point?

- **A.** methyl mercury
- **B.** elemental mercury
- **C.** sulfur dioxide
- **D.** mercury oxide

Question 10
The mouse LD50 of compound B could be determined given the following information

- **A.** 23 mice died when 3.0g was ingested by 46 different mice.
- **B.** All mice died when exposed to 0.25g/kg.
- **C.** A 40g mouse died when exposed to 0.010g.
- **D.** 50% of mice died after ingesting 0.00015g per gram of body weight.

Question 11
Organic lead will bioaccumulate in living things. Therefore, lead

- **A.** is an airborne pollutant.
- **B.** is highly toxic after a small dose.
- **C.** is persistent in the natural environment.
- **D.** will undergo biomagnification in sediment.

Question 12
Which of the following is an essential property of a bioaccumulating toxin?

- **A.** lipid-solubility
- **B.** metallic with a high atomic mass
- **C.** wide distribution in water
- **D.** adhesion to waterborne polymers

Question 13
Which of the following is an example of environmental bioremediation?

- **A.** the annual volume of sewerage flowing into a stream is decreased by one half
- **B.** the height of a factory smoke stack is increased
- **C.** a forest is declared a state park
- **D.** PCB-consuming bacteria are sprayed on a PCB contaminated area

Question 14
Which of the following is most likely to be a recommendation of an Environmental Management Plan for a mining facility?

- **A.** the area around the mine will be declared a state park
- **B.** monitoring of heavy metal contamination in surrounding soil
- **C.** the mine should be closed
- **D.** extension of the mining network to increase economic gain

Question 15
An environmental impact statement includes

- **A.** examination of environmental impacts of a product or project from materials acquisition to disposal.
- **B.** an assessment of the possible implications—positive or negative—that a proposed product or project may have for the environment.
- **C.** continually monitoring and improving a product or project with reference to environmental impact.
- **D.** a system that identifies, assesses and controls environmental risks.

Question 16
Life cycle analysis involves

- **A.** examination of environmental impacts of a product or project from materials acquisition to disposal.
- **B.** an assessment of the possible implications—positive or negative—that a proposed product or project may have for the environment.
- **C.** continually monitoring and improving a product or project with reference to environmental impact.
- **D.** a system that identifies, assesses and controls environmental risks.

Question 17
An environmental management plan incorporates

- **A.** examination of environmental impacts of a product or project from materials acquisition to disposal.
- **B.** an assessment of the possible implications—positive or negative—that a proposed product or project may have for the environment.
- **C.** continually monitoring and improving a product or project with reference to environmental impact.
- **D.** a system that identifies, assesses and controls environmental risks.

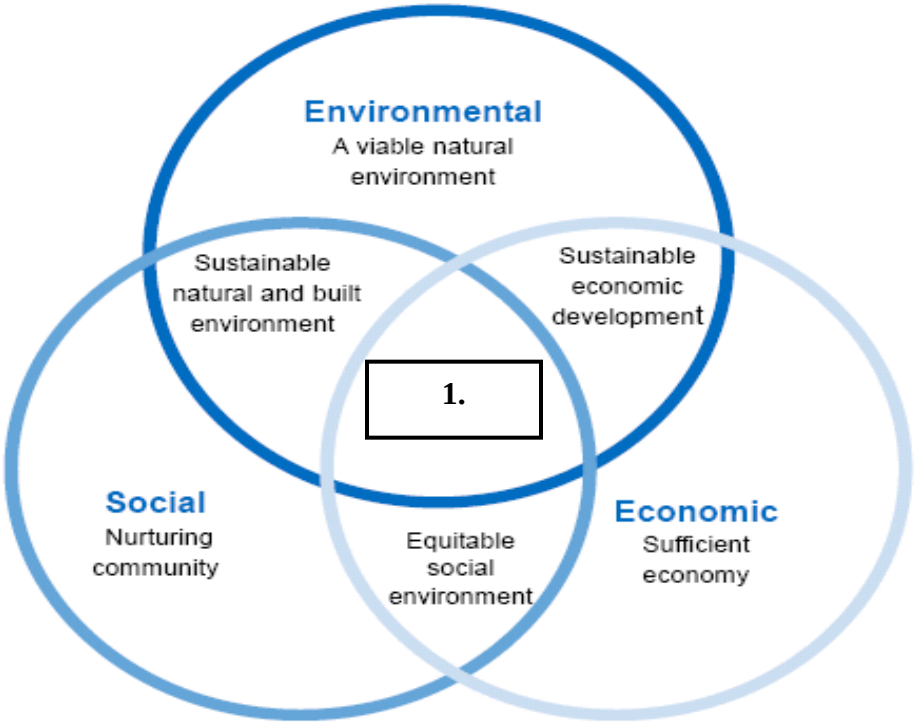
Question 18
Regulatory frameworks must be

- **A.** approved by environmentalists and construction companies.
- **B.** Government legislation.
- **C.** described in an environmental impact assessment.
- **D.** obeyed, or individuals will be sentenced to prison.

Question 19
Which of the following is the most important component of an ecotourism venture?

- **A.** registration with relevant authorities
- **B.** a discovery center
- **C.** environmental education
- **D.** interaction with animals in the natural environment

The following information relates to question 20:



Source: http://www.ciria.org.uk/complianceplus/images/sustainability2.gif

Question 20

The best description at 1. above would be

- **A.** ecotourism.
- **B.** environmental management.
- **C.** synergistic action.
- **D.** sustainable development.

SECTION B – Short answer questions

Specific instructions for Section B

Answer all questions in the spaces provided.

Question 1 (20 marks)
Name a substance, other than sulfur dioxide and mercury, you have studied this year.

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a. State the following properties of the pollutant:

i. State at room temperature:_____

ii. Density in comparison to atmospheric gases:_____

_____

iii. Solubility:_____

iv. Transportation mechanism:_____

v. LD50:_____

6 marks

b. Describe the chemical or physical properties of the pollutant that contribute to its
i. natural sink

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ii. toxicity.

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4 marks

c. State a location in which the pollutant is found and fully describe two factors that contribute to its definition as a pollutant.

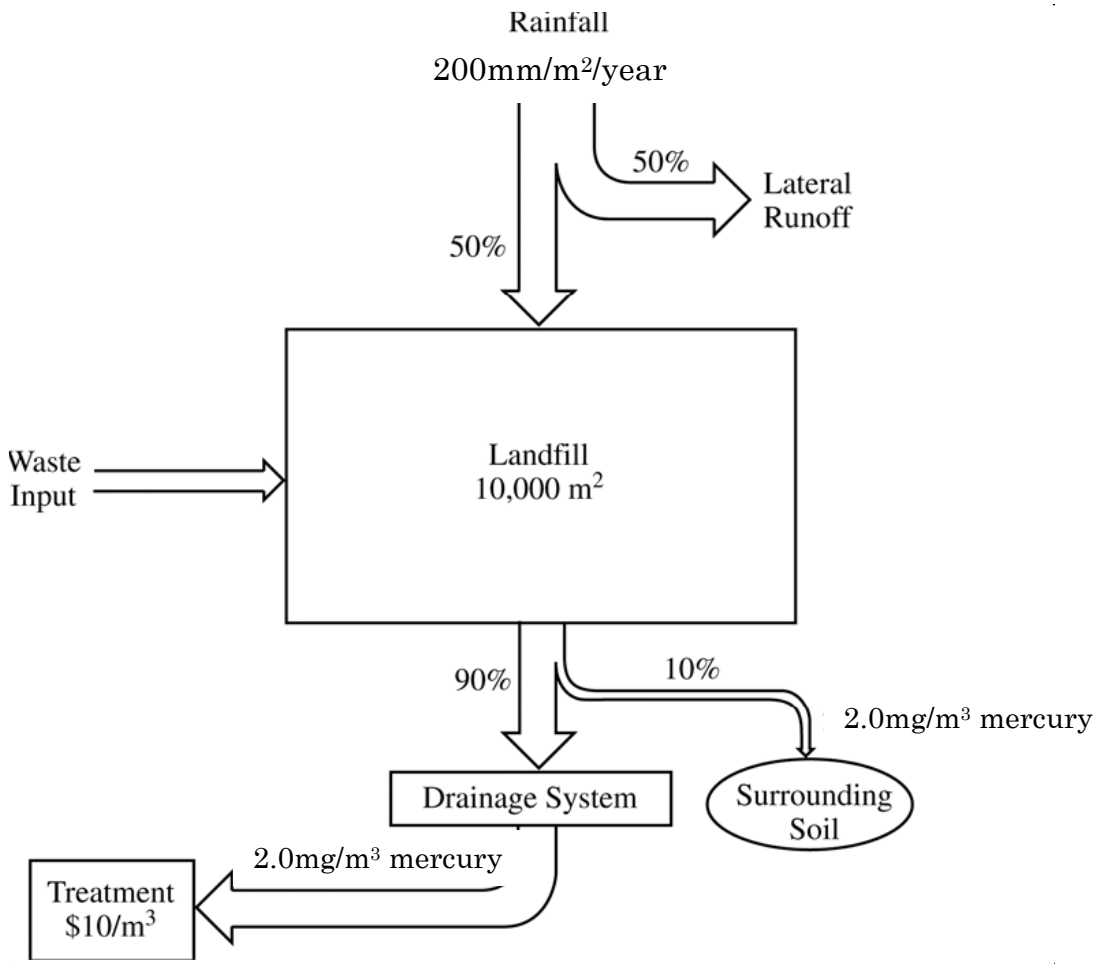
5 marks

d. Describe and evaluate a strategy that has been introduced to minimise the impact of this pollutant, ensuring you refer to the sink of the pollutant in your answer.

5 marks

Question 2 (Total 11 marks)

A city operates a municipal solid-waste landfill (rubbish tip). As represented in the diagram below, the annual precipitation in the city is 200 mm/year: 50 percent of this water infiltrates through the landfill cover soil into the waste, and 50 percent drains off the landfill. A drainage system withdraws 90 percent of the leachate generated within the landfill for treatment. The rest of the leachate travels through the bottom liner of the landfill into the surrounding soil. Most of the mercury disposed of in the landfill remains in the landfill; the leachate withdrawn from the landfill by the drainage system has an average mercury concentration of 2.0 mg/m^3.



Source: http://apcentral.collegeboard.com

a. Calculate the volume, in m^3, of the water infiltrated through the landfill per year.

2 marks

b. Given that the mercury concentration in the water draining from the landfill is 2.0 mg/m^3, calculate the mass, in g, of mercury that is released into the surrounding soil per year.

2 marks

c. Describe one viable method for reducing the amount of mercury entering the municipal waste input.

1 mark

The city council is considering two options for reclaiming the soil surrounding the landfill. The first option is to excavate and remove the contaminated soil, and the second option is to decontaminate the soil on the site using vegetation.

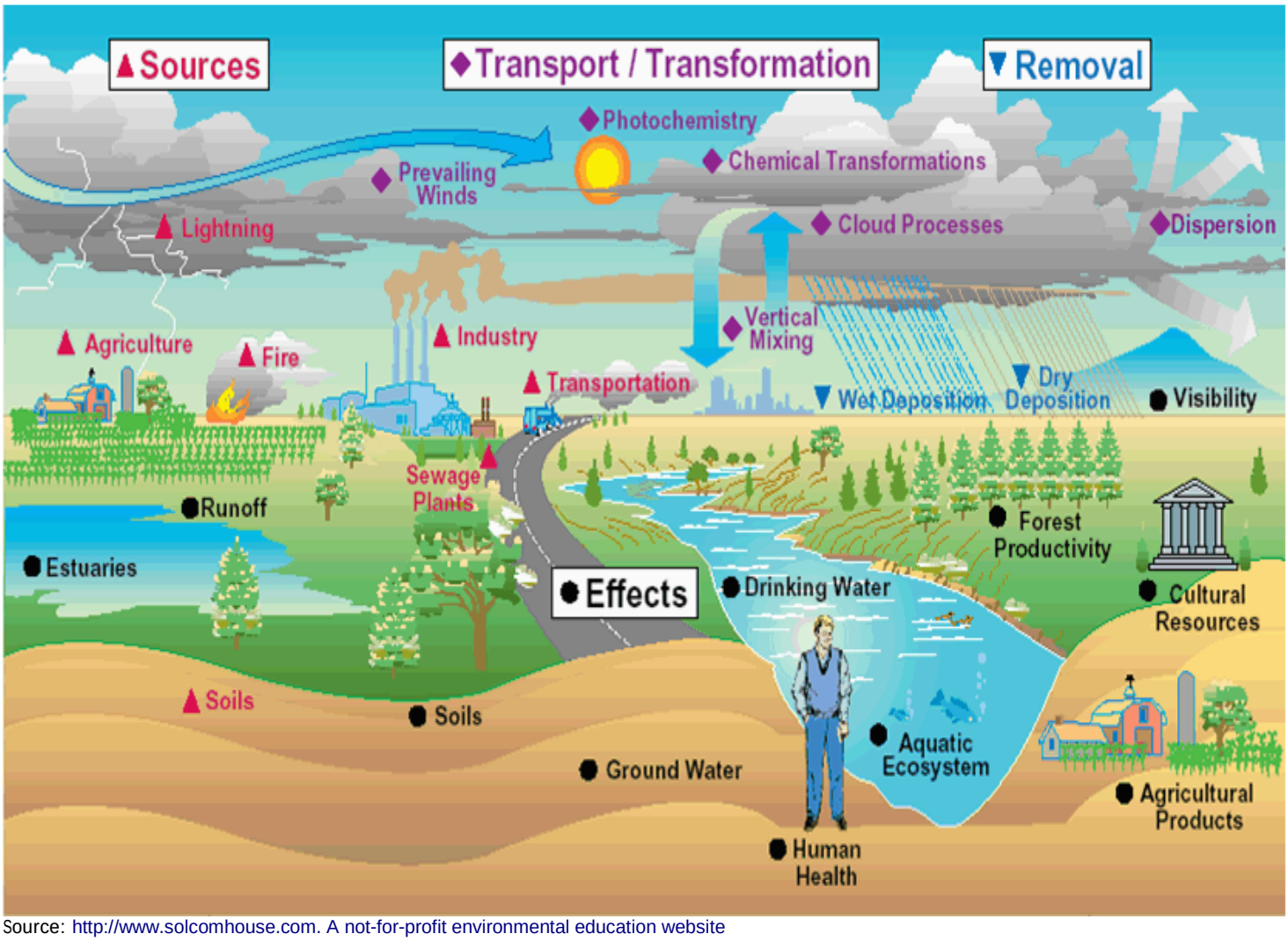
d. Assume that the city council chooses the first option. Describe one problem that may result from removing the contaminated soil from the site. Refer to a form of mercury and its toxic mechanism in your answer.

3 marks

e. Assume that the city council chooses the second option. State how vegetation could be used to decontaminate the soil. Discuss one advantage and one disadvantage of using this reclamation method.

3 marks

Question 3 (Total 14 marks)
The diagram below shows possible pathways for many types of pollution in the Canadian Great Lakes area. Sulfur dioxide pollution has been detected in this area of the Great Lakes, moving through some of the pathways depicted below:



Source: http://www.solcomhouse.com. A not-for-profit environmental education website

a. Describe a source of sulfur dioxide as depicted in the above diagram.

2 marks

b. Describe the "transport" and "removal" processes of sulfur dioxide represented in the above diagram, ensure you refer specifically to the chemical and physical properties of sulfur dioxide in your answer.

4 marks

c. State three "effects" of sulfur dioxide represented in the above diagram.

3 marks

The table below shows water quality guidelines for the Canadian Great Lakes:

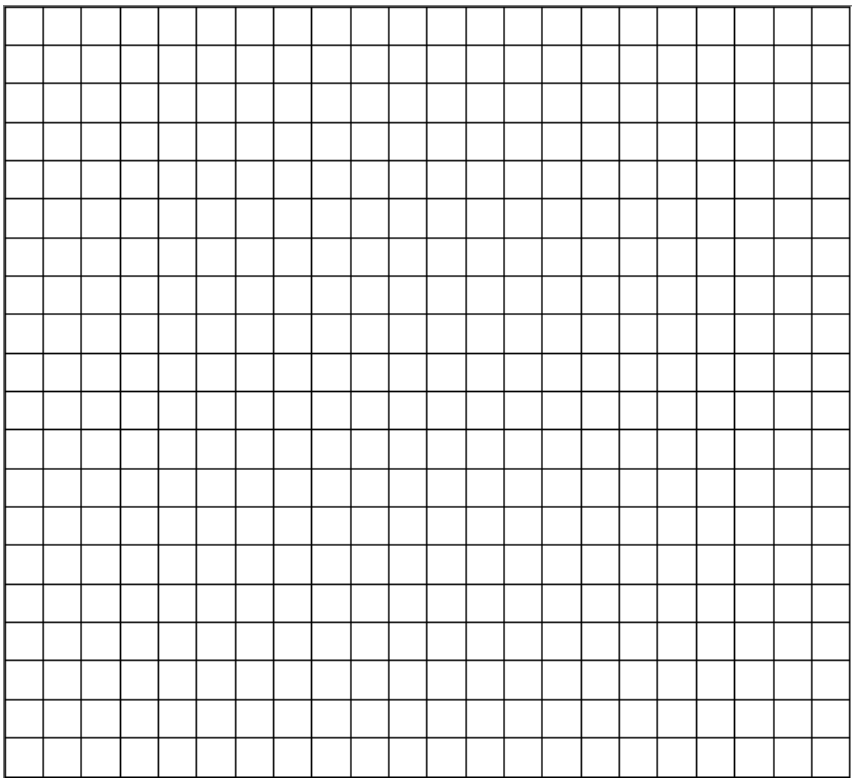
Upper limit

Compound		CCME G µg/L
Metals	Arsenic	5
	Copper	2
	Mercury	0.026
	Nickel	65
	Lead	2
	Zinc	30
Pesticides	Atrazine	1.8
	Metolachlor	7.8

Source: http://www.on.ec.gc.ca/csl/fich/fich005_002_e.html

d. What type of measurement is µg/L? _____ 1 mark

e. Draw a labelled bar graph below, showing the upper limits for all metals except mercury.



2 marks

f. Which metal, zinc or copper, is likely to have a lower LD50 for fish? Explain your choice.

_____

_____

_____

_____

_____

2 marks

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Question 4 (Total 16 marks)
Name an environmental science project that you have investigated this year.

a. Summarise the location, two aims and the timeline of the project.

2 marks

b. Outline the interests of two key stakeholders in the project and their role in enforcing or adhering to regulatory frameworks associated with the project.

3 marks

c. Describe two important components of the environmental impact assessment for the project.

2 marks

d. Explain how environmental risks were monitored in the management plan for the project.

2 marks

e. Evaluate whether the precautionary principle was utilised in the environmental management plan for the project.

3 marks

f. Evaluate the success of the management plan in upholding the principles of sustainable development.

4 marks

Question 5 (Total 9 marks)
The following is an excerpt taken from the website of the Lane Cove River caravan park, winner of a high commendation in the 2009 Ecotourism Australia awards:

"Just 10kms from the Sydney Harbour Bridge and Sydney Opera House, the Lane Cove River Tourist Caravan Park and Camp ground provides a peaceful experience in ecotourism. The bushland and eucalypt forests of Lane Cove River National Park abound with native birds, bandicoots, tawny frogmouths and lace monitor lizards (and now Brush Turkeys). Park visitors stay close to nature in fully serviced cabins or their own caravan, campervan, or tents on grassy camp sites.

Since 2005, the park has been auditing and monitoring its carbon footprint. In 2007, the park was able to claim carbon neutral status. It was certified in 2008/09 under the Climate Action Program through Sustainability Australia.

To gain carbon neutral status the park setout to reduce energy consumption, switch to 100% accredited Green Energy, installed solar stations to offset emissions it could not otherwise offset, and embarked on an ambitious visitor assisted tree planting program as part of its bush regeneration strategy.

Below is a photo of the park's solar panels and cabins:

Source: http://www.lcrtp.com.au/photos_images_videos

Since our water plan was established in 2006, we have harvested over 138,000 litres of rainwater, and have reduced our water consumption in our shower blocks by replacing our old shower heads with water saving shower heads.

The park has a comprehensive environmental education program. We can provide everything from classroom presentations for students, through to a speaker for your next function or event. Our programs and speakers are provided to your organisation at NO COST*.*

When you stay with us at the Tourist Park, every dollar from your fees contributes to habitat creation, erecting interpretative signs and ecosystem maintenance. Thanks for your support."

a. Compare the ecotourism venture you studied this year with Lane Cove River Tourist Caravan Park in terms of:

i) Minimisation of environmental impact.

3 marks

ii) Environmental education.

3 marks

iii) Extent to which the venture allows tourists to come into contact the natural environment.

3 marks

- END OF EXAM -