

FORM TP 2015192



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MAY/JUNE 2015

CARIBBEAN EXAMINATIONS COUNCIL

CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®

ENVIRONMENTAL SCIENCE

AGRICULTURE, ENERGY AND ENVIRONMENTAL POLLUTION

UNIT 2 – Paper 02

2 hours 30 minutes

12 MAY 2015 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of SIX questions, TWO from each module.
2. Answer ALL questions.
3. Write your answers in the answer booklet provided.
4. You may use a silent, non-programmable, scientific calculator to answer questions.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.



MODULE 1

Answer BOTH questions.

1. (a) The practice of agriculture impacts the environment in different ways. Table 1 provides information on how students in two Caribbean countries ranked some of these impacts in their respective countries. A ranking of 1 represents the highest impact and a ranking of 5 represents the lowest impact. Study Table 1 and answer the questions that follow.

TABLE 1: RANKED ENVIRONMENTAL IMPACTS FROM AGRICULTURE

Impact	Country A	Country B
Health	5	1
Sustainable livelihood	1	5
Pollution	2	2
Habitat loss	3	4
Soil degradation	4	3

- (i) State THREE features of sustainable agriculture. **[3 marks]**
- (ii) Using the information from Table 1, state FIVE deductions about the students' perceptions of the impact of agriculture on the environment in their country. **[5 marks]**
- (iii) Discuss TWO ways by which pollution from agrochemicals can threaten sustainable agriculture. **[4 marks]**
- (b) "Agriculture plays significant roles in the Caribbean region, and therefore it should be afforded greater importance and support in the Caribbean region". Provide TWO reasons to justify this statement. **[4 marks]**
- (c) Explain, citing TWO reasons, how technology could impact POSITIVELY on agriculture in the Caribbean. **[4 marks]**

Total 20 marks

2. (a) Figure 1 shows an agricultural practice that is commonly used in the Caribbean.



Figure 1. Agricultural practice

- (i) Identify the agricultural practice shown in Figure 1. **[1 mark]**
- (ii) State TWO reasons why this practice is suitable for use in Caribbean countries. **[2 marks]**

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- (b) A farmer used two methods of cultivation for melons. In one method, melons were planted alone and in the second method melons were planted with legumes. Figure 2 presents a record of the yield of melons harvested by the farmer for the two methods for the past ten years. Study Figure 2 and answer the questions that follow.

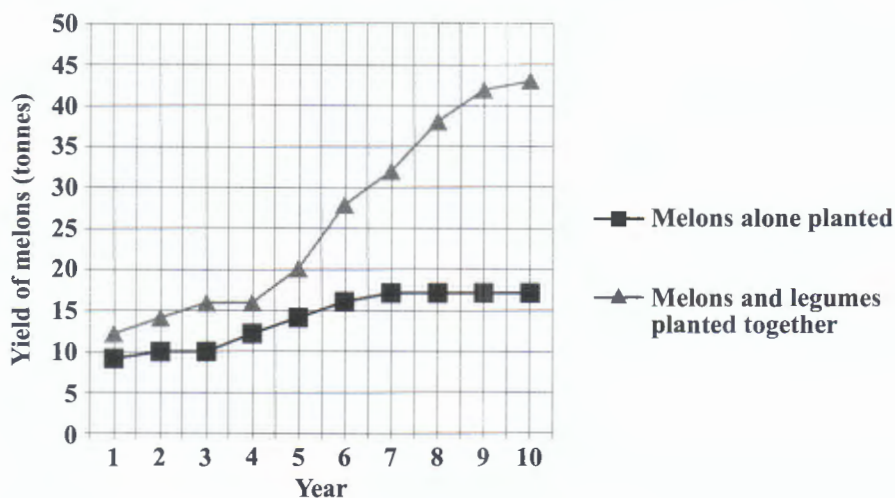


Figure 2. Yield of melon for a ten-year period using two different methods

- (i) Calculate the difference in the yield of melon for Year 10 for the two methods. **[3 marks]**
- (ii) Based on the results shown in Figure 2, compare the trends in the yield of melon for the two methods. Include FOUR points in your answer. **[4 marks]**
- (iii) Provide THREE different explanations that may account for the trends observed in Figure 2. **[6 marks]**
- (c) Farmers in the Caribbean are being encouraged to practise organic farming. Suggest FOUR benefits of organic farming. **[4 marks]**

Total 20 marks

MODULE 2

Answer BOTH questions.

3. (a) At a conference, a speaker states that “the world’s socioeconomic dependency on fossil fuel combustion will make it difficult to reduce carbon dioxide emissions”. Explain this statement. **[3 marks]**
- (b) (i) Define the term ‘efficiency of conversion’ as it refers to energy. **[2 marks]**
- (ii) A Caribbean family uses 7 200 MJ of energy per year on household lighting using incandescent light bulbs. Only 432 MJ of the energy used is actually converted into light. State the efficiency of conversion of these light bulbs AND state TWO things that the family can do to improve their energy usage for household lighting. **[4 marks]**
- (c) Figure 3 shows the distribution of world biofuel production in selected regions. Study Figure 3 carefully and answer the questions that follow.

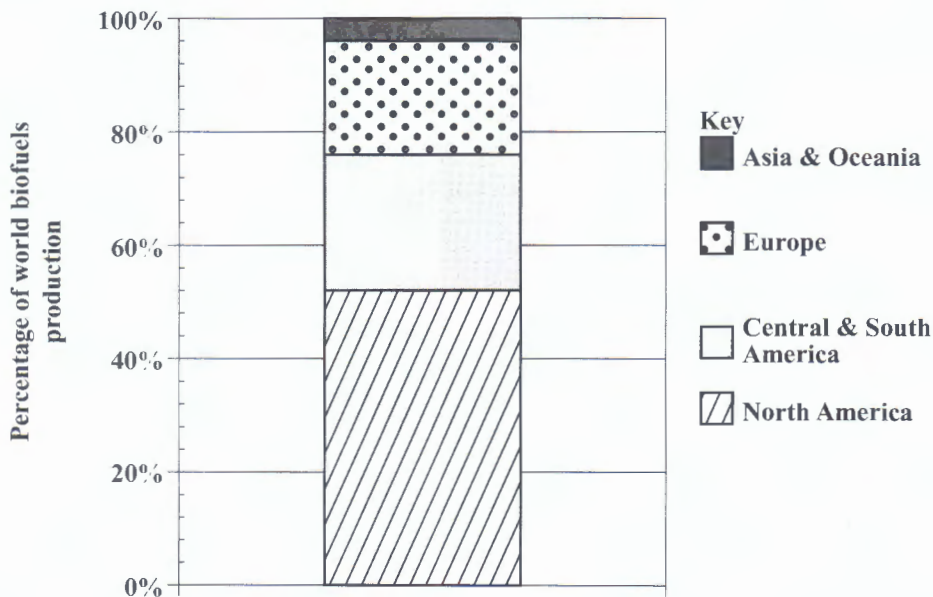


Figure 3. World biofuel production by region, 2011

Source: US Energy Information Administration, www.eia.gov.

- (i) The total world production of biofuel in 2011 was 1 810 000 barrels per day. How much more biofuel was produced in North, Central and South America combined than in Europe? **[5 marks]**
- (ii) In 2011, the total world production of petroleum was 87 331 600 barrels per day, as compared to 1 810 000 barrels per day of biofuel. Discuss TWO different reasons that could have resulted in this great disparity in the production of petroleum and biofuel in 2011. **[6 marks]**

Total 20 marks

4. (a) Table 2 shows the amount of electricity generated by renewable energy sources in selected territories in the Caribbean. Study Table 2 carefully and answer the questions that follow.

TABLE 2: ELECTRICITY PRODUCTION BY RENEWABLE SOURCES, 2010

Country	Electricity Production by Renewable Source (billion KWh)				
	Hydroelectric	Geothermal	Wind	Solar, Tidal & Wave	Waste & Biomass
Barbados	0	0	0	0	0
Belize	0.316	0	0	0	0.200
Grenada	0	0	0	0	0
Jamaica	0.150	0	0.053	0	0.064
St Vincent	0.026	0	0	0	0
Trinidad	0	0	0	0	0.020

Source: US Energy Information Administration, www.eia.gov.

- (i) Which country generated the MOST electricity by renewable sources in 2010 AND how much was generated? **[2 marks]**
- (ii) Using the information in Table 2, identify the TWO LEAST popular renewable energy sources in the Caribbean in 2010. **[2 marks]**
- (iii) Hydroelectric power generation is practised in a number of Caribbean territories. Discuss the impact that hydroelectric power generation would have on a Caribbean country. **[6 marks]**
- (b) (i) Define the term 'energy'. **[1 mark]**
- (ii) List THREE ways to improve energy efficiency. **[3 marks]**
- (iii) Discuss how the implementation of EACH of the three ways identified in (b) (ii) would result in greater energy efficiency. **[6 marks]**

Total 20 marks

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MODULE 3

Answer BOTH questions.

5. (a) (i) Identify THREE pollutants that could come from a solid waste landfill. **[3 marks]**

Figure 4 illustrates the volume of solid waste taken to landfills in Saint Lucia over the period 1998–2000. Study Figure 4 carefully and answer the questions that follow.

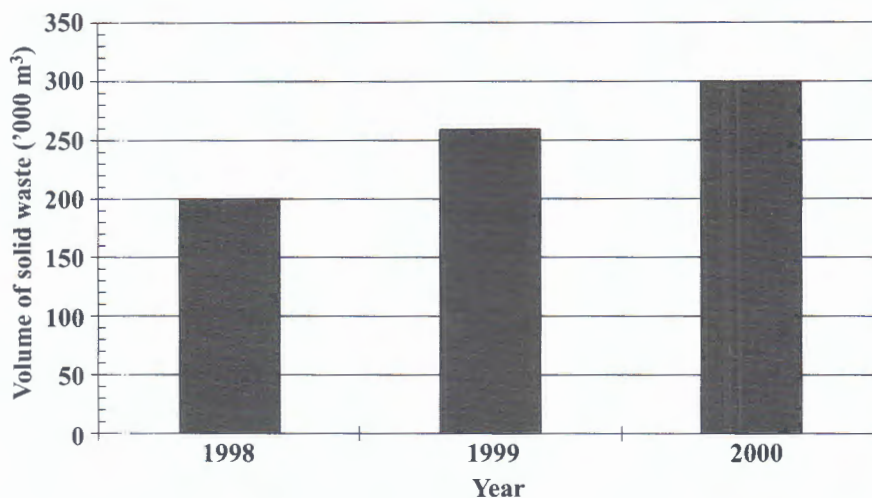


Figure 4. Disposal of solid waste at landfills in St. Lucia, 1998–2000

*Source: Saint Lucia's Compendium of Environmental Statistics, 2001,
www.stats.gov.lc/Environ.pdf.*

- (ii) What is the percentage increase in solid waste deposited at landfills in Saint Lucia from 1999 to 2000? **[4 marks]**
- (iii) Given that the population of Saint Lucia was approximately 152 000 in 1998, how much solid waste per capita was sent to landfills in Saint Lucia in 1998? **[2 marks]**
- (iv) The activities that occur in and around a landfill can be quite noisy. Briefly describe ONE health risk that may occur due to excessive noise. **[2 marks]**

- (b) Figure 5 shows the area around two lakes, Lake Tranquility and Spring Lake. Each lake receives 150 m^3 per day of an effluent stream containing chromium from a factory. Study Figure 5 and answer the questions that follow.

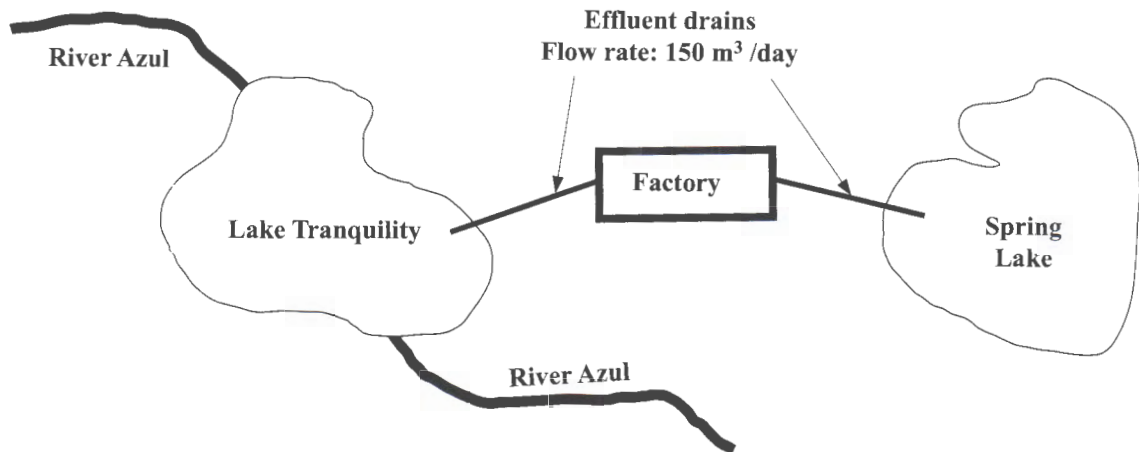


Figure 5. Diagram of the area around a factory that is discharging effluent into two lakes

- (i) Identify TWO environmental receptors for the chromium emitted by the factory. **[2 marks]**
- (ii) Is it necessary that these environmental receptors actually be in the lakes? Explain your answer. **[3 marks]**
- (iii) The two lakes supply drinking water for the communities around each lake. Explain how technological and legislative measures can be used to solve the pollution problem in Lake Tranquility and Spring Lake. **[4 marks]**

Total 20 marks

6. (a) (i) State TWO underlying causes of pollution, **other** than lack of environmental ethics. **[2 marks]**
- (ii) Define the term 'environmental ethics'. **[1 mark]**
- (iii) Suggest TWO reasons which show how a lack of environmental ethics could be an underlying cause of pollution. **[4 marks]**
- (b) A Caribbean country has recently introduced new legislation to include a deposit on plastic bottles (for example, plastic soft drink bottles). Persons bringing these bottles to an approved depot would receive a cash payment. The legislation is intended to reduce the quantity of plastic bottles that are simply thrown out into the environment. Present an outline of a research project that will determine the effectiveness of this legislation. Your outline must indicate exactly how what you measure will allow you to determine the legislation's effectiveness. **[5 marks]**
- (c) (i) Consider the following headline in the *Kaitaur News Online* on 30 December 2012.
- “CARICOM intensifies call for halt of hazardous waste shipment via Caribbean Sea”.
- Explain why CARICOM countries would NOT want to have hazardous waste shipped through the Caribbean Sea. **[4 marks]**
- (ii) Outline the basis for the Basel and Cartagena Conventions, AND use this information to indicate which convention would be best suited to treat the situation in the headline of the *Kaitaur News Online*. **[4 marks]**

Total 20 marks

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.