

# **Science and Technology**

Secondary Cycle 2, Year 1  
555-306  
Mid-Year Evaluation Task

January 2010

## **A Hospital Stay**



## **STUDENT INFORMATION BOOKLET**

**Time:** 2 hours



**Commission scolaire English-Montréal**  
**English Montreal School Board**

## QUESTION 1

A patient is admitted to the emergency room. His vital signs are stable. You are a medical student from EMSB University. You are asked to analyze the patient's symptoms.

**TABLE: POSSIBLE ILLNESSES**

ILLNESS	SYMPTOMS	CONDITIONS UNDER WHICH IT OCCURS
<b>Listeriosis</b>	Diarrhea, headache, constipation, abdominal pain, fever	Unpasteurized dairy products, raw vegetables and improperly cooked meats. Also found in hotdogs and deli meats.
<b>Inherited Mitochondrial Disease</b>	Loss of motor control, muscle weakness, pain, difficulty swallowing, cardiac disease, respiratory complications, seizures	Passed on genetically
<b>Celiac disease</b>	Diarrhea, abdominal pain	Passed on genetically
<b>Incorrect blood transfusion</b>	Chills and fever, backache or other aches and pains, hives and itching, death within hours of transfusion	Human error
<b>Shigella</b>	Abdominal pain, bloody diarrhea	Human to human contact
<b>Phenylketonuria (PKU)</b>	Severe discoloration and spotting of the skin, chronic dryness and intense itchiness and inflammation of the skin	Double recessive mutation of chromosome 12
<b>Heart Attack</b>	Chest pain, upper body discomfort in one or both arms, the back, neck, jaw, or stomach, shortness of breath, nausea, fainting, cold sweat	Plaque build up and thickening of arteries causing blockage.

- a) Refer to the table of possible illnesses on the preceding page to formulate three important and specific questions to help you determine the patient's illness?
- b) Which factors influenced your formation of the above three questions?
- c) After you speak with the patient, he mentions the following symptoms:
  - Trouble breathing
  - Pains in various bodily regions
  - **NO** fever
  - **NO** diarrhea

Refer to the table of Illnesses on the previous page and the above list of symptoms to determine the patient's condition.

## QUESTION 2

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A second patient visits your office later that day. This patient wants more energy for his upcoming competition. His coach has changed his diet to the following:

**TABLE: NEW DIET**

<b>BREAKFAST</b>	2 eggs 3 strips of bacon 125 mL coffee (nothing added to it)
<b>LUNCH</b>	250 mL vegetable soup 500 mL mixed green salad with 5 mL dressing Water
<b>DINNER</b>	250 g steak or fish 250 mL steamed vegetables Water

- As his doctor, explain whether or not his diet is deficient in energy requirements. Justify your answer (include a discussion of key nutrients in your response).
- His coach suggests that he increases his protein supplements to get the strength he needs. As a doctor, discuss whether or not this is necessary and why? (Include a discussion of key nutrients in your response.)

### QUESTION 3

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After a long day at the hospital, you step out to have dinner with some fellow doctors. You notice that the woman sitting at the table next to yours is having trouble breathing.

- a) Draw a diagram and describe the pathway followed by air (oxygen and carbon dioxide) through the respiratory system if there are no obstructions.
  
- b) Since you have taken the Hippocratic Oath, you decide to assess the situation. You realise that you must perform the Heimlich Manoeuvre. In this manoeuvre one applies pressure to the abdomen to remove the object obstructing breathing. Explain the effect the Heimlich Manoeuvre has on the respiratory system.

## **QUESTION 4**

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While at the hospital, you and your colleagues get into a discussion about the pros and cons of cloning. Use the information document provided (appendix I) for further information on cloning.

- a) Is the cloning process closer to mitosis or meiosis? Justify your answer by comparing the stages of cell division between mitosis and meiosis.
  
- b) Explain whether or not you would allow government funding of cloning experiments in Canada? Justify your answer.

## **Appendix I: Cloning Fact Sheet**

Public opinion on the subject of cloning varies. The fact of the matter is that cloning is often a misunderstood process. To form an educated opinion, a person must become informed about the various applications and outcomes of allowing cloning experimentation to continue.

**Types of cloning:** “Cloning” refers to various processes used by scientists to create an exact copy of an original product. “Cloning”, as referred to by the general public, generally means to make an exact copy of an individual as popularized by science fiction.

There are however two types of cloning procedures that are commonly confused in informed society; each with its own moral and environmental repercussions.

**Reproductive Cloning:** The idea that a clone is an exact copy of a full grown human being was popularized in science fiction and has been part of pop culture for decades but only since dolly the sheep was cloned in 1997 has it become a conscious fear of society. Still the idea of producing an exact copy of a human being has its flaws.

In order to clone a human being, one would have to obtain the nucleus of a cell from the subject to be cloned. The scientist would then have to obtain a woman’s ovum (egg cell) and strip it of all of its genetic material. The nucleus of the subject could then be implanted into the ovum and stimulated to grow creating a cloned cell. While it sound like a simple procedure one must remember that the structures involved are extremely delicate and microscopic.

Once the cloned cell is stimulated to grow it must then be nurtured and nourished as any fertilized ovum would need to be. After the cloned cell divides and begins to grow, they can then be implanted into a host female who will carry the growing cells until they reach maturity. At this point pregnancy will terminate with the birth of the cloned child.

While the subject that was cloned could be any age the clone must age like any other human child. Meaning that the subject could be full grown or dead long before the clone reaches adulthood.

Cloning as a useful technology has its problems. Dolly the sheep aged rapidly and suffered from premature arthritis and progressive lung disease, and finally was euthanized at the age of six; living only half of the expected life span for her species. In general cloned mammals tend to die soon after birth and are inflicted with genetic abnormalities that result in damaged tissue and organs.

**Therapeutic Cloning:** The process of therapeutic cloning is similar to reproductive cloning in many ways however the products and social ramifications are extremely different. Where the end goal of reproductive cloning is to produce a genetically identical copy of the original subject the intention of therapeutic cloning is to produce genetically identical organs and/or tissue that can then be transplanted into the subject.

The cloning process in both cases are identical up until the point of implantation where a cloned embryo is brought to term in the case of reproductive cloning; where therapeutic cloning would discard all material except the embryonic stem cells which can be used to re-grow damaged tissue, or scientists believe, whole organs.

Where one is creating a new life the other is saving an existing one. Therapeutic cloning however is not without its flaws some argue that after a single cell division the clone has the potential to grow into a human being and by stripping the developing embryo of its stem cells the scientists are committing murder. There are special guidelines that limit the number of cell divisions allowed before the clone must be destroyed and the public is clearly divided as to what constitutes a human life.