Applied Science and Technology

Secondary Cycle 2, Year 1
557-306
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
Listeriosis	Diarrhea, headache, constipation, abdominal pain, fever	Unpasteurized dairy products, raw vegetables and improperly cooked meats. Also found in hotdogs and deli meats.
Inherited Mitochondrial Disease	Loss of motor control, muscle weakness, pain, difficulty swallowing, cardiac disease, respiratory complications, seizures	Passed on Genetically
Celiac disease	Diarrhea, abdominal pain	Passed on Genetically
Incorrect blood transfusion	Chills and fever, backache or other aches and pains, hives and itching, death within hours of transfusion	Human error
Shigella	Abdominal pain, bloody diarrhea	Human to human contact
Phenylketonuria (PKU)	Severe discoloration and spotting of the skin, chronic dryness and intense itchiness and inflammation of the skin	Double recessive mutation of chromosome 12
Heart Attack	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

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

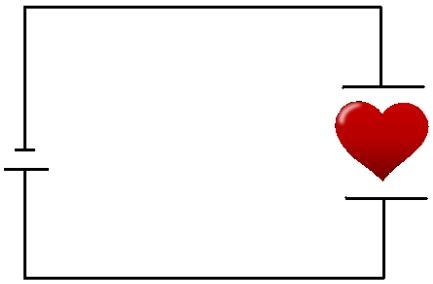
BREAKFAST	2 eggs 3 strips of bacon 125 mL coffee (nothing added to it)
LUNCH	250 mL vegetable soup 500 mL mixed green salad with 5 mL dressing Water
DINNER	250 g steak or fish 250 mL steamed vegetables Water

a) 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).

b) 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

A machine called a defibrillator may be used by paramedics to restart a person's heart. The machine is an electrical generator that sends a charge down a wire to a metal paddle. The charge passes through the heart into the other paddle to complete the circuit as shown below.



The paddles are covered in a gel and must be applied to bare skin to work.

a) Describe the types of mechanical links used in the defibrillator. Justify your answers. See Appendix 1.

   i. The power source to the wire.

   ii. The paddle and the patient's chest.

b) For each of the following points, indicate whether the item is an insulator or conductor. Justify your answers.

   i. The victim's clothing

   ii. The defibrillator paddles

   iii. The application gel

QUESTION 4

While completing your shift at the hospital, your final patient presents you with a different situation. She tells you she will soon be leaving for Africa.

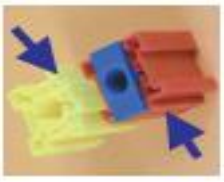
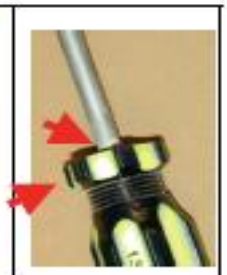
a) The patient would like to know the difference between the **attenuated (live)** and the **inactivated** vaccine against Typhoid. Explain the difference and justify which you recommend she receive. See Appendix 2.

b) The patient also explains the reason for her volunteer work in a small African village. She plans to help healthy cows produce larger quantities of higher quality milk. She would therefore like you to explain to her, in detail, the process of **pasteurization** and why it is so important. Justify your answer.

Appendix 1: Types of Links

LINKING FUNCTION: Types of links

All links have four of the following characteristics:

1	Direct: The parts are designed to fit together without a fastener.		or	Indirect: The parts need a fastener (e.g. nail, screw, glue) to hold them together.	
2	Rigid: The parts are joined together with a rigid fastener with no flexible material between them.		or	Flexible: There is a flexible fastener that allows parts to move in relation to one another.	
3	Removable: The parts can be separated without damaging the fastener or surfaces.		or	Permanent: The parts cannot be separated without damaging the fastener or surfaces.	
4	Complete: There is no freedom of movement between the parts.		or	Partial: The connected parts can move in relation to one another.	

Appendix 2: Typhoid Fever

What is typhoid fever? Typhoid fever is a life-threatening illness caused by the bacterium Salmonella Typhi. Most cases of typhoid are acquired while traveling. Typhoid fever is still common in the developing world, where it affects about 21.5 million people each year.

How is typhoid fever spread? Salmonella Typhi lives only in humans. Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. Some people, called carriers, recover from typhoid fever but continue to carry the bacteria. Both ill persons and carriers shed Salmonella Typhi in their feces.

Where do you get typhoid fever? Typhoid fever is common in most parts of the world except in industrialized countries. If you are traveling to the developing world, you should take precautions. Travelers from Canada to Asia, Africa, and Latin America have been especially at risk.

What are the signs and symptoms of typhoid fever? Those with typhoid fever usually have a sustained fever as high as 39° to 40° C. They may also feel weak, or have stomach pains, headache, or loss of appetite. In some cases, patients have a rash of flat, rose-colored spots. The only way to know for sure if an illness is typhoid fever is to have samples of stool or blood tested for the presence of *Salmonella Typhi. Untreated, typhoid fever can lead to death.*

Typhoid fever's danger doesn't end when symptoms disappear! Even if your symptoms seem to go away, you may still be carrying Salmonella Typhi. If so, the illness could return, or you could pass the disease to other people. In fact, if you work at a job where you handle food or care for small children, you may be barred legally from going back to work until a doctor has determined that you no longer carry any typhoid bacteria.

http://www.cdc.gov/ncidod/dbmd/diseaseinfo/TyphoidFever_g.htm

Appendix 3: The Difference Between the Inactivated and Attenuated Forms

Inactivated Typhoid Vaccine (Shot)

- Should not be given to children younger than 2 years of age.
- One dose provides protection. It should be given at least 2 weeks before travel to allow the vaccine time to work.
- A booster dose is needed every 2 years for people who remain at risk.

Live Typhoid Vaccine (Oral)

- Should not be given to children younger than 6 years of age.
- Four doses, given 2 days apart, are needed for protection. The last dose should be given at least 1 week before travel to allow the vaccine time to work.
- A booster dose is needed every 5 years for people who remain at risk.

Some people should not get the typhoid vaccine or should wait. Specifically:

Inactivated Typhoid Vaccine (Shot)

- Anyone who has had a severe reaction to a previous dose of this vaccine should not get another dose.

Live Typhoid Vaccine (Oral)

- Anyone who has had a severe reaction to a previous dose of this vaccine should not get another dose.
- Anyone whose immune system is weakened should not get this vaccine. They should get the inactivated typhoid vaccine instead. These people include anyone who:
    - Has HIV/AIDS or another disease that affects the immune system.
    - Is being treated with drugs that affect the immune system, such as steroids, for 2 weeks or longer.
    - Has any type of cancer.
    - Is undergoing cancer treatment with x-rays or drugs.
- Oral typhoid vaccine should not be given within 24 hours of certain antibiotics.