OPEN SCHOOL BC

Biology 12
Introduction Assignment

This assignment is an opportunity for you to demonstrate your ability to conduct a close reading of a text, and to respond to the text effectively.

Student Name _____

Student No. _____ **Date** _____

Address _____ **Postal Code** _____

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Based on the instructions provided by your school, complete the following *Biology 12* assignment independently and return it to your teacher.

There are three parts to this assignment:

Part A: Biology	8 marks
Part B: Body Systems	14 marks
Part C: Case Study	8 marks

Contents:
14 pages

Assignment time:
1 hour

Before you start, read these important tips.

1. Read each question carefully before answering.
2. Answer all questions to the best of your ability.
3. Take your time. Check your work before handing in the assignment.
4. Write neatly and check your spelling.

Part A: Biology

Biology is the study of life. There are many branches of biology: cell biology, ecology, genetics, microbiology and zoology to name a few. You have studied aspects of these and other branches in your previous science courses.

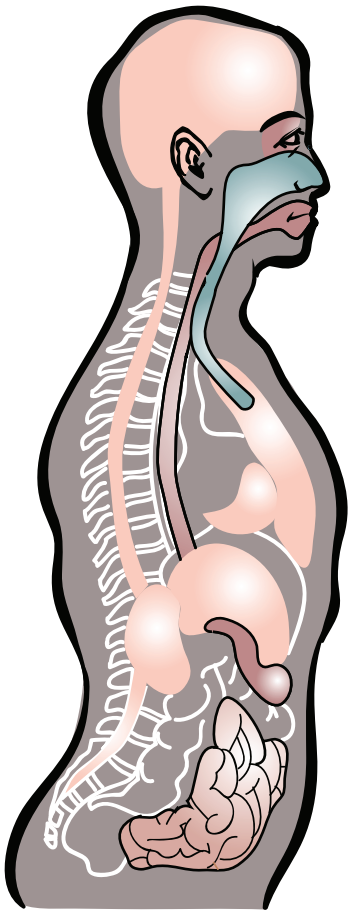
You've been studying biology for a number of years, what topic was of most interest to you and why? In a paragraph, please describe the topic in biology that interests you most. This could be a very specific topic or, more generally, a branch of biology. (8 marks)

Your response should:

- be written in complete sentences.
- include the topic in biology that interests you.
- include a rationale for your choice of topic.

Part B: Body Systems

You are an amazing multi-tasking machine. You can carry on, at any given moment, many different tasks. As you sit and read this, your heart is beating, your digestive tract is breaking down your food, your eyelids are blinking to protect your eyes, and your muscles are keeping you upright and balanced. These important activities are all related to our body systems and how they coordinate with one another. Cells of multicellular organisms must demonstrate teamwork and cooperation in order for the organism to function.



Your body is made up of an estimated 70 trillion cells. A cell is the smallest structural and functional unit in the human body. Cells perform the basic functions that keep us alive. They acquire nutrients, dispose of metabolic wastes, respire (produce ATP energy), synthesize molecules used by the cell, and grow. Many cells undergo cell division.

A group of similar cells that perform a particular function is called a tissue. Several tissues join together to form an organ. Organs work together to form an organ system. Complex organisms such as humans are a collection of organ systems.

Systems are made up of individual parts that work together and are usually connected to one or more other systems. If one part of the system is damaged, the system will not function well or may not function at all. The human body is made up of interdependent parts that work together—understanding how these parts work help us to understand the whole system.

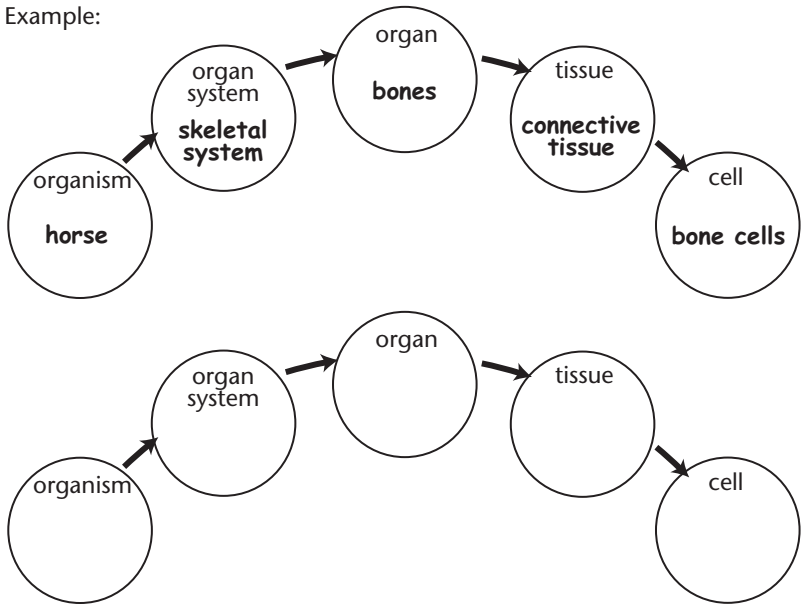
MARKS

Questions:

1. From the information provided as well as from your own prior knowledge, brainstorm what you already know about cells. Record this information using a list, or a graphic organizer (such as a mind map, flowchart or table). You may even want to include a picture or diagram. (3 marks)

MARKS

2. Using an example of your own, complete the flow chart below. (2 marks)



3. You probably know a lot about the body's systems from previous science courses, and from your day-to-day experiences.

   Match each body system listed below to its description, in the table on the next page. (5 marks)

Muscular	Immune
Digestive	Circulatory
Respiratory	Integumentary
Skeletal	Nervous
Endocrine	Excretory
Reproductive	

MARKS

Description	Body System
transports blood and nutrients to the body	
allows organisms to take in, break down, and absorb nutrients	
controls breathing and performs gas exchange in lungs and tissues	
removes wastes from the body	
cells in the body that protect the body from invaders	
manufactures and releases hormones	
includes organs for producing offspring	
includes skin, hair and nails and creates a protective barrier around the body	
forms the shape of the body; supports, protects and works together with muscles to move the body	
made up of muscles that work with bones to move the body	
the control center for your body; signals your body to changes in your environment and coordinates your actions and reactions	

4. What would happen to the body if one of the body systems failed? (You may use an example if it helps you explain your answer.) (2 marks)

MARKS

5. Botulism is a serious illness sometimes caused by ingesting food containing the botulinum neurotoxin. People suffering from this illness experience paralysis, starting in the muscles of the face and spreading to the limbs. The toxin interferes with the nerves in the body, preventing muscles from contracting. In the most severe cases, botulism can paralyse the muscles involved in breathing, leading to respiratory failure and sometimes death.
   a. Which body system does botulism affect first? Explain your answer. (1 mark)
   b. Name one other body system that may be affected by botulism? Explain your answer. (1 mark)

Part C: Case Study

Background Information

Caffeine is a stimulant found in coffee, tea, soft drinks and other drinks and foods. After consumption, caffeine is absorbed into the blood stream and carried throughout the body and to the brain. In moderate amounts (~300 mg per day) it causes increased attentiveness, it reduces feelings of fatigue, and it enables most people to think clearly and concentrate for longer periods. Caffeine also increases heart rate and rate of respiration. In large quantities (>600 mg per day) its effects are magnified. People sometimes feel irritable, distracted and tense.

People often use caffeine to increase mental alertness. Some people are more sensitive than others to the effects of caffeine. People who consume caffeine regularly may build up a tolerance to its effects. Further, since caffeine is mildly addictive, people who regularly consume caffeine may experience some withdrawal effects if they stop consumption.

The Study

In this study, three people each consumed varying levels of caffeine and recorded how they were feeling on a daily basis. Caffeine was administered at 8 am on day 1, day 2, day 3. Subjects didn't know how much caffeine (or if any) they were consuming each day.

Day 1 – Caffeine dose: 100 mg

Day 2 – Caffeine dose: 300 mg

Day 3 – Caffeine dose 600 mg

Subjects were asked not to consume any caffeine outside the administered dose for the three days of the study.

Data

Next you'll find the daily reports of the three people involved in the study. These are their own observations recorded in their own words.

Person A **Male, 24 years old, semi-active lifestyle** **Usually drinks 3-4 cups of coffee (250–350 mg caffeine) per day**	
Day 1	I felt pretty normal first thing this morning, but by the time I got to work I could feel a headache coming on. The headache got worse throughout the morning. I felt groggy all morning. It was very difficult to focus on my work. I was tired and unmotivated. By the end of the day my headache was down to a dull pain and I was exhausted.
Day 2	Had a pretty good sleep last night, except for that lingering headache. The headache was still persisting first thing this morning, but went away by about 9:00 am. I felt normal today—an average amount of energy and a normal level of concentration at work.
Day 3	I had a good sleep last night. Thank goodness that awful headache went away! I woke up feeling rested. Around mid-morning my heart rate felt a bit fast, but it leveled out after not too long. I felt alert at work: maybe a bit too alert. I had several tasks on the go, though I never quite finished any of them.

Person B **Male, 38 years old, very active lifestyle** **Usually avoids caffeine**	
Day 1	9 am—increase in heart rate morning—attentive to tasks at work afternoon—still attentive to tasks at work evening—went to the gym and had a great workout! 11 pm—still awake, should be sleeping by now
Day 2	7 am—a bit tired; should have gone to bed earlier 9 am—hyper, increased heart rate late morning—trying to focus on one task, but keep getting distracted afternoon—feel like I haven't actually accomplished anything today—hard to focus on finishing any one task evening—worn out, but mind still busy 11:59pm—still awake; brain won't shut off
Day 3	7am—tired; had trouble sleeping 9 am—wired, shaky, racing heart 10 am—irritable, upset stomach, still shaky, unable to focus on the task at hand. I feel awful. afternoon—grouchy, tense evening—stomach feeling better, but still feel wired 11:59 pm—I can't get comfortable and my mind is still racing. This is going to be a long night!

Person C **Female, 18 years old, semi-active lifestyle** **Rarely drinks coffee, but drinks cola (50 mg caffeine) at least once a day.**	
Day 1	I felt pretty normal all day.
Day 2	Shortly after the dose, I felt an increase in heart rate. I had a productive day of studying—great focus! Stayed up a bit later than normal.
Day 3	After the dose my heart was racing and I felt a bit shaky. Not such good focus today; my mind was all over the place. By the evening I was less shaky, but my mind was still busy and I was up late again.

Results

Summarize the data into the following table. (3 marks)

MARKS

Person	Day 1	Day 2	Day 3
A			
B			
C			

MARKS

Analysis

1. Caffeine affects several of the body's systems. After examining the data, name one system that is affected by caffeine and explain your choice. (2 marks)

2. Give one reason why the caffeine affected each person differently. Explain your response. (2 marks)

MARKS

3. Give a possible explanation for Person A's symptoms on day 1. (1 mark)

/8	Part A: Biology
/14	Part B: Body Systems
/8	Part C: Case Study
/30	**Total**