This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Mock Exams : Pt2

13, 14, 15 JUN2022

Do NOT write in this box. Your MARK will be placed here.

Subject :	Biology
Class :	12SE
Teacher :	Christine Khalil
Duration :	1 hour

Please write your answers on a separate sheet of paper.

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Exercise 1 (5 points)

Indicate the true statements and correct the false ones.

1. The transmission of a nervous message is blocked at an excitatory synapse.

2. The depolarization of the membrane of a neuron is due to the massive penetration of K^+ ions into the intracellular medium.

3. The nerve impulse is elaborated at the level of sensory receptors no matter how much the intensity of stimulation is.

4. The drugs modify the transmission of the nervous impulse.

5. Enkephalins and morphine bind to different receptors.

Exercise 2 (10.5 points)

Parts A and B are independent.

Part A

Document 1 shows the variation of the mass and height of a well-nourished and well growing boy.

Age	Mass (Kg)	Height (cm)
At birth	3.5	50
4 months	6	60
8 months	8	68
12 months	10	75
16 months	11	78

Document 1

BMI	Category
<18	Very thin
18-20	Thin
20-25	Normal
25-29	Moderate
>29	Obese

Document 2

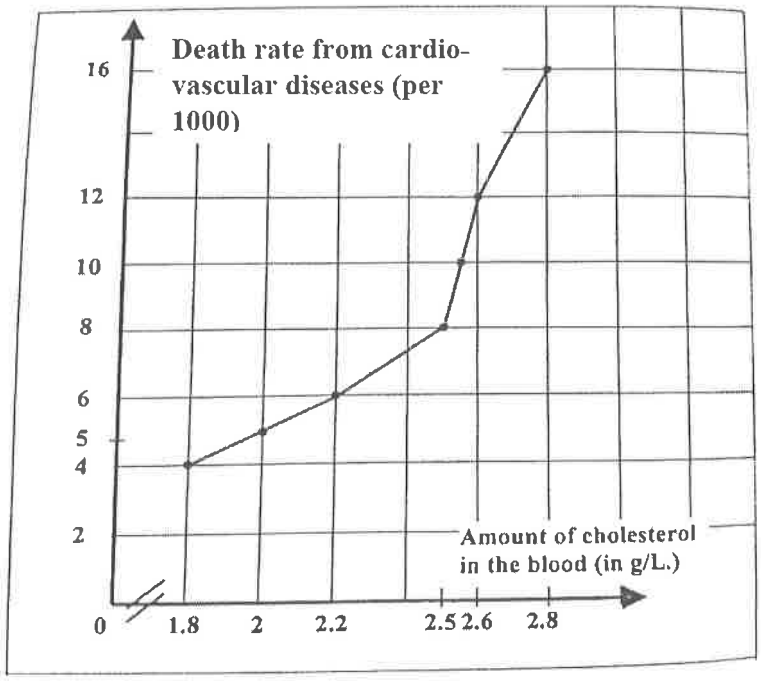
1. Indicate the range of normal growth for a 12-month-old boy given that the usual variation is ± 1Kg for mass and ± 3cm for height. (1)

2. A 12-month-old boy weighs 7 Kg and is 70 cm in height. Calculate the body mass index (BMI) of this boy. (0.5)

3. Based on documents 1 and 2, what can you deduce concerning the growth of the boy? (1)

Part B

Document 3 represents the relation between the amount of cholesterol in the blood and the risk of cardiovascular diseases.



Document 3

1. Draw a table that includes the values represented in the graph of document 3. (2)

2. a. Analyze this graph. (1)

   b. What can you conclude? (1)

3. Indicate the role of each of the lipoproteins LDL and HDL. Which of the 2 lipoproteins contributes to the development of atherosclerosis? Explain how. (3)

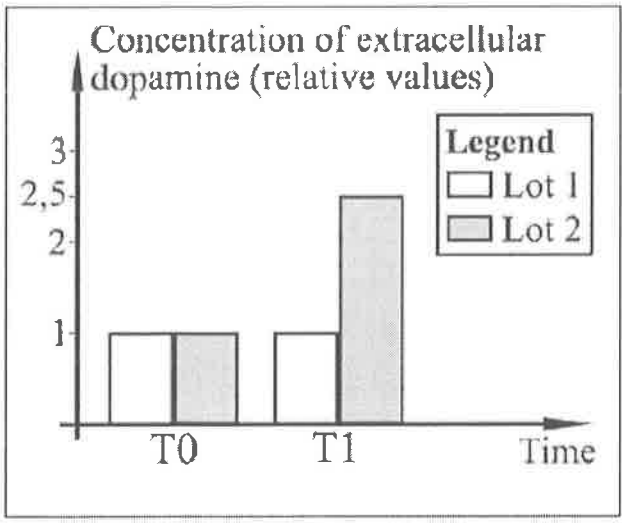
4. Propose 2 advices for avoiding the increase in the amount of blood cholesterol. (1)

Exercise 3 (4.5 points)

Pleasure sensation is related to the activity of dopaminergic neurons in the "reward system". Cocaine, just like most drugs, affects this activity. In order to understand its mode of action, the following experiments are performed.

Experiment 1: Two lots of rats, lot 1 and lot 2, are considered. Rats of lot 2 are injected with cocaine. In both lots, the concentration of dopamine is measured in the liquid surrounding the

neurons in a specific region of the cerebrum. The results of measurements done at 0 min (T0) and at 60 min (T1) following the injection are presented in document 1.



Document 1

1. Justify the following statement: "cocaine increases the pleasure sensation". (1)

Experiment 2: Stimulations are applied on a presynaptic excitatory neuron connected to a dopamine neuron. At T1, the frequency of AP of this dopamine neuron, the quantity of dopamine released as well as that recaptured are measured.

The obtained results are presented in document 2.

Lots at T1 / Measured parameters	Lot 1	Lot 2
Frequency of AP in the dopamine neuron	+++	+++
Quantity of released dopamine	+++	+++
Quantity of recaptured dopamine by the dopamine neuron	++	+
+ : low ++ : moderate +++ : high		

Document 2

2. Explain the links existing between the different parameters measured in lot 1. (1)

3.1. Compare the results of each of the parameters obtained at T1 for the two lots. (1)

3.2 What can you draw out concerning the mode of action of cocaine? (0.5)

4. Explain why the use of drugs is forbidden and not recommended. (1)

Answer Key for Mock 2 12SE

Exercise 1 (5 points, each 1 point)

1. False. The transmission of a nervous message is blocked at an inhibitory synapse.

2. False. Depolarization of the membrane of a neuron is due to the massive penetration of Na^+ ions into the intracellular medium.

3. False. The nerve impulse is elaborated at the level of the sensory receptors starting from a threshold or an effective intensity.

4. True.

5. False. Enkephalins and morphine bind to the same receptors.

Exercise 2 (10.5 points)

Part A

1. The range of normal growth for a 12-month-old boy varies between 72 and 78 cm with respect to height and between 9 and 11 Kg with respect to mass. (1)

2. BMI= $M/ H^2 = 7/ (0.7)^2 = 14.28$ (0.5)

3. Referring to document 2, the BMI of this boy is less than 18 which indicates that he is very thin. According to document 1, this boy has a mass and a height below the average for his age, which indicates that he has a lower growth than the normal. (1)

Part B

1. Table showing the variation of the death rate resulting from cardiovascular as a function of the amount of cholesterol in the blood (2)

Amount of cholesterol in blood (in g/L)	1.8	2	2.2	2.5	2.6	2.8
Death rate resulting from cardiac diseases (per 1000)	4	5	6	8	12	16

2.a. As the amount of cholesterol in the blood increases from 1.8 g/L to 2.8 g/L, the death rate resulting from cardiac diseases increases from 4 per 1000 to 16 per 1000. (1)

b. Cholesterol provokes cardiac diseases which may lead to death. (1)

3. LDL transports cholesterol to body cells. HDL transports cholesterol that is destroyed in the tissues to the liver thus prevents its accumulation in the blood.

LDL develops atherosclerosis. In abnormal conditions, the LDL deposits the cholesterol on the internal wall of the artery where it tends to accumulate and to form an atheroma plaque which narrows the artery and favors atherosclerosis. (3)

4. Avoid eating food rich in cholesterol. More physical activity or any valid advice. (each advice 0.5 point)

Exercise 3 (4.5 points)

1. Dopamine is involved in the pleasure sensation. Document 1 shows an increase of the amount of dopamine in a specific region of the cerebrum from 1 to 2.5 relative values within 60 minutes after the injection of cocaine. Thus the increase of the dopamine concentration in the cerebrum due to the action of cocaine, increases this pleasure sensation. (1)
2. The parameters are related to the synaptic transmission of the nerve message. The AP propagating through the dopamine neuron reaches the terminal buds of this neuron and stimulates the exocytosis of dopamine contained in the vesicles. The high quantity of neurotransmitters released in the synaptic cleft is proportional to the high frequency of AP. These neurotransmitters fix on specific receptors on the membrane of the postsynaptic cell. Then, a moderate quantity of the neurotransmitters is recaptured through the presynaptic membrane. (1)
3. The frequency of AP in the dopamine neuron and the amount of liberated dopamine are high and identical in both lots.
The amount of dopamine recaptured by the dopamine neuron is moderate and higher in lot 1 than in lot 2 where it is low. (1)
4. Cocaine diminishes the recapture of the dopamine neurotransmitters by the presynaptic neuron. (0.5)
5. The use of drugs is forbidden since drugs provoke physical and psychological dependence and causes, at long term, behavioral disturbances and neuronal and/or general toxicity. (1)