


<p>المادة: علوم الحياة الشهادة: الثانوية العامة الفرع: الآداب والانسانيات نموذج رقم - ١ - المدة : ساعة واحدة</p>	<p>الهيئة الأكاديمية المشتركة قسم العلوم</p>	 <p>المركز التربوي للبحوث والإنماء</p>
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نموذج مسابقة (إبراعي تعليق الدروس والتوصيف المعدل للعام الدراسي ٢٠١٦-٢٠١٧ وحتى صدور المناهج المطورة)

Exercise 1 (7 points)

Is Morphine a Drug ?

Morphine is still considered as the most effective analgesic that relieves acute pain. However its usage lead to addiction. In order to better understand the risk of the usage of morphine, clinical observations are performed some of which are presented in the document below.

Morphine, an analgesic which is used primarily to stop the pain sensation, works on receptors at the level of the brain and spinal cord. However, the pain relief provided by this substance creates also a feeling of euphoria that may push the patients to continue the intake of morphine long after the disappearance of pain. Consequently, they become morphine-dependent and tend to increase the dose of morphine to achieve the desired effect.

In case morphine usage is arrested, patients suffer from severe withdrawal symptoms such as restlessness, anxiety, yawning, sweating, muscle or abdominal pain, ..., as well as difficulties in all life activities, including interpersonal problems, social isolation, job loss and financial problems. Despite of all that, the patients cannot quit. This means that the patients have already begun to focus on morphine, to worry about getting it, and to use it to retrieve its effects. In principle, this is defined as addiction.

1- Pick out from the text :

- 1-1 The role of morphine,
- 1-2 Two withdrawal symptoms,
- 1-3 The location of receptors where the morphine works.

2- Show that morphine can cause psychic and physiological dependence as well as tolerance.

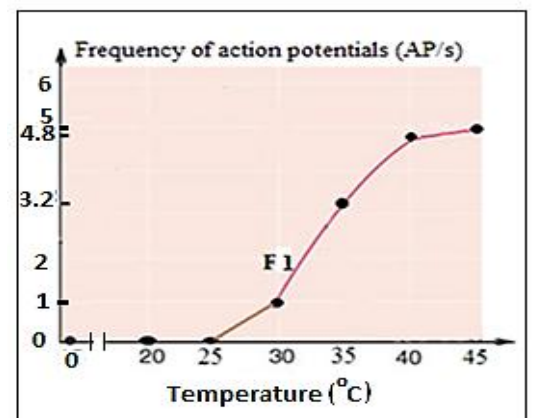
3- Can morphine be considered as a drug ? Justify the answer.

Exercise 2 (7 points) Cutaneous Sensitivity

The skin has various receptors that can be sensitive to hot or cold stimuli or pain stimuli (nociceptors). In order to identify the types of certain cutaneous receptors, the following experiments are carried out.

Experiment 1: An isolated cutaneous receptor (r1) is placed in ice water (0°C). The temperature of water is changed and the frequency of the action potentials propagating along the nerve fiber F1, originating from the receptor (r1), are recorded.

The obtained results are presented in document 1.



Document 1

1. Deduce the type of the sensory receptor involved in the cutaneous sensitivity shown in document 1.

Experiment 2: The previous experimental protocol is repeated on another sensory receptor (r2). The results are presented in document 2.

Temperature (°C)	0	5	10	20	30	40	45
Frequency of AP (AP/s)	5	2	0	0	0	0	2
Amplitude of AP (mV)	90	90	0	0	0	0	90

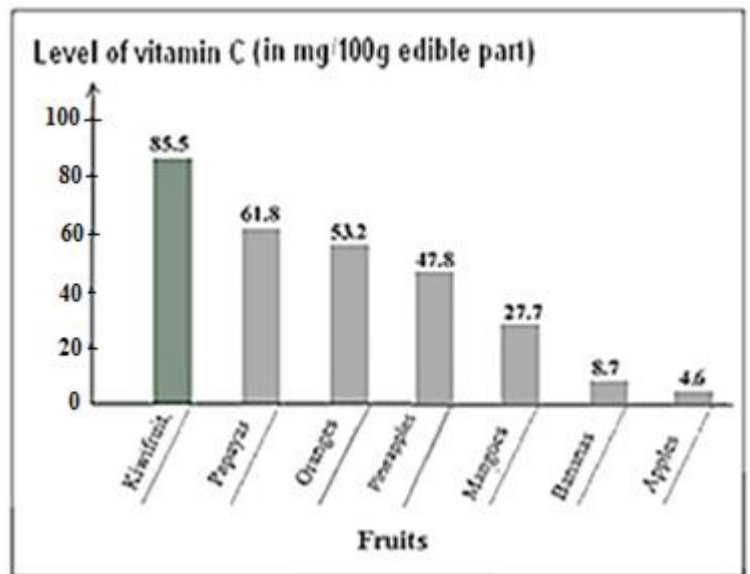
2. Draw the curve which represents the variation of the frequency of AP as a function of temperature.

3. Show, by referring to documents 1 and 2, that this cutaneous receptor is sensitive to pain. Document 2


4. Determine, by referring to document 2, the type of coding of nervous message along a nerve fiber.

Exercise 3 (6 points) Vitamin C Deficiency

Scurvy is a disease caused by a food diet poor in vitamin C (ascorbic acid). Patients suffering from this disease may develop anemia, exhaustion, and sometimes mouth ulcer (ulcer in the gums) and loss of teeth. Human cannot synthesize vitamin C. This vitamin is destroyed under heat or extensive exposure to light. Consequently, we have to obtain it from external sources, like fresh fruits and vegetables, or some foods which are enriched in vitamin C. The adjacent document shows the level of vitamin C in the edible part of certain fruits.

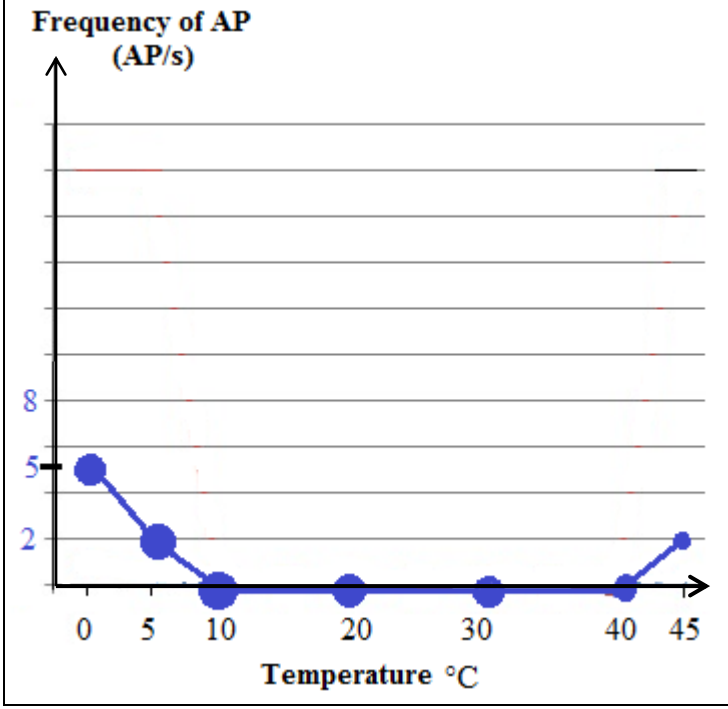


1. Pick out:
 - 1.1 The cause of Scurvy.
 - 1.2 Two symptoms of Scurvy.
 - 1.3 The fruit which is the poorest and the one which is the richest in vitamin C.
2. Represent in a table the level of Vitamin C in the edible part of certain fruits in the above document.
3. Indicate, by referring to the above document, the fruit that you would suggest to be part of the food diet of a patient suffering from scurvy in Lebanon? Justify your answer by giving two reasons.
4. Justify the statement: " Patients are advised to eat fresh fruits"

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أسس التصحيح (تراعي تعليق الدروس والتوصيف المعدل للعام الدراسي ٢٠١٦ - ٢٠١٧ وحتى صدور المناهج المطورة)

Q of Ex	Exercise 1 (6 points)	score
1-1	Morphine is an analgesic which is used primarily to stop the sensation of pain	1
1-2	restlessness, anxiety, yawning, sweating, muscle or abdominal pain (any two physiological symptoms)	1
1-3	It works on receptors in the brain and spinal cord	1
2	<p>Since morphine creates a feeling of euphoria at the level of the user that pushes him to continue taking it for a long time after the disappearance of the pain, this means that the patient shows psychic dependence to morphine intake.</p> <p>If morphine intake is arrested, patients will suffer from severe withdrawal symptoms and, despite of this, the patient cannot stop taking the drug. This means that the patient has already began to focus on morphine, to worry about getting it, and to use it to recover its effects. In principle, this is defined as addiction. This means that the patient shows physiological dependence to morphine intake.</p> <p>Since the user of morphine tends to increase the amount of drug to achieve the desired effect, this means that his body has adapted to repeated doses and must continually increase the dose to achieve the desired effects. This means he becomes tolerant to morphine intake.</p>	2
3	Yes. Since morphine induces physiological dependence, psychic dependence and tolerance just like the drug, then it is considered as a drug	1

Part of the Ex	Exercise 2 (7 points)	Score
1	The frequency of action potentials along the nerve fiber F1 remains null when the temperature increases from 0 to 25°C. On the other hand, it increases to 5 AP/s when the temperature increases from 25 to 45°C. Thus the sensory receptor (r1) is only sensitive to high temperatures (above 25°C). Hence, (r1) is a heat sensitive thermal receptor.	2
2	<p>Title: The variation of the frequency of AP in a nerve fiber F1, originating from the receptor (r2) as a function of temperature.</p> 	1 ½
3	The frequency of AP, recorded on the nerve fiber issued from (r2) only at a very high temperature of 45°C, or at very low temperatures below 5°C, is 2 AP/s. On the other hand, the frequency of AP propagating along F1 issued from the sensory receptor (r1) (document 1) are only recorded at high temperatures, above 25°C. Therefore, (r2) is not a thermal sensory receptor for the warm or cold, it is a sensory receptor for very low temperatures as well as for very high temperatures, so it is a nociceptor.	2
4	The frequency of AP increases from 2 to 5AP/s, but the amplitude of AP stays constant at 90 mV as the temperature decreases from 5 to 0°C. Therefore, at the level of a nerve fiber, the nerve message is coded by modulation of frequency of AP and not by amplitude	1 ½

Part	Exercise 3 (7 points)								Mark																
1.1	Scurvy is caused by a food diet deficient in vitamin C								1																
1.2	The symptoms of scurvy are: Anemia, exhaustion, and sometimes mouth ulcer and loss of teeth (choose 2 symptoms).								1																
1.3	The fruit which is the poorest in vitamin C is the apple. The fruit which is the richest in vitamin C is the kiwi.								1																
2	<table border="1"> <thead> <tr> <th>Fruits</th> <th>Kiwi</th> <th>Papaya</th> <th>Orange</th> <th>Pineapple</th> <th>Mango</th> <th>Banana</th> <th>Apple</th> </tr> </thead> <tbody> <tr> <td>Level of vitamin C (mg/100g of edible part)</td> <td>85.5</td> <td>61.8</td> <td>53.2</td> <td>47.8</td> <td>27.7</td> <td>8.7</td> <td>4.6</td> </tr> </tbody> </table>								Fruits	Kiwi	Papaya	Orange	Pineapple	Mango	Banana	Apple	Level of vitamin C (mg/100g of edible part)	85.5	61.8	53.2	47.8	27.7	8.7	4.6	1
	Fruits	Kiwi	Papaya	Orange	Pineapple	Mango	Banana	Apple																	
Level of vitamin C (mg/100g of edible part)	85.5	61.8	53.2	47.8	27.7	8.7	4.6																		
Title: the variation of the level of vitamin C in mg/100g of edible part in different fruits																									
3	<p>It is advisable to include kiwi in the food diet of a scurvy patient because its vitamin C content is the highest (85.5 mg / 100g of edible part) and it is available in Lebanon.</p> <p>or</p> <p>It is advisable to include orange because orange is one of the fruits which are rich in vitamin C, it constitutes 53.2 mg / 100g of the edible part. Also, since it is commonly cultivated in Lebanon it is available for all the population at a low price.</p>								1 ½																
4	Fresh fruits are recommended to patients because they retain their nutritional value, especially vitamin C, a vitamin which is destroyed by heat or prolonged exposure to light.								1½																