

الاسم:	مسابقة في مادة الفيزياء
الرقم:	المدة: ساعة واحدة

The exam is formed of three exercises.**The use of non-programmable calculators is recommended.****I-(07 points)****The Earth is in Danger**

Read carefully the following selection. Then, answer the questions that follow.

“Human activities lead to serious pollution problems that affect air, water and soil. These effects can be progressive or violent, regional or global”.

This pollution attacks our planet the Earth and manifests itself in various forms:

- ☒ gases and exhaust fumes due to vehicles or factories affect the atmosphere.
- ☒ wastes and garbage thrown in rivers, lakes and seas, are the main causes of water pollution.
- ☒ chemical fertilizers are pesticides used in agriculture contribute to pollution of air and soil.

In brief, human health is in danger. The seriousness of the situation that is due to the greedy and uncontrolled activities of man requires an urgent solution...”

After: Journal spécial Huit.

Questions:

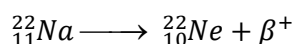
1. Pick up, from the text, two human activities that are responsible for the pollution of the environment.
2. There are two types of pollutants:
 - a) Give the names of these two types.
 - b) Which of the two types of pollutants is more dangerous? Why?
 - c) Draw, from the text, one example of each type.
3. In Lebanon, air pollution often appears as a brown thick layer, called “smog” that envelops coastal cities.
 - a) Due to what is this smog?
 - b) Give the names of two gases forming the smog and specify the harmful effect of each on the human health.
4. The temperature of the Earth is expected to rise about 3° by the end of the 21st century.
 - a) Give the name of the phenomenon that is responsible for the global warming.
 - b) Due to what is this phenomenon?
5. The pollution affects the water and the soil. Give the name of one harmful effect of this pollution on water and another on soil.
6. According to the text, human health is in danger. The seriousness of the situation requires to reduce the pollution that affects air, water and soil. Give a way in order to limit pollution in each medium.

II-(07 points)**β+ Radioactivity**

The object of this exercise is to show evidence of the properties of β⁺ radioactivity and its effect on the human body.

1. Equation of reaction

The disintegration of the sodium (${}_{11}^{22}\text{Na}$) radionuclide is given by the reaction:



- a) Applying the convenient laws, determine the charge (atomic) number and the mass number of β⁺.
- b) What is the nature of the β⁺ particle?

2. Liberated energy

Calculate, neglecting the mass of the emitted β^+ particle, the mass defect produced by this reaction. Deduce the energy liberated by this reaction.

Given:

- ☞ Mass of sodium nucleus $m({}_{11}^{22}\text{Na}) = 21.988u$;
- ☞ Mass of neon nucleus $m({}_{10}^{22}\text{Ne}) = 21.985u$;
- ☞ $1u = 1.66 \times 10^{-27}kg$; $c = 3 \times 10^8m/s$.

3. Biological effects

A man of mass $80kg$ exposed to a source of radioactive (${}_{11}^{22}\text{Na}$), receives energy of $4J$ from the source.

- a) Calculate, in Gy , the dose absorbed by this man.
- b) Knowing that the Relative Biological Efficiency (R.B.E) of a β^+ radiation is 1. Calculate, in Sv , the Physiological Equivalent of Dose received by the man.
- c) Referring to the adjacent table, deduce the effect of the disintegration of (${}_{11}^{22}\text{Na}$) on that man.

Physiological equivalent of Dose (Sv)	Effects
More than 10	Mortality
1	Digestive troubles
0.05	Modification of the blood formula

III-(06 points)

The Solar System

Read carefully the following selection. Then, answer the questions that follow.

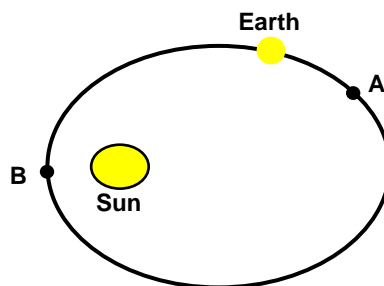
The Solar system is a well-ordered kingdom, her majesty-the Sun, is radiating fire-ball at its center...Planets revolve around the Sun along well-determined orbits that are almost in the same plane.

The four planets that are nearest to the Sun have in common some comparable properties; they are called inner (terrestrial) planets. The remaining planets, except one, are gaseous planets.

The inner planets are separated from the outer ones by a belt formed of millions of "large rocks".

Questions:

- What is the number of the outer planets forming the solar system?
- What do we call the planets that are nearest to the Sun? Why? Give the names of two of these planets.
- What is the scientific name of the term "large rocks" that is mentioned in the text?
- What are the other constituents of the solar system that are not mentioned in the text?
- Most of the planets orbit the Sun in almost the same plane. Give the name of this plane.
- The speed of a planet in its orbit does not keep always the same value due to the shape of that orbit.
 - a) What is the shape of this orbit?
 - b) The adjacent figure shows the Sun, the orbit of Earth around the Sun and two positions through which the Earth passes.
In which of these two positions A or B, is the speed of Earth greater? Justify stating the corresponding law.
- In the text, the planets are supposed to revolve around the Sun.
Give the names of two astronomers of the 16th and 17th centuries who proposed this theory.



دورة سنة 2003 العادية	امتحانات الشهادة الثانوية العامة فرعا الاجتماع والاقتصاد والآداب والإنسانيات	وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات
الاسم: الرقم:	مسابقة في مادة الفيزياء المدة: ساعة واحدة	مشروع معيار التصحيح

First Exercise (7 points)

Part	Answer	Mark
1	Industry that is responsible for ejecting gases and smokes in the air Exhausts of vehicles that ejects gases and smokes affecting the atmosphere. Wastes that are disposed by man into rivers, lakes and seas. Pesticides that are used by farmers in agriculture.	0.5
2.b	Biodegradable and non-degradable	0.5
2.b	Non-degradable since they decompose slowly or never decomposed by nature.	0.5
2.c	Animal wastes are biodegradable Pesticides are non-degradable	0.5
3.a	This smog is due to gases and smokes that are emitted by the exhaust of vehicles.	0.5
3.b	Carbon dioxide CO ₂ causes cardiac troubles and sulfur oxide causes bronchitis.	1
4.a	Greenhouse effect causes the global warming	0.5
4.b	This phenomenon is due to the existence of the greenhouses gases in the atmosphere.	1
5	The death of fish and other forms of aquatic life is a harmful effect of the water pollution The destruction of crops and forests is a harmful effect of the soil.	1
6	We can limit pollution: of air, using filters in cars and factories; of water, by preventing the disposal of sewage waters in rivers, seas and lakes; of the soil, by decreasing of use of pesticides and toxic chemical products	1

Second Exercise (6.5 points)

Part	Answer	Mark
1.a	By applying the law of conservation of the mass number: $22 = 22 + A \Rightarrow A = 0$ By applying the law of conservation of the charge number: $11 = 10 + Z \Rightarrow Z = 1$	1
1.b	Positron	0.5
2	$\Delta m = m_b - m_a = m({}_{11}^{22}\text{Na}) - m({}_{10}^{22}\text{Ne}) = 21.988\text{u} - 21.985\text{u} = 0.003\text{u}$ $\Delta m = 0.003\text{u} = 0.03 \times 1.66 \times 10^{-27} = 4.98 \times 10^{-30}\text{kg}$ $\Delta E = \Delta mc^2 = (4.98 \times 10^{-30})(3 \times 10^8)^2 = 4.48 \times 10^{-13}\text{J}$	2.5
3.a	Dose = $\frac{\text{Energy}}{\text{mass}} = \frac{4\text{J}}{80\text{kg}} = 0.05\text{J/kg} = 0.05\text{Gy}$	1
3.b	P. E = Dose \times R. B. E = $0.05 \times 1 = 0.05\text{Sv}$	1
3.c	Modification of the blood formula	0.5

Third Exercise (6.5 points)

Part	Answer	Mark
1	Five planets.	0.5
2	Inner or terrestrial planets, since they are close to the Sun and have similar properties. Mercury – Venus – Earth – Mars.	1.5
3	Asteroids.	0.5
4	The comets, meteoroids, and the satellites of planets	1
5	Ecliptic plane	0.5
6.a	Elliptical.	0.5
6.b	At position A the speed is greater since according to Kepler's 2 nd , as the distance decreases, the speed will increase.	1.5
7	Copernicus and Kepler.	0.5