

PART ONE: LISTENING COMPREHENSION (20 POINTS)

I. You will hear a radio programme about the US power grid. You will hear it twice. Read sentences 1-10, listen to the recording, and circle the correct letter: (T) if the sentences are true, (F) if they are false, or (NO INFO) if the relevant information is not given in the recording. (10 points)

1. In 1967, the electrical network in the United States was unified into a single system covering the entire country. T / F / NO INFO
2. The speaker states that blackouts happen when the equipment is damaged. T / F / NO INFO
3. Grid operators instruct power plants to match electricity production with demand. T / F / NO INFO
4. The exact location of every power grid control centre is important for preventing outages. T / F / NO INFO
5. The dispatch curve determines which energy sources are used first, usually starting with the cheapest ones. T / F / NO INFO
6. Some grids can run almost fully on clean energy. T / F / NO INFO
7. Kansas uses all of its wind energy during the day, when demand is highest, so none of it is wasted. T / F / NO INFO
8. Researchers have received generous grants to find new ways to store energy from renewables. T / F / NO INFO
9. Load flexibility can help reduce reliance on non-renewable energy sources. T / F / NO INFO
10. Around 20% of air conditioners, water heaters, and electric vehicle chargers in Texas use smart technologies. T / F / NO INFO

II. You will hear excerpts of a radio programme about the history of the BIC Crystal pen. You will hear it twice. Read sentences 1-10, listen to the recording and complete the sentences below with words or numbers that you hear in the recording. Write NO MORE THAN TWO WORDS for each answer. Transfer your answers to the column on the right. (10 points)

1.	People all over the world recognize the _____ design of the BIC Crystal pen.	
2.	Daily sales of the BIC Crystal pen reach _____ worldwide.	
3.	Traditional pens were pricey and not particularly user-friendly, so writing was considered a/an _____.	
4.	The metallic nib of the fountain pen turned out to be _____ and therefore unable to manage the flow of ink.	
5.	Making the ball too tight for its socket caused the ink to _____, while making it too loose caused messy leakage.	
6.	Laszlo Biró saw great potential in thick _____ inks, which dried quickly and didn't seep through the paper.	
7.	The principle of capillary action can be observed in the flow of _____ in the human body.	
8.	Marcel Biche developed a way to mass-produce tiny stainless steel balls with precision down to a/an _____ of a millimetre.	
9.	The hexagonal barrel of Marcel Biche's pen was not only strong and cheap, but also _____, so the user could monitor the level of ink.	
10.	The simple and inexpensive new pen became a great success in France as soon as it was introduced to the market in _____, costing just \$2.	

PART TWO: READING COMPREHENSION (20 POINTS)

GENERAL READING (10 points)

A. For statements 1-5, circle the most appropriate option according to the text below.

1. The main idea of the article is that lightning:
 - a) is very unpredictable and has little effect on the atmosphere.
 - b) can both pollute the air and help clean it.
 - c) causes more air pollution than human activities.
2. The creation of hydroxyl radicals by lightning is seen as a balancing effect because they:
 - a) help decompose greenhouse gases that stay in the atmosphere for a long time.
 - b) remove all nitrogen oxides created by storms.
 - c) stop ozone from forming in the upper atmosphere.
3. Scientists find nitrogen oxide from lightning more difficult to study than human-made emissions because it:
 - a) has a different chemical structure than nitrogen oxide from vehicles.
 - b) is released high in the atmosphere, where its effects are harder to understand.
 - c) only appears during very rare weather events.
4. The phrase “conveyor belts of moving air” used in relation to pollution means that:
 - a) pollution stays close to where it is produced.
 - b) pollution moves only along human-made transport routes.
 - c) pollutants can move long distances from their source.
5. The overall conclusion of the study is that better lightning data:
 - a) improves climate models but shows that lightning has little effect on air quality.
 - b) mainly helps explain how lightning increases pollution, especially ozone, in storm-affected regions.
 - c) might improve understanding of both pollution and air-cleaning effects, leading to more accurate air-quality and climate models.

B. For statements 6-10, decide whether they are true (T), false (F) or the information is not given in the text (NO INFO).

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|---|-----------------|
| 6. Scientists understand how lightning creates nitrogen oxides, but they do not fully understand how these gases affect the atmosphere overall. | T / F / NO INFO |
| 7. The movement of ozone from storms to faraway areas partly depends on seasonal temperature changes. | T / F / NO INFO |
| 8. Ozone produced by lightning is more harmful to human health than ozone produced by human activity. | T / F / NO INFO |
| 9. Hydroxyl radicals produced by lightning only affect pollutants that come from human activity. | T / F / NO INFO |
| 10. Researchers found that stronger lightning strikes create much higher amounts of nitrogen dioxide. | T / F / NO INFO |

How lightning passes gas and why it matters for our atmosphere

Lightning is as beautiful as it is deadly. It also passes gas. The lightning bolts that streak across the sky during thunderstorms emit a gas found in car exhaust—nitrogen oxide (NO). This gas can negatively affect air quality and trigger respiratory illnesses in humans, but how lightning-generated nitrogen oxide affects the atmosphere is less clear.

Lightning strikes generate extremely hot temperatures that break apart nitrogen and oxygen molecules in the air. This molecular change creates nitrogen oxide, nitrogen dioxide (NO₂), and other types of nitrogen oxide gas. These are some of the same air pollutants that cars, power plants, and other fossil fuel combustion generates. In turn, nitrogen oxides create ozone pollution.

While there is significantly more human-generated pollution in the atmosphere, lightning releases nitrogen oxides at much higher altitudes. At these heights, lightning can create ozone, a pale blue gas. More ozone can lead to more air pollution in the upper atmosphere, the same way that car exhaust generates ozone pollutants near the ground.

Sometimes, the ozone lightning creates can be transported down to Earth's surface, affecting the air quality hundreds of miles away from the original storm. This effect is generally worsened during the summer, when temperatures climb higher and more ozone is produced.

However, lightning doesn't just create this high-level atmospheric pollution. It also triggers the formation of hydroxyl radicals. These are important molecules that help clean the Earth's atmosphere by breaking down greenhouse gases like methane and background levels of ozone pollution that didn't originate from a local, human-produced source.

So, how does this mix of air cleaning hydroxyl radicals and air polluting ozone unfold in the atmosphere?

To find out, a team of scientists used high-frequency satellite observations to create an experiment that can detect lightning and its impact on the air. Atmospheric scientists, K. Pickering and D. Allen, used data captured by NASA's Tropospheric Emissions: Monitoring of POLLution (TEMPO) instrument. TEMPO was launched in 2023, and it tracks air pollutants from 22,000 miles above the Earth. In late June, the team carefully monitored thunderstorms as they moved across the eastern United States using TEMPO. Typically, the satellite tracks air pollutants every hour. Instead, Pickering and Allen's experiment took measurements of the nitrogen dioxide associated with each storm at 10-minute intervals.

By measuring nitrogen dioxide every 10 minutes, they observed the complicated atmospheric processes happening live inside of each thunderstorm. These short interval observations gave the scientists better snapshots of what actually happens during a storm. The team found that thunderstorms simultaneously produce both pollutants and critical chemicals that help cleanse the Earth's atmosphere.

According to Allen, the data provides a highly accurate idea of how much nitrogen dioxide each flash of lightning produces during a storm and how long it sticks around afterward. Additionally, the experiment offers insight into the chain reaction that connects the polluting nitrogen oxides to the air-cleaning hydroxyl radicals.

The preliminary data from this experiment has not been reviewed by other scientists yet, but added analysis could help improve climate models that impact daily life here on Earth. The gases produced by lightning can travel on long "conveyor belts of moving air" and possibly influence the air quality far from where storms originally occurred. Lightning also occasionally contributes to ground-level ozone, which is a primary component of smog that can trigger asthma and other respiratory diseases.

The scientists claim that for people living in mountainous areas like Colorado, this information can be very important as lightning does make a significant contribution to surface ozone at higher terrain altitudes. It could make a difference in how meteorologists predict air quality during and after storms in such regions. Furthermore, the researchers say that better data will allow them to come with more accurate predictions, and potentially better ways to protect our health and environment from both natural and human-made pollution.

II. READING 2 (10 points)

The text has six paragraphs, A - F. Find the paragraphs which match sentences 1-10. Write the correct letter (A-F) in the column on the right. Write (X) if the information is not included in any paragraph.

Find the paragraph which...

1.	...suggests that the project might influence building regulations regarding sustainable construction integrated with digital technologies.	
2.	...suggests that the project's long-term goal is to transform housing on a broad scale, not just produce a single prototype.	
3.	...implies that the home's spatial design supports well-being by connecting residents with light, air, and openness.	
4.	...shows that natural materials can achieve the same level of safety and durability as modern industrial ones.	
5.	...suggests that sustainable design can imitate natural cycles, allowing human-made structures to go back to the earth without harm.	
6.	...explains the specific 3D printing software used to design the home's curved structure.	
7.	...shows how the project blends organic architecture with smart technology to enhance comfort and security.	
8.	...mentions Japan's government funding provided for the construction of the house.	
9.	...highlights how changing building techniques can directly reduce the environmental impact of construction.	
10.	...shows how House Model B functions as a self-reliant energy system.	

Japan's First 3D-Printed Earth House Redefines Sustainable Construction

A. In the city of Yamaga, located in Japan's Kumamoto region, a modest 100 m² home, the Lib Earth House Model B, (built by the Lib Work company), marks a turning point in building sustainable homes. Instead of concrete, the house is printed in layers using a specially blended mix made mostly of local earth and sand, and threaded with plant fibers. These materials are abundant, renewable, and fully biodegradable. At the end of its lifecycle, much of the building can return to the ground with minimal waste.

B. To construct this house, a large-scale 3D printer supplied by the Italian firm WASP and engineering partner Arup lays down successive layers of the earthen blend directly on the prepared foundation. Once the shell is complete, builders install the timber frame, roof, windows, and interior finishes. Even though the finished walls are mostly soil, they meet Japan's top seismic safety grade (Grade 3), capable of withstanding strong earthquakes. Compared with earlier prototypes, the material now offers roughly five times greater strength. Additionally, building with this method emits only about half the CO₂ normally released during construction, cutting emissions from roughly 45,000 kg to around 22,400 kg for a compact 100 m² home.

C. By using 3D printing, designers accomplish entire curves, soft contours, and irregular geometries not possible to obtain with bricks or boards. Model B is laid out in a cluster configuration, with open spaces organized around a small courtyard. Big, wide windows invite light and allow air to flow naturally. Inside, the layout features living, dining, cooking, and sleeping areas, as well as a bathroom and a toilet. A facial-recognition entry system adds a touch of smart convenience.

D. The house runs off the grid. Solar panels feed energy into a battery system (a Tesla unit), powering climate control, lighting, and even the bath. Many of these functions can be controlled from a phone or a dedicated device. Sensors embedded in the walls gather data on humidity and insulation, as the house is tested.

E. Lib Work aims to deliver 10,000 homes by 2040. Unlike in traditional building, they imagine automating the entire process from on-site printing to finishing, making the method scalable, adaptable, and eventually global.

F. Lib Work's Earth House Model B emerges as Japan begins to open its building codes to new materials and digital methods. As regulations evolve, the project stands as a clear example of how additive construction achieved by the use of 3D printing technology can work with unprocessed soil at an architectural scale. It shows that this material can serve not just as a structure but as a living element of climate-responsive design. The collaboration between Japanese builders and Italian engineers also underlines how shared innovation can shape a more sustainable future.

PART THREE: VOCABULARY AND GRAMMAR (20 POINTS)

- I. For questions 1-5, complete the second sentence so that it has a similar meaning to the first sentence. Use the words written in bold. Write between TWO AND FIVE WORDS in each case. Use words from the original sentence wherever possible. (5 points)

1. Aerospace engineers have to observe aircraft maintenance and pre-flight inspection procedures. **BE**
Aircraft maintenance and pre-flight inspection procedures
2. If governments do not invest in renewable energy, dependence on fossil fuels will remain high. **UNLESS**
Dependence on fossil fuels will remain high in renewable energy.
3. A Californian start-up has attracted some of Stanford's top young graduates to its offices in San Francisco. **BEEN**
Some of Stanford's top young graduates a Californian start-up to its offices in San Francisco.
4. BYD made the first electric cars in 2008. **HAS**
BYD electric cars since 2008.
5. The university claims two of its scientists knew about ethical violations in an asthma study. **MUST**
The university claims two of its scientists ethical violations in an asthma study.

- II. For questions 1-5, circle the correct answer: a, b, c, or d. (5 points)

1. new national regulations companies had to introduce a code of ethics.
a) Because b) Despite c) Due to d) Since
2. The Dean had many visitors yesterday, three of were students of our faculty.
a) which b) whom c) who d) their
3. For very few students the dorm fees is a good idea.
a) rising b) arising c) to rise d) raising
4. The students succeeded reaching the examination room on time.
a) with b) in c) to d) for
5. All the flights from Dubai were temporarily called on 2 March 2026.
a) out b) on c) down d) off

III. ESP – VOCABULARY – ELEKTRONIKA I TELEKOMUNIKACJA / TELEINFORMATYKA (10 points)

Match each term in column A with an appropriate definition from column B. There are three options in column B that cannot be matched. Write your answers in the table below.

A	B
1. packet switching	A. the process of converting a received signal back into its original information
2. malware	B. extra systems or components added to a network to keep it working if one part fails
3. default	C. a curved antenna used to send and receive signals to and from satellites
4. dish	D. the amount of time needed between starting a process and its completion or delivery
5. node	E. a device used to turn an electrical signal on or off, acting like an electronic switch in a circuit
6. outage	F. a type of cable with a central wire, insulation, and a metal shield, used to carry signals with low interference
7. decoding	G. the main part of a network that connects smaller networks and carries most of the data
8. redundancy	H. a program designed to carry out specific maintenance tasks to keep the computer operating smoothly
9. coaxial	I. a period when a network stops working and users cannot connect or communicate
10. backbone	J. a method of sending data in small chunks that travel separately and are reassembled at the destination
	K. a pre-set value or option that a system uses automatically if no other choice is made
	L. harmful software designed to damage, disrupt, or gain unauthorized access to a computer or network
	M. any device connected to a network that can send, receive, or forward data

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.

PART FOUR: WRITING (20 POINTS)

Choose ONE of the following topics. Write between 150 and 250 words.

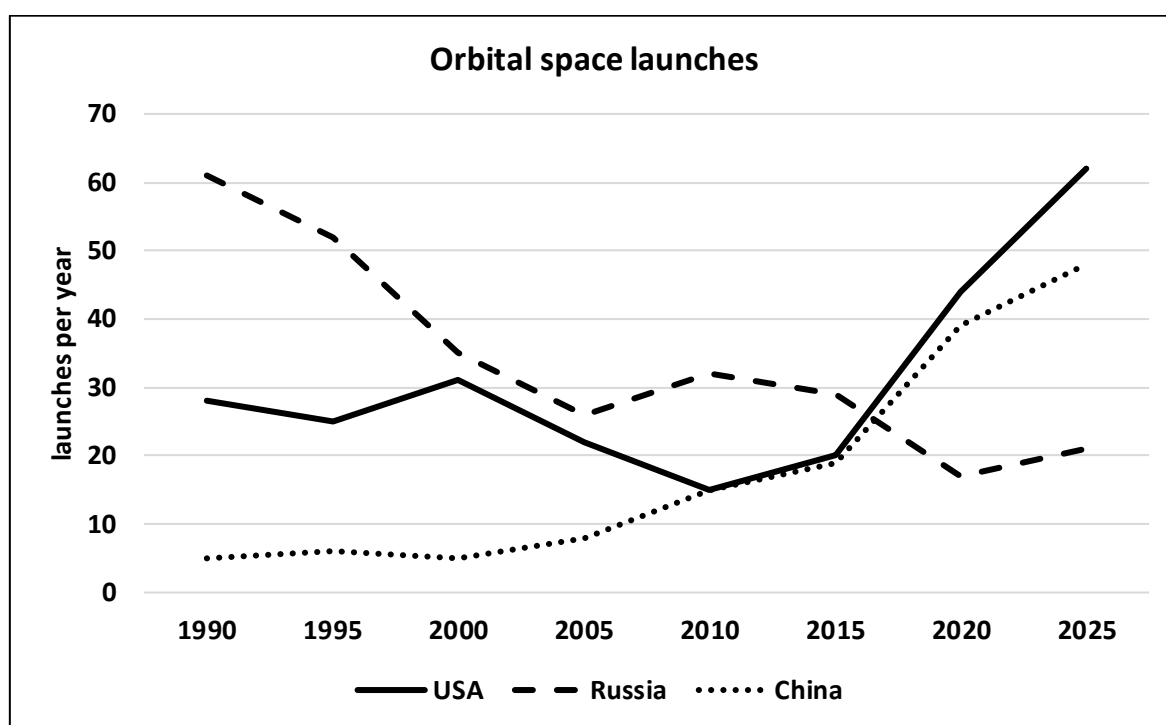
1. GUIDED WRITING – GRAPH INTERPRETATION

Imagine you are taking part in a research project examining the number of orbital space launches carried out by the United States, Russia, and China. An orbital launch successfully places something into space so that it continuously circles the Earth or travels onward into deep space. You have been asked to write an analysis of the trends shown in the data between 1990 and 2025.

Write a short paragraph of 150–250 words to describe and explain the graph below. Use a range of vocabulary and expressions, and make sure your verb tenses are consistent.

Your composition must include the following:

- **Description of trends:** Clearly outline the main patterns or changes shown in the graph.
- **Comparison of trends:** Highlight similarities and differences between the data sets and time periods.
- **Interpretation:** Offer several possible explanations for the observed changes, such as the amount of government funding available.



II. GUIDED WRITING – ESP – ELEKTRONIKA I TELEKOMUNIKACJA / TELEINFORMATYKA

You have been assigned a project which includes writing a short text in English.

In about 150-250 words, discuss the role and impact of miniaturization in electronics. In your description cover the following aspects:

- what miniaturization in electronics means
- how it has developed over time
- its impact on technology and everyday life
- your opinion on the future of miniaturization in electronics

Write a few paragraphs.

TASK:

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How many words have you written? _____

Task Achievement 0-5points	Coherence & Cohesion 0-5points	Vocabulary 0-5 points	Grammar 0-5 points	Total