# Reading Test 1

## The Concrete Mind – Urban Architecture and Mental Health

**A.** The rapid urbanization of the 21st century has led to a dramatic shift in the human habitat. For the first time in history, more than half of the global population resides in cities, a figure projected to rise to nearly 70% by 2050. While metropolitan areas offer unparalleled economic opportunities and social connectivity, they also present a unique set of psychological challenges. Modern researchers are increasingly concerned that the "concrete jungle" may be fundamentally mismatched with human evolutionary biology, leading to a rise in chronic stress and cognitive fatigue among urban dwellers.

**B.** One of the primary factors identified by environmental psychologists is the concept of "sensory overload." In a bustling city, the human brain is constantly bombarded by high-intensity stimuli: the roar of traffic, the glare of neon signage, and the unpredictable movements of large crowds. To navigate this environment safely, the mind must employ "directed attention"—a cognitively demanding process that filters out irrelevant information. Over time, the exhaustion of this mental resource can lead to irritability, poor impulse control, and a diminished capacity for problem-solving.

**C.** In contrast, natural environments offer what experts call "soft fascination." Landscapes featuring greenery, water, or fractals—complex patterns found in trees and clouds—capture the attention without requiring active effort. This allows the brain's executive functions to rest and recover. Recent neuro-imaging studies have shown that even a short walk in a park can significantly reduce activity in the subgenual prefrontal cortex, a part of the brain associated with "rumination," or the repetitive negative thought patterns linked to depression.

**D.** The architectural design of residential buildings also plays a critical role in social cohesion. High-rise developments, while efficient for housing large numbers of people, often inadvertently foster a sense of isolation. The lack of "threshold spaces"—such as porches, shared gardens, or wide landings where neighbors naturally cross paths—reduces the frequency of spontaneous social interactions. When residents feel disconnected from those living just inches away through a common wall, the resulting "social loneliness" can be as detrimental to physical health as heavy smoking.

**E.** Urban planning has historically prioritized vehicular efficiency over pedestrian experience. Many cities are designed around the "grid system," optimized for car flow but creating "urban canyons" that trap heat and noise. The absence of walkable pathways and "active fronts"—ground-level shops and cafes with windows—makes the act of walking through a city a utilitarian task rather than an engaging experience. Psychologists argue that when people are forced into cars, they lose the sense of "environmental mastery" that comes from navigating a space on foot.

**F.** However, a new movement known as "Biophilic Design" is attempting to bridge the gap between the artificial and the natural. This approach involves integrating biological elements directly into the structural fabric of buildings. Notable examples include vertical forests in Milan and the integration of indoor waterfalls in Singapore's Changi Airport. Proponents argue that these are not merely aesthetic luxuries but biological necessities. By bringing nature into the workspace and home, developers have observed measurable drops in heart rates and a significant increase in creative output among occupants.

**G.** The economic implications of "psychologically-informed" urban planning are profound. Mental health disorders cost the global economy billions in lost productivity annually. Cities that prioritize green space and human-centric design often see higher property values and better retention of skilled workers. Furthermore, "active design"—which encourages movement through strategically placed staircases and bike lanes—reduces the burden on public healthcare systems by lowering rates of obesity and cardiovascular disease.

**H.** Ultimately, the future of our species depends on our ability to create cities that nurture rather than deplete our mental reserves. As technology allows for more "smart city" integrations, planners must ensure that data-driven efficiency does not come at the cost of human emotion. The most successful cities of the future will likely be those that treat the human mind as a central pillar of infrastructure, recognizing that a city's greatest asset is the well-being of its citizens.

## Questions 1–5: True / False / Not Given

*Do the following statements agree with the information given in the Reading Passage?*

**TRUE** if the statement agrees with the information

**FALSE** if the statement contradicts the information

**NOT GIVEN** if there is no information on this

1. More than 70% of the world's population currently lives in urban areas.
2. "Directed attention" is a mental process that helps urban residents ignore unnecessary background noise and sights.
3. Walking in a park has been shown to decrease specific brain activity associated with negative repetitive thinking.
4. The design of high-rise buildings is the primary cause of the increase in global smoking rates.
5. Biophilic Design has been shown to improve the speed of creative work in addition to lowering heart rates.

## Questions 6–12

Complete the summary below. Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

### The Psychological Impact of Modern Urbanization

The transition to urban living has created a biological conflict, as modern cities may not align with our **(6)** _______________. Residents often face **(7)** _______________ due to constant environmental stimuli, forcing the brain to use a process known as "directed attention." Research suggests that, unlike cities, nature provides **(8)** _______________, which allows cognitive functions to recharge.

Architecturally, the absence of **(9)** _______________ in high-rise buildings contributes to social isolation and "social loneliness." Furthermore, urban layouts that focus on cars rather than people often lack **(10)** _______________, reducing the enjoyment of walking. To combat these issues, the **(11)** _______________ movement seeks to incorporate nature into building structures. Beyond well-being, these design choices have significant **(12)** _______________, including increased worker retention and reduced healthcare costs.

**Reading Passage 2**

# The Digital Resurrection: Remote Sensing in Modern Archaeology

**A** For centuries, the field of archaeology was defined by the physical labor of excavation—the meticulous, often back-breaking process of unearthing artifacts from layers of sediment. Traditional methods relied heavily on historical records and surface-level indicators to identify potential sites. However, the dawn of the 21st century has ushered in a technological revolution, shifting the focus from the shovel to the sensor. Remote sensing, a suite of non-invasive techniques used to gather information about the earth from a distance, is fundamentally altering how researchers identify, map, and preserve human history. By utilizing satellite imagery and aerial reconnaissance, archaeologists can now "see" through dense vegetation and modern urban sprawl to detect the ghostly outlines of ancient civilizations.

**B** Central to this digital toolkit is LiDAR (Light Detection and Ranging), a laser-based scanning technology that has proven to be a game-changer for tropical archaeology. In regions like the Maya Biosphere Reserve in Guatemala, thick jungle canopies have historically obscured massive urban complexes for over a thousand years. LiDAR overcomes this by pulsing laser light from an aircraft toward the ground; while some pulses hit the leaves, others penetrate the gaps to reach the forest floor. By measuring the time it takes for these pulses to return, software can strip away the digital representation of the trees, revealing the "bare earth" topography beneath. This process has recently unveiled thousands of previously unknown structures, including defensive walls, agricultural terraces, and complex highway systems, suggesting that ancient populations were far denser than previously estimated.

**C** Beyond the aerial perspective, geophysical surveys are providing a granular look at what lies beneath the surface without the need for a single trench. Ground-Penetrating Radar (GPR) is perhaps the most prominent of these sub-surface tools. By sending high-frequency radio waves into the soil, researchers can detect reflections from buried features such as stone walls, voids, or hearths. Because different materials reflect waves with varying intensities, a three-dimensional map of a subterranean site can be constructed. This "virtual excavation" allows archaeologists to target their physical efforts with surgical precision, minimizing the destruction of sensitive sites while maximizing the data recovered.

**D** The integration of satellite-based multispectral imaging has also expanded the scope of landscape archaeology. Unlike the human eye, which only perceives a narrow band of the electromagnetic spectrum, satellite sensors can detect infrared and ultraviolet radiation. This is particularly useful for identifying "crop marks"—subtle variations in the health and height of vegetation that occur when plants grow over buried archaeological features. Crops growing over a buried stone wall may be stunted due to moisture stress, while those over a nutrient-rich ancient ditch may flourish. From hundreds of kilometers above, these spectral signatures act as a prehistoric blueprint, guiding researchers to sites that would be invisible from the ground.

**E** However, the influx of massive datasets has created a new challenge: the "Big Data" bottleneck. A single LiDAR flight can generate billions of data points, far more than a human team can analyze in a reasonable timeframe. To combat this, the field is increasingly turning to Artificial Intelligence (AI) and machine learning algorithms. By training neural networks to recognize specific patterns associated with man-made structures—such as the square edges of a foundation or the circular depression of a burial mound—computers can scan vast territories in a fraction of the time. This synergy between human expertise and computational power is accelerating the pace of discovery at an exponential rate.

**F** While these technologies offer unprecedented efficiency, they also raise complex ethical and preservation questions. The ease with which sites can now be identified has inadvertently provided a roadmap for illicit looters. In many conflict-ridden or economically disadvantaged regions, the publication of high-resolution archaeological maps can lead to the rapid destruction of heritage sites before official protection can be established. Consequently, there is an ongoing debate within the academic community regarding "open data" versus "controlled access," as researchers struggle to balance the need for scientific transparency with the imperative of site security.

**G** Furthermore, the shift toward digital archaeology necessitates a re-evaluation of the role of the traditional fieldworker. Critics argue that an over-reliance on remote sensing may lead to "armchair archaeology," where researchers become detached from the physical and cultural context of the landscapes they study. Proponents, however, contend that technology does not replace the shovel but rather enhances its utility. The nuanced understanding of soil composition, artifact stratigraphy, and local oral histories remains essential for interpreting the data provided by a sensor. The digital image can tell us where a building was, but it cannot tell us the social significance of the ceremonies held within its walls.

**H** In conclusion, the marriage of archaeology and high-tech sensing equipment represents a pivotal moment in the study of our collective past. As these tools become more accessible and sophisticated, the hidden chapters of human history are being rewritten with startling clarity. The challenge for the next generation of archaeologists will be to navigate the technical, ethical, and interpretative complexities of this digital frontier. By combining the precision of the laser with the critical eye of the historian, the field is poised to ensure that the secrets of the ancient world are not lost to time, but rather preserved for the future.

## Questions 13–19

*Reading Passage 2 has eight paragraphs,* ***A–H****.*

*Choose the correct heading for paragraphs* ***A–G*** *from the list of headings below.*

*Write the correct number,* ***i–x****, in boxes* ***13–19*** *on your answer sheet.*

**List of Headings**

- **i.** The potential for unintended negative consequences
- **ii.** A comparison of ancient and modern agricultural yields
- **iii.** A shift from physical excavation to remote observation
- **iv.** How vegetation patterns reveal hidden structures
- **v.** The necessity of human interpretation in a digital age
- **vi.** Overcoming natural obstacles with laser technology
- **vii.** The financial burden of high-tech archaeological tools
- **viii.** Using radio waves to map the subterranean world
- **ix.** The role of automated systems in managing large datasets
- **x.** A global database for conflict-zone heritage sites

13. Paragraph **A**: ______
14. Paragraph **B**: ______
15. Paragraph **C**: ______
16. Paragraph **D**: ______
17. Paragraph **E**: ______
18. Paragraph **F**: ______
19. Paragraph **G**: ______

## Questions 20–26

*Complete the summary below. Choose **NO MORE THAN TWO WORDS** from the passage for each answer. Write your answers in boxes **20–26** on your answer sheet.*

**Technological Applications in Archaeology**

Archaeologists are moving away from traditional **20.** __________ and toward remote sensing. One of the most significant tools is LiDAR, which uses **21.** __________ to penetrate thick forest canopies. This allows researchers to see the **22.** __________ of the land, revealing that ancient cities were much more crowded than once thought.

On the ground, Ground-Penetrating Radar (GPR) uses **23.** __________ to create a 3D map of what is buried, allowing for a "virtual excavation." Meanwhile, satellites look for **24.** __________—subtle changes in plant growth that indicate hidden ruins.

Because modern technology creates so much data, researchers now use **25.** __________ to help identify patterns of man-made structures. However, experts warn against "armchair archaeology," arguing that we must still understand the **26.** __________ of the sites we study through physical fieldwork.

## Reading Passage 3

# The Evolution of Cryptography: From Scytales to Quantum Keys

**A** The human desire to safeguard information is as ancient as the written word itself. Long before the advent of digital encryption, civilizations sought ways to transmit sensitive military and political data without it falling into enemy hands. One of the earliest recorded devices was the Spartan *scytale*, a wooden baton used as a transposition cipher. A strip of parchment was wrapped around the rod, the message was written lengthwise, and once unwound, the text appeared as a nonsensical string of characters. Only a recipient with a baton of identical diameter could reconstruct the message, demonstrating that the security of information has historically relied on the possession of a physical "key" or a shared secret.

**B** As linguistic analysis grew more sophisticated, so too did the methods of concealment. During the Renaissance, the vulnerability of simple substitution ciphers—where one letter is consistently replaced by another—became apparent due to frequency analysis. Scholars realized that certain letters occur more often than others in any given language. To counter this, the Vigenère cipher was developed, employing a keyword to shift letters through a polyalphabetic system. For centuries, this "undecipherable cipher" remained the gold standard of secrecy, representing a shift from mechanical concealment to mathematical complexity.

**C** The twentieth century brought about a radical shift in the landscape of cryptography with the introduction of rotor machines. The most famous of these, the Enigma machine used by the German military during World War II, utilized a series of rotating discs to create an astronomical number of possible letter combinations. The complexity was such that the German high command believed the code to be impenetrable. However, the eventual cracking of Enigma by cryptanalysts at Bletchley Park, led by Alan Turing, proved that even the most robust mechanical systems could be defeated through a combination of linguistic intuition and early computational power.

**D** Following the war, the birth of the computer age necessitated a new form of protection: Public Key Infrastructure (PKI). Unlike earlier methods that required both sender and receiver to share a single private key, PKI utilizes a pair of mathematically linked keys—one public and one private. This innovation solved the "key distribution problem," allowing two parties to communicate securely without ever having met. This system underpins the modern internet, securing everything from personal emails to global financial transactions, yet its security is based on a precarious assumption: that certain mathematical problems, like factoring large prime numbers, are too difficult for classical computers to solve quickly.

**E** The stability of modern encryption is now facing an existential threat from the field of quantum computing. Unlike classical bits, which represent either a zero or a one, quantum bits, or qubits, can exist in a state of superposition. This allows a quantum computer to perform multiple calculations simultaneously. An algorithm known as Shor's Algorithm has already demonstrated, theoretically, that a sufficiently powerful quantum computer could bypass the mathematical barriers of current PKI systems in a matter of seconds. This looming "Q-Day" has sparked a global race to develop post-quantum cryptography (PQC) before current systems become obsolete.

**F** One promising solution lies in Quantum Key Distribution (QKD), which moves away from mathematical complexity and toward the laws of physics. QKD utilizes the properties of photons to transmit keys. According to the principles of quantum mechanics, the act of observing a quantum system inevitably alters its state. Therefore, if a third party attempts to intercept a quantum key during transmission, the intrusion is immediately detectable by the sender and receiver. This creates a "provably secure" communication channel, where security is guaranteed by the fundamental nature of the universe rather than the limitations of a computer.

**G** Despite the technological promise of quantum-based security, significant logistical hurdles remain. Implementing QKD on a global scale requires the construction of entirely new infrastructure, including specialized satellite links and fiber-optic cables that can maintain quantum states over long distances. Furthermore, the transition to post-quantum standards involves a massive bureaucratic and technical overhaul for governments and corporations. Critics argue that the cost of this transition may be prohibitive for many nations, potentially creating a "digital divide" where only the wealthiest entities can afford absolute privacy.

**H** In the final analysis, the history of cryptography is a perpetual arms race between the codemaker and the codebreaker. As we stand on the threshold of the quantum era, the stakes have never been higher. The transition from physical batons and mechanical rotors to the manipulation of subatomic particles reflects the increasing complexity of our civilization. Whether we successfully navigate this transition will depend not only on our technical ingenuity but also on our ability to establish global standards that protect the privacy of all individuals in an increasingly transparent world.

## Questions 27–34

*Reading Passage 3 has eight paragraphs, **A–H**.*

*Which paragraph contains the following information?*

*Write the correct letter, **A–H**, in boxes **27–34** on your answer sheet.*

**27.** A description of a physical device used for scrambling text in ancient times.

**28.** An explanation of how observing a system can guarantee the security of a message.

**29.** A reference to the specific mathematical weakness that modern internet security relies upon.

**30.** A mention of the potential for a new form of inequality based on the cost of privacy.

**31.** The reason why simple letter-replacement codes became easy to break.

**32.** A discussion regarding the theoretical ability of new computers to solve complex problems instantly.

**33.** An example of a historical code-breaking success that combined human skill and machines.

**34.** The logistical difficulties involved in upgrading global communication networks.

## Questions 35–40

*Choose the correct letter, **A, B, C,** or **D**. Write the correct letter in boxes **35–40** on your answer sheet.*

**35. What point does the writer make about the Spartan scytale in Paragraph A?**
A. It was the most sophisticated tool of its era.
B. It proved that secrecy depended on physical possession.
C. It was primarily used for domestic political communication.
D. The parchment used was more important than the baton itself.

**36. According to Paragraph B, the Vigenère cipher was an improvement because**
A. it was based on mechanical rather than mathematical principles.
B. it eliminated the need for a shared keyword.
C. it was immune to the frequency analysis used on simpler codes.
D. it was the first cipher to use linguistic analysis.

**37. What is the writer's view of the Enigma machine in Paragraph C?**
A. Its complexity made it truly impenetrable to machines.
B. It represented the pinnacle of 20th-century digital encryption.
C. It demonstrated that mechanical systems have inherent limits.
D. Its success was due to the intuition of the German high command.

**38. The writer suggests that modern Public Key Infrastructure (PKI) is 'precarious' because**
A. it relies on the secrecy of the public key.
B. its safety is based on the current limitations of computers.
C. it has failed to solve the key distribution problem.
D. it is too mathematically complex for the modern internet.

**39. What does the writer imply about 'Q-Day' in Paragraph E?**
A. It is a historical event that changed computing forever.
B. It will happen as soon as Shor's Algorithm is published.
C. It marks the point when current encryption becomes ineffective.
D. It will lead to the immediate end of global financial transactions.

**40. In the final paragraph, what is the writer's conclusion about the future of cryptography?**

A. Technical ingenuity alone will ensure our future privacy.
B. The arms race between codemakers and breakers has finally ended.
C. The stakes of the quantum era are lower than those of the industrial age.
D. Social and technical cooperation is needed to maintain privacy.

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