SECTION II

Time—35 minutes

27 Questions

Directions: Each set of questions in this section is based on a single passage or a pair of passages. The questions are to be answered on the basis of what is stated or implied in the passage or pair of passages. For some of the questions, more than one of the choices could conceivably answer the question. However, you are to choose the best answer; that is, the response that most accurately and completely answers the question, and blacken the corresponding space on your answer sheet.

Traditional sources of evidence about ancient history are archaeological remains and surviving texts. Those investigating the crafts practiced by women in ancient times, however, often derive little information from these sources, and the archaeological record is particularly unavailing for the study of ancient textile production, as researchers are thwarted by the perishable nature of cloth. What shreds persisted through millennia were, until recently, often discarded by excavators as useless, as were loom weights, which appeared to be nothing more than blobs of clay. Ancient texts, meanwhile, rarely mention the creation of textiles; moreover, those references that do exist use archaic, unrevealing terminology. Yet despite these obstacles, researchers have learned a great deal about ancient textiles and those who made them, and also about how to piece together a whole picture from many disparate sources of evidence.

Technological advances in the analysis of archaeological remains provide much more information than was previously available, especially about minute remains. Successful modern methods include radiocarbon dating, infrared photography for seeing through dirt without removing it, isotope "fingerprinting" for tracing sources of raw materials, and thin-layer chromatography for analyzing dyes. As if in preparation for such advances, the field of archaeology has also undergone an important philosophical revolution in the past century. Once little more than a self-serving quest for artifacts to stock museums and private collections, the field has transformed itself into a scientific pursuit of knowledge about past cultures. As part of this process, archaeologists adopted the fundamental precept of preserving all objects, even those that have no immediately discernible value. Thus in the 1970s two researchers found the oldest known complete garment, a 5,000-year-old linen shirt, among a tumbled heap of dirty linens that had been preserved as part of the well-known Petrie collection decades before anyone began to study the history of textiles.

The history of textiles and of the craftswomen who produced them has also advanced on a different front: recreating the actual production of cloth. Reconstructing and implementing ancient production methods provides a valuable way of generating and checking hypotheses. For example, these techniques made it possible to confirm that the excavated pieces of clay once considered useless in fact functioned as loom weights. Similarly, scholars have until recently been obliged to speculate as to which one of two statues of Athena, one large and one small, was adorned with a dress created by a group of Athenian women for a festival, as described in surviving texts. Because records show that it took nine months to produce the dress, scholars assumed it must have adorned the large statue. But by investigating the methods of production and the size of the looms used, researchers have ascertained that in fact a dress for the small statue would have taken nine months to produce.

1. Which one of the following most accurately expresses the main point of the passage?

   (A) Archaeology is an expanding discipline that has transformed itself in response both to scientific advances and to changing cultural demands such as a recently increasing interest in women's history.

   (B) A diversity of new approaches to the study of ancient textiles has enabled researchers to infer much about the history of textiles and their creators in the ancient world from the scant evidence that remains.

   (C) Despite many obstacles, research into the textile production methods used by women in the ancient world has advanced over the past century to the point that archaeologists can now replicate ancient equipment and production techniques.

   (D) Research into the history of textiles has spurred sweeping changes in the field of archaeology, from the application of advanced technology to the revaluation of ancient artifacts that were once deemed useless.

   (E) Though researchers have verified certain theories about the history of textiles by using technological developments such as radiocarbon dating, most significant findings in this field have grown out of the reconstruction of ancient production techniques.

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2. The author's attitude concerning the history of ancient textile production can most accurately be described as

(A) skeptical regarding the validity of some of the new hypotheses proposed by researchers
(B) doubtful that any additional useful knowledge can be generated given the nature of the evidence available
(C) impatient about the pace of research in light of the resources available
(D) optimistic that recent scholarly advances will attract increasing numbers of researchers
(E) satisfied that considerable progress is being made in this field

3. The passage indicates that the re-creation of ancient techniques was used in which one of the following?

(A) investigating the meanings of certain previously unintelligible technical terms in ancient texts
(B) tracing the sources of raw materials used in the production of certain fabrics
(C) constructing certain public museum displays concerning cloth-making
(D) verifying that a particular 5,000-year-old cloth was indeed a shirt
(E) exploring the issue of which of two statues of Athena was clothed with a particular garment

4. The author intends the term "traditional sources" (line 1) to exclude which one of the following?

(A) ancient clay objects that cannot be identified as pieces of pottery by the researchers who unearth them
(B) historically significant pieces of cloth discovered in the course of an excavation
(C) the oldest known complete garment, which was found among other pieces of cloth in a collection
(D) re-creations of looms from which inferences about ancient weaving techniques can be made
(E) ancient accounts of the adornment of a statue of Athena with a dress made by Athenian women

5. The passage as a whole functions primarily as

(A) a defense of the controversial methods adopted by certain researchers in a particular discipline
(B) a set of recommendations to guide future activities in a particular field of inquiry
(C) an account of how a particular branch of research has successfully coped with certain difficulties
(D) a rejection of some commonly held views about the methodologies of a certain discipline
(E) a summary of the hypotheses advanced by researchers who have used innovative methods of investigation

6. According to the passage, which one of the following was an element in the transformation of archaeology in the past century?

(A) an increased interest in the crafts practiced in the ancient world
(B) some archaeologists' adoption of textile conservation experts' preservation techniques
(C) innovative methods of restoring damaged artifacts
(D) the discovery of the oldest known complete garment
(E) archaeologists' policy of not discarding ancient objects that have no readily identifiable value

7. Which one of the following most accurately describes the function of the first paragraph in relation to the rest of the passage?

(A) A particularly difficult archaeological problem is described in order to underscore the significance of new methods used to resolve that problem, which are described in the following paragraphs.
(B) A previously neglected body of archaeological evidence is described in order to cast doubt on received views regarding ancient cultures developed from conventional sources of evidence, as described in the following paragraphs.
(C) The fruitfulness of new technologically based methods of analysis is described in order to support the subsequent argument that apparently insignificant archaeological remains ought to be preserved for possible future research.
(D) The findings of recent archaeological research are outlined as the foundation for a claim advanced in the following paragraphs that the role of women in ancient cultures has been underestimated by archaeologists.
(E) A recently developed branch of archaeological research is described as evidence for the subsequent argument that other, more established branches of archaeology should take advantage of new technologies in their research.

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This passage was adapted from articles published in the 1990s.

The success that Nigerian-born computer scientist Philip Emeagwali (b. 1954) has had in designing computers that solve real-world problems has been fueled by his willingness to reach beyond established paradigms and draw inspiration for his designs from nature. In the 1980s, Emeagwali achieved breakthroughs in the design of parallel computer systems. Whereas single computers work sequentially, making one calculation at a time, computers connected in parallel can process calculations simultaneously. In 1989, Emeagwali pioneered the use of massively parallel computers that used a network of thousands of smaller computers to solve what is considered one of the most computationally difficult problems: predicting the flow of oil through the subterranean geologic formations that make up oil fields. Until that time, supercomputers had been used for oil field calculations, but because these supercomputers worked sequentially, they were too slow and inefficient to accurately predict such extremely complex movements.

To model oil field flow using a computer requires the simulation of the distribution of the oil at tens of thousands of locations throughout the field. At each location, hundreds of simultaneous calculations must be made at regular time intervals relating to such variables as temperature, direction of oil flow, viscosity, and pressure, as well as geologic properties of the basin holding the oil. In order to solve this problem, Emeagwali designed a massively parallel computer by using the Internet to connect to more than 65,000 smaller computers. One of the great difficulties of parallel computing is dividing up the tasks among the separate smaller computers so that they do not interfere with each other, and it was here that Emeagwali turned to natural processes for ideas, noting that tree species that survive today are those that, over the course of hundreds of millions of years, have developed branching patterns that have maximized the amount of sunlight gathered and the quantity of water and sap delivered. Emeagwali demonstrated that, for modeling certain phenomena such as subterranean oil flow, a network design based on the mathematical principle that underlies the branching structures of trees will enable a massively parallel computer to gather and broadcast the largest quantity of messages to its processing points in the shortest time.

In 1996 Emeagwali had another breakthrough when he presented the design for a massively parallel computer that he claims will be powerful enough to predict global weather patterns a century in advance. The computer's design is based on the geometry of bees' honeycombs, which use an extremely efficient three-dimensional spacing. Emeagwali believes that computer scientists in the future will increasingly look to nature for elegant solutions to complex technical problems. This paradigm shift, he asserts, will enable us to better understand the systems evolved by nature and, thereby, to facilitate the evolution of human technology.

8. Which one of the following most accurately expresses the main point of the passage?

(A) Emeagwali's establishment of new computational paradigms has enabled parallel computer systems to solve a wide array of real-world problems that supercomputers cannot solve.

(B) Emeagwali has shown that scientists' allegiance to established paradigms has until now prevented the solution of many real-world computational problems that could otherwise have been solved with little difficulty.

(C) Emeagwali's discovery of the basic mathematical principles underlying natural systems has led to a growing use of parallel computer systems to solve complex real-world computational problems.

(D) Emeagwali has designed parallel computer systems that are modeled on natural systems and that are aimed at solving real-world computational problems that would be difficult to solve with more traditional designs.

(E) The paradigm shift initiated by Emeagwali's computer designs has made it more likely that scientists will in the future look to systems evolved by nature to facilitate the evolution of human technology.

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9. According to the passage, which one of the following is true?

(A) Emeagwali's breakthroughs in computer design have begun to make computers that work sequentially obsolete.
(B) Emeagwali's first breakthrough in computer design came in response to a request by an oil company.
(C) Emeagwali was the first to use a massively parallel computer to predict the flow of oil in oil fields.
(D) Emeagwali was the first computer scientist to use nature as a model for human technology.
(E) Emeagwali was the first to apply parallel processing to solving real-world problems.

10. The passage most strongly suggests that Emeagwali holds which one of the following views?

(A) Some natural systems have arrived at efficient solutions to problems that are analogous in significant ways to technical problems faced by computer scientists.
(B) Global weather is likely too complicated to be accurately predictable more than a few decades in advance.
(C) Most computer designs will in the future be inspired by natural systems.
(D) Massively parallel computers will eventually be practical enough to warrant their use even in relatively mundane computing tasks.
(E) The mathematical structure of branching trees is useful primarily for designing computer systems to predict the flow of oil through oil fields.

11. Which one of the following most accurately describes the function of the first two sentences of the second paragraph?

(A) They provide an example of an established paradigm that Emeagwali's work has challenged.
(B) They help explain why supercomputers are unable to accurately predict the movements of oil through underground geologic formations.
(C) They provide examples of a network design based on the mathematical principles underlying the branching structures of trees.
(D) They describe a mathematical model that Emeagwali used in order to understand a natural system.
(E) They provide specific examples of a paradigm shift that will help scientists understand certain systems evolved by nature.

12. Which one of the following, if true, would provide the most support for Emeagwali's prediction mentioned in lines 55–58?

(A) Until recently, computer scientists have had very limited awareness of many of the mathematical principles that have been shown to underlie a wide variety of natural processes.
(B) Some of the variables affecting global weather patterns have yet to be discovered by scientists who study these patterns.
(C) Computer designs for the prediction of natural phenomena tend to be more successful when those phenomena are not affected by human activities.
(D) Some of the mathematical principles underlying Emeagwali's model of oil field flow also underlie his designs for other massively parallel computer systems.
(E) Underlying the designs for many traditional technologies are mathematical principles of which the designers of those technologies were not explicitly aware.

13. It can be inferred from the passage that one of the reasons massively parallel computers had not been used to model oil field flow prior to 1989 is that

(A) supercomputers are sufficiently powerful to handle most computational problems, including most problems arising from oil production
(B) the possibility of using a network of smaller computers to solve computationally difficult problems had not yet been considered
(C) the general public was not yet aware of the existence or vast capabilities of the Internet
(D) oil companies had not yet perceived the need for modeling the flow of oil in subterranean fields
(E) smaller computers can interfere with one another when they are connected together in parallel to solve a computationally difficult problem

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Proponents of the tangible-object theory of copyright argue that copyright and similar intellectual-property rights can be explained as logical extensions of the right to own concrete, tangible objects. This view depends on the claim that every copyrightable work can be manifested in some physical form, such as a manuscript or a videotape. It also accepts the premise that ownership of an object confers a number of rights on the owner, who may essentially do whatever he or she pleases with the object to the extent that this does not violate other people's rights. One may, for example, hide or display the object, copy it, or destroy it. One may also transfer ownership of it to another.

In creating a new and original object from materials that one owns, one becomes the owner of that object and thereby acquires all of the rights that ownership entails. But if the owner transfers ownership of the object, the full complement of rights is not necessarily transferred to the new owner; instead, the original owner may retain one or more of these rights. This notion of retained rights is common in many areas of law; for example, the seller of a piece of land may retain certain rights to the land in the form of easements or building restrictions. Applying the notion of retained rights to the domain of intellectual property, theorists argue that copyrighting a work secures official recognition of one's intention to retain certain rights to that work. Among the rights typically retained by the original producer of an object such as a literary manuscript or a musical score would be the right to copy the object for profit and the right to use it as a guide for the production of similar or analogous things—for example, a public performance of a musical score.

According to proponents of the tangible-object theory, its chief advantage is that it justifies intellectual property rights without recourse to the widely accepted but problematic supposition that one can own abstract, intangible things such as ideas. But while this account seems plausible for copyrightable entities that do, in fact, have enduring tangible forms, it cannot accommodate the standard assumption that such evanescent things as live broadcasts of sporting events can be copyrighted. More importantly, it does not acknowledge that in many cases the work of conceiving ideas is more crucial and more valuable than that of putting them into tangible form. Suppose that a poet dictates a new poem to a friend, who writes it down on paper that the friend has supplied. The creator of the tangible object in this case is not the poet but the friend, and there would seem to be no ground for the poet's claiming copyright unless the poet can be said to already own the ideas expressed in the work.

14. Which one of the following most accurately expresses the main point of the passage?

(A) Copyright and other intellectual-property rights can be explained as logical extensions of the right to own concrete objects.
(B) Attempts to explain copyright and similar intellectual-property rights purely in terms of rights to ownership of physical objects are ultimately misguided.
(C) Copyrighting a work amounts to securing official recognition of one's intention to retain certain rights to that work.
(D) Explanations of copyright and other intellectual-property rights in terms of rights to ownership of tangible objects fail to consider the argument that ideas should be allowed to circulate freely.
(E) Under the tangible-object theory of intellectual property, rights of ownership are straightforwardly applicable to both ideas and physical objects.

15. According to the passage, the theory that copyright and other intellectual-property rights can be construed as logical extensions of the right to own concrete, tangible objects depends on the claim that

(A) any work entitled to intellectual-property protection can be expressed in physical form
(B) only the original creator of an intellectual work can hold the copyright for that work
(C) the work of putting ideas into tangible form is more crucial and more valuable than the work of conceiving those ideas
(D) in a few cases, it is necessary to recognize the right to own abstract, intangible things
(E) the owner of an item of intellectual property may legally destroy it

16. The passage most directly answers which one of the following questions?

(A) Do proponents of the tangible-object theory of intellectual property advocate any changes in existing laws relating to copyright?
(B) Do proponents of the tangible-object theory of intellectual property hold that ownership of anything besides real estate can involve retained rights?
(C) Has the tangible-object theory of intellectual property influenced the ways in which copyright cases or other cases involving issues of intellectual property are decided in the courts?
(D) Does existing copyright law provide protection against unauthorized copying of manuscripts and musical scores in cases in which their creators have not officially applied for copyright protection?
(E) Are there standard procedures governing the transfer of intellectual property that are common to most legal systems?

17. Suppose an inventor describes an innovative idea for an invention to an engineer, who volunteers to draft specifications for a prototype and then produces the prototype using the engineer's own materials. Which one of the following statements would apply to this case under the tangible-object theory of intellectual property, as the author describes that theory?

(A) Only the engineer is entitled to claim the invention as intellectual property.
(B) Only the inventor is entitled to claim the invention as intellectual property.
(C) The inventor and the engineer are equally entitled to claim the invention as intellectual property.
(D) The engineer is entitled to claim the invention as intellectual property, but only if the inventor retains the right to all profits generated by the invention.
(E) The inventor is entitled to claim the invention as intellectual property, but only if the engineer retains the right to all profits generated by the invention.

18. Legal theorists supporting the tangible-object theory of intellectual property are most likely to believe which one of the following?

(A) A literary work cannot receive copyright protection unless it exists in an edition produced by an established publisher.
(B) Most legal systems explicitly rely on the tangible-object theory of intellectual property in order to avoid asserting that one can own abstract things.
(C) Copyright protects the right to copy for profit, but not the right to copy for other reasons.
(D) Some works deserving of copyright protection simply cannot be manifested as concrete, tangible objects.
(E) To afford patent protection for inventions, the law need not invoke the notion of inventors' ownership of abstract ideas.

19. The passage provides the most support for inferring which one of the following statements?

(A) In most transactions involving the transfer of non-intellectual property, at least some rights of ownership are retained by the seller.
(B) The notion of retained rights of ownership is currently applied to only those areas of law that do not involve intellectual property.
(C) The idea that ownership of the right to copy an item for profit can be transferred is compatible with a tangible-object theory of intellectual property.
(D) Ownership of intellectual property is sufficiently protected by the provisions that, under many legal systems, apply to ownership of material things such as land.
(E) Protection of computer programs under intellectual-property law is justifiable only if the programs are likely to be used as a guide for the production of similar or analogous programs.

20. It can be inferred that the author of the passage is most likely to believe which one of the following?

(A) Theorists who suggest that the notion of retained rights is applicable to intellectual property do not fully understand what it means to transfer ownership of property.
(B) If a work does not exist in a concrete, tangible form, there is no valid theoretical basis for claiming that it should have copyright protection.
(C) Under existing statutes, creators of original tangible works that have intellectual or artistic significance generally do not have the legal right to own the abstract ideas embodied in those works.
(D) An adequate theoretical justification of copyright would likely presuppose that a work's creator originally owns the ideas embodied in that work.
(E) It is common, but incorrect, to assume that such evanescent things as live broadcasts of sporting events can be copyrighted.

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Passage A

In music, a certain complexity of sounds can be expected to have a positive effect on the listener. A single, pure tone is not that interesting to explore; a measure of intricacy is required to excite human curiosity. Sounds that are too complex or disorganized, however, tend to be overwhelming. We prefer some sort of coherence, a principle that connects the various sounds and makes them comprehensible.

In this respect, music is like human language. Single sounds are in most cases not sufficient to convey meaning in speech, whereas when put together in a sequence they form words and sentences. Likewise, if the tones in music are not perceived to be tied together sequentially or rhythmically—for example, in what is commonly called melody—listeners are less likely to feel any emotional connection or to show appreciation.

Certain music can also have a relaxing effect. The fact that such music tends to be continuous and rhythmical suggests a possible explanation for this effect. In a natural environment, danger tends to be accompanied by sudden, unexpected sounds. Thus, a background of constant noise suggests peaceful conditions; discontinuous sounds demand more attention. Even soft discontinuous sounds that we consciously realize do not signal danger can be disturbing—for example, the erratic dripping of a leaky tap. A continuous sound, particularly one that is judged to be safe, relaxes the brain.

Passage B

There are certain elements within music, such as a change of melodic line or rhythm, that create expectations about the future development of the music. The expectation the listener has about the further course of musical events is a key determinant for the experience of "musical emotions." Music creates expectations that, if not immediately satisfied, create tension. Emotion is experienced in relation to the buildup and release of tension. The more elaborate the buildup of tension, the more intense the emotions that will be experienced. When resolution occurs, relaxation follows.

The interruption of the expected musical course, depending on one's personal involvement, causes the search for an explanation. This results from a "mismatch" between one's musical expectation and the actual course of the music. Negative emotions will be the result of an extreme mismatch between expectations and experience. Positive emotions result if the converse happens.

When we listen to music, we take into account factors such as the complexity and novelty of the music. The degree to which the music sounds familiar determines whether the music is experienced as pleasurable or uncomfortable. The pleasure experienced is minimal when the music is entirely new to the listener, increases with increasing familiarity, and decreases again when the music is totally known.

Musical preference is based on one's desire to maintain a constant level of certain preferable emotions. As such, a trained listener will have a greater preference for complex melodies than will a naive listener, as the threshold for experiencing emotion is higher.

21. Which one of the following concepts is linked to positive musical experiences in both passages?

(A) continuous sound
(B) tension
(C) language
(D) improvisation
(E) complexity

22. The passages most strongly suggest that both are targeting an audience that is interested in which one of the following?

(A) the theoretical underpinnings of how music is composed
(B) the nature of the conceptual difference between music and discontinuous sound
(C) the impact music can have on human emotional states
(D) the most effective techniques for teaching novices to appreciate complex music
(E) the influence music has had on the development of spoken language

23. Which one of the following describes a preference that is most analogous to the preference mentioned in the first paragraph of passage A?

(A) the preference of some people for falling asleep to white noise, such as the sound of an electric fan
(B) the preference of many moviegoers for movies with plots that are clear and easy to follow
(C) the preference of many diners for restaurants that serve large portions
(D) the preference of many young listeners for fast music over slower music
(E) the preference of most children for sweet foods over bitter foods

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24. Which one of the following most accurately expresses the main point of passage B?

(A) The type of musical emotion experienced by a listener is determined by the level to which the listener's expectations are satisfied.
(B) Trained listeners are more able to consciously manipulate their own emotional experiences of complex music than are naive listeners.
(C) If the development of a piece of music is greatly at odds with the listener's musical expectations, then the listener will experience negative emotions.
(D) Listeners can learn to appreciate changes in melodic line and other musical complexities.
(E) Music that is experienced by listeners as relaxing usually produces a buildup and release of tension in those listeners.

25. Which one of the following most undermines the explanation provided in passage A for the relaxing effect that some music has on listeners?

(A) The musical traditions of different cultures vary greatly in terms of the complexity of the rhythms they employ.
(B) The rhythmic structure of a language is determined in part by the pattern of stressed syllables in the words and sentences of the language.
(C) Many people find the steady and rhythmic sound of a rocking chair to be very unnerving.
(D) The sudden interruption of the expected development of a melody tends to interfere with listeners' perception of the melody as coherent.
(E) Some of the most admired contemporary composers write music that is notably simpler than is most of the music written in previous centuries.

26. Which one of the following would be most appropriate as a title for each of the passages?

(A) "The Biological Underpinnings of Musical Emotions"
(B) "The Psychology of Listener Response to Music"
(C) "How Music Differs from Other Art Forms"
(D) "Cultural Patterns in Listeners' Responses to Music"
(E) "How Composers Convey Meaning Through Music"

27. It can be inferred that both authors would be likely to agree with which one of the following statements?

(A) The more complex a piece of music, the more it is likely to be enjoyed by most listeners.
(B) More knowledgeable listeners tend to prefer music that is discontinuous and unpredictable.
(C) The capacity of music to elicit strong emotional responses from listeners is the central determinant of its artistic value.
(D) Music that lacks a predictable course is unlikely to cause a listener to feel relaxed.
(E) Music that changes from soft to loud is perceived as disturbing and unpleasant by most listeners.

S T O P

IF YOU FINISH BEFORE TIME IS CALLED, YOU MAY CHECK YOUR WORK ON THIS SECTION ONLY. DO NOT WORK ON ANY OTHER SECTION IN THE TEST.