



Questions 13-24 are based on the following passages.

These passages discuss string theory, the as-yet-unproven idea that all matter in the universe is made up of “strings” so small that they have not been detected by instruments. The passages were adapted from books published in 2000 and 2006, respectively.

Passage 1

String theory is a work in progress whose partial completion has already revealed remarkably elegant answers to questions about nature’s most fundamental constituents and forces. For instance, in string theory many aspects of nature that might appear to be arbitrary technical details—such as the number of distinct varieties of particle ingredients and their properties—are found to arise from tangible aspects of the geometry of the universe.

In the final analysis, though, nothing is a substitute for definitive, testable predictions that can determine whether string theory has truly lifted the veil of mystery hiding the deepest truths of our universe. It may be some time before our level of comprehension has reached sufficient depth to achieve this aim. In fact, the mathematics of string theory is so complicated that, to date, no one even knows the exact equations of the theory. Nevertheless, experimental tests could provide strong circumstantial support for string theory within the next ten years or so.

One of the pioneers of string theory summarizes the situation by saying that “string theory is a part of twenty-first-century physics that fell by chance into the twentieth century.” It is as if our forebears in the nineteenth century had been presented with a modern-day supercomputer, without the operating instructions. Through inventive trial and error, hints of the supercomputer’s power would have become evident, but it would have taken vigorous and prolonged effort to gain true mastery. The hints of the computer’s potential, like our glimpses of string theory’s explanatory power, would have provided strong motivation for obtaining complete facility. A similar motivation today energizes physicists to pursue string theory.

Science proceeds in fits and starts. Scientists put forward results, both theoretical and experimental. The results are then debated by the community; sometimes they are discarded, sometimes they are modified, and sometimes they provide inspiration for new and more accurate ways of understanding the universe. In other words, science proceeds along a zigzag path toward what we hope will be ultimate truth, a path that began with humanity’s earliest attempts to fathom the cosmos and whose end we cannot predict. Whether string theory is an incidental rest stop along this path, a landmark turning point, or the final destination we do not know. But the last two decades of research by hundreds of dedicated physicists and mathematicians has given us well-founded hope that we are on the right and possibly final track.

Passage 2

No matter how things turn out, the story of string theory is an episode with no parallel in the history of modern physics. More than twenty years of research by thousands of the world’s best scientists producing tens of thousands of scientific papers has not led to a single testable experimental prediction of the theory. This unprecedented situation leads one to ask whether one can really describe string theory as science.

Human beings engage in many different attempts to explain the world around them, but only a specific sort of explanation is normally considered to be scientific. An explanation that allows one to predict successfully in detail what will happen when one goes out and performs a feasible experiment is the sort of explanation that most clearly can be labeled “scientific.” Explanations that cannot be used to form predictions clearly do not deserve this label.

Remarkably, the lack of any progress in achieving a predictive version of string theory that could be tested by experiment has not led to theorists’ giving it up. Indeed, in recent years, many string theorists have become convinced that string theory inherently must allow an astronomically large number of physical possibilities, so many that it is difficult to see how the theory can ever be tested. Yet some theorists are convinced that a better understanding of the theory will uncover testable phenomena. This way of thinking is a steadfast refusal to acknowledge the lesson that conventional science says one should draw in this kind of circumstance: if one’s theory can’t predict anything, one should try something else.

The phrase “not even wrong” is popular among physicists. A theory can be “not even wrong” because it is so incomplete and ill-defined that it can’t be used to make predictions whose failure would show it to be wrong. This sort of “not even wrong” is not necessarily a bad thing. Most new theoretical ideas begin in this state, and it can take quite a bit of work before their implications are well enough understood for researchers to be able to tell whether the idea is right or wrong. But there is a second connotation of “not even wrong”: something worse than a wrong idea. In the case of string theory, the way some physicists are abandoning fundamental scientific principles rather than admit that a theory is wrong is something of this kind: worse than being wrong is refusing to admit when one is wrong.



13. Which best describes the relationship between the two passages?
- (A) Passage 1 provides concrete evidence in support of a hypothesis attacked in Passage 2.
 - (B) Passage 1 advocates a theoretical approach that is only reluctantly endorsed by Passage 2.
 - (C) Passage 1 praises the achievements of a scientific researcher who is denounced in Passage 2.
 - (D) Passage 1 offers a largely positive assessment of a theory that is criticized in Passage 2.
 - (E) Passage 1 offers a detailed description of a methodology that is praised in Passage 2.
14. The author of Passage 2 would most likely respond to the claim in lines 9-12 in Passage 1 ("In the . . . universe") with
- (A) complete agreement
 - (B) amused toleration
 - (C) deliberate neutrality
 - (D) open skepticism
 - (E) total opposition
15. The author of Passage 2 would most likely argue that the prediction made in lines 16-18 in Passage 1 ("Nevertheless . . . or so") is
- (A) unlikely to come to pass
 - (B) based on relevant data
 - (C) a patently obvious claim
 - (D) a somewhat plausible outcome
 - (E) an unnecessarily pessimistic assessment
16. In the analogy of the supercomputer (lines 22-30), modern physicists resemble the "forebears" in that both
- (A) have an obligation to acknowledge their own limitations
 - (B) lack the knowledge to take full advantage of a tool
 - (C) fail to recognize the complexity of a challenge
 - (D) must learn to use computers to do their work more effectively
 - (E) should seek instruction to understand a phenomenon more fully
17. In line 32, "fits" most nearly means
- (A) violent attacks
 - (B) unprovoked tantrums
 - (C) emotional reactions
 - (D) unexpected whims
 - (E) sudden bursts
18. The characterization of the "path" (line 38) suggests that science
- (A) results from purely chance events
 - (B) is driven by an unforeseen and mysterious purpose
 - (C) progresses in an orderly manner
 - (D) is inaccessible to those without proper training
 - (E) advances in indirect and sometimes unexpected ways
19. The author of Passage 2 would most likely advise the "physicists and mathematicians" referred to in lines 44-45, Passage 1, to
- (A) redouble their current efforts
 - (B) collaborate more with one another
 - (C) find new avenues for research
 - (D) pursue a more interdisciplinary approach
 - (E) seek to replicate their experimental findings
20. The primary contrast in lines 47-52 ("No matter . . . theory") is between the
- (A) size of a project and its importance
 - (B) purpose of an undertaking and its result
 - (C) history of an enterprise and its future
 - (D) scope of an endeavor and its outcome
 - (E) randomness of an approach and its findings
21. Passage 1 suggests that its author would most likely argue that the "unprecedented situation" (lines 52-53, Passage 2) is
- (A) proof of the arbitrary nature of theoretical physics
 - (B) evidence of the lack of consensus among physicists
 - (C) a sign of the challenges involved with working with supercomputers
 - (D) a testament to the difficulty of directly observing subatomic phenomena
 - (E) a consequence of the highly complex mathematics underlying string theory
22. The second paragraph in Passage 2 (lines 55-63) primarily serves to
- (A) analyze the steps required by a process
 - (B) assess the practicality of achieving an objective
 - (C) articulate the criteria required to meet a standard
 - (D) characterize the qualifications of practitioners
 - (E) describe the significant advancements of a discipline



23. In line 74, "draw" most nearly means

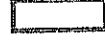
- (A) sketch
- (B) lead
- (C) attract
- (D) infer
- (E) provoke

24. Both authors would agree with which statement about string theory?

- (A) Through its development, important technological advances have taken place.
- (B) In its current state, the explanations it provides are ultimately incomplete.
- (C) It is unlikely that it will ever provide an encompassing explanation.
- (D) It is beginning to be challenged by the majority of scientists.
- (E) It represents our best chance of understanding subatomic phenomena.

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.



Questions 16-24 are based on the following passage.

This passage is adapted from the autobiographical account of a journalist traveling through Africa to research chimpanzees.

Our walk through the forest was like a journey through an extended underground cavern. We wound through obscure passages, out into small openings or great rooms, and then tunneled back into winding passageways. Toward the end of the afternoon, we followed what seemed to be a large movement of chimpanzees into one great open room in the forest, relatively clear except for columns of nut trees. Soon about a dozen chimps were hammering away, using log hammers on log or root anvils.

We had entered a factory, but it was also a nursery. I turned to watch a mother playing with her infant, tickling his toes with playful little nibbles and then looking into his laughing face and eyes with the most amazing gaze of adoration. Elsewhere, three adult females had situated themselves in a tree and were kissing and tickling an infant, who writhed with apparent pleasure. Suddenly, their faces, which had taken on remarkable glowing expressions of adoration, registered in my mind as entirely comprehensible. I was looking at intelligent faces experiencing an emotion I could only imagine to be love.

One commentator has said that the big difference between humans and chimps (intelligent though those apes may be) is that humans can invent great wonders of technology. "I considered the differences between men and animals," this person wrote. "Some were vast. A chimpanzee could be taught to drive a car. It could even be taught to build parts of it. But it could not begin to design it Our intellect is incomparably more sophisticated than [that of] any animal." One hears this sort of argument often, and, to my mind, it is mere self-stroking puffery. Could you or I begin to design a car? Has any single human actually designed a car? Could any one person abandoned at birth on a desert island somewhere—without pictures, communication, education, or artifacts—even invent a tricycle or a child's kite or a mousetrap? Obviously not. Left at birth on a desert island, you and I and that commentator would be lifting and dropping chunks of wood or rounded stones onto hard nuts—and be glad we figured that one out.

The great accomplishment of *Homo sapiens* is not technology, which has become bigger and scarier than we are, a mixed blessing. The great accomplishment is language, which has enabled us to accumulate and coordinate our achievements, insights, and minicreations. Our big technologies are collective efforts, cultural products, all and always made possible by language. Even the supposed "milestones" of technological advancement—the use of movable type, to take one example—were collective events. Johannes Gutenberg* didn't think up movable type whole, in an isolated stroke of genius. His partner was a goldsmith; his father was a

mint employee, entirely familiar with soft metals. Printing presses were all around Europe by then. Gutenberg's great genius was to assemble, revise, and modify already long-established traditions in metallurgy, goldsmithing, and woodblock printing, not to mention papermaking and press design.

Our one great accomplishment is language, but our great hope is the internal compass that may enable us to guide ourselves and our technological powers into the future: our glowing capacity for valuing our own kind and for at least some empathy beyond our kind. The hand lifting and dropping the stone is less impressive than the eye that gazes with love.

*Gutenberg's typesetting process made the mass production of text possible.

16. It can be inferred that the "chimps" mentioned in line 8 are

- (A) using simple tools to crack open nuts
- (B) expressing themselves by making a lot of noise
- (C) taking out their aggressions on the nut trees
- (D) working cooperatively on different tasks
- (E) mimicking the work habits of human beings

17. The author uses the word "factory" (line 10) primarily to suggest that

- (A) some chimpanzees live a highly regimented life
- (B) the sound created by the chimpanzees' activity is loud enough to impair hearing
- (C) the chimpanzees are doing productive work collectively
- (D) only those chimpanzees who want to participate in communal activities do so
- (E) the activity of the male chimpanzees differs significantly from that of the females

18. In lines 30-31 ("it . . . puffery"), the author characterizes the commentator's argument as

- (A) useless flattery
- (B) exaggerated self-regard
- (C) witty repartee
- (D) self-conscious hyperbole
- (E) deliberate distortion



19. The questions in lines 31-36 serve primarily to
- (A) suggest ideas for further research
 - (B) provide an example of missing data
 - (C) point to an alternative explanation
 - (D) debate whether knowledge is incomplete
 - (E) imply that an argument is flawed
20. In lines 40-42 ("The great . . . blessing"), the author characterizes technology as
- (A) the accomplishment that distinguishes *Homo sapiens* from chimpanzees
 - (B) a phenomenon that has come to overshadow those who developed it
 - (C) an inevitable step in the development of human beings and their societies
 - (D) an achievement that has grown impressively in importance over time
 - (E) a force that is ultimately shaped by the fears of those who created it
21. According to the author, the "great accomplishment is language" (lines 42-43) because it allows human beings to
- (A) combine small, individual advances into something larger and more powerful
 - (B) express their emotions and show their feelings toward one another
 - (C) work with each other so that dangerous conflicts can be avoided
 - (D) express in concrete form notions that would otherwise seem vague and abstract
 - (E) demonstrate that they are more intelligent, and thus more capable, than chimpanzees
22. The author uses the word "supposed" in line 47 primarily to
- (A) signal a claim that is counterintuitive for most people
 - (B) make reference to a viewpoint that is known to be controversial
 - (C) suggest that a certain concept may not be entirely accurate
 - (D) indicate a complete and technically correct definition
 - (E) bolster the claims of authorities who are often cited
23. Which best describes the relationship between the "internal compass" (line 59) and the characterization of chimpanzee behaviors in the second paragraph (lines 10-20) ?
- (A) One shows a sophisticated understanding, while the other shows a less-developed capacity for understanding.
 - (B) One deals with nonverbal communication, while the other deals with communication through language.
 - (C) One is an example of a uniquely human ability, while the other is an example of an ability that chimpanzees may or may not have.
 - (D) Both represent the ability to have affection for and understanding of other beings.
 - (E) Both are examples of the ability of primates to use tools to improve their lives.
24. The "hand" (line 62) and the "eye" (line 63) represent, respectively, which of the following?
- (A) Gesture and feeling
 - (B) War and peace
 - (C) Ingenuity and language
 - (D) Communication and meaning
 - (E) Technology and empathy

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section in the test.



The passage below is followed by questions based on its content. Answer the questions on the basis of what is stated or implied in the passage and in any introductory material that may be provided.

Questions 7-19 are based on the following passage.

The following passage is from a nineteenth-century British novel. The narrator is Gabriel Betteredge, the butler of Lady Julia Verinder, owner of a stolen diamond called the Moonstone.

In the first part of *Robinson Crusoe*,* at page one hundred and twenty-nine, you will find it thus written:

Line "Now I saw, though too late, the Folly of beginning
5 a Work before we count the Cost, and before we judge rightly of our own Strength to go through with it."

Only yesterday I opened my *Robinson Crusoe* at that place. Only this morning (May 21, 1850) came my lady's nephew, Mr. Franklin Blake, and held a short
10 conversation with me, as follows:

"Betteredge," says Mr. Franklin, "I have been to the lawyer's about some family matters; and, among other things, we have been talking of the loss of the Indian Diamond, in my aunt's house in Yorkshire, two years
15 since. The lawyer thinks, as I think, that the whole story ought, in the interests of truth, to be placed on record in writing—and the sooner the better."

Not perceiving his drift yet, and thinking it always desirable for the sake of peace and quietness to be on the lawyer's side, I said I thought so too. Mr. Franklin
20 went on:

"In this matter of the Diamond," he said, "the characters of innocent people have suffered under suspicion already—as you know. The memories of innocent people may suffer,
25 hereafter, for want of a record of the facts to which those who come after us can appeal. There can be no doubt that this strange family story of ours ought to be told. And I think, Betteredge, the lawyer and I together have hit on the right way of telling it."

30 Very satisfactory to both of them, no doubt. But I failed to see what I myself had to do with it, so far.

"We have certain events to relate," Mr. Franklin proceeded; "and we have certain persons concerned in those events who are capable of relating them. Starting from
35 these plain facts, the lawyer's idea is that we should all write the story of the Moonstone in turn—as far as our own personal experience extends, and no further. We must begin by showing how the Diamond first fell into the hands of my uncle Herncastle, when he was serving in India fifty years since. This prefatory narrative I have
40 already got by me in the form of an old family paper, which relates the necessary particulars on the authority of an eye-witness. The next thing to do is to tell how the

Diamond found its way into my aunt's house in Yorkshire, two years since, and how it came to be lost in little more than twelve hours afterward. Nobody knows as much as you do, Betteredge, about what went on in the house at that time. So you must take the pen in hand, and start the story."

50 In those terms I was informed of what my personal concern was with the matter of the Diamond. If you are curious to know what course I took under the circumstances, I beg to inform you that I did what you would probably have done in my place. I modestly
55 declared myself to be quite unequal to the task imposed upon me—and I privately felt, all the time, that I was quite clever enough to perform it, if I only gave my own abilities a fair chance. Mr. Franklin, I imagine, must have seen my private sentiments in my face. He declined to believe in my modesty; and he insisted on giving my
60 abilities a fair chance.

Two hours have passed since Mr. Franklin left me. As soon as his back was turned I went to my writing-desk to start the story. There I have sat helpless (in spite of my
65 abilities) ever since; seeing what Robinson Crusoe saw, as quoted above—namely, the folly of beginning a work before we count the cost, and before we judge rightly of our own strength to go through with it. Please to remember, I opened the book by accident, at that bit, only the day
70 before I rashly undertook the business now in hand; and, allow me to ask—if *that* isn't prophecy, what is?

* A British novel by Daniel Defoe, published in 1719

7. The quotation in lines 4-6 ("Now . . . it") implies that one should

- (A) assess a project carefully before committing oneself to it
- (B) strive to meet a challenge rather than to avoid it
- (C) take advantage of an opportunity before it is lost
- (D) approach a task with a sense of amusement instead of annoyance
- (E) focus on the benefits that can be earned by accomplishing a difficult feat



8. The repetition of "Only" in lines 7-8 serves to emphasize the
- (A) uniqueness of an experience
 - (B) solitary nature of a task
 - (C) simplicity of a solution
 - (D) brevity of an interval
 - (E) insignificance of an action
9. In lines 11-49 ("Betteredge . . . story"), Mr. Franklin proposes that
- (A) various people contribute individual accounts to a single narrative about the diamond
 - (B) everyone with an interest in the diamond gather together to write its story
 - (C) the lawyer interview different people and compile their views in a report about the diamond
 - (D) the narrator research and write the definitive story of the diamond
 - (E) the narrator determine the reliability of existing documents related to the diamond
10. As revealed in lines 18-20 ("Not . . . too"), Betteredge's attitude toward the lawyer is
- (A) belligerent
 - (B) envious
 - (C) deferential
 - (D) protective
 - (E) empathetic
11. In line 23, Mr. Franklin voices the concern that "innocent people"
- (A) have been corrupted
 - (B) have been defamed
 - (C) have been forgotten
 - (D) possess faulty memories
 - (E) suffer feelings of guilt
12. In line 25, "want" most nearly means
- (A) poverty
 - (B) desire
 - (C) lack
 - (D) fault
 - (E) requirement
13. Lines 30-31 ("Very . . . far") suggest that Betteredge felt a sense of
- (A) momentary perplexity
 - (B) adamant disapproval
 - (C) sincere regret
 - (D) increasing alarm
 - (E) profound disappointment
14. The phrase "no further" (line 37) emphasizes the lawyer's view that the story of the Moonstone should NOT
- (A) be completed if it implicates a family member
 - (B) be made known outside the household
 - (C) be based on speculation or hearsay
 - (D) continue to be recounted once it is written down
 - (E) proceed past the time of the stone's disappearance
15. Lines 58-59 ("Mr. Franklin . . . face") suggest that Mr. Franklin
- (A) lacked confidence in Betteredge's abilities
 - (B) was able to determine Betteredge's true feelings
 - (C) enjoys a close relationship with Betteredge
 - (D) tends to disregard other people's viewpoints
 - (E) is a difficult man to understand
16. The phrase "As soon as his back was turned" (line 63) serves to emphasize Betteredge's
- (A) deviousness
 - (B) cowardice
 - (C) disloyalty
 - (D) eagerness
 - (E) courtesy
17. The quotation from *Robinson Crusoe* is repeated in lines 66-68 ("namely . . . with it") in order to
- (A) defend Betteredge's ability to complete a task
 - (B) praise a little-known insight into human nature
 - (C) emphasize a warning Betteredge should have heeded
 - (D) question the relevance of the novel to modern readers
 - (E) show how Betteredge arrived at a faulty conclusion



18. In line 67, "cost" most nearly means

- (A) personal toll
- (B) legal obligation
- (C) moral fortitude
- (D) financial expenditure
- (E) social sacrifice

19. Ultimately, Betteredge regards the quotation from *Robinson Crusoe* as

- (A) an omen
- (B) a cliché
- (C) a metaphor
- (D) a paradox
- (E) a distraction

STOP

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Correct Answers and Difficulty Levels
Form Codes AEGC, BWGC, CFGC

Critical Reading

Section 2			Section 5			Section 8		
COR. DIFF. ANS. LEV.			COR. DIFF. ANS. LEV.			COR. DIFF. ANS. LEV.		
1.	A	1	13.	D	3	1.	D	1
2.	E	1	14.	A	4	2.	B	1
3.	D	1	15.	A	3	3.	B	3
4.	C	1	16.	B	3	4.	E	4
5.	D	1	17.	E	3	5.	A	4
6.	E	2	18.	E	2	6.	E	5
7.	A	5	19.	C	3	7.	A	3
8.	A	5	20.	D	4	8.	D	4
9.	B	1	21.	E	5	9.	A	4
10.	A	2	22.	C	3	10.	C	4
11.	B	5	23.	D	3			
12.	C	1	24.	B	3			

Number correct

Number correct

Number correct

Number incorrect

Number incorrect

Number incorrect

Mathematics

Section 4				Section 6				Section 9			
Multiple-Choice Questions		Student-Produced Response Questions		COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.	
	COR. DIFF. ANS. LEV.		COR. ANS.		DIFF. LEV.						
1.	E 1	9.	7.80	2		11.	C 3	1.	A 1	9.	C 3
2.	A 1	10.	6, 9, 12 or 15	3		12.	C 3	2.	B 1	10.	D 3
3.	D 2	11.	72	2		13.	E 3	3.	C 2	11.	A 3
4.	A 2	12.	102	3		14.	D 3	4.	D 1	12.	C 3
5.	C 2	13.	36	3		15.	C 3	5.	B 2	13.	B 3
6.	C 4	14.	4	4		16.	E 4	6.	E 2	14.	D 4
7.	B 4	15.	5	3		17.	B 5	7.	D 2	15.	E 4
8.	E 4	16.	3/4 or .75	4		18.	A 5	8.	A 3	16.	A 5
		17.	1000	4		19.	E 4				
		18.	8521	5		20.	E 4				

Number correct

Number correct
(9-18)

Number correct

Number correct

Number incorrect

Number incorrect

Number incorrect

Writing Multiple-Choice

Section 7				Section 10			
COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.		COR. DIFF. ANS. LEV.	
1. E	1	10. C	3	19. B	3	28. D	5
2. C	1	11. A	4	20. A	3	29. C	5
3. E	1	12. D	1	21. D	3	30. D	3
4. A	2	13. D	2	22. A	3	31. A	2
5. B	1	14. B	1	23. D	3	32. C	3
6. E	2	15. B	2	24. D	4	33. C	3
7. A	3	16. B	2	25. D	4	34. B	4
8. E	3	17. D	3	26. C	3	35. D	2
9. B	3	18. A	3	27. E	3		
						1. C	1
						2. B	2
						3. E	2
						4. A	2
						5. B	2
						6. C	3
						7. A	3
						8. B	3
						9. A	3
						10. C	3
						11. C	4
						12. D	3
						13. D	4
						14. D	5

Number correct

Number correct

Number incorrect

Number incorrect

NOTE: Difficulty levels are estimates of question difficulty for a reference group of college-bound seniors. Difficulty levels range from 1 (easiest) to 5 (hardest).