

READING TEST

35 Minutes—40 Questions

DIRECTIONS: There are several passages in this test. Each passage is accompanied by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

Passage I

LITERARY NARRATIVE: This passage is adapted from the essay "Rough Water" by David McGlynn (©2008 by David McGlynn).

One of my best races could hardly be called a race at all. I was a senior in high school, gunning to qualify for the USA Junior Nationals. The previous summer I had missed the cut by less than a second in the mile, and just the day before, at my high school regional meet, I had come within three-tenths of a second in the 500-yard freestyle. The qualification time was 4:39.69; I swam a 4:39.95. The next day, Sunday, I drove with my mother to the far side of Houston where a time trial was being held—an informal, unadvertised event thrown together at the last minute. The only races swum were those the swimmers requested to swim. Most were short, flapping sprints in which swimmers attempted to shave off a few one-hundredths of a second. I didn't have the courage to face the mile, and since I'd struck out in the 500 the day before, I decided to swim the 1,000-yard freestyle. Forty lengths of the pool. It was a race I'd swum fast enough to believe that given the right confluence of circumstances—cold water, an aggressive heat, an energetic meet—I could make the cut. I had fifteen seconds to drop to qualify.

By the time I stood up on the blocks, I was not only the only one in the race, I was practically the only one in the natatorium. The horn sounded and I dove in. I was angry and disheartened at having missed the cut the day before and I had little belief that I could go any faster today.

About six hundred yards in, my coach started to pace. I stayed steady on, not in a hurry, not about to get my hopes up. In my mind, I had already missed the time. Then a boy from a rival high school, whom I hardly knew, unfolded his legs and climbed down from the bleachers and started to cheer. He squatted low to the water and pointed his finger toward the end of the pool, as if to say, *That's where you're going, now hurry up.* I thought, *If he's cheering, maybe I'm close.*

Sometimes a moment comes along when the world slows down, and though everything else moves around us at the same frenetic speed, we're afforded the opportunity to reflect in real-time rather than in retrospect. It

is as though we slip into a worm-hole in the fabric of time and space, travel into the past and then back again to the present in the same instant. That morning, swimming, I remembered a day in late September the year before, the last day my swim team had use of an outdoor pool. All summer long my teammates and I swam under an open sky. After this day we would spend the rest of the season in a dank and moldy indoor pool.

The triangular backstroke flags were strung across the lanes and the adjacent diving well. My teammates liked to run down the long cement deck, jump out over the diving well, and try to grab hold of the line. Many of them could jump far enough to make it. I could not, though I tried every day. I tried that day, and missed. Since I would not have another shot until May, I decided to try again. I squared up and ran, my feet wet against the pavement, and just as my foot hit the water's edge, one of my teammates called out "Jump!" I bent my knees and pushed off hard and got my hand around the flag line. I pulled the whole thing into the water. Autumn was coming and I wondered if there was a metaphor in what I had just done; a fortune folded inside a cookie: my greatest effort would come when I was down to my last opportunity.

Now it was March and I was down to my last opportunity, thinking about that day and hearing the word "Jump!" as my eyes followed the finger of the boy pointing me onward. What I understood—not later, but right then, in the water—was how little this swim added up to in the world. I had spent more than a year training for this one swim, and when it was finished the world would be no different than before it began. If no one else cared, then the swim was mine alone. It mattered because it was the task before me *now*, the thing I wanted *now*. Swimming, I had long understood, is a constant choice between the now and the later: exhaustion now for the sake of fitness later, all those Friday nights spent in the pool in pursuit of an end that seemed always one step farther on. I was out of later, this was the end, and I made my choice. I cashed in the energy I set aside for climbing out of the pool and unfolding my towel and tying my shoes. I've never sprinted harder in my life, not before and not since. I hit the wall. I knew by instinct, by the spasm of my tendons and the ache in my bones, before I ever turned toward the clock or heard my coach scream, that I had made it.

- The narrator of the passage can best be described as a swimmer who primarily:
 - recalls the swim of his life and the factors that motivated him during that swim.
 - remembers the events that inspired him to participate in a time trial at the Junior Nationals.
 - contrasts the joy of winning competitions early in the season with his later struggles to succeed.
 - chronicles his swimming career, from childhood through high school.
- Which of the following events mentioned in the passage happened first chronologically?
 - The narrator stood on the blocks at the Sunday time trial his senior year.
 - The narrator leapt out over the diving well in late September.
 - The narrator swam the 500-yard freestyle in the high school regional meet as a senior.
 - The narrator heard a boy from a rival school cheering.
- The narrator describes the natatorium as being nearly empty of spectators the day of his race in order to:
 - illustrate that the perfect racing conditions the narrator had hoped for weren't likely to occur.
 - demonstrate that, contrary to the narrator's expectations, the meet was energetic.
 - explain why the narrator's coach paced at the sound of the horn.
 - identify why the narrator felt a rush of energy before the race.
- The narrator indicates that when he swam the 1,000-yard freestyle in the time trials, the world, for a moment, seemed to:
 - speed up, blurring past and present events.
 - rush past, forcing him to reflect in retrospect.
 - move in slow motion, as did everything around him.
 - slow down, allowing him to reflect in real time.
- The passage indicates that during the narrator's swim at the time trial, he understood for the first time that:
 - his goals would always be one step farther on.
 - he had trained for this swim for over a year.
 - the swim was an event that was important to him alone.
 - swimming is a choice between the now and the later.
- Based on the passage, the "end" the narrator mentions in line 80 most likely refers to his:
 - final pursuit of fitness.
 - last chance to qualify for Junior Nationals.
 - memory of his final Friday night practice.
 - ultimate realization that he had defeated the other competitors in the race.
- The narrator of the passage characterizes the time trial in Houston as:
 - one long sprint in which swimmers attempted to improve their times.
 - a meet advertised as a way to qualify for the Junior Nationals.
 - a regional meet that featured only the 500-yard freestyle and 1,000-yard freestyle.
 - an informal swimming event put together at the last minute.
- The statement "*That's where you're going, now hurry up*" (lines 35–36) can most directly be attributed to the:
 - cheering boy, as he verbally criticizes the narrator's efforts.
 - cheering boy, as he shouts encouragement to the narrator.
 - narrator, as he speculates about what the cheering boy meant when the boy pointed at the pool.
 - narrator, as he angrily contemplates his response to the cheering boy.
- For the narrator, compared to practicing in the outdoor pool, practicing in the indoor pool is:
 - more productive.
 - more liberating.
 - less appealing.
 - less competitive.
- When the narrator heard "Jump!" in his mind while swimming (line 67), he was most likely remembering:
 - his teammate's command the day the narrator caught the flag line.
 - his own shout as he leapt off the outdoor pool's deck that fall.
 - the cheers of the boy from the rival school.
 - the abrupt start of his race that Sunday.

Passage II

SOCIAL SCIENCE: Passage A is adapted from the book *Apple: A Global History* by Erika Janik (©2011 by Erika Janik). Passage B is adapted from the article "The Fatherland of Apples" by Gary Nabhan (©2008 by The Orion Society).

Passage A by Erika Janik

In early September of 1929, Nikolai Vavilov, famed Russian plant explorer and botanist, arrived in the central Asian crossroads of Alma-Ata, Kazakhstan. Climbing up the Zailiyskei Alatau slopes of the Tian Shan mountains separating Kazakhstan from China, Vavilov found thickets of wild apples stretching in every direction, an extensive forest of fruit coloured russet red, creamy yellow, and vibrant pink. Nowhere else in the world do apples grow thickly as a forest or with such incredible diversity. Amazed by what he saw, Vavilov wrote: 'I could see with my own eyes that I had stumbled upon the centre of origin for the apple.'

With extraordinary prescience and few facts, Vavilov suggested that the wild apples he had seen growing in the Tian Shan were in fact the ancestors of the modern apple. He tracked the whole process of domestication to the mountains near Alma-Ata, where the wild apples looked awfully similar to the apples found at the local grocery. Unfortunately, Vavilov's theory would remain mostly unknown for decades.

Exactly where the apple came from had long been a matter of contention and discussion among people who study plant origins. Vavilov, imprisoned by Joseph Stalin in 1940 for work in plant genetics that challenged Stalin's beliefs, died in a Leningrad prison in 1943. Only after the fall of communism in Russia did Vavilov's theory, made more than half a century earlier, become widely recognized.

As Vavilov predicted, it's now believed that all of the apples known today are direct descendents of the wild apples that evolved in Kazakhstan. Apples do not comprise all of Kazakhstan's plant bounty, however. At least 157 other plant species found in Kazakhstan are either direct precursors or close wild relatives of domesticated crops, including 90 per cent of all cultivated temperate fruits. The name of Kazakhstan's largest city, Alma-Ata, or Almaty as it is known today, even translates as 'Father of Apples' or, according to some, 'where the apples are'. So this news about the apple's origins was probably no surprise to residents, particularly in towns where apple seedlings are known to grow up through the cracks in the pavements. The apple has been evolving in Central Asia for upwards of 4.5 million years.

Passage B by Gary Nabhan

Nikolai Vavilov is widely regarded as the world's greatest plant explorer, for he made over 250,000 seed, fruit, and tuber collections on five continents. Kazakh conservationist Tatiana Salova credits him with first recognizing that Kazakhstan was the center of origin

and diversity for apples. "It is not surprising," she concedes, "that when Vavilov first came to Kazakhstan to look at plants he was so amazed. Nowhere else in the world do apples grow as a forest. That is one reason why he stated that this is probably where the apple was born, this was its birthing grounds."

Discerning where a crop originated and where the greatest portion of its genetic diversity remains extant may seem esoteric to the uninitiated. But knowing where exactly our food comes from—geographically, culturally, and genetically—is of paramount importance to the rather small portion of our own species that regularly concerns itself with the issue of food security. The variety of foods that we keep in our fields, orchards, and, secondarily, in our seed banks is critically important in protecting our food supply from plagues, crop diseases, catastrophic weather, and political upheavals. Vavilov himself was personally motivated to become an agricultural scientist by witnessing several famines during the czarist era of Russia. He hoped that by combining a more diverse seed portfolio with knowledge from both traditional farmers and collaborating scientists, the number of Russian families suffering from hunger might be reduced.

In a very real sense, the forests of wild foragers and the orchards of traditional farmers in such centers of crop diversity are the wellsprings of diversity that plant breeders, pathologists, and entomologists return to every time our society whittles the resilience in our fields and orchards down to its breaking point.

And whittle away we have done. Here in North America, according to apple historian Dan Bussey, some 16,000 apple varieties have been named and nurtured over the last four centuries. By 1904, however, the identities and sources of only 7,098 of those varieties could be discerned by USDA scientist W. H. Ragan. Since then, some 6,121 apple varieties—86.2 percent of Ragan's 1904 inventory—have been lost from nursery catalogs, farmers' markets, and from the American table.

11. The author's use of the words and phrases "thickets," "stretching in every direction," and "extensive forest" (lines 6–7) in Passage A most nearly serves to emphasize which of the following points?
- The Tian Shan mountains are a challenge to navigate.
 - The apple varieties of Kazakhstan would be difficult for a botanist to catalog.
 - The diversity of plant species in Kazakhstan is crucially important.
 - The magnitude of wild apples in Kazakhstan is stunning.

12. The author of Passage A most likely states that the wild apples growing in the Tian Shan looked like apples found at the local grocery store to support the point that:
- F. many of the apples stocked in grocery stores are harvested in the Tian Shan.
 - G. in the Tian Shan, Vavilov had likely found the wild ancestors of the domesticated apple.
 - H. the wild apples growing in the Tian Shan are among the most popular varieties with consumers.
 - J. in the Tian Shan, Vavilov had found new apple varieties to introduce to food producers.
13. Passage A makes which of the following claims about plant species that are found in Kazakhstan?
- A. Approximately 157 species of cultivated temperate fruits originated in Kazakhstan.
 - B. Ninety percent of all domesticated crops are either direct precursors or close wild relatives of plant species found in Kazakhstan.
 - C. Of the plant species found in Kazakhstan, ninety percent are species of apples.
 - D. Aside from apples, at least 157 plant species found in Kazakhstan are either direct precursors or close wild relatives of domesticated crops.
14. Passage B most strongly suggests that Vavilov was motivated to become an agricultural scientist primarily because he:
- F. wanted to have one of his findings published.
 - G. aimed to work with a famous botanist.
 - H. wished to remedy a personal financial crisis.
 - J. hoped to help feed others.
15. The author of Passage B uses the phrase “whittle away” (line 80) to refer to the way that apple varieties have been:
- A. gradually lost from nursery catalogs, farmers’ markets, and the American table.
 - B. modified by plant breeders, entomologists, and pathologists to meet specialized needs.
 - C. weeded out by scientists until only the few thousand most resilient varieties remained.
 - D. pared down in 1904 to the few varieties that nursery catalogs wanted to feature.
16. As it is used in lines 82–83, the phrase *named and nurtured* most nearly means:
- F. nominated and encouraged.
 - G. identified and cultivated.
 - H. pointed to and groomed.
 - J. cited and fed.
17. In Passage B, it can most reasonably be inferred from the third paragraph (lines 74–79) that “centers of crop diversity” become crucially important when:
- A. plant breeders would like to learn more about the plant species of central Asia.
 - B. problems with a cultivated crop require experts to research a new variety of the crop.
 - C. consumers would like more variety in grocery produce departments.
 - D. disputes among plant breeders, pathologists, and entomologists lead to a reduction in crop variety.
18. Which of the following statements best describes the difference in the tone of the two passages?
- F. Passage A is defensive, whereas Passage B is dispassionate.
 - G. Passage A is solemn, whereas Passage B is optimistic.
 - H. Passage A is celebratory, whereas Passage B is cautionary.
 - J. Passage A is accusatory, whereas Passage B is sentimental.
19. Compared to the author of Passage A, the author of Passage B provides more information about the:
- A. reduction in the number of apple varieties in North America over the past four centuries.
 - B. methods Vavilov used to prove to other scientists that the apples growing in the Tian Shan are the ancestors of the modern apple.
 - C. number of apple varieties that are thriving in Kazakhstan today.
 - D. techniques used by researchers to determine the regions with the greatest genetic diversity in plants.
20. Passage A quotes Vavilov as saying “I could see with my own eyes that I had stumbled upon the centre of origin for the apple” (lines 11–12). In Passage B this quote is directly:
- F. invoked by the passage author as he imagines what Kazakhstan looked like centuries ago.
 - G. used to support an argument by USDA scientists.
 - H. paraphrased by Salova.
 - J. refuted by Bussey.

Passage III

HUMANITIES: This passage is adapted from the article “The Quiet Sideman” by Colin Fleming (©2008 by The American Scholar).

Near the end of his eight years as a recording-session musician, tenor saxophonist Leon “Chu” Berry landed a short-lived spot with Count Basie’s orchestra. Standing in for one of the Basie band’s two tenor giants, Berry took a lead solo on “Oh, Lady Be Good,” the 1924 Gershwin song that Basie had played for years. In the 28 seconds that the solo lasted on February 4, 1939, we are treated to no less than the musical personification of mind and body working together in divine tandem. When you hear the recording for the first time, you’re likely to wonder why you’ve never heard of Chu Berry before.

Why you’ve never heard of him is pretty simple: a lot of hard-core jazz buffs don’t know much about him. Berry was a solid session player who turns up on recordings with Basie, Bessie Smith, Fletcher Henderson, and Billie Holiday. But he did not cut many sessions himself as a leader, and when he soloed, he worked within the recording constraints of the era and the swing genre—fast-moving 78s with solos often lasting for a mere 32 beats.

The people who loved Berry were, not surprisingly, other tenor players, a situation leading to the dreaded “musician’s musician” tag. But that’s not nearly praise enough to describe Chu Berry, who, when given opportunity, displayed a musical dexterity that would be envied by future generations of horn men.

Berry faced the lot of other horn players: having to grind it out long and hard until something memorable burst through; the prejudices and expectations of the listening public; and the accepted wisdom of what is and isn’t art in a given medium. In this case, swing was fodder for dance parties, not music worthy of study.

Oddly enough, Berry’s geniality might help explain his failure to court history’s favor: it wasn’t in his nature to call attention to himself or his playing. Born in 1908 into the black middle class in Wheeling, West Virginia, the laid-back, affable Berry attended West Virginia State in Charleston, where he switched from alto sax to tenor and exhibited the willingness to fit in that characterized his presence in so many dance bands. He was the rare artist who refused to put his interests above those of the band, even if that meant playing ensemble passages rather than taking a healthy allotment of solo breaks.

College proved a training ground for Berry the bandsman, as he teamed up with a number of amateur outfits. He never played simply to show off. Instead, he tried to bring out the positive attributes in any given situation or setting. Later, when Berry is performing with the Calloway ensemble, we hear some ragged, out-of-tune playing until Berry’s first few solo notes emerge.

The other players, no longer languidly blowing through their charts, immediately surge up behind him, all fighting-fit. Once Berry finishes his solo, the shenanigans resume.

After making his way to New York, Berry immediately became a presence and soon was in demand. The great jazz orchestras of the swing era were fronted by musical directors/arrangers—Duke Ellington was pre-eminent—who drew the acclaim. The sidemen were musical traveling salesmen who sold someone else’s wares in the best style they could manage. It was with Fletcher Henderson that Berry began to ditch some of the sideman’s subservient trappings. For starters, Henderson wrote in keys that were rare for the jazz orchestras of the day, and his somber, indigo-inflected voicings were ideal for a player of Berry’s introspective approach to his instrument: Berry sounds as if he’s being swallowed by his sax. “Blues in C Sharp Minor,” for instance, is odd, haunting, and ultimately relaxing. A Berry solo in it is slightly off mike, making the listener feel as though he’s been playing for some time before we finally hear him. The effect is unnerving, as if we weren’t paying close attention.

In June 1940, Cab Calloway granted Berry a showcase piece, “A Ghost of a Chance,” the sole recording in Berry’s career to feature him from start to finish. It was his “Body and Soul,” a response to Coleman Hawkins’s famous recording, intended not as a riposte to a rival, but as the other half of a dialogue. Its rubato lines are disembodied from the music meant to accompany it, which is spartan to begin with. This may be Berry’s one and only instance of indulgence on a record, a cathedral of a solo in its flourishes, angles, ornamentations, reflexivity. If sunlight could pass through music, “A Ghost of a Chance” would funnel it out in the broadest spectrum of colors.

21. Based on the passage, how did Berry’s personality affect his career?
- His ambitious, competitive personality was off-putting to other musicians, who were reluctant to play with him.
 - His genial personality endeared him to other musicians, but his career suffered when he spent more time socializing than practicing.
 - His modest and easygoing personality kept him out of the spotlight and, consequently, he received less attention as a performer.
 - His shy, introspective personality was misunderstood as snobbish arrogance, so he was offered few recording-session jobs.

22. The author mentions Berry's solo in "Oh, Lady Be Good" primarily in order to:
- F. illustrate why most people haven't heard of Berry.
 - G. provide an example of Berry's musical excellence.
 - H. contrast Berry's later work with Berry's early work.
 - J. establish that Berry's solo was better than Count Basie's.
23. The author points out that many serious jazz enthusiasts know little about Berry primarily in order to:
- A. criticize scholarship that has provided an unbalanced history of jazz.
 - B. demonstrate that the author is more knowledgeable than most jazz scholars.
 - C. illustrate the secrecy Berry demanded in order to preserve his family's privacy.
 - D. explain why it's likely that readers would be unfamiliar with Berry.
24. According to the author, Berry's solos as a recording-session musician were often very short because he:
- F. wasn't a very good saxophone player until late in his career.
 - G. drew more attention playing ensemble passages.
 - H. worked within the recording constraints of the era.
 - J. preferred playing many short solos to playing a few long ones.
25. The author indicates that during Berry's time as a musician, swing music was primarily regarded as:
- A. an opportunity for soloists to show off their skills.
 - B. a genre to be most appreciated by young people.
 - C. musician's music that lacked a popular audience.
 - D. music for dance parties but not music for study.
26. As it is used in line 35, the word *court* most nearly means to:
- F. seek to attract.
 - G. romantically pursue.
 - H. dangerously provoke.
 - J. pass judgment upon.
27. In the seventh paragraph (lines 57–75), the author compares sidemen to traveling salesmen in order to:
- A. make clear how often musicians had to travel.
 - B. indicate that musicians often had side jobs.
 - C. illustrate sidemen's supportive role in a band.
 - D. show how hard sidemen worked to get hired.
28. The author describes Henderson's "Blues in C Sharp Minor" as:
- F. innovative, indulgent, and colorful.
 - G. fast-moving, memorable, and eerie.
 - H. artful, sublime, and unexpectedly upbeat.
 - J. odd, haunting, and relaxing.
29. According to the author, what is unique about the June 1940 rendition of the song "A Ghost of a Chance"?
- A. It's the only recorded piece that features Berry from beginning to end.
 - B. Berry plays an alto saxophone instead of his usual tenor saxophone.
 - C. It was the only public performance Berry gave in 1940.
 - D. Berry showcases his unrivaled ability to play a solo that blends into the background.
30. The author uses the phrase "a cathedral of a solo" (line 85) most likely to create a sense that Berry's solo was:
- F. an intricate, awe-inspiring masterpiece.
 - G. a somber, mournful hymn.
 - H. a crumbling remnant of Berry's once-great skill.
 - J. a testament to Calloway's band leadership.

Passage IV

NATURAL SCIENCE: This passage is adapted from the article "Warp Factor" by Charles Liu (©2003 by Natural History Magazine, Inc.).

Astronomers sometimes describe the shape of our home galaxy, the Milky Way, as a thin-crust pizza with a plum stuck in the middle. The plum is the slightly oblong central bulge, protruding about 3,000 light-years above and below the galactic plane, comprised mostly of older stars; it makes up the core of the Milky Way, and includes a black hole two and a half million times the mass of the Sun. The crust of the pizza is the galactic disk—the source of most of our galaxy's light. Thin and flat, the disk is 100,000 light-years across, about 1,000 light-years thick, on average, and includes more than 80 percent of the galaxy's hundred billion or so stars.

The plum-and-pizza picture works well enough, but like most simple metaphors, it breaks down if you push it. For one thing, the galactic disk isn't a rigid body, but a loose agglomeration of matter streaming around a common center of gravity. (The swirling pattern of a hurricane far better resembles our spinning galaxy.) For another thing, our galaxy's disk isn't flat; it's warped. Picture a disk of pizza dough spun into the air by a skilled chef: our galaxy goes through the same kind of floppy, wobbly gyrations, though at a rate best measured in revolutions per hundreds of millions of years.

Why does the Milky Way have such an odd-looking warp? No definitive answer has emerged. One thing we do know: when it comes to warps, our galaxy is hardly unique. About half of all spiral galaxies are warped to some degree. Theoretical and computational models have shown that a number of physical processes can warp a galaxy, so it's a matter of figuring out which scenario applies. An innovative analysis of the problem by Jeremy Bailin, an astronomy graduate student at the University of Arizona in Tucson, has implicated a small satellite galaxy, currently being ripped to shreds by the gravity of the Milky Way.

The Sagittarius Dwarf Spheroidal Galaxy was discovered in 1994. It appears to be in a roughly polar orbit around the Milky Way—that is, above and below the galactic disk—about 50,000 light-years from the galactic center. That orbit brings the dwarf galaxy far too close to the huge gravitational tidal forces of the Milky Way for the dwarf to remain intact. As a result, the Sagittarius Dwarf now looks something like strands of spaghetti spilling from the front of a pasta-making machine, the galaxy's matter being drawn out over hundreds of millions of years by intergalactic tides.

Gravitational collisions between small satellite galaxies and big spiral galaxies have long been regarded as possible culprits in the warping of a larger galaxy's disk. The best known satellite galaxies orbiting the Milky Way—the Large and Small Magellanic Clouds—are too far away, and have the wrong orbital

characteristics, to have warped our galactic home. The Sagittarius Dwarf seems a much more likely candidate, simply because it is only a third as far from the center of the Milky Way as the Magellanic Clouds. But in astronomy—unlike in real estate—location isn't everything; to show a direct connection between warp and dwarf, the orbital motion of the Sagittarius Dwarf must be linked to the rotation of the Milky Way's disk.

Bailin's study is the first to find such a link. His analysis of the galactic warp is based on angular momentum—a measure of how much a system is spinning or rotating. Just as objects moving in a straight line have momentum, objects spinning or orbiting around an axis have angular momentum; and just as the momenta of two objects combine when they collide, so too do their angular momenta. Imagine two figure skaters coming together for a combination spin. When they make physical contact, their individual spiraling motions combine to produce a single, unified whirl.

Starting with the latest measurements of the structure and spin of the Milky Way, Bailin deduced the angular momentum of the warped portion of the Milky Way's disk. He then compared that measure with the angular momentum of the Sagittarius Dwarf—and found for the first time, within the margins of measurement error, that the two angular momenta are identical in both quantity and direction. Such a coupling of the angular momenta of two bodies almost never happens by chance; usually, it takes place only when two spinning systems, like the skaters, come into contact. The coupling isn't enough to prove cause and effect by itself, but it's solid circumstantial evidence that the interaction of the Sagittarius Dwarf with the Milky Way disk created the warp in our galaxy.

31. Which of the following statements best expresses the main idea of the passage?
- Bailin began studying the Sagittarius Dwarf when he was a graduate student in astronomy.
 - The gravitational tidal forces of the Milky Way are destroying the Sagittarius Dwarf.
 - Most astronomers have come to an agreement that evidence about how galaxies have formed is, at best, circumstantial.
 - Evidence suggests that the warp in the Milky Way's disk results from the Milky Way's interaction with a small satellite galaxy.
32. It can reasonably be inferred that the problem the author mentions in line 33 refers to:
- a particular aspect of Bailin's theory for which there is little evidence.
 - a mathematical computation that led Bailin to focus on the Sagittarius Dwarf.
 - the question of which physical processes caused the warp in the Milky Way.
 - the potential impact of wobbly gyrations on the Milky Way's rotation.

33. It can reasonably be inferred from the passage that the small satellite galaxy referred to in lines 35–36 is:
- A. the Small Magellanic Cloud.
 - B. the Sagittarius Dwarf.
 - C. a known but as yet unnamed galaxy.
 - D. a hypothetical galaxy that is believed to exist but has not yet been found.
34. Based on the passage, which of the following statements best describes Bailin’s study as it relates to the field of astronomy?
- F. It led astronomers to the discovery of a warp in the Milky Way’s disk.
 - G. It convinced more astronomers to focus their attention on the center of the Milky Way.
 - H. It revealed problems with the basic assumptions held by most astronomers.
 - J. It provided evidence for an idea that scientists had long considered a possibility but had not yet proved.
35. According to the passage, Bailin discovered that the angular momentum of the warped portion of the Milky Way and the angular momentum of the Sagittarius Dwarf are:
- A. identical in quantity but different in direction.
 - B. identical in direction but different in quantity.
 - C. identical in both quantity and direction.
 - D. different in both quantity and direction.
36. According to the passage, the central bulge of the Milky Way is comprised of:
- F. 80 percent of the galaxy’s stars.
 - G. older stars and a black hole.
 - H. a galactic plane and several dwarf planets.
 - J. a loose agglomeration of unidentified matter.
37. The author refers to the swirling pattern of a hurricane primarily in order to:
- A. help explain the shortcomings of the plum-and-pizza metaphor.
 - B. argue that the unpredictability of the rotation of spiral galaxies requires a new metaphor.
 - C. emphasize the particular aspects of the Milky Way that make it unique.
 - D. describe how the movement of the Milky Way creates gravitational tides.
38. The passage directly compares the Milky Way’s disk as it is affected by its warp to:
- F. a pasta maker churning out spaghetti.
 - G. pizza dough being spun in the air by a chef.
 - H. a thin-crust pizza balanced on top of a plum.
 - J. two figure skaters coming together for a combination spin.
39. According to the passage, which of the following statements best describes the movement of the Sagittarius Dwarf with respect to the Milky Way?
- A. It appears to be in a roughly polar orbit around the Milky Way.
 - B. It appears to orbit the Milky Way at an angle of roughly forty-five degrees.
 - C. It follows the movement of the stars in the Milky Way’s disk, though at a slightly faster rate.
 - D. It once followed the movement of the stars in the Milky Way’s disk, but now seems to move erratically along its own path.
40. The passage describes angular momentum as the amount of a system’s:
- F. vertical deviation within an orbital path.
 - G. movement in a straight line through space.
 - H. gravitational pull.
 - J. spin or rotation.

END OF TEST 3

**STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.
DO NOT RETURN TO A PREVIOUS TEST.**