Mission 1: The pirate flags excavation

1 ■ ■ ■ ■

The widths of the lines correspond perfectly to the widths
23

of the zebra's stripes. Providing the zebra's "StripeCode,"
24

unique to each animal in much the same way a fingerprint is unique to each person. The StripeCode is logged in the database, where a researcher uploading a new photograph of a zebra can scan the stored codes to find a potential match.

[4]

[C] StripeSpotter has proved so useful that it's developers plan to design similar programs
25

for identifying other animals. Any pattern
26

present over an animal's life could be translated
27

into an identification code—spots on a leopard's hide, the wrinkled trunk of an elephant, rings on
28

a tortoise's shell. So far, StripeSpotter has helped researchers thoroughly monitor the social interactions
29

and migration patterns of endangered zebra species in Kenya. [D]

Secret word

24. F. NO CHANGE
G. Resulting in
H. This is
J. As

Secret word

26. F. NO CHANGE
G. animals, though these programs have not yet been created.
H. animals through a comparable means.
J. animals that are not zebras.

In June 1903, under Young's command, the soldiers began work on the road. Soon the eleven-mile route was complete. By the middle of August, vehicles could enter the park. Young and his troops had succeeded where no one else had; they enabled visitors to get to the giant sequoias more easily.

Because he had his troops
52

send most of their efforts into the road,
53
Young was just as concerned with maintaining the park's natural features. His troops guarded the grounds against illegal grazing, poaching, and logging. Nevertheless, since tourist foot traffic tended to damage
54
some of the giant sequoias, Young had his soldiers place fences around the most damaged trees to protect them from future bad stuff.
55

Over one hundred years later, the contributions Young made possible has been counted among the
56

most significant in the park's history. [57] In 2003, the National Park Service decided to formally recognize the efforts of Captain Young (who

being promoted to lieutenant colonel in 1916).
58

Secret Word

52. F. NO CHANGE
G. Although
H. Unless
J. If

Secret word

54. F. NO CHANGE
G. Additionally,
H. Thus,
J. Still,

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: Passage A is adapted from the autobiography *A Peculiar Treasure* by Edna Ferber (©1960 by Morris L. Ernst, et al., Trustees). Passage B is adapted from the memoir *Pull Me Up: A Memoir* by Dan Barry (©2004 by Dan Barry).

Passage A by Edna Ferber

The printing shop and pressroom were separated from the front office only by a doorway, and the door never was closed. There were the type forms and tables, the linotype machine (a new and fearsome invention to me), the small press, the big newspaper press, the boiler plate, the trays of type, all the paraphernalia that goes to make up the heart of a small-town newspaper. The front room is its head, but without the back room it could not function or even live. The linotype and the small press went all day, for there the advertising was set up and printed, as well as handbills, programs, all the odds and ends classified as job printing. Mac, who ruled this domain, was the perfect example of the fictional printer. He had come in years before, his brown hair curled over a mild brow, his limp shirt seemed perennial. But his eye was infallible, and few if any shrdlus and etaoins marred the fair sequence of Mac's copy. His voice was soft, gentle, drawling, but he was boss of the print shop from the cat to the linotype operator. Mac seldom talked but sometimes—rarely—he appeared in the front office, a drooping figure, with a piece of news by which he had come in some devious way. Standing at the side of the city editor's desk he would deliver himself of this information, looking mild and limply romantic. It always proved to be a bombshell.

Such was the make-up of the Appleton, Wisconsin, Daily Crescent office.

In the past thirty years all sorts of ex-newspaper men from Richard Harding Davis to Vincent Sheean and John Gunther have written about the lure of the reporter's life, the smell of printer's ink, the adventure of reporting. It all sounds slightly sentimental and silly, but it's true—or it was, at least, in my newspaper experience. To this day I can't smell the scent of white paper, wet ink, oil, hot lead, mucilage and cats that goes to make up the peculiar odor of any newspaper plant, be it Appleton, Wisconsin, or Cairo, Egypt, that I don't get a pang of nostalgia for the old reporting days. "I was once a newspaper man myself" has come to be a fun phrase. But practically everyone seems to have been, or to have wanted to be, a newspaper reporter.

Passage B by Dan Barry

Ink. The building smelled of ink, spilled and bled. It was a tart and chemical smell, the kind that weaves into the fabric of your clothes and then under your skin, the kind that comes home with you, sits with you at the dinner table, tells you constantly what it is you do. Car mechanics know their smell, as do fishermen and hair stylists, nurses and short-order cooks. You are a man who chases halibut, a woman who perms hair. You smell of it.

I waded into that invisible veil of ink, inhaled it deeply, allowed it to wash over me. It smelled of words and phrases, rants and ideas, sports scores and felony arrests, announcements of marriage and notices of death. Maybe the chemical-like aroma was inducing hallucination, but I doubted it. In a squat concrete building, no different from all the others in a drab Connecticut industrial park, I was experiencing a moment of revelation—an epiphany, really, at the age of twenty-five.

This is what I do.

Pinned like a manifesto to a bulletin board in the center of this ink-perfumed building was a typewritten note from my new employer, announcing that on this day, October 17, 1983, I would begin working as a reporter for a daily newspaper. The note formalized my calling in life with a splash of perspective that would stay with me forever:

Dan is a former intern at the Daily News *in New York and a graduate assistant for the journalism department at New York University. His writing has appeared in the* Daily News, *the* New York Times *and the* Rocky Mountain News. *Soon it will appear in trashcans throughout north-central Connecticut. Please make him feel relevant.*

Reading the note, I thought, I'm home.

Finding my way had not been easy. The internship at the *Daily News* had ended, the graduate degree from NYU had been shoved in a drawer, and I had returned to living beside the sump pump in my parents' basement. I spent my days splitting sod for a lawn and sprinkling company alongside Eddie, who had taken to calling me "Professor," and my nights typing out professional love letters to the *New London Day*, the *Asbury Park Press*, the *Poughkeepsie Journal*, the *Stamford Advocate*, the *Anywhere Clarion-Bugle-Star-Record-Sentinel*, and every other Northeastern newspaper that I had never read.

Questions 1–4 ask about Passage A.

1. It can reasonably be inferred that Passage A is narrated from the point of view of someone who:

   A. once worked in the newspaper business.
   B. recently started a career in the newspaper business.
   C. is outside the newspaper business and is evaluating the inner workings of various news offices.
   D. is outside the newspaper business and longs to be a reporter.

2. Based on Passage A, the narrator believes that, compared to what goes on in the front office, what goes on in the printing shop and pressroom is:

   F. more tedious.
   G. equally critical.
   H. equally chaotic.
   J. less regulated.

Secret word

Passage II

SOCIAL SCIENCE: This passage is adapted from the book *Lost Discoveries: The Ancient Roots of Modern Science—from the Babylonians to the Maya* by Dick Teresi (©2002 by Dick Teresi).

"In the history of culture," wrote mathematician Tobias Dantzig in 1930, "the discovery of zero will always stand out as one of the greatest single achievements of the human race." Zero, he said, marked a "turning point" in math, science, and industry. He also noted that the zero was invented not in the West but by the Indians in the early centuries after Christ. Negative numbers followed soon thereafter. The Maya invented zero in the New World at approximately the same time. Europe, says Dantzig, did not accept zero as a number until the twelfth or thirteenth century.

There are many "biographies of zero," and Dantzig's concise and spirited account of the birth of a number is adequate for most of us. He sees zero's invention appearing on an Indian's counting board in, say, the first or second century A.D. The Indian counting board had columns for the ones, tens, hundreds, thousands, and so on. To "write" 302, for instance, a mathematician would put a 2 in the first (right) column and a 3 in the third, leaving the second column empty. On one fateful day, as Dantzig sees it, an unknown Indian drew an oval in the second column. He called it *sunya*, for "empty" or "blank." *Sunyata*, an important concept in Buddhism, is often translated as "emptiness" or "void."

The Arabs turned *sunya* into *sifr* ("empty" in Arabic), which became *zephirum* in Italy, and eventually zero. In Germany and elsewhere, *sifr* became *cifra*, and then, in English, *cipher*. In other words, it took over a thousand years for Western civilization to accept a number for "nothing." Dantzig blames the Greeks. "The concrete mind of the ancient Greeks could not conceive the void as a number, let alone endow the void with a symbol."

That's the short version, and not a bad one. You don't want to hear the long version, so let's suffice with a medium-sized tale.

Zero lay rustling in the weeds for many centuries before that Indian drew it on a counting board. It was an unnamed, unwritten force. It took many more centuries after the Indians and the Maya dared speak its name before zero was promoted to a full-fledged number.

The U.S. Library of Congress defends our calendar and its missing zero. "There has never been a system of recording reigns, dynasties, or eras," the library states, "that did not designate its first year as the year 1." In fact, the Maya had both years 0 and days 0.

The Babylonians had no zero, but they knew something was wrong. If they numbered the first year of each king's reign as year 1, then added up the number of years of each separate reign, they'd end up with too many years unless each king died just before midnight on New Year's Eve and his successor took the throne after midnight. Thus, the Babylonians called a king's first year the *accession year*. The following year was year 1. The accession year was a kind of year 0. The Babylonians, so far as we know, never articulated zero, but seemed aware that there was a missing number in their system.

The contemporary mathematician who has conducted the most rigorous research on nothing is Robert Kaplan, the author of *The Nothing That Is: A Natural History of Zero*. Zero turns up throughout history in different cultures as a series of dots and circles, and Kaplan writes of following "the swarm of dots we find in writings from a host of languages, across great spans of time, and on topics mathematical and otherwise."

Kaplan traces the roots of zero to Sumer and Babylonia. The Sumerians counted by tens and sixties, a system adopted by the Babylonians, who eclipsed them in Mesopotamia. The Babylonians, far ahead of the Romans and Greeks to come, imposed a positional notation on the old Sumerian sexagesimal system. Writing their numbers on clay, the Babylonians needed a symbol to put in the "empty" columns, just as we today use zero to differentiate between 302 and 32.

Somewhere between the sixth and third centuries B.C., the Babylonians began using two slanted tacklike symbols to insert in the empty columns. They borrowed the slanty tacks from their language, where they were used as periods, among other things. However, the Babylonians used their "zero" only in the middle of numbers, never at the end. Clearly, this was not a full-fledged zero.

Kaplan argues that when Alexander invaded the Babylonian empire in 331 B.C., he hauled off zero along with the gold. Shortly thereafter we find the symbol 0 for zero in the papyri of Greek astronomers, but the mathematicians never pursued the concept.

Secret word

Secret word

13. According to the passage, the Maya invented zero at about the same time as:

A. the Indians invented zero.
B. the Sumerians invented zero.
C. Alexander invaded Babylonia.
D. Europe accepted zero as a number.

Secret word

19. The passage author responds to the US Library of Congress's statement that there has never been a system of dates with a year 0 by:

A. arguing that undiscovered civilizations may have had years 0.
B. citing an expert who disagrees with the statement.
C. suggesting that the Library of Congress's research is authoritative.
D. providing an example that contradicts the statement.

16. In the passage, Dantzig criticizes the ancient Greeks because he thinks they:

F. lacked the abstract thinking necessary to think of the void as a number.
G. attempted to use zero in their mathematics before they understood it fully.
H. were unwilling to share their knowledge of zero with other European countries.
J. focused so much on negative numbers that they couldn't imagine a number for the void.

Passage IV

NATURAL SCIENCE: This passage is adapted from the book *Mycophilia: Revelations from the Weird World of Mushrooms* by Eugenia Bone (©2011 by Eugenia Bone).

There are a number of fungi that live in mutualist relationships in which a balance of interests occurs between two organisms. Lichen has a mutualistic relationship with photosynthesizing algae and bacteria. And there are also commensal relationships, where the fungus may not be doing the host any good or any harm, either—the raison d'être of some yeasts in our body, for example, is unknown and may be commensal. But mycorrhizal fungi are the princes of mutualism. "Fungi can't make their own food," said Gary Lincoff. "So they made a strategic choice to team up with plants."

Ninety percent of natural land plants are thought to have mycorrhizal fungi partners. It's a masterpiece of evolution: Mycorrhizal fungi break down nutrients like phosphorus, carbon, water, and nitrogen into a readily assimilative form and deliver them to the plant in return for sugar produced by the plant via photosynthesis. The fungus needs sugar for energy and to launch its spores, and the tree needs nutrients because (despite what I learned in school) tree roots don't do the job adequately. Tree roots primarily anchor the tree in the soil. While tree roots will absorb moisture if watered and nutrients if fertilized, it is the mycorrhizal fungus *growing on and in the tree roots* that provides the tree with the lion's share of its nutrition and water. Mycorrhizal fungi significantly expand the reach of plant roots, and by extending the root system, increase the tree's nutrient and water uptake.

In the wild, mycorrhizal fungi are key to not just the health of single trees but to healthy forest ecosystems. A single fungal genotype or clone can colonize the roots and maintain the nutritional requirements of many trees at once. And multiple fungi can colonize the roots of all or most of the trees in a forest. The hyphae, those threadlike strings of cells that are the fungus, function as pathways for shuttling nutrients, water, and organic compounds around the forest. The mycologist Paul Stamets believes that mycorrhizal fungi function as a giant communications network between multiple trees in a forest—he calls it "nature's Internet." Others have described this linkage as the "architecture of the wood-wide web."

Weaker plants are able to tap into this network, too, like hitchhikers on a nutritional superhighway. Young seedlings struggling to grow in the shadow of established trees tap into the larger, older tree's fungal network to improve their nutritional uptake. This network exists to benefit not only established trees and seedlings of the same species but also trees from different species, and at different stages of development. So one multitasking fungus, its hyphae attached to the roots of multiple trees in the forest, can simultaneously provide a different nutritional load as needed to different trees. It's a couture service.

The old trees in a forest function as hubs for these mycelial networks. "Like spokes of a wheel," said Suzanne Simard, a professor of forestry at the University of British Columbia who studies mycorrhizae. Rhizomorphs (ropes of hyphae) connect the foundation tree with other trees—like an express stop on a subway system where lots of local trains come through—and the bigger the tree, the larger the hub. That's because the largest trees have the greatest root system, and the more roots there are, the more real estate there is for the fungus to colonize. "In one forest, we found 47 trees linked by two species of fungi composed of 12 individuals," said Simard. (By individuals, she means two genetically distinct fungal entities.) "Talk about two degrees of separation!" Even nonphotosynthesizing plants take advantage of "the hub." Parasites like the Indian pipe depend totally on mycorrhizal fungi for its nutritive needs. It taps into the nutrients and water provided by the mycorrhizae and connects via the mycorrhizae to a photosynthesizing plant for sugar.

Despite the fact that fungi are microscopic organisms, the functions they perform are often on an ecosystem or landscape scale. If you could take an x-ray look at the soil, you'd see that underneath the forest duff there is a layer of mycorrhizal mycelium running between, on, and in the roots of plants. It's like a stratum of life between the duff and the soil that holds water and nutrients in the ground. And when that stratum is disrupted, or not present, plants suffer. In fact, ecosystems with inadequate mycorrhizal fungi can experience catastrophic losses of plant biomass.

Secret word

32. According to the passage, compared to the typical amount of water a tree's roots provide the tree, the typical amount of water mycorrhizal fungi provide the tree is:

F. about the same.
G. much larger.
H. much smaller.
J. somewhat smaller.

33. The main idea of the fourth paragraph (lines 44–55) is that:

Secret word

35. In the passage, the relationship between yeast and the human body is cited as an example of a:

A. definite commensal relationship.
B. possible commensal relationship.
C. definite mutualist relationship.
D. possible mutualist relationship.

36. The author most likely includes the quote from Lincoff (lines 10–12) to:

F. suggest that mycorrhizal fungi have a commensal relationship with plants.
G. contend that mycorrhizal fungi serve the same function as some yeasts in the human body.
H. indicate why mycorrhizal fungi have a mutualist relationship with plants.
J. explain why mycorrhizal fungi cannot make their own food.

Secret Word

Secret word

40. Which of the following statements, if true, would most WEAKEN the claim made by the author in lines 83–86 of the passage?

F. Over a three-year span, two forests with different tree types increase the amount of mycorrhizal mycelium at the same rate.
G. Over a three-year span, two forests with the same amount of mycorrhizal mycelium both lost the majority of their plant biomass.
H. During a given year, after the majority of mycorrhizal mycelium dies in a forest, the plants in the forests flourish.
J. During a given year, after the majority of mycorrhizal mycelium dies in a forest, the plants in the forests suffer.

END OF TEST 3

DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO A PREVIOUS TEST.