

Reading Class Sheet-2

To understand what the new software—that is, analytics—can do that's different from more familiar software like spreadsheets, word processing, and graphics, consider the lowly photograph. Here the relevant facts aren't how many bytes constitute a digital photograph, or a billion of them. That's about as instructive as counting the silver halide molecules used to form a single old-fashioned print photo. The important feature of a digital image's bytes is that, unlike crystalline molecules, they are uniquely easy to store, transport, and manipulate with software. In the first era of digital images, people were fascinated by the convenience and malleability (think PhotoShop) of capturing, storing, and sharing pictures. Now, instead of using software to manage photos, we can mine features of the bytes that make up the digital image. Facebook can, without privacy invasion, track where and when, for example, vacationing is trending, since digital images reveal at least that much. But more importantly, those data can be cross-correlated, even in real time, with seemingly unrelated data such as local weather, interest rates, crime figures, and so on. Such correlations associated with just one photograph aren't revealing. But imagine looking at billions of photos over weeks, months, years, then correlating them with dozens of directly related data sets (vacation bookings, air traffic), tangential information (weather, interest rates, unemployment), or orthogonal information (social or political trends). With essentially free super-computing, we can mine and usefully associate massive, formerly unrelated data sets and unveil all manner of economic, cultural, and social realities.

For science fiction aficionados, Isaac Asimov anticipated the idea of using massive data sets to predict human behavior, coining it “psychohistory” in his 1951 Foundation trilogy. The bigger the data set, Asimov said then, the more predictable the future. With big-data analytics, one can finally see the forest, instead of just the capillaries in the tree leaves. Or to put it in more accurate terms, one can see beyond the apparently random motion of a few thousand molecules of air inside a balloon; one can see the balloon itself, and beyond that, that it is inflating, that it is yellow, and that it is part of a bunch of balloons en route to a birthday party. The data/software world has, until now, been largely about looking at the molecules inside one balloon.

1

The main idea of the passage is that

- A) Bytes have allowed people to capture and edit images in innovative ways.
- B) New forms of technology allow users' activities to be tracked without violating privacy.
- C) Recent developments in technology have transformed the way data is acquired and analyzed.
- D) Modern technology was described in science fiction novels long before it was invented.

2

The author's central claim in the second paragraph is that

- A) The predictions of science fiction writers tend to be more accurate than those of scientists.
- B) All human behavior can be understood through the use of massive data sets.
- C) Technological innovation is often inspired by the natural world.
- D) Data sets will reveal unforeseen relationships between large-scale phenomena.

This passage is adapted from Jamaica Kincaid,
Annie John, © 1985 © Farrar Strauss and Giroux.
The protagonist is a girl growing up in the Caribbean.

It was the first day of a new term, Miss Nelson said, so we would not be attending to any of our usual subjects; instead, we were to spend the morning in contemplation and reflection and writing something she 5 described as an “autobiographical essay.” In the afternoon, we would read aloud to each other our auto-biographical essays. (I knew quite well about “autobiography” and “essay,” but reflection and contemplation! A day at school spent in such a way! 10 Of course, in most books all the good people were always contemplating and reflecting before they did anything. Perhaps in her mind’s eye she could see our future and, against all prediction, we turned out to be good people.) On hearing this, a huge sigh went up 15 from the girls.

Half the sighs were in happiness at the thought of sitting and gazing off into clear space, the other half in unhappiness at the misdeeds that would have to go unaccomplished. I joined the happy half, because I 20 knew it would please Miss Nelson, and, my own selfish interest aside, I liked so much the way she wore her ironed hair and her long-sleeved blouse and box-pleated skirt that I wanted to please her.

The morning was uneventful enough: a girl 25 spilled ink from her inkwell all over her uniform; a girl broke her pen nib and then made a big to-do about replacing it; girls twisted and turned in their seats and pinched each other’s bottoms; girls passed notes to each other. All this Miss Nelson must have seen and 30 heard, but she didn’t say anything—only kept reading her book: an elaborately illustrated edition of the *The Tempest*, as later, passing by her desk, I saw. Midway in the morning, we were told to go out and stretch our legs and breathe some fresh air for a few minutes; 35 when we returned, we were given glasses of cold lemonade and a slice of bun to refresh us.

As soon as the sun stood in the middle of the sky, we were sent home for lunch. The earth may have grown an inch or two larger between the time I had 40 walked to school that morning and the time I went home to lunch, for some girls made a small space for me in their little band. But I couldn’t pay much attention to them; my mind was on my new surroundings, my new teacher, what I had written in my nice new 45 notebook with its black-all-mixed-up-with-white cover and smooth lined pages (so glad was I to get rid of my old notebooks, which had on their covers a picture of a wrinkled-up woman wearing a crown on her head and a neckful and armfuls of diamonds and pearls—their 50 pages so coarse, as if they were made of cornmeal).

I flew home. I must have eaten my food. By half past one, we were sitting under a flamboyant tree in a secluded part of our schoolyard, our auto-biographical essays in hand. We were about to read aloud what 55 we had written during our morning of contemplation and reflection. In response to Miss Nelson, each girl stood up and read her composition. One girl told of a much revered and loved aunt who now lived in England and of how much she looked forward to 60 one day moving to England to live with her aunt; one girl told of her brother studying medicine in Canada and the life she imagined he lived there (it seemed quite odd to me); one girl told of the fright she had when she dreamed she was dead, and of the matching 65 fright she had when she woke and found that she wasn’t (everyone laughed at this, and Miss Nelson had to call us to order over and over); one girl told of how her oldest sister’s best friend’s cousin’s best friend (it was a real rigmarole) had gone on a Girl Guide jamboree held in Trinidad and met someone who 70 millions of years ago had taken tea with Lady Baden-Powell; one girl told of an excursion she and her father had made to Redonda, and of how they had seen some booby birds tending their chicks. Things 75 went on in that way, all so playful, all so imaginative. I began to wonder about what I had written, for it was the opposite of playful and it was the opposite of imaginative. What I had written was heartfelt, and, except for the very end, it was all too true.

1

Which choice best summarizes the passage?

- A) A character is apprehensive about attending new school but is quickly reassured by her teacher.
- B) A character is excited about attending a new school but struggles to make friends.
- C) A character is eager to complete a school assignment but becomes anxious after observing her classmates’ work.
- D) A character admires her teacher but is disappointed by her teacher’s reaction to her work.

The primary purpose of the passage is to

- A) describe the interactions between a young girl and her peers.
- B) recount a memorable episode in a young girl's life.
- C) explain the influence of an important figure on a young girl's life.
- D) explore the consequences of a young girl's decision.

The following passage is adapted from Olympe de Gouges, *Declaration of the Rights of Women*. It was initially published in 1791, during the French Revolution, and was written in response to the *Declaration of the Rights of Man* (1789).

Woman, wake up; the toxin of reason is being heard throughout the whole universe; discover your rights. The powerful empire of nature is no longer surrounded by prejudice, fanaticism, superstition, and lies. The flame of truth has dispersed all the clouds of folly and usurpation. Enslaved man has multiplied his strength and needs recourse to yours to break his chains. Having become free, he has become unjust to his companion. Oh, women, women! When will you cease to be blind? What advantage have you received from the Revolution? A more pronounced scorn, a more marked disdain. In the centuries of corruption you ruled only over the weakness of men. The reclamation of your patrimony, based on the wise decrees of nature – what have you to dread from such a fine undertaking? Do you fear that our legislators, correctors of that morality, long ensnared by political practices now out of date, will only say again to you: women, what is there in common between you and us? Everything, you will have to answer. If they persist in their weakness in putting this hypocrisy in contradiction to their principles, courageously oppose the force of reason to the empty pretensions of superiority; unite yourselves beneath the standards of philosophy; deploy all the energy of your character. Regardless of what barriers confront you, it is in your power to free yourselves; you have only to want to. Let us pass not to the shocking tableau of what you have been in society; and since national education is in question at this moment, let us see whether our wise legislators will think judiciously about the education of women.

Women have done more harm than good. Constraint and dissimulation have been their lot. What force has robbed them of, ruse returned to them; they had recourse to all the resources of their charms, and the most irreproachable persons did not resist them. Poison and the sword were both subject to them; they commanded in crime as in fortune. The French government, especially, depended throughout the centuries on the nocturnal administrations of women; the cabinet could keep no secrets as a result of their indiscretions; all have been subject to the cupidity and ambition of this sex, formerly contemptible and respected, and since the revolution, respectable and scorned.

45 In this sort of contradictory situation, what remarks could I not make! I have but a moment to make them, but this moment will fix the attention of the remotest posterity. Under the Old Regime, all was vicious, all was guilty; but could not the amelioration of 50 conditions be perceived even in the substance of vices? A woman only had to be beautiful or lovable; when she possessed these two advantages, she saw a hundred fortunes at her feet. If she did not profit from them, she had a bizarre character or a rare philosophy 55 which made her scorn wealth; then she was deemed to be like a crazy woman. A young, inexperienced woman, seduced by a man whom she loves, will abandon her parents to follow him; the ingrate will leave her after a few years, and the older she has 60 become with him, the more inhuman is his inconstancy; if she has children, he will likewise abandon them. If he is rich, he will consider himself excused from sharing his fortune with his noble victims. If some involvement binds him to his duties, he will 65 deny them, trusting that the laws will support him. If he is married, any other obligation loses its rights. Then what laws remain to extirpate vice all the way to its root? The law of dividing wealth and public administration between men and women. It can easily 70 be seen that one who is born into a rich family gains very much from such equal sharing. But the one born into a poor family with merit and virtue – what is her lot? Poverty and opprobrium. If she does not precisely excel in music or painting, she cannot be admitted to 75 any public function when she has all the capacity for it.

1

The central problem that the author describes in the second paragraph (lines 32-44) is that women

- A) are encouraged by their husbands to secretly gather information.
- B) have played a significant but unacknowledged role in political life.
- C) have been responsible for undermining their own cause.
- D) must play a more active role in civic life.

The author's main point in the passage is that

- A) women and men must work together to improve conditions for women.
- B) women must excel in the arts in order to gain societal approval.
- C) women must unite to demand the rights that society has denied them.
- D) women's lack of rights can be primarily attributed to government policies.

The following passage is adapted from Julian Jackson, "New Research Suggests Dinosaurs Were Warm-Blooded and Active" © 2011 by Julian Jackson.

New research from the University of Adelaide has added to the debate about whether dinosaurs were cold-blooded and sluggish or warm-blooded and active. Professor Roger Seymour from the University's School of Earth & Environmental Sciences has applied the latest theories of human and animal anatomy and physiology to provide insight into the lives of dinosaurs.

Human thigh bones have tiny holes – known as the 10 "nutrient foramen" – on the shaft that supply blood to living bone cells inside. New research has shown that the size of those holes is related to the maximum rate that a person can be active during aerobic exercise. Professor Seymour has used this principle to evaluate 15 the activity levels of dinosaurs.

"Far from being lifeless, bone cells have a relatively high metabolic rate and they therefore require a large blood supply to deliver oxygen. On the inside of the bone, the blood supply comes usually from a single 20 artery and vein that pass through a hole on the shaft – the nutrient foramen," he says.

Professor Seymour wondered whether the size of the nutrient foramen might indicate how much blood was necessary to keep the bones in good repair. For 25 example, highly active animals might cause more bone 'microfractures,' requiring more frequent repairs by the bone cells and therefore a greater blood supply. "My aim was to see whether we could use fossil bones of dinosaurs to indicate the level of bone metabolic rate 30 and possibly extend it to the whole body's metabolic rate," he says. "One of the big controversies among paleobiologists is whether dinosaurs were cold-blooded and sluggish or warm-blooded and active. Could the size of the foramen be a possible gauge for dinosaur 35 metabolic rate?"

Comparisons were made with the sizes of the holes in living mammals and reptiles, and their metabolic rates. Measuring mammals ranging from mice to elephants, and reptiles from lizards to crocodiles, one 40 of Professor Seymour's Honors students, Sarah Smith, combed the collections of Australian museums, photographing and measuring hundreds of tiny holes in thigh bones.

"The results were unequivocal. The sizes of the holes 45 were related closely to the maximum metabolic rates during peak movement in mammals and reptiles," Professor Seymour says. "The holes found in mammals were about 10 times larger than those in reptiles."

These holes were compared to those of fossil 50 dinosaurs. Dr. Don Henderson, Curator of Dinosaurs from the Royal Tyrrell Museum in Alberta, Canada, and Daniela Schwarz-Wings from the Museum für Naturkunde Humboldt University Berlin, Germany measured the holes in 10 species of 55 dinosaurs from five different groups, including bipedal and quadrupedal carnivores and herbivores, weighing 50kg to 20,000kg.

"On a relative comparison to eliminate the differences in body size, all of the dinosaurs had 60 holes in their thigh bones larger than those of mammals," Professor Seymour says.

"The dinosaurs appeared to be even more active than the mammals. We certainly didn't expect to see that. These results provide additional weight to 65 theories that dinosaurs were warm-blooded and highly active creatures, rather than cold-blooded and sluggish."

Professor Seymour says following the results of this study, it's likely that a simple measurement of 70 foramen size could be used to evaluate maximum activity levels in other vertebrate animals.

1

The main purpose of the passage is to

- A) Describe an experiment to resolve a scientific controversy and discuss its results.
- B) Refute a commonly held belief about dinosaur behavior.
- C) Compare the development of dinosaur bones to the development of mammal bones.
- D) Explain how foramen size has been used to gauge activity levels in mammals.

Which of the following best summarizes the findings of Professor Seymour's study?

- A) Foramen size can be used as a measure of growth rate in dinosaurs and other animals.
- B) The density of dinosaurs' thigh bones conclusively proves that dinosaurs were warm-blooded.
- C) The size of dinosaurs' foramens indicates that dinosaurs may have behaved more like mammals than like reptiles.
- D) The size of the holes in the shaft of dinosaurs' thigh bones strongly suggests that dinosaurs were warm-blooded.

This passage is adapted from a 1950 speech by Dean Acheson, who served as Secretary of State from 1949 to 1953 and strongly influenced United States foreign policy during the Cold War.

However much we may sympathize with the Soviet citizens who for reasons bedded deep in history are obliged to live under it, we are not attempting to change the governmental or social structure of the Soviet Union. The Soviet regime, however, has devoted a major portion of its energies and resources to the attempt to impose its system on other peoples. In this attempt it has shown itself prepared to resort to any method or stratagem, including subversion, threats, and even military force.

Therefore, if the two systems are to coexist, some acceptable means must be found to free the world from the destructive tensions and anxieties of which it has been the victim in these past years and the continuance of which can hardly be in the interests of any people.

I wish, therefore, to speak to you about those points of greatest difference which must be identified and sooner or later reconciled if the two systems are to live together, if not with mutual respect, at least in reasonable security.

It is now nearly 5 years since the end of hostilities, and the victorious Allies have been unable to define the terms of peace with the defeated countries. This is a grave, a deeply disturbing fact. For our part, we do not intend nor wish, in fact we do not know how, to create satellites. Nor can we accept a settlement which would make Germany, Japan, or liberated Austria satellites of the Soviet Union. The experience in Hungary, Rumania, and Bulgaria has been one of bitter disappointment and shocking betrayal of the solemn pledges by the wartime Allies. The Soviet leaders joined in the pledge at Tehran that they looked forward "with confidence to the day when all peoples of the world may live free lives, untouched by tyranny, and according to their varying desires and their own consciences." We can accept treaties of peace which would give reality to this pledge and to the interests of all in security.

With regard to the whole group of countries which we are accustomed to thinking of as the satellite area, the Soviet leaders could withdraw their military and police force and refrain from using the shadow of that force to keep in power persons or regimes which do not command the confidence of the respective peoples, freely expressed through orderly representative processes.

45 In this connection, we do not insist that these governments have any particular political or social complexion. What concerns us is that they should be truly independent national regimes, with a will of their own and with a decent foundation in popular feeling.

50 The Soviet leaders could cooperate with us to the end that the official representatives of all countries are treated everywhere with decency and respect and that an atmosphere is created in which these representatives could function in a normal and helpful manner,

55 conforming to the accepted codes of diplomacy.

These are some of the things which we feel that Soviet leaders could do which would permit the rational and peaceful development of the coexistence of their system and ours. They are not things that go to

60 the depths of the moral conflict. They have been formulated by us, not as moralists but as servants of government, anxious to get on with the practical problems that lie before us and to get on with them in a manner consistent with mankind's deep longing for a

65 respite from fear and uncertainty.

Nor have they been formulated as a one-sided bargain. A will to achieve binding, peaceful settlements would be required of all participants. All would have to produce unmistakable evidence of their good faith.

70 All would have to accept agreements in the observance of which all nations could have real confidence.

The United States is ready, as it has been and always will be, to cooperate in genuine efforts to find peaceful settlements. Our attitude is not inflexible, our opinions

75 are not frozen, our positions are not and will not be obstacles to peace. But it takes more than one to cooperate. If the Soviet Union could join in doing these things I have outlined, we could all face the future with greater security. We could look forward to more than

80 the eventual reduction of some of the present tensions. We could anticipate a return to a more normal and relaxed diplomatic atmosphere and to progress in the transaction of some of the international business which needs so urgently to be done.

1

What is the main idea of the passage?

- A) The Soviet Union's failure to adhere to international agreements poses an immediate threat to American security.
- B) Relations between the Soviet Union and the United States will improve if the Soviet Union offers greater liberties to its citizens.
- C) The Soviet Union will be unable to conduct normal relations with other countries until communism has been thoroughly destroyed.
- D) The conduct of the United States toward the Soviet Union is a moral dilemma that cannot be easily resolved.

2

The primary purpose of the passage is to

- A) Criticize the Soviet Union for its harsh treatment of peoples under its rule.
- B) Suggest that the Soviet Union should model its diplomatic process on that of the United States.
- C) Propose a course of action that would result in a reduction of tension between the Soviet Union and the United States.
- D) Decry the use of a force as a tool for maintaining international order.

3

The main idea of the fourth paragraph (lines 21-37) is that

- A) Leaders must act according to their conscience as well as their desires.
- B) Control of Soviet satellites will be granted to the United States if the Soviet Union continues to behave unreliably.
- C) Soviet control of Germany, Japan, and Austria would inevitably end in disaster.
- D) The Soviet Union must abide by its promises in order for the United States to accept its treaties.

The following passage is adapted from George Orwell, "Keep the Aspidistra Flying," first published in 1936. Gordon, the protagonist, is a poet.

Gordon walked homeward against the rattling wind, which blew his hair backward and gave him more of a 'good' forehead than ever. His manner conveyed to the passers-by — at least, he hoped it did — that if he wore 5 no overcoat it was from pure caprice.

Willowbed Road, NW, was dingy and depressing, although it contrived to keep up a kind of mingy decency. There was even a dentist's brass plate on one of the houses. In quite two-thirds of them, amid the 10 lace curtains of the parlor window, there was a green card with 'Apartments' on it in silver lettering, above the peeping foliage of an aspidistra.*

Mrs. Wisbeach, Gordon's landlady, specialized in 'single gentlemen'. Bed-sitting-rooms, with gaslight laid 15 on and find your own heating, baths extra (there was a geyser), and meals in the tomb-dark dining-room with the phalanx of clotted sauce-bottles in the middle of the table. Gordon, who came home for his midday dinner, paid twenty-seven and six a week.

20 The gaslight shone yellow through the frosted transom above the door of Number 31. Gordon took out his key and fished about in the keyhole — in that kind of house the key never quite fits the lock. The darkish little hallway — in reality it was only a passage — smelt of 25 dishwater and cabbage. Gordon glanced at the japanned tray on the hall-stand. No letters, of course. He had told himself not to hope for a letter, and nevertheless had continued to hope. A stale feeling, not quite a pain, settled upon his breast. Rosemary might have written!

30 It was four days now since she had written. Moreover, he had sent out to magazines and had not yet had returned to him. The one thing that made the evening bearable was to find a letter waiting for him when he got home. But he received very few letters — four or five in a week 35 at the very most.

On the left of the hall was the never-used parlor, then came the staircase, and beyond that the passage ran down to the kitchen and to the unapproachable lair inhabited by Mrs. Wisbeach herself. As Gordon came in, 40 the door at the end of the passage opened a foot or so. Mrs. Wisbeach's face emerged, inspected him briefly but suspiciously, and disappeared again. It was quite impossible to get in or out of the house, at any time before eleven at night, without being scrutinized in this 45 manner. Just what Mrs. Wisbeach suspected you of it

was hard to say. She was one of those malignant respectable women who keep lodging-houses. Age about forty-five, stout but active, with a pink, fine-featured, horribly observant face, beautifully grey hair, 50 and a permanent grievance.

In the familiar darkness of his room, Gordon felt for the gas-jet and lighted it. The room was medium-sized, not big enough to be curtained into two, but too big to be sufficiently warmed by one defective oil lamp. It had 55 the sort of furniture you expect in a top floor back.

White-quilted single-bed; brown lino floor-covering; wash-hand-stand with jug and basin of that cheap white ware which you can never see without thinking of chamberpots. On the window-sill there was a sickly 60 aspidistra in a green-glazed pot.

Up against this, under the window, there was a kitchen table with an inkstained green cloth. This was Gordon's 'writing' table. It was only after a bitter struggle that he had induced Mrs. Wisbeach to give him 65 a kitchen table instead of the bamboo 'occasional' table — a mere stand for the aspidistra — which she considered proper for a top floor back. And even now there was endless nagging because Gordon would never allow his table to be 'tidied up'. The table was in a 70 permanent mess. It was almost covered with a muddle of papers, perhaps two hundred sheets, grimy and dog-eared, and all written on and crossed out and written on again — a sort of sordid labyrinth of papers to which only Gordon possessed the key. There was a film of 75 dust over everything. Except for a few books on the mantelpiece, this table, with its mess of papers, was the sole mark Gordon's personality had left on the room.

*a bulbous plant with broad leaves, often used as a houseplant.

1

Which choice correctly states the order of events in the passage?

- A) A character arrives home, is briefly observed by another character, and retires unhappily to his room.
- B) A character arrives home, finds a letter that he has been expecting, and races to his room to read it.
- C) A character sneaks into his house, then is stopped by another character with whom he has an unpleasant encounter.
- D) A character who is waiting for a letter learns that it has not been sent; later, he narrowly avoids being seen by another character.

2

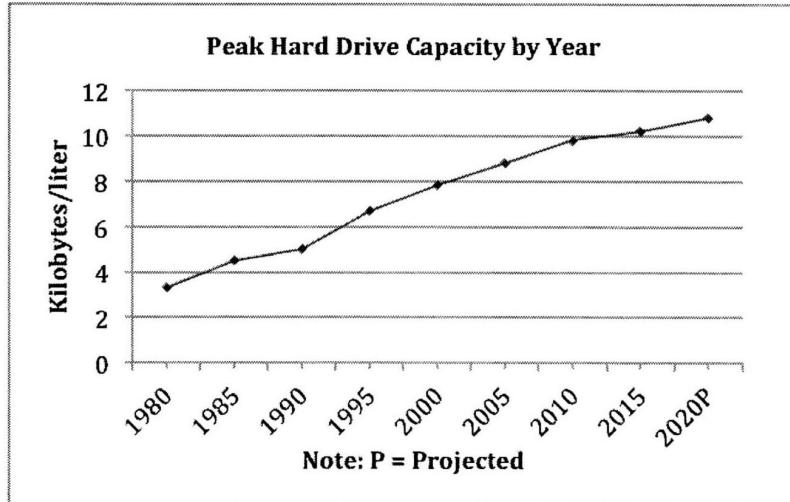
The primary purpose of the passage is to

- A) describe the habits of a somewhat eccentric character.
- B) illustrate the difficulties involved in being a writer.
- C) foreshadow an ominous development in a character's life.
- D) depict an unusual occurrence in a character's routine.

Graph Question

Note: Some graphs in this exercise refer to a passage when none is provided. This is a deliberate strategy to reinforce the point that many questions can be answered using the graph alone, even when the passage is mentioned in the question.

1.



1

According to the graph, which statement is true about peak hard drive capacity in 2005?

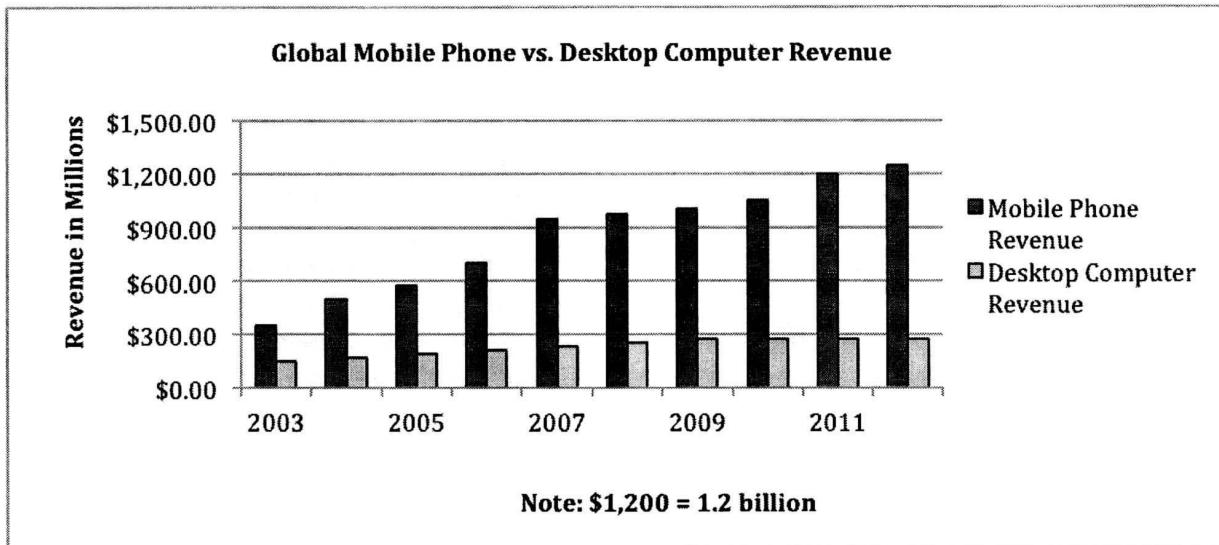
- A) It was double the peak hard drive capacity of a decade earlier.
- B) It was around one kilobyte/liter higher than it had been five years earlier.
- C) It was higher than peak hard drive capacity in 2010.
- D) It was nine kilobytes/liter lower than it was in 2010.

2

Which choice best summarizes the information presented in the graph?

- A) Hard drive capacity is expected to peak sometime before 2020.
- B) Peak hard drive capacity was slightly higher in 2000 than in 1995.
- C) Expanding peak hard drive capacity has led to a large increase in computer sales.
- D) Peak hard drive capacity has increased dramatically since 1980.

2.



1

According to the graph, which statement is true about the amount of revenue from mobile phone sales in 2008?

- A) It was slightly higher than the amount of revenue from PC sales in 2008.
- B) It was similar to the amount of revenue from PC sales in 2009.
- C) It was similar to the amount of revenue from mobile phone sales in 2009.
- D) It was wildly out of proportion to the amount of revenue from mobile phone sales the previous year.

3

Data in the graph provide most direct support for which idea in the passage?

- A) People increasingly prefer mobile devices for numerous common tasks.
- B) Consumers prefer to buy from companies whose products are familiar to them.
- C) Mobile sales in new markets are substantially higher than are mobile sales in established markets.
- D) Tablets can now perform many of the same functions as mobile phones.

2

Which information best summarizes the information presented in the graph?

- A) The gap between revenue from mobile phone sales and PC sales has increased significantly.
- B) Revenue from PC sales increased more rapidly than did revenue from mobile phone sales.
- C) Revenue from tablet sales may soon overtake revenue from mobile phone sales.
- D) Revenue from mobile phone sales has risen steadily, while revenue from PC sales has declined.

3.

Figure 1

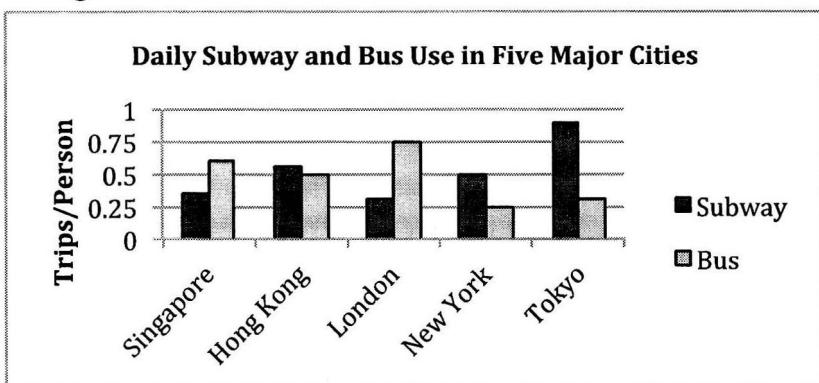
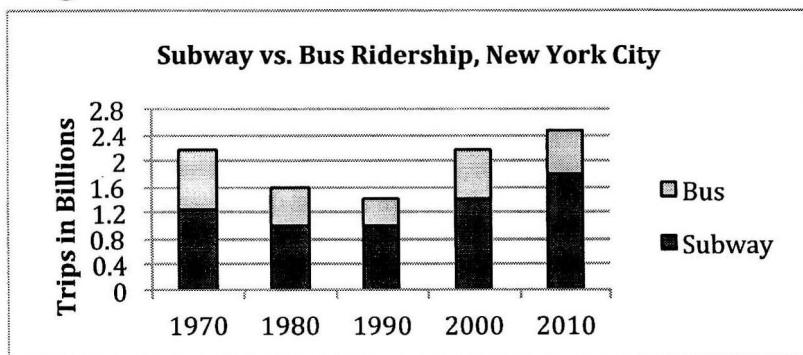


Figure 2



1

Information in figure 1 suggests that public transportation users in London

- A) take subways and buses at similar rates.
- B) are unusually reliant on buses.
- C) take at least one subway trip daily.
- D) take subways at about the same rate as people in New York.

2

Which of the following statements about bus use in New York City is best supported by information in figure 2?

- A) It reached its highest point in 2010.
- B) It was lower in 1980 than it was in 1990.
- C) It began to rebound after 1990.
- D) It declined in every decade.

3

Information in figure 1 supports the author's point that buses are growing in popularity as a means of urban transport by indicating that

- A) many people around the world take at least one bus trip every day.
- B) bus ridership surpasses subway ridership in some major cities.
- C) people in Tokyo make far more trips by bus daily than they do trips by subway.
- D) the number of bus trips taken by people in major cities has substantially increased.

4

Taken together, the graphs suggest that public transit users in New York City

- A) use buses more often today than they did in previous decades.
- B) use buses about as often as they use the subway.
- C) rely more heavily on buses than do public transit users in other cities.
- D) increasingly prefer to travel by subway.

4. The following passage is adapted from Michael Anft, "Solving the Mystery of Death Valley's Walking Rocks," © 2011 by Johns Hopkins Magazine.

For six decades, observers have been confounded by the movement of large rocks across a dry lake bed in California's Death Valley National Park. Leaving flat trails behind them, rocks that weigh up to 100 5 pounds seemingly do Michael Jackson's moonwalk across the valley's sere, cracked surface, sometimes traveling more than 100 yards. Without a body of water to pick them up and move them, the rocks at Racetrack Playa, a flat space between the valley's high cliffs, 10 have been the subject of much speculation, including whether they have been relocated by human pranksters or space aliens. The rocks have become the desert equivalent of Midwestern crop circles. "They really are a curiosity," says Ralph Lorenz, a planetary scientist at 15 the Applied Physics Laboratory. "Some [people] have mentioned UFOs. But I've always believed that this is something science could solve."

It has tried. One theory holds that the rocks are blown along by powerful winds. Another posits that 20 the wind pushes thin sheets of ice, created when the desert's temperatures dip low enough to freeze water from a rare rainstorm, and the rocks go along for the ride. But neither theory is rock solid. Winds at the playa aren't strong enough—some scientists believe that 25 they'd have to be 100 miles per hour or more—to blow the rocks across the valley. And rocks subject to the "ice sailing theory" wouldn't create trails as they moved.

Lorenz and a team of investigators believe that a 30 combination of forces may work to rearrange Racetrack Playa's rocks. "We saw that it would take a lot of wind to move these rocks, which are larger than you'd expect wind to move," Lorenz explains. "That led us to this idea that ice might be picking up the 35 rocks and floating them." As they explained in the January issue of *The American Journal of Physics*, instead of moving along with wind-driven sheets of ice, the rocks may instead be lifted by the ice, making them more subject to the wind's force. The key, Lorenz 40 says, is that the lifting by an "ice collar" reduces friction with the ground, to the point that the wind now has enough force to move the rock. The rock moves, the ice doesn't, and because part of the rock juts through the ice, it marks the territory it has covered. 45 Lorenz's team came to its conclusion through a combination of intuition, lab work, and observation—not that the last part was easy. Watching the rocks travel is a bit like witnessing the rusting of a hubcap. Instances of movement are rare and last for only a few

50 seconds. Lorenz's team placed low-resolution cameras on the cliffs (which are about 30 miles from the nearest paved road) to take pictures once per hour. For the past three winters, the researchers have weathered extreme temperatures and several flat tires to measure how 55 often the thermometer dips below freezing, how often the playa gets rain and floods, and the strength of the winds. "The measurements seem to back up our hypothesis," he says. "Any of the theories may be true at any one time, but ice rafting may be the best explanation for the trails we've been seeing. We've seen trails like this documented in Arctic coastal areas, and the mechanism is somewhat similar. A belt of ice surrounds a boulder during high tide, picks it up, and then drops it elsewhere." His "ice raft theory" was also 60 borne out by an experiment that used the ingenuity of a high school science fair. Lorenz placed a basalt pebble in a Tupperware container with water so that the pebble projected just above the surface. He then turned the container upside down in a baking tray filled with a 65 layer of coarse sand at its base, and put the whole thing in his home freezer. The rock's "keel" (its protruding part) projected downward into the sand, which simulated the cracked surface of the playa (which scientists call "Special K" because of its resemblance to cereal flakes). A gentle push or slight puff of air caused the 70 Tupperware container to move, just as an ice raft would under the right conditions. The pebble made a trail in the soft sand. "It was primitive but effective," Lorenz says of the experiment. Lorenz has spent the 75 last 20 years studying Titan, a moon of Saturn. He says that Racetrack Playa's surface mirrors that of a dried lakebed on Titan. Observations and experiments on Earth may yield clues to that moon's geology. "We also may get some idea of how climate affects 80 geology—particularly as the climate changes here on Earth," Lorenz says. "When we study other planets and their moons, we're forced to use Occam's razor—sometimes the simplest answer is best, which means you look to Earth for some answers. Once you get out 85 there on Earth, you realize how strange so much of its surface is. So, you have to figure there's weird stuff to be found on Titan as well." Whether that's true or not will take much more investigation. He adds: "One day, 90 we'll figure all this out. For the moment, the moving 95 rock present a wonderful problem to study in a beautiful place."

Racetrack Playa Average vs. Maximum Wind Speed

	Average Wind Speed (miles/hour)	Peak Wind Speed (miles/hour)
2008		
November	20	67
December	19	72
January	21	78
February	23	92
March	25	87
2009		
November	19	69
December	21	71
January	20	76
February	22	90
March	24	89

1

According to the graph, which statement is true about wind speeds at Racketrack Playa in 2009?

- A) Peak wind speeds increased during every month between November and March.
- B) Average wind speeds increased during every month between November and March.
- C) Average wind speed in February was substantially higher than it was in December.
- D) The lowest peak wind speed occurred in November.

3

Which of the following statements from the passage is represented by the chart?

- A) Lines 16-17 (“But...solve”)
- B) Lines 23-26 (“Winds...valley”)
- C) Lines 39-42 (“The key...rock”)
- D) Lines 58-60 (“Any...seeing”)

2

Which choice is best supported by the information in the chart?

- A) Peak wind speeds in 2009 were higher in every month than they were in 2008.
- B) Average wind speeds in some months exceeded peak wind speeds in others.
- C) The windiest months at Racetrack Playa were February and March.
- D) Peak wind speed in February 2009 was higher than peak wind speed in February 2008.

5. The following passage is adapted from "Makerspaces, Hackerspaces, and Community Scale Production in Detroit and Beyond," © 2013 by Sean Ansanelli.

During the mid-1980s, spaces began to emerge across Europe where computer hackers could convene for mutual support and camaraderie. In the past few years, the idea of fostering such shared, physical spaces 5 has been rapidly adapted by the diverse and growing community of "makers", who seek to apply the idea of "hacking" to physical objects, processes, or anything else that can be deciphered and improved upon.

A hackerspace is described by hackerspaces.org as 10 a "community-operated physical space where people with common interests, often in computers, technology, science, digital art or electronic art, can meet, socialize, and/or collaborate." Such spaces can vary in size, available technology, and membership structure (some 15 being completely open), but generally share community-oriented characteristics. Indeed, while the term "hacker" can sometimes have negative connotations, modern hackerspaces thrive off of community, openness, and assimilating diverse viewpoints – these often being the 20 only guiding principles in otherwise informal organizational structures.

In recent years, the city of Detroit has emerged 25 as a hotbed for hackerspaces and other DIY ("Do-It-Yourself") experiments. Several hackerspaces can already be found throughout the city and several more are currently in formation. Of course, Detroit's 30 attractiveness for such projects can be partially attributed to cheap real estate, which allows aspiring hackers to acquire ample space for experimentation. Some observers 35 have also described this kind of making and tinkering as embedded in the DNA of Detroit's residents, who are able to harness substantial intergenerational knowledge and attract like-minded individuals.

Hackerspaces (or "makerspaces") can be found in 40 more commercial forms, but the vast majority of spaces are self-organized and not-for-profit. For example, the OmniCorp hackerspace operates off member fees to cover rent and new equipment, from laser cutters to welding tools. OmniCorp also hosts an "open hack night" 45 every Thursday in which the space is open to the general public. Potential members are required to attend at least one open hack night prior to a consensus vote by the existing members for admittance; no prospective members have yet been denied.

45 A visit to one of OmniCorp's open hack nights reveals the vast variety of activity and energy existing in the space. In the main common room alone, activities range from experimenting with sound installations and learning to program Arduino boards to building speculative "loid"

50 shapes – all just for the sake of it. With a general atmosphere of mutual support, participants in the space are continually encouraged to help others.

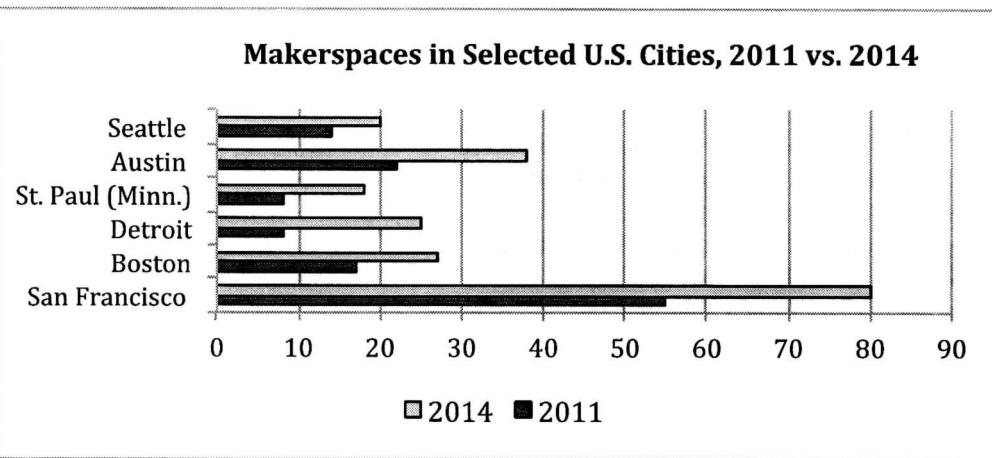
One of the most active community-focused initiatives 55 in the city is the Mt. Elliot Makerspace. Jeff Sturges, former MIT Media Lab Fellow and Co-Founder of OmniCorp, started the Mt. Elliot project with the aim of replicating MIT's Fab Lab model on a smaller, cheaper scale in Detroit. "Fab Labs" are production facilities that consist of a small collection of flexible computer 60 controlled tools that cover several different scales and various materials, with the aim to make "almost anything" (including other machines). The Mt. Elliot Makerspace now offers youth-based skill development programs in eight areas: Transportation, Electronics, 65 Digital Tools, Wearables, Design and Fabrication, Food, Music, and Arts. The range of activities is meant to provide not only something for everyone, but a well-rounded base knowledge of making to all participants.

While the center receives some foundational support, 70 the space also derives significant support from the local community. Makerspaces throughout the city connect the space's youth-based programming directly to school curriculums.

The growing interest in and development of 75 hacker/makerspaces has been explained, in part, as a result of the growing maker movement. Through the combination of cultural norms and communication channels from open source production as well as increasingly available technologies for physical 80 production, amateur maker communities have developed in virtual and physical spaces.

Publications such as *Wired* are noticing the 85 transformative potential of this emerging movement and have sought to devote significant attention to its development. Chief editor Chris Anderson recently published a book entitled *Makers*, in which he proclaims that the movement will become the next Industrial Revolution. Anderson argues such developments will allow for a new wave of business opportunities by 90 providing mass-customization rather than mass-production.

The transformative potential of these trends goes beyond new business opportunities or competitive advantages for economic growth. Rather, these trends 95 demonstrate the potential to actually transform economic development models entirely.



1

According to the graph, which statement is true about the number of makerspaces in Austin in 2014?

- A) It was smaller than the number of makerspaces in Detroit in 2014.
- B) It was almost half the number of makerspaces in San Francisco the same year.
- C) It was the same as the number of makerspaces in Austin in 2011.
- D) It lagged behind the number of makerspaces in Boston in 2014.

3

Which of the following statements from the passage is supported by information in the graph?

- A) Lines 3-6 (“In...makers”)
- B) Lines 26-29 (“Of...experimentation”)
- C) Lines 69-71 (“While...community”)
- D) Lines 92-94 (“The transformative...growth”)

2

The author of the passage would most likely regard the graph with

- A) enthusiasm, because it demonstrates that makerspaces can revolutionize the United States economy.
- B) skepticism, because it shows a relatively small number of makerspaces in Detroit.
- C) approval, because it indicates that the makerspace movement has grown across the United States.
- D) indifference, because it reveals that San Francisco has the greatest number of makerspaces.

6. The following passage is adapted from Julian Jackson, "New Research Suggests Dinosaurs Were Warm-Blooded and Active" © 2011 by Julian Jackson.

New research from the University of Adelaide has added to the debate about whether dinosaurs were cold-blooded and sluggish or warm-blooded and active. Professor Roger Seymour from the University's School of Earth & Environmental Sciences has applied the latest theories of human and animal anatomy and physiology to provide insight into the lives of dinosaurs.

Human thigh bones have tiny holes – known as the "nutrient foramen" – on the shaft that supply blood to living bone cells inside. New research has shown that the size of those holes is related to the maximum rate that a person can be active during aerobic exercise. Professor Seymour has used this principle to evaluate the activity levels of dinosaurs.

"Far from being lifeless, bone cells have a relatively high metabolic rate and they therefore require a large blood supply to deliver oxygen. On the inside of the bone, the blood supply comes usually from a single artery and vein that pass through a hole on the shaft – the nutrient foramen," he says.

Professor Seymour wondered whether the size of the nutrient foramen might indicate how much blood was necessary to keep the bones in good repair. For example, highly active animals might cause more bone 'microfractures,' requiring more frequent repairs by the bone cells and therefore a greater blood supply. "My aim was to see whether we could use fossil bones of dinosaurs to indicate the level of bone metabolic rate and possibly extend it to the whole body's metabolic rate," he says. "One of the big controversies among paleobiologists is whether dinosaurs were cold-blooded and sluggish or warm-blooded and active. Could the size of the foramen be a possible gauge for dinosaur metabolic rate?"

Comparisons were made with the sizes of the holes in living mammals and reptiles, and their metabolic rates. Measuring mammals ranging from mice to elephants, and reptiles from lizards to crocodiles, one of Professor Seymour's Honors students, Sarah Smith, combed the collections of Australian museums, photographing and measuring hundreds of tiny holes in thigh bones.

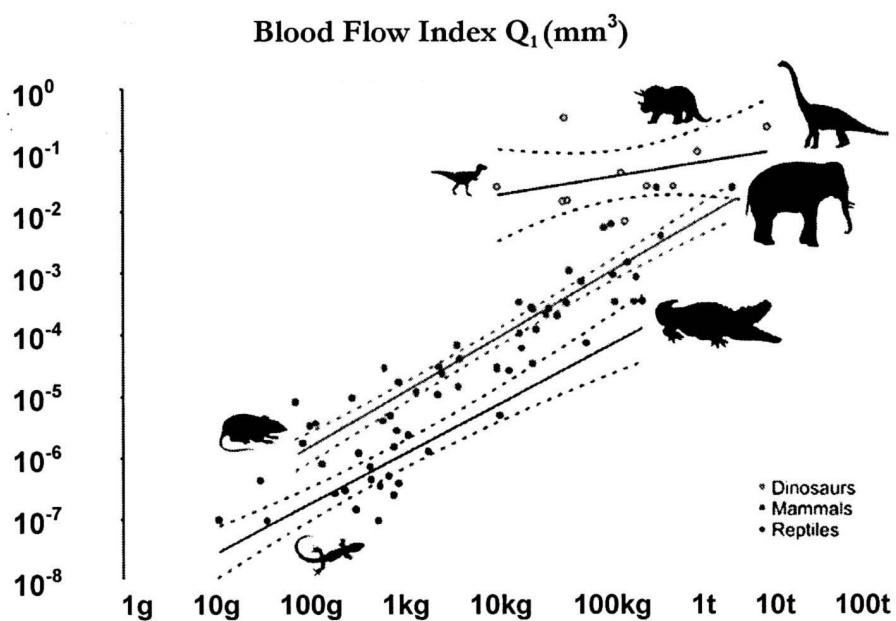
"The results were unequivocal. The sizes of the holes were related closely to the maximum metabolic rates during peak movement in mammals and reptiles," Professor Seymour says. "The holes found in mammals were about 10 times larger than those in reptiles."

These holes were compared to those of fossil dinosaurs. Dr. Don Henderson, Curator of Dinosaurs from the Royal Tyrrell Museum in Alberta, Canada, and Daniela Schwarz-Wings from the Museum für Naturkunde Humboldt University Berlin, Germany measured the holes in 10 species of dinosaurs from five different groups, including bipedal and quadrupedal carnivores and herbivores, weighing 50kg to 20,000kg.

"On a relative comparison to eliminate the differences in body size, all of the dinosaurs had holes in their thigh bones larger than those of mammals," Professor Seymour says.

"The dinosaurs appeared to be even more active than the mammals. We certainly didn't expect to see that. These results provide additional weight to theories that dinosaurs were warm-blooded and highly active creatures, rather than cold-blooded and sluggish."

Professor Seymour says following the results of this study, it's likely that a simple measurement of foramen size could be used to evaluate maximum activity levels in other vertebrate animals.



Seymour et al 2011

1 Which statement is best supported by data in the graph?

- A) Light reptiles have higher blood flow than heavier reptiles.
- B) Heavy mammals have lower blood flow than heavy reptiles.
- C) Blood flow in the heaviest mammals is slightly higher than in light dinosaurs.
- D) Blood flow is fairly uniform in dinosaurs at a wide range of weights.

2 The author of the passage would most likely consider the information in the graph to be

- A) a compelling piece of evidence in support of Professor Seymour's theory.
- B) a potentially interesting but premature finding.
- C) conclusive proof that dinosaurs were active and warm-blooded.
- D) suggestive of a point of view towards which the author is skeptical.

3 Do the data in the table provide support for Professor Seymour's claim that dinosaurs were warm-blooded and highly active?

- A) Yes, because they indicate that dinosaurs' foramen size was larger than that of the largest mammals.
- B) Yes, because they suggest that dinosaurs had even higher metabolic rates than animals known to be warm-blooded.
- C) No, because they show that dinosaurs had lower blood flow than reptiles.
- D) No, because they reveal only minimal changes in metabolic rate between small and large dinosaurs.