Questions 1-10 are based on the following passage.

Austen, Jane. *Pride and Prejudice.* New York: Signet Classics. 1950. 51-54. Print.

When the ladies removed after dinner, Elizabeth Bennet ran up to her sister, and seeing her well guarded from cold, attended her into the drawing-room, where she was welcomed by her two friends with many professions of pleasure; and Elizabeth had never seen them so agreeable as they were during the hour which passed before the gentlemen appeared. Their powers of conversation were considerable. They could describe an entertainment with accuracy, relate an anecdote with humor, and laugh at their acquaintance with spirit.

But when the gentlemen entered, Jane Bennet was no longer the first object. Miss Bingley's eyes were instantly turned towards Darcy, and she had something to say to him before he had advanced many steps. He addressed himself directly to Miss Bennet, with a polite congratulation; Mr. Hurst also made her a slight bow, and said he was "very glad"; but diffuseness and warmth remained for Bingley's salutation. He was full of joy and attention. The first half hour was spent in piling up the fire, lest she should suffer from the change of room; and she removed at his desire to the other side of the fireplace, that she might be farther from the door. He then sat down by her, and talked scarcely to anyone else. Elizabeth, at work in the opposite corner, saw it all with great delight.

When tea was over, Mr. Hurst reminded his sister-in-law of the card-table – but in vain. Miss Bingley had obtained private intelligence that Mr. Darcy did not wish for cards; and Mr. Hurst soon found even his open petition was rejected. She assured him that no one intended to play, and the silence of the whole party on the subject seemed to justify her. Mr. Hurst had therefore nothing to do, but to stretch himself on one of the sofas and go to sleep. Darcy took up a book; Miss Bingley did the same; and Mrs. Hurst, principally occupied in playing with her bracelets and rings, joined now and then in her brother's conversation with Miss Bennet.

Miss Bingley's attention was quite as much engaged in watching Mr. Darcy's progress through *his* book, as in reading her own; and she was perpetually either making some inquiry, or looking at his page. She could not win him, however, to any conversation; he merely answered her question, and read on. At length, quite exhausted by the attempt to be amused with her own book, which she had only chosen because it was the second volume to his, she gave a great yawn and said, "How pleasant it is to spend an evening in this way! I declare after all there is no enjoyment like reading! How much sooner one tires of anything than a book! When I have a house of my own, I shall be miserable if I have not an excellent library."

No one made any reply. She then yawned again, threw aside her book, and cast her eyes round the room in quest of some amusement; when hearing her brother Mr. Bingley mention a ball to Miss Bennet, she turned suddenly towards him and said,

"By the bye, Charles, are you really serious in meditating a dance at Netherfield? I would advise you, before you determine on it, to consult the wishes of the present party; I am much mistaken if there are not some among us to whom a ball would be rather a punishment than a pleasure."

"If you mean Darcy," cried her brother, "he may go to bed, if he chooses, before it begins – but as for the ball, it is quite a settled thing; and as soon as Nicholls has made white soup enough I shall send round my cards."

"I should like balls infinitely better," she replied, "if they were carried on in a different manner; but there is something insufferably tedious in the usual process of such a meeting. It would surely be much more rational if conversation instead of dancing made the order of the day."

"Much more rational, my dear Caroline, I dare say; but it would not be near so much like a ball."

Miss Bingley made no answer; and soon afterwards got up and walked about the room. Her figure was elegant and she walked well; but Darcy, at whom it

was all aimed, was still inflexibly studious. In the desperation of her feelings she resolved on one effort more; and, turning to Elizabeth, said,

"Miss Eliza Bennet, let me persuade you to follow my example, and take a turn about the room. – I assure you it is very refreshing after sitting so long in one attitude."

Elizabeth was surprised, but agreed to it immediately. Miss Bingley succeeded no less in the real object of her civility; Mr. Darcy looked up. He was as much awake to the novelty of attention in that quarter as Elizabeth herself could be, and unconsciously closed his book. He was directly invited to join their party, but he declined it, observing that he could imagine but two motives for their choosing to walk up and down the room together, with either of which motives his joining them would interfere. "What could he mean? She was dying to know what could be his meaning" – and asked Elizabeth whether she could at all understand him?

"Not at all," was her answer; "but depend upon it, he means to be severe on us, and our surest way of disappointing him will be to ask nothing about it."

1. Which choice best describes what happens in the passage?
   A) Miss Bingley and Miss Bennet enjoy taking walks.
   B) Miss Bingley attempts to get Mr. Darcy's attention.
   C) Miss Bingley ensures that Mr. Darcy has a restful evening.
   D) Mr. Darcy decides not to attend a ball.

2. Which choice best describes the developmental pattern of the passage?
   A) A careful analysis of a character's plans and motives.
   B) A practical account of a series by trial and error.
   C) An explanation provided through a succession of anecdotes.
   D) A detailed description of an encounter.

3. In line 5, "profession" most nearly means
   A) A paid occupation.
   B) An open declaration.
   C) An expert.
   D) A teacher in college or university.

4. Who was Miss Bingley talking to before the gentlemen entered the room?
   A) Jane.
   B) Elizabeth.
   C) Mrs. Hurst.
   D) Caroline.

5. Why did Miss Bingley reject Mr. Hurst's request?
   A) She didn't want to play cards.
   B) She wished to read instead.
   C) She wished for Mr. Darcy to be at ease.
   D) She was being spiteful to Mr. Hurst.

6. Which choice provides the best evidence for the answer to the previous question?
   A) Lines 29-31 ("Miss Bingley…cards")
   B) Lines 32-34 ("She assured…her")
   C) Lines 34-36 ("Mr. Hurst…sleep")
   D) Lines 36-37 ("Darcy took…same")

7. Why does Miss Bingley make those statements ("How pleasant…library") in lines 50-55?
   A) She wished to exclaim her love for books and education.
   B) She was mocking Mr. Darcy's predilection for reading.
   C) She was attempting to engage Mr. Darcy in conversation.
   D) She felt that her chosen book was very pleasant and enjoyable.

8. In line 62, "meditating" most nearly means
   A) Pondering deeply for religious purposes.
   B) Considering.
   C) Intervening between two people in a dispute.
   D) Planning.

9. Why does Miss Bingley ask Elizabeth to walk with her?
   A) To encourage Elizabeth to take some exercise after sitting for so long.
   B) To get ready for the ball.
   C) To ask Mr. Darcy what his two motives were.
   D) To attract Mr. Darcy's attention.

10. What choice provides the best evidence for the answer to the previous question?
   A) Lines 72-75 ("I should…meeting")
   B) Lines 81-85 ("Her figure…said")
   C) Lines 87-89 ("I assure…attitude")
   D) Lines 103-105 ("Not at…it")

Questions 11-21 are based on the following passage and supplementary material.

Curtis, Edward E, IV. Muslims in America. New York: Oxford University Press, 2009. Print. Figure is from Ingraham, Christopher. "Anti-Muslim hate crimes are still five times more common today than before 9/11." *Washington Post* 11 Feb. 2015.

Setting out to destroy the symbol of US financial, military, and political power on September 11, 2001, nineteen members of al-Qa'ida hijacked and crashed large passenger planes into both towers of New York's World Trade Center and into the Pentagon. A fourth hijacked jet, apparently bound for Washington, DC, crashed in Pennsylvania. In total, approximately 3,000 human beings were murdered that day. Usama bin Ladin, the leader of al-Qa'ida, considered the attacks to be religiously sanctioned retribution for the suffering caused by US foreign policy in the Middle East. Before and after the attacks, al-Qa'ida members cited several reasons for their violent acts, including US-based support of Israel, the US-led war against Iraq in 1991, the presence of US military bases in the Persian Gulf, and US support for corrupt regimes in the Middle East.

For the families and friends of al-Qa'ida's victims, these attacks resulted in immeasurable loss, deep pain, and anger. For many Americans, including Muslim Americans, the attacks inspired national solidarity in the face of fear and insecurity. After the attacks, for example, some Muslims placed flowers and cards outside of the Muslim Council Center mosque in Washington, DC, where a large American flag hung in the entrance to the building. In Paterson, New Jersey, Muslims hoisted a banner on Main Street proclaiming that "The Muslim Community Does Not Support Terrorism." All across the country, mosques and Islamic centers flew the American flag and opened their doors to non-Muslims. Muslims sought to educate their non-Muslim neighbors about Islam and reassure the public about their loyalty to the US and their love of the American dream. Many Americans visited a mosque for the first time, often attending information sessions on Islam in which Muslim leaders explained that Islam is a peaceful religion that does not condone terrorism.

Like so many of their fellow citizens, Muslim Americans also reacted to the attacks with a determination to help the victims. Muslims contributed thousands of dollars to 9/11-related charities. Near Washington, DC, the All Dulles Area Muslim Society dedicated its Friday congregational prayers to the victims and sponsored a blood drive. Members of the University of Maryland chapter of the Muslim Students Association also gave blood, donated money, and participated in interfaith prayer services for the victims and their families. In Queens, New York, where Pakistani American Mohammad Chaudhary managed a branch office of the Edhi International Foundation, ten-cent garments were sold and donations were accepted for a $10,000 gift to the Red Cross 9/11 disaster relief fund.

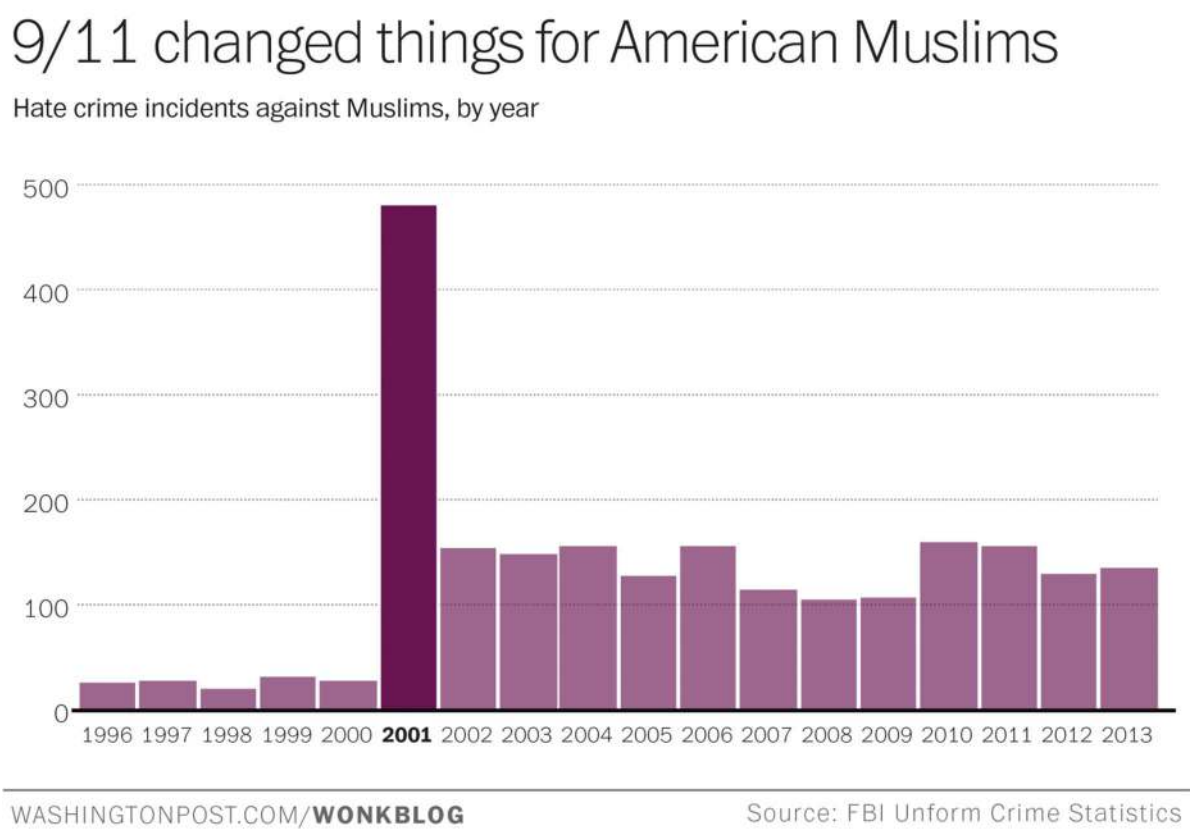
All major Muslim American organizations and leaders condemned terrorism and the murder of innocent victims in unambiguous terms. Immediately after the 9/11 attacks, the American Muslim Political Coordination Council, which represented the Council of American-Islamic Relations, the Muslim Public Affairs Council, the Islamic Society of North America, and other groups, issued a press release proclaiming that "American Muslims utterly condemn what are apparently vicious and cowardly acts of terrorism against innocent civilians. We join with all Americans in calling for the swift apprehension and punishment of the perpetrators. No political cause could ever be assisted by such immoral acts."

In the immediate aftermath of 9/11, Muslim Americans also feared a backlash against them. In the past, some Americans had physically or verbally assaulted Muslims and those who "looked like Muslims" as a reaction to events overseas. After the 1973-1974 OPEC oil embargo of the US, the Iranian Revolution of 1979, and the 1983 attack on the Marine barracks in Beirut, Muslim Americans had been harassed, beaten up, or threatened by their fellow citizens. After 9/11, President Bush joined American Muslim leaders in asking Americans to protect their fellow Americans, not injure them.

Alas, such calls went unheeded among some Americans. A few were in the mood for revenge. After Frank Roque was arrested for murdering Balbi Singh Sodhi, a Sikh man whom Roque had mistaken for a Muslim, Roque told Mesa, Arizona police, "I stand for America all the way. I am an American. Go ahead. Arrest me and let those terrorists run wild." Hours before the crime, according to the police, Roque had bragged at a local bar that he was going to "kill the rag heads responsible for 9/11."

Perhaps as many as seven people, including an Arab American Christian, were murdered in revenge for 9/11. Other hate crimes included violent assaults against Muslims, attacks against places of worship, and personal harassment. Some Americans told their fellow Muslim citizens to "go back to where they came from" and sent anonymous e-mail messages threatening to kill them. A few Americans actually spat on Muslim American women wearing head scarves. On the whole, anti-Muslim hate crimes in the US increased 1700% during 2001.

Despite President Bush's strong support for the Muslim American community, many Muslim American leaders asserted that the US government was sending out mixed messages about the trustworthiness of Muslim Americans. Using the powers granted to him under the USA Patriot Act, passed in October 2001, US Attorney General John Ashcroft rounded up approximately 1,200 Arab, South Asian, and Muslim men on suspicion of possible ties to terrorism. This was no ordinary law enforcement action. In many instances, the detainees' names were not released, they were not allowed access to a lawyer, and they were held in jail without being charged of a crime. In addition, the FBI sought to interview 8,000 Muslim men to probe their possible connection to or knowledge of terrorism. One Muslim American activist said that these activities sent an important message to non-Muslims: "Most people are probably asking, 'If the government doesn't trust these people, why should I?'"



11. The author most likely highlights the events listed in paragraph 1 in order to
    A) Highlight the far reaching impacts of the attacks.
    B) Establish the background relevant to the rest of the passage.
    C) Extrapolate on al-Qa'ida's reasoning behind the attacks.
    D) Explain US involvement in the Middle East.

12. The author most likely uses the examples in lines 18-69 in order to
    A) Show how Muslim American responses and actions paralleled that of other Americans.
    B) Emphasize how Muslim Americans did more charity work than other Americans.
    C) Showcase how all Muslim Americans came together in solidarity and support.
    D) Illustrate how open minded Muslim Americans are.

13. In line 67, "apprehension" most nearly means
    A) Anxiety or fear.
    B) Understanding of an idea.
    C) Action of arresting someone.
    D) Judgment.

14. The author indicates that Muslim Americans were expecting harassment and attacks in the immediate aftermath of 9/11 because
    A) Events overseas invariably prompts such behavior.
    B) Of the Iranian Revolution and the attack on Marine barracks.
    C) It had happened before.
    D) The US government sent mixed messages on the trustworthiness of Muslim Americans.

15. What choice provides the best evidence for the answer to the previous question?
    A) Lines 70-74 ("In the…overseas")
    B) Lines 74-79 ("After the…citizens")
    C) Lines 79-81 ("After 9/11…them")
    D) Lines 119-122 ("One Muslim…I?")

16. According to the passage, hate crimes on Muslim Americans were precipitated mainly because
    A) Many people can look Muslim.
    B) Other Americans did not view Arabs or Muslim Americans as American.
    C) Americans had to protect America from terrorists.
    D) President Bush asked Americans to protect Muslim Americans.

17. From lines 92-102 ("Perhaps as…2001"), one can conclude that
    A) Hate crimes can take many different forms.
    B) Only seven people were murdered for 9/11.
    C) More places of worship were attacked than individual Muslim Americans.
    D) Anti-Muslim hate crimes in the US decreased after 2001.

18. In line 105, "asserted" most nearly means
    A) Confidently.
    B) Insisted.
    C) Demanded.
    D) Accused.

19. The author mentions the Patriot Act and its consequences in order to
    A) Highlight the threat Muslim Americans posed.
    B) Give an example of some of the laws that resulted from the 9/11 attacks.
    C) Illustrate how many Arab, South Asian, and Muslim men had ties to terrorism.
    D) Emphasize that the government did not treat Muslim, Arab, and South Asian Americans fairly.

20. As represented in the graph, in what year after 2001 was the number of hate crimes the lowest?
    A) 1998
    B) 2005
    C) 2008
    D) 2010

21. Does the graph support the author's argument?
    A) No, the author stated that there were 7 deaths after the attacks, not 500.
    B) No, the number of crimes from 2002 onwards had not increased by 1700% from before 2001.
    C) Yes, the number of crimes after 2001 adds up to the approximate number of the 1,200 Arab, South Asian, and Muslim men who were detained.
    D) Yes, the number of crimes in 2001 increased greatly from the previous year.

Questions 22-31 are based on the following passage and supplementary material.

Roberts, Kevin D. African American Issues. Greenwood Press, Connecticut. 2006. 28-30.

Proponents of reforming the nation's criminal justice system begin with the argument that racism pervades the entire system. They argue that in every step of the criminal justice process – from arrests to convictions to sentencing to imprisonment – African Americans are at the wrong end of the racial discrimination. While reform activists recognize that some progress has been made in the realm of civil rights, they often portray the criminal justice system as a lagging arena for the eradication of racism.

Statistics necessarily serve as the argumentative foundation for the reformers' claims. Though such numbers can be both misleading and difficult to follow, a brief capitulation of the most commonly cited ones is necessary to understand the position of supporters. These numbers often illustrate the long-term problem in the criminal justice system. According to US Justice Department statistics, African Americans are imprisoned at seven times the rate of whites, even though they make up a little more than one-tenth the nation's population. A recent Bureau of Justice Statistics study shows that African American children born in the early 21st century have considerably higher chances than other ethnic groups of spending time in prison. In 2001, black men faced a 32.2% chance of being imprisoned, while Latino men (17.2% chance) trailed, and white men (5.6% chance) faced sharply lower chances. Among women, African American females had a 5.6% chance.

As one of the leading advocacy groups for ending racial bias in the criminal justice system, the Justice Policy Institute used such statistical summaries to prompt a wave of reform efforts in the Maryland state legislature. Compiled in the report, "Race and Incarceration in Maryland," the statistics illustrated that in addition to national trends holding true in Maryland, some facets of that state's justice system were even more racially skewed. The study found that black men in Maryland were eight times more likely to be imprisoned than white men, and that black women were 4.2 times more likely to be imprisoned than white women. Moreover, while constituting 28% of the state's population, 9 of every 10 inmates convicted of a drug offense are black. In tandem with the finding that three-quarters of new prisoners since 1980 have been African Americans, these statistical studies led Maryland's governor and legislature to create new reforms, namely, the use of rehabilitation.

Reform advocates use other statistics to focus on the application of the death penalty, which has whipped up considerable emotion on both sides of the reform debate. For example, 4,220 inmates were executed in the US from 1930 to 1996; of this number just over half (53%) were black, when during this period African Americans comprised 12% of the nation's population. Moreover, as the Baldus study illustrated, prosecutors in Georgia, and presumably in other places, sought the death penalty much more frequently for black defendants than for white defendants.

As in most civil rights-oriented debates, not all supporters of criminal justice reform are African Americans. Many white observers and researchers have taken a leading role in pushing for justice. Perhaps most prominent among this group of reformers is former US president Jimmy Carter. Since leaving office, Carter has been a vocal proponent of prison reform. Using his firsthand experience with racially assigned justice during this tenure as governor of Georgia, Carter has written, "Deliberately or not, punishments are focused on black offenders." Citing statistics showing African Americans are far more likely than whites to be sentenced for crack cocaine violations, Carter has urged state governors and Congress to address what he sees as racial disparities in conviction and sentencing.

Carter's emphasis on drug-related crimes demonstrates one of the reform supporters' most common arguments: that the drug war, which they claim is probably not worth fighting, discriminates grossly against African Americans. Statistics seem to

bear out this claim, as 90% of inmates who were convicted of drug-related offenses are African American. Marc Mauer, writing in the popular book *The Race to Incarcerate*, published under the auspices of the Sentencing Project, has concluded, "Since 1980, no policy has contributed more to the incarceration of African Americans than the 'war on drugs'… The drug war has exacerbated racial disparities in incarceration while failing to have any sustained impact on the drug problem."

But what causes this disparity within the war on drugs? Most critics of the drug war as a racially discriminatory effort point out that unlike burglary and similar crimes, which require that police react to a crime based on a citizens' report, waging the drug war effectively means that the police must target neighborhoods where drug possession and selling is most prevalent. Though whites, given their numerical superiority in the population, make up the majority of drug users, African Americans have been the chief targets by police. This is likely a result of the nation's largest cities still having racially segregated neighborhoods. Given resources by the federal and state governments to reduce drug crime, local police forces, according to reformers, have concentrated on predominantly black working-class and middle-class neighborhoods. Jason Ziedenberg, an analyst for the Justice Policy Institute, argues, "The police tactics tend to be more focused on neighborhoods where you are more likely to arrest an African American man for a low-level drug offense than if we were to concentrate those resources in a suburb." Though whites and blacks use drugs at roughly the same rate, Ziedenberg says, "We enforce the drug laws more in urban communities, and then we arrest people, and then we convict people, and then they end up in prison." The result, not surprisingly, is that such a high proportion of black Americans end up in prison.

Table: Number of Inmates in Federal, State, and Local Prisons, by Gender, Race, and Ethnicity, as of June 30, 2003

	Total	White	Black	Hispanic
Men	1,902,300	665,100	832,400	363,900
Women	176,300	76,100	66,800	28,300

Source: Paige M. Harrison and Jennifer C. Karberg, "Prisons and Jail Inmates at Midyear 2003," Bureau of Justice Statistics Bulletin, US Department of Justice

22. The main purpose of this article is to
    A) Emphasize the value of reducing crime rates.
    B) Stress the urgency of a social issue.
    C) Point out the lack of objectivity in an institution.
    D) Question the statistical claims in regards to a social issue.

23. The central claims of the passage is that
    A) Statistics can be used to find the truth.
    B) There are inherent biases within the criminal justice system.
    C) There are different ways of reforming the criminal justice system.
    D) African Americans are more likely to commit crimes than any other group.

24. In line 1, "proponents" most nearly means
    A) Supporters.
    B) Antagonists.
    C) Recorders.
    D) Debaters.

25. Why does the author include Maryland as an example in lines 31-50?
    A) To point out how Maryland has the most racially skewed criminal justice system in the nation.
    B) To lead the reader to the topic of rehabilitation use.
    C) To show how the war on drugs is hurting African Americans in Maryland.
    D) To prove that statistical analysis can lead to legislative reform.

26. From lines 51-62, one can conclude that
    A) Reform advocates are typically passionate and emotional about their cause.
    B) 53% of executed prisoners in Georgia were African Americans.
    C) The percentage of executed African Americans is disproportionate to the percentage of total African Americans.
    D) All prosecutors seek the death penalty more frequently for African American defendants than for white defendants.

27. According to the passage, Jimmy Carter
    A) Is the most prominent former US president.
    B) Was a vocal proponent of prison reform during his presidency.
    C) Used his position as governor of Georgia to advocate for prison reform.
    D) Used statistical evidence to persuade others to reform the criminal justice system.

28. Which choice provides the best evidence for the answer to the previous question?
    A) Lines 67-68 ("Perhaps most…Carter")
    B) Lines 69-70. ("Since leaving…reform")
    C) Lines 70-74 ("Using his…offenders")
    D) Lines 74-79 ("Citing statistics… sentencing")

29. In line 89, "auspices" most nearly means
    A) Divination.
    B) Patronage.
    C) Favorable signs.
    D) Strictness.

30. According to the passage, African Americans
    A) Sell more drugs than whites.
    B) Are more likely to be caught with drugs than whites.
    C) All live in racially segregated neighborhoods.
    D) Commit more crimes than expected given their population size.

31. The author would most likely attribute the differences in the number of imprisoned white women and African American women as represented in the table to
    A) The fact that white women commit more crimes than African American women.
    B) Local police forces who concentrate efforts in reducing drug crime to predominantly African American working-class and middle-class neighborhoods.
    C) The racial bias against white women.
    D) The larger population of white women in the nation compared to African American women.

Questions 32-42 are based on the following passages.

Passage 1 is from Graybiel, Ann M. and Kyle S. Smith. "Good Habits, Bad Habits." *Scientific American*. June 2014: 39-43. Print. Passage 2 is from Shariff, Azim F. and Kathleen D. Vohs. "The World Without Free Will." *Scientific American.* June 2014: 77-79. Print.

Passage 1

Although habits fall along different parts of the behavior spectrum, they share certain core features. Once they form, for example, they are stubborn. This stubbornness, in particular, has been a clue to uncovering the brain circuitry responsible for habit formation and maintenance. Habits become so ingrained that we perform them even when we do not want to, in part because of what are called "reinforcement contingencies." Say you do A, and then you are rewarded somehow. But if you do B, then you are not rewarded or are even punished. These consequences of our actions – the contingencies – push our future behavior one way or another.

In order to decipher which brain pathways were involved and how their activity might change as habits formed, we taught rats and mice to run down a T-shaped maze once they heard a click. Depending on the audio "instruction" cue that sounded as they ran, they would turn left or right toward the top of the T and run to that end to a receive a reward. Our goal was to understand how the brain judges the pros and cons of behaving in a particular way and then stamps a sequence of behavior as a "keeper" – a habit. Our rats certainly did develop habits! Even when a reward had become distasteful, the rats would run to it when the instruction tone sounded.

To figure out how the brain stamps a behavior as one to make a habit, we began recording the electrical activity of a small collection of neurons (brain cells) in the striatum. What our group found surprised us. When the rats were first learning the maze, neurons in the motor-control part of the striatum were active the whole time the rats were running. But as their behavior became more habitual, neuronal activity began to pile up at the beginning and end of the runs and quieted down during most of the time in between. It was as though the entire behavior had become packaged, with the striatal cells noting the beginning and end of each run. This was an unusual pattern; what seemed to be happening was that the striatal cells were malleable and could help package movements together while leaving relatively few "expert cells" to handle the details of the behavior.

Because the striatum works together with a habit-related part of the neocortex at the front of the brain known as the infralimbic cortex, we then recorded activity in that region. This was an eye-opener as well. Even though we saw the beginning-and-end pile-up of activity in the habit striatum, during the initial learning period we saw very little change in the infralimbic cortex. It was not until the animals had been trained for a long time and the habit became fixed that the infralimbic activity changed. Strikingly, when it did, the habitual chunking pattern then developed there, too. It was as though the infralimbic cortex was the wise one, waiting until the striatal evaluation system had fully decided that the behavior was a keeper before committing the larger brain to it.

We decided to test whether the infralimbic cortex has online control over whether a habit can be expressed by using a new technique called optogenetics. With this technique, we could place light-sensitive molecules in a tiny region of the brain, and then, by shining light on that region, we could turn the neurons in that region on or off. We experimented with turning off the infralimbic cortex in rats that had fully acquired the maze habit and had formed the chunking pattern. When we turned off the neocortex just for a few seconds while the rats were running, we totally blocked the habit.

The habit could be blocked rapidly, sometimes immediately, and the habit blockade endured even after the light was turned off. The rats did not stop running in the maze, however. It was just the habitual runs to the devalued reward that were gone. The animals still ran just fine to reach the good reward on

the other side of the maze. In fact, as we repeated the test, the rats developed a new habit: running to the good-reward side of the maze no matter what cue they were given.

So how close are we to helping people clinically? It will likely be a long time before anyone can flip a switch to zap away our pesky habits. The experimental methods that we and others are using cannot yet be translated directly to people. But neuroscience is changing at lightning speed, and those of us in the field are closing in on something truly important: the rules habits work by. If we can fully understand how habits are made and broken, we can better understand our idiosyncratic behaviors and how to train them.

Passage 2

Recently an increasing number of philosophers and neuroscientists have argued that instead of being the intentional authors of our lives, we are simply pushed around by past events and by the behind-the-scenes machinations of our unconscious minds. Even when we are wide awake, free will is just an illusion. Recent studies have suggested that the experience of conscious choice is the *outcome* of the underlying neural processes that produce human action, not the cause of them. Our brains decide everything we do without "our" help – it just feels like we have a say.

Not everyone agrees, of course, and debates over the existence of free will continue to rage. We, however, are intrigued by a related question of equal importance: What happens when people's belief in free will – justified or not – is shaken? What does a post-free will society, or rather a post-belief in free will society look like? Our research into this issue offers inklings of an answer, some of which are disturbing. In particular, we see signs that a lack of belief in free will may end up tearing social organization apart.

Some of our experiments have hinted at a more benign outcome, implying that a society that abandoned its belief in free will would be less punitive than our world is today: In survey research, we found that the more people doubt free will, the less they favor "retributive" punishment – punishment meted out not primarily to deter future crime, but rather to make individuals suffer for their transgressions. Yet what people believed about free will did not diminish support for "consequentialist" punishment, which abandons the notion of comeuppance and focuses instead on the most effective ways to discourage crime and rehabilitates perpetrators. In effect, free will skeptics treat people who break the law as they would viruses, raging floods or other natural phenomena: they want to protect themselves against further harm but have no desire to seek vengeance.

A subsequent investigation reached a similar conclusion. Half of our participants read a book excerpt arguing that a rational view of human beings leaves no room for free will. The other half read a passage from the same book that was unrelated to free will. As we expected, the first group became more doubtful of free will's existence. All the participants subsequently read a story about a hypothetical man convicted for killing someone in a bar fight. The story made it clear that imprisonment would not help reform him. Those who had been exposed to arguments against free will recommended half as much time in prison as did volunteers in other groups.

Some of our research reveals that such doubt in free will, which weakens a sense of accountability for one's actions, encouraged people to abandon existing rules. In other studies, participants who read an anti-free will passage cheated on an academic test – electing to peek at the answers – 50% more than participants who read a neutral passage.

Equally disturbing for social cohesion, diminished belief in free will also seems to release urges to harm others. One of the admittedly odd ways that psychologists measure aggression in the laboratory is by giving people the opportunity to add hot sauce to a snack that they know will be served to someone who hates spicy food. The study asked a group of volunteers to read arguments for or against the existence of free will before preparing plates of tortilla chips and clearly labeled hot sauce for another

volunteer who had rebuffed each group member earlier, refusing to work together with that person. This same aloof individual, the subjects knew full well, was not a fan of spiciness, and the person would have to eat everything that was handed out. Those who had read texts doubting free will's existence used nearly double the amount of hot sauce.

Neuroscience has revealed that at least one way skepticism about free will erodes ethical behavior is by weakening willpower. Before people make a motion – such as reaching for a cup – a particular pattern of electrical activity known as readiness potential occurs in the brain's motor cortex, which helps to regulate movement. By placing electrodes on the scalp, researchers showed that diminishing people's belief in free will decreased this electrical activity. In a follow-up study, people whose free will beliefs have been weakened were less able to inhibit impulsive reactions during a computerized test of willpower. The less we believe in free will, it seems, the less strength we have to restrain ourselves from the urge to lie, cheat, steal and feed hot sauce to rude people.

32. In lines 3-9, the author describes habits primarily in order to
    A) Emphasize how difficult it is to change habits.
    B) Describe how habits are permanently ingrained.
    C) Define what reinforcement contingencies are.
    D) Stress how all actions have consequences.

33. As used in line 19, "cue" most nearly means
    A) A rod used in pool, billiards, etc.
    B) A signal for action.
    C) Noise.
    D) The sound of running.

34. The author of Passage 1 indicates which of the following about habits in rats?
    A) The brain shuts off during an activity when it becomes a habit.
    B) The striatal cells have no plasticity.
    C) There is little neural control when in the middle of a behavior.
    D) Motor functions are controlled by all the cells in the striatum.

35. Which choice provides the best evidence for the answer to the previous question?
    A) Lines 28-31 ("To figure…striatum")
    B) Lines 32-34 ("When the…running")
    C) Lines 34-38 ("But as…between")
    D) Lines 40-44 ("This was…behavior")

36. According to Passage 1, the researchers learned that
    A) Neurons in the infralimbic cortex are dependent on the striatal neurons for cues on whether or not a new behavior should be adopted.
    B) The infralimbic cortex develops the habitual chunking pattern at the same time as the striatal neurons.
    C) Turning off the infralimbic cortex, the neocortex, and the straital neurons for a few seconds blocked the habit in rats.
    D) Turning off the neocortex with optogenetics directly resulted in the habit changing so that the rats ran in the opposite direction in order to reach the good-reward side.

37. The central claim of Passage 2 is that belief in free will
    A) Is directly affected by articles and passages on free will.
    B) Could affect how people perceive retributive punishment.
    C) Is an illusion of underlying neural processes that produce human action.
    D) Could have an impact on how closely people cleave to ethical values.

38. In line 172, "erodes" most nearly means
    A) Completely destroys.
    B) Gradually wears away.
    C) Promotes.
    D) Incorrectly modifies.

39. Which statement best describes the relationship between the passages?
    A) Passage 2 refutes the central claim advanced in Passage 1.
    B) Passage 1 describes the possible applications of a discovery while Passage 2 is more theoretical in its outlook.
    C) Passage 1 argues that further research is needed while Passage 2 warns that there may be unintended societal consequences.
    D) Passage 2 illustrates a potential consequence of the discoveries described in Passage 1.

40. The author of Passage 1 would most likely respond to the discussion of free will in lines 171-186, Passage 2, by saying that
    A) The increase or decrease of electrical activity in the motor cortex only measures learned behaviors, not free will.
    B) The researchers should measure the electrical activity of the infralimbic cortex instead.
    C) The test subjects were not "trained" long enough, so there shouldn't be any neurological changes involved.
    D) The researchers should measure the electrical activity of the motor cortex during the computerized test of willpower.

41. Which choice provides the best evidence for the answer to the previous question?
    A) Lines 32-34 ("When the…running")
    B) Lines 34-38 ("But as…between")
    C) Lines 45-48 ("Because the…region")
    D) Lines 52-54 ("It was…changed")

42. Which point about free will and habits would the authors of Passage 1 and Passage 2 agree on?
    A) Free will and conscious choice is an illusion because of underlying neural processes.
    B) Willpower is difficult to exercise when a behavior becomes a habit.
    C) More complex research into free will and habits should be done on people, not rats.
    D) Skepticism about free will only reinforces bad habits.

Questions 43-52 are based on the following passage and supplementary materials.

Zimmer, Carl. "The Oldest Rocks on Earth." *Scientific American.* March 2014: 59-63. Print. Graph is from "Age of the Earth." GeoKansas. 4 May 2005. Kansas Geological Survey. 22 July 2015 < http://www.kgs.ku.edu/Extension/geotopics/earth_age.html >. Table is adapted from Doumit, Peter. "A Unification of Science and Religion." 2012. 22 July 2015 < http://peterdoumit.webs.com/theageoftheearth.htm>.

Like the rocks that make up much of the Earth's crust, the rocks at Nuvvuagittuq generally arose in one of two ways. In some cases, fine particles settled to the bottom of oceans, where they were gradually pressed into layers of sedimentary rock. In other cases, molten magma rose from Earth's mantle, cooling and crystallizing into igneous rock as it ascended.

Only tiny portions of ancient crust in places such as Nuvvuagittuq have remained intact, whereas the rest has vanished. Some rocks were slowly eroded by rain and wind and delivered back to the ocean for new sedimentation. Many others were carried back down under Earth's crust by tectonic plates sinking into the hot mantle, where the rocks melted, their original identity wiped out like an ice cube tossed into a warm pond. Their atoms mixed into the magma and rose again as fresh, young stone.

Rocks on the early Earth were also wiped out by giant asteroids that smashed into the planet and melted large fractions of the crust. About 4.4 billion years ago one collision – called the Giant Impact – hurled a huge amount of material into orbit, which became the moon.

Given that so much ancient rock was destroyed in one way or another, it is not surprising that samples are rare. That is why the Nuvvuagittuq findings are so prized – and so hotly contested. Just a few other sites around the world have provided samples that are 3.8 billion years old. The oldest is from the tundra of the Northwest Territories, dating back 3.92 billion years.

The rarity of the early rocks has driven geologists to look for other clues to what the planet was like in its first few hundred million years. Some of those clues have come from tiny crystals called zircons. These rugged, zirconium-based minerals will sometimes form in cooling magma. When the resulting rocks later erode away, some of the zircons may remain intact, even as they settle back on the ocean floor and are incorporated into younger sedimentary rocks.

The chemical bonds that make up zircons can trap radioactive atoms such as uranium. The decay of those atoms acts like a clock that geologists can use to measure the age of the zircons. The crystals also trap other chemicals which can provide a few clues to what Earth was like when they were formed.

In the outback of Australia, geologists have found sedimentary rocks that are sprinkled with immensely old zircons. Some of the zircons (but not the surrounding rock) date back as far as 4.4 billion years, making them the oldest traces of geologic history ever found. Scientists have squeezed remarkable information from these tiny gems since their discovery in 2001, but it is vastly less than they could get from the original rock in which the zircons grew. Rock contains many other minerals, which together can reveal far more about the what Earth was like when it formed. "Unless you have the rocks, you don't have the complete story," says Larry Heaman of the University of Alberta. Which brings us back to Nuvvuagittuq.

In the late 1990s the Quebec government launched a massive geologic expedition to make the first detailed maps of the northern reaches of the province. The region has an onionlike geology, with ancient cores of continental crust surrounded by layers of younger rock. Much of the rock proved to be around 2.8 billion years old. But a researcher brought back a sample that dated back 3.8 billion years. By sheer luck, he had been sent to the Nuvvuagittuq greenstone belt.

Other geologists began to make the long journey to Nuvvuagittuq. Among those pilgrims was O'Neil from McGill University. He was struck by the chemical similarity between Nuvvuagittuq rocks and

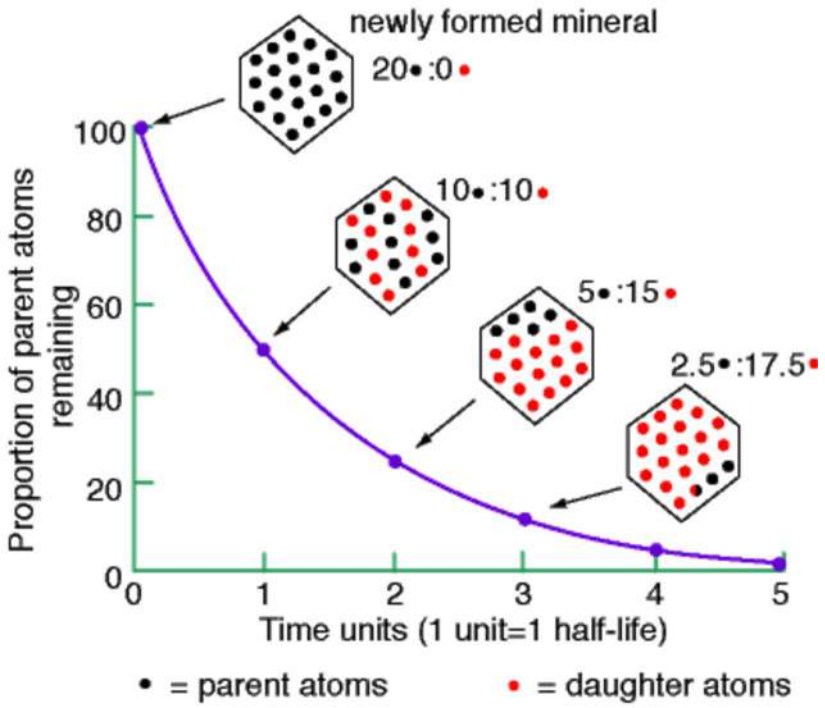
3.8-billion-year-old rocks in Greenland. Perhaps they belonged to the same ancient landmass.

To probe the chemistry, O'Neil teamed up with Carlson from the Carnegie Institution, who is an expert at precision measurements of ancient rocks. The only clear way to determine if a specific stone from Nuvvuagittuq is ancient or not is to date it. To do so, scientists count the levels of radioactive isotopes trapped inside a stone. Radioactive isotopes are variations of atoms that were part of the dusty cloud from which our solar system was born. They became incorporated into solidifying planets and meteorites, and when rocks on Earth crystallized, they became imprisoned inside. As time passed, the isotopes gradually broke down at a regular, clocklike pace. Measuring the levels remaining today reveals a rock's age.

In the lab, O'Neil and Carlson tallied up the concentrations of different isotopes. That was when they realized something was very strange about the Nuvvuagittuq samples. Among the isotopes was one known as neodymium 142. It forms from the breakdown of samarium 146. There is no natural samarium 146 left on Earth, because its half-life is short, by some estimates only 68 million years. "It's long gone," Carlson says. "Samarium 146 was present when the Earth formed because it was injected by the supernova that started the solar system. But then it decayed away within 500 million years."

Carlson and his colleagues found that different Nuvvuagittuq rocks had different proportions of neodymium 142 and other neodymium isotopes. That variation could have come about only if the rocks formed at a time when there was still samarium 146 on Earth. O'Neil, Carlson and their colleagues compared the proportions to estimate just how long ago the rocks had formed. The number was one none of them had anticipated: 4.28 billion years. To their surprise, they had discovered the oldest rocks on Earth.

"This was totally not what we were expecting to find," O'Neil says. He and his colleagues reported their discovery in 2008. Since then, they have analyzed other samples and now estimate that the Nuvvuagittuq rocks are as old as 4.4 billion years.



Parent (Radioactive) Isotope	Daughter (Radiogenic) Isotope	Half-Life
Carbon-14	Nitrogen-14	5730 years
Beryillium-10	Boron-10	1.5 million years
Samarium-146	Neodymium-142	68 million years
Uranium-235	Lead-207	0.704 billion years
Uranium-238	Lead-206	4.4 billion years
Potassium-40	Argon-40	11.93 billion years
Thorium-232	Lead-208	14.01 billion years
Lutecium-176	Halfnium-176	35.7 billion years
Rhenium-187	Osmium-187	42.3 billion years
Rubidium-87	Stronitium-87	48.8 billion years
Samarium-147	Neodymium-143	106 billion years

43. The author indicates that it's difficult to find old rocks of Earth's crust because
    A) They can only be found in remote regions of the world.
    B) Many of the rocks found on earth are from giant asteroids.
    C) They can be reformed through natural processes.
    D) Only zircons can survive through the ages.

44. A student claims that the 4.4 billion year old zircons must have traces of samarium-146. Which of the following statements in the passage contradicts the student's claim?
    A) Lines 42-43 ("The chemical…uranium")
    B) Lines 53-59 ("Scientists have…formed")
    C) Line 99-101 ("There is…years")
    D) Lines 109-115 ("That variation…years")

45. According to the passage, why do scientists want to analyze early rocks?
    A) Zircons hold little to no information about early Earth.
    B) They want to understand the process of sedimentation.
    C) Rocks hold more minerals than zircons.
    D) Rocks can trap and stop the decay of radioactive atoms.

46. Based on the passage, the authors' statement in lines 75-78 ("He was…landmass") implies that
    A) Somebody had moved rocks from Greenland to Nuvvuagittuq.
    B) Rocks with similar chemical make-ups were most likely formed at the same location.
    C) The rocks of the Nuvvuaguittuq greenstone belt were physically similar to the 3.8-billion-year-old rocks in Greenland.
    D) The Nuvvuagittuq rocks and the rocks in Greenland have chemically similar zircons embedded in them.

47. The author's main purpose of including information about radioactive dating is to
    A) Provide support for the author's claim that Nuvvuagittuq rocks are extremely old.
    B) Prove that Carlson is an expert at precision measurement of ancient rocks.
    C) Imply that all Nuvvuagittuq rocks have traces of atoms from the cloud that formed the solar system.
    D) Describe the primary problem scientists have in dating ancient objects.

48. The author's use of "regular, clocklike pace" in lines 91-92 functions mainly to
    A) Describe how scientists calculate the age of a rock.
    B) Emphasize that isotopes can be relied on to calculate the elapsed time since the formation of a rock.
    C) Refute the idea that samarium 146 can be used to date an object.
    D) Support the claim that any radioactive isotope can be used to measure the age of an object.

49. Based on the graph and table, how long would it take 20 atoms of Uranium-238 to decay to 5 atoms of Uranium-238?
    A) 0.7 billion years.
    B) 1.4 billion years.
    C) 4.4 billion years.
    D) 8.8 billion years.

50. Do the data in the table support the author's statements about the age of the Nuvvuaguittuq rocks?
    A) No, because samarium-147 has a half life of 106 billion years.
    B) No, because neodymium-142 does not decay.
    C) Yes, because samarium-146 has a relatively short half life compared to other isotopes.
    D) Yes, because samarium-146 decays into neodymium-142.

51. According to the graph and the table, if an object was found to have a proportion of 25% carbon-14 to 75% nitrogen-14, approximately how old is the object?
    A) 3000 years.
    B) 6000 years.
    C) 12,000 years.
    D) 18,000 years.

52. According to the passage, samarium-146 has a half life of 68 million years and would decay away within 500 million years. Which of the following radioactive isotopes could also decay away within that time frame?
    A) Beryillium-10.
    B) Uranium-235.
    C) Thoirum-232.
    D) Samarioum-147

Answers

1. B
2. D
3. B
4. A
5. C
6. A
7. C
8. B
9. D
10. B
11. B
12. A
13. C
14. C
15. B
16. B
17. A
18. B
19. D
20. C
21. D
22. C
23. B
24. A
25. D
26. C
27. D
28. D
29. B
30. B
31. D
32. A
33. B
34. C
35. C
36. A
37. D
38. B
39. D
40. D
41. A
42. C
43. C
44. C
45. C
46. B
47. A
48. B
49. D
50. C
51. D
52. A