1 Read the passage below and then answer the questions 1–8 about it. Boxes ([ ]) in the passage indicate missing information. Choose the most appropriate answers based on what is stated in the passage. Choose ONE answer for each question unless stated otherwise.

In 2010 a mathematician* found that there was a direct correlation between the number of cellphone towers and the number of births in some areas of the UK. For every additional cellphone tower in an area, 17.6 more babies were born compared to the national average. It was an incredibly strong correlation and would have required further investigation, [1] any cause-and-effect link—but there wasn't. The finding was meaningless, and I can say that because I was that mathematician.

This was a project I was doing with the BBC Radio 4 mathematics program *More or Less* to look at how people respond to a correlation where there is no cause-and-effect link. The sight of cellphone towers was not putting the citizens of the UK in a romantic mood, and decades of studies have revealed no biological impact from <1> them. In this case, both factors were dependent on a third variable: population size. Both the number of cellphone towers in an area and the number of births depend on how many people live there.

I should make it very clear: in the article I explained that the correlation was because of population size. I explained in great detail that this was an exercise in showing that correlation does not equal a cause-and-effect relationship. It ended up also being an exercise in [2] people don't read the article properly before commenting on it. The correlation was too appealing, and people could not help but put forward their own reasons. More than one person suggested that expensive neighborhoods have fewer towers and young families with many kids cannot afford to live there. Of course, it also attracted a few of the alternative-facts types, like this one:

> *If this study holds up, then it's in strong support of the existing <2> scientific evidence that low-level radiation from cellphone towers does cause biological effects.*

A correlation is never enough to <3> argue that one thing is causing another. There is always the chance that something else is influencing the data, causing the link. For example, between 1993 and 2008, the police in Germany were searching for the mysterious "Phantom of Heilbronn*," a woman who had been linked to forty crimes, including six murders; her DNA had been found at all the crime scenes. Tens of thousands of police hours were spent looking for Germany's "most dangerous woman," and there was a huge reward on her head. It turns out that she was a woman who worked in the factory that made the cotton swabs* used to collect DNA evidence.

Of course, some correlations happen to be completely random. If enough data sets are compared, sooner or later there will be two that match almost perfectly completely by <4> accident. There is even a website dedicated to fake correlations, where you can search through publicly available data and find matches. I did a quick check against the number of people in the United States who obtained a Ph.D.* in mathematics. Between 1999 and 2009, the "Number of math Ph.D. degrees <5> awarded" had an 87 percent correlation with the "Number of people who tripped over their own two feet and died."

As a mathematical technique, correlation is powerful. It can take a collection of data and provide a good measure of how closely direct changes in one variable match changes in the other. However, <6> it is only a tool, not the answer. Much of mathematics is about finding the correct answer but, in statistics, the numbers coming out of calculations are never the whole story. The numbers produced by statistics are the start of finding the answer, not the end. It takes a bit of common sense and clever insight to go from the statistics to the actual answer.

[3], when you hear a statistic such as the fact that cancer rates have been steadily increasing, you could assume that people are living less healthy lives. The opposite is true: duration of life is increasing, which means more people are living long enough to get cancer. For most cancers, age is the biggest risk factor and, in the US, 77 percent of all cancer cases are found in people aged fifty-five or older. As much as it pains me to say it, when it comes to statistics, the numbers are not everything.

<<NOTES*>>
mathematician = a person who studies or is an expert in mathematics
Phantom of Heilbronn = ハイルブロンの怪人
cotton swabs = 綿棒
Ph.D. = Doctor of Philosophy（博士号）

1. Choose the most appropriate answer.

[1]	① was there	② will there be	③ would there be	④ has there been	⑤ had there been
[2]	① how	② how far	③ whose	④ those	⑤ such
[3]	① Therefore	② Together	③ Otherwise	④ As though	⑤ Nevertheless

2. [4] What does <1> them refer to?

① project	② BBC Radio 4	③ mathematics program	④ how people respond	⑤ a correlation
⑥ cause-and-effect link		⑦ sight	⑧ cellphone towers	⑨ citizens
⑩ a romantic mood		⑪ decades	⑫ studies	

3. Which is the most stressed syllable in the following word?

[5] <2> *scientific*　　sci-en-tif-ic
① ② ③④

4. Choose the answer that is closest in meaning.

[6]	<3> argue	① fight	② claim	③ improve	④ resolve	⑤ deny
[7]	<4> accident	① fate	② surprise	③ chance	④ unfortunate	⑤ collision
[8]	<5> awarded	① granted	② afforded	③ found	④ won	⑤ depended

5. [9] What does <6> it refer to?

① a mathematical technique ② correlation ③ collection ④ data ⑤ measure
⑥ direct changes ⑦ one variable ⑧ match ⑨ changes ⑩ the other

6. [10] What is the correct explanation given for the correlation between the number of cellphone towers and the number of births?

① Cellphones increase the chances of finding someone to start a family with, so there are more babies if there are more cellphone towers.
② Families with babies and young children use cellphones more often than older people, so there are more cellphone towers in areas where they live.
③ Some areas have a higher population, so there are more cellphone towers and more babies in those areas.
④ Areas that are cheaper to live in have more cellphone towers, and young families live in those areas, so there are also more babies.

7. [11] How were the police able to solve the mystery of the "Phantom of Helbronn"?

① They used criminal statistics from 1993 to 2008.
② They set a trap using her DNA and criminal profile.
③ They got a call from someone who wanted the reward.
④ They discovered that she owned a cotton swab factory.
⑤ They realized that the DNA at the crime scenes was misleading.

8. [12] What is the main message that the author wants to express in this article?

① Statistics is an interesting and fun subject because it can be used to explain many unrelated events.
② It is easy to mislead people with statistics, so we should not trust news articles which use them.
③ We should use statistics as a starting point to explain a possible relationship between events.
④ Environmental dangers, accidental deaths, and cancers can be reduced through statistical analysis.

2 Read the passage below and then answer the questions 1–7 about it. Boxes ([ ]) in the passage indicate missing information. Choose the most appropriate answers based on what is stated in the passage. Choose ONE answer for each question unless stated otherwise.

Stress is a normal occurrence in everyday life, but what is it exactly? Stress is a psychological and physical reaction people have when exposed to certain input. Stress can be produced by non-life-threatening situations such as a job interview or a final exam. It also can be caused by <1> potentially life-threatening situations such as exposure to dangerous machines in a factory.

Stressful input can be real or imagined. Either way, it causes the same response in the body: an increase in heart rate, an increase in blood flow to the muscles, a decrease in blood flow to the digestive system*, a rise in blood sugar (glucose), and an expansion of the pupils* of the eyes. These physical changes in the body help us to respond to the stress. They may, for instance, help us <2> flee from a stressful situation or a perceived threat. Once that source of stress is gone, though, the body typically returns to normal.

How stress affects us, however, also depends on how long we're exposed to it. ≪ ① ≫ If the stressful input is short-lived, our bodies recover easily. ≪ ② ≫ Some argue that a little stress may actually improve a person's performance. ≪ ③ ≫ Long-term exposure to stressful input, however, can have serious consequences; a long period of stress may lead to disease. ≪ ④ ≫ The immune system protects us from bacteria and viruses that cause colds, flu, and other diseases. ≪ ⑤ ≫ Continuous stress also results in changes in the blood vessels. ≪ ⑥ ≫ These changes may quicken the buildup of cholesterol, which blocks the blood vessels and may eventually result in serious diseases. ≪ ⑦ ≫

Stress doesn't affect all people in the same way. Some people can recognize the stress they are feeling and are able to <3> channel its energies into productive work. Such people are better able to cope with stress. Psychologists believe that those who handle stress the best are individuals who have a sense of being in control, [17] the stress that may come with their work or lifestyle. They typically have clear objectives and a strong sense of purpose. They view their jobs and life as a challenge, not a threat. Unfortunately, not all people are so lucky. Many of us are not in a position of control; we may feel unimportant or view ourselves as victims. What can be done to deal with stress?

One of the most important strategies is preventive: selecting an environment and creating a lifestyle that is as stress-free as possible. As a college student, for instance, you may want to select a realistic class load. If you have to work to pay for college, or if you are taking very difficult courses like physics or chemistry, sign up for a lighter class load—one you can handle more easily. Try to arrange your schedule in a way that avoids creating unnecessary stress. In addition to these prevention strategies, effectively coping with stress may require physical and mental strategies. Let's consider the physical strategies first.

One of the easiest ways to reduce the impact of stress is exercise. Studies show that a single workout at the gym, a bike ride, a swim, or a cross-country skiing trip reduces tension for two to five hours. When [18] regularly, exercise reduces the overall stress in one's life. Individuals who are easily stressed usually find that stress levels decline after two weeks of consistent exercise.

Exercise can be supplemented by relaxation training. As you prepare for a difficult test or get ready for a date that you are nervous about, tension often builds in your muscles. Periodically stopping to release that tension helps to reduce physical stress. Stretching or going for a walk can help. Some people find it useful to tighten their muscles forcefully and then let them relax. Massage therapy and acupuncture* can also be used to reduce stress. Stress-reduction programs on DVDs and the internet can teach relaxation methods, as can trained therapists.

Psychological factors may also play a role in stress. In many instances, the mind's response to stressful input is excessive. <4> Being able to recognize and deal with thoughts that make you overly stressed helps you better control the stress they produce. Start paying attention to specific thoughts that cause anxiety in your life. Do they seem excessive? If so, why? For example, are you nervous before exams? Why? Would better preparation reduce your anxiety? You might

remind yourself that you've been through similar stressful situations before and still triumphed. Such thought management could help you better cope with stress.

Finding the source of your anxiety and taking positive action to reduce it are helpful ways of reducing stress. However, stress reduction is not always easy. Test anxiety, for example, may be deeply [19] in feelings of not being good enough. Many people struggle with low self-esteem. A trained psychologist can help you find the causes and assist you in learning to feel better about yourself. Psychological help is as important as medical help these days, [20] the complexity and pace of our society. There is no shame in seeking counseling.

Biofeedback is another form of stress relief. In this form of stress reduction, a trained healthcare worker places sensors on you and connects them to a machine that monitors heart rate, breathing, muscle tension, or some other indicators of stress. During a biofeedback session, your trainer first helps you relax, and then asks you to describe a stressful situation. When one of the indicators shows that you are suffering from stress, a signal is given off. Your goal is to consciously reduce the <5> frequency of the signal. For example, if your heart started beating faster when you thought about taking an exam, the machine would start beeping. By breathing deeply and relaxing, you consciously slow down your heart rate; at that point the sound from the machine slows down and then disappears. Learning to recognize the symptoms of stress and to counter them is the goal of biofeedback. Eventually, you should be able to do it without the aid of a machine.

<<NOTES*>>
digestive system = the organs in the body such as the mouth and stomach that are involved with digesting food
pupils = 瞳孔
acupuncture = 針療法

1. Choose the answer that is closest in meaning.

[13]	<1> potentially	① presumably	② consistently	③ randomly	④ dangerously	⑤ incredibly
[14]	<2> flee	① take out	② fight off	③ drop out	④ run away	⑤ let go
[15]	<3> channel	① observe	② solve	③ acquire	④ direct	⑤ develop

2. [16] The following sentence was taken from the passage. Which location indicated by ≪ ① ≫ – ≪ ⑦ ≫ was it taken from?

≪ One reason this happens is that the body's immune system is often weakened by stress. ≫

3. Choose the most appropriate answer.

[17]	① instead of	② although	③ regardless	④ until	⑤ despite
[18]	① does	② did	③ done	④ doing	⑤ to do
[19]	① rooted	② worried	③ covered	④ concerned	⑤ composed
[20]	① taken	② given	③ proven	④ driven	⑤ shown

4. [21] For <4> Being able to ..., find the MAIN VERB of the sentence.

① Being	② able	③ recognize and deal	④ thoughts	⑤ make	⑥ overly
⑦ stressed	⑧ helps	⑨ control	⑩ stress	⑪ produce	

5. Identify the most stressed vowel, and choose the word that has the same vowel pronunciation.

[22] <5> frequency

① heat	② sit	③ wet	④ cat	⑤ bird	⑥ cut	⑦ food	⑧ book	⑨ stop	⑩ stay	⑪ sky	⑫ old

6. [23] Which TWO of the following are NOT mentioned as a physical response to stress?

① Your heart rate quickens.
② More blood goes to the muscles.
③ You develop a headache.
④ Your blood sugar increases.
⑤ Your eyes produce tears.

7. [24] – [30] Based on paragraphs 5–10, choose the answer for each to complete the table.

Table: Stress Management

[24] strategies	[26] strategies	[28] strategies
• select a good environment • create the right lifestyle • control your [25]	• exercise • do [27] training • stretch or go for walks	• [29] your thoughts • find the source of your [30] • take a biofeedback session

① manage	② mental	③ medicine	④ prevention	⑤ schedule
⑥ sleep	⑦ anxiety	⑧ physical	⑨ relaxation	⑩ diet

3 Read the passage below and then answer the questions 1–6 about it. Boxes ([ ]) in the passage indicate missing information. Choose the most appropriate answers based on what is stated in the passage. Choose ONE answer for each question unless stated otherwise.

The will to stay alive is the primary <1> urge of living things, and humans use their intelligence and willpower to avoid death as long as possible. "Choose life, so that you and your children may live," commanded the God of the Bible. A long life is the ultimate <2> blessing.

How long do you think an average person in the world can be expected to live today? You should <3> keep in mind that the global average is dragged down by early deaths from hunger and disease in the high population countries in the developing world, particularly by the deaths of infants, who mix a lot of zeroes into the average.

The answer for 2015 is 71.4 years. How close is that to your guess? In a recent survey, Hans Rosling found that less than one in four people in Sweden guessed that it was that high, a finding consistent with the results of other multinational surveys of opinions on longevity (having a long life), literacy, and poverty in what Rosling called *The Ignorance Project*. The logo of the project is a chimpanzee because, as Rosling explained, "If for each question I wrote the alternatives on bananas, and asked chimpanzees in the zoo to pick the right answers, they'd have done better than the respondents." However, the respondents, including students and professors of global health, were likely not so much <4> ignorant as they were pessimistic*.

Figure 1, a graph from Max Roser, displays general patterns of life expectancy (i.e., expected length of life) over the centuries in world history. At the point where the lines begin, in the mid-18th century, life expectancy in Europe and the Americas was around 35, where it had been for the 225 previous years for which we have data. Life expectancy for the world as a whole was 29. These numbers are in the range of expected lifespans for most of human history. The life expectancy of hunter-gatherers was around 32.5, and it probably decreased among the people who first took [34] farming because of their diet and the diseases they caught from their livestock and each other. It returned to the low 30s by the Bronze Age, where it stayed for thousands of years, with small changes across centuries and regions. During this period of human history, any advance in agriculture or health was quickly canceled by the resulting increase in population.

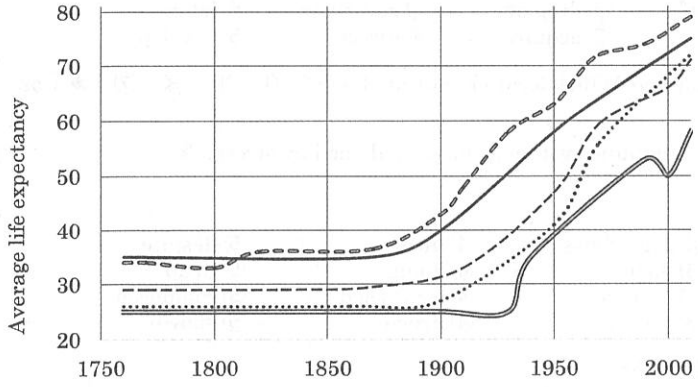

Figure 1: General patterns of life expectancy

But starting in the 19th century, the world began the Great Escape, the economist Angus Deaton's term for humanity's release from its inheritance of poverty, disease, and early death. Life expectancy began to rise, picked up speed in the 20th century, and shows no signs of slowing down. As the economic historian Johan Norberg points out, we tend to think that "we approach death by one year for every year we age, but during the 20th century, the average person approached death by just seven months for every year they aged." The gift of longevity is spreading to all of humankind, including the world's poorest countries, and at a much faster pace than it did in the rich ones. "Life expectancy in Kenya increased by almost 10 years between 2003 and 2013," Norberg writes. "After having lived, loved, and struggled for a whole decade, the average person in Kenya had not lost a single year of their remaining lifetime. Everyone got 10 years older, yet death had not come a step closer."

As a result, inequality in life expectancy, which increased during the Great Escape when a few fortunate countries broke away from the pack, is shrinking as the rest catch up. In 1800, no country in the world had a life expectancy above 40. By 1950, it had grown to around 60 in Europe and the Americas, leaving Africa and Asia far behind. However, since then, life expectancy in Asia has risen at twice the European rate, and at one and a half times the rate in Africa. An African born today can expect to live as long as a person born in the Americas in 1950 or in Europe in the 1930s. The average would have been longer still were it not for the tragedy of AIDS, which caused many terrible deaths in the 1990s before medicine started to bring it under control.

The African AIDS epidemic is a reminder that progress is not an escalator that constantly improves the well-being of every human everywhere all the time. That would be magic, and progress is an outcome not of magic [35] of problem-solving. Problems are inevitable, and at times particular sectors of humanity have suffered terrible difficulties. In addition to the African AIDS epidemic, longevity [36] into reverse for young adults worldwide during the Spanish flu pandemic of 1918-19. It also decreased for middle-aged, non-college-educated, non-Hispanic white Americans in the early 21st century. However, problems are solvable, and the fact that longevity continues to increase in every other Western demographic means that solutions to the problems facing this specific one exist as well.

Average lifespans are stretched the most by decreases in the infant and child death rate, both because children are weak and because the death of a child brings down the average more than the death of a 60-year-old. In Sweden in the 1800s, between a quarter and a third of all children died before their fifth birthday, and in the 1700s the average death toll was closer to half. This appears to be typical in human history. Even now in the 21st century, a fifth of hunter-gatherer children die in their first year and almost half before they reach adulthood.

<<NOTES*>>
pessimistic = expecting something bad to happen

1. Choose the answer that is closest in meaning.

31	<1> urge	① destiny	② impulse	③ necessity	④ admiration	⑤ option
32	<2> blessing	① wealth	② occasion	③ goal	④ gift	⑤ desire
33	<3> keep in mind	① take into account		② memorize	③ bear with us	
		④ continue to believe		⑤ remain calm		

2. Choose the most appropriate answer.

34	① over	② out	③ up	④ off	⑤ away
35	① also	② because	③ despite	④ and	⑤ but
36	① proved	② went	③ brought	④ decreased	⑤ revealed

3. Identify the most stressed vowel, and choose the word that has the same vowel pronunciation.

37 <4> ignorant

① heat ② sit ③ wet ④ cat ⑤ bird ⑥ cut ⑦ food ⑧ book ⑨ stop ⑩ stay ⑪ store ⑫ old

4. 38 What did the survey in Sweden and *The Ignorance Project* discover?

① They revealed that the average lifespan in Sweden was higher than the global average.
② They showed that most people thought the global average lifespan was less than it actually was.
③ They confirmed that almost all of the respondents were about 71 years old.
④ They implied that the intelligence of chimpanzees was higher than previously believed.
⑤ They demonstrated that choosing answers randomly was a good way to answer surveys.

5. Match each line to the place it corresponds to in Figure 1.

39	Which line corresponds to Africa?
40	Which line corresponds to Asia?
41	Which line corresponds to Europe?
42	Which line corresponds to the Americas?

① ———— ② ▫▫▫▫▫▫▫ ③ ---------- ④ ..... ⑤ ═══

6. 43 Which of the following is the most appropriate title for the passage?

① Causes for decreases in the global lifespan
② The impact of the Great Escape on life expectancy
③ How AIDS has affected the average length of life
④ Changes in lifespans around the world
⑤ A global comparison of death rates in children