READING PASSAGE 1

You should spend about 20 minutes on Questions 1-13.

The megafires of California

Drought, housing expansion, and oversupply of tinder make for bigger, hotter fires in the western United States

Wildfires are becoming an increasing menace in the western United States, with Southern California being the hardest hit area. There's a reason fire squads battling more frequent blazes in Southern California are having such difficulty containing the flames, despite better preparedness than ever and decades of experience fighting fires fanned by the 'Santa Ana Winds'. The wildfires themselves, experts say, are generally hotter, faster, and spread more erratically than in the past.

Megafires, also called 'siege fires', are the increasingly frequent blazes that burn 500,000 acres or more -10 times the size of the average forest fire of 20 years ago. Some recent wildfires are among the biggest ever in California in terms of acreage burned, according to state figures and news reports.

One explanation for the trend to more superhot fires is that the region, which usually has dry summers, has had significantly below normal precipitation in many recent years. Another reason, experts say, is related to the century- long policy of the US Forest Service to stop wildfires as quickly as possible. The unintentional consequence has been to halt the natural eradication of underbrush, now the primary fuel for megafires.

Three other factors contribute to the trend, they add. First is climate change, marked by a 1-degree Fahrenheit rise in average yearly temperature across the western states. Second is fire seasons that on average are 78 days longer than they were 20 years ago. Third is increased construction of homes in wooded areas.

'We are increasingly building our homes in fire-prone ecosystems,' says Dominik Kulakowski, adjunct professor of biology at Clark University Graduate School of Geography in Worcester, Massachusetts. 'Doing that in many of the forests of the western US is like building homes on the side of an active volcano.'

In California, where population growth has averaged more than 600,000 a year for at least a decade, more residential housing is being built. 'What once was open space is now residential homes providing fuel to make fires bum with greater intensity,' says Terry McHale

of the California Department of Forestry firefighters' union. 'With so much dryness, so many communities to catch fire, so many fronts to fight, it becomes an almost incredible job.'

That said, many experts give California high marks for making progress on preparedness in recent years, after some of the largest fires in state history scorched thousands of acres, burned thousands of homes, and killed numerous people. Stung in the past by criticism of bungling that allowed fires to spread when they might have been contained, personnel are meeting the peculiar challenges of neighborhood - and canyon- hopping fires better than previously, observers say.

State promises to provide more up-to-date engines, planes, and helicopters to fight fires have been fulfilled. Firefighters' unions that in the past complained of dilapidated equipment, old fire engines, and insufficient blueprints for fire safety are now praising the state's commitment, noting that funding for firefighting has increased, despite huge cuts in many other programs. 'We are pleased that the current state administration has been very proactive in its support of us, and [has] come through with budgetary support of the infrastructure needs we have long sought,' says Mr. McHale of the firefighters' union.

Besides providing money to upgrade the fire engines that must traverse the mammoth state and wind along serpentine canyon roads, the state has invested in better command-and-control facilities as well as in the strategies to run them. 'In the fire sieges of earlier years, we found that other jurisdictions and states were willing to offer mutual-aid help, but we were not able to communicate adequately with them,' says Kim Zagaris, chief of the state's Office of Emergency Services Fire and Rescue Branch. After a commission examined and revamped communications procedures, the statewide response 'has become far more professional and responsive,' he says. There is a sense among both government officials and residents that the speed, dedication, and coordination of firefighters from several states and jurisdictions are resulting in greater efficiency than in past 'siege fire' situations.

In recent years, the Southern California region has improved building codes, evacuation procedures, and procurement of new technology. 'I am extraordinarily impressed by the improvements we have witnessed,' says Randy Jacobs, a Southern California- based lawyer who has had to evacuate both his home and business to escape wildfires. 'Notwithstanding all the damage that will continue to be caused by wildfires, we will no longer suffer the loss

of life endured in the past because of the fire prevention and firefighting measures that have been put in place,' he says.

Questions 1 - 6

Complete the notes below.

Choose **ONE WORD AND/OR A NUMBER** from the passage for each answer.

Write your answers in boxes **1-6** on your answer sheet.

Wildfires

- Characteristics of wildfires and wildfire conditions today compared to the past:
  - occurrence: more frequent
  - temperature: hotter
  - speed: faster
  - movement: **1** ..... more unpredictably
  - size of fires: **2** .....greater on average than two decades ago

- Reasons wildfires cause more damage today compared to the past:
  - rainfall: **3** ..... average
  - more brush to act as **4** .....
  - increase in yearly temperature
  - extended fire **5** .....
  - more building of **6** ..... in vulnerable places

Question 7 -13

Do the following statements agree with the information given in Reading Passage 1?

In boxes **7-13** on your answer sheet, write

TRUE	if the statement agree with the information
FALSE	if the statement contradicts with the information
NOT GIVEN	if there is no information on this

7. The amount of open space in California has diminished over the last ten years.

8. Many experts believe California has made little progress in readying itself to fight fires.

9. Personnel in the past have been criticised for mishandling fire containment.

10. California has replaced a range of firefighting tools.

11. More firefighters have been hired to improve fire-fighting capacity.

12. Citizens and government groups disapprove of the efforts of different states and agencies working together.

13. Randy Jacobs believes that loss of life from fires will continue at the same levels, despite changes made.

READING PASSAGE 2

You should spend about 20 minutes on Questions **14-26**.

What destroyed the civilisation of Easter Island?

A Easter Island, or Rapu Nui as it is known locally, is home to several hundred ancient human statues - the moai. After this remote Pacific island was settled by the Polynesians, it remained isolated for centuries. All the energy and resources that went into the moai - some of which are ten metres tall and weigh over 7,000 kilos - came from the island itself. Yet when Dutch explorers landed in 1722, they met a Stone Age culture. The moai were carved with stone tools, then transported for many kilometres, without the use of animals or wheels, to massive stone platforms. The identity of the moai builders was in doubt until well into the twentieth century. Thor Heyerdahl, the Norwegian ethnographer and adventurer, thought the statues had been created by pre-Inca peoples from Peru. Bestselling Swiss author Erich von Daniken believed they were built by stranded extraterrestrials. Modern science - linguistic, archaeological and genetic evidence - has definitively proved the moai builders were Polynesians, but not how they moved their creations. Local folklore maintains that the statues walked, while researchers have tended to assume the ancestors dragged the statues somehow, using ropes and logs.

B When the Europeans arrived, Rapa Nui was grassland, with only a few scrawny trees. In the 1970s and 1980s, though, researchers found pollen preserved in lake sediments, which proved the island had been covered in lush palm forests for thousands of years. Only after the Polynesians arrived did those forests disappear. US scientist Jared Diamond believes that the Rapanui people - descendants of Polynesian settlers – wrecked their own environment. They had unfortunately settled on an extremely fragile island - dry, cool, and too remote to be properly fertilised by windblown volcanic ash. When the islanders cleared the forests for firewood and farming, the forests didn't grow back. As trees became scarce and they could no longer construct wooden canoes for fishing, they ate birds. Soil erosion decreased their crop yields. Before Europeans arrived, the Rapanui had descended into civil war and cannibalism, he maintains. The collapse of

their isolated civilisation, Diamond writes, is a 'worst-case scenario for what may lie ahead of us in our own future'.

C The moai, he thinks, accelerated the self-destruction. Diamond interprets them 46 as power displays by rival chieftains who, trapped on a remote little island, lacked other ways of asserting their dominance. They competed by building ever bigger figures. Diamond thinks they laid the moai on wooden sledges, hauled over log rails, but that required both a lot of wood and a lot of people. To feed the people, even more land had to be cleared. When the wood was gone and civil war began, the islanders began toppling the moai. By the nineteenth century none were standing.

D Archaeologists Terry Hunt of the University of Hawaii and Carl Lipo of California State University agree that Easter Island lost its lush forests and that it was an 'ecological catastrophe' - but they believe the islanders themselves weren't to blame. And the moai certainly weren't. Archaeological excavations indicate that the Rapanui went to heroic efforts to protect the resources of their wind-lashed, infertile fields. They built thousands of circular stone windbreaks and gardened inside them, and used broken volcanic rocks to keep the soil moist. In short, Hunt and Lipo argue, the prehistoric Rapanui were pioneers of sustainable farming.

E Hunt and Lipo contend that moai-building was an activity that helped keep the peace between islanders. They also believe that moving the moai required few people and no wood, because they were walked upright. On that issue, Hunt and Lipo say archaeological evidence backs up Rapanui folklore. Recent experiments indicate that as few as 18 people could, with three strong ropes and a bit of practice, easily manoeuvre a 1,000 kg moai replica a few hundred metres. The figures' fat bellies tilted them forward, and a D-shaped base allowed handlers to roll and rock them side to side.

F Moreover, Hunt and Lipo are convinced that the settlers were not wholly responsible for the loss of the island's trees. Archaeological finds of nuts from the extinct Easter Island palm show tiny grooves, made by the teeth of Polynesian rats. The rats arrived along with the settlers, and in just a few years, Hunt and Lipo calculate, they would have overrun the island. They would have prevented the reseeding of the slow-growing palm trees and thereby doomed Rapa Nui's forest, even without the settlers' campaign of deforestation. No doubt the rats ate birds' eggs too. Hunt and Lipo also see no evidence that Rapanui civilisation collapsed when the palm forest did. They think its population grew rapidly and then remained more or less stable until the arrival of the Europeans, who introduced deadly diseases to which islanders had no immunity. Then in the

nineteenth century slave traders decimated the population, which shrivelled to 111 people by 1877.

G Hunt and Lipo's vision, therefore, is one of an island populated by peaceful and ingenious nioai builders and careful stewards of the land, rather than by reckless destroyers ruining their own environment and society. 'Rather than a case of abject failure, Rapu Nui is an unlikely story of success', they claim. Whichever is the case, there are surely some valuable lessons which the world at large can learn from the story of Rapa Nui.

Questions 14-20

Reading Passage 2 has seven paragraphs, **A-G**.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, **i-ix**, in boxes **14-20** on your answer sheet.

List of Headings

i.	Evidence of innovative environment management practices
ii.	An undisputed answer to a question about the moai
iii.	The future of the moai statues
iv.	A theory which supports a local belief
v.	The future of Easter Island
vi.	Two opposing views about the Rapanui people
vii.	Destruction outside the inhabitants' control
viii.	How the statues made a situation worse
ix.	Diminishing food resources

14. Paragraph A
15. Paragraph B
16. Paragraph C
17. Paragraph D
18. Paragraph E
19. Paragraph F
20. Paragraph G

Questions 21-24

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 21-24 on your answer sheet.

Jared Diamond's View

Diamond believes that the Polynesian settlers on Rapa Nui destroyed its forests, cutting down its trees for fuel and clearing land for **21** ..... . Twentieth-century discoveries of pollen prove that Rapu Nui had once been covered in palm forests, which had turned into grassland by the time the Europeans arrived on the island. When the islanders were no longer able to build the **22** ..... they needed to go fishing, they began using the island's **23** ..... as a food source, according to Diamond. Diamond also claims that the moai were built to show the power of the island's chieftains, and that the methods of transporting the statues needed not only a great number of people, but also a great deal of **24** ..... .

Questions 25-26

Choose TWO letters, **A-E**.

Write the correct letters in boxes **25-26** on your answer sheet.

On what points do Hunt and Lipo disagree with Diamond?

A. the period when the moai were created
B. how the moai were transported
C. the impact of the moai on Rapanui society
D. how the moai were carved
E. the origins of the people who made the moai

READING PASSAGE 3

You should spend about 20 minutes on Questions **27-40**.

Music and the emotions

Neuroscientist Jonah Lehrer considers the emotional power of music

Why does music make us feel? On the one hand, music is a purely abstract art form, devoid of language or explicit ideas. And yet, even though music says little, it still manages to touch us deeply. When listening to our favourite songs, our body betrays all

the symptoms of emotional arousal. The pupils in our eyes dilate, our pulse and blood pressure rise, the electrical conductance of our skin is lowered, and the cerebellum, a brain region associated with bodily movement, becomes strangely active. Blood is even re-directed to the muscles in our legs. In other words, sound stirs us at our biological roots.

A recent paper in Nature Neuroscience by a research team in Montreal, Canada, marks an important step in revealing the precise underpinnings of the potent pleasurable stimulus' that is music. Although the study involves plenty of fancy technology, including functional magnetic resonance imaging (fMRI) and ligand-based positron emission tomography (PET) scanning, the experiment itself was rather straightforward. After screening 217 individuals who responded to advertisements requesting people who experience 'chills' to instrumental music, the scientists narrowed down the subject pool to ten. They then asked the subjects to bring in their playlist of favourite songs - virtually every genre was represented, from techno to tango - and played them the music while their brain activity was monitored. Because the scientists were combining methodologies (PET and fMRI), they were able to obtain an impressively exact and detailed portrait of music in the brain. The first thing they discovered is that music triggers the production of dopamine - a chemical with a key role in setting people's moods - by the neurons (nerve cells) in both the dorsal and ventral regions of the brain. As these two regions have long been linked with the experience of pleasure, this finding isn't particularly surprising.

What is rather more significant is the finding that the dopamine neurons in the caudate - a region of the brain involved in learning stimulus-response associations, and in anticipating food and other 'reward' stimuli - were at their most active around 15 seconds before the participants' favourite moments in the music. The researchers call this the 'anticipatory phase' and argue that the purpose of this activity is to help us predict the arrival of our favourite part. The question, of course, is what all these dopamine neurons are up to. Why are they so active in the period preceding the acoustic climax? After all, we typically associate surges of dopamine with pleasure, with the processing of actual rewards. And yet, this cluster of cells is most active when the 'chills' have yet to arrive, when the melodic pattern is still unresolved.

One way to answer the question is to look at the music and not the neurons. While music can often seem (at least to the outsider) like a labyrinth of intricate patterns, it turns out that the most important part of every song or symphony is when the patterns break down, when the sound becomes unpredictable. If the music is too obvious, it is annoyingly boring, like an alarm clock. Numerous studies, after all, have demonstrated that dopamine neurons quickly adapt to predictable rewards. If we know what's going to happen next, then we don't get excited. This is why composers often introduce a key note in the beginning of a song, spend most of the rest of the piece in the studious avoidance of the pattern, and then finally repeat it only at the end. The longer we are denied the pattern we expect, the greater the emotional release when the pattern returns, safe and sound.

To demonstrate this psychological principle, the musicologist Leonard Meyer, in his classic book Emotion and Meaning in Music (1956), analysed the 5th movement of Beethoven's String Quartet in C-sharp minor, Op. 131. Meyer wanted to show how music is defined by its flirtation with - but not submission to - our expectations of order. Meyer dissected 50 measures (bars) of the masterpiece, showing how Beethoven begins with the clear statement of a rhythmic and harmonic pattern and then, in an ingenious tonal dance, carefully holds off repeating it. What Beethoven does instead is suggest variations of the pattern. He wants to preserve an element of uncertainty in his music, making our brains beg for the one chord he refuses to give us. Beethoven saves that chord for the end.

According to Meyer, it is the suspenseful tension of music, arising out of our unfulfilled expectations, that is the source of the music's feeling. While earlier theories of music focused on the way a sound can refer to the real world of images and experiences - its 'connotative' meaning - Meyer argued that the emotions we find in music come from the unfolding events of the music itself. This 'embodied meaning' arises from the patterns the symphony invokes and then ignores. It is this uncertainty that triggers the surge of dopamine in the caudate, as we struggle to figure out what will happen next. We can predict some of the notes, but we can't predict them all, and that is what keeps us listening, waiting expectantly for our reward, for the pattern to be completed.

Questions 27-33

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes **27-31** on your answer sheet.

The Montreal Study

Participants, who were recruited for the study through advertisements, had their brain activity monitored while listening to their favourite music. It was noted that the music stimulated the brain's neurons to release a substance called **27**..... in two of the parts of the brain which are associated with feeling **28** ..... Researchers also observed that the neurons in the area of the brain called the **29** ..... were particularly active just before the participants' favourite moments in the music - the period known as the **30**..... Activity in this part of the brain is associated with the expectation of 'reward' stimuli such as **31**..... .

Questions 32-36

Choose the correct letter, **A**, **B**, **C** or **D**.

Write the correct letter in boxes **32-36** on your answer sheet.

32. What point does the writer emphasise in the first paragraph?

- **A** how dramatically our reactions to music can vary
- **B** how intense our physical responses to music can be
- **C** how little we know about the way that music affects us
- **D** how much music can tell us about how our brains operate

33. What view of the Montreal study does the writer express in the second paragraph?

- **A** Its aims were innovative.
- **B** The approach was too simplistic.
- **C** It produced some remarkably precise data.
- **D** The technology used was unnecessarily complex.

34. What does the writer find interesting about the results of the Montreal study?

- **A** the timing of participants' neural responses to the music.
- **B** the impact of the music on participants' emotional state.
- **C** the section of participants' brains which was activated by the music.
- **D** the type of music which had the strongest effect on participants' brains.

35. Why does the writer refer to Meyer's work on music and emotion?

A to propose an original theory about the subject.

B to offer support for the findings of the Montreal study.

C to recommend the need for further research into the subject.

D to present a view which opposes that of the Montreal researchers.

36. According to Leonard Meyer, what causes the listener's emotional response to music?

A the way that the music evokes poignant memories in the listener

B the association of certain musical chords with certain feelings

C the listener's sympathy with the composer's intentions

D the internal structure of the musical composition

Questions 37-40

Complete each sentence with the correct ending, **A-F**, below.

Write the correct letter, **A-F**, in boxes **37-40** on your answer sheet.

37 The Montreal researchers discovered that

38 Many studies have demonstrated that

39 Meyer's analysis of Beethoven's music shows that

40 Earlier theories of music suggested that

A	our response to music depends on our initial emotional state.
B	neuron activity decreases if outcomes become predictable.
C	emotive music can bring to mind actual pictures and events.
D	experiences in our past can influence our emotional reaction to music.
E	emotive music delays giving listeners what they expect to hear.
F	neuron activity increases prior to key points in a musical piece.

Good luck!