READING TEST

PASSAGE 1

Walking with dinosaurs

Peter L. Falkingham and his colleagues at Manchester University are developing techniques which look set to revolutionize our understanding of how dinosaurs and other extinct animals behaved.

The media image of palaeontologists who study prehistoric life is often of field workers camped in the desert in the hot sun, carefully picking away at the rock surrounding a large dinosaur bone. But Peter Falkingham has done little of that for a while now. Instead, he devotes himself to his computer. Not because he has become inundated with paperwork, but because he is a new kind of palaeontologist: a computational palaeontologist.

What few people may consider is that uncovering a skeleton, or discovering a new species, is where the research begins, not where it ends. What we really want to understand is how the extinct animals and plants behaved in their natural habitats. Drs Bill Sellers and Phil Manning from the University of Manchester use a 'genetic algorithm' – a kind of computer code that can change itself and 'evolve' – to explore how extinct animals like dinosaurs, and our own early ancestors, walked and stalked.

The fossilized bones of a complete dinosaur skeleton can tell scientists a lot about the animal, but they do not make up the complete picture and the computer can try to fill the gap. The computer model is given a digitized skeleton, and the locations of known muscles. The model then randomly activates the muscles. This, perhaps unsurprisingly, results almost without fail in the animal falling on its face. So the computer alters the activation pattern and tries again … usually to similar effect. The modeled dinosaurs quickly 'evolve'. If there is any improvement, the computer discards the old pattern and adopts the new one as the base for alteration. Eventually, the muscle activation pattern evolves a stable way of moving, the best possible solution is reached, and the dinosaur can walk, run, chase or graze. Assuming natural selection evolves the best possible solution too, the modeled animal should be moving in a manner similar to its now-extinct counterpart. And indeed, using the same method for living animals (humans, emu and ostriches) similar top speeds were achieved on the computer as in reality. By comparing their cyberspace results with real measurements of living species, the Manchester team of palaeontologists can be confident in the results computed showing how extinct prehistoric animals such as dinosaurs moved.

The Manchester University team have used the computer simulations to produce a model of a giant meat-eating dinosaur. It is called an acrocanthosaurus which literally means 'high spined lizard' because of the spines which run along its backbone. It is not really known why they are there but scientists have speculated they could have supported a hump that stored fat and water reserves. There are also those who believe that the spines acted as a support for a sail. Of these, one half think it was used as a display and could be flushed with blood and the other half think it was used as a temperature-regulating device. It may have been a mixture of the two. The skull seems out of proportion with its thick, heavy body because it is so narrow and the jaws are delicate and fine. The feet are also worthy of note as they look surprisingly small in contrast to the animal as a whole. It has a deep broad tail and powerful leg muscles to aid locomotion. It walked on its back legs and its front legs were much shorter with powerful claws.

Falkingham himself is investigating fossilized tracks, or footprints, using computer simulations to help analyze how extinct animals moved. Modern-day trackers who study the habitats of wild animals can tell you what animal made a track, whether that animal was walking or running, sometimes even the sex of the animal. But a fossil track poses a more considerable challenge to interpret in the same way. A crucial consideration is knowing what the environment including the mud, or sediment, upon which the animal walked was like millions of years ago when the track was made. Experiments can answer these questions but the number of variables is staggering. To physically recreate each scenario with a box of mud is extremely time-consuming and difficult to repeat accurately. This is where computer simulation comes in.

Falkingham uses computational techniques to model a volume of mud and control the moisture content, consistency, and other conditions to simulate the mud of prehistoric times. A footprint is then made in the digital mud by a virtual foot. This footprint can be chopped up and viewed from any angle and stress values can be extracted and calculated from inside it. By running hundreds of these simulations simultaneously on supercomputers, Falkingham can start to understand what types of footprint would be expected if an animal moved in a certain way over a given kind of ground. Looking at the variation in the virtual tracks, researchers can make sense of fossil tracks with greater confidence.

The application of computational techniques in palaeontology is becoming more prevalent every year. As computer power continues to increase, the range of problems that can be tackled and questions that can be answered will only expand.

Question 1–6

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

In following statements below, choose

YES	*if the statement agrees with the information*
NO	*if the statement contradicts the information*
NOT GIVEN	*if it is impossible to say what the writer thinks about this*

1. In his study of prehistoric life, Peter Falkingham rarely spends time on outdoor research those days.

2. Several attempts are usually needed before the computer model of a dinosaur used by Sellers and Manning manages to stay upright.

3. When the Sellers and Manning computer model was used for people, it showed them moving faster than they are physically able to.

4. Some palaeontologists have expressed reservations about the conclusions reached by the Manchester team concerning the movement of dinosaurs.

5. An experienced tracker can analyse fossil footprints as easily as those made by live animals.

6. Research carried out into the composition of prehistoric mud has been found to be inaccurate.

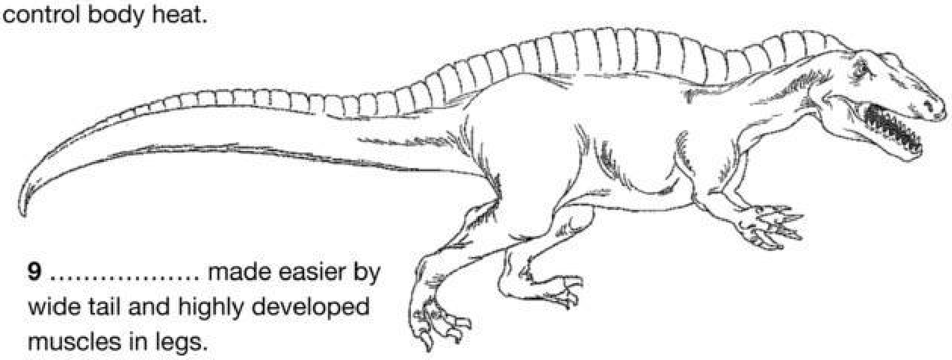
Question 7–9

*Choose **NO MORE THAN ONE WORD** from the passage for each answer.*

A model of an acrocanthosaurus

Dinosaur's name comes from spines. One theory: they were necessary to hold up a **7** .... which helped control body heat.

Skull is **8** .... compared with rest of body.



9 .... made easier by wide tail and highly developed muscles in legs.

Question 10–13

Complete the flow-chart below

*Write **NO MORE THAN TWO WORDS** for each answer.*

Peter Falkingham's computer model

Mud is simulated with attention to is texture and thickness and how much **10** .... it contains.

↓

A virtual foot produces a footprint in the mud.

↓

The footprint is dissected and examined from all angles.

↓

Levels of **11** .... are measured with the footprint.

↓

Multiple simulations relate footprints to different types of **12** ....

↓

More accurate interpretation of **13** .... is possible

PASSAGE 2

Volcanoes-earth-shattering news

When Mount Pinatubo suddenly erupted on 9 June 1991,
the power of volcanoes past and present again hit the headlines

A

Volcanoes are the ultimate earth-moving machinery. A violent eruption can blow the top few kilometres off a mountain, scatter fine ash practically all over the globe and hurl rock fragments into the stratosphere to darken the skies a continent away.

But the classic eruption – cone-shaped mountain, big bang, mushroom cloud and surges of molten lava – is only a tiny part of a global story. Vulcanism, the name given to volcanic processes, really has shaped the world. Eruptions have rifted continents, raised mountain chains, constructed islands and shaped the topography of the earth. The entire ocean floor has a basement of volcanic basalt.

Volcanoes have not only made the continents, they are also thought to have made the world's first stable atmosphere and provided all the water for the oceans, rivers and ice-caps. There are now about 600 active volcanoes. Every year they add two or three cubic kilometres of rock to the continents. Imagine a similar number of volcanoes smoking away for the last 3,500 million years. That is enough rock to explain the continental crust.

What comes out of volcanic craters is mostly gas. More than 90% of this gas is water vapour from the deep earth: enough to explain, over 3,500 million years, the water in the oceans. The rest of the gas is nitrogen, carbon dioxide, sulphur dioxide, methane, ammonia and hydrogen. The quantity of these gases, again multiplied over 3,500 million years, is enough to explain the mass of the world's atmosphere. We are alive because volcanoes provided the soil, air and water we need.

B

Geologists consider the earth as having a molten core, surrounded by a semi-molten mantle and a brittle, outer skin. It helps to think of a soft-boiled egg with a runny yolk, a firm but squishy white and a hard shell. If the shell is even slightly cracked during boiling, the white material bubbles out and sets like a tiny mountain chain over the crack - like an archipelago of volcanic islands such as the Hawaiian Islands. But the earth is so much bigger and the mantle below is so much hotter.

Even though the mantle rocks are kept solid by overlying pressure, they can still slowly 'flow' like thick treacle. The flow, thought to be in the form of convection currents, is powerful enough to fracture the 'eggshell' of the crust into plates, and keep them bumping and grinding against each other, or even overlapping, at the rate of a few centimetres a year. These fracture zones, where the collisions occur, are where earthquakes happen. And, very often, volcanoes.

C

These zones are lines of weakness, or hot spots. Every eruption is different, but put at its simplest, where there are weaknesses, rocks deep in the mantle, heated to 1,350°C, will start to expand and rise. As they do so, the pressure drops, and they expand and become liquid and rise more swiftly.

Sometimes it is slow: vast bubbles of magma - molten rock from the mantle – inch towards the surface, cooling slowly, to snow through as granite extrusions (as on Skye, or the Great Whin Sill, the lava dyke squeezed out like toothpaste that carries part of Hadrian's Wall in northern England). Sometimes – as in Northern Ireland, Wales and the Karoo in South Africa – the magma rose faster, and then flowed out horizontally on to the surface in vast thick sheets. In the Deccan plateau in western India, there are more than two million cubic kilometres of lava, some of it 2,400 metres thick, formed over 500,000 years of slurping eruption.

Sometimes the magma moves very swiftly indeed. It does not have time to cool as it surges upwards. The gases trapped inside the boiling rock expand suddenly, the lava glows with heat, it begins to froth, and it explodes with tremendous force. Then the slightly cooler lava following it begins to flow over the lip of the crater. It happens on Mars, it happened on the moon, it even happens on some of the moons of Jupiter and Uranus. By studying the evidence, vulcanologists can read the force of the great blasts of the past. Is the pumice light and full of holes? The explosion was tremendous. Are the rocks heavy, with huge crystalline basalt shapes, like the Giant's Causeway in Northern Ireland? It was a slow, gentle eruption.

The biggest eruptions are deep on the mid-ocean floor, where new lava is forcing the continents apart and widening the Atlantic by perhaps five centimetres a year. Look at maps of volcanoes, earthquakes and island chains like the Philippines and Japan, and you can see the rough outlines of what are called tectonic plates – the plates which make up the earth's crust and mantle. The most dramatic of these is the Pacific 'ring of fire' where there have been the most violent explosions – Mount Pinatubo near Manila, Mount St Helen's in the Rockies and El Chichon in Mexico about a decade ago, not to mention world-shaking blasts like Krakatoa in the Sunda Straits in 1883.

D

But volcanoes are not very predictable. That is because geological time is not like human time. During quiet periods, volcanoes cap themselves with their own lava by forming a powerful cone from the molten rocks slopping over the rim of the crater; later the lava cools slowly into a huge, hard, stable plug which blocks any further eruption until the pressure below becomes irresistible. In the case of Mount Pinatubo, this took 600 years.

Then, sometimes, with only a small warning, the mountain blows its top. It did this at Mont Pelee in Martinique at 7.49 a.m. on 8 May, 1902. Of a town of 28,000, only two people survived. In 1815, a sudden blast removed the top 1,280 metres of Mount Tambora in Indonesia. The eruption was so fierce that dust thrown into the stratosphere darkened the skies, cancelling the following summer in Europe and North America. Thousands starved as the harvests failed, after snow in June and frosts in August. Volcanoes are potentially world news, especially the quiet ones.

Questions 14–17

Reading Passage has four sections A–D.

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

Write the correct number i–vi in boxes 1–4 on your answer sheet.

List of Headings	**List of Sections**
i.Causes of volcanic eruption	**14** Section **A**
ii. Efforts to predict volcanic eruption	**15** Section **B**
iii. Volcanoes and the features of our planet	**16** Section **C**
iv. Different types of volcanic eruption	**17** Section **D**
v.International relief efforts	
vi. The unpredictability of volcanic eruptions	

Questions 18–21

Answer the questions below using ***NO MORE THAN THREE WORDS AND/OR A NUMBER*** *from the passage for each answer.*

Write your answers in boxes 5–8 on your answer sheet.

18. What are the sections of the earth's crust, often associated with volcanic activity, called?

19. What is the name given to molten rock from the mantle?

20. What is the earthquake zone on the Pacific Ocean called?

21. For how many years did Mount Pinatubo remain inactive?

Questions 22–26

Complete the summary below.

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

Write your answers in boxes 9–13 on your answer sheet.

Volcanic eruptions have shaped the earth's land surface. They may also have produced the world's atmosphere and **22** .... Eruptions occur when molten rocks from the earth's mantle rise and expand. When they become liquid, they move more quickly through cracks in the surface. There are different types of eruption. Sometimes the **23** .... moves slowly and forms outcrops of granite on the earth's surface. When it moves more quickly it may flow out in thick horizontal sheets. Examples of this type of eruption can be found in Northern Ireland, Wales, South Africa and **24** .... A third type of eruption occurs when the lava emerges very quickly and **25** .... violently. This happens because the magma moves so suddenly that **26** .... are emitted.

PASSAGE 3

Endangered languages

'Nevermind whales, save the languages',
says Peter Monaghan, graduate of the Australian National University

Worried about the loss of rain forests and the ozone layer? Well, neither of those is doing any worse than a large majority of the 6,000 to 7,000 languages that remain in use on Earth. One half of the survivors will growing evidence that not all approaches to the almost certainly be gone by 2050, while 40% more preservation of languages will be particularly will probably be well on their way out. In their place, almost all humans will speak one of a handful of megalanguages – Mandarin, English, Spanish.

Linguists know what causes languages to disappear, but less often remarked is what happens on the way to disappearance: languages' vocabularies, grammars and expressive potential all diminish as one language is replaced by another. 'Say a community goes over from speaking a traditional Aboriginal language to speaking a creole*,' says Australian Nick Evans, a leading authority on Aboriginal languages, 'you leave behind a language where there's very fine vocabulary for the landscape. All that is gone in a creole. You've just got a few words like 'gum tree' or whatever. As speakers become less able to express the wealth of knowledge that has filled ancestors' lives with meaning over millennia, it's no wonder that communities tend to become demoralised.'

If the losses are so huge, why are relatively few linguists combating the situation? Australian linguists, at least, have achieved a great deal in terms of preserving traditional languages. Australian governments began in the 1970s to support an initiative that has resulted in good documentation of most of the 130 remaining Aboriginal languages. In England, another Australian, Peter Austin, has directed one of the world's most active efforts to limit language loss, at the University of London. Austin heads a programme that has trained many documentary linguists in England as well as in language-loss hotspots such as West Africa and South America.

At linguistics meetings in the US, where the endangered-language issue has of late been something of a flavour of the month, there is growing evidence that not all approaches to the preservation of languages will be particularly helpful. Some linguists are boasting, for example, of more and more sophisticated means of capturing languages: digital recording and storage, and internet and mobile phone technologies. But these are encouraging the 'quick dash' style of recording trip: fly in, switch on digital recorder, fly home, download to hard drive, and store gathered material for future research. That's not quite what some endangered-language specialists have been seeking for more than 30 years. Most loud and untiring has been Michael Krauss, of the University of Alaska. He has often complained that linguists are playing with non-essentials while most of their raw data is disappearing.

Who is to blame? That prominent linguist Noam Chomsky, say Krauss and many others. Or, more precisely, they blame those linguists who have been obsessed with his approaches. Linguists who go out into communities to study, document and describe languages, argue that theoretical linguists, who draw conclusions about how languages work, have had so much influence that linguistics has largely ignored the continuing disappearance of languages. Chomsky, from his post at the Massachusetts Institute of Technology, has been the great man of theoretical linguistics for far longer than he has been known as a political commentator. His landmark work of 1957 argues that all languages exhibit certain universal grammatical features, encoded in the human mind. American linguists, in particular, have focused largely on theoretical concerns ever since, even while doubts have mounted about Chomsky's universals.

Austin and Co. are in no doubt that because languages are unique, even if they do tend to have common underlying features, creating dictionaries and grammars requires prolonged and dedicated work. This requires that documentary linguists observe not only languages' structural subtleties, but also related social, historical and political factors. Such work calls for persistent funding of field scientists who may sometimes have to venture into harsh and even hazardous places. Once there, they may face difficulties such as community suspicion. As Nick Evans says, a community who speak an endangered language may have reasons to doubt or even oppose efforts to preserve it. They may have seen support and funding for such work come and go. They may have given up using the language with their children, believing they will benefit from speaking a more widely understood one.

Plenty of students continue to be drawn to the intellectual thrill of linguistics field work. That's all the more reason to clear away barriers, contend Evans, Austin and others. The highest barrier, they agree, is that the linguistics profession's emphasis on theory gradually wears down the enthusiasm of linguists who work in communities. Chomsky disagrees. He has recently begun to speak in support of language preservation. But his linguistic, as opposed to humanitarian, argument is, let's say, unsentimental: the loss of a language, he states, 'is much more of a tragedy for linguists whose interests are mostly theoretical, like me, than for linguists who focus on describing specific languages, since it means the permanent loss of the most relevant data for general theoretical work'. At the moment, few institutions award doctorates for such work, and that's the way it should be, he reasons. In linguistics, as in every other discipline, he believes that good descriptive work requires thorough theoretical understanding and should also contribute to building new theory. But that's precisely what documentation does, objects Evans. The process of immersion in a language, to extract, analyse and sum it up, deserves a PhD because it is 'the most demanding intellectual task a linguist can engage in'.

Question 33–36

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

In following statements below, choose

YES	*if the statement agrees with the information*
NO	*if the statement contradicts the information*
NOT GIVEN	*if it is impossible to say what the writer thinks about this*

27. By 2050 only a small number of languages will be flourishing.

28. Australian academics' efforts to record existing Aboriginal languages have been too limited.

29. The use of technology In language research is proving unsatisfactory in some respects.

30. Chomsky's political views have overshadowed his academic work.

31. Documentary linguistics studies require long-term financial support.

32. Chomsky's attitude to disappearing languages is too emotional.

Question 7–10

Choose appropriate options A, B, C or D.

33 The writer mentions rainforests and the ozone layer

A. a because he believes anxiety about environmental issues is unfounded.

B. to demonstrate that academics in different disciplines share the same problems.

C. because they exemplify what is wrong with the attitude of some academics.

D. to make the point that the public should be equally concerned about languages.

34 What does Nick Evans say about speakers of a creole?

A. They lose the ability to express ideas which are part of their culture.

B. Older and younger members of the community have difficulty communicating.

C. They express their ideas more clearly and concisely than most people.

D. Accessing practical information causes problems for them.

35 What is similar about West Africa and South America, from the linguist's point of view?

A. The English language is widely used by academics and teachers.

B. The documentary linguists who work there were trained by Australians.

C. Local languages are disappearing rapidly in both places.

D. There are now only a few undocumented languages there.

36 Michael Krauss has frequently pointed out that

A. linguists are failing to record languages before they die out.

B. linguists have made poor use of improvements in technology.

C. linguistics has declined in popularity as an academic subject.

D. linguistics departments are underfunded in most universities.

Question 37–40

Complete each sentence with the correct ending A–G below.

Write the correct letter A–G.

37. Linguists like Peter Austin believe that every language is unique

38. Nick Evans suggests a community may resist attempts to save its language

39. Many young researchers are interested in doing practical research

40. Chomsky supports work in descriptive linguistics

A.	even though it is in danger of disappearing.
B.	provided that it has a strong basis in theory.
C.	although it may share certain universal characteristics
D.	because there is a practical advantage to it
E.	so long as the drawbacks are clearly understood.
F.	in spite of the prevalence of theoretical linguistics.
G.	until they realize what is involved