READING

READING PASSAGE 1

You should spend about 20 minutes on Questions 1-İ2, which are based on Reading Passage / below.

Seas beneath the sands

A Look at a map of North Africa from Egypt to Algeria. Almost everything outside the Nile Valley and south of the coastal plain appears to be lifeless sand and gravel deserts. But peer deeper, under the sand, and you will find water. Under the Sahara lie three major aquifers, strata of saturated sandstones and limestones that hold water in their pores like a wet sponge. The easternmost of these, extending over two million square kilometres, contains 375,000 cubic kilometres of water—the equivalent of 3,750 years of Nile river flow. It is called the Nubian Sandstone Aquifer System, and lately it has come to the attention of practitioners of a subspeciality of nuclear science known as isotope hydrology.

B Isotope hydrology, which studies the atoms of the two elements making up groundwater— oxygen and hydrogen—and the trace elements in it, like carbon and nitrogen, is able to determine when, give or take a couple of thousand years, today's ground water fell to earth as rain. In the case of the Nubian Aquifer, some water in the system is thought to be one million years old, but most of it fell between 50,000 and 20,000 years ago. Since then, as the region has slowly turned to desert, there has been little addition of water to the aquifer. What lies beneath the ground is called fossil water, and it will likely never be recharged.

C Because the Nubian Aquifer is shared among four nations, and because Libya and Egypt are now going forward with big water-pumping projects that tap the Nubian Aquifer, the International Atomic Energy Agency (IAEA), co-recipient of the 2005 Nobel Peace Prize, is trying to bring the countries together in a joint

effort to plan for a rational shared use of the water.

D The stakes are certainly high. Egypt eventually hopes to use almost half a billion cubic metres of groundwater annually—more than the volume of Lake Erie. Libya is already pumping water from the Kufra Oasis, in its southeast corner, through a four-metre-diameter pipeline to its thirsty coastal cities. When fully operational, that project will pump some 3.6 million cubic metres per day. still, at current extraction rates, the aquifer is not likely to be depleted for a thousand years.

E Dr Taher Muhammad Hassan of the EAEA (Egyptian Atomic Energy Authority) says "One thing that isotope studies have shown US is that there is surprisingly little aquifer recharge from the Nile. Nile water has a younger isotopic profile, and samples from wells dug as close as five kilometres from the river show no sign of the Nile fingerprint. In fact, some of that well water is dated at 26,000 years old." Hassan is confident there is little likelihood of international conflict over aquifer sharing. *"We* know that the velocity of underground flow in most places is just two metres a day," he says. "It's like sucking a thick milkshake through a straw—it doesn't happen fast, and eventually it stops completely." Even Libya's big extraction plans for Kufra will probably have only a minor effect on Egypt's East Uweinat farming area, given the distance between the two. If Kufra's water table drops 200 metres, the Egyptian side might see a drop of only 10 centimetres.

F At al-Agouza West in Egypt, a 10-story drilling rig, the same kind used to drill oil wells, has reached 800 metres and is now evacuating the drilling mud and widening the bore. It has taken 20 days to penetrate layers of shale and clay to reach the saturated sandstone—the basement of the Nubian formation is some 1,800 metres deep here—at a cost of about $400,000. Once the well is ready for testing, the ministry engineers check its static and dynamic levels with a sounder, a kind of fisherman's bob at the end of a tape measure that rises and falls with the water table.

G Dr Khaled Abu Zeid, of the Egyptian non-profit Center for Environment and Development of the Arab Region and Europe (CEDARE), stresses the social context of water-resource development, and the need to keep in mind traditional water users as well as new users. Small farmers and Bedouin who rely on shallow wells should not be ignored in favour of the big development schemes. "They need water today," he says, "and will still need it tomorrow. We must not let it run dry because deeper wells are more cost-effective. But neither should we have an absolutist conservationist approach, in which we try to keep fossil water in some kind of 'museum' for their benefit."

H The director of the Groundwater Research Institute at the Nile Barrage, Dr Ahmed Khater, finds it ironic that in a desert region like the Middle East, petroleum geology is much better understood than subsurface hydrology. "But water is what makes our life possible here, and we must use it wisely," he says. He cites

the experience of President Nasser's "New Valley" project in the 1960s, which proposed a massive resettlement of Nile Valley farmers to the western oases. It was a failure. "These isotope studies hold the promise of learning more about what is really our most precious asset—water, not oil," he says. Nasser, he notes, got the New Valley project's motto wrong. "He said, 'When settlers come, then we will find water.' He should have said, When we find water, then settlers can come.'

Questions 1-4

Complete the table below.
Choose NO MORE THAN THREE WORDS from the passage for each answer.

Nubian Sandstone Aquifer system	
Extent	1..... 375,000 km^3 of water
Formation	The majority of the 2.....between 50,000 and 20,000 years ago
Flow	water moves only 3..... a day in most places
Depth	The 4 .....of the formation is 1,800 metres deep.

Questions 5-12

Reading Passage 1 has eight paragraphs, *A-H.*

Which paragraph contains the following information?

Write the correct letter, A-H, next to Questions 5-12.

5 dating the age of the water
6 understanding underground water through studying isotopes
7 the process of water collection
8 review of the likelihood of conflict
9 the importance of water for North-Saharan countries
10 layers of porous rock holding water under the desert
11 attention to the needs of local people
12 cross-country project for the use of water

READING PASSAGE 2

Ton *should spend about 20 minutes on Questions 13-27, which are based on Reading Passage 2 below.*

High intensity training

Endurance vs intensity

The traditional view of exercise is that more is better. But now a new form of exercise is challenging the old view and causing debate between traditionalists and proponents of a new form of exercise, High Intensity Training (HIT). Current recommendations from the US Department of Health and Human Services say adults aged between 16 and 64 should take two kinds of exercise every week: aerobic and muscle-strengthening. Aerobic exercise covers activities that make you breathe harder and your heart beat faster - activities such as walking quickly, swimming or playing a relaxed game of tennis. Muscle-strengthening exercises work all the major muscle groups in a person's body - legs, hips, back, chest, abdomen, shoulders and arms. The US Department of Health and Human Services recommends that adults do two hours and thirty minutes of moderate-intensity aerobic activity per week and muscle strengthening activities on at least two days per week. A lot of people, perhaps understandably, never meet these targets, usually citing lack of time as the main reason.

However, a recent study has removed the old excuse. Professor Martin Gibala, from Canada's McMaster University, has published research in the Journal of Physiology that shows doing less exercise can be more effective than time-consuming periods of aerobic and muscle-strengthening activities. High Intensity Training is very simple: it involves a warm-up period followed by a short burst of intense activity, usually 30 seconds to one minute, then a recovery period where you exercise at a gentler pace for a couple of minutes, then another short period of high-energy activity. After a second recovery phase, there is more energy-intensive exercise before slowing down for a while, then stopping. That's all your exercise for the day. This cycle of warm up / intense activity / recovery / intense activity, etc can be applied to a variety of sports such as cycling, jogging and swimming.

How does it work?

There are a number of different explanations as to why HIT seems to be more effective than endurance exercise. Firstly, exercising at low intensity only bums calories while you are active so that the minute you stop, you also stop burning calories. In contrast, high-intensity exercise continues to work on your metabolism a long time after you have finished - and this can be up to 24 hours later - so that

you continue burning calories for longer. Secondly, HIT builds your muscles, replacing fat with muscle mass. The third theory is that the sprint-and-recover cycle doesn't give the body the chance to store energy in the same way as training over a long period: the body needs to use all the energy in one go rather than maintain the same energy level over a longer period and still being able to reserve some as fat. The final theory is HIT combines both aerobic and muscle-strengthening activities and uses many more muscles than regular exercise - up to 80% of the muscles in the body, compared with up to 40% for moderate jogging or cycling.

There have been numerous experiments into HIT. In one conducted by a team from the University of Colorado led by Kyle Sevits, five male volunteers were tested to measure the number of calories a typical HIT workout bums. The volunteers, aged between 25 and 31, were tested to make sure their hearts were healthy, and their body composition and resting metabolic rates were measured. The participants ate a specific diet, then taken to a hospital room where researchers were able to control the air intake and determine the oxygen, carbon dioxide and water content of the air. Through these indices researchers were able to measure how many calories the volunteers burned. While each person lived in the room, they were kept on their strict diet and could only watch TV or use a computer. However, on one day they were asked to participate in HIT on a gym bike, pedaling as fast as they could for five 30-second periods with four-minute recovery periods between. The results were startling: the volunteers burned an average of an extra 200 calories on the workout day in spite of doing high-intensity activity for just 2.5 minutes. Other experiments have revealed similar results. In Japan, a team from the National Institute of Fitness and Sport separated individuals into two groups. The first group trained five days a week over six weeks, taking an hour of moderate-intensity exercise per day, totally five hours per week. The oxygen intake of this group improved by an average of 9%. The second group's training sessions were eight 20-second intense workouts followed by ten seconds of rest. Their oxygen intake improved by 15%.

Benefits to health

Good oxygen intake is a sign of a healthy adult but the workout routine has shown

other health benefits in diabetes. Scientists at Herriot Watt University in Edinburgh found that short bursts of high-intensity activity every few days reduced the risk of contracting diabetes due to the beneficial effects on blood sugar. Similarly, a study in 2011 by Professor Gibala found that insulin sensitivity improved by 35% after just two weeks, which is important in enabling glucose digested from food to get to our cells and provide energy. Endurance is also increased: one study in 2006 found that eight weeks of doing high-intensity workouts meant subjects could exercise twice as long as they could before the study, while maintaining the same pace. Additionally, HIT increases the fat burnt and sustains more muscle. Finally, HIT stimulates production of human growth hormone (HGH) by up to 450% during the 24 hours after the workout has finished. HGH - is not only responsible for increased calorie burning but also slows down the ageing process. It seems that HIT could keep US fitter and younger for longer.

Questions 13-17

Do the following statements agree with the information given in Reading Passage 2?
Write

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

13 The traditional view of exercise questions the effectiveness of long periods of activity.

14 Aerobic exercise includes tennis, walking and football.

15 Many people fail to do the recommended amount of exercise.

16 Some now believe that being active for shorter periods is better for our health,

17 HIT involves a 10-minute cool-down period.

Questions 18-22

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

18 Low-intensity activity

A bums calories after you stop.

B lets the body store fat.

C doesn't take much time.

D uses all the body's energy reserves.

19 High-intensity training

A retains both muscle and fat tissue.

B is only good for muscle-building.

C makes use of under half of our muscles.

D is done in cycles of rest and activity.

20 In one experiment, participants

A were all middle aged.

B were slightly unhealthy.

c ate a high-fibre diet.

D were kept in a controlled environment.

21 Researchers measured

A the air intake.

B how much TV they watched.

c how fast they pedalled.

D how much energy they used.

22 In the Japanese experiment

A there were two groups of men.

B the groups trained simultaneously.

C scientists measured the amount of oxygen used in training,

D both groups had intensive training sessions.

Questions 23-27

Complete the text below.

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

A study has found that HIT 23..... the chance of getting diabetes. Another study found that HIT improves 24..... enabling individuals to exercise for longer periods while 25..... a similar pace. More fat is 26..... and the 27 ..... of human growth hormone increases enormously.

READING PASSAGE 3

You should spend about 20 minutes on Questions 28-40, which are based on Reading Passage 3 on the following pages.

Questions 28-32

Passage 3 has six paragraphs, A-F.

Choose the correct heading for paragraphs B-F from the list below.

Write the correct number, I - IX. next to Questions 28-32.

List of Headings

i. The collapse of the Neanderthal population
ii. The origin of modern humans
iii. Humanity's prehistoric mother
iv. Routes out of Africa
v. Attributes of humans and Neanderthals
vi. The human migration
vii. What did Neanderthals look Like?
viii. The diversity of African populations
ix. Tracing back our DNA

Example	Answer
Paragraph A	ii

28 Paragraph B

29 Paragraph C

30 Paragraph D

31 Paragraph E

32 Paragraph F

A Among prehistoric archeologists, Ksar Aqil has an almost mythical status, but the site is little known outside professional circles. The migration of modern humans out of Africa and the Near East's position as a bridge between continents and cultures, as well as nearly a century of scientific research, are all woven into the story of Ksar Aqil. Current perspectives on human evolution and mankind's colonization of the globe are based upon fossil evidence, as well as excavated artifacts and biogenetic data. These lines of inquiry indicate a relatively recent evolution of modern humans, *Homo sapiens sapiens,* in Africa about 200,000 years ago.

B The latest, and arguably most powerful, analytical tool available to those investigating human origins comes from molecular biology. Geneticists have found that examination of the DNA from tiny structures inside the cell, called mitochondria, provided a means to measure human biogenetic relationships on a time scale spanning hundreds of thousands of years. Mitochondria, also known as the powerhouse of the cell because they generate chemical energy, possess their own genome, and mitochondrial DNA (mtDNA) is inherited exclusively from the mother. Dramatic results released in 1987 by researchers at the University of California at Berkley indicated that all mtDNA present in people today stems from a single female who lived about 200,000 years ago in Africa. This woman was called "Mitochondrial Eve," the genetic mother of all of earth's present-day population.

C Tens of thousands of years before Beirut became a meeting place of East and West, the Levantine coastal strip and the Arabian Peninsula to the south were corridors through which our common ancestors moved out of Africa and into Asia, Europe, Australia and, lastly, the Americas. The region also has the distinction of being a place where Neanderthals *(Homo sapiens neanderthalensis)* and our immediate ancestors coexisted and indeed interbred. Although the evolutionary split between Neanderthals and the ancestors of modern humans occurred sometime between 440,000 and 270,000 years ago, according to research, a little Neanderthal DNA, between one and four per cent, exists in all peoples alive today, except for those in Africa. It is probable that our Neanderthal heritage resulted from interbreeding that happened in the Near East

sometime between 80,000 and 45,000 years ago.

D According to proponents of the "out of Africa" theory, the exodus of anatomically modem humans probably occurred in waves. One early migration into the Near East occurred prior to 130,000 years ago, and an examination of a modern map of the Horn of Africa and adjacent parts of Arabia shows there are two obvious routes this migration could have taken. One involves crossing from northern Egypt into the Sinai Peninsula, the other crosses the Bab el-Mandab strait to reach modern-day Yemen, perhaps by watercraft. It is likely that both these routes were taken at different times, as they were navigable, presented no significant hazards and were frequented by the animals our early ancestors tracked and hunted. Given the geographic position of the Near East as a bridge between Europe and Asia, this region formed the trunk through which our family tree branched out from its African roots, both geographically and genetically. When modern humans entered the area over 130,000 years ago, the Neanderthals were in residence, and it seems they curtailed the extent of the newcomers' settlement for a while. When another wave of modern humans began migrating from Africa about 50,000 years ago, perhaps due to population pressure on resources and territory, our ancestors ultimately became the sole inhabitants of places like Ksar Aqil.

E If this contest had been based on physical strength alone, the Neanderthals would have won hands down. Modern humans, however, had developed cognitive, physical and cultural abilities that provided an advantage, ultimately leading to the Neanderthals being relegated to geographically marginalized refugees. Neanderthals differed from modern humans in a number of ways, perhaps most noticeably in their skull anatomy, which featured a sloped forehead, a large projection at the back of the skull called an occipital bun, pronounced eyebrow ridges, and no chin. Physically robust and more powerfully built than our ancestors, their massive but relatively short stature was more efficient in cold climates like Europe's. In common with modern humans, they possessed a gene essential for language development, and some paleoanthropologists believe they were capable of complex speech patterns. The Neanderthals apparently were not suited to activities like long-distance running. The energy cost of locomotion was apparently 32 per cent higher in Neanderthals, resulting in a daily dietary requirement between 100 and 350 calories greater than that of modern humans living in similar environmental settings. Our ancestors may, therefore, have had a competitive edge simply by being more fuel-efficient.

F What exactly happened to the Neanderthals no one knows. Modern peoples migrating into Southwest Asia and on to Europe may have displaced them. Undoubtedly, contact led to a variety of interactions, some clearly resulting in

opportunities for interbreeding, others involving physical conflict and competition for resources. The Neanderthals' demise may also have been linked to rapid climatic swings between 50,000 and 30,000 years ago, which created further pressure on their already divided and isolated populations.

Questions 33—39

Classify the following as typical of

A Neanderthals

B *humans*

C *both*

Write the correct letter, A, B or C next to Questions 33-39.

33 the ability to develop language

34 the absence of one particular facial feature

35 the ability to run long distances

36 needing to consume lots of calories

37 greater physical strength

38 being small in height

39 making up at least 96% of our genes

Question 40

What is the best title for Reading Passage 3?

Choose the correct letter, A, B or C.

A The decline of Neanderthal man

B The site where humans and Neanderthals met and mixed

C The migration of humans into Europe