SECTION 1 Questions 1–13

*You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.*

"For the strength of the pack is the wolf, and the strength of the wolf is the pack."

– Rudyard Kipling, The Law for the Wolves

A wolf pack is an extremely well-organised family group with a well-defined social structure and a clear-cut code of conduct. Every wolf has a certain place and function within the pack and every member has to do its fair share of the work. The supreme leader is a very experienced wolf – the *alpha* – who has dominance over the whole pack. It is the protector and decision-maker and directs the others as to where, when and what to hunt. However, it does not lead the pack into the hunt, for it is far too valuable to risk being injured or killed. That is the responsibility of the *beta* wolf, who assumes second place in the hierarchy of the pack. The beta takes on the role of enforcer – fighter or 'tough guy'– big, strong and very aggressive. It is both the disciplinarian of the pack and the alpha's bodyguard.

The *tester*, a watchful and distrustful character, will alert the alpha if it encounters anything suspicious while it is scouting around looking for signs of trouble. It is also the quality controller, ensuring that the others are deserving of their place in the pack. It does this by creating a situation that tests their bravery and courage, by starting a fight, for instance. At the bottom of the social ladder is the *omega* wolf, subordinate and submissive to all the others, but often playing the role of peacemaker by intervening in an intra-pack squabble and defusing the situation by clowning around. Whereas the tester may create conflict, the omega is more likely to resolve it.

The rest of the pack is made up of mid- to low-ranking non-breeding adults and the immature offspring of the alpha and its mate. The size of the group varies from around six to ten members or more, depending on the abundance of food and numbers of the wolf population in general.

Wolves have earned themselves an undeserved reputation for being ruthless predators and a danger to humans and livestock. The wolf has been portrayed in fairy tales and folklore as a very bad creature, killing any people and other animals it encounters. However, the truth is that wolves only kill to eat, never kill more than they need, and rarely attack humans unless their safety is threatened in some way. It has been suggested that hybrid wolf-dogs or wolves suffering from rabies are actually responsible for many of the historical offences as well as more recent incidents.

Wolves hunt mainly at night. They usually seek out large herbivores, such as deer, although they also eat smaller animals, such as beavers, hares and rodents, if these are obtainable. Some wolves in western Canada are known to fish for salmon. The alpha wolf picks out a specific animal in a large herd by the scent it leaves behind. The prey is often a very young, old or injured animal in poor condition. The alpha signals to its hunters which animal to take down and when to strike by using tail movements and the scent from a gland at the tip of its spine above the tail.

Wolves kill to survive. Obviously, they need to eat to maintain strength and health but the way they feast on the prey also reinforces social order. Every member of the family has a designated spot at the carcass and the alpha directs them to their places through various ear postures: moving an ear forward, flattening it back against the head or swivelling it around. The alpha wolf eats the prized internal organs while the beta is entitled to the muscle-meat of the rump and thigh, and the omega and other low ranks are assigned the intestinal contents and less desirable parts such as the backbone and ribs.

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The rigid class structure in a wolf pack entails frequent displays of supremacy and respect. When a higher-ranking wolf approaches, a lesser-ranking wolf must slow down, lower itself, and pass to the side with head averted to show deference; or, in an extreme act of passive submission, it may roll onto its back, exposing its throat and belly. The dominant wolf stands over it, stiff-legged and tall, asserting its superiority and its authority in the pack.

Questions 1–6

Classify the following statements as referring to

A the alpha wolf

B the beta wolf

C the tester wolf

D the omega wolf

*Write the correct letter, **A**, **B**, **C** or **D** in boxes 1–6 on your answer sheet.*

NB You may use any letter more than once.

- **1** It is at the forefront of the pack when it makes a kill. ____
- **2** It tries to calm tensions and settle disputes between pack members. ____
- **3** It is the wolf in charge and maintains control over the pack. ____
- **4** It warns the leader of potential danger. ____
- **5** It protects the leader of the pack. ____
- **6** It sets up a trial to determine whether a wolf is worthy of its status in the pack. ____

Questions 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 agrees with the information*

FALSE *if the statement contradicts the information*

NOT GIVEN *if there is no information on this*

- **7** Wolves are a constant danger to humans. ____
- **8** Crossbred wolves or sick wolves are most likely to blame for attacks on people. ____
- **9** Canadian wolves prefer to eat fish, namely salmon. ____
- **10** The wolf pack leader identifies a particular target for attack by its smell. ____
- **11** When wolves attack a herd, they go after the healthiest animal. ____
- **12** The piece of a dead animal that a wolf may eat depends on its status in the pack. ____
- **13** A low-ranking wolf must show submission or the dominant wolf will attack it. ____

SECTION 2 Questions 14–27

*You should spend about 20 minutes on **Questions 14–27**, which are based on Reading Passage 2 below.*

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Green virtues of green sand

Revolution in gloss recycling could help keep water clean

A For the past 100 years special high grade white sand, dug from the ground at Leighton Buzzard in the UK, has been used to filter tap water to remove bacteria and impurities – but this may no longer be necessary. A new factory that turns used wine bottles into green sand could revolutionise the recycling industry and help to filter Britain's drinking water. Backed by $1.6m from the European Union and the Department for Environment, Food and Rural Affairs (Defra), a company based in Scotland is building the factory, which will turn beverage bottles back into the sand from which they were made in the first place. The green sand has already been successfully tested by water companies and is being used in 50 swimming pools in Scotland to keep the water clean.

B The idea is not only to avoid using up an increasingly scarce natural resource, sand, but also to solve a crisis in the recycling industry. Britain uses 5.5m tonnes of glass a year, but recycles only 750,000 tonnes of it. The problem is that half the green bottle glass in Britain is originally from imported wine and beer bottles. Because there is so much of it, and it is used less in domestic production than other types, green glass is worth only $25 a tonne. Clear glass, which is melted down and used for whisky bottles, mainly for export, is worth double that amount.

C Howard Dryden. a scientist and managing director of the company. Dryden Aqua, of Bonnyrigg, near Edinburgh, has spent six years working on the product he calls Active Filtration Media, or AFM. He concedes that he has given what is basically recycled glass a 'fancy name' to remove the stigma of what most people would regard as an inferior product. He says he needs bottles that have already contained drinkable liquids to be sure that drinking water filtered through the AFM would not be contaminated. Crushed down beverage glass has fewer impurities than real sand and it performed better in trials. 'The fact is that tests show that AFM does the job better than sand, it is easier to clean and reuse and has all sorts of properties that make it ideal for other applications.' he claimed.

D The factory is designed to produce 100 tonnes of AFM a day, although Mr. Dryden regards this as a large-scale pilot project rather than full production. Current estimates of the UK market for this glass for filtering drinking water, sewage, industrial water, swimming pools and fish farming are between 175,000 to 217,000 tonnes a year, which will use up most of the glass available near the factory. So he intends to build five or six factories in cities where there are large quantities of bottles, in order to cut down on transport costs.

E The current factory will be completed this month and is expected to go into full production on January 14th next year. Once it is providing a 'regular' product, the government's drinking water inspectorate will be asked to perform tests and approve it for widespread use by water companies. A Defra spokesman said it was hoped that AFM could meet approval within six months. The only problem that they could foresee was possible contamination if some glass came from sources other than beverage bottles.

F Among those who have tested the glass already is Caroline Fitzpatrick of the civil and environmental engineering department of University College London. 'We have looked at a number of batches and it appears to do the job.' she said. 'Basically, sand is made of glass and Mr. Dryden is turning bottles back into sand. It seems a straightforward idea and there is no reason we can think of why it would not work. Since glass from wine bottles and other beverages has no impurities and clearly did not leach any substances into the contents of the bottles, there was no reason to believe there would be a problem,' Dr. Fitzpatrick added.

G Mr Dryden has set up a network of agents round the world to sell AFM. It is already in use in central America to filter water on banana plantations where the fruit has to he washed before being despatched to European

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markets. It is also in use in sewage works to filter water before it is returned to rivers, something which is becoming legally necessary across the European Union because of tighter regulations on sewage works. So there are a great number of applications involving cleaning up water. Currently, however, AFM costs $670 a tonne, about four times as much as good quality sand. 'But that is because we haven't got large-scale production. Obviously, when we get going it will cost a lot less, and be competitive with sand in price as well,' Mr. Dryden said. 'I believe it performs better and lasts longer than sand, so it is going to be better value too.'

H If AFM takes off as a product it will be a big boost for the government agency which is charged with finding a market for recycled products. Crushed glass is already being used in road surfacing and in making tiles and bricks. Similarly. AFM could prove to have a widespread use and give green glass a cash value.

Questions 14–23

*Reading Passage 2 has 8 paragraphs, **A–H**.*

Which paragraph contains the following information?

*Write the correct letter, **A–H**, in boxes 14–23 on your answer sheet.*

NB You may use any letter more than once.

- **14** a description of plans to expand production of AFM
- **15** the identification of a potential danger in the raw material for AFM
- **16** an example of AFM use in the export market
- **17** a comparison of the value of green glass and other types of glass
- **18** a list of potential applications of AFM in the domestic market
- **19** the conclusions drawn from laboratory checks on the process of AFM production
- **20** identification of current funding for the production of green sand
- **21** an explanation of the chosen brand name for crushed green glass
- **22** a description of plans for exporting AFM
- **23** a description of what has to happen before AFM is accepted for general use

Questions 24-27

Complete the summary below.

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

Write your answers in boxes 24-27 on your answer sheet.

Green sand

The use of crushed green glass (AFM) may have two significant impacts: it may help to save a diminishing **24** while at the same time solving a major problem for the **25** in the UK. However, according to Howard Dryden, only glass from bottles that have been used for **26** can be used in the production process. AFM is more effective than **27** as a water filter, and also has other uses.

SECTION 3 Questions 28–40

*You should spend about 20 minutes on **Questions 28–40**, which are based on Reading Passage 3 below.*

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Environmental medicine

– also called conservation medicine, ecological medicine, or medical geology –

A In simple terms, environmental medicine deals with the interaction between human and animal health and the environment. It concerns the adverse reactions that people have on contact with or exposure to an environmental excitant. Ecological health is its primary concern, especially emerging infectious diseases and pathogens from insects, plants and vertebrate animals.

B Practitioners of environmental medicine work in teams involving many other specialists. As well as doctors, clinicians and medical researchers, there may be marine and climate biologists, toxicologists, veterinarians, geospatial and landscape analysts, even political scientists and economists. This is a very broad approach to the rather simple concept that there are causes for all illnesses, and that what we eat and drink or encounter in our surroundings has a direct impact on our health.

C Central to environmental medicine is the total load theory developed by the clinical ecologist Theron Randolph, who postulated that illness occurs when the body's ability to detoxify environmental excitants has reached its capacity. His wide-ranging perception of what makes up those stimuli includes chemical, physical, biological and psychosocial factors. If a person with numerous and/or chronic exposures to environmental chemicals suffers a psychological upset, for example, this could overburden his immune system and result in actual physical illness. In other words, disease is the product of multiple factors.

D Another Randolph concept is that of individual susceptibility or the variability in the response of individuals to toxic agents. Individuals may be susceptible to any number of excitants but those exposed to the same risk factors do not necessarily develop the same disease, due in large part to genetic predisposition; however, age, gender, nutrition, emotional or physical stress, as well as the particular infectious agents or chemicals and intensity of exposure, all contribute.

E Adaptation is defined as the ability of an organism to adjust to gradually changing circumstances of its existence, to survive and be successful in a particular environment. Dr Randolph suggested that our bodies, designed for the Stone Age, have not quite caught up with the modern age and consequently, many people suffer diseases from maladaptation, or an inability to deal with some of the new substances that are now part of our environment. He asserted that this could cause exhaustion, irritability, depression, confusion and behavioural problems in children. Numerous traditional medical practitioners, however, are very sceptical of these assertions.

F Looking at the environment and health together is a way of making distant and nebulous notions, such as global warming, more immediate and important. Even a slight rise in temperature, which the world is already experiencing, has immediate effects. Mosquitoes can expand their range and feed on different migratory birds than usual, resulting in these birds transferring a disease into other countries. Suburban sprawl is seen as more than a socioeconomic problem for it brings an immediate imbalance to the rural ecosystem, increasing population density so people come into closer contact with disease- carrying rodents or other animals. Deforestation also displaces feral animals that may then infect domesticted animals, which enter the food chain and transmit the disease to people. These kinds of connections are fundamental to environmental medicine and the threat of zoonotic disease looms larger.

G Zoonoses, diseases of animals transmissible to humans, are a huge concern. Different types of pathogens, including bacteria, viruses, fungi and parasites, cause zoonoses. Every year, millions of people worldwide get sick because of foodborne bacteria such as salmonella and campylobacter, which cause fever, diarrhoea and abdominal pain. Tens of thousands of people die from the rabies virus after being bitten by rabid animals like

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dogs and bats. Viral zoonoses like avian influenza (bird flu), swine flu (H1N1 virus) and Ebola are on the increase with more frequent, often uncontainable, outbreaks. Some animals (particularly domestic pets) pass on fungal infections to humans. Parasitic infection usually occurs when people come into contact with food or water contaminated by animals that are infected with parasites like cryptosporidium, trichinella, or worms.

H As the human population of the planet increases, encroaching further on animal domains and causing ecological change, inter-professional cooperation is crucial to meet the challenges of dealing with the effects of climate change, emergent cross-species pathogens, rising toxicity in air, water and soil, and uncontrolled development and urbanisation. This can only happen if additional government funds are channelled into the study and practice of environmental medicine.

Questions 28–33

*Reading Passage 2 has 8 paragraphs, **A–H**.*

Which paragraph contains the following information?

*Write the correct letter, **A–H**, in boxes 28–33 on your answer sheet.*

- **28** an explanation of how population expansion exposes humans to disease [ ]
- **29** the idea that each person can react differently to the same risk factors [ ]
- **30** types of disease-causing agents that move between species [ ]
- **31** examples of professionals working in the sphere of environmental medicine [ ]
- **32** a definition of environmental medicine [ ]
- **33** how ill health results from an accumulation of environmental stressors [ ]

Questions 34–40

Complete the summary below.

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

Write your answers in boxes 34–40 on your answer sheet.

- **34** According to Dr Randolph, people get sick because of [ ] – in other words,
- **35** Vague, far-off concepts like global warming are made more urgent when [ ] are studied together.
- **36** Rising temperatures result in more widespread distribution of disease because some insects are able to [ ] .
- **37** Large-scale removal of trees forces wildlife from their habitat and brings them into contact with [ ] .
- **38** Uncontrollable [ ] of zoonotic viruses are becoming more numerous.
- **39** Collaboration between many disciplines is needed to confront the problems of urban development, pollution, [ ] and new pathogens.
- **40** Environmental medicine should receive more [ ] to help it meet future demands.

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