PASSAGE 1

Questions 1–7

The reading passage has seven paragraphs, ***A–G****.*
Choose the correct heading for paragraphs ***A–G*** *from the list below.*
Write the correct number, ***i–x****, in boxes* ***1–7*** *on your answer sheet.*

List of Headings		List of paragraphs	
i	The positive correlation between climate and wealth	**1**	Paragraph **A**
ii	Other factors besides climate that influence wealth	**2**	Paragraph **B**
iii	Inspiration from reading a book	**3**	Paragraph **C**
iv	Other researchers' results do not rule out exceptional cases	**4**	Paragraph **D**
		5	Paragraph **E**
v	different attributes between Eurasia and Africa	**6**	Paragraph **F**
vi	Low temperature benefits people and crops	**7**	Paragraph **G**
vii	The importance of institution in traditional views.		
viii	The spread of crops in Europe, Asia and other places		
ix	The best way to use aid		
x	Confusions and exceptional		

WEALTH IN A COLD CLIMATE

A

Dr William Masters was reading a book about mosquitoes when inspiration struck. "There was this anecdote about the great yellow fever epidemic that hit Philadelphia in 1793," Masters recalls. "This epidemic decimated the city until the first frost came." The inclement weather froze out the insects, allowing Philadelphia to recover.

B

If weather could be the key to a city's fortunes, Masters thought, then why not to the historical fortunes of nations? And could frost lie at the heart of one of the most enduring economic mysteries of all — why are almost all the wealthy, industrialised nations to be found at latitudes above 40 degrees? After two years of research, he thinks that he has found a piece of the puzzle. Masters, an agricultural economist from Purdue University in Indiana, and Margaret McMillan at Tufts University, Boston, show that annual frosts are among the factors that distinguish rich nations from poor ones. Their study is published this month in the Journal of Economic Growth. The pair speculates that cold snaps have two main benefits — they freeze pests that would otherwise destroy crops, and also freeze organisms, such as mosquitoes, that carry disease. The result is agricultural abundance a big workforce.

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C

The academics took two sets of information. The first was average income for countries, the second climate data from the University of East Anglia. They found a curious tally between the sets. Countries having five or more frosty days a month are uniformly rich; those with fewer than five are impoverished. The authors speculate that the five-day figure is important; it could be the minimum time needed to kill pests in the soil. Masters says: "For example, Finland is a small country that is growing quickly, but Bolivia is a small country that isn't growing at all. Perhaps climate has something to do with that." In fact, limited frosts bring huge benefits to farmers. The chills kill insects or render them inactive; cold weather slows the break-up of plant and animal material in the soil, allowing it to become richer; and frosts ensure a build-up of moisture in the ground for spring, reducing dependence on seasonal rains. There are exceptions to the "cold equals rich" argument. There are well-heeled tropical countries such as Hong Kong and Singapore (both city-states, Masters notes), a result of their superior trading positions. Likewise, not all European countries axe moneyed — in the former communist colonies, economic potential was crushed by politics.

D

Masters stresses that climate will never be the overriding factor — the wealth of nations is too complicated to be attributable to just one factor. Climate, he feels, somehow combines with other factors — such as the presence of institutions, including governments, and access to trading routes — to determine whether a country will do well. Traditionally, Masters says, economists thought that institutions had the biggest effect on the economy, because they brought order to a country in the form of, for example, laws and property rights. With order, so the thinking went, came affluence. "But there are some problems that even countries with institutions have not been able to get around," he says. "My feeling is that, as countries get richer, they get better institutions. And the accumulation of wealth and improvement in governing institutions are both helped by a favourable environment, including climate."

E

This does not mean, he insists, that tropical countries are beyond economic help and destined to remain penniless. Instead, richer countries should change the way in which foreign aid is given. Instead of aid being geared towards improving governance, it should be spent on technology to improve agriculture and to combat disease. Masters cites one example: "There are regions in India that have been provided with irrigation — agricultural productivity has gone up and there has been an improvement in health." Supplying vaccines against tropical diseases and developing crop varieties that can grow in the tropics would break the poverty cycle.

F

Other minds have applied themselves to the split between poor and rich nations, citing anthropological, climatic and zoological reasons for why temperate nations are the most

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affluent. In 350BC, Aristotle observed that "those who live in a cold climate… are full of spirit". Jared Diamond, from the University of California at Los Angeles, pointed out in his book Guns, Germs and Steel that Eurasia is broadly aligned east-west, while Africa and the Americas are aligned north-south. So, in Europe, crops can spread quickly across latitudes because climates are similar. One of the first domesticated crops, einkorn wheat, spread quickly from the Middle East into Europe; it took twice as long for corn to spread from Mexico to what is now the eastern United States. This easy movement along similar latitudes in Eurasia would also have meant a faster dissemination of other technologies such as the wheel and writing, Diamond speculates. The region also boasted domesticated livestock, which could provide meat, wool and motive power in the fields. Blessed with such natural advantages, Eurasia was bound to take off economically.

G

John Gallup and Jeffrey Sachs, two US economists, have also pointed out striking correlations between the geographical location of countries and their wealth. They note that tropical countries between 23.45 degrees north and south of the equator are nearly all poor. In an article for the Harvard International Review, they concluded that "development surely seems to favour the temperate-zone economies, especially those in the northern hemisphere, and those that have managed to avoid both socialism and the ravages of war". But Masters cautions against geographical determinism, the idea that tropical countries are beyond hope: "Human health and agriculture can be made better through scientific and technological research," he says, "so we shouldn't be writing off these countries. Take Singapore: without air conditioning, it wouldn't be rich."

Questions 21-26

Complete the following summary of the paragraphs of Reading Passage 1.
*Using **NO MORE THAN TWO WORDS** from the Passage for each answer.*
*Write your answers in boxes **8–13** on your answer sheet.*

Dr William Masters read a book saying that a(an) **8** ..... epidemic which struck an American city hundreds of years ago was terminated by a cold frost. And academics found that there is a connection between climate and country's wealth as in the rich but small country of **9** ..... . Yet besides excellent surroundings and climate, one country still needs to improve their **10** ..... to achieve long prosperity.

Thanks to resembling weather conditions across latitude in the continent of **11** ....., crops such as **12** ..... is bound to spread faster than from South America to the North. Other researchers also noted that even though geographical factors are important, tropical country such as **13** ..... still became rich due to scientific advancement.

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PASSAGE 2

Two Wings And A Toolkit

Betty and her mate Abel are captive crows in the care of Alex Kacelnik, an expert in animal behaviour at Oxford University. They belong to a forest-dwelling species of bird {Corvus rnoneduloides) confined to two islands in the South Pacific. New Caledonian crows are tenacious predators, and the only birds that habitually use a wide selection of self-made tools to find food.

One of the wild crows' cleverest tools is the crochet hook, made by detaching a side twig from a larger one, leaving enough of the larger twig to shape into a hook. Equally cunning is a tool crafted from the barbed vine-leaf, which consists of a central rib with paired leaflets each with a rose-like thorn at its base. They strip out a piece of this rib, removing the leaflets and all but one thorn at the top, which remains as a ready-made hook to prise out insects from awkward cracks.

The crows also make an ingenious tool called a padanus probe from padanus tree leaves. The tool has a broad base, sharp tip, a row of tiny hooks along one edge, and a tapered shape created by the crow nipping and tearing to form a progression of three or four steps along the other edge of the leaf. What makes this tool special is that they manufacture it to a standard design, as if following a set of instructions. Although it is rare to catch a crow in the act of clipping out a padanus probe, we do have ample proof of their workmanship: the discarded leaves from which the tools are cut. The remarkable thing that these 'counterpart' leaves tell us is that crows consistently produce the same design every time, with no in-between or trial versions. It's left the researchers wondering whether, like people, they envisage the tool before they start and perform the actions they know are needed to make it. Research has revealed that genetics plays a part in the less sophisticated toolmaking skills of finches in the Galapagos islands. No one knows if that's also the case for New Caledonian crows, but it's highly unlikely that their toolmaking skills are hardwired into the brain. 'The picture so far points to a combination of cultural transmission - from parent birds to their young - and individual resourcefulness,' says Kacelnik.

In a test at Oxford, Kacelnik's team offered Betty and Abel an original challenge - food in a bucket at the bottom of a 'well'. The only way to get the food was to hook the bucket out by its handle. Given a choice of tools - a straight length of wire and one with a hooked end - the birds immediately picked the hook, showing that they did indeed understand the functional properties of the tool.

But do they also have the foresight and creativity to plan the construction of their tools? It appears they do. In one bucket-in-the-well test, Abel carried off the hook, leaving Betty with nothing but the straight wire. 'What happened next was absolutely amazing,' says Kacelnik. She wedged the tip of the wire into a crack in a plastic dish and pulled the other end to

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fashion her own hook. Wild crows don't have access to pliable, bendable material that retains its shape, and Betty's only similar experience was a brief encounter with some pipe cleaners a year earlier. In nine out of ten further tests, she again made hooks and retrieved the bucket.

The question of what's going on in a crow's mind will take time and a lot more experiments to answer, but there could be a lesson in it for understanding our own evolution. Maybe our ancestors, who suddenly began to create symmetrical tools with carefully worked edges some 1.5 million years ago, didn't actually have the sophisticated mental abilities with which we credit them. Closer scrutiny of the brains of New Caledonian crows might provide a few pointers to the special attributes they would have needed. 'If we're lucky we may find specific developments in the brain that set these animals apart,' says Kacelnik.

One of these might be a very strong degree of laterality - the specialisation of one side of the brain to perform specific tasks. In people, the left side of the brain controls the processing of complex sequential tasks, and also language and speech. One of the consequences of this is thought to be right-handedness. Interestingly, biologists have noticed that most padanus probes are cut from the left side of the leaf, meaning that the birds clip them with the right side of their beaks - the crow equivalent of right- handedness. The team thinks this reflects the fact that the left side of the crow's brain is specialised to handle the sequential processing required to make complex tools.

Under what conditions might this extraordinary talent have emerged in these two species? They are both social creatures, and wide-ranging in their feeding habits. These factors were probably important but, ironically, it may have been their shortcomings that triggered the evolution of toolmaking. Maybe the ancestors of crows and humans found themselves in a position where they couldn't make the physical adaptations required for survival - so they had to change their behaviour instead. The stage was then set for the evolution of those rare cognitive skills that produce sophisticated tools. New Caledonian crows may tell us what those crucial skills are.

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Questions 14–17

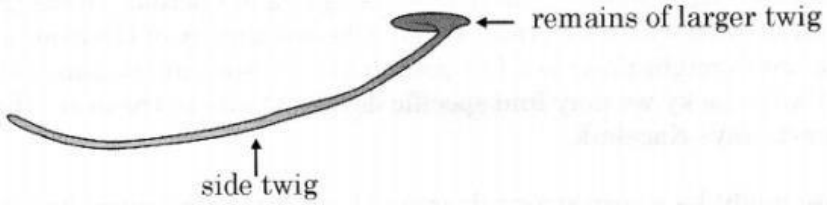
Label the diagrams below.

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

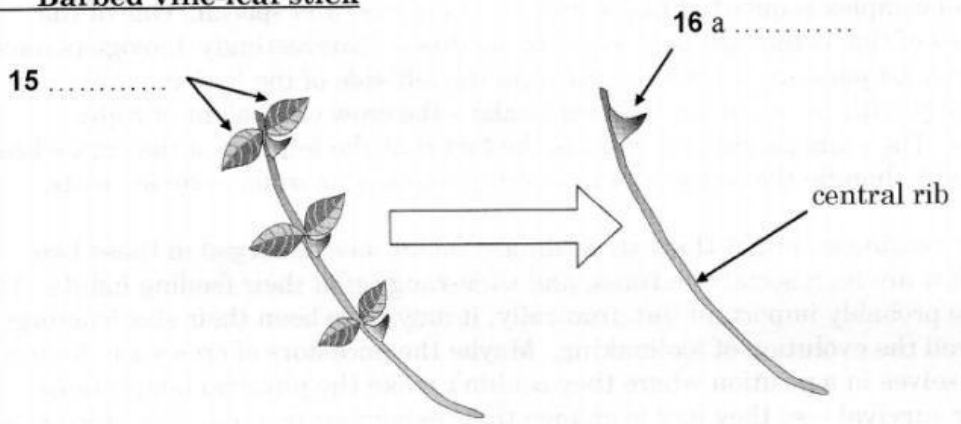
*Write your answers in boxes **14–17** on your answer sheet.*

THREE TOOLS MADE BY CROWS

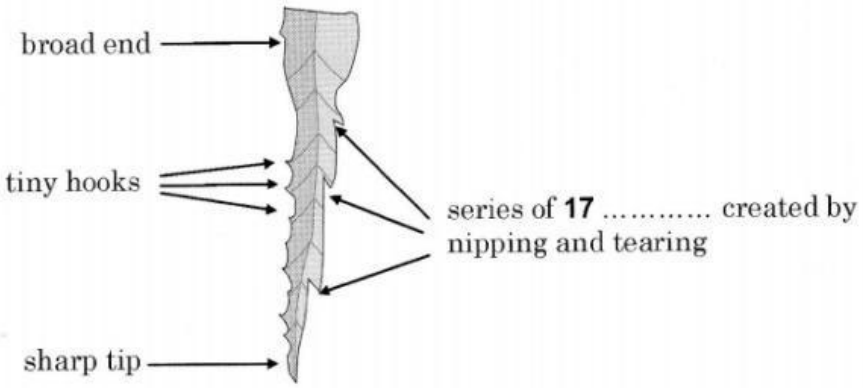
a) **14** .....



b) **Barbed vine-leaf stick**



c) **Padanus probe**



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Questions 18–23

*Do the following statements agree with the information given in Reading Passage 2? In boxes **18–23** 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*

18 There appears to be a fixed pattern tor the padanus probe's construction.
19 There is plenty of evidence to indicate how the crows manufacture the padanus probe.
20 Crows seem to practise a number of times before making a usable padanus probe.
21 The researchers suspect the crows have a mental image of the padanus probe before they create it.
22 Research into how the padanus probe is made has helped to explain the toolmaking skills of many other bird species.
23 The researchers believe the ability to make the padanus probe is passed down to the crows in their genes.

Questions 24–26

*Choose **THREE** letters, **A–G**.*

According to the information in the passage, which **THREE** of the following features are probably common to both New Caledonian crows and human beings?

A keeping the same mate for life
B having few natural predators
C having a bias to the right when working
D being able to process sequential tasks
E living in extended family groups
F eating a variety of foodstuffs
G being able to adapt to diverse habitats

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