Reading Section 2

1 Read through the text about Russia's boreal forests briefly and look at Questions 6–9.

In which sections of the text are the scientists on the list mentioned? .....

2 Now read the text carefully and answer Questions 1–13.

Russia's boreal forests and wild grasses could combat climate change

A Scientists believe Russia's ancient forests are the country's best natural weapon against climate change, even though the stockpile of carbon beneath the ground also makes these areas vulnerable to carbon release. A recent study found that half the world's carbon is stored within land in the permafrost region, about two-thirds of which lies in Russia. Overlying former glaciers, they are a coniferous mix called the boreal forest. 'There's a lot of carbon there and it's very vulnerable,' says Josep Canadell, co-author of the study. 'If the permafrost thaws, we could be releasing ten percent more carbon a year for several centuries more than our previous models predicted. It's going to cost a lot to reduce our emissions by that much – but it will cost more in damage if we don't.'

B The study was published in *Global Biogeochemical Cycles*. Researchers found that the region contains 1,672 billion tons of organic carbon, much of it several feet underground, that 'would account for approximately 50 percent of the estimated global below-ground organic carbon'. Another paper published in *Nature* found that old forests, which make up perhaps half of the boreal forest, 'continue to accumulate carbon, contrary to the long-standing view that they are carbon-neutral'. Even though fires and insect infestations destroy entire swaths of forest and release into the atmosphere the carbon they contain, old-growth forests still take in more than these natural disturbances release, says lead author Sebastiaan Luyssaert, a biologist at the University of Antwerp in Belgium. 'This is all the more reason to protect Russia's boreal forests,' which take in 500 million tons of carbon a year, or about one-fifth of the carbon absorbed by the world's landmass, says Mr Canadell, who is executive director of the Global Carbon Project, based in Canberra.

C Jing Ming Chen, a University of Toronto geography professor who specialises in climate modelling for the boreal region, says: 'Cutting boreal trees increases the amount of carbon in the atmosphere and it takes 50 to 100 years to put that carbon back in the ground.' Luysaaert and Chen argue there's a strong case for conserving the old-growth forests. 'It's better to keep as much carbon in the forest as possible right now,' Mr Luyssaert explains. 'If we want to avoid irreversible processes like melting permafrost or changing ocean currents, we absolutely have to control our emissions in the next two or three decades. It's a case where you need to be short-sighted to be far-sighted.' 'The threats to the boreal forests don't seem significant right now,' explains Nigel Roulet, a carbon cycle specialist at McGill University in Montreal, 'but I'm convinced pressure will increase as the region gets warmer and it gets easier to operate there. Also, I expect these resources to become more valuable as others are exhausted.'

D Scientists say Russia and Kazakhstan could make a unique contribution to the fight against global warming by harvesting wild grasses that have overgrown 100,000 square miles of agricultural lands abandoned in the nineties, and using them to make ethanol – or, better yet, burn them in coal-fuelled power plants. According to Nicolas Vuichard, principal author of a paper published in *Environmental Science and Technology* of Washington, DC, using the grasses to make ethanol would sequester in the ground, over 60 years, about 10 million tons of carbon a year – one-quarter as dead root matter in the soil and the rest in producing ethanol as a substitute for petroleum-based fuels. 'That's not huge on a world scale, but it's substantial,' he says. Fossil fuels emit about eight billion tons of carbon a year, of which about two billion tons are absorbed by plants and soil.

E Renton Righelato, visiting research fellow at the University of Reading and former chairman of the World Land Trust, agrees. 'Given that it would take the world's entire supply of arable land to replace just two-thirds of our transport fuel needs,' he says, 'biofuels are not a practicable long-term solution for transportation emissions. What we need is carbon-free fuel. But in the case of abandoned croplands, using grasses as biofuels could make a contribution,' he adds. Study co-author Adam Wolf, of the Carnegie Institution for Science at Stanford University, cites a study by Elliott Campbell in *Science* magazine that showed that burning grasses in a coal-fuelled plant doubles the savings in carbon emissions compared to using the same grasses to make ethanol. 'If biofuels are going to reduce emissions, using abandoned croplands to make electricity and offset coal use is our best bet,' he says. 'Both of these countries have coal-fuelled power plants, so the process could start soon.' Thus, Russia and Kazakhstan are now in a position to become leaders in green energy, and could use the grasses to export clean electricity in addition to oil and gas, according to Mr Wolf.

Questions 1–5

The reading passage has five paragraphs, **A–E.**

Which paragraph contains the following information?

Write the correct letter, ***A–E.***

NB *You may use any letter more than once.*

1 a view concerning what can and what cannot replace something
2 a mention of the amount by which carbon emissions might increase in the future
3 a reference to an established belief that researchers say is incorrect
4 evidence from one study that supports the conclusions of another study
5 how much carbon is currently located in a particular part of the world

Questions 6–9

Look at the following statements (Questions 6–9) and the list of scientists below.

Match each statement with the correct scientist, ***A–D.***

6 More attention will be paid to the situation in the boreal forests in the future.
7 Boreal forests are able to deal with some of the damage that is done to them.
8 Earlier research may have underestimated the scale of a future problem.
9 The damage done by destroying boreal forests lasts for a very long time.

List of scientists

A Josep Canadell
B Sebastiaan Luyssaert
C Jing Ming Chen
D Nigel Roulet

Questions 10–13

Complete the summary below.

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

Wild grasses in Russia and Kazakhstan

Scientists believe that wild grasses which are currently growing on former **10** ..... in Russia and Kazakhstan could be useful in combating environmental problems. There are two different ideas concerning how this could happen.

With the first idea, approximately ten million tons of carbon would be stored in the ground, and three-quarters of this would create **11** ..... that could be used instead of petroleum-based fuels. The second idea is to burn the grasses in **12** ..... power plants. Supporters of this idea say that the effect in reducing carbon emissions would be twice as great as if the first idea was carried out. The grasses would be used to produce **13** ..... and production of this could begin in a short period of time.