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MULTIPLE CHOICE QUESTIONS

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

Write the correct letter in boxes 37-40 on your answer sheet.

37 What is Mott T Greene doing in the fifth paragraph?

- A describing what motivated him to write the book
- B explaining why it is desirable to read the whole book
- C suggesting why Wegener pursued so many different careers
- D indicating what aspects of Wegener's life interested him most

38 What is said about Wegener in the sixth paragraph?

- A He was not a particularly ambitious person
- B He kept a record of all his scientific observations
- C He did not adopt many of the scientific practices of the time
- D He enjoyed discussing new discoveries with other scientists

39 What does Greene say about some other famous scientists?

- A Their published works had a greater impact than Wegener's did
- B They had fewer doubts about their scientific ideas than Wegener did
- C Their scientific ideas were more controversial than Wegener's
- D They are easier subjects to write about than Wegener

40 What is Greene's main point in the final paragraph?

- A It is not enough in life to have good intentions
- B People need to plan carefully if they want to succeed
- C People have little control over many aspects of their lives
- D Multiple choice questions don't people ensure they have the freedom to act

(...)

P5 Readers interested in the specific details of Wegener's career will see that he often stopped pursuing a given line of investigation (sometimes for years on end), only to pick it up later. I have tried to provide **guideposts** to his rapidly shifting interests by characterizing different phases of his life as careers in different sciences, which is reflected in the titles of the chapters. Thus, the index should be a sufficient guide for those interested in a particular aspect of Wegener's life but perhaps not all of it. My own feeling, however, is that the parts do not make as much sense on their own as do all of his activities taken together. In this respect I urge readers to try to experience Wegener's life as he lived it, with all the interruptions, changes of mind, and renewed efforts this entailed.

P6 Wegener left behind a few published works but, as was standard practice, these reported the results of his work – not the journey he took to reach that point. Only a few hundred of the many thousands of letters he wrote and received in his lifetime have survived and he didn't keep notebooks or diaries that recorded his life and activities. He was not active (with a few exceptions) in scientific societies, and did not seek to find influence or advance his ideas through professional contacts and politics, spending most of his time at home in his study reading and writing, or in the field collecting observations.

(...)

7 Some famous scientists, such as Newton, Darwin and Einstein, left mountains of written material behind, hundreds of notebooks and letters numbering in the tens of thousands. Others, like Michael Faraday, left extensive journals of their thoughts and speculations, parallel to their scientific notebooks. The more such material a scientist leaves behind, the better chance a biographer has of forming an accurate picture of how a scientist's ideas took shape and evolved.

I am firmly of the opinion that most of us, Wegener included, are not in any real sense the authors of our own lives. We plan, think and act, often with apparent freedom, but most of the time our lives 'happen to us', and we only retrospectively turn this happenstance into a coherent narrative filled with intentions. This book, therefore, is a story both of the life and scientific work that Alfred Wegener planned and intended and of the life and scientific work that actually 'happened to him'. These are, as I think you will soon see, not always the same thing.

Questions 14–19

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

Write the correct letter in boxes 14–19 on your answer sheet.

14 What point does the writer make about AI in the first paragraph?

- A It is difficult to predict how quickly AI will progress
- B Much can be learned about the use of AI in chess machines
- C The future is unlikely to see limitations on the capabilities of AI
- D Experts disagree on which specialised tasks AI will be able to perform

15 What is the writer doing in the second paragraph?

- A explaining why machines will be able to outperform humans
- B describing the characteristics that humans and machines share
- C giving information about the development of machine intelligence
- D indicating which aspects of humans are the most advanced

16 Why does the writer mention the story of King Midas?

- A to compare different visions of progress
- B to illustrate that poorly defined objectives can go wrong
- C to emphasise the need for cooperation
- D to point out the financial advantages of a course of action

17 What challenge does the writer refer to in the fourth paragraph?

- A encouraging humans to behave in a more principled way
- B deciding which values we want AI to share with us
- C creating a better world for all creatures on the planet
- D ensuring AI is more human-friendly than we are ourselves

18 What does the writer suggest about the future of AI in the fifth paragraph?

- A The safety of machines will become a key issue
- B It is hard to know what impact machines will have on the world
- C Machines will be superior to humans in certain respects
- D Many humans will oppose machines having a wider role

19 Which of the following best summarises the writer's argument in the sixth paragraph?

- A More intelligent machines will result in greater abuses of power
- B Machine learning will share very few features with human learning
- C There are a limited number of people with the knowledge to program machines
- D Human shortcomings will make creating the machines we need more difficult

4/6

Living with artificial intelligence

Powerful artificial intelligence (AI) needs to be reliably aligned with human values, but does this mean AI will eventually have to police those values?

This has been the **decade of AI**, with one astonishing feat after another. A chess-playing AI that can defeat not only all human chess players, but also all previous human-programmed chess machines, after learning the game in just four hours? That's yesterday's news, what's next? True, these prodigious accomplishments are all in so-called narrow AI, where machines perform highly specialised tasks. But many experts believe this restriction is very temporary. By mid-century, we may have **artificial general intelligence (AGI)** – machines that can achieve human-level performance on the full range of tasks that we ourselves can tackle.

If so, there's little reason to think it will stop there. **Machines will be free of many of the physical constraints on human intelligence**. Our brains run at slow biochemical processing speeds on the power of a light bulb, and their size is restricted by the dimensions of the **human birth canal**. It is remarkable what they accomplish, given these handicaps. But they may be as far from the **physical limits of thought as our eyes are from the incredibly powerful Webb Space Telescope**.

Once machines are better than us at designing even smarter machines, progress towards these limits could accelerate. What would this mean for us? Could we ensure a safe and worthwhile coexistence with such machines? On the plus side, AI is already useful and profitable for many things, and super AI might be expected to be super useful, and super profitable. But the **more powerful AI becomes, the more important it will be to specify its goals with great care**. Folklore is full of tales of people who ask for the wrong thing, with disastrous consequences – King Midas, for example, might have wished that everything he touched turned to gold, but didn't really intend this to apply to his breakfast.

So we need to create **powerful AI** machines that are 'human-friendly' – that have goals **reliably aligned with our own values**. One thing that makes this **task difficult** is that we are far from **reliably human-friendly ourselves**. We do many terrible things to each other and to many other creatures with whom we share the planet. If superintelligent machines don't do a lot better than us, we'll be in deep trouble. We'll have **powerful new intelligence amplifying the dark sides of our own fallible natures**.

Test 2

For **safety's sake**, then, we want the machines to be **ethically as well as cognitively superhuman**. We want them to **aim for the moral high ground**, not for the troughs in which many of us spend some of our time. Luckily they'll be smart enough for the job. If there are routes to the **moral high ground**, they'll be better than us at finding them, and steering us in the right direction.

However, there are **two big problems with this utopian vision**. One is how we get the machines started on the journey, the other is what it would mean to reach this destination. The 'getting started' problem is that we need to tell the machines what they're looking for with sufficient clarity that we can be confident they will find it – whatever it actually turns out to be. This won't be easy, given that we are tribal creatures and conflicted about the ideals ourselves. We often ignore the suffering of strangers, and even contribute to it, at least indirectly. How then, do we point machines in the direction of something better?

As for the 'destination' problem, we might, by putting ourselves in the hands of these moral guides and gatekeepers, be sacrificing our own autonomy – an important part of what makes us human. Machines who are better than us at sticking to the moral high ground may be expected to discourage some of the lapses we presently take for granted. We might lose our freedom to discriminate in favour of our own communities, for example.

Loss of freedom to behave badly isn't always a bad thing, of course: denying ourselves the freedom to put children to work in factories, or to smoke in restaurants are signs of progress. But are we ready for **ethical silicon police limiting our options**? They might be so good at doing it that we won't notice them; but few of us are likely to welcome such a future.

These issues might seem far-fetched, but they are to some extent already here. AI already has some input into how resources are used in our National Health Service (NHS) here in the UK, for example. If it was given a greater role, it might do so much more efficiently than humans can manage, and act in the interests of taxpayers and those who use the health system. However, we'd be depriving some humans (e.g. senior doctors) of the **control they presently enjoy**. Since we'd want to ensure that people are treated equally and that policies are fair, the goals of AI would need to be specified correctly.

We have a new powerful technology to deal with – itself, literally, a new way of thinking. For our own safety, we need to point these new thinkers in the right direction, and get them to act well for us. It is not yet clear whether this is possible, but if it is, it will require a cooperative spirit, and a willingness to set aside self-interest.

Both general intelligence and moral reasoning are often thought to be uniquely human capacities. But safety seems to require that we think of them as a package: if we are to give general intelligence to machines, we'll need to give them moral authority, too. And where exactly would that leave human beings? All the more reason to think about the destination now, and to be careful about what we wish for.