

**SUMMARY COMPLETION**

Complete the summary using the list of phrases, A–J, below.

Write the correct letter, A–J, in boxes 31–36 on your answer sheet.

**Wegener's life and work**

One of the most remarkable things about Wegener from a scientific point of view is that although he proposed a theory of continental drift, he was not a geologist. He **31** ... was limited to atmospheric physics. However, at the time he proposed his **theory of continental drift** in 1912, he was already a person of **33** ... and had been a member of a team that had spent **32 hours** in a hot-air balloon, followed by his publication but **35** ... of Greenland's coast. With the publication of his textbook on thermodynamics, he had also come to the attention of a group of German scientists.

**33** A modest fame    B vast range    C record-breaking achievement  
**34** D research methods    E selected topics    F professional interests  
**35** G scientific debate    H hazardous exploration    I biographer's perspective  
**36** J narrow

**Paleoclimatology – The study of past climates**

**S** **Read all the options.**

- **Read the summary, trying to guess which options could fit each question.**
- **Answers usually come from the same paragraph or section.**
- **Highlight keywords in the summary.**
- **Pay attention to grammar.**
- **Cross out used options.**
- **Continue reading the passage to find your answers.**

**Questions 32–35**

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 32–35 on your answer sheet.

**The Inter-Agency Space Debris Coordination Committee**

The committee gives advice on how the **32** ... of space can be achieved. The committee advises that when satellites are no longer active, any unused **33** ... fuel or pressurised material that could cause **34** ... explosion should be removed.

Although operators of large satellite constellations accept that they have obligations as stewards of space, Holger Krag points out that the operators that become **35** ... bankrupt are unlikely to prioritise removing their satellites from space.

**Questions 24–26**

Complete the summary using the list of phrases, A–F, below.

Write the correct letter, A–F, in boxes 24–26 on your answer sheet.

**Using AI in the UK health system**

AI currently has a limited role in the way **24** ... are allocated in the health service. The positive aspect of AI having a bigger role is that it would be more efficient and lead to patient benefits. However, such a change would result, for example, in certain **25** ... A not having their current level of **26** ... E. It is therefore important that AI goals are appropriate so that discriminatory practices could be avoided.

- A medical practitioners    B specialised tasks    C available resources  
 D reduced illness    E professional authority    F technology experts

**Questions 5–8**

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 5–8 on your answer sheet.

**Making buildings with wood**

Wood is a traditional building material, but current environmental concerns are encouraging **5** ... architects to use wood in modern construction projects. Using wood, however, has its challenges. For example, as **6** ... moisture in the atmosphere enters wood, it increases in size. In addition, wood is prone to pests and the risk of fire is greater. However, wood can be turned into a better construction material if treated and combined with other materials. In one process, **7** ... adhesive ... of solid wood are glued together to create building blocks. These blocks are **8** ... lighter than concrete and steel but equal them in strength. Experts say that wooden buildings are an improvement on those made of concrete and steel in terms of the **8** ... speed with which they can be constructed and how much noise is generated by the process.

**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 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 brain 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

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 a safer sake, then, we want the machines to be **aligned** as well as cognitively **similar**. We want them to learn the moral high ground, not 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 set the machines started on the journey. We must start with a clear definition of this definition. The primary problem is that we need to tell the machine what they are and what 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 right direction?

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 pollute in factories, or 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 much more efficiently the repetitive tasks of a doctor, such as entering patient records or 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 goal of AI would need to be specified carefully.

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 thinkers in the right direction, and get them to act for us. It is not yet clear exactly what this means, but if it is, it will require a cooperative spirit and a sense of something better.

Both moral intelligence and moral reasoning are often thought to be uniquely human capacities. But ethics 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.

**Test 3**

Using wood to construct buildings, however, is not straightforward. Wood is rich as it absorbs moisture from the air and is susceptible to pests, not to mention fire. But treating wood and combining it with other materials can improve its properties. Cross-laminated timber is engineered wood. An adhesive is used to stick layers of solid-sawn timber together, crosswise, to form building blocks. This material is light but has the strength of concrete and steel. Construction experts say that wooden buildings can be constructed at a greater speed than ones of concrete and steel and the process, it seems, is quicker.

**F** Stone Edge is Europe's biggest supplier of cross-laminated timber, and its vice-president, Markus Mamatrot, reports that the company is seeing increasing demand globally for building with wood. A climate change expert the key to this trend, with its large forests, while Stone Edge says, has been leading the way, but the market for timber is growing a rate in demand for its timber products across the world, including in Asia. Of course, using timber in a building also locks away the carbon that it absorbed as it grew. But even treated wood has its limitations and only when a wider range of construction projects has been proven in practice will it be possible to see wood as a real alternative to concrete in constructing tall buildings.

**G** Fly ash and slag from iron ore are possible alternatives to cement in a concrete mix. Fly ash, a byproduct of coal-burning power plants, can be incorporated into concrete mixes to make up as much as 15 to 30% of the cement, without harming the strength or durability of the resulting mix. Iron-slag, a byproduct of the iron-ore smelting process, can be used in a similar way. Their incorporation into concrete mixes has the potential to reduce greenhouse gas emissions.

**H** But Ania Suttorp, of the UK's Green Building Council, notes that although these waste products are all promising ideas, they are either unproven or based on materials that are not abundant. In their overview of innovation in the concrete industry, Felicity Preston and Johanna Lehne of the UK's Royal Institute of International Affairs reached the conclusion that 'Some novel cements have been discussed for more than a decade without reaching market maturity, without breaking through. At present, these alternatives are rarely as cost-effective as conventional cement; and they face raw-material shortages and resistance from customers.'