

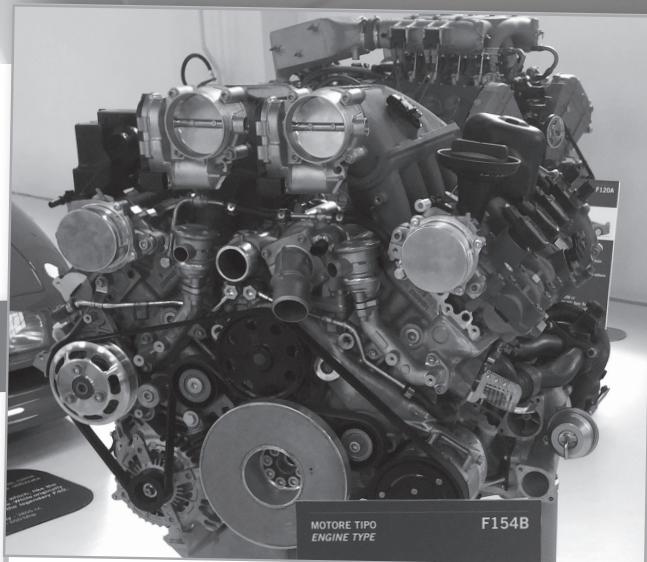
## Reading

Read the article and choose the best answer  
A, B C or D.

### Evolutionary machine design

Evolution occurs in more than just living creatures. It is very much present in the way engineers create cutting-edge machines and products that operate more efficiently and provide a better service. Many factors play a role in how a company's product evolves: competition from other companies, consumer changes in the marketplace, and rules and regulations set in place by institutions that govern the field. A prime example of evolutionary machine design at work, especially one that has progressed at a fast pace, can be seen in racing.

Participants in the Formula One competition compete in a race both on the track and in the research laboratory. For the latter, they are racing to manufacture a vehicle with the greatest performance characteristics possible. They compete in this theoretical race each and every year because the governing body that sets the rules of the contest, the Fédération Internationale de l'Automobile, or FIA, implements new restrictions for engine and vehicle design on an annual basis. They do this to slow the cars down and force competitors to use tactics other than speed to adeptly overtake one another on the track. The result is a more interesting race for



spectators and viewers to watch, which in turn draws more viewers in and makes the race more attractive to television stations paying for the rights to broadcast.

These new restrictions force the brains behind racing to introduce modifications to their vehicles that adhere to the new restrictions, but that also result in a vehicle which performs better than the competitors'. This sends engineers into a frenzy to navigate the three stages of evolution – variation, selection and replication – and produce a state-of-the-art racing car with the ultimate engine and body design. Interestingly enough, these three stages run parallel to those seen in the evolution of life. Engineers input data into computers which calculate a variety of random solutions and they then select the best ones and use them to produce even more advanced solutions. It is similar to the way in which genetic traits in species are produced randomly, with the most advantageous traits allowing one offspring to survive over others less advantaged. These stronger traits are then replicated when passed onto the next generation and eventually cause physical adaptations in the species, thus allowing it to better survive in a changing environment.

The same adaptations occur in racing vehicles over time, and in fact, even a casual observer could notice another parallel in how racing evolves in the same way that nature does. Wings are present on the body of a racing vehicle, which give the driver better control and allow him or her to 'fly' down the racetrack with greater ease. Smaller engines with more advanced ventilation allow the racing car's 'heart' to 'beat' and its 'lungs' to 'breathe' more efficiently. Curvatures in the vehicle's body mimic those of fish, which allow the car to 'swim' through the air with the least resistance. These are just a few of the ways in which nature's designs have crept into racing through evolutionary machine design.

Obviously, this emerging technology does not exist to further racing competitions alone. Its use is revolutionising how companies produce products, mainly to compete with one another, but the end result is a better experience for the consumer. And, as in the wild, any company or institution that fails to keep up with the evolution will be driven out of existence, which for the consumer is fortunately beneficial, but for the company that fails to innovate, decidedly not beneficial, and nor should it be.

- What does the writer say about evolutionary machine design in the first paragraph?
  - It is mainly used in racing car engine design.
  - There is one crucial reason why a company does it.
  - It developed by studying biological adaptations.
  - Its application in one field has advanced very quickly.
- Why does the FIA want to reduce the speed of racing cars?
  - It is concerned about the durability of vehicles.
  - Drivers will have to use different skills to win a race.
  - Observers wish to see more skilful races.
  - Television stations won't broadcast dangerous races.
- In the third paragraph, the writer suggests that the parallels between evolutionary machine design and nature
  - have been around since engineering began.
  - are most similar when considering timeframes.
  - are absent when looking at the phases they go through.
  - exist in the way traits are produced by both.
- An idea that recurs in the fourth paragraph is how engineers
  - have studied nature to produce a better vehicle.
  - change vehicles to make them more animal-like.
  - have inadvertently used animal features in designs.
  - have improved the facilities that racing cars perform in.
- The writer's opinion in the final paragraph is that
  - manufacturers should survive without innovating.
  - the consumer is more important than the manufacturer.
  - technology is unfairly forcing manufacturers to compete.
  - innovation should serve manufacturers the most.

## Vocabulary

### 1 Complete the sentences with the correct form of the words in bold.

- More than 25 years ago, Tim Berners-Lee \_\_\_\_\_ the way we live, work and communicate by creating the World Wide Web. **REVOLUTION**
- Your new office chair is \_\_\_\_\_, so you can raise or lower it to exactly the right height. **ADJUST**
- Linen garments are subject to \_\_\_\_\_ when washed; to avoid this, wash by hand or have items dry-cleaned. **SHRINK**
- Recent research suggests that workers are more \_\_\_\_\_ if they are happy and gain satisfaction from their work. **PRODUCE**
- Mike's small company specialises in \_\_\_\_\_ technologies at the cutting edge of medical science. **EMERGE**
- Just printing colourful T-shirts isn't going to keep your business going; you'll have to \_\_\_\_\_ if you want to expand and make a profit. **DIVERSE**

\_\_\_\_ / 6

### 2 Complete the sentences with these prepositions.

**around for from in of on out with**

- The Department of Health is planning to bring \_\_\_\_\_ a new law to discourage people from eating excessive amounts of sugar and salt.
- Jenny suffers \_\_\_\_\_ various food allergies, so you'd better check that she can eat what you're planning to cook tonight.
- The fashion house has hired a new creative director in the hope that he can turn the company's fortunes \_\_\_\_\_.
- Do you really think the explorers are capable \_\_\_\_\_ finding their way across the desert with only the stars to guide them?
- The opening of the new hypermarket on the edge of town has driven many small grocery stores \_\_\_\_\_ of business.
- If you want to keep up \_\_\_\_\_ your market rivals, then you're going to have to invest in some up-to-date computer equipment.
- Harry and I get on fantastically because we're \_\_\_\_\_ the same wavelength; we have the same taste in clothes, music and films!
- We always take the dog through the park; why don't we walk along the river today \_\_\_\_\_ a change?

\_\_\_\_ / 8

### 3 Circle the correct words.

- Colin's niece has **taken to** / **taken over** the business and he now has no say in how the firm is run at all.
- Our team of skillful volunteers has **altered** / **transformed** the school hall into a mysterious underwater kingdom using paint, coloured paper and lots of imagination!
- The new manager wants every member of staff to **adopt** / **adapt** new working practices which will improve efficiency and productivity.
- Luckily for me, the coach has had a change of **heart** / **pace** and he's going to give me one more chance to prove my worth on the team.
- How would you **innovate** / **interpret** the first three verses of the poem? What do you think the writer means?
- Boys, I sincerely hope that you regret your irresponsible behaviour and that an incident of this kind will never **recur** / **occur**.
- The robbery was **carried off** / **carried out** with a skill which seems to indicate that these were professional thieves.
- I think we must have got our **batteries** / **wires** crossed – I didn't say it was a *necessity*, I said it was *unnecessary*.

\_\_\_\_ / 8



## 4 Complete the sentences with one word in each gap.

- 1 I don't \_\_\_\_\_ the point of going all the way home and then back into town. Why don't we just stay here until it's time for the film?
- 2 Many people like to be given \_\_\_\_\_ appliances as wedding gifts, so a kettle or a toaster is always a good choice of present.
- 3 Tim Berners-Lee is known \_\_\_\_\_ the 'father' of the modern Internet.
- 4 Why don't you \_\_\_\_\_ up the topic of money and see what he says? Maybe he'll offer to pay back the money without you asking.
- 5 I'm sorry, but you \_\_\_\_\_ the necessary experience to enable you to qualify for this job.
- 6 They've told us that we can't take any gadgets with us on the expedition – I don't know how I'm going to manage \_\_\_\_\_ my phone, though!
- 7 It's no use trying to change the \_\_\_\_\_; we're going to discuss this matter whether you like it or not!
- 8 Look – just put the detergent in this compartment and turn the dial. Using the washing machine isn't \_\_\_\_\_ science, you know!

\_\_\_\_ / 8

Vocabulary: \_\_\_\_ / 30

## Grammar

### 1 Complete the sentences with the verbs in brackets. Use the correct present tense.

- 1 A: Good morning, Sir. \_\_\_\_\_ you \_\_\_\_\_ (require) any assistance?  
B: No, thank you. I \_\_\_\_\_ just \_\_\_\_\_ (look).
- 2 A: \_\_\_\_\_ you \_\_\_\_\_ (ever / use) voice recognition technology?  
B: Yes. My computer at work \_\_\_\_\_ (have) a voice recognition security system.
- 3 A: Hey! What \_\_\_\_\_ you \_\_\_\_\_ (do)? What's that in your hand?  
B: It's my new video camera. I \_\_\_\_\_ (film) you for the last five minutes and you didn't even notice!
- 4 A: \_\_\_\_\_ (be) I late? I'm really sorry.  
B: No, it's OK. I \_\_\_\_\_ (not wait) very long.

\_\_\_\_ / 8

### 2 Circle the correct words.

- 1 When we were children, our mother **didn't used** / **didn't use** to allow us to eat sweets or sugary snacks.
- 2 Where **were you hurrying** / **had you hurried** off to when I saw you last night?
- 3 **Had you ever suffered** / **Were you ever suffering** from any kind of allergic reaction before the day you had the asthma attack?
- 4 They **would live** / **used to live** in a huge city, but decided to get back to nature and move to a farm in the countryside.
- 5 The Industrial Revolution **brought about** / **used to bring about** a dramatic change in people's working conditions.
- 6 Jonathon **had** / **had been having** trouble with his vision for a while before he saw an eye doctor.
- 7 **Did you accumulate** / **Would you accumulate** all these statues and paintings while you were living abroad?
- 8 Dorothy **would back up** / **was backing up** her files at the end of each work day.

\_\_\_\_ / 8

### 3 Complete the sentences with one word in each gap.

- 1 The robotic presentation \_\_\_\_\_ starting in five minutes – hurry up!
- 2 Dominic \_\_\_\_\_ demonstrate our state-of-the-art security system – I think you're going to be impressed.
- 3 I'm sorry, but I don't think I will \_\_\_\_\_ finished the report by Friday afternoon as you requested.
- 4 When are you \_\_\_\_\_ to return my book about Inuit culture?
- 5 We will be \_\_\_\_\_ in a four-star hotel by the beach.
- 6 Excuse me, what time \_\_\_\_\_ the 'Life Lessons' seminar begin?

\_\_\_\_ / 6

### 4 Complete the second sentence so it has the same meaning as the first sentence, using the word in bold. You must use between three and six words, including the word given.

- 1 They had planned to replace Julie, but nobody was suitable. **FIND**  
They were \_\_\_\_\_ for Julie, but nobody was suitable.
- 2 I had expected Harry to solve this problem. **MEANT**  
Harry was \_\_\_\_\_ to this problem.
- 3 When are you supposed to have your appointment with the doctor? **DUE**  
When \_\_\_\_\_ see the doctor?
- 4 Helen wanted to buy a new phone, but in the end she couldn't afford one. **THINKING**  
Helen \_\_\_\_\_ a new phone, but in the end she couldn't afford one.

\_\_\_\_ / 8

Grammar: \_\_\_\_ / 30

## Writing

Read this writing task.

*Teen Time* magazine has published an article about major life decisions in a young person's life, focusing on moving house and changing schools. It has now invited readers to give their views on the subject of life decisions and share an experience where they, or someone they know, made a decision which changed their life or affected it in a significant way. You decide to write a letter.

Write your letter. (220-260 words)

Writing: \_\_\_\_ / 10

Mark: \_\_\_\_ / 80