

Use of English

Complete the text below by writing a suitable word in the space provided. The first one is done for you as an example. Indicate your answers on the Answer Sheet.

Inside the Hyperloop

How do you travel nearly 600 km in under 40 minutes? Elon Musk's fifth mode of transport **could (0)** be the answer.

Forget boats, planes, trains and cars as a new means of transport, the vacuum tube ... **(1)** ... being created by the pioneer behind Tesla and SpaceX. ... **(2)** ... lack of air resistance means the vacuum trains – vactrains – ...**(3)**... reach terrific speed, theoretically exceeding the speed of sound – no air means no sound barrier. But vactrains ... **(4)** ... always been a conceptual technology thought to be ... **(5)** ... difficult to turn it actually into reality. Musk has adapted the ideas ... **(6)** ... remove some of the potential drawbacks while still keeping ... **(7)** ... of the advantages. The train cars called pods ... **(8)** ... equipped with compressors in their noses to suck the air out of the way ... **(9)** ... lifting the pod clear of the floor of the tube. The pods would slide on skis made ... **(10)** ... Inconel, a nickel-chromium alloy with extraordinary temperature resistance. Even so, ... **(11)** ... pod would have to carry 800kg of water for cooling. Power for forward motion comes from linear electric motors ... **(12)** ... could accelerate the pods up to 1,220km/h. ... **(13)** ... a speed could see a Hyperloop pod complete the 563km journey ... **(14)** ... LA and San Francisco in about 35 minutes. If the project works, it ... **(15)** ... change the face of medium range travel completely. If it doesn't, it will remain part of science fiction.

Max.: 15

Reading

Part 1

Read the article below from which 10 sentences or sentence fragments have been removed. Match the list of sentences or sentence fragments (A-K) with the gaps (1–10) and decide where they fit. Indicate your answers on the Answer Sheet. Remember there is *one extra sentence (fragment) you do not need to use*.

World's First Invisible Train to Be Launched in Japan

Architect Kazuyo Sejima wants Tokyo's next local express trains to be as hard to see as Wonder Woman's jet plane.

Japan has traditionally been a leading country in technological progress and innovation. ... (1) ... Following the introduction of bullet trains that reach the speed up to 580 km /hour, an invisible train will be carrying passengers in Japan as early as in two years from now.

... (2) ... The new train being designed for the Seibu Railway Co. by Japanese architect Kazuyo Sejima of Sanaa will be hard to see, even standing still. ... (3) ... that it is streaking through.

Scheduled to hit tracks in 2018, the new ... (4) ... that is much different from the boxy New Red Arrow trains that currently run limited express services in the Tokyo area. ... (5) ..., Sejima's train was designed with the stated goal to be as fun to watch blend into its surroundings as it is to ride.

... (6) ..., a recipient of the Pritzker, often called the Nobel Prize of architecture. She has a wealth of experience designing buildings of a similar reflective style. It's the latest example of Japan's railways and train services turning to unconventional designers to reimagine the way trains look in the country. ... (7) ... designing a building, which is rooted in a single spot, and designing an object that needs to travel through many different environments.

"The limited express travels in a variety of different sceneries, from the mountains of Chichibu to the middle of Tokyo, and I thought it would be good if the train could gently co-exist with this variety of scenery," Sejima is quoted as saying in Seibu's official press release. "... (8) ..., like a living room, so that they think to themselves 'I look forward to riding that train again.'"

Of course, in a way, a train's appearance probably makes less impact on its environment than anything else about it. ... (9) ... the sight of a train quickly passing through a given area.

... (10) ..., finally applies the same approach to its railroad system. Let's just hope that if Japan is going to have invisible trains, it at least makes sure everyone knows where the tracks are.

Reading

- A. The Seibu train will be the first train ever designed by Sejima
- B. It's a chameleon-like train that has been designed to blend into the countryside
- C. Seibu flagship train cars have an organic shape
- D. Japan, long a country that tries to emphasize design harmony with nature
- E. Japan's speedy bullet trains already move so fast that you almost can't see them coming
- F. Coupled with a semi-reflective skin designed to mirror the surrounding scenery
- G. Sejima says that what appealed to her about the project was the difference between
- H. This time, a Japanese architect has unveiled a truly futuristic concept
- I. I also would like it to be a limited express where large numbers of people can all relax in comfort, in their own way
- J. Till now, there is not much information about the details of this innovative design
- K. Emissions, sound pollution, and the disruption of laying down miles of track are all going to be bigger problems than

Max.: 20

Reading

Part 2

Read the text below and answer the questions in English. Give short answers. Indicate your answers on the Answer Sheet.

Smart Pet Collars

Kyon is introducing a high-tech dog collar that's packed with internal sensors to protect your pet. The fundamental idea behind Kyon is that the device looks more like a regular collar than a tech-enabled gadget. Meanwhile, its impressive suite of sensors and circuitry work to keep you in tune with the less obvious elements of your pet's health, and a mobile tracking solution ensures you'll be able to track your pet down if it gets lost.

"We started working on Kyon about two and a half years ago with a small team of engineers," creator Founder Leon Yohai told Digital Trends. "I have a Maltese named Charlie, and I wanted to be able to communicate with him. Small dogs don't communicate as well as larger breeds, so I wanted to know when he needed to go out, if he was too hot, if he was too cold – I wanted to know exactly what was going on with him."

The collar's sensors and chips include a 9-axis accelerometer, an altimeter, heat sensor, water sensor, GPS, GSM, and ultrasound buzzer. Kyon also has an LED display, and is Wi-Fi and Bluetooth enabled so the collar can work in tandem with the base station and the Kyon mobile app. These embedded technologies facilitate some of the key pet protecting features of the collar, like finding your pet when it's lost, avoiding heat stroke, and preventing dog fights.

Using Kyon starts with the mobile app. Pet owners can design specific home ranges on a map display so that any time a pet leaves home, the system knows it has run away. The collar communicates with the base station that stays in your home, and any time you take your pet for a walk, your cell phone in your pocket (with the Kyon mobile app) becomes a beacon for the collar to register that the dog is safe. The app also lets users program important dates as notifications, like regular vet visits and walking or medication reminders.

The Kyon collar weighs 2.1 ounces and is adjustable to fit dogs and cats over 7 pounds with 10-20 inch necks. Because it can resist about 60 pounds of force, Kyon can still function as a regular collar with larger dogs who pull on their leashes. The base station that serves as a beacon for the collar's safe region while at home is also a charging dock. Yohai and his team of engineers worked to get the collar's battery life from ten days at the start, up to 30 full days before needing to recharge. "Once a month, you just have to place the collar on the docking station for a few hours to get a full charge, and that's it."

Reading

Kyon launched a Kickstarter campaign on March 1st in 2016 to help spread the word and also determine how many units to order from their manufacturer. The retail price of Kyon collar is \$250 with an additional monthly fee of \$5 to service GSM microchip functionality around the world. Yoahi believes that being able to find your dog when it is lost is more than worth the monthly fee: "We created this collar to make a difference. Most dogs run away at some time in their life – we believe being able to find your lost pet is an essential part of the Kyon collar."

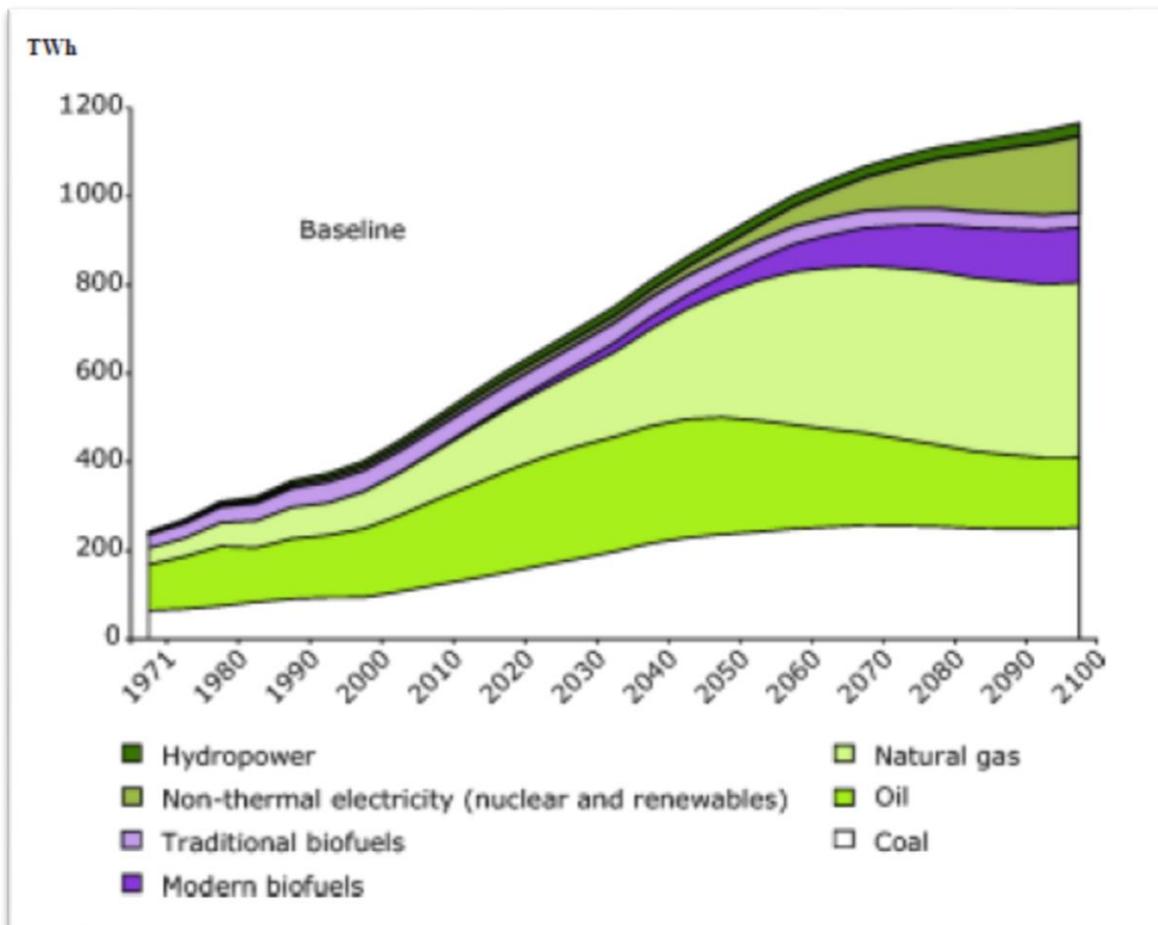
1. How long did Yoahi and his colleagues work on the Kyon project?
2. What was the primary motivation of Yoahi inventing Kyon?
3. Mention ONE hazard to your pet.
4. What is the first step to obtain the full service of the smart pet collar?
5. What functions as a signalling device outside home?
6. Is it true that only cats and small dogs can use this smart device?
(Write only YES/NO.)
7. Name two functions of the base station. (a., b.)
8. How long can the improved battery provide energy?
9. How much do you have to invest in the first month if you want this high-tech collar?
10. What is the most important function of the device according to Yoahi?

Max.: 20

Writing

Part 1

The graph shows the past of and predictions for the global development in energy use in the world. Write a short analysis in which you describe the tendencies and reflect on why they might take place. (150-200 words) Write to an expert audience.



Max.: 25

Writing

Part 2

Write a letter of application. Give reasons why you would like to get the job, describe your background, skills and experience. Use the conventions of a formal letter (100-120 words).

IEEE-USA/AAAS Mass Media Science and Engineering Fellows Program



U.S. IEEE student members can help strengthen connections between engineers and journalists by working for 10 weeks during the summer as reporters, researchers and production assistants in newsrooms across the country. The goal is to increase public understanding and awareness of science and engineering.

To apply, you must be at least a junior in college majoring in a technical field, mathematics or social sciences. A weekly stipend of \$450 is provided.





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