**JAF04 Unit 9 Technology in Use**

**Task 1 Speaking – Space elevator**

* How do you think a space elevator would work?
* What could it be used for?
* What technical challenges would it face?
* How seriously do you think the concept of space elevators is being taken at present?

**Task 2 Space elevators**

1. **Read the following extract, complete the gaps with suitable forms of the verbs in brackets and compare it to your answers in task 1.**

*Space elevators: preparing for takeoff*

In his 1979 novel, *The Fountains of Paradise*, Arthur C. Clarke \_\_\_\_\_\_\_\_\_\_ (write) about an elevator connecting the earth´s surface to space. Three decades later, this science-fiction concept \_\_\_\_\_\_\_\_\_\_\_\_ (prepare) to take off in the real world. NASA \_\_\_\_\_\_\_\_\_\_\_ (launch) the Space Elevator Challenge, a competition with a generous prize fund, and several teams and companies \_\_\_\_\_\_\_\_\_ (work) on serious research projects aimed at winning it.

As its name suggests, a space elevator is designed \_\_\_\_\_\_\_\_\_\_ (raise) things into space. Satellites, components for space ships, supplies for astronauts in space stations, and even astronauts themselves are examples of payloads that could \_\_\_\_\_\_\_\_ (transport) into orbit without the need for explosive and environmentally unfriendly rockets. However, the altitude of orbital space – a colossal 35,790 km above the earth – is a measure of the challenge \_\_\_\_\_\_\_\_\_ (face) engineers. How could such a height \_\_\_\_\_\_\_\_\_\_ (reach)?

The answer is by \_\_\_\_\_\_\_\_\_\_ (use) an incredibly strong and lightweight cable, strong enough \_\_\_\_\_\_\_\_\_ (support) its own weight, and a heavy load. The design of such a cable is still largely theoretical. This would \_\_\_\_\_\_\_\_\_\_ (attach) to a base station on earth at one end and a satellite in geostationary orbit (fixed above a point on the equator) at the other. Lift vehicles would then ascend and descend the cable, \_\_\_\_\_\_\_\_\_\_\_\_ (power) by electromagnetic force and \_\_\_\_\_\_\_\_\_ (control) remotely.

1. **Match the verbs (1-9) from the text to the definitions (a-i).**

1 connecting a) carried (objects, over a distance)

2 raise b) hold something firmly

3 transported c) climb down

4 support d) provided with energy/ moved by a force

5 attached e) joining

6 ascend f) driven/ have movement directed

7 descend g) fixed

8 powered h) climb up

9 controlled i) lift/ make something go up

1. **James, an engineer, is giving a talk on space elevators. Complete his notes using the correct form of the verbs in exercise c.** (Audio 1.2)

Space elevators

* Challenge of \_\_\_\_\_\_\_\_\_\_\_\_\_\_(1) a satellite to earth by cable is significant.
* To \_\_\_\_\_\_\_\_\_\_\_ (2) its own weight, and be securely \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (3) at each end, cable would need phenomenal strength-to-weight ratio.
* How could vehicles be \_\_\_\_\_\_\_\_\_\_\_ (4) into space, by cable?
* Self-contained energy source problematic, due to weight (heavy fuel or batteries required to \_\_\_\_\_\_\_\_\_\_\_ (5) vehicle.)
* Two possible ways round problem:

1. Transmit electricity wirelessly. But technique only at research stage.
2. Solar power. But would only allow vehicle to \_\_\_\_\_\_\_\_\_\_ (6) slowly. Not necessarily a problem, as car could be controlled remotely, allowing it to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (7) payloads unmanned.

**Listen to part of James´ talk and check your answers in the exercise above.**

**What kind of words are missing from the notes?**

1. **Some space elevator designs propose an offshore base station. What advantages might an offshore base have compared with a land base?**
2. **James goes on to discuss offshore base stations. Listen to the talk and answer the following questions.** (Audio 1.3)
3. How would an offshore base station be supported?
4. How would payloads reach the base station?
5. What problem would a mobile base station help to prevent?
6. What would the procedure be if there was an alert?

(To read more about space elevators, go to: <http://science.howstuffworks.com/space-elevator.htm>)

(adapted from Ibbotson, M. (2008). *Cambridge English for Engineering.* CUP.)