**Private Space**

A. It's a remarkable achievement: the question is no longer 'How can we send humans into space?' but 'How can we keep them there?' Spaceflight is reaching a turning point where new technologies in engine development, better understanding of aerodynamics and materials for body construction are making spaceflight possible for private industry.

B. The history of space exploration, until relatively recently, has been one of big government-backed projects like the Space Shuttle, Mars Landers and Long March rockets. But the most recent launches to the International Space Station (ISS) have been very special for at least three reasons. Firstly, along with 450 kg of scientific equipment, food and clothes, the rocket was carrying ice cream for the three space station astronauts. Secondly, the rocket was unmanned, being guided into docking position and back to earth again by remote control and automated systems. Finally, the rocket was commissioned from a private company by NASA.

C. When the privately owned rocket delivered its goods to the ISS, it marked a milestone in the evolution of space flight and vindicated NASA's decision to delegate routine supply flights to the space station. The flight has been a long time in development. It started with President George W Bush announcing his Vision for Space Exploration, calling for the ISS to be completed. Under the next President, America's Space Shuttles were retired leaving NASA with no other choice but to look for alternative methods of supplying the ISS. The initiative was part of an effort to commercialise the space industry in order to decrease costs and spread the investment in the industry across a wider group than governments.

D. The initiative had many attractions for NASA. By outsourcing to the private sector the routine business of taking food and equipment to and from low-earth orbit, NASA can theoretically free up money to do things that it really wants to prioritise: missions such as sending astronauts to Mars and landing on asteroids by the 2030s. Now that the Space Exploration Technologies Corporation (spaceX) has proved that private enterprise can be players in space exploration, firms are pouring money into developing new spacecraft built to transport cargo, to mine asteroids and to carry passengers into space.

E. In the last half of the twentieth century only government-backed agencies like NASA and Russia's ROSCOSMOS were capable of running space programmes due to the gigantic investment costs and uncertain payoffs. However, SpaceX and similar companies are proving that the former conditions are no longer relevant as new solutions are coming to light. Commercial companies like Boeing are able to raise large sums of money to run these projects. Furthermore, as the firms are running cargo and taxi services to lower orbits, the break-even point is lower, the technology is cheaper and they have the benefit of years of experience in commercial aviation and space flight. Opening space programmes to the commercial sector has the additional advantage of generating more solutions to old problems. An analogy is the invention of the Internet. when the technology went into the commercial sector, no one could have envisioned the development of social network sites. Likewise, no one can predict where commercial enterprise will take the space industry.

F. The uncertainty surrounding where the space industry will end up is a problem as well as an asset and it is unsettling private investors who like to invest in relatively certain prospects. At the moment the industry is dominated by big-spending billionaires like the owner of SpaceX. In addition, the relatively small number of companies in the area could pose a problem in the future. The commercial space industry is still very new and there is no guarantee that progress will be smoother. For one thing, no one is sure that the business model is sound: government is still the major, if not only, customer available to the private space companies. The other problem is that space travel is high risk: the loss of space shuttles Challenger in 1986 and Columbia in 2003 illustrates that even the most carefully planned launches have unavoidable risks associated with them. The question is what would happen to the industry if another accident occurred. Finally, many space experts are doubtful that, even if private industry takes over the 'taxi' role for low-orbit missions, NASA will be able to achieve its ambitions, given its squeezed budgets and history of being used for political purposes. Furthermore, NASA may have created another space race, this time between government and private industry. If NASA doesn't go to Mars or the asteroid belt, its private competitors certainly have plans to do so.

G. In spite of all of these risks, many argue that it is critical for the private sector and federal government to work together to push further into space. There are a number of problems with commercial space projects.

**Questions:**

Questions 1-6

The passage has seven paragraphs labelled A-F

Which paragraph contains the following information?

**Write the correct letter A-F in boxes 1-6 on your answer sheet.**

1. NASA being able to spend money on important projects ..........
2. events leading to the commercialisation of spaceflight ..........
3. new developments that have made spaceflight more accessible ..........
4. an automated rocket that successfully completed a mission ..........
5. the great dangers of space travel ..........
6. new answers being found to previous questions ..........

Questions 7-11

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

1. Which is NOT mentioned as making private space night possible?
2. new methods of constructing the rockets
3. modern substances from which to build the rockets
4. understanding better how air moves round objects
5. new methods of making space suits
6. Why are the recent launches special?
7. Their destination was the International Space Station.
8. They carried clothes.
9. They were not managed by a private company.
10. The rocket is not owned by a government.
11. In order to make NASA look for other spaceflight providers, the US government
12. invested in private space companies.
13. started to build the international space station.
14. stopped using the Space Shuttle.
15. allowed private companies to fly into space.
16. Private companies-------
17. need to reduce the cost of space projects.
18. have social network sites.
19. are able to fly rockets at high orbits.
20. act as ferries to and from the space station.
21. At present, the private space industry is characterised by-----------
22. uncertainty about how to make profits.
23. companies controlled by individuals.
24. companies too small to raise the amount of money needed.
25. government interference.

Questions 12-17

Complete the summary below.

Choose NO MORE THAN TWO WORDS from the passage for each answer.

Write your answers in boxes 12-17 on your answer sheet.

There are a number of problems with commercial space projects. To start with, the \_\_\_\_\_might not be sound. There is also great\_\_\_\_ attached to space flight - what would happen if there was another \_\_\_\_\_\_\_? Experts doubt whether NASA can fulfil its \_\_\_\_\_\_ as it has often been under\_\_\_\_\_\_\_\_ pressure. Moreover, the development may lead to a \_\_\_\_\_\_\_\_between NASA and the private space industry.