READING PASSAGE 2

*You should spend about 20 minutes on **Questions 14-26**, which are based on Reading Passage 2 on the following pages.*

Questions 14–19

*Reading Passage 2 has six paragraphs, **A–F**.*

Choose the correct heading for each paragraph from the list of headings below.

*Write the correct number, **i-ix**, in boxes 14-19 on your answer sheet.*

List of headings

i	Robots on Earth – a re-evaluation
ii	The barriers to cooperation in space exploration
iii	Some limitations of robots in space
iv	Reduced expectations for space exploration
v	A general reconsideration of human/robot responsibilities in space
vi	Problems in using humans for space exploration
vii	The danger to humans of intelligent machines
viii	Space settlement and the development of greater self-awareness
ix	Possible examples of cooperation in space

14 Paragraph **A**

15 Paragraph **B**

16 Paragraph **C**

17 Paragraph **D**

18 Paragraph **E**

19 Paragraph **F**

Should space be explored by robots or by humans?

A The advisability of humans participating directly in space travel continues to cause many debates. There is no doubt that the presence of people on board a space vehicle makes its design much more complex and challenging, and produces a large increase in costs, since safety requirements are greatly increased, and the performance of the technology providing necessities for human passengers such as oxygen, food and water must be guaranteed. Moreover, the systems required are bulky and costly, and their complexity increases for long-duration missions. Meanwhile, advances in electronics and computer science allow increasingly complex tasks to be entrusted to robots, and unmanned space probes are becoming lighter, smaller and more convenient.

B However, experience has shown that the idea of humans in space is popular with the public. Humans can also be useful; there are many cases when only direct intervention by an astronaut or cosmonaut can correct the malfunction of an automatic device. Astronauts and cosmonauts have proved that they can adapt to conditions of weightlessness and work in space without encountering too many problems, as was seen in the operations to repair and to upgrade the Hubble Space Telescope. One human characteristic which is particularly precious in space missions, and which so far is lacking in robots, is the ability to perform a great variety of tasks. In addition, robots are not good at reacting to situations they have not been specifically prepared for. This is especially important in the case of deep space missions. While in the case of the Moon it is possible for someone on Earth to ‘tele-operate’ a robotic device such as a probe, as the two-way link time is only a couple of seconds, on Mars the two-way link time is several minutes, so sending instructions from Earth is more difficult.

C Many of the promises of artificial intelligence are still far from being fulfilled. The construction of machines simulating human logical reasoning moves towards ever more distant dates. The more the performance of computers improves, the more we realise how difficult it is to build machines which display logical abilities. In the past it was confidently predicted that we would soon have fully automated factories in which all operations were performed without any human intervention, and forecasts of the complete substitution of workers by robots in many production areas were made. Today, these perspectives are being revised. It seems that all machines, even the smartest ones, must cooperate with humans. Rather than replacing humans, the present need appears to be for an intelligent machine capable of helping a human operator without replacing him or her. The word ‘cobot’, from ‘collaborative robot’, has been invented to designate this type of robot.

D A similar trend is also apparent in the field of space exploration. Tasks which were in the past entrusted only to machines are now performed by human beings, sometimes with the aim of using simpler and less costly devices, sometimes to obtain better performance. In many cases, to involve a person in the control loop is a welcome simplification which may lower the cost of a mission without compromising safety. Many operations originally designed to be performed under completely automatic control can be performed more efficiently by astronauts, perhaps helped by their ‘cobots’. The human-machine relationship must evolve towards a closer collaboration.

E One way this could happen is by adopting the Mars Outposts approach, proposed by the Planetary Society. This would involve sending a number of robotic research stations to Mars, equipped with permanent communications and navigational systems. They would perform research, and establish the infrastructure needed to prepare future landing sites for the exploration of Mars by humans. It has also been suggested that in the most difficult environments, as on Venus or Jupiter, robots could be controlled by human beings located in spaceships which remain in orbit around the planet. In this case, the link time for communication between humans and robots would be far less than it would be from Earth.

F But if space is to be more than a place to build automatic laboratories or set up industrial enterprises in the vicinity of our planet, the presence of humans is essential. They must learn how to voyage through space towards destinations which will be not only scientific bases but also places to live. If space is a frontier, that frontier must see the presence of people. So the aim for humankind in the future will be not just the exploration of space, but its colonisation. The result of exploring and living in space may be a deep change in the views which humankind has of itself. And this process is already under way. The images of Earth taken from the Moon in the Apollo programme have given humankind a new consciousness of its fragility, its smallness, and its unity. These impressions have triggered a realisation of the need to protect and preserve it, for it is the place in the solar system most suitable for us and above all it is the only place we have, at least for now.

Questions 20 and 21

*Choose **TWO** letters, **A–E**.*

Write the correct letters in boxes 20 and 21 on your answer sheet.

According to the writer, which **TWO** predictions about artificial intelligence have not yet been fulfilled?

- **A** Robots will work independently of humans.
- **B** Robots will begin to oppose human interests.
- **C** Robots will be used to help humans perform tasks more efficiently.
- **D** Robots will think in the same way as humans.
- **E** Robots will become too costly to use on space missions.

Questions 22–26

Complete the summary below.

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

Write your answers in boxes 22–26 on your answer sheet.

Humans in space – the Mars Outposts approach and its implications

One way of exploring space would be through collaboration between humans and robots. For example, when exploring the planet Mars, robots could be used to set up **22** _____ and do initial research before humans arrive. In other cases, humans could stay in orbiting **23** _____ and give orders to robots working on the surface of the planet. This would increase the speed of **24** _____ with the robots.

In such ways, robots might be used to work in space in commercial enterprises or **25** _____. However, the final aim of humankind may be the **26** _____ of space, and this could in turn change people's attitudes towards Earth.

List of Headings（Q14–19）

题号	答案	精确定位句（第X段）	解释（同义改写 / 选择理由）
14 (A)	**vi**	“the presence of people on board a space vehicle makes its design much more complex… produces a large increase in costs… the systems required are bulky, and costly”（第A段）	通篇在说**有人参与的困难与代价**（复杂、昂贵、体积大、长期任务复杂度上升），对应 *Problems in using humans for space exploration*。
15 (B)	**iii**	“robots… lack… the ability to perform a great variety of tasks… are not good at reacting to situations they have not been specifically prepared for… on Mars the two-way link time is several minutes”（第B段）	重点是**机器人在太空的局限**：不够多能、对突发反应差、火星通信延时大。对应 *Some limitations of robots in space*。
16 (C)	**i**	“Many of the promises of artificial intelligence are still far from being fulfilled… forecasts of the complete substitution of workers by robots… are being revised… machines… must cooperate with humans… ‘cobot’”（第C段）	讨论的是**地球上对机器人的再评估**（从“完全替代”转向“协作”），对应 *Robots on Earth – a re-evaluation*。
17 (D)	**v**	“A similar trend is… in space exploration… involve a person in the control loop… operations… under completely automatic control can be performed more efficiently by astronauts, perhaps helped by their ‘cobots’. The human–machine relationship must evolve towards a closer collaboration.”（第D段）	明确提出**在太空重新分配人/机职责并走向协作**，对应 *A general reconsideration of human/robot responsibilities in space*。
18 (E)	**ix**	“Mars Outposts… sending a number of robotic research stations to Mars… It has also been suggested… robots could be controlled by human beings located in spaceships in orbit…”（第E段）	给出**具体协作范例**：先发机器人前站、轨道飞船遥控，通信时延更短。对应 *Possible examples of cooperation in space*。
19 (F)	**viii**	“the presence of humans is essential… not just the exploration… but its colonisation. The result of exploring and living in space… a new consciousness… of Earth’s fragility… need to protect and preserve it”（第F段）	讲**太空定居**与**更强自我/地球意识**的形成，正对 *Space settlement and the development of greater self-awareness*。

Multiple Choice（Q20–21）

题干：“Which TWO predictions about artificial intelligence have **not yet** been fulfilled?”

题号	答案	定位句	解释（同义改写 / 排除）
20	**A**	“fully automated factories in which all operations were performed without any human intervention… are being revised… machines… must cooperate with humans”（第C段）	过去预测“**完全独立于人类**工作”（A）并未实现；现在强调“必须与人类合作”。
21	**D**	“we realise how difficult it is to build machines which display logical abilities”（第C段）	等价于还未实现让机器人“**像人类一样思考**”。

排除： B（反对人类利益）文中未提；C（帮助人类更高效）**正在发生**（cobots）；E（成本过高）无此预测/信息。

Summary Completion（Q22–26，ONE WORD ONLY）

空格	答案	精确定位句（第X段）	解释（同义改写 / 语法）
22	**infrastructure**	“They would perform research, **and establish the infrastructure** needed to prepare future landing sites for the exploration of Mars by humans.”（第E段）	概述句：*robots could be used to set up 22 ___ and do initial research before humans arrive.* 这里把第E段的两个并列谓语 (perform research / establish the infrastructure) 压缩到“set up … and do initial research”，因此取 **infrastructure** 与 “before humans arrive/prepare future landing sites” 逻辑正好对应。
23	**spaceships**	“robots could be controlled by human beings located in **spaceships** which remain in orbit around the planet.”（第E段）	概述句：*humans could stay in orbiting 23 ___ and give orders…* 与原文 “located in **spaceships**… in orbit” 完全重合。
24	**communication**	“in this case, the link time for **communication** between humans and robots would be far less than it would be from Earth.”（第E段）	概述句：*increase the speed of 24 ___ with the robots* ↔ “link time for **communication** … far less” ＝通信更快。注意这里用不可数 **communication**（行为/过程），不同于前文 “communications… systems”（可数，系统）。
25	**laboratories**	“a place to build automatic **laboratories** or set up industrial enterprises in the vicinity of our planet”（第F段）	概述句：*work in space in commercial enterprises or 25 ___* 与原文并列完全对应：**enterprises / laboratories**，均用复数。
26	**colonisation**	“the aim… will be… not just the exploration of space, but its **colonisation**.”（第F段）	同词复现。注意英式拼写 **colonisation**（题目要求 “from the passage”）。