

 Questions 31–40

21 Complete the notes below.

Write **ONE WORD ONLY** for each answer.

### The Challenges of Living in Space

#### Living on the International Space Station (ISS)

- Astronauts spend months in microgravity, so
  - their blood moves to their head and **31** .....
  - they lose minerals such as **32** .....
  - they have to exercise 2.5 hours to avoid **33** ..... loss.
  - they may suffer from poor **34** ..... back on Earth.
- NASA continues to improve ways to recycle water, including **35** .....

#### Building on the moon or Mars

- Engineers and architects must either use materials which
  - are **36** ..... enough for transport.
  - can already be found on the moon or Mars.
- Rocks and minerals could be used to make metal, brick and possibly **37** ..... for buildings.
- NASA still needs to find a way to make large **38** .....
- People could use virtual reality
  - to visit places like a **39** .....
  - to get a new **40** .....

## LISTENING PART 3

### Questions 21–30

- 21 A** Oliver suggests the introduction includes something on why ‘restoration is necessary’, and gives examples: damage by water, insects and sunlight.  
*Distraction C:* Chloe suggests starting with a definition, but Oliver says this isn’t necessary. Therefore, the students don’t agree; B: Oliver gives examples of why restoration work might be required, but doesn’t talk about situations when restorers have not done their work well.
- 22 B** Chloe assumes that the restorers would have a background in a subject such as art history, but discovers some of the restorers studied chemistry and archaeology. Oliver also expresses surprise that these kinds of skills were required.  
*Distraction A:* Chloe does mention a painting requiring a year to clean, but neither student expresses surprise about this length of time; C: Oliver says the restorers have to experiment with cleaning methods, but this does not appear to surprise him. We also can’t assume that ‘methods’ and ‘materials’ are the same thing.
- 23 A** Oliver says he wouldn’t like the pressure of having to please the people who owned a painting he was restoring.  
*Distraction B:* Oliver talks about working at heights [= ‘restoring the paintings high up on a church ceiling’] but says this might be interesting, not off-putting; C: Chloe makes a joke about Oliver not being able to draw, but this is not the reason for his choosing not to work in art restoration.
- 24 A** Chloe says that the person who bought the Dutch landscape probably thought a whale spoiled the picture. Oliver agrees [= ‘You must be right’] and says that ‘not everyone judges a painting in the same way’.  
*Distraction B:* Chloe explains that people had viewed the landscape painting for a long time without realising what the artist had originally included. ‘Undervalued’ suggests that people viewing the picture in the gallery hadn’t appreciated the painting or understood its financial worth, but Chloe does not suggest this; C: We are told that the painting was cleaned, but there is no information about the cleaning technique being particularly good or new.
- 25 C** Oliver says digital reproduction techniques make it possible for many copies of a painting to be made,

and therefore more people can see the painting. He says he likes this development.

*Distraction B:* Oliver makes the point that people who make digital reproductions are not pretending that their paintings are originals – unlike dishonest people who sell fakes.

- 26 C**  
**27 A**  
**28 D**  
**29 B**  
**30 F**

## LISTENING PART 4

### Questions 31–40

- 31 chest**  
*Distraction* ‘feet’ might be tempting but we are told blood is pulled towards the feet on Earth, not in space.
- 32 calcium** This is the only mineral given as an example.
- 33 muscle** Another way of saying ‘muscle loss’ is ‘their muscle begins to waste’.
- 34 vision** We are told that microgravity can lead to astronauts not being able to see clearly, and that their vision can be permanently affected.
- 35 sweat** Because of the word ‘including’ in the question, we know that the key must be a form of water.
- 36 light**  
*Distraction* ‘expensive’ might be tempting but the speaker explains that engineers want to make light materials so that transport doesn’t have to cost so much.
- 37 paint**
- 38 windows** ‘Large windows’ is expressed as ‘to increase the size of the windows on the ISS. They’re very small.’
- 39 museum**  
*Distraction* ‘exhibits’ might be tempting, but they are objects, not places. Also, because the word begins with a vowel, it wouldn’t work with the article ‘a’ in the question.
- 40 qualification**  
*Distraction* ‘education’ might be tempting but this word doesn’t collocate with ‘get a new’.



Q25 *Oliver:* I guess the difference between a digital reproduction and a fake painting is no-one's pretending it was painted by the original artist. And what I like about digital reproduction is you could potentially make lots of copies – so a wider audience can see them.

*Chloe:* Maybe. I'd rather look at the real painting.

Now listen and answer questions 26 to 30.

*Chloe:* OK, so if we're talking about digital reproduction of art, we have to mention the company Factum Arte, and how they reproduced famous paintings that had been lost or damaged – so they can go on public display.

*Oliver:* Good idea.

*Chloe:* Let's note down the challenges the team faced. What about Vincent van Gogh's *Six Sunflowers*? The original painting was destroyed. The team had a photo of it, but it wasn't very clear.

Q26 *Oliver:* Right. They couldn't see how Van Gogh had used his brush. They knew the National Gallery had a nearly identical sunflower painting by Van Gogh – and so they had to ask the gallery whether the team would be allowed to study and scan it – so they could reproduce the brushstrokes in the right way.

*Chloe:* They got approval in the end.

*Oliver:* What about *The Concert*? The original was stolen, right?

Q27 *Chloe:* The team had a photo they could use, but the problem was – it was a photo of *The Concert* after someone had tried to touch it up with fresh paint.

*Oliver:* And they'd done a terrible job, hadn't they?

*Chloe:* Yes. But the team were happy with the reproduction in the end. We should mention the *Portrait of Sir Winston Churchill*.

*Oliver:* Churchill hated that portrait. So his wife burnt it, and nothing was left.

Q28 *Chloe:* So, the Factum Arte team had to search for the pencil sketches the artist had also made of Churchill as part of his preparation.

*Oliver:* Right. For me, I was most interested in *The Water Lilies*.

*Chloe:* By Claude Monet. In that case, the painting wasn't lost, but the top layer of paint had turned completely black because of smoke from a fire.

Q29 The team had to work out what the colours beneath that layer had been.

*Oliver:* And then there was *Myrto* – a painting by Tamara de Lempicka. No-one knows for sure what happened to the original. At least the team had a black and white photo they could work from.

Q30 *Chloe:* But they needed to know what colours Lempicka would have used. And most of her other paintings are held in private collections. Because of that, they couldn't go and see them. That's a shame because...



## 21 LISTENING PART 4

You will hear a student giving a presentation about the challenges of living in space.

Now listen carefully and answer questions 31 to 40.

*Student:* Hello everyone. So I'd like to tell you about some of the challenges of living in space. We'll start with the International Space

Station – or ISS, as it's often called. The ISS has been in space – in orbit around the Earth – since 1998. Over 200 astronauts have lived on board – and one of the biggest challenges for them is living in microgravity. So what happens when you're living in microgravity 24 hours a day for months? For a start, it affects your blood circulation. On Earth, your blood would naturally be pulled towards your feet, but in space, it goes to your head. And we'll talk a bit more about the consequences of that later. But it also goes to your chest – and that's why astronauts have to be careful about their blood pressure. Microgravity also affects the minerals stored inside your body. Over time, for example the amount of calcium inside your bones begins to decrease, so the bones become weaker. Yes, it's not much fun living in space. The astronauts have to maintain a very strict exercise programme – they do 2.5 hours of exercise six days a week. If they don't, what happens is that their muscle begins to waste. Some of it also turns into fat. And one final problem that some astronauts experience – they find that when they get back to Earth, they can't see clearly. Scientists aren't exactly sure why this happens, but it seems that the astronauts' vision can be permanently affected.

Another challenge with living in the ISS is – you have to take everything you need with you. So space agencies like NASA are constantly improving the way they recycle things. Water, of course, is a vital resource, and every little bit counts. That means that even the sweat that the astronauts produce is recycled. I know that doesn't sound very nice – but NASA says their water is purer than anything you'd drink on Earth.

Now listen and answer questions 36 to 40.

*Student:* So what's next? Humans are already living in space – in the space station – but now the goal is to live on the moon or Mars. For this, we need to make buildings, and the challenges for engineers and architects are even harder. It's incredibly expensive to transport materials into space, so they need to be as light as possible. The alternative is to use materials which already exist on the moon or Mars – and this does seem to be the sensible way forward. So to make buildings on the moon, for example, we could use rock, and the moon also has plenty of useful minerals. These can be made into metal, into brick... and some engineers are also suggesting they could produce paint. So it seems everything we need for a basic building might already be on the moon. Actually there's one thing that NASA hasn't managed yet, and that's to increase the size of the windows on the ISS. They're very small – and if people were going to live in buildings on the moon, this is something NASA still has to work on.

So, even if we manage to create a network of buildings for people to live in on the moon or Mars – and grow food, and be self-sufficient – they would still need mental stimulation, and opportunities to relax and stay in touch with what was happening back on Earth. Virtual reality could be the answer. Imagine you're living on the moon but you could use virtual reality to walk around a museum and see all the exhibits. That would be incredible. And by using virtual reality, you could continue your education, by say, studying for a qualification that might be useful in your current environment, or once you're back on Earth. Now Mars is a different...

