READING PASSAGE 3

*You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 below.*

Questions 27-32

*Reading Passage 3 has seven paragraphs **A–G**.*

*Choose the correct heading for paragraphs **B–G** from the list of headings below.*

*Write the correct number **i–viii** in boxes 27-32 on your answer sheet.*

List of Headings

i	Less is more
ii	Research can't guarantee safety
iii	Unexplained symptoms
iv	Setting the limits of acceleration
v	The irresistible appeal of speed
vi	Gentle surprises
vii	A difficult task
viii	A different ride every time

Example	*Answer*
Paragraph **A**	**vii**

27 Paragraph **B**

28 Paragraph **C**

29 Paragraph **D**

30 Paragraph **E**

31 Paragraph **F**

32 Paragraph **G**

Keeping the Fun in Funfairs

A Fun is becoming a tricky issue for ride designers. In order to increase excitement, they have been ramping up the accelerations to create the most dizzying forces possible. But getting it right is far from easy. Err on the side of caution and people won't bother with a second ride; go too far, however, and they may not be able to. Experts realise we are now at the limit of how much acceleration a human body can take, and designers are finding it hard to think up ways of keeping the public coming back for more. The problem is that true innovation has been lacking for a while, and fair-ground rides have become more about survival than actual enjoyment. So if our thrill-seeking bodies can really take no more, what's going to keep dragging us back to amusement parks? Creating something new and exciting, yet safe, is going to take some careful thought.

B When the Disney Corporation asked German designer Walter Stengel to design a giant loop ride for them in the 1970s, he went to NASA, the aeronautics and space administration, to discover the effects of sustained acceleration on pilots. NASA's research suggests that the maximum level we can endure is 9 g (g is the standard unit of acceleration due to gravity). Go much beyond that and pilots pass out; go further still and they suffer serious internal damage. So Stengel decided that the maximum vertical acceleration for the public should be 6 g, and then only for a second or so. What's more, he put firm restrictions on the rate at which acceleration can increase – you'll never go down a 45-degree ramp into a tight circular loop, for instance.

C But stricter safety limits only intensify the need to search for novel ways to thrill customers. Part of the problem is that no matter how exciting an attraction is, after a few rides passengers will have some idea of what to expect. The next stage in designing rides, however, could throw predictability out of the window. This step has already been taken in the most recent waltzers (or tea-cup rides). Ride a waltzer and you sit in a car that spins on its own axis; the car is on a huge platform that also rotates. In the past you could take comfort from the fact that the spin was tightly controlled by gears that turned your car at a rate determined by the rotation speed of the whole ride. But the latest generation of waltzer cars spin freely, at a rate determined by the weight and position of the people in them. So you never have the same experience twice. "People seem to like these 'chaotic rides'," says Stengel.

D Although seemingly a passport to endless thrills, chaos does have one rather obvious drawback – it's unpredictable. Despite complex calculations, designers can never be completely sure that something odd won't happen, especially since freely turning systems occasionally hit a resonance frequency. For example, if pushed at a particular frequency, a child on a swing would go over the top of the swing's frame. Similarly, if you drive a revolving waltzer car at its resonance frequency it could speed up uncontrollably. This could be very hazardous, according to Stengel. If a ride is subjected to unforeseen stresses, no one can guarantee that it will be able to cope.

E No one even knows what the safe limits of rotational force are, let alone its effect on the human body. Stengel has worked with the German Air Force, rotating volunteers head over heels while also making them cartwheel or pirouette like ballet dancers. It emerged that if the pilots were turned on all three axes simultaneously, they became so nauseous they almost blacked out, and when they got off they couldn't walk. But what Stengel found particularly puzzling was that they also developed headaches and other problems about two days later. Since these effects aren't understood, he tries to limit how people on his rides are rotated. People want to enjoy fun, not pain.

F With that goal in mind, Stengel feels that flinging people around in ever more chaotic machines is no longer the way forward. He believes that the sequence of accelerations, not their size, is what counts and that the way to make rides more fun is to put people through a carefully designed succession of relatively small accelerations. Other experts in this field agree, and it seems likely that designers could formulate profiles even for existing attractions that would lead to higher amusement value. Recent experiments testing the tolerances of Dutch military pilots to a range of accelerations have shown that tumbling around in machines doesn't have to be unpleasant – when the force is kept low, the subjects actually enjoy the experience.

G The fun seems to come from the unforeseen, particularly when an effect called the Coriolis illusion comes into play. This is an agreeable tumbling feeling which occurs, for example, when the head is suddenly tilted while the subject is spinning with eyes closed. It appears that a roll which includes, for instance, an unexpected change of acceleration from a small negative g – a feeling of weightlessness – to a small positive g – a slight crushing sensation – has an extraordinary effect on people. If the theories of Stengel and other experts really do work, fair-ground fun might one day be measured in smiles, not screams.

Questions 33-37

Complete the sentences below.

*Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.*

Write your answers in boxes 33-37 on your answer sheet.

33 Some attractions, such as the new type of waltzers, depend on both the _____ and _____ of their passengers in order to create a variety of ride experiences.

34 Designers need to be aware that a "chaotic" ride could accelerate at a violent rate if it reaches its _____.

35 Research has shown that people will begin to feel ill if they are subjected to movement on all _____ at the same time.

36 Volunteers in Stengel's rotation tests suffered delayed reactions such as _____.

37 A phenomenon known as the _____ produced a pleasurable sensation in test subjects.

Questions 38-40

Do the following statements agree with the claims of the writer of Reading Passage 3?

In boxes 38-40 on your answer sheet, write

YES	*if the statement agrees with the claims of the writer*
NO	*if the statement contradicts the claims of the writer*
NOT GIVEN	*if it is impossible to say what the writer thinks about this*

38 There is still a lot to be learnt about the rates of acceleration that people can withstand.

39 Children enjoy funfairs more than adults.

40 Current rides could probably be adapted to become more enjoyable.

27-32 选标题（List of Headings）

题号	段落	正确标题	中文解释（关键词 & 推理）
27	B	**iv 设定加速度极限**	迪士尼请 Walter Stengel 设计巨型环形过山车，他先去 NASA 查人类**可承受的最大 g 值**，并规定垂直方向最多 6 g、且只持续一瞬，还限制加速度爬升速率——整段都在讲“把安全上限定出来”。
28	C	**viii 每次都是不同的体验**	新一代 waltzer（茶杯）“**自由旋转**”，速度由乘客的**体重和坐姿**决定，因此“你**永远不会两次坐到同样的体验**”。
29	D	**ii 研究不能保证安全**	虽有“复杂计算”，但设计师**永远无法百分百确定**不会出问题；自由旋转系统可能触发共振，出现无法预测的危险。
30	E	**iii 无法解释的症状**	把受试者在三个轴同时旋转后，他们不仅当场想吐，还出现**两天后才冒出的头痛等症状**，“这些效应尚未被理解”。
31	F	**i 适度即乐趣**	Stengel 主张用**一连串较小的加速度**而非单次大冲击来提高乐趣；荷兰实验也表明，“当力值较低时，翻滚其实很愉快”。
32	G	**vi 温和的惊喜**	乐趣来自“出其不意的小变化”，例如 **Coriolis 幻觉**——轻微由负 g 转正 g 的“滚动”带来愉快感觉，是**温和**而又**惊喜**的刺激。

33-37 句子填空（NO MORE THAN TWO WORDS / NUMBER）

题号	答案	定位与理由
33	**weight and position**	C 段：新 waltzer “spin freely, at a rate determined by the **weight and position** of the people”。题干说“依赖乘客的 ___ 以产生多样体验”，正是这两个因素。
34	**resonance frequency**	D 段：若在共振频率下驱动，“车厢会失控加速”。题干提到“若达到其 ___，混乱型设施可能剧烈加速”。
35	**three axes**	E 段：受试者若在 **all three axes** 同时旋转就会呕吐。
36	**headaches**	E 段：两天后出现 **headaches** 等延迟反应。
37	**Coriolis illusion**	G 段：Coriolis illusion 造成“令人愉快的翻滚感”，题干对应。

38-40 判断题（YES / NO / NOT GIVEN）

题号	答案	依据 & 说明
38	**YES**	E 段开头：“甚至没人知道旋转力的安全极限”，说明对可承受加速度仍有很多未知。
39	**NOT GIVEN**	全文未比较**儿童**与成人对游乐场的喜爱，只用“荡秋千”作共振类比，没有提及谁更喜欢。
40	**YES**	F 段：专家认为“即便是**现有项目**也能通过重新设计加速度序列来提升乐趣”，说明可以改进现有设施。