英　　語

1. 監督者の指示があるまで開かないでください。
2. 試験開始後，解答用紙に受験番号・氏名を忘れないで記入してください。
3. 試験開始後，問題冊子に落丁や乱丁がないか確認し，落丁・乱丁があった場合は挙手してください。
4. 解答は解答用紙に記入してください。
5. 解答用紙は科目の試験終了後回収します。
6. 問題冊子は科目の試験終了後，持ち帰って結構です。

次の文章を読み，設問に答えなさい。

Virtual reality—often referred to as "VR"—used to be science fiction. Today, it's everywhere. All you need is a smartphone and a headset to immerse yourself in 3-D virtual worlds or games. This booming technology may also _____.

"In the last few years, there's been a huge (A) of exciting clinical applications of virtual reality," says Dr. Andrew Huberman, a VR researcher at Stanford University.

NIH-funded researchers are finding that VR may help with many areas of medicine. These include tailoring rehabilitation exercises, improving mental health, and (B).

Scientists have been testing VR to treat movement problems. These can be caused by a stroke, a brain injury, Parkinson's disease, or other conditions. Rehabilitation exercises can sometimes help people train their muscles to improve their movement. But these exercises can be boring—(C).

Dr. Amy Bastian, a movement specialist at the Kennedy Krieger Institute, is using VR to make rehabilitation exercises more engaging for kids. It also lets her team (D) to individual children's needs.

"With VR, we can do things that are really hard to do in real-world therapy," Bastian says. "If we want you to learn to reach and control your balance in one direction, we can make all the game (E) things in that direction."

VR can also help kids who have trouble following directions, she explains. "We can say something like, 'just punch the red things.' (F)"

Bastian is also developing VR exercises for adults who have damage to the cerebellum, the part of the brain that coordinates movement. (G)

The team is testing whether other parts of the brain can be taught to coordinate movements instead. (H)

That's why her team is putting people into a VR scene where their bodies don't exist. They must

reach for targets with now-invisible limbs. (I)

Coins fall from the virtual sky when the person makes a smooth movement to grab an object. This instant feedback for a successful movement is vital for the brain to forge new learning pathways, Bastian explains. "(J)"

Huberman is using VR to test techniques to help people cope with fear and anxiety. VR is ideal for studying such mental states, he explains.

"Vision, more than any other sense, is the sense that humans use to (K) and survive. And, more than any other sense, it drives phobias and anxiety."

What you see can be easily manipulated using a virtual environment. His team is using this aspect of VR to help people learn to (L).

"We can (M) that are very realistic," Huberman explains. "We can create an experience that's a little bit threatening, or one that's very threatening."

VR can show people scenes of sharks or spiders, (N) on top of a building, or have them standing in front of a crowd to speak.

After their participants have one of these VR experiences, the team teaches them ways to (O) discomfort. These include focused breathing exercises and other techniques.

The researchers then (P) into the stressful VR environment to see if the techniques can help them reduce their anxiety in the moment.

A unique advantage of VR, Huberman explains, is that researchers can directly (Q). These include changes in eye movements and pupil size.

The study is still in progress, but Huberman says the training seems to (R) with their anxiety.

In addition to helping people process uncomfortable mental experiences, VR may help people cope with physical discomfort. Researchers are testing how VR can help reduce the pain from certain

medical procedures.

Dr. Sam Sharar, a pain expert at the University of Washington, uses VR to distract children and adults who are recovering from burns.

(S) Drugs that reduce pain often provide only partial relief for people with burn injuries.

(T) This happens even though the same pain signal is coming through the skin."

(U) It also has a game where people hit a target to distract more of their attention.

The team's studies have shown that the immersive program reduced people's pain during burn care by half compared with playing a regular video game.

(V) His team and others are now using VR to expand access to techniques that have proven to help people manage chronic pain, like cognitive behavioral therapy (CBT).

"If VR could be used to deliver this type of therapy in an immersive, virtual environment," Sharar says, "I think that would have tremendous potential to improve self-management of pain."

(W) Such improvements could potentially open doors to its use in more areas of health care. See the Wise Choices boxes to learn more about NIH-funded studies testing VR.

[Adapted from: "Beyond Games: Using Virtual Reality to Improve Health"
NIH News in Health, July 2019.
URL: https://newsinhealth.nih.gov/2019/07/beyond-games]

問 1. 本文中の一段落目の下線部に入る７語を英語で解答用紙に書きなさい。

問 2. 本文中の(A)～(E)それぞれに入る最も適切なものを，選択肢１～５の中から一つ選び，その番号を書きなさい。但し，選択肢１～５は一回しか使えません。

1. components move
2. especially to kids
3. expansion in the number
4. reducing pain
5. tailor the exercises

問 3. 本文中の(F)～(J)それぞれに入る最も適切なものを，選択肢１～５の中から一つ選び，その番号を書きなさい。但し，選択肢１～５は一回しか使えません。

1. This type of brain injury makes people's movements jerky and uncoordinated.
2. This can get them to do all kinds of complex tasks.
3. In VR, we can manipulate the environment in real time to help them learn to use another brain system.
4. But this can't happen if the eyes can see the body, because the damaged cerebellum tries to take over.
5. Because the people can't see their arms, other brain areas must take over to complete the task.

問 4. 本文中の(K)～(R)それぞれに入る最も適切なものを，選択肢１～８の中から一つ選び，その番号を書きなさい。但し，選択肢１～８は一回しか使えません。

1. be helping people
2. create experiences
3. manage their fears
4. manage their stress and
5. measure signs of anxiety
6. navigate the world
7. put people back
8. put them high

問 5. 本文中の(S)～(W)それぞれに入る最も適切なものを，選択肢１～５の中から一つ選び，その番号を書きなさい。但し，選択肢１～５は一回しか使えません。

1. His team and others developed a VR program that places people in a freezing cold virtual world. It engages their eyes and ears to block out what's happening to their skin.

2. Sharar and other researchers continue looking for ways to use virtual environments to provide more effective pain relief. For people with chronic pain, which lasts for more than three months, using VR distraction hasn't been found to be helpful.

3. Sharar believes VR can relieve pain by distracting the brain. "People have a fixed amount of conscious attention," he says. "If you divert some of that from experiencing a painful procedure to another task, the brain experiences less pain.

4. VR continues to drop in cost and grow in popularity, Huberman adds. He thinks the feedback it can provide to the senses will also continue to improve.

5. "Burn pain can be really, really bad. It's hard to tolerate," Sharar says. For burns to heal, the wounds must be washed and covered again every day. These procedures are very painful.