令和 6 年度
前 期 日 程

英　　語

医学部医学科・応用生物科学部共同獣医学科

問 題 冊 子

注意事項

(1) 試験開始の合図があるまで，問題冊子を開かないこと。

(2) 問題冊子は 29 ページで，解答用紙は 5 枚である。問題冊子や解答用紙に，落丁，乱丁，印刷不鮮明のものがあった場合は，ただちに試験監督者に申し出ること。

(3) 受験番号は，5 枚の解答用紙のそれぞれの指定箇所に丁寧に、読みやすい字で記入すること。

(4) 問題は，[1]，[2] および [3] の 3 つの大問よりなる。

(5) 解答は解答用紙の指定箇所に丁寧に、読みやすい字で記入すること。

(6) 解答用紙は，持ち帰らないこと。

(7) 問題冊子は，持ち帰ること。

(8) 各大問の満点に対する配点の比率(%)を次のとおりとする。
[1] は 31 %，[2] は 38 %，[3] は 31 %

(9) 設問は英文で書かれている。

1

Part 1

Questions 1–8 :

Read the following text and fill in the blanks (1)–(8) to complete the sentences. For each blank, you have four choices given below. Choose the correct option and write A, B, C, or D in boxes 1–8 on your answer sheet.

Most people recognize that the knowledge-based, twenty-first-century organization depends ___(1)___ cross-disciplinary collaboration, flattened hierarchies, and continuous innovation. One reason for this is that expertise has narrowed and many fields have splintered into subfields. ___(2)___, the problems that need solving in the world haven't narrowed accordingly. Instead, they've just become more complex. This means that many challenges must be approached by people working together across disciplines. Product design, patient care, strategy development, pharmaceutical research, and rescue operations are just a few of the activities that ___(3)___ cross-disciplinary teamwork.

To ___(4)___ a changing and competitive global economy, organizations must also be able to learn. Expertise in almost any field is a moving target. To keep up with developments in their field, people must become lifelong learners, and success will belong to ___(5)___ can master new skills and envision novel possibilities. Employees must absorb, and sometimes create, new knowledge while executing. Because this process typically happens among individuals working together, ___(6)___ learning — that is, learning in and by smaller groups — is regarded as the primary vehicle for organizational learning. Consequently, to ___(7)___ in a complex and uncertain business environment, people need to both work and learn together. The implications of this new reality are ___(8)___ for leaders, professionals, and anyone working in an organization.

(Adapted from Amy C. Edmondson, *Teaming: How organizations learn, innovate, and compete in the knowledge economy*, Jossey-Bass, 2012, p.1.)

(1)	**A.** on	**B.** in	**C.** at	**D.** to
(2)	**A.** Therefore	**B.** Unfortunately	**C.** Otherwise	**D.** Likewise
(3)	**A.** stand off	**B.** keep out of	**C.** turn down	**D.** call for
(4)	**A.** success	**B.** successful in	**C.** succeed to	**D.** succeed in
(5)	**A.** who	**B.** whom	**C.** those who	**D.** those whom
(6)	**A.** collective	**B.** professional	**C.** individual	**D.** passive
(7)	**A.** break	**B.** drop	**C.** excel	**D.** give
(8)	**A.** idle	**B.** trivial	**C.** vague	**D.** enormous

1

Part 2

Questions 9–15 :

Read the following text, choose from A–I the phrase that fits each blank (9)–(15) and write the letter on your answer sheet. There are two extra options that are not used.

With more than a billion cattle worldwide contributing up to six per cent of global greenhouse gas (GHG) emissions, innovators and farmers are working together to find ways to transform farming ___(9)___. And cattle aren't the only farm animals that emit methane. Sheep and goats do, too, meaning ___(10)___.

In the United States, ArkeaBio is joining the handful of companies worldwide seeking a vaccine to reduce methane emissions from farm animals. Companies that are developing such a vaccine vary in their predictions of how much methane could be eliminated, ___(11)___.

Development is particularly tricky because the vaccine must work on specific microbes in such a way that does not upset an animal's normal digestive processes. It also must be strong ___(12)___. Affordability is a key consideration as ranchers and farmers, particularly those with larger herds, will not be able to spend money and time ___(13)___. The farmers must also be able to easily integrate the new technology into existing work processes, especially those whose animals graze, rather than feed in a barn.

ArkeaBio is working towards a commercial availability date for its affordable and scalable technology of either 2025 or 2026 depending on how quickly the company can attain regulatory approval. If a vaccine such as this does become available, it could make ___(14)___. Having recently closed a $12 million (around €11.3 million) round of seed funding, ArkeaBio plans to use the investment to advance the company's research and begin to scale trials ___(15)___.

(Adapted from "A vaccine to reduce methane emissions from livestock", 2022, https://www.springwise.com/innovation/agriculture-energy/a-vaccine-to-reduce-methane-emissions-from-livestock/)

A. across different geographies and systems of farming

B. with estimates ranging from 30 to almost 100 per cent

C. that total livestock emissions are even higher

D. other methane-reducing innovations

E. on regularly recurring vaccination programmes

F. turning animal manure into biogas

G. one of the world's most significant reductions in GHG emissions

H. enough to need only periodic administration

I. into a more sustainable industry

1

Part 3

Questions 16–19 :

Combine three phrases from the table below to complete the conversation. Then, select the option from 1 to 8 that matches your answer.

Example:

Question 0 :

Tyler : How was your weekend?

Sam : Great! I went to see a movie with my friend from high school.

Tyler : _____0_____?

Sam : Yes, I did. It was very exciting!

(A) **Did you**	⇒	(A) **like to see that movie**	⇒	(A) **that is coming out next week**
(B) **Would you**		(B) **see that movie**		(B) **that just came out**

1. (A) → (A) → (A)
2. (A) → (A) → (B)
3. (A) → (B) → (A)
4. (A) → (B) → (B)
5. (B) → (A) → (A)
6. (B) → (A) → (B)
7. (B) → (B) → (A)
8. (B) → (B) → (B)

Answer:

The best combination is:

(A) Did you ⇒ (B) see that movie ⇒ (B) that just came out

Therefore the answer is: 4. **(A) → (B) → (B). So you write:**

0
4

Question 16 :

John : Hello, George, this is John.

George : Where are you?

John : I'm sorry to keep you waiting. I'll be there in thirty minutes.

George : What happened?

John : _____16_____.

George : There's no hurry. Take your time.

(A) **I missed the train at Roma Street and, on**	(A) **the other side, I got on the next train. I tried**	(A) **to make up for this**
(B) **I changed trains at Roma Street and, by**	(B) **mistake, I got on one bound for Robina. I'll buy you lunch**	(B) **to put up with the delay**

1. (A)→(A)→(A)
2. (A)→(A)→(B)
3. (A)→(B)→(A)
4. (A)→(B)→(B)
5. (B)→(A)→(A)
6. (B)→(A)→(B)
7. (B)→(B)→(A)
8. (B)→(B)→(B)

Question 17 :

Linda : Have you heard the proverb, "you are what you eat"?

Peter : No, what does it mean?

Linda : If you eat healthy foods, you will be healthy, and...

Peter : I always eat junk food and fast food.

Linda : _____17_____.

Peter : I suppose you're right. Thank you for the advice.

(A) **Eating junk food regularly may lead to**	(A) **an increased risk of disease. You should**	(A) **be a balanced diet**
(B) **If you don't eat junk food, you will not**	(B) **be cured of a disease. You'll**	(B) **change your diet**

1. (A)→(A)→(A)
2. (A)→(A)→(B)
3. (A)→(B)→(A)
4. (A)→(B)→(B)
5. (B)→(A)→(A)
6. (B)→(A)→(B)
7. (B)→(B)→(A)
8. (B)→(B)→(B)

Question 18 :

Tom : I'm looking forward to seeing Bob for dinner tomorrow.

Riz : Me too! It must be about four years since we saw him.

Tom : He'll be all grown up now.

Riz : Yes, he turned 20 last month.

Tom : I hope he likes the restaurant. What time is the reservation?

Riz : Oops! I _____18_____. I'll book a table somewhere else.

(A) **forgot to reserve a table**	⇒	(A) **last night. We should think twice about whether**	⇒	(A) **the restaurant will be fully booked by now**
(B) **forgot reserving a table**		(B) **for tomorrow night. The chances are**		(B) **he likes the restaurant**

1. (A) → (A) → (A)
2. (A) → (A) → (B)
3. (A) → (B) → (A)
4. (A) → (B) → (B)
5. (B) → (A) → (A)
6. (B) → (A) → (B)
7. (B) → (B) → (A)
8. (B) → (B) → (B)

Question 19 :

Mike : I'm really worried about global warming.

Cavin : Me too. Are you doing anything about it?

Mike : Well, I always turn off the lights when I'm not using them.

Cavin : That's great. I do too, and I replaced all my bulbs with LED ones.

Mike : Nice idea. Also, recycling is important.

Cavin : I agree. _____19_____.

(A) **All the world should cooperate and take action**	⇒	(A) **after climate change**	⇒	(A) **accumulates rubbish**
(B) **Humans are in charge**		(B) **to stop global warming before it**		(B) **is too late**

1. (A) → (A) → (A)
2. (A) → (A) → (B)
3. (A) → (B) → (A)
4. (A) → (B) → (B)
5. (B) → (A) → (A)
6. (B) → (A) → (B)
7. (B) → (B) → (A)
8. (B) → (B) → (B)

Part 4

Questions 20–23 :

Read sentence A, then rearrange the words and phrases in the brackets in B to make a sentence with a similar meaning. In each question, there is ONE word or phrase that is not used. Then, in boxes 20–23 on your answer sheet, write the word or phrase that is not needed to complete the sentence.

Example:

0. **A** : Last night Peter declared his love for Emily.

   B : Peter [that / very / Emily / told / loved / he / last night] her.

The completed sentence B is "Peter told Emily last night that he loved her," and the word "very" in the brackets is unnecessary. So you write:

0
very

Write ONLY the unnecessary word or phrase in the boxes on your answer sheet. Note that completed sentences do not necessarily begin with a capital letter.

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20. **A** : He is a journalist rather than a scholar.

    B : [as / a journalist / a scholar / he / is / much / not / so / than].

21. **A** : We cannot but admire her courage.

    B : [admiring / bravery / cannot / help / her / it / we].

22. **A** : I think that he is honest.

    B : [as / as / be / can / far / he / I / if / know / trusted].

23. **A** : We were completely exhausted by the long discussion.

    B : [conversation / extended / out / the / totally / us / was / wore].

2

Part 1

Questions 24–31 :

Read the following text and choose from A–I the option that fits each blank (24)–(31). Write the correct letter in boxes 24–31 **on your answer sheet. There is one extra option that is not used.**

Scientists Partially Reconstruct Genome of Extinct Mammoth

An international team of scientists has reconstructed about two-thirds of the genome of the woolly mammoth using DNA extracted from balls of hair, the first time this has been accomplished for an extinct species. The project provides some of the starting material that would be required to bring back to life the giant, hairy, cold-weather animals. That task, however, is not ___(24)___ — and may turn out to be impossible. The research offers insight into the history of elephants, however. It may illuminate the evolutionary adaptations that did — and did not — occur in mammoths as their habitat and the climate changed eons ago. The research also suggests that samples of fur, including many in museum collections, may be more useful than scientists thought in studying extinct species. "One can imagine a new field of 'museomics' using the collected samples that are now stored in natural history museums," said Stephan C. Schuster, a biologist at Pennsylvania State University who led the 21-person research team with a colleague, Webb Miller. "This is ___(25)___, which is really cool," said Hendrik Poinar, a molecular biologist at McMaster University in Ontario. He has worked on other projects using "fossil DNA" but was not involved in this one.

Mammoths disappeared about 10,000 years ago when they were hunted to extinction by ___(26)___. The lineages that gave rise to Asian elephants and woolly mammoths diverged from a common ancestor about 7 million years ago. The lineage that led to African elephants had split off less than a million years before that. The researchers, who are reporting their results today in the journal *Nature*, used two samples of woolly mammoth hair. One was from a 20,000 year-old mammoth from Siberia; they paid $130 for a four-ounce handful collected legally by Siberian natives. The other was from ___(27)___ from an animal that died 65,000 years ago. Schuster and his colleagues read the sequence of genetic letters from fragments of DNA inside the shafts of the hair. The DNA is left from cells that produce the hair protein and then stack up and die as the hair grows. The chief advantage of using this source is that the DNA is largely protected from contamination by microbial DNA, which muddies the

picture.

The mammoth DNA had degraded into very short strands of no more than a few hundred bases, or letters of genetic code, strung end-to-end. In intact cells, DNA strands can be tens of millions of bases long. The researchers sequenced 4.17 billion bases and determined that 3.3 billion belonged to the mammoths. The rest were from viruses, bacteria, fungi and other microbes. The researchers identified the mammoth DNA by ___(28)___. Sequences that were extremely close were assumed to have come from the mammoth, not from the microbial contaminants. Elephant and mammoth genomes are very large, probably 4.7 billion bases, considerably longer than the 3 billion-base human genome. This suggests that Schuster and his colleagues captured about 70 percent of the mammoth genome. Their preliminary analysis shows that mammoths and elephants differed by 0.6 percent of their DNA. That is about half the difference between human beings and their closest relatives, chimpanzees.

Elephants evolved in a tropical habitat, and the species surviving today live only in very warm places. Their chief problem is dispersing the heat generated by ___(29)___. Woolly mammoths apparently moved into the Arctic about 2 million years ago. Their chief problem was conserving body heat, exactly the opposite. How mammoths were able to adapt through natural selection to such different conditions — while remaining 99.4 percent identical to elephants — is a matter of intense interest to evolutionary biologists. "It was ___(30)___," said Michael Hofreiter, a molecular geneticist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

Mammoths are among the few mammals that re-evolved the ability to grow thick hair, a capacity their ancestors had lost. They had other heat-saving features, such as small ears and short tails. But the most interesting changes almost certainly involve metabolism, use and storage of fat, and circulation. "That's what we really want to learn — what made a mammoth a mammoth," Poinar said. Curiously, there is evidence that natural selection may ultimately have failed at least one limb of the woolly mammoth family tree. Schuster and his colleagues determined that the 65,000-year-old animal was from a subspecies that died out about 45,000 years ago. That was before there were human beings in Siberia to hunt it. "You have to ask: How can species that made it through so many ice ages suddenly go extinct?" Schuster said. "It seemed that the genetic outfit of that mammoth did not have enough 'plasticity' anymore for it to deal with challenges coming from the environment."

As for bringing mammoths back to life, that is ___(31)___. It would require retrofitting an elephant cell with hundreds of thousands of mammoth-making mutations or building the nucleus of a mammoth cell from scratch — both impossible at the moment. J. Craig Venter, one of the sequencers of the human genome, has synthesized from chemical compounds the

genes of a bacterium, *Mycoplasma genitalium*. "We have not yet booted it up," he said yesterday, referring to the next step of putting the manmade genes into a bacterium whose native genes have been removed to see whether the whole thing will grow and divide. He does not think there will be baby mammoths anytime soon.

(Adapted from David Brown, "Scientists partially reconstruct genome of extinct mammoth", *the Washington Post*, November 20, 2008.)

A. definitely heading in the right direction toward acquiring an extinct genome

B. their massive bodies

C. still firmly the domain of science fiction

D. insects

E. likely to be accomplished soon

F. prehistoric humans

G. a relatively rapid shift, a relatively recent shift and a dramatic change

H. comparing the sequences with the genome of the modern African elephant

I. a specimen

The examination continues on the next page.

2

Part 2

Questions 32–42 :

Read the following text and answer the questions that follow. Write the correct option in boxes 32–42 **on your answer sheet.**

Risky Play: Why Children Love It and Need It

Fear, you would think, is a negative experience to be avoided whenever possible. Yet, as everyone who has a child or once was one knows, children love to play in risky ways — ways that combine the joy of freedom with just the right measure of fear to produce the exhilarating blend known as *thrill*.

Section 1 Six categories of risky play

Ellen Sandseter, a professor at Queen Maud University in Trondheim, Norway, has identified **six categories** (32) of risks that seem to attract children everywhere in their play. These are:

- *Great heights.* Children climb trees and other structures to scary heights, from which they gain a birds-eye view of the world and the thrilling feeling of, *I did it!*
- *Rapid speeds.* Children swing on vines, ropes, or playground swings; slide on sleds, skis, skates, or playground slides; shoot down rapids on logs or boats; and ride bikes, skateboards, and other devices fast enough to produce the thrill of almost but not quite losing control.
- *Dangerous tools.* Depending on the culture, children play with knives, bows and arrows, farm machinery (where work and play combine), or other tools known to be potentially dangerous. There is, of course, great satisfaction in being trusted to handle such tools, but there is also thrill in controlling them, knowing that a mistake could hurt.
- *Dangerous elements.* Children love to play with fire, or in and around deep bodies of water, either of which poses some danger.
- *Rough and tumble.* Children everywhere chase one another around and fight playfully, and they typically prefer being in the most vulnerable position — the one being chased or the one underneath in wrestling — the position that involves the most risk of being hurt and requires the most skill to overcome.
- *Disappearing/getting lost.* Little children play hide and seek and experience the thrill of

temporary, scary separation from their companions. Older ones venture off, on their own, away from adults, into territories that to them are new and filled with imagined dangers, including the danger of getting lost.

Section 2 (33)

Other young mammals also enjoy **risky play**(34). Goat kids frolic along steep slopes and leap awkwardly into the air in ways that make landing difficult. Young monkeys playfully swing from branch to branch in trees, far enough apart to challenge their skill and high enough up that a fall could hurt. Young chimpanzees enjoy dropping from high branches and catching themselves on lower ones just before hitting the ground. Young mammals of most species, not just ours, spend great amounts of time chasing one another around and play fighting, and they, too, generally prefer the most vulnerable positions.

From a perspective rooted in the process of natural selection, the obvious question about risky play is this: Why does it exist? It can cause injury (though serious injury is rare) and even (very rarely) death, so why hasn't natural selection weeded it out? The fact that it hasn't been weeded out is evidence that **the benefits must outweigh the risks**(35). What are the benefits? Laboratory studies with animals give us some clues.

Researchers have devised ways to deprive young rats of play, during a critical phase of their development, without depriving them of other social experiences. Rats raised **in this way**(36) grow up emotionally crippled. When placed in a novel environment, they overact with fear and fail to adapt and explore as a normal rat would. When placed with an unfamiliar peer, they may alternate between freezing in fear and lashing out with inappropriate, ineffective, aggression. In earlier experiments, similar findings occurred when young monkeys were deprived of play.

Such findings have contributed to **the emotion regulation theory** of play — the theory that one of play's major functions is to teach young mammals how to regulate fear and anger. In risky play, youngsters dose themselves with manageable quantities of fear and practice keeping their heads and behaving adaptively while experiencing that fear. They learn that they can manage their fear, overcome it, and come out alive. In rough and tumble play they may also experience anger, as one player may accidentally hurt another. But to continue playing, to continue the fun, they must overcome that anger. If they lash out, the play is over. Thus, according to the emotion regulation theory, play is, among other things, the way that

young mammals learn to control their fear and anger so they can encounter real-life dangers, and interact in close quarters with others, without succumbing to negative emotions.

Section 3 (37)

On the basis of such research, Sandseter wrote, in a 2011 article in the journal *Evolutionary Psychology*, "We may observe an increased neuroticism or psychopathology in society if children are hindered from partaking in age adequate risky play." She wrote this as if it were a prediction for the future, but I've reviewed data indicating that this future is here already and has been for a while.

Briefly, the evidence is this. Over the past 60 years we have witnessed, in our culture, a continuous, gradual, but ultimately dramatic decline in children's opportunities to play freely, without adult control, and especially in their opportunities to play in risky ways. Over the same 60 years we have also witnessed a continuous, gradual, but ultimately dramatic increase in all sorts of childhood mental disorders, especially emotional disorders.

Look back at that list of six categories of risky play. In the 1950s, even young children regularly played in all of these ways, and adults expected and permitted such play (even if they weren't always happy about it). Now parents who allowed such play would likely be accused of negligence, by their neighbors if not by state authorities.

Here — as an admittedly nostalgic digression — are just a few examples of my own play, as a child in the 1950s(38):

- At the age of 5, I took bike rides with my 6-year-old friend all over the village where I lived and into the surrounding countryside. Our parents gave us some limits as to when we had to be back, but they didn't restrict our range of movement. (And, of course, we had no cell phones then, no means of contacting anyone if we got lost or hurt.)
- From the age of 6 on, I, and all the other boys I knew, carried a jackknife. We used it not just for whittling, but also for games that involved throwing knives (never at each other).
- At age 8, I recall, my friends and I spent recesses and lunch hour wrestling in the snow or grass on a steep bank near the school. We had tournaments that we arranged ourselves. No teachers or other adults paid attention to our wrestling, or, if they did, they never interfered.
- When I was 10 and 11, my friends and I took all-day skating and skiing hikes on the

5-mile-long lake that bordered our northern Minnesota village. We carried matches and occasionally stopped on islands to build fires and warm ourselves, as we pretended to be brave explorers.

- Also when I was 10 and 11, I was allowed to operate the big, dangerous, hand-fed printing press at the print shop where my parents worked. In fact, I often took Thursdays off from school (in 5th and 6th grade), to print the town's weekly newspaper. The teachers and principal never complained, at least not that I know of. I think they knew that I was learning more valuable lessons at the print shop than I would have at school.

Such behavior was unexceptional in the 1950s. My parents may have been a bit more trusting and tolerant than most other parents, but not by much. How much of this would be acceptable to most parents and other adult authorities today? Here's an index of how far we have moved: In a recent survey of over a thousand parents in the UK, 43% believed that children under the age of 14 shouldn't be allowed outside unsupervised, and half of those believed they shouldn't be allowed such freedom until at least 16 years of age! My guess is that roughly the same would be found if that survey were conducted in the US. Adventures that used to be normal for 6-year-olds are now not allowed even for many teenagers.

As I said, over the same period that we have seen such a dramatic decline in children's freedom to play, and especially in their freedom to embrace risk, we have seen an equally dramatic rise in all sorts of childhood mental disorders. The best evidence for this comes from the analyses of scores on standard clinical assessment questionnaires that have been given in unchanged form to normative groups of children and young adults over the decades. Such analyses reveal that five to eight times as many young people today suffer from clinically significant levels of anxiety and depression, by today's standards, than was true in the 1950s. Just as the decline in children's freedom to embrace risk has been continuous and gradual, so has the rise in children's psychopathology.

The story is both ironic and tragic. We deprive children of free, risky play, ostensibly to protect them from danger, but in the process, we set them up for mental breakdowns. Children are designed by nature to teach themselves emotional resilience by playing in risky, emotion-inducing ways. In the long run, we endanger them far more by preventing such play than by allowing it. And, we deprive them of fun.

Section 4 (39)

Children are highly motivated to play in risky ways, but they are also very good at knowing their own capacities and avoiding risks they are not ready to take, either physically or emotionally. Our children know far better than we do what they are ready for. When adults pressure or even encourage children to take risks they aren't ready for, the result may be trauma, not thrill.

There are big differences among kids, even among those who are similar in age, size, and strength. What is thrilling for one is traumatic for another. When physical education instructors require all of the children in a gym class to climb a rope or pole to the ceiling, some children, for whom the challenge is too great, experience trauma and shame. Instead of helping them learn to climb and experience heights, the experience turns them forever away from such adventures. Children know how to dose themselves with just the right amount of fear, for them, and for that knowledge to operate they must be in charge of their own play.

Parenthetically, I note that a relatively small percentage of children are prone to overestimate their abilities and do repeatedly hurt themselves in risky play. These children may need help in learning restraint.

An ironic fact is that children are far more likely to injure themselves in adult-directed sports than in their own freely chosen, self-directed play. That's because the adult encouragement and competitive nature of the sports lead children to take risks — both of hurting themselves and of hurting others — that they would not choose to take in free play. It is also because they are encouraged, in such sports, to specialize, and therefore overuse specific muscles and joints.

According to the latest data from the U.S. Centers for Disease Control and Prevention, more than 3.5 million children per year under the age of 14 receive medical treatment for sports injuries. That's about 1 out of every 7 children engaged in youth sports. Sports medicine for children has become a big business, thanks to adults who encourage young pitchers to throw so hard and so often they throw out their elbows, encourage young football linemen to hit so hard they get concussions, encourage young swimmers to practice so often and hard they damage their shoulders to the point of needing surgery. Children playing for fun rarely specialize (they enjoy variety in play), and they stop when it hurts, or they change the way they are playing. Also, because it's all for fun, they take care not to hurt their

playmates. Adults, who get all wrapped up in winning and may hope for eventual scholarships, work against nature's means of preventing damage.

So, we prevent children from their own, self-chosen, thrilling play, believing it dangerous when in fact it is not so dangerous and has benefits that outweigh the dangers, and then we encourage children to specialize in a competitive sport, where the dangers of injury are really quite large. It's time to reexamine our priorities.

What have been your experiences and observations concerning children's risky play? How did you play as a child? How do your children play? Do you allow your children to play freely in the ways that Sandseter has described, and, if so, how do you deal with the social pressure against it?

(Adapted from Peter Gray, "Risky Play: Why Children Love It and Need It", *Psychology Today*, 2014, https://www.psychologytoday.com/intl/blog/freedom-learn/201404/risky-play-why-children-love-it-and-need-it)

Question 32 :

According to the article, what are the common characteristics of the six categories (32) of risks that attract children as classified by Prof. Sandseter?

A. They contain a reasonable amount of risk that adults recommend, and are in an environment where children can play freely.

B. They contain a reasonable amount of risk that adults choose, and are in an environment where children are encouraged to work hard.

C. They contain a reasonable amount of risk that children can handle, and are in an environment where children can play freely.

D. They contain a reasonable amount of risk that children should be deprived of, and are in an environment where adults organize the play.

Question 33 :

Choose the most appropriate title for Section 2.

A. The evolutionary value of risky play

B. The historical value of risky play

C. The market value of risky play

D. The social value of risky play

Question 34 :

According to the article, what is the common feature we can see in risky play (34) of young mammals?

A. They are born to control their fear and anger.

B. They are born to avoid danger that they cannot cope with.

C. They deliberately expose themselves to risks that they cannot endure.

D. They deliberately put themselves into fear-inducing situations.

Question 35 :

According to the article, what does the author mean by the benefits must outweigh (35) the risks?

A. Risky play can prevent young mammals from having a negative experience that they would otherwise encounter in their future lives.

B. Risky play can prevent young mammals from learning emotional recovery.

C. Risky play can provide opportunities to learn how to adapt in situations that young mammals will inevitably encounter in their future lives.

D. Risky play can provide opportunities to overact with fear in difficult situations.

Question 36 :

Based on the information contained in this article, what does the author mean by in (36) this way?

A. Where scientists have come up with methods to prevent young rats from engaging in play without preventing them from having other social encounters.

B. Where scientists have figured out how to get young rats to engage in play without interfering with other social encounters.

C. Where scientists have struggled to find means to allow young rats to engage in play while still allowing them to have other social experiences.

D. Where scientists have struggled to find means to prevent young rats from engaging in play while pressuring them to have other social experiences.

Question 37 :

Choose the most appropriate title for Section 3.

A. The harmful consequences of play deprivation in our culture today

B. The nostalgic digression of play deprivation in our history

C. The revised consequences of play deprivation in our society today

D. The unexceptional digression of play deprivation in our lives today

Question 38 :

Based on the information contained in this article, which of the following is NOT true about the characteristics of children's play in the 1950s(38)**?**

A. The children organized their own play and they sometimes imitated what adults did and had fun playing, feeling like adults.

B. Adults and society were tolerant of what children did, sometimes allowing them to play and behave in ways that would not be tolerated today.

C. Adults and society deprived children of opportunities for free play for the sake of their schooling or to protect them from danger.

D. The attitude of the parents was that, although there were some restrictions, there was a high degree of freedom regarding children's play.

Question 39 :

Choose the most appropriate title for Section 4.

A. Encourage children to give their all in pursuit of success

B. Encourage children to specialize in a competitive sport

C. How to restrict children's freedom to embrace risks

D. Play must be free play, not coerced, managed, or pushed by adults

Questions 40–42 :

The following sentences are a part of a text on another topic written by the same author based on the emotion regulation theory. Complete the sentences below by choosing the most appropriate word A–H below for Questions (40)–(42).

I have heard from many parents who restrict their child's video gaming because they see the intense excitement and emotions, including negative emotions, the child experiences during and sometimes for a period of time after the gaming, and they are worried that this is not good for the child. But research supporting **the emotion regulation theory** indicates that a major purpose of play is to provide (40) at dealing with fear and anger in the relatively safe context of play. In play, children learn that they can experience these emotions and can subsequently calm themselves. They don't have to panic or have a tantrum. There is evidence that children who have been "protected" from experiencing such emotions in play are subsequently less able to deal with the inevitable fear-and anger-producing situations of real life, outside of play.

Consistent with the hypothesis that video gaming helps children learn to (41) their emotions is the evidence that children who played video games for more than five hours a week exhibited (42) mental health difficulties, outside of play, than children who played such games less or not at all. Also, in studies in which they describe their own perceptions of benefits of gaming, gamers often talk about how video play helps them to deal better with the stress and frustrations of their non-play life.

(Adapted from Peter Gray, "Benefits of Play Revealed in Research on Video Gaming", *Psychology Today*, 2018, https://www.psychologytoday.com/us/blog/freedom-learn/201803/benefits-play-revealed-in-research-video-gaming)

Words

A. disrupt
B. practice
C. evidence
D. fewer
E. fun
F. larger
G. more
H. regulate

The examination continues on the next page.

3

Questions 43–53 :

Read the following text and answer the questions below. Write the correct letter in boxes 43–53 on your answer sheet.

Does the Human Lifespan Have a Limit?

Plateau, or no?

One of the first efforts to map the boundaries of human lifespan came from the British mathematician and actuary Benjamin Gompertz in 1825. His analysis of demographic records demonstrated that after a person's late twenties, their risk of dying increased at an exponential rate year after year — suggesting that there is a horizon where that risk finally reaches 100%.

"Gompertz speculated that this was a law equivalent to Newton's law of gravity," says Jay Olshansky, an epidemiologist and gerontologist at the University of Illinois Chicago. Almost 200 years later, Gompertz's work remains influential. His model still seems to accurately map the pattern of age-related mortality for a sizeable portion of the human lifespan, even though medical advances have shifted the timing somewhat.

In 1996, for example, a mathematical analysis by Caleb Finch and Malcolm Pike at the University of Southern California in Los Angeles used the Gompertz model to estimate a maximum human lifespan of around 120 years — a reasonable ceiling, given that only one person had reached that age.

However, the authors also speculated that medical advances in controlling senescence and treating chronic disease could theoretically bend the curve and make that limit a routine life expectancy in the future.

Questions have emerged about the flexibility of Gompertz's model as more and more people reach ages that were considered exceptional a few generations ago. The United Nations estimates that there were 573,000 (45) alive worldwide in 2020 — more than 20 times the number 50 years earlier. And hundreds of people reached the rarefied ranks of the supercentenarians — aged 110 or older — although demographers have validated the records of only a fraction of them. The current longevity record is held by Jeanne Calment, a French woman who passed away in 1997 at the age of 122 years and five months. These trends have fueled debate about just how far we can go. A 2016 study by geneticist Jan Vijg's group at the Albert Einstein College of Medicine in New York City analyzed the maximum reported ages of death in France, Japan, the United States and the United Kingdom, and concluded that

survival past the age of 125 is exceedingly unlikely. This proposal of a *de facto* maximum lifespan proved controversial, drawing numerous published responses that questioned both the statistical methods used and the interpretation of the results.

Two years later, a group led by demographer Elisabetta Barbi at the Sapienza University of Rome challenged Vijg's findings with a study of Italians over the age of 105. The team's data indicated that the Gompertz curve actually plateaus at this extreme age, with mortality risk levelling off to a 50% chance of survival every subsequent year — thus reaching no firm longevity limit. But these findings also became a subject of strong contention.

One of the biggest challenges when studying supercentenarians pertains to poor — or even deceptive — record-keeping. "There are so many misreports," says James Vaupel, a biodemographer at the University of Southern Denmark in Odense who co-authored Barbi's study. Some of these are clerical ___(46)___ or the product of confused reports by extremely elderly individuals with memory problems, he says, but some seem to be instances of fraud by families bidding for fame.

Regardless of the cause, the effect on the data is ultimately the same, says Leonid Gavrilov, a biodemographer who studies human longevity at NORC at the University of Chicago, Illinois. Such errors generally bias the demographic data in a way that suggests a misleadingly reduced risk of mortality at extreme old age, he adds.

Any attempt to survey supercentenarians therefore requires considerable detective work to verify their age. "You have to basically trace the person over their whole life," says Vaupel.

Vaupel points out that Barbi's analysis used rigorously vetted data derived from the International Database on Longevity (IDL). The IDL was developed by a network of gerontologists and demographers, including Vaupel and Jean-Marie Robine, and relies on careful review of birth certificates, baptism records, census details and other sources of information to validate each supercentenarian's claim. Nevertheless, Robine says that "we could still spend a few years more working on the quality of the data" available for supercentenarians.

Indeed, a 2020 study from Gavrilov and his wife and fellow biodemographer Natalia Gavrilova has questioned the utility of even the IDL for making predictions about population-scale longevity trends. Gavrilov thinks that another validated supercentenarian data set maintained by the Gerontology Research Group — a Los Angeles-based network of gerontology researchers — is a better tool for this purpose. Using this data set, he and Gavrilova observed continued sharp growth in the mortality rate beyond the age of 113.

Critics also contend that models of survival at extreme ages run into the inevitable problem of sharply dwindling numbers. "The plateau is a result of having too few people to

generate reliable mortality statistics," says Olshansky. This might result in misleading or inaccurate trends that disappear as more data become available. Indeed, this happened with Gompertz's original model, which lost its predictive power beyond the age of 85, which was extremely old in the nineteenth century.

But Vaupel stands by his findings. "The numbers are serviceable up until age 114," he says. "And if there's a plateau from 105 to 114, there's no reason why that plateau should not continue."

To oldly go

Calment's record survival of 122 years and five months is not only unbroken, but also unrivalled — the nearest contender was Sarah Knauss, who ___(47)___ away at the age of 119 in 1999. The existence of such an extreme outlier has also been a cause of contention. In 2019, Nikolay Zak, a Moscow-based mathematician and economist, claimed that Calment had in fact died decades earlier, and that her identity had been assumed by her then-elderly daughter. "It was a paper attacking my work," says Robine, who is among the researchers who knew Calment and validated her longevity.

The scientific consensus supports Calment's claim. Vaupel notes that the field of 'extreme value theory' mathematics — which assesses the probabilities associated with ultra-rare or even unprecedented events — has shown that such records often go unbroken for many years. In a 2019 paper, he and his colleague Anthony Medford estimated that there was a 20% chance that Calment's achievement might remain unsurpassed by 2050.

The rarity of survival to such advanced ages underlines a greater statistical truth, which holds regardless of whether or not mortality reaches a plateau. "The most optimistic thing you can say is that after age 105, your chance of dying stops going up," says Brandon Milholland, a data scientist at healthcare data company IQVIA in New York City and co-author on the Vijg lab's 2016 paper.

If the plateau is real, the number of living 110-year-olds required to produce a survivor beyond that age would roughly double for each successive year of longevity. "This means the odds of anybody getting to be more than about 120 or 125 are vanishingly small," says Steven Austad. "It's not really the limit that people who talk about limits think about, but it's also not immortality." And if the plateau is merely an artefact, as some contend, the odds shrink even more.

Progress in extending average life expectancy could potentially increase the odds of individuals reaching an extreme old age by creating ever-larger numbers of centenarians. Major advances in preventing infant and child mortality, and in the treatment of chronic and

infectious diseases, have already produced considerable improvement in this metric.

In a 2002 publication, Vaupel noted that life expectancies in Sweden and Japan had increased by as much as three months per year since 1840. Indeed, Japanese women currently have the highest average life expectancy in the world, at 87 years. It remains an open question whether such gains will continue — there has been little improvement in life expectancy in the United States or United Kingdom over the past decade.

But Shripad Tuljapurkar, a biodemographer at Stanford University in California, says that much of this stagnation might be due to the rise in premature mortality from drug and alcohol abuse, suicide and other 'deaths of despair'. In 2018, he and his colleagues showed evidence of a steady improvement in life expectancy for individuals in their 60s in the United States, Japan and Sweden. "From my perspective, the main takeaway is that we are simply able to keep people living longer," he says. "And I don't see a slow-down."

Low- and middle-income countries are at a disadvantage in terms of life expectancy relative to their wealthy peers, but they also have opportunities for major gains. Indeed, World Bank estimates have shown a steady increase to an average life expectancy of 71 years in 2019 — an improvement of six years on the figure two decades earlier.

Robine also thinks that life expectancy is increasing. In a 2021 paper published by the UN, he analyzed French demographic data to monitor the highest age reached by at least 30 individuals who died in a given year, eliminating the confounding effects of rare outliers such as Calment on population-scale longevity. Remarkably, this metric had steadily increased from 99 years in 1946 to 109 years in 2016. "It was just a straight line," says Robine.

But he points out there is robust evidence that we might be experiencing a phenomenon known as compression of mortality, in which populations are generally surviving to older ages without meaningfully pushing the outer limits of longevity. Gavrilov sees a similar pattern. "You have much better survival to age 100," he says, "but the remaining life expectancy at age 100 is the same, with no documented progress in the last 80 years." In other words, the exceptionally elderly are still at the mercy of nature's coin toss.

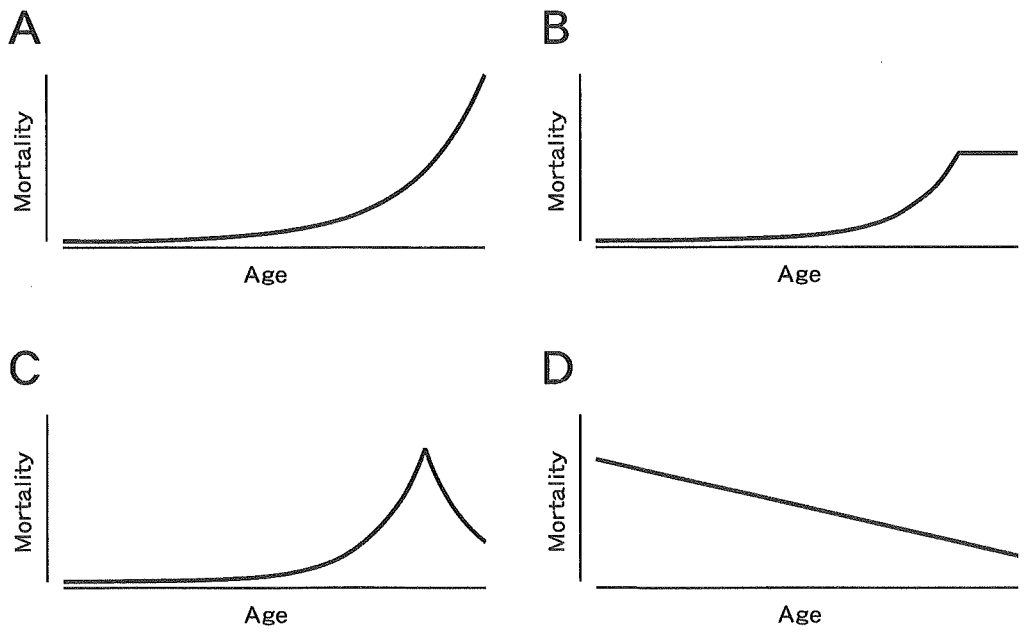
(Adapted from Michael Eisenstein, "Does the human lifespan have a limit?", *Nature,* 601, 2022, S2-S4)

Questions 43–44 :

The graphs below show the relationship between age and mortality. Choose the one (A, B, C, or D) which best fits the concept of each researcher.

(43) Benjamin Gompertz

(44) Elisabetta Barbi



Questions 45–47 :

Choose the word (A, B, C, or D) that fits each blank (45)–(47) in the text. Write your answers in boxes (45)–(47).

(45)

A. centenarians

B. demographers

C. students

D. supercentenarians

(46)

A. challenges

B. data

C. errors

D. staff

(47)

A. broke

B. gave

C. moved

D. passed

Questions 48–53 :

Each question contains two sentences. Choose the appropriate letter, A, B, C, or D, and write your answers in boxes (48)–(53).

A. Statement 1 and statement 2 are both true.

B. Statement 1 is true, but statement 2 is false.

C. Statement 1 is false, but statement 2 is true.

D. Statement 1 and statement 2 are both false.

(48)

1. The pattern of weight-related mortality during a considerable portion of the human lifespan appears to be precisely mapped by Gompertz's model.

2. It is speculated that medical advances in controlling senescence and treating chronic disease could bend the Gompertz's curve.

(49)

1. A researcher has pointed out that inadequate or misleading record-keeping is one of the most significant challenges when studying supercentenarians.

2. The International Database on Longevity provides data on supercentenarians with both the quality and sample size suitable for statistical analysis.

(50)

1. A researcher suggests that the plateau is due to the inadequate number of individuals required to generate reliable mortality data.

2. The record for the longest known human lifespan, held by Nikolay Zak at 122 years and five months, remains unbroken.

(51)

1. According to a researcher, the odds of anybody getting to be more than about 120 or 125 shrink if the plateau is simply an artefact.

2. Increasing the average life expectancy could potentially lead to a greater number of individuals reaching an extreme old age by creating a higher number of infants.

(52)

1. Over the past decade, there has been much progress in improving life expectancy in the United States and United Kingdom.

2. Evidence presented by researchers indicates a consistent increase in life expectancy for individuals in their 60s in the United States, Japan, and China.

(53)

1. Wealthy nations have an advantage over low- and middle-income countries in terms of life expectancy.

2. According to a researcher, the exceptionally elderly are still subject to the randomness of nature's coin toss.