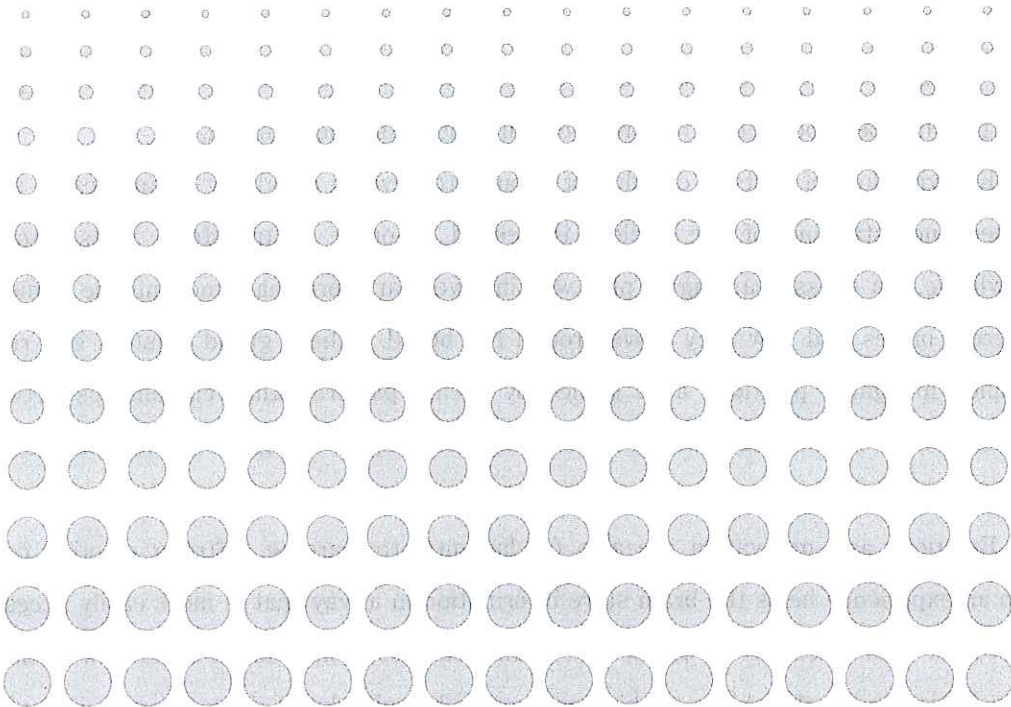


平成23年度

産業医科大学

入試問題



## 英語

●医学部

試験選抜

時間=100分

- [ 1 ] 次の英文を読んで、文中の( ア )～( コ )に入れるのに最も適当な英語一語をそれぞれ書きなさい。

It seemed that nothing could get Matt Keane to give up the junk food and start exercising, even when his weight became 209 kilograms. Then one day a friend ( ア ) him to Dance Dance Revolution, the popular video game ( イ ) has players move around on a platform as instructed ( ウ ) arrows — up, down, right or left — to a strong musical beat. The moves ( エ ) faster and more difficult as the player gets ( オ ), making the game tough, making playing it a habit and, by chance, ( カ ) the player good physical exercise.

Keane says, “I remember ( キ ) this game so much that I was sweating through my shirt and I ( ク ) even notice it. I was having so much ( ケ ) that I didn’t realize I was getting tired.” He started playing three or four hours a day, and in ( コ ) than a year he had lost 68 kilograms by dancing at home and at the shopping mall.

[Adapted from “Japan’s ‘Exertainment’ Games Turn Arcades into Sports Clubs”, *The Japan Times*, July 20, 2005]

[ 2 ] 次の英文を読んで設問に答えなさい。

Marine mammals such as whales and dolphins spend their entire lives in the sea. So how can they sleep without drowning? Observations of bottlenose dolphins\*<sup>1</sup> in aquariums and zoos, and of whales and dolphins in nature, show two basic methods of sleeping: they either rest quietly in the water, vertically or horizontally, or sleep while swimming slowly next to another animal of their kind. Individual dolphins also enter a deeper form of sleep, mostly at night. It is called logging because, in this state, a dolphin resembles a log floating at the water's surface.

When marine mammals sleep and swim at the same time, they are in a state similar to napping. Young whales and dolphins actually rest, eat, and sleep while their mother swims, pulling them along in her slipstream.\*<sup>2</sup> At these times, the mother will also sleep as she moves. In fact, she cannot stop swimming for the first several weeks of her baby's life. If she does for any length of time, the baby will begin to sink; it is not born with enough body fat to float easily.

Lots of swimming will make an infant get tired, producing a weak animal that can catch diseases or be attacked easily. Adult male dolphins, which generally travel in pairs, often swim slowly side by side as they sleep. Females and young travel in larger groups. They may rest in the same general area, or animals that are friends with each other may make pairs for sleeping while swimming.

While sleeping, the bottlenose dolphin shuts down only half of its brain, along with the opposite eye. The other half of the brain stays slightly awake. This alert side is used to watch for hunters, obstacles, and other animals. It also signals when to rise to the surface for a fresh breath of air. After approximately two hours, the animal will reverse this process, resting the active side of the brain and awakening the rested half. This pattern is often called catnapping.

(1) Dolphins generally sleep at night, but only for a couple of hours at a time. They are often  
(2) active late at night, possibly matching this alert period to feed on fish or squid,\*<sup>3</sup> which then  
rise from the depths. Bottlenose dolphins spend an average of one-third of their day asleep. It is not clear whether they undergo dream sleep. Rapid eye movement (REM)—a characteristic of deep sleep—is hard to detect, but a pilot whale\*<sup>4</sup> was noted as having six minutes of REM in a single night.

To avoid drowning during sleep, it is necessary for marine mammals to keep control of their blowhole. The blowhole is a piece of skin that is thought to open and close under the voluntary control of the animal. Although still a matter of discussion, most researchers feel

that in order to breathe, a dolphin or whale must be conscious and alert to recognize that its blowhole is at the surface. Humans, of course, can breathe while the conscious mind is asleep; our subconscious\*<sup>5</sup> mechanisms have control of this involuntary system. But equipped with a voluntary breathing system, whales and dolphins must keep part of the brain alert in order to take each breath.

Other methods help marine mammals to hold their breath longer than other types of mammals can. Marine mammals can take in more air with each breath, because their lungs are larger than those in humans in proportion to body size. In addition, they exchange more air each time they breathe in or breathe out. Their blood also carries more oxygen, and, when diving, marine mammals' blood travels only to the parts of the body that need oxygen — the heart, the brain, and the swimming muscles. Other body functions have to wait until the animal finishes diving.

Finally, these animals can stand larger amounts of carbon dioxide (CO<sub>2</sub>). Their brains do not start a breathing response until the levels of CO<sub>2</sub> are much higher than what humans can stand. These mechanisms, part of the marine mammal diving response, are adaptations\*<sup>6</sup> to living in an ocean environment and help during the process of sleeping. They reduce the number of breaths taken during rest periods; a dolphin might average 8 to 12 breaths a minute when fairly active only to have their breathing rate drop to 3 to 7 per minute while resting.

It is actually rare for a marine mammal to drown, as they won't breathe in underwater; but it is possible for them to die from a lack of air. Being born underwater can cause problems for whales and dolphins that have just been born. It is the touch of air on the skin that triggers that first, important breath, and examinations of dead dolphins sometimes show that an animal never gets to the surface to take its first breath of air. The same problem can occur when an animal is caught in a fishing net. If unable to reach the surface, or if in a panic, the animal may dive deeper, where it will be unable to breathe and will suffocate.

[Adapted from the editors of *Scientific American*, "How Do Whales and Dolphins Sleep without Drowning?", in *Scientific American's Ask the Experts*, HarperCollins Publishers Inc., 2003, pp. 57- 60]

[注] \* 1 bottlenose dolphin : バンドウイルカ

\* 2 slipstream : 後流(流体中を物体が運動するとき, その物体の後方に回り込むようにできる流れ)

\* 3 squid : イカ

\* 4 pilot whale : ゴンドウクジラ

\* 5 subconscious : 潜在意識の

\* 6 adaptation : 順応, 適応

〔設 問〕

1. 下線部(1)が指すことを、本文の内容に沿って具体的に日本語で説明しなさい。
2. 下線部(2)を日本語に訳しなさい。
3. 下線部(3)が指すことを3点、本文の内容に沿って日本語で簡潔に述べなさい。
4. 本文の内容に関する次の文(1)～(5)を読み、正しいものには○、間違っているものには×を、それぞれ記入しなさい。
  - (1) A whale never sleeps next to another whale.
  - (2) Newly born whales and dolphins can sleep while floating with help from their mother.
  - (3) Adult male dolphins will often swim with female and infant dolphins.
  - (4) Marine mammals breathe 8 to 12 times more when active than when resting.
  - (5) A baby dolphin or whale will not breathe until it feels air on its skin.

[ 3 ] 次の英文を読んで設問に答えなさい。

You wake from a deep sleep and open your eyes. It's dark. The distant, regular beating at the edge of your hearing is still there. You rub your eyes with your hands, but you can't make out any shapes or forms. Time passes, but how long? Half an hour? One hour? Then you hear a different but recognizable sound — a shapeless, moving, irregular sound with fast beating, a pounding that you can feel in your feet. The sounds start and stop without definition. Gradually building up and dying down, they blend together with no clear beginnings or endings. These familiar sounds make you feel comfortable, you've heard them before. As you listen, you have a vague notion of what will come next, and it does, even as the sounds remain remote and confused, as though you're listening underwater.

Inside the womb,<sup>\*1</sup> surrounded by amniotic fluid,<sup>\*2</sup> the fetus<sup>\*3</sup> hears sounds. It hears the heartbeat of its mother, at times speeding up, at other times slowing down. The fetus also hears music, as was recently discovered by Alexandra Lamont of Keele University in the UK. She found that, a year after they are born, children recognize and prefer music they were exposed to in the womb. The hearing system of the fetus is fully functional about twenty weeks after the mother becomes pregnant. In Lamont's experiment,<sup>(1)</sup> mothers played a single piece of music to their babies in the womb repeatedly during their last three months before birth. Of course, the babies were also hearing — through the filter of the amniotic fluid in the womb — all of the sounds of their mothers' daily life, including other music, conversations, and environmental noises. But one particular piece of music was selected for each baby to hear regularly. The selected pieces included classical, pop, reggae<sup>\*4</sup> and world music.<sup>\*5</sup> After birth, the mothers were not allowed to play the experimental song to their infants. Then, one year later, Lamont played babies the music that they had heard in the womb, along with another piece of music with the same style and tempo as the first piece. For example, a baby who had heard the reggae song "Many Rivers to Cross" heard that piece again, a year later, along with "Stop Loving You" by a different reggae artist. Lamont then determined which one the babies preferred.

How do you know which of two stimuli an infant who cannot speak prefers? Most infant researchers use a technique known as the Conditioned Head-Turning procedure, developed by Robert Fantz in the 1960s. Two speakers are set up in the laboratory and the infant is placed (usually on his mother's lap) between the speakers. When the infant looks at one speaker, it starts to play music or some other sound, and when he looks at the other speaker, it starts to play different music or a different sound. The infant quickly learns that he can control what is playing by where he is looking; he learns, that is, that the conditions of the experiment are



[設問]

1. 下線部(1)の実験内容を、本文の内容に沿って100字程度の日本語で説明しなさい。
2. 下線部(2)を日本語に訳しなさい。
3. 下線部(3)のようになる原因を、本文の内容に沿って100字程度の日本語で説明しなさい。
4. 本文の内容に関する次の文(1)~(5)を読み、正しいものには○、間違っているものには×を、それぞれ記入しなさい。
  - (1) 5-month-old fetuses can hear sounds from outside their mother's body.
  - (2) In the Conditioned Head-Turning procedure, two different types of music are played at the same time and researchers check which speaker the infant looks at.
  - (3) The subjects in all of the groups in Lamont's experiment showed a preference for one of two songs.
  - (4) If infants hear a fast song and a slow song, and had heard neither song in the womb, they tend to like the fast song better.
  - (5) Young children have memories of music even before they learn to speak.

[ 4 ] (英作文) 次の指示に従って、100語程度の英語を書きなさい。

In Europe and North America, "anime" and "manga" have become representative of modern Japanese culture. Do you think that these are good representatives? Explain your opinion.