試験開始の指示があるまで、この問題冊子の中を見てはいけません。

令和 4 年度

一般選抜 試験問題

英語・数学（120分）

出題科目	ページ	解答方法
英　語	4～17	左の2科目を解答しなさい。 解答時間の配分は自由です。
数　学	18～23	

Ⅰ注意事項

1　ページの脱落や重複、印刷の不鮮明な箇所があった場合には、直ちに手を挙げて監督者に知らせなさい。

2　受験番号および解答は必ず解答用紙の所定の欄に記入しなさい。

3　この問題冊子の余白は適宜利用してもかまいません。

4　質問、中途退室など用件のある場合は、手を挙げて知らせなさい。

5　退室時は、問題冊子は閉じ、解答用紙は裏返しにしなさい。

6　試験に関わるすべての用紙は、持ち帰ることはできません。

Ⅱ解答上の注意

1　「**解答上の注意**」が、裏表紙に記載してあるので、この問題冊子を裏返して必ず読むこと。ただし、問題冊子を開いてはいけません。

英　語

（解答はすべて解答用紙に記入すること）

第１問　次の英文を読み、下の問い（**問１・問２**）に答えよ。

An acupuncturist is a kind of healer. Acupuncturists use knowledge of the body's electrical impulse system to [1] pain and heal. There are pathways through the body that are similar to the circulatory system, which supplies oxygen and nutrients to the body by pumping blood through the body. The electrochemical system is a separate system with pulses just like those that the heart causes in the body. (However, these electrochemical pulses are much harder to feel.) The system works something like the brain's neural transmitters, along the meridians (the pathways) of the body. Stimulating one part of the body with an extremely [2] needle stimulates the acupuncture point that is connected to it.

The practice of acupuncture has its [3] in the Chinese medical tradition. The "barefoot doctors" of Chinese history practiced acupuncture, but only recently has the practice come to be common in the Western world. The stimulation caused by twirling a needle that has been placed into a meridian seems to trigger the [4] system to create and send out chemicals that reduce inflammation and pain.

Researchers have studied the effects of acupuncture on patients. They have found that acupuncture causes the release of endorphins, natural body chemicals that act like painkillers. Researchers also believe a hormone called ACTH — a natural chemical that fights inflammation — is released. That's why [5] heal more quickly with acupuncture.

An added benefit is that acupuncture causes no negative side effects. [6] drugs, like all medicines, can have some serious side effects. Aspirin, perhaps the most common of all medicines in the world, has many strong

points in its favor; however, even one tablet can cause a small amount of [7] in the stomach. Acupuncture causes no negative things to happen in the body. Acupuncture has been used to treat headaches, arthritis, and serious [8] problems (such as the ones associated with asthma). People who suffer from arthritis (inflammation of bones at joints like knees and elbows) and strokes have used acupuncture to improve their quality of life. They can do more with less discomfort. No one is absolutely sure why it works, but the theory is this: the acupuncture needle stimulates [9] nerves which sends an electrical impulse to the brain. That impulse signals the [10] of brain chemicals which stop the nociceptors (pain receivers) and send out endorphins (the "feel-good" chemicals). In any case, acupuncture helps many people who are suffering.

(出典 Jean Zukowski-Faust. *Steps to Academic Reading 5: Between the Lines*. Cengage Learning, 2002.)(一部改変)

(注) acupuncturist<acupuncture, しんきゅう師<針術、針療法;
neural transmitters, 神経伝達物質; side effects, 副作用;
asthma, ぜんそく

問1 英文の [1] ～ [5] に入れるのに最も適当なものを、それぞれ下の①～⑦から1つずつ選べ。

① fine	② ease	③ injuries	④ nervous	⑤ medical
⑥ hide	⑦ origins			

問2 英文の [6] ～ [10] に入れるのに最も適当なものを、それぞれ下の①～⑦から1つずつ選べ。文頭に来る語も小文字で表記されている。

① bleeding	② breathing	③ fracture	④ release
⑤ sensory	⑥ prescribed	⑦ positive	

第２問　次に与えられた語について、１～３（ 11 ～ 13 ）は下線部の発音が同じものを、４～６（ 14 ～ 16 ）は第１アクセント（第１強勢）の位置が同じものを、それぞれ下の①～④から１つずつ選べ。

１．suit 11

① aloud　② flood　③ globe　④ crew

２．ache 12

① acid　② agent　③ architect　④ height

３．poster 13

① broad　② knowledge　③ property　④ soap

４．e・vent 14

① com・fort　② im・age　③ mo・bile　④ sus・pense

５．al・co・hol 15

① de・li・cious　② mu・se・um

③ pen・al・ty　④ vol・un・teer

６．in・gre・di・ent 16

① bi・og・ra・phy　② cer・e・mo・ny

③ e・co・nom・ics　④ in・tu・i・tion

第３問　次の１～５の文の［ 17 ］～［ 21 ］に入れるのに最も適当なものを、それぞれ下の①～④から１つずつ選べ。

1．After the competition, the athlete applied for［ 17 ］to remain in Japan.

① allowance　② acceptance

③ permission　④ concession

2．I trust Jane because she is intelligent, hard-working, and［ 18 ］honest.

① above all　② for instance

③ in the end　④ on duty

3．This is not a subject that I want to［ 19 ］.

① dwell on　② wear out

③ come about　④ set forth

4．All the participants in the study［ 20 ］the purpose of the task in advance.

① informed that　② informed them

③ were informed　④ were informed of

5．［ 21 ］to have a health and social care assessment.

① It is compulsory that these students

② It is compulsory for these students

③ These students are compulsory

④ They are compulsory students

第４問　次の対話文の［ 22 ］～［ 24 ］に入れるのに最も適当なものを、それぞれ下の①～⑨から１つずつ選べ。

Linda: So how have you been getting along with the report for Mr. Sackler? Did you manage to meet the deadline?

Peter: Well, yes and no, but I really messed up in a stupid kind of way.

Linda: What does that mean? Come on, don't beat around the bush. [22]

Peter: You know I've been burning the midnight oil on this report and it was worth the effort. [23] Anyway, when I was happy with it, I decided to email it to Mr. Sackler, right on the deadline.

Linda: So what was the problem?

Peter: When I wrote the email and sent it, I was in too much of a rush. I forgot to attach the file of the report.

Linda: [24]

Peter: No. The next day I sent him another email with everything, and he was quite happy with it.

Linda: Still, don't make the same mistake again.

① Did Mr. Sackler get angry?

② Didn't Mr. Sackler attach conditions to the agreement?

③ Was Mr. Sackler able to find the file?

④ How clever of you!

⑤ They couldn't put out the fire.

⑥ I made a complete mess of it.

⑦ Where did you meet your teacher?

⑧ What are you trying to say?

⑨ I think I did a pretty good job on it.

第５問　次の問い（**問１～４**）のパラグラフ（段落）には、まとまりをよくするために取り除いた方がよい文が一つある。取り除く文として最も適当なものを、それぞれ下線部①～④のうちから１つずつ選べ。

問１　25

The human body can't handle excessive heat. The processes that keep us alive work best within a certain temperature window. That's generally between about 36℃ and 37℃, depending on the person. ①If someone's core body temperature goes higher, the body's primary response to heat is to try and get rid of it. ②Chemical reactions take place more slowly at low temperatures. ③To get rid of excess heat, blood vessels in the skin expand. ④At the same time, the heart begins beating faster. That pushes blood flow to the skin. There, the blood can release heat to cool down.

（出典 Aimee Cunningham. "How heat kills." *Science News for Students*. May 2, 2019. Retrieved September 28, 2021 from <https://www.sciencenewsforstudents.org>.）（一部改変）

問２　26

It is only natural that the performance of the body decreases with age, just like a car. ①This process can be reversed by replacing old parts with new ones. ②We can try to keep it in top condition, but it will not last forever. ③Eventually, the car will get rusty parts and a noisy old engine, and the body will start to "break down". ④Muscles become weaker, bones lose their strength, vision weakens, hearing decreases, and so on. This happens because our DNA gets a little faulty.

（出典 Armaan Gvalani. "Why do we tire more easily as we age?" *Science News ABC*. June 23, 2021. Retrieved September 28, 2021 from <https://www.scienceabc.com>.）（一部改変）

問3 27

Several years ago, New York City Mayor Michael Bloomberg proposed a ban on selling soft drinks over 16 ounces. ①He defended the ban, saying it would help curb childhood obesity and promote better health in general. ②Recent research has shown that large-sized sweetened drinks are a major contributing factor in childhood obesity. ③However, a government-imposed ban on soda size is likely to be an ineffective response. ④This is because the size has little to do with the total cost. Instead, a more effective way to address the issue would be for the government to institute more programs to educate parents and children about the dangers of high-sugar beverages.

(出典 *Maximize Your Reading 4*. Pearson Education, 2017.)(一部改変)

問4 28

It's a myth that our nails continue to grow after we die. ①A scientific journal once ran a study in which the author produced data showing that nails in dead bodies continued growing for anywhere from eight to ten days! ②Your fingernails grow at an average rate of 3.47 mm per month. ③This has long been a popular horror-movie scenario, but no credible expert believes the results of that study. ④The apparent growth of nails after death is actually caused by the drying and retraction of the tissue around the nail making them look longer than before. That puts a nail in that coffin, once and for all.

(出典 Jay Ingram. *Why Do Onions Make Me Cry?* Simon & Shuster, 2019.)
(一部改変)

第６問　次の１～３の文において、それぞれ下の①～⑦の語句を並べ替えて空所を補い、最も適当な英文を完成させよ。解答は [29] ～ [37] に入れるものの番号のみを答えよ。

1．Unlike fleas, lice _____ [29] _____ [30] _____ [31] _____ contact.

① cannot　② they　③ jump　④ through
⑤ spread　⑥ physical　⑦ but instead

2．Efforts to extinguish the fire were hampered _____ [32] _____ [33] _____ [34] _____ the building.

① amount　② flammable　③ of　④ inside
⑤ material　⑥ by　⑦ the large

3．Any samples of hair, blood or other organic material _____ [35] _____ [36] _____ [37] _____ a national database for DNA.

① against　② will　③ from　④ the objects
⑤ removed　⑥ be　⑦ matched up

第7問 次の英文を読み、下の問い（**問1・問2**）に答えよ。

Tobacco and other pollutants don't just stink up the air. They also alter immune cells in ways that could hurt the body. Some can raise blood pressure, even in kids. That's the finding of three new studies. Taken together, they show that dirty air does not just pose risks to the lungs. It also threatens the heart and body's ability to fight infection.

One study analyzed 221 young kids living in Fresno. This central California city ranks among the nation's most polluted. In the American Lung Association's annual *State of the Air* report, "(A)they get F's all the time," says Mary Prunicki, an immunologist at Stanford University in California.

Her team wanted to see how that pollution affects child health. So they collected blood and took blood-pressure readings from Fresno kids who were six to eight years old. The researchers also collected data from stations that monitor air pollution. This helped them figure out how much pollution each child had likely been breathing.

Among kids exposed to higher pollution levels, DNA in their immune cells showed chemical changes. The changes reflect the addition of a chemical group (a carbon atom attached to three hydrogen atoms). Once in place, these chemical groups act like genetic switches. They're called epigenetic, for "above" the gene. That's because they influence how genes work without altering their DNA. Epigenetic changes can later be inherited.

Prunicki's group found epigenetic changes in four genes that regulate immunity. In fact, the blood in these children also contained fewer white blood cells, which is a bad sign. The body produces those white cells to help fight infection and to rid itself of foreign substances.

What's more, the blood pressure in kids who had inhaled more air pollutants was higher. This suggests their arteries were getting stiffer. (B)That can force your heart to work harder to pump blood, and puts people at

greater risk for heart failure. The team shared its findings February 18 in *Scientific Reports*.

Wildfires spew some of the same chemicals, such as ozone and carbon monoxide, that pollute many urban cities. A second new study analyzed blood from people affected by the November 2018 Camp Fire, which was the deadliest wildfire in California history.

This study focused on a specific type of white blood cell. They are part of the immune system's first responders, known as innate immune cells. The researchers looked at a group of these cells in bone marrow. They also looked at dendritic cells, which move relentlessly through the lining of the gut. When they find a foreign invader, they spew chemical messengers. These molecules tell the immune system "something bad is going on," explains Angela Haczku, a physician-scientist at the University of California, Davis. Her team found that during the wildfire season, the immune cells showed molecular changes typical of inflammation or an allergic reaction.

The immune changes persisted at least two months. They returned to normal within the next two to four months. Some immune cells in the Fresno kids reacted to certain pollutants right away. Other cells took weeks or months to show changes. It's unclear if some of these changes might last into adulthood. Scientists also don't know if moving into an area with clean air would reset the body's immune system back to normal.

Scientists do know that prolonged exposure to urban air pollution makes people more prone to asthma and allergic disease. It also can shorten lifespan. Cigarette smoking is another source of air pollution. And a third study probed links between (C)it and blood pressure in kids.

The researchers analyzed data from 8,520 U.S. kids who took part in a nationwide health survey. Some were as young as eight, while others were older, up to age 19. The study had measured blood levels of cotinine, a breakdown product of the nicotine found in tobacco. The researchers also

noted whether the kids had smoked, lived with a smoker or had high blood pressure.

Whereas young smokers were more likely to have high blood pressure than kids exposed solely to secondhand smoke, all kids with cotinine residues were at elevated risk of having high blood pressure, says Rebecca Levy, a kidney specialist at Montefiore Medical Center in New York City, who led the study. This was true whether the kids actually smoked or had just been around smokers.

"The more nicotine you had in your body, the more likely you were to have high blood pressure," she reports. And high blood pressure increases risk for strokes, heart disease and kidney problems. Her team published its findings February 23 in *JAMA Network Open*. In the future Levy hopes to get similar data on vaping. Among kids, "vaping is getting more popular," she notes. And some e-cigarettes have a "much higher nicotine dose than traditional cigarettes."

(出典 Esther Landhuis. "Urban pollution can pose unseen risks to kids' immunity and more." *Science News for Students*. April 7, 2021. Retrieved September 28, 2021 from <https://www.sciencenewsforstudents.org>.)(一部改変)

(注) spew, 噴出する; bone marrow, 骨髄; dendritic cell, 樹状細胞; gut, 消化管; asthma, ぜんそく; vaping, 電子タバコによる喫煙

問1 本文の内容に合うように、次の1～4の文の [38] ～ [41] に入れるのに最も適当なものを、それぞれ下の①～④から1つずつ選べ。

1. According to the text, [38] .

① if children move into an area with clean air, it will help reset their body's immune system back to normal

② ozone and carbon monoxide produced by wildfires are the worst pollutants for adults as well as children

③ in addition to being harmful to the lungs and the heart, polluted air weakens children's immunity against diseases

④ children exposed to secondhand smoke are actually at a greater risk for infections than young smokers

2. The underlined part "(A)they get F's all the time" means that [39] .

① a majority of young smokers fail to pass the blood pressure test

② the air in Fresno, California is continuously of poor quality

③ most young children in Fresno, California do poorly at school work

④ it's not unusual for students at Stanford University to get straight F's

3. The underlined word "(B)That" refers to [40] .

① arteries getting stiffer

② air pollution

③ high blood pressure in kids

④ risk of heart failure

4. The underlined word "(C)it" refers to [41].

① allergic disease

② lifespan

③ urban air

④ cigarette smoking

問2 次の1～6の質問の答えとして最も適当なものを、それぞれ下の①～④から1つずつ選べ。 [42] ～ [47]

1. What did Mary Prunicki and her team find? [42]

① They found that the average blood pressure of 221 young children living in Fresno was abnormally low.

② They found that DNA in children's immune cells was chemically altered if the children were exposed to heavily polluted air.

③ They found that epigenetic changes didn't occur among children who were exposed to higher levels of air pollution.

④ They found that the blood vessels of Fresno children who were six to eight years old were more flexible than those of children in other areas.

2. What did Angela Haczku and her team find? [43]

① They found that certain kinds of cells detect a foreign invader and send out messages that the immune system of the body must be boosted.

② They found that dendritic cells in bone marrow kept moving quickly through the lining of the gut.

③ They found that molecular changes associated with an allergic reaction could be found in immune cells during the wildfire season.

④ They found that once the immune cells in young children react to air pollutants, the changes last into adulthood.

3. What did Rebecca Levy and her team find? 44

① They found that children exposed to secondhand smoke had a higher risk of developing high blood pressure.

② They found that 8,520 children in the U.S. who participated in a health survey all had high blood levels of cotinine.

③ They found that children who were habitually exposed to secondhand smoke had higher blood pressure than firsthand smokers.

④ They found that smokers with high blood pressure actually faced lower risk for strokes, heart disease and kidney problems.

4. According to the passage, what was discovered about children who were exposed to a high level of air pollution? 45

① Their heart was stiff and didn't work hard enough to pump blood.

② They had been seriously affected by the November 2018 Camp Fire in California.

③ They didn't have as many cells that fight infection as those who had less exposure.

④ They tended to be more immune to hazardous chemicals such as ozone and carbon monoxide.

5. Why does Rebecca Levy hope to conduct research into vaping? 46

① Because e-cigarettes are much less harmful to the lungs than smoking cigarettes.

② Because vaping may reduce risk for strokes, heart disease and kidney problems.

③ Because vaping does not seem to be spreading as quickly as was anticipated.

④ Because vaping could be more harmful than smoking traditional cigarettes.

6. According to the passage, which of the following is true? 47

① Cotinine is a substance contained in tobacco that changes into nicotine in the blood.

② Epigenetic changes affect the way some genes function by means of changing their DNA.

③ Many urban cities are polluted by ozone and carbon monoxide, which are also produced by wildfires.

④ Once immune cells are changed by certain pollutants, the body's immune system will likely be permanently damaged.

解答上の注意（1：英語，2～4：数学，5：共通）

1　解答はすべて解答用紙の解答番号に対応した解答欄にマークしてください。

10　と表示のある問いに対して

（例1）　③と解答する場合は、**解答番号10の③にマーク**してください。

解答番号	解　答　欄
10	① ② ● ④ ⑤ ⑥ ⑦ ⑧ ⑨

（例2）　②と⑦を解答する場合は、**解答番号10の②と⑦にマーク**してください。

（複数解答の場合）

解答番号	解　答　欄
10	① ● ③ ④ ⑤ ⑥ ● ⑧ ⑨

2　問題の文中の　アイ　、　ウ　などには、特に指示がないかぎり、符号（－）、数字（0～9）が入ります。**ア、イ、ウ、…**の一つ一つは、これらのいずれか一つに対応します。それらを解答用紙の**ア、イ、ウ、…**で示された解答欄にマークして答えなさい。

（例）　アイ　に－8と答えたいとき

ア	● ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨
イ	⊖ ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ● ⑨

なお、同一の問題文中に　ア　、　イウ　などが2度以上現れる場合、2度目以降は、　ア　、　イウ　のように細字で表記します。

3　分数形で解答する場合、分数の符号は分子につけ、分母につけてはいけません。

例えば、$\dfrac{\boxed{\text{エオ}}}{\boxed{\text{カ}}}$ に$-\dfrac{4}{5}$と答えたいときは、$\dfrac{-4}{5}$として答えなさい。

また、それ以上約分できない形で答えなさい。

例えば、$\dfrac{3}{4}$、$\dfrac{2a+1}{3}$と答えるところを、$\dfrac{6}{8}$、$\dfrac{4a+2}{6}$のように答えてはいけません。

4　根号を含む形で解答する場合、根号の中に現れる自然数が最小となる形で答えなさい。

例えば、$4\sqrt{2}$、$\dfrac{\sqrt{13}}{2}$、$6\sqrt{2a}$と答えるところを、$2\sqrt{8}$、$\dfrac{\sqrt{52}}{4}$、$3\sqrt{8a}$のように答えてはいけません。

5　解答用紙に正しく記入・マークされていない場合は、採点できないことがあります。特に、解答用紙の**受験番号欄に正しくマークされていない場合は、その科目は0点**となります。