

단국대학교 2024학년도 편입학 모집 필기고사

고사시간	오전
과 목	영어, 수학

자연계열 문제지



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영어 [자연계열] < 오전 >

※ 밑줄 친 부분과 뜻이 가장 가까운 것을 고르시오. (1-8) [각 3점]

1. After forgetting their anniversary, Rob bought his wife a magnificent bunch of flowers as a conciliating gesture.
① exonerating ② soothing ③ clarifying ④ flaring
2. Sophie's family were in an exultant mood after her success in the competition.
① triumphant ② furious ③ amiable ④ lethargic
3. That human rights are infringed is unacceptable in a civilized society.
① ingrained ② eradicated ③ oppressed ④ inflected
4. Every society holds certain groups of people in high esteem while condemning others, whether on the basis of their skills, accent, gender, religion, or skin color.
① oppressing ② criticizing ③ praising ④ judging
5. The most absurd customs and the most ridiculous ceremonies are everywhere excused by an appeal to the phrase, *but that's the tradition*.
① irresistible ② sensible ③ preposterous ④ hilarious
6. If we had carried out a fair assessment of our strengths and decided upon our value, another's suggestion that we were inconsequential would not wound us.
① arrogant ② insignificant ③ disparaged ④ overestimated
7. An old Soviet joke used to say that under capitalism people lived under a system of exploitation of man by man but under communism it is the other way round.
① unfair use ② pure speculation
③ total employment ④ instant gratification
8. Although he usually plays quite flamboyant people, his character in this play is rather an ordinary person.
① elusive ② outgoing ③ exaggerating ④ colorful

※ 어법상 빈칸에 가장 적절한 것을 고르시오. (9-11) [각 3점]

9. Scientists have researched what conditions are like beyond Earth's atmosphere and what effects space travel _____ on the human body.

- ① has ② is ③ does ④ having

10. Although the exact process by which memories are coded and retrieved _____ a mystery, there is no doubt eating that the right food can help us make the best use of our brains' ability.

- ① is remained as ② remain as
③ remains ④ are remained

11. Had I _____ that a very important message was included, I would have thrown away the letter.

- ① not been told ② not be told ③ not told ④ was not told

※ 밑줄 친 부분 중 어법에 맞지 않은 것을 고르시오. (12-14) [각 3점]

12. Before ①considering some present-day instances of utilitarian thinking, it is ②worth to ask whether Bentham's philosophy is objectionable, and ③if so, ④on what grounds.

13. Accordingly, the possession of ①a great many material goods becomes desirable ②not principally because such goods provide ③any objective or subjective pleasure ④because they confer honor.

14. By necessities I understand not only ①the commodities indispensably necessary for the support of life, but whatever ②the custom of the country renders ③them indecent for ④creditable people to be without.

※ 다음 글을 읽고 물음에 답하십시오. (15-16) [각 3점]

We should not consume more water than we actually need. If we do, we won't have enough water in the future. However, just how much is too much? If we remove more fresh water than nature replaces, we have taken too much.

Many cities run campaigns to get people to stop wasting water. They show them ways they can cut back on water use. They also increase water bills for people who use too much. (A)_____, they fund programs that reduce water use. For example, they give people shower heads and toilets that use less water. (B)_____, they make laws

limiting the amount of water people can use.

Another threat to our water supply is pollution. When our sources of fresh water get polluted, we can no longer use this water. This also endangers the animals that rely on the water. There are several things we can all do to conserve water. We can save lots of water by not letting the tap run while we brush our teeth.

15. Which is the most appropriate for the blanks (A) and (B)?

- ① However — Generally ② Therefore — Initially
③ In addition — Finally ④ Moreover — Overall

16. According to the passage, which is NOT true?

- ① One of the major threats to our water supply is water pollution.
② If people use too much water, they pay increased water bills in many cities.
③ There are lots of movements to raise awareness of dangers of wasting water.
④ In order to save fresh water, the government should cut off water supply.

※ 다음 글을 읽고 물음에 답하십시오. (17-18) [각 3점]

In the latest study, researchers measured biomarkers in blood plasma that are associated with a higher risk of developing Alzheimer's, particularly amyloid beta 40 and 42. Half of the 108 participants were told to try to bring themselves to a place of calm by imagining a serene scene, listening to relaxing sounds, and closing their eyes—essentially, mindfulness meditation. The goal was to decrease their heart rate oscillations, encouraging their heart rate to have a steadier, more consistent beat.

Although no definitive single cause has been identified for causing Alzheimer's, clumps of amyloid beta protein known as plaques have been found to be one of key features of the disease. Certain types of this protein can be particularly toxic when they clump together inside brain cells, causing them damage that affects their normal function and causes (A)them to die.

Mather and her team hadn't expected the levels of amyloid beta to be "affected so robustly." And it wasn't just for older adults who already might have been more susceptible to having higher levels of amyloid beta. "The effects were significant in both younger and older adults," Mather says. "This is an intriguing finding because, in healthy adults, lower plasma levels of amyloid beta are associated with lower risk of getting Alzheimer's disease later," she says. "Slow-paced breathing might have benefits not only for emotional well-being—but also for improving biomarkers associated with

Alzheimer's disease.”

The researchers aren't sure why, exactly, (B)this might be. But one hypothesis is that slow, deliberate breathing may mimic some of the benefits of deep sleep, which research has found might clear neuro-toxic waste products from the brain and nervous system at a faster rate. The build-up of these waste products seems to play a role in the development of Alzheimer's.

17. What does the underlined word “them” in (A) refer to?

- ① Alzheimer's patients
- ② brain cells
- ③ certain types of protein
- ④ plaques

18. What does the underlined word “this” in (B) refer to?

- ① that slow breathing might mimic some of the benefits of deep sleep
- ② that emotional well-being might clear neuro-toxic waste products
- ③ that slow-paced breathing might have benefits for emotional well-being
- ④ that slow-paced breathing has benefits for improving biomarkers related to Alzheimer's disease

※ 다음 글을 읽고 물음에 답하시오. (19-20) [각 3점]

Like many nineteenth-century reformers, Thomas Carlyle dreamt not of a world in which everyone would financially equal, but of one in which high and low alike would come by their inequalities honestly. “Europe requires a real aristocracy,” he wrote, “only it must be aristocracy of talent. False aristocracies are insupportable.” What he was imagining was a system _____ had not been coined: a meritocracy.

The new ideology of meritocracy competed with two alternative notions of social organization: the egalitarian principle, calling for absolute equality in the distribution of goods among all members of society; and the hereditary principle, endorsing the automatic transfer of titles and posts from the wealthy to their children. Like aristocrats of old, meritocrats were prepared to tolerate a great deal of inequality, but like radical egalitarians, they favored (if only for a transitional phase) complete equality of opportunity. If everyone received the same education and had the same chance to enter any career, they argued, subsequent differences in income and prestige would be justified by reference to individuals' particular talents and weaknesses. Consequently, there would

be no need artificially to equalize salaries or assets; hardships would be merited no less than privileges.

19. Which is the most appropriate for the blank?

- ① whose name ② whose source
③ which term ④ which result

20. According to the passage, which is NOT true?

- ① Carlyle dreamt of a social system where both the lower and the upper classes can obtain inequalities in an honest way.
- ② Like aristocrats of old, meritocrats were willing to accept inequality of opportunity.
- ③ In the egalitarian system, it is required that goods should be absolutely equally distributed.
- ④ In the meritocratic system, salaries and assets do not have to be artificially equalized.

※ 다음 글을 읽고 물음에 답하시오. (21-23) [각 3점]

Learn how to draw inferences in order to understand your reading better, and to be able to respond to it more accurately. An inference is an expectation about something you don't know directly, based on information you have. It is similar to a guess or (A)_____.

Inferences are affected by circumstances, by interpretations, and by assumptions you make. First, think about how circumstances can affect your inferences. For example, imagine you are in a biology class and the teacher announces there will be a quiz. You will infer that the quiz will be about biology, not history or English (even though the teacher didn't say directly what it would be about!) If the teacher announces the quiz loudly and angrily, you might infer that your teacher is giving the quiz because the class hasn't studied enough, or the teacher is angry with the students for some reason. Your own beliefs affect the inferences you make, too. For example, if you believe biology is the hardest class you have, you might infer that (B)_____. Language also plays an important role in inferences. The writer can lead the reader to certain inferences through (C)_____. In order to understand the role of language in inferences, consider where you are getting your inference as you read.

21. Which is the title of the passage?
- ① Teacher's Role in Class
 - ② How to Prepare for a Test Well
 - ③ Using Inference for Better Understanding
 - ④ Ways of Improving Language Skills
22. Which is the most appropriate for the blanks (A) and (C)?
- ① creation — rhetoric
 - ② imagination — meaning
 - ③ prediction — word choice
 - ④ suspicion — storyline
23. Which is the most appropriate for the blank (B)?
- ① the teacher will push me to take extra classes
 - ② the teacher will help me with the test
 - ③ the test will make a great result
 - ④ the test will be extremely hard

※ 다음 글을 읽고 물음에 답하십시오. (24-25) [각 3점]

There are clear characteristics that determine whether an animal is a mammal. The offspring of mammals develop in their mothers' wombs. When mammals are born, they are alive. Female mammals produce milk to feed their babies. Mammals have hair or fur to keep themselves warm in cold weather. Mammals can grow teeth as they mature, and they also have arms and hands.

Birds are different from mammals. Birds have feathers and wings. An animal does not have to be able to fly to be considered a bird. But birds must have feathers. Pigeons, turkeys, chickens, and ducks are birds because they all have feathers. Birds lay eggs and take care of the eggs until they hatch. Birds need more _____ because they need to fly for long periods of time. So they have more complex respiratory systems.

Bats nurse their young with the milk they produce. Bats have fur and use their hands to catch food. People saw that bats did not have feathers but still called them birds. People used to think that bats were birds just because they could fly. But now we know that there is no such thing as a featherless bird. Even a penguin has feathers. Penguins are big fat birds, but they cannot fly. Penguins can swim, but that does not make them fish. So even though bats can fly, they are not birds. Bats are the only mammals that can fly.

24. Which is the most appropriate for the blank?

- ① energy ② oxygen ③ feathers ④ water

25. According to the passage, which is true?

- ① Bats and birds are similar in that they use their hands to catch food.
② A penguin is classified as a bird because it can fly.
③ All that has feathers is not birds.
④ Mammals grow their hair to protect themselves from cold weather.

※ 다음 글을 읽고 물음에 답하십시오. (26-27) [각 5점]

Although there may be debate as to specifics, there is no doubt the last few decades have shown increasing changes in our climate. With each passing year, the need for global action and intervention becomes clearer. From increased extreme weather and flooding to the failing of many plant and animal species, _____. One example is in the Great Barrier Reef around Australia. The Great Barrier Reef is a collection of coral reef that stretches over 2,300km. This living underwater ecosystem provides a home to hundreds of species of different kinds of other water animals, fish, and birds. Unfortunately, the Great Barrier Reef, like all coral reefs, is sensitive to changes in water temperature. Thus, the increased ocean temperatures that are part of global warming have seriously impacted the Great Barrier Reef. Coral reefs are delicate systems. They contain tiny living organisms within them, a kind of algae. These organisms not only give the corals their different beautiful colors, but also help create a living under water ecosystem. These algae produce food which they pass on to the coral. This, in turn, allows the coral to grow and spread, providing homes and food for other water animals. Unfortunately, increases in temperature cause coral reefs to kick out algae from their structures. This disrupts the entire ecosystem and results in a loss of color in the corals. Any non-living coral becomes a washed-out white in color. If not given the chance to recover, the damage could become permanent. A recent scientific survey found that fully two-thirds of the Great Barrier Reef has now changed to this washed-out white color.

26. Which is the most appropriate for the blank?

- ① people contributed to solving the problems
② living ecosystem failed
③ international legislation should be passed on
④ nothing is unaffected

27. According to the passage, which is NOT true?

- ① When corals are dead, their color changes into washed-out white.
- ② Increased ocean temperature can lead to a loss of color in the Great Barrier Reef.
- ③ Algae in the Great Barrier Reef are provided help such as homes and food.
- ④ Australia has a collection of coral reef which is long enough to be around 2,300km.

※ 다음 글을 읽고 물음에 답하십시오. (28-30) [각 5점]

To discern the geometry of a snowflake, you need a microscope and good cold temperatures—the canonical six-sided flake forms only below -15 degrees Celsius, or 5 degrees Fahrenheit. Work on examining and depicting snowflakes began seriously in the seventeenth century in Rober Hooke’s famous compendium of microscopic observations and continued through the next two hundred years as better microscopes resulted in ever more intricate illustrations of their six-sided symmetry.

Whereas Hooke’s flakes are a little uncouth, the resplendent forms drawn by the Arctic explorer William Scoresby in 1820 exhibit exemplary symmetry. Scoresby saw God imparting his own perfection to his creation.

Are snowflakes really quite so immaculate? Scoresby drew them that way, but other snowflake scientists’ reports might prompt second thoughts.

During one particularly brutal winter freeze in 1855, the British meteorologist James Glaisher sketched snowflakes and handed them on to an illustrator to provide the finishing touches. The drawings were lovely, each flake flawless in its own six-sided way. As Glaisher remarked, _____, the ideal was not perceived but rather inferred: the sketches had none of it. The illustrator had assumed the symmetry of the flakes in order to round out the finished pictures.

28. Which has the closest meaning to the underlined word “immaculate”?

- ① immodest ② immune ③ immanent ④ impeccable

29. Which is the most appropriate for the blank?

- ① furthermore ② however ③ nevertheless ④ moreover

30. According to the passage, which is true?

- ① The six-sided snowflakes can be seen with the naked eye.
- ② The observations of snowflakes set to work seriously in the nineteenth century.
- ③ The snowflakes do not form at less than -15 degrees Celsius, or 5 degrees Fahrenheit.
- ④ The symmetry was assumed for rounded flakes by an illustrator.

수학 [자연계열] <오전> [문항별 5점]

31. 원 $x^2 + y^2 = 25$ 위의 점 $(3, 4)$ 에 접하는 직선의 방정식은?

- ① $3x + 4y = 25$ ② $3x - 4y = -7$
 ③ $4x + 3y = 24$ ④ $4x - 3y = 0$

32. 닫힌구간 $[-1, 2]$ 에서 함수 $f(x) = x^3 - 2x^2 + x - 1$ 의 최댓값을 a , 최솟값을 b 라 할 때 $a + b$ 의 값은?

- ① -4 ② -1 ③ 1 ④ 4

33. $\int_{-1}^3 (x - a|x|)dx = 10$ 일 때, 실수 a 의 값은?

- ① $-\frac{6}{5}$ ② $-\frac{2}{5}$ ③ $\frac{2}{5}$ ④ $\frac{6}{5}$

34. 좌표평면에서 직선 $x = 0$, $x = 2\pi$ 와 곡선 $y = \sin \frac{x}{2}$, $y = \cos x$ 로 둘러싸인 영역의 넓이는?

- ① $-2 + 3\sqrt{3}$ ② $-4 + 6\sqrt{3}$
 ③ $2 + 3\sqrt{3}$ ④ $4 + 6\sqrt{3}$

35. 수열 $a_n = -\ln n$ ($n = 1, 2, \dots$)에 대하여

급수 $\sum_{n=1}^{\infty} k^{a_n}$ 이 수렴하기 위한 정수 k 의 최솟값은?

- ① 2 ② 3 ③ 4 ④ 5

36. 극방정식으로 표현된 곡선

$$r = \cos 2\theta \quad (\text{단, } \cos \theta \geq 0)$$

로 둘러싸인 영역의 넓이는?

- ① $\frac{\pi}{8}$ ② $\frac{\pi}{4}$ ③ $\frac{\pi}{2}$ ④ π

37. 다음 중 두 평면 $x - 2y + z = 0$ 과 $2x + 3y - 2z = 0$ 이 만나서 생기는 직선에 평행한 벡터는?

- ① $\langle 1, -4, 7 \rangle$ ② $\langle 1, 4, -7 \rangle$
 ③ $\langle 1, 4, 7 \rangle$ ④ $\langle 1, -4, -7 \rangle$

38. 점 $(1, 2)$ 에서 함수 $f(x, y) = 2x^2 + y^2$ 이 가장 빨리 변화하는 방향을 $\langle a, b \rangle$ 라 할 때, $\frac{b}{a}$ 의 값은?
 (단, a, b 는 상수)

- ① 1 ② 2 ③ 3 ④ 4

39. 곡면 $y = x^2 + z^2$ 과 평면 $y = a$ ($a > 0$)로 둘러싸인 영역을 E 라 하자. $\iiint_E \sqrt{x^2 + z^2} dV = \frac{128\pi}{15}$ 일 때, 실수 a 의 값은?

- ① 1 ② 4 ③ 9 ④ 16

40. 함수 $f(x, y) = -x^3 + 4xy - 2y^2 + 1$ 은 점 (a, b) 에서 극값 c 를 갖는다. $a + b + c$ 의 값은? (단, a, b, c 는 상수)

- ① $\frac{20}{27}$ ② $\frac{19}{9}$ ③ $\frac{94}{27}$ ④ $\frac{131}{27}$

41. 매끄러운 함수 $f : \mathbb{R}^3 \rightarrow \mathbb{R}$ 와 $\mathbf{r} : (-1, 1) \rightarrow \mathbb{R}^3$ 에 대하여 함수 $g(t) = f(\mathbf{r}(t))$ 는 $t = 0$ 에서 최솟값을 갖는다. 벡터 $\mathbf{u} = (\nabla f)(\mathbf{r}(0))$ 와 $\mathbf{v} = \mathbf{r}'(0)$ 의 크기가 각각 $\sqrt{3}$, 1일 때, 벡터 $\mathbf{u} - \mathbf{v}$ 의 크기는?

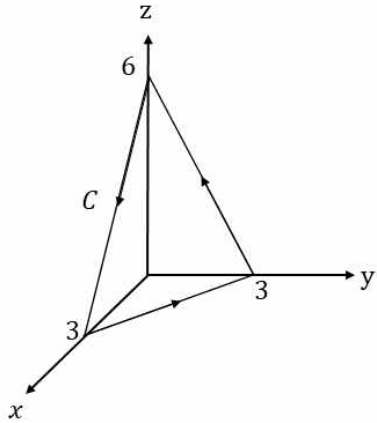
- ① 1 ② 2 ③ 3 ④ 4

42. 구면 $S^2 : x^2 + y^2 + z^2 = 1$ 에 대하여 $\iint_{S^2} \ln(1 + \sqrt{x^2 + y^2 + z^2}) dS$ 의 값은?

- ① $\pi \ln 2$ ② $2\pi \ln 2$ ③ $3\pi \ln 2$ ④ $4\pi \ln 2$

43. 유향곡선 C 는 그림과 같이 평면 $2x + 2y + z = 6$ 과 각 평면 $x = 0, y = 0, z = 0$ 과의 세 교선을 변으로 하는 삼각형이고, 방향은 원점에서 바라보았을 때 시계방향이다.

벡터장 $\mathbf{F}(x, y, z) = -y^2 \mathbf{i} + z \mathbf{j} + x \mathbf{k}$ 에 대하여 선적분 $\int_C \mathbf{F} \cdot d\mathbf{r}$ 의 값은?



- ① -12 ② -9 ③ -6 ④ -3

44. 벡터장 $\mathbf{F} : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ 에 대하여 $\nabla \times \mathbf{F} = \langle P, Q, R \rangle$ 라 하자. 점 (x_0, y_0, z_0) 에서

$$\begin{pmatrix} P_x & P_y & P_z \\ Q_x & Q_y & Q_z \\ R_x & R_y & R_z \end{pmatrix} = \begin{pmatrix} -3 & a & 0 \\ 1 & 0 & b \\ 2 & 5 & c \end{pmatrix}$$

일 때, 실수 c 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

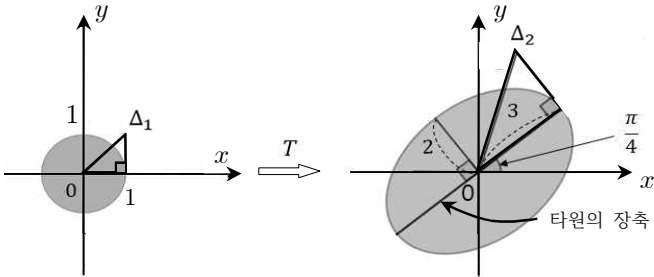
45. 행렬 $A = \begin{pmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{pmatrix}$ 에 대한 다음 설명 중 옳은 것의 개수는?

- ① A 의 고윳값은 모두 양의 실수이다.
② 행렬 $B = A^6$ 의 고윳값의 최댓값은 64이다.
③ A 는 대각화가능(diagonalizable)하다.
④ A 는 직교대각화가능(orthogonally diagonalizable)하지 않다.

- ① 1 ② 2 ③ 3 ④ 4

46. 일차변환 $T: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ 은 그림과 같이 단위원을 타원으로, 삼각형 \triangle_1 을 삼각형 \triangle_2 로 대응시킨다.

$T\left(\left\langle \frac{1}{3}, \frac{2\sqrt{2}}{3} \right\rangle\right) = \langle a, b \rangle$ 일 때, $a+b$ 의 값은?



- ① $\frac{5}{3}$ ② $\frac{8}{3}$ ③ $\sqrt{2}$ ④ $2\sqrt{2}$

47. 상수 a, b, c 에 대하여

$\det \begin{pmatrix} a & b & c \\ 3 & 1 & 2 \\ 0 & -1 & 1 \end{pmatrix} = \langle a, b, c \rangle \cdot \langle 3, 1, 2 \rangle \times \langle 0, -1, 1 \rangle = 3$

이다. 방정식

$\begin{pmatrix} a & b & c \\ 3 & 1 & 2 \\ 0 & -1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3 \\ 0 \\ 0 \end{pmatrix}$

의 해가 $x = x_0, y = y_0, z = z_0$ 일 때, $3x_0 + y_0 + z_0$ 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

48. 미분방정식

$y' + (\tan x)y = \cos^2 x, \quad y(0) = -1$

의 해 $y = y(x)$ 에 대하여 $y\left(\frac{\pi}{4}\right)$ 의 값은?

- ① $1 + \sqrt{2}$ ② $1 - \sqrt{2}$
③ $\frac{1 + \sqrt{2}}{2}$ ④ $\frac{1 - \sqrt{2}}{2}$

49. 미분방정식

$x^2 y'' - 3xy' + 4y = 0 \quad (x > 0)$
 $y(1) = 5, \quad y'(1) = 3$

의 해 $y = y(x)$ 에 대하여 $y(2) - y'(2)$ 의 값은?

- ① 14 ② 16 ③ 18 ④ 20

50. 함수

$F(s) = \frac{1}{(s^2 + 1)(s^2 + 4)}$

의 역라플라스변환(inverse Laplace transform)은?

- ① $\frac{1}{3} \left(\sin t - \frac{1}{2} \cos 2t \right)$ ② $\frac{1}{3} \left(\cos t - \frac{1}{2} \sin 2t \right)$
③ $\frac{1}{3} \left(\sin t - \frac{1}{2} \sin 2t \right)$ ④ $\frac{1}{3} \left(\cos t - \frac{1}{2} \cos 2t \right)$