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고사시간	오후
과 목	영어, 수학

자연계열 문제지



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영어 [자연계열] < 오후 >

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

1. Overweight is on the rise, even as popular culture continues to celebrate slimness, to the point of embracing emaciated fashion models as standards of female beauty.
① fatty ② moderate ③ lean ④ frolic

2. RNA has been deployed to make a whole new type of vaccine that will, when it reaches enough people, change the course of the pandemic.
① employed ② activated ③ explored ④ extruded

3. The global proliferation of electronic mass media has excited deep feeling and passionate debate.
① increase ② prohibition ③ indictment ④ ally

4. We should open to the creative criticism in the process of progress. But we also should admit that vituperating someone is never a constructive way to effect change.
① supplanting ② castigating ③ haranguing ④ galvanizing

5. Impressed by the rapport she had built with Baharka's children, the international nonprofit organization Save the Children enlisted her on local projects.
① affinity ② devotion ③ establishment ④ reputation

6. He might have spoken, but I did not hear; one hand was stretched out, seemingly to detain me, but I escaped, and rushed downstairs.
① banish ② expatriate ③ restrain ④ emulate

7. Its revenues plummeted during work-from-home lockdowns, too, when items like bottled water were suddenly less relevant.
① increased ② soared ③ floated ④ dropped

8. The windshield is designed to enclose the driver in inclement weather and can be retracted, if desired.
① tempestuous ② serene ③ placid ④ sedate

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

9. Emphasis allows you _____ similar special effects by magnifying, reducing, or even eliminating certain details.

- ① create ② to create ③ creating ④ to be created

10. Despite their importance to Facebook, the workers in this Nairobi office are among the lowest-paid workers for the platform anywhere in the world, with some of _____ taking home as little as \$1.50 per hour.

- ① which ② whom ③ us ④ them

11. She could estimate the total amount of her purchases within pennies, so she would not _____ at the check-out stand.

- ① be embarrassed ② be embarrassing ③ embarrass ④ being embarrassed

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

12. Although herds of big game animals ①were more abundant in the tropics in prehistory than ②it is today, gathering ③has probably always been at least as important as hunting ④for tropical foragers.

13. Now with vaccines ①available to Americans ②who meet an expanding range of ③eligibility requirements, they are trying to both ④demystifying the science and debunk conspiracy theories.

14. And, of course, translators are forever ①stumbling upon words they ②have never seen before, words that ③appear in no dictionary they own, words ④which they must find exact target-language equivalents by tomorrow.

※ 다음 글을 읽고 물음에 답하십시오. (15-16) [각 3점]

Two prominent researchers in the field of ancient Greek art history recently penned articles about research conducted on artwork uncovered in Greek ruins. (A)_____ they both believe it is likely that the pieces of artwork discovered date back to the time of Homer, perspectives on some technical features of the artifacts differ between the two experts. Schmidt, whose team is credited with the discovery of a variety of sculptures, maintains that his findings indicate that the sculptors responsible for creating the pieces used advanced methods far beyond what were previously believed to have been used.

(B) _____, a different view is held by Thompson, an art historian and professor who specializes in ancient Greek sculptures. He emphasizes that while the works of art discovered by Schmidt indeed reveal evidence that advanced sculpting techniques were utilized, the existence of such innovative methods was previously known by researchers in his own department. With that said, he does consider the discoveries made by Schmidt's team to be of extreme importance, as the sculptures found differ significantly in size, shape, and material from previously known pieces.

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

- ① Because — Similarly
- ② Since — In addition
- ③ Although — Furthermore
- ④ While — However

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

- ① Schmidt and his team discovered a variety of ancient Greek sculptures.
- ② Both researchers agree that ancient Greek sculptors used advanced sculpting methods.
- ③ Thompson claims that innovative methods were not used in ancient Greek sculptures.
- ④ The sculptures found by Schmidt's team differ in size from previously known pieces.

※ 다음 글을 읽고 물음에 답하시오. (17-18) [각 3점]

Many evolutionary psychologists have speculated that the ability to feel another's pain and quickly read emotional nuance gave Stone Age women a tentacle to sense potential dangerous or aggressive behavior and thus avoid the consequences to themselves and protect their children. This talent also primes women for anticipating the physical needs of nonverbal infants.

Being this emotionally sensitive has its pros and cons. Jane, a normally brash and courageous person, told me that she could not get to sleep for hours after seeing an intense action flick. In a study on the aftereffects of frightening films, women were more likely to lose sleep than men. Studies show that, from childhood, females startle more easily and react more fearfully as measured through electrical conductivity in the skin. Her boy friend had to insist his movie-watching habits if he wanted to include Jane. So when he suggested that they watch *The Godfather*, he made sure it was in the middle of the day.

17. Which underlined part is NOT appropriate in the context?

- ① tentacle
- ② primes
- ③ startle
- ④ insist

18. According to the passage, which is true?

- ① Females are more sensitive to the potential danger.
- ② Females are forced to grow up as child-carers.
- ③ Females are rarely scared in order to protect themselves.
- ④ Females are insensitive to delicate electricity.

※ 다음 글을 읽고 물음에 답하십시오. (19-20) [각 3점]

How many English words do you need to know in order to be considered fluent? Experts disagree on the exact number of words learners need to know to achieve fluency in a new language, but they generally agree that you need to know at least several thousand. Many language learners have at some point wished that they could simply insert a computer chip into their memories containing all the vocabulary of the target language. Although that isn't yet feasible, with training, the potential of the human memory can be unlocked. Many teachers suggest accelerating the vocabulary-building process by using mnemonics.

Simply put, mnemonics are methods used to help remember information that is otherwise difficult to recall. There are a wide variety of methods and different ones work better for different people, depending on their learning styles. The loci method is a primarily visual system of remembering things. The association method encouraged people to link target words to memorable images and utilize their senses. The grouping method works well for people who are good at linking concepts and organizing ideas together.

The loci method is very useful for remembering lists of words. Before using this method, it is necessary to visualize a path that you know well, such as the way to school or to work.

(A) For example, for the word "accelerate," you might choose the image of a race car; an image for the word "enormous" might be a dinosaur. Creating these images may take a little practice.

(B) Finally, put away the list and move along the path in your mind again, recalling as many words as you can.

(C) Next, looking at your list of words, you'll need to create an image for each word, ideally one that is vivid and memorable.

(D) Then, imagine yourself walking down your path and put the images you associated with the words at certain common landmarks, like seeing a race car at the convenience store, a dinosaur in the park, etc.

19. Which is the most appropriate order for (A), (B), (C), and (D)?
- ① (A) - (C) - (D) - (B)
 - ② (D) - (C) - (A) - (B)
 - ③ (C) - (A) - (D) - (B)
 - ④ (D) - (A) - (C) - (B)
20. According to the passage, which is true?
- ① You need to be able to associate words with images.
 - ② You need to think about a path you are unfamiliar with.
 - ③ You need to learn as many languages as possible.
 - ④ You need to cultivate your imagination.

※ 다음 글을 읽고 물음에 답하십시오. (21-23) [각 3점]

There were _____ main reasons that led me to change my major from anthropology to business administration. First, anthropology was not what I had expected. Within anthropology, I was specializing in archaeology because I was intrigued with learning the secrets of long-lost people. My archaeology classes seemed to lose sight of the people, however, and focused, instead, on the height of columns, the width of pediments, and the chemical composition of paint on a tiny fragment of pottery. In short, I was bored. Another reason was purely (A)_____. I became increasingly aware of the scarcity of jobs for people with a Ph.D. in anthropology. I did not want to spend five years in graduate school only then to find myself waiting on tables for a living due to lack of demand for archaeologists. The deciding factor for me came last year, however, when I worked at a travel agency for the summer. I had never (B)_____ work so much before. I loved the interaction with clients, the challenge of planning the “perfect vacation.” the opportunity to travel, and the knowledge that diligent work could bring not only the satisfaction of doing a good job but also financial rewards. As a result, I decided to change my major to business administration, with the goal of one day owning my own travel agency.

21. Which is the most appropriate for the blank?
- ① one
 - ② two
 - ③ three
 - ④ four
22. Which is the most appropriate for the blanks (A) and (B)?
- ① cultural — finished
 - ② theoretical — practiced
 - ③ psychological — denied
 - ④ practical — enjoyed

23. Which is the topic of the passage?

- ① Anthropology and business administration
- ② The reasons for the change of major
- ③ Practical things to determine one's major
- ④ Future alternatives to different majors

※ 다음 글을 읽고 물음에 답하십시오. (24-25) [각 3점]

In humans, sleep is punctuated by rapid eye movement (REM) sleep every 90 minutes. This is when most dreaming occurs. REM sleep is triggered by a specialized set of neurons that pump activity straight into the brain's visual cortex, causing us to experience vision even though our eyes are closed. This activity in the visual cortex is presumably why dreams are _____. The anatomical precision of these circuits suggests that dream sleep is biologically important—such precise and universal circuitry rarely evolves without an important function behind it.

The defensive activation theory makes some clear predictions about dreaming. For example, because brain flexibility diminishes with age, the fraction of sleep spent in REM should also decrease across the life span. And that's exactly what happens: in humans, REM accounts for half of an infant's sleep time, but the percentage decreases steadily to about 18% in the elderly. REM sleep appears to become less necessary as the brain becomes less flexible.

Of course, this relationship is not sufficient to prove the defensive activation theory. To test it on a deeper level, we broadened our investigation to animals other than humans. The defensive activation theory makes a specific prediction: the more flexible an animal's brain, the more REM sleep it should have to defend its visual system during sleep. As predicted, we found that species with more flexible brains spend more time in REM sleep each night. Although these two measures—brain flexibility and REM sleep—would seem at first be unrelated, they are in fact linked.

24. Which is the most appropriate for the blank?

- ① pictorial and filmic
- ② invisible and oblivious
- ③ vivid and aural
- ④ empirical and transcendent

25. Which is the best topic of the passage?

- ① The brain activation theory and its prediction
- ② The role of brain cortex while dreaming
- ③ The REM sleep and brain flexibility
- ④ The importance of visual cortex circuitry

※ 다음 글을 읽고 물음에 답하시오. (26-28) [각 5점]

Artificial Intelligence is now one of the most concentrated industries in the world. Dominated by a handful of tech giants and deployed at a planetary scale, AI already influences high-stakes social institutions in education, criminal justice, hiring and welfare. AI is remapping and intervening in the world, expanding wealth inequality and power asymmetries. But so far the sector has primarily escaped regulation, despite affecting the lives of billions of people, even when its products are unproven or potentially harmful.

The COVID-19 pandemic has obstructed this. Many AI companies are now pitching emotion recognition tools (ERTs) for monitoring remote workers and even schoolchildren. These systems map the “micro-expressions” in people’s faces from their video cameras. Then they predict internal emotional states drawn from a short list of supposedly universal categories: happiness, sadness, anger, disgust, surprise and fear.

This industry is predicted to be worth \$56 billion by 2024, and yet there is considerable scientific doubt that these systems are accurately detecting emotional states at all. A landmark 2019 review of the available research found no reliable correlation between facial expression and genuine emotion. “It is not possible to confidently infer happiness from a smile, anger from a scowl, or sadness from a frown,” the review stated. Even so, AI companies have built upon this “universal emotion” theory as a means to do human analysis at scale. ERTs are now being used in job interviews, in classrooms, in airport security and in law enforcement.

26. Which underlined part is NOT appropriate in the context?

- ① obstructed ② escaped ③ map ④ genuine

27. Which is the title of the passage?

- ① The AI: Source of Gold for New Generation
② The Almighty AI can Save the World
③ The Unchecked AI Peeks into Human Emotion
④ Alarm Signal: the AI Endangers People’s Lives

28. According to the passage, which is true?

- ① Universal emotion theory tries to judge human objectively.
② AI divides human emotions into countless categories.
③ AI changes the political and social situations in a positive way.
④ ERTs are adopted in many areas because of their accuracy.

※ 다음 글을 읽고 물음에 답하십시오. (29-30) [각 5점]

Sudden success or winnings can be very dangerous. Neurologically, chemicals are released in the brain that give a powerful jolt of arousal and energy, leading to the desire to repeat this experience. It can be the start of any kind of addiction and manic behavior. Also, when gains come quickly we tend to lose sight of the basic wisdom that true success, to really last, must come through hard work. We do not take into account the role that luck plays in such sudden gains. We try again and again to recapture that high from winning so much money or attention. We acquire feelings of grandiosity. We become especially (A)_____ to anyone who tries to warn us—they don't understand, we tell ourselves. Because this cannot be sustained, we experience an inevitable fall, which is all the more painful, leading to the depression part of the cycle. Although gamblers are the most prone to this, it equally applies to businesspeople during bubbles and to people who gain sudden attention from the public.

Unexpected losses or a string of losses equally create irrational reactions. We imagine we are cursed with bad luck and that this will go on indefinitely. We become fearful and hesitant, which will often lead to more mistakes or failures. In sports, this can induce what is known as choking, as previous losses and misses weigh on the mind and tighten it up.

The solution here is simple: whenever you experience (B)_____ gains or losses, that is precisely the time to step back and counterbalance them with some necessary pessimism or optimism. Be extra wary of sudden success and attention—they are not built on anything that lasts and they have an addictive pull. And the fall is always painful.

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

- ① resistant — unusual
- ② susceptible — sudden
- ③ satisfied — accidental
- ④ hesitant — anticipated

30. According to the passage, which is true?

- ① Unforeseen success does not create irrational reactions.
- ② People’s manic behavior is related to their continual habits.
- ③ The chemicals in the brain may cause any kind of addiction.
- ④ Athletes are not inclined to be affected by previous losses in sports.

수학 [자연계열] <오후> [문항별 5점]

31. 함수 $f(x) = 2x^3 - 18x^2 + 60x + 2$ 에 대하여
곡선 $y = f(x)$ 에 접하는 직선의 기울기는 $x = a$ 일 때
최솟값을 갖고, 그 최솟값은 b 이다. $a + b$ 의 값은?

- ① 3 ② 6 ③ 9 ④ 12

32. 미분가능한 함수 $f(x)$ 가 다음 조건을 만족시킨다.

(가) $f(x)$ 의 역함수가 존재한다.
(나) 모든 자연수 k 에 대하여 곡선 $y = f(x)$ 는
점 (k, k) 에서 직선 $y = x$ 에 접한다.

$g(x) = f(x)f^{-1}(x)$ 라 할 때, $\sum_{k=1}^n g'(k) = 12$ 이다.

자연수 n 의 값은?

- ① 1 ② 3 ③ 6 ④ 12

33. $\int_1^{e^2} (1 + \ln x)^2 dx$ 의 값은?

- ① $e^2 + 1$ ② $e^2 - 1$
③ $5e^2 + 1$ ④ $5e^2 - 1$

34. 곡선 $y = \frac{1}{3}(2x - 1)^{\frac{3}{2}}$ 위의 두 점 $(\frac{1}{2}, 0)$ 과 $(1, \frac{1}{3})$
사이의 곡선의 길이는?

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

35. 다음 중 급수가 수렴하게 되는 자연수 x 의 개수가
가장 많은 것은?

㉠ $\sum_{n=1}^{\infty} \frac{(x-3)^n}{n}$ ㉡ $\sum_{n=1}^{\infty} \frac{n(x+2)^n}{3^{n+1}}$
㉢ $\sum_{n=1}^{\infty} \frac{(-3)^n x^n}{\sqrt{n+1}}$ ㉣ $\sum_{n=1}^{\infty} \frac{(-2)^n (x-3)^n}{\sqrt{n}}$

- ① ㉠ ② ㉡ ③ ㉢ ④ ㉣

36. 극 곡선 $r = \sin\theta$ ($0 \leq \theta \leq \pi$)를 극축을 회전축으로 하
여
회전시켜 얻은 회전체의 겉넓이는?

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

37. 영이 아닌 벡터 \vec{a}, \vec{b} 에 대하여 $k = (2\vec{a}) \cdot \vec{b}$ 라 하자.
 \vec{a} 와 $\vec{c} = 8\vec{b} - k\vec{a}$ 가 수직일 때,
벡터 \vec{a} 의 크기 $|\vec{a}|$ 의 값은? (단, $\vec{c} \neq 8\vec{b}$)

- ① 1 ② 2 ③ 3 ④ 4

38. 점 $(1, 3, 0)$ 에서 벡터 $\vec{v} = \langle 1, 2, -1 \rangle$ 방향으로의 함수
 $f(x, y, z) = x \sin(yz) + \tan^{-1}(yz)$
에 대한 방향도함수의 값은?

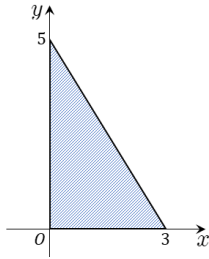
- ① $-\sqrt{6}$ ② $-\sqrt{3}$ ③ $-\frac{\sqrt{6}}{2}$ ④ $-\frac{\sqrt{3}}{2}$

39. 그림과 같이 영역 D 는

세 점 $(0,0)$, $(3,0)$, $(0,5)$ 를 꼭짓점으로 하는 삼각형의 내부와 경계이다. 함수 $f : D \rightarrow \mathbb{R}$,

$$f(x,y) = 3xy - 6x - 3y + 7$$

의 최솟값은?



- ① -15 ② -11 ③ -7 ④ -5

40. $\int_0^2 \frac{1}{\sqrt{|x-1|}} dx$ 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

41. 두 직선 $y = x$, $x = \pi$ 와 x 축으로 둘러싸인 영역을

D 라 할 때, 이중적분 $\iint_D \frac{\sin x}{x} dA$ 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

42. 곡선 C 는

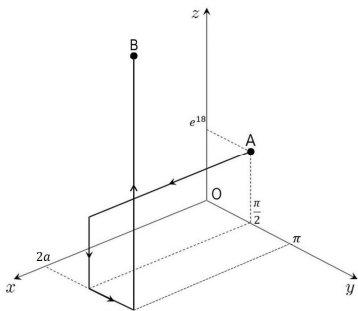
점 $A(0, \frac{\pi}{2}, e^{18})$ 로 부터

점 $B(2a, \pi, 3e^{18})$ 까지 그림과 같은 경로이다.

벡터장

$$\vec{F}(x,y,z) = \langle ae^{ax} \cos y, -e^{ax} \sin y, 1 \rangle$$

에 대하여 선적분이 $\int_C \vec{F} \cdot d\vec{r} = e^{18}$ 일 때, 양의 실수 a 의 값은?



- ① $\sqrt{3}$ ② 3 ③ $3\sqrt{3}$ ④ 9

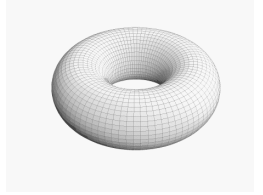
43. 그림과 같은 토러스(torus) S 와 벡터장

$$\vec{F}(x,y,z) = \langle y^2, x+y, z+e^y \rangle$$

에 대하여 면적분이

$$\iint_S \vec{F} \cdot d\vec{S} = 2$$

일 때, 토러스 내부의 부피는?



- ① 1 ② 2 ③ 3 ④ 4

44. 두 점 $(0,0,0)$ 과 $(1,2,2)$ 를 양 끝점으로 하는

선분 L 에 대하여 선적분 $\int_L xyz ds$ 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

45. 행렬 $A = \begin{pmatrix} 0 & 0 & -2 \\ 1 & a & 1 \\ 1 & 0 & 3 \end{pmatrix}$ 와 가역행렬(invertible matrix)

P 에 대하여 $P^{-1}AP = \begin{pmatrix} 2 & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & 2 \end{pmatrix}$ 일 때, $a-b$ 의 값은?

(단, a, b 는 실수)

- ① 1 ② 2 ③ 3 ④ 4

46. 벡터공간 V 의 기저 $\{\vec{e}_1, \vec{e}_2, \vec{e}_3\}$ 에 대하여 선형변환 $T: V \rightarrow V$ 가 다음 조건을 만족시킨다.

- (가) T 의 핵(kernel)은 2차원
- (나) $T(\vec{e}_1) = 2\vec{e}_2$
- (다) $\vec{e}_2 \cdot T(\vec{e}_1) = \vec{e}_2 \cdot T(\vec{e}_i), \quad i = 2, 3$

$T(\vec{e}_1 + 2\vec{e}_2 - \vec{e}_3) = a\vec{e}_1 + b\vec{e}_2 + c\vec{e}_3$ 일 때, $a+b-c$ 의 값은?
(단, a, b, c 는 실수이고, $\vec{u} \cdot \vec{v}$ 는 \vec{u} 와 \vec{v} 의 내적이다.)

- ① 1 ② 2 ③ 3 ④ 4

47. 행렬 $A = \begin{pmatrix} 1 & -2 & -2 \\ -2 & 5 & 1 \\ 3 & -4 & -3 \end{pmatrix}$ 의 역행렬 A^{-1} 에 대하여

$2A^{-1}$ 의 행렬식의 값은?

- ① $\frac{2}{3}$ ② $\frac{7}{9}$ ③ $\frac{8}{9}$ ④ 1

48. 곡선 $f(x, y) = 0$ 이 미분방정식

$$(6x + 4y + 1)dx + (4x + 2y + 2)dy = 0, \quad y\left(\frac{1}{3}\right) = 1$$

을 만족시킨다. 곡선 $f(x, y) = 0$ 위의 점 $(1, \alpha)$ 에 대하여 $\alpha^2 + 6\alpha$ 의 값은? (단, α 는 실수)

- ① -1 ② 0 ③ 1 ④ 2

49. 미분방정식

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 4y = 6e^x, \quad y(0) = y'(0) = -1$$

의 해를 $f(x)$ 라 할 때, $f(1) \times f'(-1)$ 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

50. 함수 $f(t)$ 의 라플라스변환 $\mathcal{L}(f) = F$ 가

$$F(s) = \frac{s+1}{s^4 + 4s^3 + 4s^2}$$

일 때, $f(4)$ 의 값은?

- ① $1 - e^{-8}$ ② $2 - e^{-8}$
③ $1 - e^{-4}$ ④ $2 - e^{-4}$