

단국대학교 2022학년도 편입생 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) [각3점]

1. The European Central Bank promised copious support for 2022, confirming its relaxed view on inflation and indicating that any exit from years of ultra-easy policy will be slow.
① conditional ② abundant ③ imitative ④ frugal
2. Just as uncompleted projects line the arteries of Nigeria, inchoate probes and investigations afflict the system.
① threatening ② haphazard ③ incipient ④ tricky
3. These two races are fastened to each other without intermingling and unable to separate entirely or to combine; although the law may abolish slavery, God alone can obliterate the traces of its existence.
① resuscitate ② obstruct ③ pursue ④ destroy
4. The overall population is becoming overweight, due to poor eating habits, lack of exercise, and a sedentary lifestyle.
① immobile ② quiet ③ serene ④ surreptitious
5. What distinguishes Semakau from Thilafushi—and most any other landfill—is that its trash has been incinerated and sealed off from its surroundings.
① burnt ② frozen ③ conserved ④ repaired
6. This was accomplished by inoculating material from the brains of individuals who had died of a disease named kuru into the brains of three female chimpanzees.
① transforming ② extricating
③ vaccinating ④ impinging
7. To understand this mind-boggling idea, consider a black hole floating in space.
① spontaneous ② sophisticated
③ incredible ④ poignant

8. Critical to the survival of marine life is plankton, the tiny plants and animals that normally teem near the ocean's surface, providing food for predators from salmon to seabirds.

- ① twinkle ② float ③ inhabit ④ crowd

※ 어법상 빈칸에 가장 적절한 것을 고르시오. (9-11) [각3점]

9. Long _____ an outsider's sport, surfing requires intense athleticism and highly technical skills that will be on display for the whole world when it makes its Olympic debut in Tokyo.

- ① considering ② considered
③ consideration of ④ consider

10. The signature can-do spirit that began with her discussions of clinical depression continued after she announced in 2015 that she _____ with breast cancer.

- ① had been diagnosed
② has been diagnosed
③ may be diagnosed
④ will have been diagnosed

11. While there is disagreement about the scale of the problem, most Americans, _____ patients, doctors, or insurance reps, think our health care system faces serious challenges.

- ① are their ② be they ③ that they are ④ are

※ 밑줄 친 부분 중 어법에 맞지 않은 것을 고르시오. (12-14) [각3점]

12. Technology now allows the public ①to scrutinize factory pollution problems and governments ②to make more efficient enforcement efforts and let companies ③to hold their supply chains ④to account.

13. Schoolmasters agreed that the curriculum ①are already overloaded and requires ②to be lightened, and that the best preparation that the school can give for making a boy likely to be a good soldier when grown up, ③is to develop his intelligence and physique ④as far as the conditions of school life admit.

14. Comte believed that earlier ①modes of thought, which he called theological and metaphysical, ②were imperfect, ③and that positive knowledge had to be based on natural phenomena ④which properties and relations were verified empirically.

※ 다음 글을 읽고 물음에 답하시오. (15-17) [각3점]

Astronomers have made the most precise measurements so far of the stars that orbit the supermassive black hole at the heart of our galaxy. Observing the stellar dance at the heart of the Milky Way has shown astronomers that 99.9 percent of the mass located there is possessed by the central black hole, named Sagittarius A* (Sgr A*), with just 0.1 percent attributed to stars, gas, and dust, dark matter and smaller black holes.

The researchers took advantage of a phenomenon predicted by Einstein's theory of general relativity, the most precise theory we have to describe gravity and therefore the orbits of moons, planets and stars. _____ general relativity, orbits change their orientation over time tracing out a rosette-like pattern, a process called Schwarzschild precession.

To measure the velocities of the stars, the astronomers used spectroscopy, and the positions of the stars were measured with the GRAVITY instrument. Detailing how these stars moved around Sgr A* and measuring the tiny variations in their orbits allowed the researchers to determine how mass was distributed in this region. Measuring such tiny changes in the orbits of distant stars is no easy feat and a deeper investigation may have to wait until telescope technology improves.

15. According to the passage, which is true?

- ① Improved telescopes were also used to detect the tiny movements of the stars around the black hole.
- ② Sgr A* takes 99.9 percent of the galactic mass.
- ③ Einstein's theory of general relativity was applied to the stars at the heart of our Milky Way.
- ④ Astronomers measured the speeds of the stars by applying the theory of general relativity.

16. Which is the most appropriate for the blank?

- ① With the purpose of
- ② In addition to
- ③ Irrelevant to
- ④ According to

17. Which has the closest meaning to the underlined part?

- ① synthesis
- ② observation
- ③ study
- ④ exploit

※ 다음 글을 읽고 물음에 답하시오. (18-19) [각3점]

A fairy story, as distinct from a merry tale, or an animal story, is a serious tale with a human hero and a happy ending. The progress of its hero is the reverse of the tragic hero's: at the beginning he is either socially obscure or despised as being stupid or untalented, lacking in the heroic virtues, but at the end, he has surprised everyone by demonstrating his heroism and winning fame, riches, and love. Though ultimately he succeeds, he does not do so without a struggle in which his success is in doubt, for opposed to him are not only natural difficulties like glass mountains, or barriers of flame, but also hostile wicked powers, stepmothers, jealous brothers and witches. In many cases, indeed, he would fail, were he not assisted by friendly powers who give him instructions or perform tasks for him which he cannot do himself; that is, in addition to his own powers, he needs luck, but this luck is not casual but dependent upon his character and his actions. The tale ends with the establishment of justice; not only are the good rewarded but also the evil are punished.

18. According to the passage, which is NOT the factor of the hero's success in a fairy tale?

- ① What he does
- ② His personality
- ③ Accidental luck
- ④ Help of supernatural beings

19. According to the passage, which is true about the fairy tale?

- ① It is a human story.
- ② The hero succeeds only by his own ability after all.
- ③ Unlike a tragic story, it presents the hero in an overall happy situation.
- ④ The hero's fate is unpredictable.

※ 다음 글을 읽고 물음에 답하시오. (20-22) [각3점]

Americans should have four-week vacations each year. First, Americans can complete household tasks and relax. Too often, many Americans choose to paint the house, complete some remodeling, or build decks during their vacations. They return to the office exhausted. The vacation did not accomplish its major goals: relaxation and rejuvenation. Second, workers would have several breaks around the holidays. With four weeks to choose from, workers can plan their vacations to fit their needs. They can enjoy quiet holidays without _____ work and holiday preparations into a

brief, tiring week. Next, studies indicate that workers are more satisfied and productive when they have four-week vacations. In most European countries, workers enjoy this longer vacation. Office managers have long noted that workers return to the office or plant eager to resume their duties. Moreover, productivity increases when workers are given a chance to relax completely. This vacation period would help the travel industry grow and would have a positive impact on the economy. With longer vacations, people would take the time to explore other areas of the country. The travel industry would see an increase in tours. In addition, the entire economy—from automobile manufactures and hotels and restaurants to camping-equipment industries—would benefit as more vacationers need additional services and goods. For all these reasons, Americans should have an extended vacation period.

20. Which is NOT mentioned as an advantage of an extended vacation?

- ① Workers' enhanced productivity
- ② More amicable relationship among family members
- ③ Workers' more relaxing vacation
- ④ The stimulation of the economy

21. Which is the most appropriate for the blank?

- ① cramming ② distorting ③ dissipating ④ postponing

22. Which is the title of the passage?

- ① Goals of Vacation: Relaxation and Rejuvenation
- ② Need for an Extended Vacation
- ③ Four-week Vacation and the Economy
- ④ Travel Industry and an Extended Vacation

※ 다음 글을 읽고 물음에 답하십시오. (23-25) [각3점]

What is the insight in which the scientist tries to see into nature? Can it indeed be called either imaginative or creative? To the literary man the question may seem merely silly. He has been taught that science is a large collection of facts; and if this is true, then the only seeing which scientists need to do is, he supposes, seeing the facts. He pictures them, the colorless professionals of science, going off to work in the morning into the universe in a neutral, unexposed state. They then expose themselves like a

photographic plate. And then in the darkroom or laboratory they develop the image, so that suddenly and startlingly it appears, printed in capital letters, as a new formula for atomic energy.

Men who have read Balzac and Zola are not deceived by the claims of these writers that they do no more than record the facts. The readers of Christopher Isherwood do not take him literally when he writes “I am a camera.” Yet the same readers solemnly carry with them from their schooldays this foolish picture of the scientist fixing by some mechanical process the facts of nature. I have had of all people a historian tell me that science is a collection of facts, and his voice had not even the ironic rasp of one filing cabinet reproving another.

It seems impossible that this historian had ever studied the beginnings of a scientific discovery. The Scientific Revolution can be held to begin in the year 1543 when there was brought to Copernicus, perhaps on his deathbed, the first printed copy of the book he had finished about a dozen years earlier. The thesis of this book is that the earth moves around the sun. When did Copernicus go out and record this fact with his camera? What appearance in nature prompted his outrageous guess? And in what odd sense is this guess to be called a _____ record of fact?

23. Which does the underlined part refer to?

- ① scientists
- ② Balzac and Zola
- ③ colorless professionals of science
- ④ literary people

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

- ① Scientist as well as writers need to see nature with imagination.
- ② Isherwood wrote in one of his works that he was a camera.
- ③ One book that Copernicus wrote was brought to him in 1543.
- ④ The Scientific Revolution started with recording the facts about nature.

25. Which is the most appropriate for the blank?

- ① slanted
- ② biased
- ③ neutral
- ④ complete

※ 다음 글을 읽고 물음에 답하시오. (26-27) [각5점]

Each cell in a particular plant starts out with a particular set of genes. The mystery is how these cells know how to form all of the plant’s separate structures such as roots,

leaves, and fruits. Cellular botanists have recently discovered that these genes are expressed, or “activated,” a few at a time through a complex system of hormones and regulatory molecules. This system is comparable to that of many mammals, which have what scientists call a “hormone hierarchy.” _____, hormones in the brain are delivered to the pituitary gland, which then releases other hormones to various other parts of the body. It is now believed that plant hormones exist in a similarly tiered system.

26. Which is the topic of the passage?

- ① Important breakthroughs in the field of cellular botany
- ② The ultimate role of a plant’s cells
- ③ A similarity between the cellular behavior of plants and animals
- ④ Genetic explanation about a plant’s cellular development

27. Which is the most appropriate for the blank?

- ① For example
- ② In spite
- ③ Alternatively
- ④ Nonetheless

※ 다음 글을 읽고 물음에 답하십시오. (28-30) [각5점]

Feng shui, meaning “the way of wind and water,” is an ancient Chinese art of arranging buildings, objects, and space in an environment to achieve harmony and balance. The concept derived from an ancient poem that talks about human life being connected and flowing with the environment around it.

Feng shui stems from the Taoist belief in *chi*, or the life force that inhabits everything. *Chi* is made up of *yin* and *yang* elements. These are opposing but complementary forces that cannot be separated. Taoists believed that by balancing *yin* and *yang* elements, people can improve the flow of positive *chi* in their lives and keep the negative *chi* away. Feng shui is a method of balancing *yin* and *yang*, and improving the flow of *chi* by arranging furniture, decorations, buildings, and even whole cities in a beneficial way. The ancient Chinese people believed that arranging things to create positive *chi* would ensure good health, improve interpersonal relationships, and bring luck and prosperity.

28. Which is the main purpose of the passage?

- ① To explain the practical applications of feng shui in Chinese culture
- ② To explain the advantages of using feng shui in our life
- ③ To explain the relationship between feng shui and Taoism
- ④ To explain the basic principle of feng shui

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

- ① The goal of feng shui is to harness energy forces and establish harmony between individuals and their environment.
- ② Feng shui is a Chinese religion that has roots in Taoism.
- ③ Ancient Chinese people believed feng shui guidelines could alter the flow of *chi* in a positive or negative way.
- ④ Feng shui suggests balancing *yin* and *yang* traits of any given space to assure health and good fortune.

30. Which is the tone of the passage?

- ① neutral
- ② skeptical
- ③ sarcastic
- ④ excited

수학 [자연계열] <오전> [문항별 5점]

31. $\lim_{x \rightarrow 0} \frac{\sinh x}{e^x - 1}$ 의 값은?

- ① 0 ② $\frac{1}{2}$ ③ 1 ④ 2

32. 구간 $[1, 4]$ 에서 함수 $f(x) = x^2 + \frac{16}{x}$ 의
최솟값과 최댓값의 합은?

- ① 29 ② 32 ③ $\frac{103}{3}$ ④ 39

33. 두 곡선 $y = \cos x$, $y = \sin 2x$ 와

두 직선 $x = 0$, $x = \frac{\pi}{2}$ 로 둘러싸인 영역의 넓이는?

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

34. 멱급수 $\sum_{n=1}^{\infty} (-1)^n \frac{(x+3)^n}{n 3^n}$ 이 수렴하는
모든 정수 x 의 개수는?

- ① 3 ② 4 ③ 5 ④ 6

35. 다음 중 수렴하는 특이적분의 개수는?

㉠. $\int_1^{\infty} \frac{\ln x}{x^2} dx$	㉡. $\int_2^{\infty} \frac{2+e^{-x}}{x} dx$
㉢. $\int_1^2 \frac{x}{1-x^2} dx$	㉣. $\int_1^3 \frac{1}{\sqrt{x-1}} dx$

- ① 0 ② 1 ③ 2 ④ 3

36. 극 곡선 $r = 1 + \sin \theta$ 에 대하여 $\theta = \theta_0$ 일 때의
접선의 기울기가 0인 θ_0 의 값을 모두 더하면?
(단, $-\pi \leq \theta \leq \pi$ 이다.)

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

37. 3차원 공간에서 네 점

$P(-3, 1, 0)$, $Q(-2, 2, 1)$, $R(2, 3, -2)$, $S(2, 5, -1)$
을 꼭짓점으로 하는 사면체의 부피는?

- ① 11 ② $\frac{11}{6}$ ③ $\frac{11}{4}$ ④ $\frac{11}{3}$

38. 함수 $f(x, y, z) = kxy^2 \sin z$ 에 대하여 점 $(1, 1, 0)$ 에서
벡터 $\vec{v} = \langle 1, 2, -1 \rangle$ 방향으로 함수 f 의
방향 도함수가 $\sqrt{6}$ 일 때, 상수 k 의 값은?

- ① -6 ② $-\sqrt{6}$ ③ $\sqrt{6}$ ④ 6

39. 네 평면 $x + 2y + z = a$, $x = 2y$, $x = 0$, $z = 0$ 으로 둘러싸인 입체의 부피가 $\frac{8}{3}$ 일 때, 양의 실수 a 의 값은?

- ① 1 ② 2 ③ 3 ④ 4

40. 영역 $\{(x, y) | 0 \leq x \leq 3, -1 \leq y \leq 2\}$ 에서 정의된 함수 $f(x, y) = x^2 - 2xy + 3y$ 의 최솟값과 최댓값의 합은?

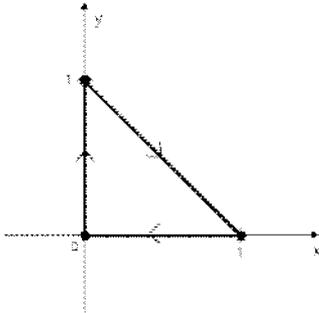
- ① 7 ② 8 ③ 9 ④ 10

41. 양의 실수 a 에 대하여 타원 $9x^2 + 4y^2 = a$ 로 둘러싸인 영역을 D 라고 하자.

이중적분 $\iint_D (x^2 + 3y) dA = \frac{8}{27}\pi$ 일 때, a 의 값은?

- ① 2 ② 4 ③ 6 ④ 8

42. 아래 그림과 같이 곡선 C 는 세 점 $(0,0)$, $(0,1)$, $(1,0)$ 을 꼭짓점으로 하는 삼각형의 경계일 때, 벡터장 $\vec{F}(x, y) = \langle 3x^4, xy \rangle$ 에 대하여 선적분 $\int_C \vec{F} \cdot d\vec{r}$ 의 값은?



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

43. 영역 $\{(x, y) | x^2 + y^2 \leq 9\}$ 위에서 정의된 함수 $f(x, y) = x^2 + y^2$ 에 대하여, 곡면 $z = f(x, y)$ 의 넓이는?

- ① $\frac{\pi}{6}(37\sqrt{37} - 1)$ ② $\frac{\pi}{6}(39\sqrt{39} - 1)$
 ③ $\frac{\pi}{4}(37\sqrt{37} - 1)$ ④ $\frac{\pi}{4}(39\sqrt{39} - 1)$

44. 곡면 S 는 포물 기둥 $z = 1 - x^2$ 과 세 평면 $z = 0$, $y = 0$, $y + z = 2$ 로 둘러싸인 영역의 경계이다. 벡터장 $\vec{F}(x, y, z) = \langle 3xy, 2y^2 + e^{xz}, \sin(xy) \rangle$ 에 대하여, 면적분 $\iint_S \vec{F} \cdot d\vec{S}$ 의 값은? (단, 곡면 S 의 방향은 원점에서 바라봤을 때 바깥 방향이다.)

- ① $\frac{184}{15}$ ② $\frac{62}{5}$ ③ $\frac{188}{15}$ ④ $\frac{38}{5}$

45. 행렬 $\begin{pmatrix} 5 & 0 & 0 \\ 1 & 3 & 4 \\ 2 & 0 & a \end{pmatrix}$ 의 특성방정식(characteristic equation)이

$x^3 - 15x^2 + 71x - 105 = 0$ 일 때, 실수 a 의 값은?

- ① 3 ② 5 ③ 7 ④ 9

46. 선형변환 $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ 가 다음 조건을 만족시킨다.

$T(1, 1, 0) = (1, 1)$

$T(1, 0, 1) = (3, -1)$

$T(0, 1, 1) = (2, 4)$

선형변환 T 의 표준행렬을 A 라 할 때, A 의 모든 성분의 합은?

- ① 2 ② 3 ③ 4 ④ 5

47. 행렬 $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{pmatrix}$ 에 대하여 $AB = 2A^2 - A + E$ 를

만족시키는 행렬을 B 라 할 때, $\text{tr}(B)$ 의 값은?

(단, E 는 3×3 항등행렬이고 $\text{tr}(B)$ 는

행렬 B 의 트레이스(trace)이다.)

- ① -25 ② -23 ③ -21 ④ -19

48. $y = y(x)$ 가 미분방정식

$$y^{-2}dx - \frac{1}{\sin(\ln x)}dy = 0, \quad y(1) = 1$$

의 해일 때, $y(e^{\pi/3})$ 의 값은?

① $\left(\frac{3\sqrt{3}+3}{4}e^{\pi/3} + \frac{5}{6}\right)^{1/3}$ ② $\left(\frac{3\sqrt{3}+3}{4}e^{\pi/3} + \frac{5}{2}\right)^{1/3}$

③ $\left(\frac{3\sqrt{3}-3}{4}e^{\pi/3} + \frac{5}{6}\right)^{1/3}$ ④ $\left(\frac{3\sqrt{3}-3}{4}e^{\pi/3} + \frac{5}{2}\right)^{1/3}$

49. $y = y(x)$ 가 미분방정식

$$x^3y''' + 5x^2y'' + 7xy' + 8y = 0,$$

$$y(1) = 1 + e^\pi, \quad y(e^{-\pi/2}) = 0, \quad y(e^{-\pi/4}) = e^{\pi/2} - e^{-\pi}$$

의 해일 때, $y(e^{-\pi/8})$ 의 값은?

① $e^{\pi/4} + \frac{\sqrt{2}}{2}e^\pi - \frac{\sqrt{2}}{2}e^{-\pi}$

② $e^{\pi/4} - \frac{\sqrt{2}}{2}e^\pi - \frac{\sqrt{2}}{2}e^{-\pi}$

③ $e^{\pi/4} + \frac{\sqrt{2}}{2}e^\pi + \frac{\sqrt{2}}{2}e^{-\pi}$

④ $e^{\pi/4} - \frac{\sqrt{2}}{2}e^\pi + \frac{\sqrt{2}}{2}e^{-\pi}$

50. $X = X(t)$ 가 연립미분방정식

$$X'(t) = \begin{pmatrix} 1 & 2 \\ -\frac{1}{2} & 1 \end{pmatrix} X(t), \quad X(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

의 해일 때, $X(\pi/2)$ 를 구하면?

① $\begin{pmatrix} 2e^{\frac{\pi}{2}} \\ -\frac{1}{2}e^{\frac{\pi}{2}} \end{pmatrix}$

② $\begin{pmatrix} 2e^{\frac{\pi}{2}} \\ \frac{1}{2}e^{\frac{\pi}{2}} \end{pmatrix}$

③ $\begin{pmatrix} -\frac{1}{2}e^{\frac{\pi}{2}} \\ 2e^{\frac{\pi}{2}} \end{pmatrix}$

④ $\begin{pmatrix} \frac{1}{2}e^{\frac{\pi}{2}} \\ 2e^{\frac{\pi}{2}} \end{pmatrix}$

영어 정답표 [자연계열] < 오전 >

문제번호	1	2	3	4	5	6	7	8	9	10
정답	②	③	④	①	①	③	③	④	②	①
배점	3	3	3	3	3	3	3	3	3	3

문제번호	11	12	13	14	15	16	17	18	19	20
정답	②	③	①	④	③	④	④	③	①	②
배점	3	3	3	3	3	3	3	3	3	3

문제번호	21	22	23	24	25	26	27	28	29	30
정답	①	②	②	④	③	③	①	④	②	①
배점	3	3	3	3	3	5	5	5	5	5

수학 정답표 [자연계열] < 오전 >

문제번호	31	32	33	34	35	36	37	38	39	40
정답	③	②	①	④	③	②	②	①	④	③
배점	5	5	5	5	5	5	5	5	5	5

문제번호	41	42	43	44	45	46	47	48	49	50
정답	④	②	①	①	③	④	③	④	①	①
배점	5	5	5	5	5	5	5	5	5	5