2022 학년도 고 1 11 월 모의고사 영어

#21

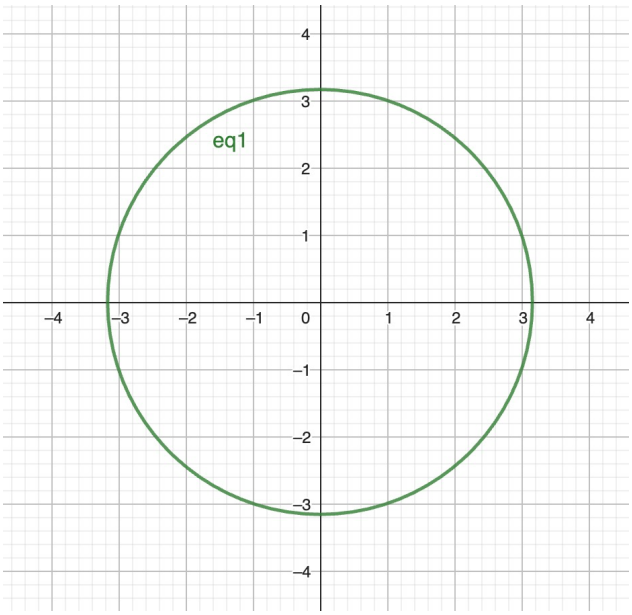
<A> “blood, sweat, and tears”, “hard-earned”, “hard day’s work”, harder, sacred cow, huge effort, hardship, hard work

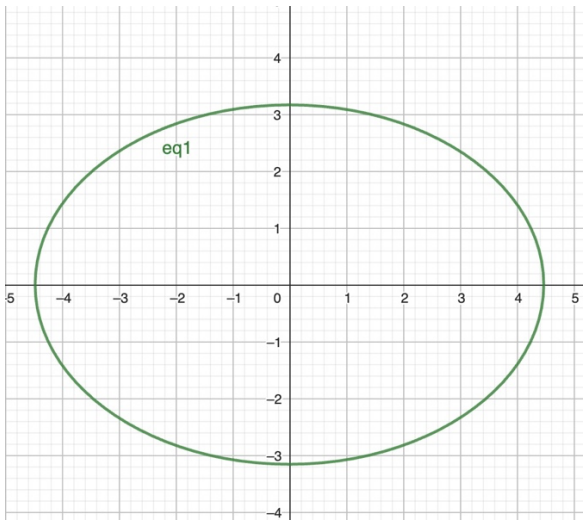
<B> “easy money”, “That’s easy for you to say”, easy

마냥 <A>가 좋은 것이고 <B>가 나쁜 것이라는 통념에 의문을 제기하고 있음, 글쓴이는 <A>가 아니어도 we can do what matters 라고 간접적으로 말하고 있음

#23

빙하가 녹음 → 해수면 상승 → 중력에 의해 바닷물들이 적도 근처로 더 몰림 (대충 왼쪽 원에서 오른쪽 타원으로 바뀌는 느낌?) → 지구 자전이 느려짐 → 축적되니 공룡들이 살 때에 비해 하루가 1 시간이나 더 길어짐 (23 시간에서 24 시간으로)





Q. 왜 바닷물이 적도 근처로 모여서 지구가 뚱뚱해진다고 자전이 느려질까? 이유는 각운동량 보존법칙 때문이다. 4 페이지를 참고.

21. 밑줄 친 challenge this sacred cow가 다음 글에서 의미하는 바로 가장 적절한 것은? [3점]

Our language helps to reveal our deeper assumptions. Think of these revealing phrases: When we accomplish something important, we say it took "blood, sweat, and tears." We say important achievements are "hard-earned." We recommend a "hard day's work" when "day's work" would be enough. When we talk of "easy money," we are implying it was obtained through illegal or questionable means. We use the phrase "That's easy for you to say" as a criticism, usually when we are seeking to invalidate someone's opinion. It's like we all automatically accept that the "right" way is, inevitably, the harder one. In my experience this is hardly ever questioned. What would happen if you do challenge this sacred cow? We don't even pause to consider that something important and valuable could be made easy. What if the biggest thing keeping us from doing what matters is the false assumption that it has to take huge effort?

* invalidate: 틀렸음을 입증하다

① resist the tendency to avoid any hardship
② escape from the pressure of using formal language
③ doubt the solid belief that only hard work is worthy
④ abandon the old notion that money always comes first
⑤ break the superstition that holy animals bring good luck

23. 다음 글의 주제로 가장 적절한 것은?

The most remarkable and unbelievable consequence of melting ice and rising seas is that together they are a kind of time machine, so real that they are altering the duration of our day. It works like this: As the glaciers melt and the seas rise, gravity forces more water toward the equator. This changes the shape of the Earth ever so slightly, making it fatter around the middle, which in turns slows the rotation of the planet similarly to the way a ballet dancer slows her spin by spreading out her arms. The slowdown isn't much, just a few thousandths of a second each year, but like the barely noticeable jump of rising seas every year, it adds up. When dinosaurs lived on the Earth, a day lasted only about twenty-three hours.

① cause of rising temperatures on the Earth
② principles of planets maintaining their shapes
③ implications of melting ice on marine biodiversity
④ way to keep track of time without using any device
⑤ impact of melting ice and rising seas on the length of a day

<각운동량 보존법칙>

수학적 정의 [편집]

어떤 원점에 대한 입자의 각운동량을 수학적으로 정의하면 다음과 같다.:

$$\mathbf{L} = \mathbf{r} \times \mathbf{p} = \mathbf{r} \times m\mathbf{v}$$

여기서

- m : 입자의 질량
- $\mathbf{L}$: 입자의 각운동량
- $\mathbf{p}$: 입자의 선운동량
- $\mathbf{r}$: 원점에서부터 입자까지의 위치벡터
- $\mathbf{v}$: 입자의 속도

이다. 물리계가 여러 입자로 구성되어 있을 때에는, 한 원점에 대한 총 각운동량은 각각의 각운동량을 더해서 구하거나,

$$\mathbf{L} = \sum_i \mathbf{r}_i \times \mathbf{p}_i$$

좀 더 복잡한 부피를 가지는 물체의 각운동량은 미소질량에 대해 각운동량을 적분하여 얻을 수 있다.

$$\mathbf{L} = \int_V \mathbf{r} \times \mathbf{v}\, dm$$

많은 경우, 고정된 특정한 한 축에 대한 각운동량만을 고려하기 때문에 각운동량을 3차원 벡터로 취급하지 않고 단순히 반시계방향의 회전은 양으로, 시계방향의 회전은 음으로 취급하여 스칼라로 놓기도 한다. 이렇게 할 때에는 벡터곱의 크기로 각운동량을 표기하게 된다.

$$\mathbf{L} = |\mathbf{r}||\mathbf{p}| \sin\theta$$

여기서 θ는 $\mathbf{r}$로부터 $\mathbf{p}$까지 재는 각도이다.

각운동량의 보존 [편집]

각운동량을 시간에 대해 미분하면 돌림힘 $\boldsymbol{\tau}$

$$\begin{aligned}\frac{d\mathbf{L}}{dt} &= \left(\frac{d\mathbf{r}}{dt} \times \mathbf{p}\right) + \left(\mathbf{r} \times \frac{d\mathbf{p}}{dt}\right) \\ &= (\mathbf{v} \times m\mathbf{v}) + (\mathbf{r} \times \mathbf{F}) \\ &= \boldsymbol{\tau}\end{aligned}$$

가 된다. 만약 어떤 원점을 기준으로 계에 돌림힘이 작용하지 않으면

$$\frac{d\mathbf{L}}{dt} = 0$$

$\mathbf{L} = \mathbf{C}$(상수벡터)

이 되어 각운동량이 보존되게 된다. 이를 **각운동량 보존 법칙** 또는 간단히 **각운동량 보존**(conservation of angular momentum)이라고 부른다.

각운동량 보존 법칙은 특히 중심력이 작용하는 운동을 분석하는 데 유용하게 쓰일 수 있다. 중심력이 작용하는 입자들의 운동에서 두 입자는 외부로부터의 영향에서 고립된 계를 이루고, 원점은 두 입자를 잇는 선 위의 한 점으로 잡는다. 서로 작용하는 힘의 방향이 언제나 원점에서 입자들까지의 위치벡터와 같은 방향이 되므로, 앞에서 잡은 원점을 기준으로 한 알짜 토크는 언제나 0이 된다. 따라서, 각운동량은 보존된다. 일정한 각운동량을 갖는 이와 같은 경우는 행성, 위성, 보어의 원자모형등의 분석에 유용하게 사용된다.

대충 X 는 벡터의 외적을 뜻하는 기호이고 dL/dt 는 L 을 t 에 대해 미분한다는 뜻이므로 고등학교 1 학년 수준에서 이해하기는 쉽지 않을 것이다. 외적은 2026 학년도 수능 선택 과목인 기하에서도 다루지 않고 있다, 현 수능 기하에서는 벡터의 내적만을 다룬다. 미분은 수학 2 에서 다루고 있으나 연쇄 법칙 (음함수 미분법, 합성함수 미분법, 매개변수 미분법, 역함수 미분법, ...) 은 미적분에서 다루고 있기에 1-2 년 내로 학습해보실 수 있을 것.

아무튼 중요한 것은 다음이다.

L=r*p*sin(theta)

Theta 가 일정하다고 가정하자. 이때 지구의 적도 부근으로 물이 몰리는 것은 r 이 커지는 것이라 이해할 수 있다. 그런데 각운동량 보존법칙에 의해 L 은 일정하다. 따라서 L 과 theta 가 일정할 때 r 이 증가하면 p 는 감소할 수밖에 없다. 이는 수식을 다음과 같이 바꾸어보면

p=L/(r*sin(theta))

수학(하)에서 학습하는 유리함수 y=1/x 의 그래프와 본질적으로 일치하기 때문에 (x 에 r 넣고 y 에 p 넣고 적당한 상수 L/sin(theta)를 곱했다고 생각해봐라) 왜 r 값이 증가할 때 p 값이 작아지는지 이해할 수 있을 것이다. 물론 정확히는 다음 페이지에 서술된 관성 모멘트의 변화에 관한 이해가 필요하지만, 더 자세한 것은 대학 가서 일반물리학을 배울 때 해보도록 하자.

(본문에 드러난 발레리나 예시가 일반물리학에서 각운동량 보존 법칙을 설명할 때 대표적으로 소개하는 예시이기 때문에 각운동량 보존을 이용해 설명하는 것이 적절하다 판단, 다만 저도 물리학 전공자가 아니기 때문에 잘못된 설명일 수 있습니다. 고등학교 1 학년 수준에서 논리적으로 지문 내용을 받아들이는 데에 문제 없도록 한다는 맥락에서 학습에 활용해주시면 감사드리겠습니다.)

관성 모멘트와 각운동량 [편집]

관성 모멘트와 각운동량 사이에는 질량과 운동량사이의 관계

$$\mathbf{p} = m\mathbf{v}$$

와 유사하게

$$\mathbf{L} = I\boldsymbol{\omega}$$

꼴의 식이 있다. 경우에 따라 스칼라 관성모멘트 I나 관성텐서 $\mathbf{I}$중 하나를 사용한다.

회전축이 변하지 않는 경우 [편집]

회전축이 변하지 않는 경우에 각운동량은 간단히 스칼라 관성모멘트 I와 각속도 ω의 곱으로 쓰일 수 있다.

$$\mathbf{L} = I\boldsymbol{\omega}$$

위 식은 스칼라 관성 모멘트의 정의

$$I = m|\mathbf{r}|^2$$

와 각속도의 공식 (ω와 $\mathbf{r}$이 **수직**일 때만 성립.)

$$\omega = \frac{\mathbf{r} \times \mathbf{v}}{|\mathbf{r}|^2}$$

을 사용하여 각운동량의 정의로부터 간단히 유도할 수 있다.

$$\begin{aligned}\mathbf{L} &= \mathbf{r} \times m\mathbf{v} \\ &= \left(m|\mathbf{r}|^2\right) \cdot \left(\frac{\mathbf{r} \times \mathbf{v}}{|\mathbf{r}|^2}\right) \\ &= I\boldsymbol{\omega}\end{aligned}$$

여기서는 입자 하나에 대해서만 유도를 하였지만, 일반적인 경우에도 관성모멘트와 각운동량 사이에는 이와 같은 관계가 성립한다.

#29
AI 언급된 김에 ML 과 DL 에 관한 학습도 같이 해봅시다.

AI, ML, and DL are often used interchangeably, but they have distinct meanings:

1. Artificial Intelligence (AI):
    - Broadest term: Encompasses any intelligence displayed by machines, aiming to mimic or surpass human capabilities in areas like learning, reasoning, problem-solving, and perception.
    - Examples: Self-driving cars, facial recognition, playing chess at a superhuman level.
2. Machine Learning (ML):
    - Subset of AI: Focuses on algorithms that learn from data without explicit programming.
    - Types of learning: Supervised learning (predicting outcomes based on labeled data), Unsupervised learning (finding patterns in unlabeled data), Reinforcement learning (learning through trial and error).
    - Examples: Recommender systems, spam filtering, image recognition.
3. Deep Learning (DL):
    - Subset of ML: Utilizes artificial neural networks with multiple layers to learn complex representations from data.
    - Requires large amounts of data: Often used for tasks requiring high accuracy and complex decision-making.
    - Examples: Natural Language Processing (NLP), computer vision, medical diagnosis.

그들의 관계는 다음과 같은데, AI 의 부분집합이 ML 이고 ML 의 부분집합이 DL 이라 생각하시면 됩니다. 수학(하)에서 학습하셨던 벤 다이어그램 생각해보셔도 좋겠습니다.

Think of them as a pyramid:

- Base: AI encompasses all forms of intelligence exhibited by machines.
- Middle: ML falls within AI and focuses specifically on algorithms that learn from data.

- Top: DL is a subfield of ML that leverages artificial neural networks for complex learning tasks.

Here's an analogy:

- Imagine building a house:
    - AI: Represents the entire construction project.
    - ML: Encompasses specific tasks like laying the foundation, building walls, and installing the roof.
    - DL: Represents advanced techniques like using specialized tools or materials for specific tasks.

Each layer builds upon the previous one, with AI being the overarching goal, ML providing core learning methods, and DL offering advanced capabilities for specific tasks.

29. 다음 글의 밑줄 친 부분 중, 어법상 틀린 것은? [3점]

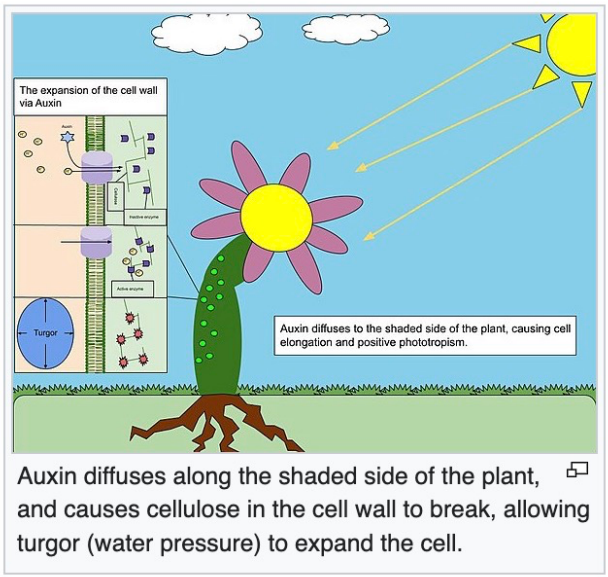
You may have seen headlines in the news about some of the things machines powered by artificial intelligence can do. However, if you were to consider all the tasks ① that AI-powered machines could actually perform, it would be quite mind-blowing! One of the key features of artificial intelligence ② is that it enables machines to learn new things, rather than requiring programming specific to new tasks. Therefore, the core difference between computers of the future and ③ those of the past is that future computers will be able to learn and self-improve. In the near future, smart virtual assistants will know more about you than your closest friends and family members ④ are. Can you imagine how that might change our lives? These kinds of changes are exactly why it is so important ⑤ to recognize the implications that new technologies will have for our world.

#30

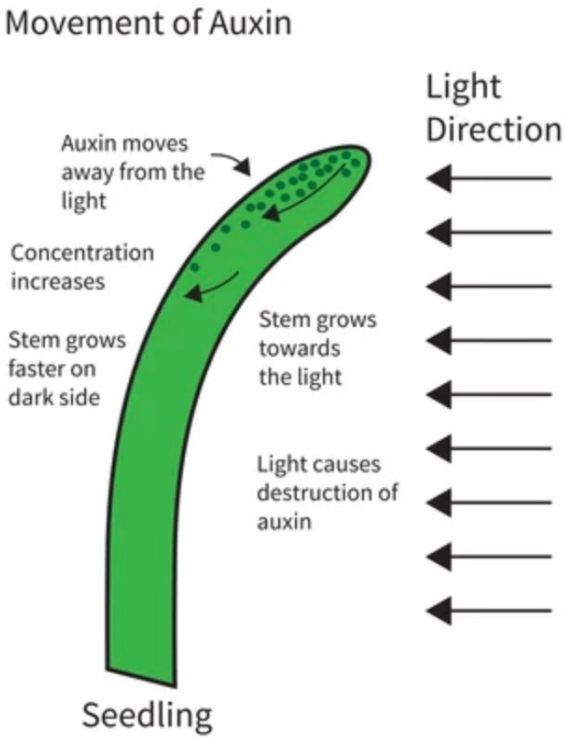
Auxins: 대충 식물의 생장에 관여하는 호르몬

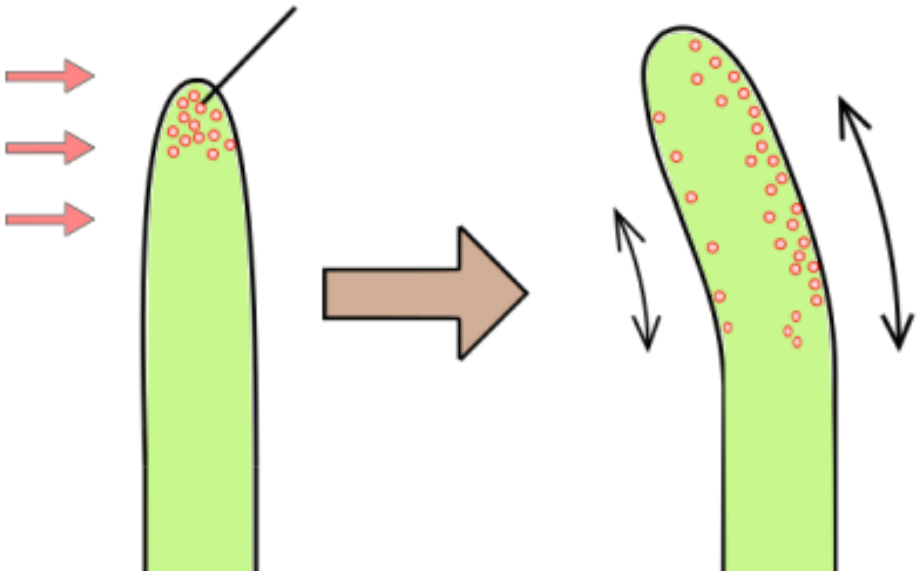
At the tips of stems: 줄기 쪽에 있는 애들은 촉진 → 햇빛 쪽으로 줄기가 휨 (그늘 쪽에 호르몬이 축적됨 → 그늘 쪽이 더 빠르게 생장하니 = 햇빛 쪽이 더 느리게)

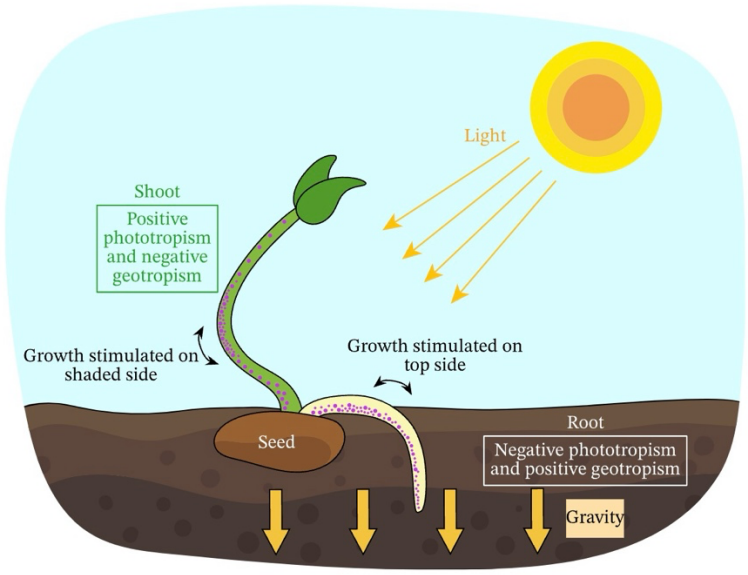
At the tips of roots: 뿌리 쪽에 있는 애들은 저해 → 뿌리가 아래로 향함 (아래 쪽에 호르몬이 축적됨 → 아래 쪽이 더 느리게 생장하니 = 위쪽이 더 빠르게)



Auxin diffuses along the shaded side of the plant, and causes cellulose in the cell wall to break, allowing turgor (water pressure) to expand the cell.







Auxins	Low concentration	High concentration
Shoot	−	+
Root	+	−

(+) = growth is stimulated
(−) = growth is inhibited

30. 다음 글의 밑줄 친 부분 중, 문맥상 낱말의 쓰임이 적절하지 <u>않은</u> 것은? [3점]

Plant growth is controlled by a group of hormones called auxins found at the tips of stems and roots of plants. Auxins produced at the tips of stems tend to accumulate on the side of the stem that is in the shade. Accordingly, the auxins ① <u>stimulate</u> growth on the shaded side of the plant. Therefore, the shaded side grows faster than the side facing the sunlight. This phenomenon causes the stem to bend and appear to be growing ② <u>towards</u> the light. Auxins have the ③ <u>opposite</u> effect on the roots of plants. Auxins in the tips of roots tend to limit growth. If a root is horizontal in the soil, the auxins will accumulate on the lower side and interfere with its development. Therefore, the lower side of the root will grow ④ <u>faster</u> than the upper side. This will, in turn, cause the root to bend ⑤ <u>downwards</u>, with the tip of the root growing in that direction.

#32
특화, 분업 → 거래, 시장 경제 → 상부상조

32. The best way in which innovation changes our lives is by _____. The main theme of human history is that we become steadily more specialized in what we produce, and steadily more diversified in what we consume: we move away from unstable self-sufficiency to safer mutual interdependence. By concentrating on serving other people's needs for forty hours a week — which we call a job — you can spend the other seventy-two hours (not counting fifty-six hours in bed) relying on the services provided to you by other people. Innovation has made it possible to work for a fraction of a second in order to be able to afford to turn on an electric lamp for an hour, providing the quantity of light that would have required a whole day's work if you had to make it yourself by collecting and refining sesame oil or lamb fat to burn in a simple lamp, as much of humanity did in the not so distant past. [3점]

* a fraction of a second: 아주 짧은 시간 ** refine: 정제하다

① respecting the values of the old days
② enabling people to work for each other
③ providing opportunities to think creatively
④ satisfying customers with personalized services
⑤ introducing and commercializing unusual products

#34
인간이 실내 생활하며, 실내에서 살아가는 다른 생명체들도 생존 위해 적응
→ 후에 우리가 그들로 인해 생존 위해 적응해야할 수도
(1m 짜리 바퀴벌레가 출현하면 맞서기 위한 칼을 만들어야할 것 아님?)

34. Our homes aren't just ecosystems, they're unique ones, hosting species that are adapted to indoor environments and pushing evolution in new directions. Indoor microbes, insects, and rats have all evolved the ability to survive our chemical attacks, developing resistance to antibacterials, insecticides, and poisons. German cockroaches are known to have developed a distaste for glucose, which is commonly used as bait in roach traps. Some indoor insects, which have fewer opportunities to feed than their outdoor counterparts, seem to have developed the ability to survive when food is limited. Dunn and other ecologists have suggested that as the planet becomes more developed and more urban, more species will _____. Over a long enough time period, indoor living could drive our evolution, too. Perhaps my indoorsy self represents the future of humanity. [3점]

* glucose: 포도당 ** bait: 미끼

① produce chemicals to protect themselves
② become extinct with the destroyed habitats
③ evolve the traits they need to thrive indoors
④ compete with outside organisms to find their prey
⑤ break the boundaries between wildlife and humans

#35
Poetry 찬양함. 돌 던지는 순간 나락

35. 다음 글에서 전체 흐름과 관계 없는 문장은?

Developing a personal engagement with poetry brings a number of benefits to you as an individual, in both a personal and a professional capacity. ① Writing poetry has been shown to have physical and mental benefits, with expressive writing found to improve immune system and lung function, diminish psychological distress, and enhance relationships. ② Poetry has long been used to aid different mental health needs, develop empathy, and reconsider our relationship with both natural and built environments. ③ Poetry is also an incredibly effective way of actively targeting the cognitive development period, improving your productivity and scientific creativity in the process. ④ Poetry is considered to be an easy and useful means of expressing emotions, but you fall into frustration when you realize its complexity. ⑤ In short, poetry has a lot to offer, if you give it the opportunity to do so.

* cognitive: 인지적인

#38
<A> use language to understand mine, language is just one aspect of mind, without using language
<B> use mind to understand language, language is basic, if proper use of language was appreciated, language is fundamental, language is enormously important, depended in part on language

논리의 흐름이 다음과 같다.

1. <A> or <B>?
2. <B>
3. However, <A>
4. <A>
5. No <B> (= <A>)
6. Nevertheless, <B>
7. <B>

However 와 Nevertheless 라는 접속사에 의해 꺾이는 논리의 흐름에 초점을 두어보자.
<A>와 <B>로 묶은 지문 속 표현들이 모두 본질적으로 같은 뜻을 지니고 있다는 것도 이해해보면 좋다. 이는 앞으로 많은 수능 영어 지문을 대할 때 초점을 둘 부분이기도 하다.

38.

> Nevertheless, language is enormously important in human life and contributes largely to our ability to cooperate with each other in dealing with the world.

Should we use language to understand mind or mind to understand language? (①) Analytic philosophy historically assumes that language is basic and that mind would make sense if proper use of language was appreciated. (②) Modern cognitive science, however, rightly judges that language is just one aspect of mind of great importance in human beings but not fundamental to all kinds of thinking. (③) Countless species of animals manage to navigate the world, solve problems, and learn without using language, through brain mechanisms that are largely preserved in the minds of humans. (④) There is no reason to assume that language is fundamental to mental operations. (⑤) Our species *homo sapiens* has been astonishingly successful, which depended in part on language, first as an effective contributor to collaborative problem solving and much later, as collective memory through written records. [3점]

#40
과거를 돌아보고 + 글을 써라 → 좋다

40. 다음 글의 내용을 한 문장으로 요약하고자 한다. 빈칸 (A), (B)에 들어갈 말로 가장 적절한 것은?

One of the most powerful tools to find meaning in our lives is reflective journaling — thinking back on and writing about what has happened to us. In the 1990s, Stanford University researchers asked undergraduate students on spring break to journal about their most important personal values and their daily activities; others were asked to write about only the good things that happened to them in the day. Three weeks later, the students who had written about their values were happier, healthier, and more confident about their ability to handle stress than the ones who had only focused on the good stuff. By reflecting on how their daily activities supported their values, students had gained a new perspective on those activities and choices. Little stresses and hassles were now demonstrations of their values in action. Suddenly, their lives were full of meaningful activities. And all they had to do was reflect and write about it — positively reframing their experiences with their personal values.

* hassle: 귀찮은 일

⬇

Journaling about daily activities based on what we believe to be ___(A)___ can make us feel that our life is meaningful by ___(B)___ our experiences in a new way.

(A)	(B)	(A)	(B)
① factual	··· rethinking	② worthwhile	··· rethinking
③ outdated	··· generalizing	④ objective	··· generalizing
⑤ demanding	··· describing		