

2024 Ağustos
YÖKDİL

Fen Bilimleri

1

Throughout the course of history, development of world trade routes rapidly increased the --- of epidemic diseases.

- A) accuracy
- B) exclusion
- C) spread
- D) acceptability
- E) interest

2

--- in technology have allowed ships to travel faster, carry more cargo, and load with greater ease, which made ports grow in size to accommodate today's bigger and faster ships.

- A) Assertions
- B) Enhancements
- C) Compliments
- D) Mishaps
- E) Distributions

3

In 1855, Italian seismologist Luigi Palmieri invented the first electric seismograph which was thought to be capable of routinely detecting earthquakes --- to human beings.

- A) unrelated
- B) misleading
- C) incompatible
- D) imperceptible
- E) unattainable

4

A black hole is an area in space with an --- strong force called gravity, which pulls in everything that gets close, even the light.

- A) incredibly
- B) alternatively
- C) abruptly
- D) accidentally
- E) urgently

5

Because forests --- a large biomass of leaves, they cause large quantities of water to evaporate into the atmosphere, in a hydrologic process called evapotranspiration.

- A) prevent
- B) engage
- C) harvest
- D) sustain
- E) target

6

Some living things can --- respiration without oxygen, but for most, an oxygen supply is essential.

- A) call for
- B) set up
- C) pass on
- D) carry out
- E) turn down

7

Rainforests are very important because they help clean the world's air and water, but they --- every day, --- for land and wood.

- A) have been shrinking / to be chopped down
- B) will shrink / having been chopped down
- C) shrank / being chopped down
- D) are shrinking / chopped down
- E) shrink / to have been chopped down

8

Advancements in bionics --- to fulfil the wish that --- for in recent years: artificial organs literally identical to the natural ones.

- A) will begin / is being searched
- B) have begun / has been searched
- C) began / is searched
- D) begin / was being searched
- E) had begun / was searched

9

Besides making thermometers, Daniel Gabriel Fahrenheit was the first to show that the boiling point of liquids varies --- different atmospheric pressures, and he suggested this as a principle --- the construction of barometers.

- A) across / through
- B) from / on
- C) at / for
- D) in / by
- E) with / over

10

A bacterial parasite that negatively affects fertility --- Asian tiger mosquitoes has been used to reduce the number of biting female insects by more than 80 percent --- two sites in Guangzhou, China.

- A) with / across
- B) in / at
- C) on / among
- D) to / towards
- E) by / between

11

Science in the Enlightenment benefited --- technology, both in the creation of new and more precise scientific instruments and in the new problems posed --- new machinery.

- A) in / about
- B) for / on
- C) from / by
- D) to / through
- E) with / along

12

Technology has increased human prosperity and well-being and will continue to do so --- humans are allowed to freely develop and deploy it.

- A) in case
- B) as though
- C) even if
- D) as long as
- E) just as

13

--- the Earth's surface is made of very different types of land and water, it absorbs the Sun's heat at different rates.

- A) Provided
- B) Since
- C) As much as
- D) Until
- E) Whether

14

--- our petroleum-based civilisation keeps burning fuel at current rates, it is projected that the concentration of carbon dioxide in the atmosphere will double the pre-industrial levels by the year 2030.

- A) Although
- B) As far as
- C) Whenever
- D) If
- E) In order that

15

Educational technologies make scientific concepts more accessible through multiple representations; ---, kinetic molecular theory may be easier for students to understand if they can see and manipulate representations of molecules operating under a variety of conditions.

- A) for example
- B) nevertheless
- C) by comparison
- D) meanwhile
- E) instead

16

--- a fluorescent light bulb does not provide light through the continual heating of a metallic filament, it consumes much less electricity than the normal light bulb.

- A) Even though
- B) In case
- C) Because
- D) As if
- E) So that

17

--- the tremendous information-carrying capacity of optical fibres, the performance of most communication systems is severely limited by the speed of the electronics in signal regeneration.

- A) Instead of
- B) Despite
- C) Similar to
- D) Besides
- E) As a result of

18

---- running on a tank filled with gas or diesel, electric cars get their power by being plugged into a socket and taking electricity from the grid.

- A) Rather than
- B) Prior to
- C) As a consequence of
- D) In accordance with
- E) Except for

19

When moving around tree tops, colobus monkeys tend to walk along branches, ---- upright ---- on all four limbs, instead of swinging beneath them.

- A) such / that
- B) as / as
- C) either / or
- D) the more / the more
- E) so / that

20

Sugar cane is thought to have originated in southern Asia, ---- it has been cultivated for at least 3,000 years.

- A) which
- B) when
- C) how
- D) where
- E) why

The classification of the natural world into a clear hierarchy of groups of named and described organisms is a foundation stone of the biological sciences. These groupings help to make sense of life's diversity, (21)---- scientists to compare and identify millions of individual organisms. Modern taxonomy – the science of identifying, naming, and classifying organisms – began (22)---- the Swedish naturalist, Carl Linnaeus. He was the first to devise a systematic hierarchy, (23)---- his wide-ranging and detailed study of physical characteristics of plants and animals. He also pioneered a way of naming different organisms that is still in use today. (24)----, the most influential of early classifications was that of the Greek philosopher Aristotle. In his *History of Animals*, he grouped similar animals into broad genera, (25)---- the species within each group, and ranked them on a ladder of life.

21

- A) to be allowing
- B) to be allowed
- C) being allowed
- D) allowing
- E) having been allowed

22

- A) on
- B) with
- C) off
- D) for
- E) into

23

- A) with the aim of
- B) as opposed to
- C) except for
- D) in the absence of
- E) based on

24

- A) Briefly
- B) However
- C) Accordingly
- D) In other words
- E) Similarly

25

- A) impacted
- B) nurtured
- C) distinguished
- D) occupied
- E) surpassed

The earliest known ideas on the cause of volcanic eruptions date to the Greek natural philosophers of the 5th century BCE. Anaxagoras proposed that eruptions were caused by great winds (26)---- inside the Earth. When these winds were forced (27)---- narrow passages or emerged from openings in the Earth's crust, the friction between the compressed air and the surrounding rocks generated great heat, leading to melting of the rocks and the formation of magma. To anyone who (28)---- an explosive volcanic eruption, this is a perfectly logical idea, one that in fact was taken up and passed on by scholars until the Middle Ages. (29)----, Aristotle discussed the origin of earthquakes, attributing the same or similar origin for volcanic eruptions. (30)---- Aristotle, the Earth possesses its own internal fire, which generates wind inside the Earth by acting on trapped air and moisture, leading to earthquakes and volcanic eruptions.

26

- A) facilitated
- B) eliminated
- C) prohibited
- D) demanded
- E) stored

27

- A) over
- B) for
- C) about
- D) through
- E) with

28

- A) had been observing
- B) had observed
- C) has observed
- D) is going to observe
- E) was observing

29

- A) Therefore
- B) Likewise
- C) Nevertheless
- D) Eventually
- E) In short

30

- A) As opposed to
- B) According to
- C) Along with
- D) Except for
- E) Similar to

31

----, so that by the time the wildfire reaches the burnt ground or forest, there is no more fuel to feed the fire.

- A) The practice of fighting fire with fire is an unusual and unexpected method which is used by firefighters
- B) To stop the spread of a fire, firefighters create a controlled fire to consume the vegetation in an area ahead of a spreading wildfire
- C) Flamethrowers, which were originally used as weapons of war, can be one of the best tools for stopping a fire from spreading
- D) There are multiple fire suppression methods that firefighters make use of while extinguishing a fire
- E) A portable battery is essential for a flamethrower, which is used to ignite controlled fires

32

While e-bikes and e-scooters offer a great way to get around a city, ----.

- A) the wattage of the e-bike battery can be doubled by switching to a higher-voltage system
- B) the reason for the difficulty in extinguishing e-bike battery fires is the underlying electrochemical reactions
- C) their batteries can cause extremely dangerous fires that can quickly spread out of control if they become faulty
- D) most high-end e-bikes feature a battery management system to prevent the battery from being over-charged
- E) batteries of commercial use e-bikes are all based on lithium-ion technology

33

Because the skin is more sensitive to sunlight after the use of products containing beta hydroxy acids for acne treatment, ----.

- A) skin breakouts are reduced by preventing the build-up of dead skin cells associated with acne formation
- B) users should apply sunscreens and avoid prolonged sun exposure to prevent skin damage
- C) systemic side effects do not occur as they sometimes do with oral antibiotics
- D) the products should be applied once or twice a day to get better results
- E) the effective prevention of acne eruptions and smoothing of the skin can be achieved

34

Although from an astrophysical point of view solar eclipses are insignificant, ----.

- A) the problem is that close to the Sun, seeing any stars at all is impossible due to its bright light
- B) they give astronomers a special opportunity to see things that are usually outshone by the light of the Sun
- C) little attention has been paid to them since 1919 when a total eclipse occurred
- D) they should be observed indirectly with a pinhole camera or using approved protective goggles
- E) they are the result of the Sun being completely blocked out by the Moon at certain times

35

---, but quantum computers can exploit the unusual properties of quantum physics to speed up some calculations.

- A) Modern encryption algorithms are derived from mathematical problems deemed too hard to be cracked in a reasonable time
- B) The efficacy of an algorithm is dependent on the number of steps a computer must take to execute the algorithm
- C) Today, quantum computers are accurate enough to hack into personal computers in a practical timescale
- D) A group of researchers has claimed that quantum computers can now crack the encryption we use to protect e-mails and other sensitive data
- E) There is immense interest in the processing power that quantum computers require to crack today's encryption

36

---, although there were a few private teaching positions available and a little money could be made from books.

- A) During the 18th century, there were no institutions that financially supported scientists
- B) The exchange of scientific information between nations increased considerably in the 19th century
- C) The 19th century was when science and the teaching of science underwent a number of changes
- D) The idea that science would ultimately explain all phenomena in nature became stronger towards the end of the 18th century
- E) Science teaching in the 19th-century England was more advanced in technical schools than at the University of Oxford

37

Advances in airplane engine performance have historically taken place in military development; ---.

- A) by contrast, the cost is a secondary consideration compared to the military performance of the aircraft
- B) in fact, the core of every engine model currently used on commercial aircraft had its beginning as a military engine
- C) at least, new models are taken to the edge of their performance by testing them under the most extreme weather conditions
- D) therefore, the purpose of testing is to certify that any new airplane will safely carry passengers and is airworthy
- E) instead, military requirements diverging too far from commercial interests led to a jet development centre supported by the government

38

Penguins have unusual and distinct characteristics, and their relationship to other orders of birds is not fully understood; ---.

- A) on the other hand, they are physically adapted to life in cold, marine conditions
- B) however, group living provides better care for their young and protection against the cold
- C) in fact, scientists dispute whether penguins should have their own subclass
- D) for instance, most species of penguin breed in Antarctica and on the islands near that continent
- E) in addition, many species look similar, generally dark-blue or dark-gray on top with a white belly

39

Planting forests to absorb more carbon dioxide is seen as key in slowing climate change, ---.

- A) rather scientists would attempt to uncover the major causes of erosions and earthquakes
- B) yet human activity and environmental health are connected to each other
- C) but new research finds that the impact of new trees seems to be lower than expected
- D) so there is not much to be said about the importance of new findings in forestry
- E) and the links between global warming and climate change are yet to be defined

40

Elephants use their six-foot-long tusks to dig wells in search of water, lift objects, remove bark off trees, and even battle lions; ---.

- A) on the other hand, a significant number of African elephants were once heavily poached for their tusks
- B) that is, tusks may have developed alongside the trunk, which contains thousands of individual muscles
- C) in other words, they are not just majestic to look at but are highly useful tools
- D) in fact, mothers in some herds have passed down a gene that weakens the tusk
- E) conversely, the loss of tusks might affect these giant mammals' overall survival

41

---, they learned how to fuel fires with bone when wood was found to be scarce in open landscapes.

- A) Although people mostly used wood for the early fires that they started
- B) As if people knew how to make use of fire to make glass from sand and soda
- C) Supposing that fire has many uses other than keeping people warm and cooking
- D) Since the early deposits of charcoal are likely caused by natural fires started by lightning
- E) As long as people learned how to start a fire all by themselves

42

Technological advances are generally accompanied by risks which raise important ethical issues that need to be dealt with by the societies that produce these technologies.

- A) Genellikle önemli ahlaki sorunları gündeme getiren risklerle beraber ortaya çıkan teknolojik gelişmeler, bu teknolojileri üreten toplumlar tarafından ele alınmalıdır.
- B) Teknolojik gelişmeler, genellikle bu teknolojileri üreten toplumlar tarafından ele alınması gereken önemli ahlaki sorunları gündeme getiren riskleri beraberinde getirir.
- C) Teknolojik gelişmelerin beraberinde getirdiği riskler, genellikle bu teknolojileri üreten toplumların ele alması gereken önemli ahlaki sorunları gündeme getirir.
- D) Önemli ahlaki sorunları gündeme getiren risklerle beraber ortaya çıktıkları için teknolojik gelişmelerin genellikle bu teknolojileri üreten toplumlar tarafından ele alınması gerekir.
- E) Teknolojik gelişmeler, genellikle bu teknolojileri üreten ve önemli ahlaki sorunları gündeme getiren toplumlar tarafından ele alınması gereken riskleri beraberinde getirir.

43

The fact that the increase in the levels of greenhouse gases has occurred at the same time as the increase in the mean global temperature strengthens the idea that global warming will become a more serious concern in the future.

- A) Sera gazı seviyelerindeki artış ortalama küresel sıcaklıktaki artışla aynı zamanda gerçekleştiği için gelecekte küresel ısınmanın daha ciddi bir mesele hâline geleceği düşüncesi güçlenmiştir.
- B) Ortalama küresel sıcaklıktaki artışla aynı zamanda gerçekleşen sera gazı seviyelerindeki yükselme, gelecekte küresel ısınmanın daha ciddi bir mesele hâline geleceği düşüncesini güçlendirmiştir.
- C) Küresel ısınmanın gelecekte daha ciddi bir mesele hâline geleceği düşüncesi sera gazı seviyelerindeki ve ortalama küresel sıcaklıktaki artışın aynı zamanda gerçekleşmesi ile güçlenmiştir.
- D) Sera gazı seviyelerindeki artışın ortalama küresel sıcaklıktaki artışla aynı zamanda gerçekleşmesine bağlı olarak gelecekte küresel ısınmanın daha ciddi bir mesele hâline geleceği düşüncesi güçlenmektedir.
- E) Sera gazı seviyelerindeki artışın ortalama küresel sıcaklıktaki artışla aynı zamanda gerçekleşmesi, küresel ısınmanın gelecekte daha ciddi bir mesele hâline geleceği düşüncesini güçlendirmektedir.

44

Although ozone in the stratosphere forms a protective shield against ultraviolet radiation, it is harmful in the lower levels of atmosphere because it irritates the respiratory system.

- A) Ozon stratosferde ultraviyole ışınlar karşı koruyucu bir kalkan oluştururken atmosferin daha alt seviyelerinde zararlıdır çünkü solunum sistemini tahriş eder.
- B) Ozon stratosferde ultraviyole ışınlar karşı koruyucu bir kalkan oluştursa da zararlı olan atmosferin daha alt seviyelerindeki ozondur çünkü solunum sistemini tahriş eder.
- C) Stratosferdeki ozon ultraviyole ışınlar karşı koruyucu bir kalkan oluştursa da atmosferin daha alt seviyelerinde solunum sistemini tahriş ettiği için zararlıdır.
- D) Ozonun stratosferdeki ultraviyole ışınlar karşı koruyucu bir kalkan oluşturmasına rağmen atmosferin daha alt seviyelerinde zararlı olmasının sebebi solunum sistemini tahriş etmesidir.
- E) Stratosferdeki ultraviyole ışınlar karşı koruyucu bir kalkan oluşturan ozon, atmosferin daha alt seviyelerinde zararlı olduğu için solunum sistemini tahriş eder.

45

Video streaming is a major cause of rising energy use in that carbon emissions generated by watching 30 minutes of a video are the same as driving almost four kilometres.

- A) 30 dakikalık bir video izleme ile salınan karbonun, neredeyse dört kilometre araba kullanma ile salınan karbona eşit olması çevrim içi video izlemeyi artan enerji tüketiminin önemli bir nedeni yapmaktadır.
- B) 30 dakikalık bir video izleme ile ortaya çıkan karbon salınımı neredeyse dört kilometre araba kullanma ile aynı olduğundan çevrim içi video izleme artan enerji tüketiminin önemli bir nedenidir.
- C) Artan enerji tüketiminin önemli nedenlerinden biri çevrim içi video izlemektir öyle ki ortaya çıkan karbon salınımı açısından 30 dakikalık bir video izlemek ve dört kilometre araba kullanmak neredeyse aynıdır.
- D) Çevrim içi video izlemek enerji tüketimini oldukça artırmaktadır ki bu da 30 dakikalık bir video izleme ile salınan karbonun yaklaşık dört kilometre araba kullanma ile salınan karbona eşit olması demektir.
- E) Çevrim içi video izleme enerji tüketiminin artmasının önemli bir nedenidir öyle ki 30 dakikalık bir video izlendiğinde ortaya çıkan karbon salınımı neredeyse dört kilometre araba kullanma ile aynıdır.

46

The term 'invasive species' should be used only when referring to new species that are spreading rapidly and having a large negative impact on the environment, economic activities, or human health.

- A) 'İşgalci tür' terimi sadece hızla yayılan ve çevreye, ekonomik faaliyetlere ya da insan sağlığına büyük bir olumsuz etkisi olan yeni türlerden bahsederken kullanılmalıdır.
- B) 'İşgalci tür' terimi sadece hızla yayılan değil aynı zamanda çevreye, ekonomik faaliyetlere ya da insan sağlığına büyük bir olumsuz etkisi olan yeni türlerden bahsederken de kullanılmalıdır.
- C) Sadece çevreye, ekonomik faaliyetlere ya da insan sağlığına büyük bir olumsuz etkisi olan yeni türler için kullanılan 'işgalci tür' terimi, hızla yayılan türlerden bahsederken de kullanılmalıdır.
- D) Çevreye, ekonomik faaliyetlere ya da insan sağlığına büyük bir olumsuz etkisi olan yeni türler için kullanılan 'işgalci tür' terimi, sadece hızla yayılan türlerden bahsederken kullanılmalıdır.
- E) 'İşgalci tür' terimi çevreye, ekonomik faaliyetlere ya da insan sağlığına büyük bir olumsuz etkisi olan yeni türler yerine sadece hızla yayılan türlerden bahsederken kullanılmalıdır.

47

According to a proposal made by the European Commission, sustainable aviation fuels would consist of biofuels derived from waste as well as synthetic fuels produced using renewable energy in the near future.

- A) Avrupa Komisyonu tarafından yapılan bir öneriye göre, havacılık yakıtlarının sürdürülebilir olanları çok yakın bir zamanda yenilenebilir enerji kullanılarak atıklardan üretilen sentetik yakıtlar kadar biyoyakıtlardan da oluşacaktır.
- B) Avrupa Komisyonu'na yapılan bir öneriye göre, yakın gelecekte sürdürülebilir havacılık yakıtları atıklardan elde edilecek biyoyakıtlar ve yenilenebilir enerji kullanımıyla üretililecek sentetik yakıtlar olacaktır.
- C) Avrupa Komisyonu'nun yaptığı bir öneriye göre, havacılık yakıtlarından sürdürülebilir olanlar yakın gelecekte atıklardan elde edilen biyoyakıtlara ek olarak yenilenebilir enerji kullanımıyla üretilen sentetik yakıtları da kapsayacaktır.
- D) Avrupa Komisyonu'nun yaptığı bir öneriye göre, çok yakında yenilenebilir enerjiyle üretilen sentetik yakıtlar ve atıklardan elde edilen biyoyakıtlar sürdürülebilir havacılık yakıtlarını oluşturacaktır.
- E) Avrupa Komisyonu tarafından yapılan bir öneriye göre, sürdürülebilir havacılık yakıtları yakın gelecekte yenilenebilir enerji kullanarak üretilen sentetik yakıtların yanı sıra atıklardan elde edilen biyoyakıtlardan da oluşacaktır.

48

18. yüzyılın başında görüş mesafesinden uzakta herhangi biriyle iletişim kurmanın tek yolu elle bir mektup yazmak ve onun bir haberci tarafından götürülmesini ayarlamaktır.

- A) At the beginning of the 18th century, the only way to communicate with anyone farther away than the line of sight was to write a letter by hand and arrange to have it carried by a messenger.
- B) In the early 18th century, communicating with anyone farther away than the line of sight was only possible via a letter written by hand and an arrangement to have it carried by a messenger.
- C) During the early 18th century, in order to communicate with anyone farther away than the line of sight, one could only write a letter by hand and arrange to have it carried by a messenger.
- D) Writing a letter by hand and arranging to have it carried by a messenger was the only way to communicate with anyone farther away than the line of sight at the beginning of the 18th century.
- E) At the beginning of the 18th century, writing a letter by hand and arranging a messenger to carry it was the only way to communicate with anyone farther away than the line of sight.

49

Bir yazılım programı tarafından, yaygın olarak bulunan kimyasal atıkları bir dizi ilaç ve gübreye dönüştürmenin 300'den fazla yöntemi belirlendi.

- A) It has been identified by a software programme that there are more than 300 ways through which widely available chemical waste can be converted into a range of drugs and fertilisers.
- B) A software programme has identified over 300 ways of converting widely available chemical waste into a range of drugs and fertilisers.
- C) More than 300 ways to convert widely available chemical waste into a range of drugs and fertilisers have been identified by a software programme.
- D) By using a software programme, it is possible to identify more than 300 ways of converting widely available chemical waste into a range of drugs and fertilisers.
- E) Widely available chemical waste is converted into a variety of drugs and fertilisers by a software programme which identified more than 300 ways to do it.

50

Gen terapisi, hastalıkları tedavi etmede devrim niteliğinde bir yaklaşım olarak umut vaat etse de kullanımı ve muhtemel sonuçlarıyla ilgili etik kaygılar dile getirilmiştir.

- A) Despite the revolutionary approach of gene therapy for disease treatment, ethical concerns about its use and ramifications have been voiced.
- B) Gene therapy offers a potentially revolutionary approach to treating diseases, yet it has raised ethical concerns regarding its use and ramifications.
- C) While gene therapy holds promise as a revolutionary approach to treating diseases, ethical concerns over its use and ramifications have been expressed.
- D) Although gene therapy shows potential as a revolutionary approach to disease treatment, there are ethical concerns about its application and ramifications.
- E) Despite the fact that gene therapy presents a revolutionary approach to treating diseases, its use and ramifications have raised ethical questions.

51

Tüm dünyada, bilim insanları felç ve kalp hastalıklarından şeker hastalığı ve kansere kadar her şeyi tedavi etmek için kök hücreleri kullanmanın yollarını araştırıyorlar.

- A) Throughout the world, scientists are researching ways that can cure anything from paralysis and heart disorders to diabetes and cancer by the use of stem cells.
- B) Stem cells are used by scientists all around the world who are researching ways to cure illnesses such as paralysis, heart disorders, diabetes and cancer.
- C) Throughout the world, scientists are researching ways to use stem cells to cure anything from paralysis and heart disorders to diabetes and cancer.
- D) Researching ways to use stem cells, scientists all around the world are trying to cure anything from paralysis and heart disorders to diabetes and cancer.
- E) Scientists all around the world are researching ways stem cells can cure anything from paralysis and heart disorders to diabetes and cancer.

52

İzlanda, veri merkezlerini çalıştırmak ya da yurt dışına satılan ürünleri üretmek için yenilenebilir elektrik kullanarak yeşil ekonomisini dünyanın geri kalanına etkin bir şekilde ihraç etmektedir.

- A) By using renewable electricity to run data centres or produce products that are sold abroad, Iceland is effectively exporting its green economy to the rest of the world.
- B) The use of renewable electricity to run data centres or produce products that are sold abroad makes Iceland a country which is effectively exporting its green economy to the rest of the world.
- C) As a country effectively exporting its green economy to the rest of the world, Iceland uses renewable electricity to run data centres or produce products that are sold abroad.
- D) Iceland effectively runs data centres or produces products that are sold abroad to export its green economy to the rest of the world by using renewable electricity.
- E) Using renewable electricity, Iceland effectively exports its green economy to the rest of the world by running data centres or producing products that are sold abroad.

53

Çok yaşlı çam ağaçlarının bükülmüş ve bozulmuş şekilleri, 600 yıldan fazla yaşamlarını mümkün kılan strese olağanüstü bir uyum sağlama becerisinin belirtisi olabilir.

- A) The twisted and deformed shapes of very old pine trees may be a sign of an exceptional ability to adapt to stress that has enabled them to live for more than 600 years.
- B) As a sign of an exceptional ability to adapt to stress, very old pine trees twisted and deformed their shapes, which has enabled them to live for more than 600 years.
- C) The twisted and deformed shapes of very old pine trees may be a sign that these trees have lived for more than 600 years thanks to an exceptional ability to adapt to stress.
- D) The twisted and deformed shapes of very old pine trees have enabled them to live for more than 600 years, which may be a sign of an exceptional ability to adapt to stress.
- E) In order to live for more than 600 years, very old pine trees may have twisted and deformed their shapes, which may be a sign of an exceptional ability to adapt to stress.

54

A commonly noted pattern in aviation accidents is that there is rarely only a single reason for the accident. Experienced pilots refer to the events leading up to an accident as an error chain. Individual links of the chain, when combined, cause an accident to happen. For instance, bad weather alone might not cause an accident, but bad weather combined with darkness and the fact that the pilot became lost might. The error chain is weather, darkness, and becoming lost. --- In other words, if one link of the chain were broken, the accident would not happen.

- A) The vast majority of aviation accidents result from human-factor errors.
- B) Anyone with a role in launching an aircraft can make mistakes that may cause an accident.
- C) The key to accident investigation, then, is to determine the error chain leading up to the event.
- D) The elimination of any one of these factors can possibly prevent the mishap.
- E) Accident investigators can study each link of the chain and report their findings.

55

Any process that involves a chemical reaction involves change. Sometimes the change occurs on its own. Such a process is called spontaneous. If a change does not occur on its own, it is called non-spontaneous. A spontaneous change may not occur immediately. For example, if a barrel of fuel is left alone, it will remain as fuel indefinitely. However, if a match is used to ignite the fuel, it will burn spontaneously until all the reactants like air and fuel are completely consumed. --- However, once started, it proceeds without assistance.

- A) In this instance, the spontaneous process requires a small amount of energy to be added to the system before a much larger amount of energy can be released.
- B) If an acid is being mixed with a base, any water used to dissolve them and the beaker in which they are all held are considered the system.
- C) There are two factors as energy and disorder whose combination determines whether a process occurs spontaneously or not.
- D) In most chemical reactions, chemical energy is converted to some other, more useful form of energy such as converting chemical energy to electrical energy.
- E) Energy is a state function and there are a number of different forms of energy, which is the ability to do various useful works.

56

The digital divide refers to the gap between those who can effectively make use of information and computing technologies (ICTs) and those who cannot. The term is a social construction emerged in the latter half of the 1990s, after the Internet came into the public domain and the World Wide Web exploded. For those who can both contribute and retrieve information from the Web, ICTs hold the promise of broad collaborations in science and technology. Sadly, there are still people who have limited access to the Internet. --- Like access to food or clean water, access to essential information has moral and ethical implications that merit consideration in the formation of public policy.

- A) While information poverty is rarely blamed as a direct cause of human suffering, the digital divide raises ethical questions of universal access.
- B) The digital divide is a problem of multiple dimensions which is summarised from a technical aspect referring to availability of the software of ICTs.
- C) A high concentration of access to ICTs is observed in places where technology is advanced and widely used.
- D) Including the excluded people in the empowerment is the most effective approach to harnessing technologies in the interests of the poor.
- E) The divide may never be fully closed, but a bridge can be built by active participants from both sides.

57

The year 1543 was marked by the publication of two books that revolutionised our view of humanity and the Universe. The more celebrated of the two, Nicolaus Copernicus's *De revolutionibus orbium caelestium*, was actually completed in the 1530s, but Copernicus was reluctant to publish for fear of reprisals from the church. The other book from 1543 that changed the world was *De humani corporis fabrica* by Andreas Vesalius. Unlike Copernicus, Vesalius decided to publish when he was a young man, not quite 30. --- After Vesalius published his book, many accusations were directed against him by physicians loyal to older ideas.

- A) However, Copernicus might have had the right idea about keeping new ideas quiet.
- B) Vesalius spent the rest of his life as a court physician, doing almost no more research.
- C) As Copernicus neared death, he was finally persuaded to publish by the mathematician Rheticus.
- D) Thus, *De humani corporis fabrica* is an important book with exceptional illustrations.
- E) It encouraged the publication of many more books in line with Vesalius's ideas.

58

In the first half of the 19th century, chemists gradually isolated more elements, and it became clear that certain groups of elements had similar properties. For example, sodium and potassium are both silvery solids (alkali metals) that react violently with water, liberating hydrogen gas. --- Similarly, the halogen elements chlorine and bromine are both pungent, poisonous oxidising agents, even though chlorine is a gas and bromine a liquid. John Newlands noticed that when the known elements were listed in order of increasing atomic weight, similar elements occurred every eighth place.

- A) In fact, they are so similar that, when first discovered, the two elements could not be differentiated from one another.
- B) The elements, if arranged according to their atomic weight, exhibit an apparent periodicity of properties.
- C) The first attempt at classifying elements was made around the same period.
- D) By 1828, Johann Döbereiner had found that some elements formed groups of three with related properties.
- E) The discovery of these missing elements suggests that the periodic table reveals important features of the structure of the atom.

59

Although the thermometer may indicate a temperature only a few degrees below freezing point, wind can make it feel much colder. The chill factor or cold index – often now incorporated into 'feels like' temperatures on weather forecasts – occurs because our bodies usually heat the air around us, producing a layer of insulation. --- During a storm, -20°C may thereby be just as dangerous as -40°C in calm weather. Staying dry is also important, as the body will cool much faster when clothes are wet, or if your body is wet from perspiration underneath the clothes.

- A) There is a lower limit to temperatures our bodies can tolerate even when wrapped in clothes.
- B) But if this layer is blown away by the wind, we will cool faster, so the skin gets colder.
- C) Confusion occurs when we step outside and notice it is much lower than announced by the weather forecaster.
- D) If naked skin is subjected to temperatures below -60°C , it will immediately freeze.
- E) Even with a thick layer of clothing, areas around the eyes and nose will be under risk of severe frostbite.

60

(I) When we think about planets, we usually picture the eight worlds of our Solar System silently orbiting the central star. (II) Yet, in recent years astronomers have uncovered an increasingly large population of a very different kind of planet. (III) These are free-floating planets that no longer orbit a star at all. (IV) Many rogue planets are found through their gravitational influence thanks to a technique called microlensing. (V) Originally they orbited a star, but then something happened and they were forced to leave.

- A) I B) II C) III D) IV E) V

61

(I) Scientific and technological advances have both substantive and procedural effects on the law. (II) On the initial side, new scientific evidence and techniques can change the way legal claims are resolved, including their outcomes. (III) For example, forensic DNA evidence has fundamentally changed criminal law and paternity disputes by greatly improving the accuracy of legal fact finding, while creating a plethora of new legal, ethical, and social issues. (IV) In criminal cases, it has helped identify and convict guilty people who might have otherwise escaped prosecution. (V) The practice of law has historically been influenced by new technologies, including the printing press, telephone, photocopier, and fax.

A) I B) II C) III D) IV E) V

62

(I) Earth's water is stored in many forms, including oceans, rivers, lakes, glaciers, groundwater, and the atmosphere. (II) Water is constantly transferred in different states whether in liquid, solid or gaseous form. (III) Life on Earth would not be possible without the presence of water. (IV) The water cycle begins when the Sun's heat makes water evaporate into the atmosphere, where it becomes clouds, dew, or fog. (V) Water that has been evaporated falls back down to Earth's surface as rain or snow, then streams and rivers carry it to lakes or the sea, where it eventually evaporates and the whole cycle begins again.

A) I B) II C) III D) IV E) V

63

(I) Noctilucent, or night-shining clouds are ice-sheet clouds that form around 82 km up in the mesosphere, roughly seven times higher than regular clouds. (II) At such heights, they are still bathed in sunlight when the Sun is below the horizon for us on the ground and appear to shine in the deep summer twilight. (III) Typically, they can be seen at low altitudes above the northwest horizon, 90 to 120 minutes after sunset. (IV) Such a big display basically keeps position with the Sun as it moves below the horizon. (V) Although clouds may sound like a strange thing to be looking out for in astronomy, nothing should be underestimated when science is concerned.

A) I B) II C) III D) IV E) V

64

(I) Many amphibians lay eggs that hatch out into larvae that do not look like the adults. (II) The process of changing from a larva into an adult is known as metamorphosis and usually takes about 12 weeks. (III) Some female salamanders and frogs lay their eggs on land or keep the eggs in their bodies. (IV) Amphibians were the first vertebrates (animals with backbones) to develop limbs, emerge from water, and live at least part of their lives on land. (V) In these cases, the eggs hatch out as tiny versions of their parents.

A) I B) II C) III D) IV E) V

65

(I) When a computer or a robot solves a problem or uses language, it may seem to be intelligent; however, this type of intelligence is different from human intelligence and it is called artificial intelligence. (II) Computers use programmes developed by people to analyse large amounts of information quickly, and then they pick answers or actions from among many choices. (III) Computer programmes can be used for playing games, making medical decisions, and translating languages. (IV) Computers can use logic, or the relationships among facts, to figure out problems while humans use many skills besides logic when making decisions. (V) They use such things as imagination, awareness, emotion, and values.

A) I B) II C) III D) IV E) V

Crows can recognise themselves in mirrors, use tools and plan for the future, all cognitive abilities more similar to those seen in primates than those of most other birds. Felix Ströckens at the Ruhr University and his colleagues analysed the brains of common ostriches, brown warren chickens, racing homer pigeons and three members of the corvid family: carrion crows, hooded crows, and rooks. These are the animals that had either been killed for food or pest control. The researchers were able to analyse the nuclei of the birds' brain cells using a method called isotropic fractionation. This allowed them to categorise the types of cells present in each brain and estimate how many there were of each. The team found that corvids had the highest number of interneurons, small cells that pass on local signals and are involved in cognitive processing. These cells process information received from sensory neurons and send inputs to motor neurons. They are involved in tasks such as decision making, future planning and risk assessment. "If we think about the neuron as the main processing unit of the brain, we can assume that a higher number of neurons equals more processing power," says Ströckens. But it is not enough to explain why crows have stronger cognitive abilities than most birds, he adds.

66

According to the passage, crows ----.

- A) have the ability to reflect on previous events but do not have an understanding of the future
- B) are diminishing in number because of the mass killings for pest control
- C) are substantially similar to most other birds in terms of the cognitive abilities they have
- D) have been studied because their resemblance to other species makes it hard to classify them
- E) have cognitive skills which are similar in some ways to thinking abilities of primates

67

One can understand from the passage that the intelligence that corvids have ----.

- A) seems to develop more in time due to their reasoning capacities functioning well compared to that of others
- B) could be seen in a specific member of the corvid family excluding the crows killed for food or pest control
- C) is one of the most easily detected abilities they have as it can be seen and observed everywhere
- D) may be related to them having an unusually high number of brain cells involved in processing information
- E) is relatively equal to that of common ostriches, brown warren chickens, and racing homer pigeons

68

Which of the following statements is true according to the passage?

- A) The researchers performed an analysis of the nuclei of the birds' brain cells to help control pests.
- B) Sensory neurons process information and tasks are performed through cognitive processing.
- C) The isotropic fractionation method helped explain why crows have a higher number of brain cells compared to other birds.
- D) The study found that small cells that pass on local signals are used most when a risk is posed.
- E) Risk calculation and contemplating the future are among the examples of reasoning that corvids exhibit.

Grafting, where the root of one plant is attached to the shoot of another, has been used in agriculture for thousands of years to improve the growth of plants such as apples and citrus trees and to eradicate diseases. But this technique was not thought to work for a major group of plants: the monocotyledons (or monocots). This category includes all grasses like wheat and oats, as well as other high-value crops like bananas and date palms. These species lack a tissue called vascular cambium, which helps grafts heal and fuse in many other plants. Now, Julian Hibberd at the University of Cambridge and his colleagues have found an approach that allows monocots to be grafted. They extracted a form of embryonic tissue from inside a monocot plant seed and applied it to the potential graft site between two monocot specimens belonging to the same species, for instance, wheat. The tissue stimulated growth and fused the two plant halves together. The researchers used fluorescent dyes to verify that the root and shoots had joined and could transport liquids and nutrients up and down the stem. "I have written on the record that I thought it was near impossible. So, as a science breakthrough, it's pretty amazing," says Colin Turnbull at Imperial College London.

69

According to the passage, the method of grafting was believed not to work efficiently for monocots because ----.

- A) they are high-value and vulnerable crops like bananas
- B) the diseases they have could not be eradicated until now
- C) they have been the world's most endangered crops
- D) they lack the necessary roots and shoots for grafting
- E) they do not have the tissue of vascular cambium

70

Which of the following is true about the grafting of monocots?

- A) Vascular cambium is a tissue that triggers growth in all grasses like wheat and oats and in crops like bananas and date palms.
- B) Embryonic tissue extraction is possible provided that the tissue concerned is vascular cambium.
- C) The researchers' studies indicated that grafting can work not only in the same species but also between species.
- D) The technique could be especially useful for combatting disease in vulnerable species which face extinction.
- E) The scientists confirmed plant growth occurred as the transportation of liquids and nutrients was observed within the stem.

71

What is the passage mainly about?

- A) The grafting technique which is preferable for stimulating plant growth effectively
- B) Grafting and its history as the most well-known plant growing technique
- C) The species which require grafting the most in order to thrive
- D) Making grafting possible for a specific plant species on which it was previously believed not to work
- E) Factors contributing to successful plant growth subsequent to grafting

Water pollution control methods can be subdivided into three treatment systems. Physical treatment systems rely on physical processes such as screening, filtration, and sedimentation to aid in the removal of pollutants. Screening and filtration are similar methods used to separate coarse solids from water. Suspended particles are also removed from water with the use of sedimentation processes. Just as in air pollution control, sedimentation devices exploit gravity to remove the heavier particles from the water stream. Chemical treatment systems, on the other hand, are those which utilise chemical reactions to remove water pollutants or to form other, less toxic compounds. Chemical precipitation, for example, is one of the most commonly used chemical treatment processes. It utilises the addition of chemicals to the water in order to bring about the precipitation of dissolved solids. A physical process such as sedimentation or filtration is then required to remove the solid. Lastly, biological water pollution control methods are used for the control of biodegradable organic chemicals, as well as nutrients such as nitrogen and phosphorus. In these systems, microorganisms consisting mainly of bacteria turn carbonaceous matter into gas. There are two main groups of microorganisms used in biological treatment; aerobic and anaerobic microorganisms, each of which requires special climatic settings to work effectively.

72

According to the passage, one mutual method used in air and water pollution control systems is to ----.

- A) separate pollutants into sub-categories before the process starts
- B) decrease toxicity levels with chemical reactions
- C) mix a variety of solutions to absorb pollutant agents
- D) utilise gravity to remove particular pollutants
- E) convert carbon-containing matter into gas

73

It is clear in the passage that the chemical precipitation process ----.

- A) decreases toxicity levels faster than biological processes
- B) is among the most preferred chemical methods for water pollution control
- C) includes the use of heavy chemicals that may harm underwater species
- D) requires specific microorganisms to be effective
- E) is particularly efficient in removing heavy metals

74

According to the passage, aerobic and anaerobic microorganisms ----.

- A) are solely used for the removal of phosphorus from water streams
- B) selectively destroy disease-causing organisms in water
- C) do not work as efficiently on nitrogen as they do on biodegradable organic chemicals
- D) rely on environmental conditions to function in an efficient way
- E) may be as harmful to the environment as some toxic chemicals are

Muscles, bones, and connective tissues grow stronger by sustaining damage. Skeletal muscle in particular responds to unfamiliar exercise with a measure of harm. Unlike other muscle tissues like the cardiac muscle, it is made up of long, thin fibres that are composed of several different proteins. These proteins interlock inside fibrous compartments called sarcomeres. Sarcomeres can stretch, but only so far. During certain kinds of movements, some of these sarcomeres within the affected muscles are pulled past their tolerance. The proteins inside separate, resulting in micro-tears throughout the muscle tissue. Hours or even a day or two after the exercise, this cellular-level damage is thought to lead to inflammation. Blood vessels dilate in the affected sections of muscle, white blood cells and other immune-system-related cells flood in, and tissues swell and warm. This familiar sensation is known as 'delayed onset muscle soreness,' or DOMS, and affects anyone who works out. Strange muscle contractions during which forces are applied to muscles as they lengthen, are the main causative factors. In general, this soreness is a good thing. Afterwards, the tissues rebuild themselves, becoming stronger and more flexible, a process known as adaptation.

75

According to the passage, when the sarcomeres stretch beyond their limit ----.

- A) it leads to a small amount of damage in the muscle tissue which becomes sore
- B) muscles require professional treatment to heal afterwards
- C) the proteins that they contain start to connect with one another
- D) it becomes impossible to exercise in the following couple of days
- E) they cause cellular-level damage which can be alleviated in a couple of hours

76

According to the passage, which of the following is true about DOMS?

- A) It creates a burning sensation right after the exercise and disappears quickly.
- B) It is not experienced by people who do certain kinds of exercise.
- C) It results in an irreversible damage done to muscle tissue.
- D) It is the result of extending the muscle fibres while working out.
- E) It could be avoided by comprehensive warm-up before exercise.

77

What is the passage mainly about?

- A) The need for adequate rest after working out
- B) The importance of exercise on muscle growth
- C) The workings of different kinds of muscles
- D) The way muscles react to stretching
- E) The danger of muscle soreness after exercise

Various theories about the end of the Universe all concern the balance between the expansion of the Universe and the pull of gravity. In one scenario, gravity may not be strong enough to stop the Universe from expanding, meaning it will continue to do so forever. The Universe will become darker and colder. Even black holes will evaporate as the Universe becomes an endless and timeless void where nothing ever happens. This is called the 'Big Freeze'. But, according to a second theory, if gravity is strong enough to overcome expansion, then the Universe will start to contract again. Eventually, it will collapse in on itself to become a compact fireball. The 'Big Crunch', as it is called, will swallow all matter and energy, as well as space and time. A third theory concerns the mysteries of 'dark energy.' Astronomers have found that the expansion of the Universe is actually speeding up due to dark energy, and if this acceleration continues, the expansion will overcome all the forces of nature. The result will be the 'Big Rip.' All matter, and space-time itself, will be ripped apart and destroyed. Estimates say this could happen in about 22 billion years.

78

What are all of the hypotheses about the end of the Universe based on?

- A) The relation between gravity and the increase in the size of the Universe
- B) The difference in temperature between different parts of the Universe
- C) The continuation of the expansion of the Universe
- D) The probability that the Universe may shrink
- E) The eventual decrease in the speed of the expansion of the Universe

79

According to the passage, which of the following is true about the end of the Universe?

- A) Despite the name 'Big Freeze', the Universe will actually heat up in that scenario.
- B) Only black holes will be able to survive the end of the Universe.
- C) If the Universe turns into a fireball, it will be due to its expansion.
- D) The discovery of dark energy rules out all the other theories.
- E) Astronomers can calculate a probable time for the end of the Universe.

80

What is the main purpose of the author?

- A) To warn the reader about the approaching end of the Universe
- B) To inform the reader about different possibilities concerning the end of the Universe
- C) To correct some misconceptions about the forces of nature that act upon the Universe
- D) To explain the reason why astronomers cannot agree on one scenario
- E) To highlight a new theory refuting other abstract classical theories

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ANSWER KEY

1 C	21 D	41 A	61 E
2 B	22 B	42 B	62 C
3 D	23 E	43 E	63 E
4 A	24 B	44 C	64 D
5 D	25 C	45 B	65 C
6 D	26 E	46 A	66 E
7 D	27 D	47 E	67 D
8 B	28 C	48 A	68 E
9 C	29 B	49 C	69 E
10 B	30 B	50 C	70 E
11 C	31 B	51 C	71 D
12 D	32 C	52 A	72 D
13 B	33 B	53 A	73 B
14 D	34 B	54 D	74 D
15 A	35 A	55 A	75 A
16 C	36 A	56 A	76 D
17 B	37 B	57 A	77 D
18 A	38 C	58 A	78 A
19 C	39 C	59 B	79 E
20 D	40 C	60 D	80 B