ÖSYM

T.C. Ölçme, Seçme ve Yerleştirme Merkezi

YÜKSEKÖĞRETİM KURUMLARI YABANCI DİL SINAVI (2025-YÖKDİL/1)

İNGİLİZCE

FEN BİLİMLERİ

16 ŞUBAT 2025

1

Paul Dirac was a mathematical genius who made several key ---- to quantum physics, sharing the Nobel Prize in Physics with Erwin Schrödinger in 1933.

A) contributions
B) calculations
C) persuasions
D) accusations
E) restrictions

2

Renewable energy resources such as solar, hydroelectric, geothermal, and tidal schemes are sustainable because there is no ---- of natural resources.

A) estimation
B) absence
C) depletion
D) equivalent
E) comprehension

3

Some historians and archaeologists believe that marks on sticks and bones, made by Ice Age hunters in Europe around 20,000 years ago, show the days were recorded between ---- new moons.

A) extensive
B) viable
C) distinctive
D) successive
E) ambiguous

4

A navigation system comprised of a network of satellites, the global positioning system (GPS) was originally intended for military applications to ---- determine locations worldwide in all kinds of weather.

A) drastically
B) excessively
C) presumably
D) accurately
E) sparsely

5

The purpose of the Convention of Biological Diversity is to conserve biological diversity and encourage equitable sharing of the benefits ---- out of the utilisation of genetic resources.

A) enacting
B) evaluating
C) promoting
D) arising
E) distributing

6

At the atomic level, our body is made up of four major elements, namely oxygen, carbon, hydrogen, and nitrogen, which collectively ---- more than 96% of adult body weight.

A) run into
B) account for
C) give up
D) bring down
E) come through

7

Aboard a mobile robot, radio direction finding (RDF) equipment facilitates ---- the location of a transmitter, and it ---- to find the location of a robot with respect to two or more transmitters operating on different frequencies.

A) being determined / must be used
B) determining / can be used
C) to be determined / need to be used
D) to determine / should have been used
E) having determined / could have been used

8

Since the global climate agreement of 2015, which ---- the aim of a maximum global temperature rise of 1.5 degrees, scientists ---- the lack of ambition by many governments.

A) has included / criticise
B) included / have criticised
C) would include / are criticising
D) includes / criticised
E) had included / had been criticising

9

Enormous power is needed to overcome gravity and travel ---- space, so satellites and spacecraft are propelled by launch vehicles ---- rocket engines and their own fuel supply.

A) on / against

B) over / about

C) into / with

D) through / from

E) for / at

10

First formulated by Dmitri Mendeleev in 1869, the periodic table organises the elements ---- the number of protons they bear and groups elements ---- the same number of available electrons, and similar bonding properties, in columns.

A) into / between

B) by / with

C) among / towards

D) over / from

E) at / about

11

Asteroids, rocky bodies that vary in size, exist ---- the solar system, but most are found ---- the asteroid belt between Mars and Jupiter.

A) along / from

B) about / for

C) upon / to

D) throughout / in

E) off / on

12

---- a clinic substantially alters someone's tissue by maturing extracted stem cells in the lab into different types of cells, this potentially becomes a novel therapy, requiring the testing and approval as a new drug.

A) While

B) Until

C) Just as

D) If

E) Before

13

---- starfish lack teeth, they must convert their food to a liquid form before they can ingest it.

A) As though

B) While

C) Because

D) In order that

E) Just as

14

During a meal, the appetitive phase is the goal-directed behaviour focusing on acquiring food ---- the consumatory phase is the act of ingestion.

A) while

B) as though

C) in that

D) once

E) whether

15

The actual positions of the distant stars in space relative to one another have only changed by minuscule amounts over many millennia; ----, the distinctive patterns of the constellations visible in today's skies around the world have not changed significantly since early prehistory.

A) however

B) that is

C) instead

D) otherwise

E) on the contrary

16

---- lead was the material of choice in the construction of water pipes for many years, many of such applications have been discontinued with the recognition of its hazard to human health.

A) Although

B) Just as

C) Unless

D) Once

E) As if

17

Turtles and tortoises have hardly changed biologically in the past 150 million years ---- the protection provided by their characteristic back and belly shells.

A) instead of

B) contrary to

C) in pursuit of

D) rather than

E) thanks to

18

---- its nutritious value and low ecological impact on native ecosystems, dandelion is an extremely invasive plant and considered a nuisance by many researchers.

A) Instead of

B) Similar to

C) Based on

D) Despite

E) According to

19

Beetles are economically important in agriculture, ---- feeding directly on crops and trees, ---- preying on other species that harm plant crops.

A) as / as

B) so / that

C) the more / the less

D) either / or

E) such / that

20

French chemist Antoine Lavoisier tried to create an analytical chemical language ---- the names of substances would reveal their fundamental composition and other central chemical properties.

A) how

B) that

C) in which

D) what

E) when

The alpine mountains are threatened by many angles. Humans are having an impact on the Alps **(21)----** an expansion of urban areas. The rise of urbanisation can disrupt animals and fragment their habitat, damaging their long-term survival and reproductive success. Also, the mountain range is filled with thousands of glaciers. They have been monitored over several years and are all receding at an unprecedented rate. Since the Earth's climate changes and the global temperature increases, the future of the Alps will **(22)----** threat. If the glaciers melt, it will cause flooding on a large scale and destruction of many animals' mountain habitats. Additionally, **(23)----** the climate has been warming, plants have been shifting their range to further up the mountains. They are gradually growing in higher and colder ground in an effort to keep their surroundings **(24)----** an optimum constant temperature. This means that the animals depending on these plants **(25)----** to higher elevations to survive as well, pushing them into even more extreme environments.

21

A) in comparison to
B) due to
C) in spite of
D) similar to
E) rather than

22

A) come under
B) cut down
C) take over
D) break away
E) turn off

23

A) in case
B) even if
C) until
D) as
E) once

24

A) off
B) on
C) at
D) by
E) across

25

A) might move
B) would have moved
C) should have moved
D) could have moved
E) have to move

Calendars are deemed precise according to how well they accommodate the variations in larger celestial cycles. Clocks, on the other hand, have historically been judged precise **(26)----** the average duration of the Earth's rotation around the Sun – that is, by how well they keep 'mean time'. **(27)----** calendrical standards have remained fairly stable, the clock's units of measure have gradually shifted away from using the Earth-Sun relationship as a norm. **(28)----** the introduction of mechanical clocks, clock time became increasingly removed from cyclical events in the sky, for the cycles on which mechanical clocks base their measures are independent of Earth and Sun. A pendulum clock, for example, measures only the beat of its pendulum, not any part of a 'real' day. The pendulum clock **(29)----** the modern search for the perfect clock, a timepiece governed by a naturally cycling period that operated free from mechanical friction and fatigue. In 1927, W. A. Marrison invented a clock that operated via a tiny quartz crystal. The crystal vibrated at an ultrasonic frequency when **(30)----** to an electric field.

26

A) in relation to
B) as opposed to
C) prior to
D) with the goal of
E) by means of

27

A) Unless
B) Whether
C) As though
D) Because
E) While

28

A) Among
B) Into
C) To
D) By
E) With

29

A) dealt with
B) abstained from
C) set out
D) got off
E) went through

30

A) being exposed
B) exposing
C) exposed
D) to expose
E) to be exposing

31

Although mathematics provides the foundations on which artificial intelligence (AI) systems are built, ----.

A) AI systems might be able to generalise their mathematics abilities with thorough prompts
B) they are beginning to pull off some remarkable mathematical feats, matching humans
C) some have been sceptical that AI could ever construct tricky mathematical proofs
D) these systems can replicate human-like reasoning and show signs of creativity
E) they are regarded as the most important revolution in the contemporary world of technology

32

----, but it had everything in it for one to survive and was an engineering masterpiece at the time.

A) The cone-shaped Mercury space capsule had a series of parachutes and vital supplies
B) The Mercury space capsule was only big enough to fit a single person inside
C) The Mercury space capsule would accommodate astronauts on their journey
D) The Mercury space capsule had to be designed before NASA could send anyone to space
E) Planning for the design of the Mercury space capsule began in the late 1950s

33

Even though the techniques of the 19th century provide an adequate model to assess the periodic tides and tidal currents, ----.

A) movements of water caused by the gravitational forces of the Moon and the Sun acting on the Earth make up the tide
B) the shape of tides not only changes due to friction, but in direct response to the changing tidal forces
C) there are many exciting new strategies to predict tides using information derived from images such as waterlines
D) tidal records form the basis to study important scientific issues such as sea level rise
E) many marine scientists attempt to account for many constituents in a long time series of water levels or currents

34

Dirigibles, aircrafts that contain gas helping them float, cannot climb above storms like jet-propelled airplanes can ----.

A) whereas the engine produced three horsepower at most
B) unless they are specially designed with high altitude conditions in mind
C) so that they could be less vulnerable than airplanes to icing in the cold
D) even though their great size causes them to be significantly slower than other aircrafts
E) given that they have potential for certain markets because they can run quietly and smoothly

35

While large language models, which generate text to mimic human speech and writing, may be human-like, ----.

A) the arrival of these human-sounding models started a race to teach them how to effectively manipulate tools
B) they have been trained with so much information that they can answer almost any question without any sign of superficiality
C) they draw their information from billions of words about how humans do or say things, giving them authenticity
D) they are considered far from being skilled like humans and can fail to fully appreciate the implications of a request
E) some developers are attempting to create models that generate not just language but images and sounds as well

36

If the metabolisable energy of the food is insufficient to meet the demand of the body, ----.

A) conservation of energy necessitates that food energy intake is balanced by energy lost
B) energy retention can be negative and the body consumes its own energy reserves
C) the digestible energy consists of nutrients that are absorbed from the gut
D) there is the basal energy requirement for maintenance of vital functions
E) excess food intake leads to the deposition of body fat that retains in the body

37

Isaac Newton's law of gravity states that weight will decrease as the distance between the object and the ground increases, ----.

A) so that objects at high altitudes will weigh less than they do at sea level
B) even if the loss of weight is real and easily measured with modern instruments
C) just as weight never disappears completely because gravity extends infinitely
D) as the huge mass of earth causes gravity to be the dominant force in everyday life
E) although balances and scales are used to determine mass by measuring weight

38

Today, anyone with the slightest acquaintance with anatomy knows that blood passes from the heart to the lungs and back before making its trip through the body, ----.

A) but this was far from obvious to early physicians and scientists
B) as it seemed clear that blood was pumped through the body by the heart
C) so Chinese physicians believed that blood circulates throughout the body
D) although some writers guessed the circulation of the blood in the 16th century
E) because no one knew how blood could travel from the arteries to the veins in 1628

39

Dinosaurs have gone extinct long before humans; ----.

A) however, they are rather difficult to define as a zoological group
B) in brief, the dinosaurs were among the most successful large animals ever to live
C) therefore, evidence about the existence and nature of them is entirely indirect
D) similarly, it is not known exactly what caused the last dinosaurs to become extinct
E) furthermore, some dinosaur species bear clear resemblances to each other

40

The distinction between hills and mountains is decided entirely by the people that live near them; ----.

A) however, individual mountains rarely last very long in the powerfully erosive atmosphere of the Earth
B) thus, distinguishing mountains from smaller topographic features is partly a matter of perception
C) on the other hand, mountains, like every other thing in the natural world, go through a life cycle
D) for example, most of the mountain ranges in the planet's history rose and wore away at different times
E) still, throughout their almost four-billion-year history, the continents have been criss-crossed by many immense ranges of mountains

41

The accepted wisdom was once that the complexity of a modern fighter aircraft's avionics systems made it impossible for a pilot to fly alone, ----.

A) but improvements in cockpit design and the use of computers have greatly reduced the workload
B) yet no amount of newly-developed technology can fully protect a pilot from the stress of g-force (the force caused by gravity)
C) so the new generation of jet fighter was a response to the demand for a cheaper aircraft
D) though it is an established fact that the more unstable an aircraft the more agile it will be
E) otherwise designers and pilots had to choose between stability and manoeuvrability throughout aviation history

42

The analysis of satellite data has shown that rainfall is decreasing in tropical areas where forests are being cut down, confirming the predictions of climate models.

A) İklim modellerinin tahminlerini doğrulayan uydu verilerinin incelenmesi, tropikal bölgelerde ormanların kesilmesi sonucunda yağış miktarının azaldığını göstermiştir.

B) Uydu verilerinin incelenmesi, ormanların kesilmekte olduğu ve yağış miktarının azaldığı tropikal bölgelerde iklim modellerinin tahminlerinin doğru olduğunu göstermiştir.

C) Uydu verilerinin incelenmesi, iklim modellerinin tahminlerini doğrulayarak, ormanların kesilmekte olduğu tropikal bölgelerde yağış miktarının azalmakta olduğunu göstermiştir.

D) Uydu veri incelemeleri, tropikal bölgelerde yağış miktarının azaldığını ve ormanların kesildiğini göstererek iklim modellerinin tahminlerini doğrulamıştır.

E) Ormanların kesilmekte olduğu tropikal bölgelerde yapılan uydu veri incelemeleri, yağış miktarının azaldığını göstererek iklim modellerinin tahminlerini doğrulamıştır.

43

At certain times of the year, the Earth passes through parts of our solar system that are rich in meteorites, and these times of high-frequency meteorite encounters are known as meteor showers.

A) Dünya, Güneş sistemimizin gök taşları yönünden zengin kesimlerinden geçerken gök taşı karşılaşmaları yüksek sıklıkta gerçekleşir ve yılın bu belirli zamanları meteor yağmurları olarak bilinir.

B) Dünya, yılın belirli zamanlarında Güneş sistemimizin gök taşları yönünden zengin kesimlerinden geçtiği zamanlarda gök taşı karşılaşmaları yüksek sıklıkta gerçekleşir ve bu zamanlar meteor yağmurları olarak bilinir.

C) Dünya, yılın belirli zamanlarında Güneş sistemimizin gök taşları yönünden zengin olduğu kesimlerinden geçer ve gök taşı karşılaşmalarının yüksek sıklıkta olduğu bu zamanlar meteor yağmurları olarak bilinir.

D) Dünya, Güneş sistemimizin gök taşları yönünden zengin kesimlerinden yılın belirli zamanlarında geçer ve bu zamanlar gök taşıyla karşılaşma sıklığının yüksek olmasından dolayı meteor yağmurları olarak bilinir.

E) Yılın belirli zamanlarında, Güneş sistemimizin gök taşları yönünden zengin olduğu kesimlerinden geçen Dünya, meteor yağmurları olarak bilinen bu zamanlarda yüksek sıklıkta gök taşları ile karşılaşır.

44

While it is widely viewed as a hazardous technology, the growing concern about atmospheric pollution makes nuclear power plants more acceptable.

A) Nükleer elektrik santralleri tehlikeli bir teknoloji olarak görülse de atmosferik kirlilik ile ilgili endişelerin artması ile çoğunlukla kabul edilebilir olmuştur.

B) Atmosferik kirlilik ile ilgili artan endişeler nükleer elektrik santrallerini daha kabul edilebilir kılsa da hâlâ çoğunlukla tehlikeli bir teknoloji olarak görülmektedir.

C) Çoğunlukla tehlikeli bir teknoloji olarak görülse de atmosferik kirlilik ile ilgili artan endişeler nükleer elektrik santrallerini daha kabul edilebilir kılmaktadır.

D) Çoğunlukla tehlikeli olarak görülen atmosferik kirlilik ile ilgili endişelerin artması, nükleer elektrik santrali teknolojisini daha kabul edilebilir kılmaktadır.

E) Çoğunlukla tehlikeli bir teknoloji olarak görülen nükleer elektrik santralleri, atmosferik kirlilik ile ilgili artan endişeler sebebiyle daha kabul edilebilir olmuştur.

45

Speeding up the movement of people and goods all over the world, steam locomotives were renowned as 'iron horses' when they started a transportation revolution in the early 1800s.

A) Tüm dünyada insanların ve yüklerin hareketini hızlandıran buharlı lokomotifler, 1800'lerin başında bir taşımacılık devrimi başlattıklarında 'demir atlar' olarak ünlenmişlerdi.

B) 1800'lerin başında bir taşımacılık devrimi başlattıklarında 'demir atlar' olarak ünlenen buharlı lokomotifler, tüm dünyada insanların ve yüklerin hareketini hızlandırmışlardı.

C) Buharlı lokomotifler 1800'lerin başında bir taşımacılık devrimi başlattıklarında 'demir atlar' olarak ünlenmişlerdi ve tüm dünyada insanların ve yüklerin hareketini hızlandırmışlardı.

D) Tüm dünyada insanların ve yüklerin hareketini hızlandırarak bir taşımacılık devrimi başlatan buharlı lokomotifler, 1800'lerin başında 'demir atlar' olarak ünlenmişlerdi.

E) Tüm dünyada insanların ve yüklerin hareketine hız katan buharlı lokomotifler, 1800'lerin başında başlattıkları taşımacılık devrimiyle 'demir atlar' olarak ünlenmişlerdi.

46

Understanding the formation of the Earth and the solar system is a fundamental yet complex problem that has intrigued scientists and philosophers for centuries.

A) Bilim insanlarının ve filozofların yüzyıllardır merakını uyandıran Dünya'nın ve Güneş sisteminin oluşumunun anlaşılması temel fakat karmaşık bir problemdir.

B) Dünya'nın ve Güneş sisteminin oluşumunun anlaşılması temel ancak karmaşık bir problemdir ve yüzyıllar boyunca bilim insanlarının ve filozofların ilgisini çekmiştir.

C) Temel fakat karmaşık bir problem olan Dünya'nın ve Güneş sisteminin oluşumunu anlamak, yüzyıllar boyunca bilim insanlarının ve filozofların ilgisini çekmiştir.

D) Dünya'nın ve Güneş sisteminin oluşumunu anlamak, yüzyıllardır bilim insanlarının ve filozofların merakını uyandıran temel ancak karmaşık bir problemdir.

E) Bilim insanları ve filozoflar yüzyıllardır temel fakat karmaşık bir problem olan Dünya'nın ve Güneş sisteminin oluşumunu anlamaya ilgi duymuştur.

47

Researchers tracking more than half a million snowflakes have discovered a broad mathematical pattern that describes how snowflakes swirl through the air.

A) Kar tanelerinin havada nasıl döndüğünü tanımlamak için yarım milyondan fazla kar tanesini izleyen araştırmacılar, geniş kapsamlı bir matematiksel model keşfetmiştir.

B) Geniş kapsamlı bir matematiksel model keşfeden araştırmacılar, yarım milyondan fazla kar tanesini izleyerek kar tanelerinin havada nasıl döndüğünü tanımlamıştır.

C) Yarım milyondan fazla kar tanesini izleyen araştırmacılar, kar tanelerinin havada nasıl döndüğünü tanımlayan geniş kapsamlı bir matematiksel model keşfetmiştir.

D) Kar tanelerinin havada nasıl döndüğünü tanımlayan araştırmacılar yarım milyondan fazla kar tanesini izleyerek geniş kapsamlı bir matematiksel model keşfetmiştir.

E) Yarım milyondan fazla kar tanesinin havada nasıl döndüğünü tanımlayan araştırmacılar, kar tanelerini izleyerek geniş kapsamlı bir matematiksel model keşfetmiştir.

48

Dünya'nın dış kabuğundaki cıva miktarı diğer elementlere kıyasla nispeten daha azdır ancak büyük ve yüksek yoğunluklu yataklarda bulunduğu için cıva nadir bir element olarak değerlendirilmez.

A) Despite existing in proportionately lower amounts in the Earth's crust compared to other elements, mercury is not regarded as a rare element since it is found in large and highly concentrated deposits.

B) The amount of mercury in the Earth's crust is relatively lower compared to other elements; however, mercury is not considered a rare element because it is found in large and highly concentrated deposits.

C) As it can be found in large and highly concentrated deposits, mercury is not among the rare elements, but the amount of mercury found in the Earth's crust is considered proportionately lower when compared to other elements.

D) The amount of mercury in the Earth's crust is relatively lower in relation to other elements, but it is not a rare element because it is found in deposits that are regarded as large and highly concentrated.

E) The amount of mercury in the Earth's crust is relatively lower, yet it cannot be considered a rare element since it is found in large and highly concentrated deposits in relation to other elements.

49

Başlangıçta pratik ihtiyaçlardan dolayı geliştirilen Pisagor teoremi, çok basamaklı sayıları araştıran ilk bilginlere zihinsel bir uğraşı sunmuştur.

A) Initially developed for practical needs, the Pythagorean theorem was an intellectual pursuit provided to early scholars on their search for multi-digit numbers.

B) The Pythagorean theorem, initially developed for practical needs, provided an intellectual pursuit to early scholars, who searched for multi-digit numbers.

C) Early scholars, who searched for multi-digit numbers, initially developed the Pythagorean theorem for their practical needs, which provided an intellectual pursuit to them.

D) The Pythagorean theorem was initially developed for practical needs but it provided an intellectual pursuit to early scholars who searched for multi-digit numbers.

E) Early scholars initially developed the Pythagorean theorem for practical needs, which later provided an intellectual pursuit to those who search for multi-digit numbers.

50

Yer bilimciler magmanın oluştuğu fiziksel şartlar ve onun bileşimi hakkında daha fazla bilgi edinmek için laboratuvarda magma oluşturmuşlardır.

A) Geologists have created magma in the laboratory to learn more about the physical conditions in which magma originated and its composition.

B) To learn more about the physical conditions that create magma, geologists have developed magma and its composition in the laboratory.

C) Having created magma in the laboratory, geologists learned more about the physical conditions in which magma developed and its composition.

D) The physical conditions in which magma originated have been created in the laboratory by geologists to learn more about its composition.

E) Geologists have created the physical conditions in which magma originated in the laboratory to learn more about magma and its composition.

51

Sürtünme, makinelerin verimliliğini düşürdüğü için genellikle bir sorun olarak görülse de çivi, vida ve kibrit gibi nesneler için gerekli bir kuvvettir.

A) While friction is often regarded as a nuisance because it reduces the efficiency of machines, it is an essential force for such items as nails, screws and matches.

B) While it is an essential force for items like nails, screws and matches, friction, which reduces the efficiency of machines, is often considered to be a nuisance.

C) Even though friction reduces the efficiency of machines and is often regarded as a nuisance, it is an essential force for items such as nails, screws and matches.

D) While many perceive friction as a nuisance because it can reduce machine efficiency, it is still an essential force for such items as nails, screws and matches.

E) Friction is an essential force for items like nails, screws and matches, but it is often seen as a nuisance reducing machine efficiency.

52

Eğer yeterince insan petrol yerine elektrikle çalışan arabalara geçerse bu, önümüzdeki birkaç yılda 10 milyar tondan daha fazla sera gazının havaya karışmasını engelleyebilir.

A) More than 10 billion tonnes of greenhouse gases could be prevented from being spewed into the air in the next few years if enough people switch to cars that run on electricity rather than gas.

B) If enough people switch to cars that run on electricity rather than gas, it could prevent more than 10 billion tonnes of greenhouse gases from being spewed into the air in the next few years.

C) In the next few years, more than 10 billion tonnes of greenhouse gases will be spewed into the air if enough people do not switch to cars that run on electricity rather than gas, which can prevent it.

D) It is using cars that run on electricity rather than gas that could prevent more than 10 billion tonnes of greenhouse gases from being spewed into the air in the next few years if enough people switch to them.

E) Only if there are enough people switching to cars that run on electricity rather than gas in the next few years, more than 10 billion tonnes of greenhouse gases will be prevented from being spewed into the air.

53

Atmosfer bilimciler, musonların oluşumunu ve değişkenliğini birçok tropikal bölge üzerindeki olağanüstü etkileri nedeniyle çalışmaya devam etmektedir.

A) Atmospheric scientists continue to study the formation and variability of monsoons because of their tremendous effect on many tropical areas.

B) Given their enormous impact on numerous tropical areas, the formation and variability of monsoons are continually studied by atmospheric scientists.

C) Due to their tremendous effect on various tropical regions, the study of formation and variability of monsoons persists among atmospheric scientists.

D) Monsoons' significant influence on numerous tropical areas prompts atmospheric scientists to keep exploring their formation and variability.

E) Atmospheric scientists keep examining how monsoons form and vary due to their profound impact on many tropical regions.

54

Whatever its institutional affiliation, the goal of a botanical garden was the collection of plants for purposes of utility and scientific interest. Great gardeners were admired for the skill with which they could acclimate plants coming from vastly different climates and environments. Definitions of utility shifted during the 18th century. At its beginning, the dominant use envisioned for botanical garden plants was medical. ---- This tradition retained its vitality and even expanded into new areas – the veterinary school in Lyons, France, the first ever, acquired a botanical garden in 1763.

A) Individuals could still found botanical gardens, such as the one founded by the physician John Fothergill in the British town of Upton in 1762.

B) The expansion of scientific functions and the vast numbers of new plants found in the 18th century put pressure on the space allocated to gardens.

C) Europe's unquestionable leader among botanical gardens was the Royal Botanical Garden of France, and Britain's Kew Gardens was emerging by late in the century.

D) University botanical gardens were associated with medical programmes, and they were usually administered by medical professors.

E) The major gardens also published catalogues to acquaint people who could not visit botanical gardens with their collections and achievements.

55

Genetic engineering refers to the process of manipulating genes in humans, animals, or plants, in order to create an organism with new genetic characteristics, such as a crop that is resistant to pests or an animal which resists cancer. ---- Changing the genetic makeup of an animal by manipulating and transferring selected genes from one animal to the next allows scientists to produce specific traits in animals to be used for food such as tenderness of flesh, disease resistance and level of fat. One company, for example, has discovered a gene marker which will allow scientists to breed animals with leaner meat, while another has recently developed a way to test for genes for lean meat production (double muscling) in cattle.

A) Genetic engineering is being currently used to genetically modify plants and animals for human benefit.

B) Cloning breeder livestock is the wave of the future, since Dolly the sheep was successfully cloned in 1996.

C) In genetic engineering, the health of the clones is currently in question as such animals may not live a long life.

D) The focus has been to clone only prized breeder animals as it is not yet legal to produce food animals themselves.

E) However, the primary focus in genetic engineering for the past few years has been to produce an allergen-free animal.

56

A human being breathes 16 times a minute on average when active but not under physical exertion such as running. By breathing, an adult gets about 500 litres or 0.7kg of pure oxygen a day. ---- When the air is inhaled, it includes 20-21% oxygen, whereas the oxygen content is about 15% when the air is exhaled again. Once inside the body, the oxygen is not equally distributed. Your brain accounts for 2% of your body weight, but it claims 20% of your oxygen supply to meet its considerable energy requirement.

A) Interestingly, people can neither see, nor smell nor taste oxygen but are dependent on it to survive.

B) But if you are subjected to high oxygen concentrations for more than 24 hours, it could harm your lung cells.

C) Yet, contrary to common belief, we do not use all the available oxygen that we breathe into our lungs.

D) 50kg of oxygen exists in a person of 75kg, since the human body consists primarily of water.

E) Oxygen is an extremely efficient tool in our metabolism, and it functions as fuel in energy production.

57

Within the Mariana Trench in the Pacific Ocean lies the deepest point on Earth's surface: Challenger Deep. It is a place that only the most fearless ocean explorers have visited. As submersible design has improved, the journey has become more accessible, but still, more people have been to space than to Mariana Trench. ---- Research published in 2019 found that 100% of the amphipods from the trench had traces of microplastics in their stomachs. In the same year, undersea explorer Victor Vescovo discovered a plastic bag and sweet wrappers at almost 11,000m deep.

A) And, just like space, this remote underwater frontier offers mysteries that humans cannot resist, like if life can exist there.

B) Yet, despite being one of the most remote locations on Earth, the Mariana Trench has not escaped the impact of humanity.

C) In recent years, scientists investigating the Mariana Trench have revealed a strange and fascinating alien world right here on Earth.

D) With near-freezing temperatures and crushing pressure, the Mariana Trench makes for an environment that is as inhospitable as space.

E) The Mariana Trench was formed when one tectonic plate was pushed beneath another and today, the deepest parts of Earth's oceans sit within it.

58

Gerontechnology, a new area in the study of human aging, has focused on developing technology to promote independence and reduce disabilities associated with old age. ---- For this reason, it is important that effective training programmes be developed to teach older adults how to use new technology. The discipline known as human factors provides an effective means of accomplishing this goal. Human factor is a science focused on optimising interactions between humans and the machines they use, thereby resulting in improved safety and quality of life. When developing methods to teach older adults to use new technologies, a systems-approach is effective because the characteristics of the person, the environment, and the technology itself are considered through a series of steps.

A) New technologies may cause some occupations to lose their importance as the service they provide is no longer needed such as home care for the elderly.

B) To evaluate a programme, measures of successful learning such as retention of information and ease of device usage should be examined.

C) Training techniques such as the provision of well-organised written instructions may assist in reconciling the differences between task requirements and personal limitations.

D) Non-users of new technologies such as the Internet share common goals with older adults and express positive attitudes about learning to use new technology.

E) Although the promise of new technologies is great for making life easier, this potential is highly dependent on the ability of older adults to learn to use such technologies.

59

Some adipose tissue is brown because of its high concentration of mitochondria, which have iron-containing pigments. When energy-rich molecules in brown fat are catabolised (broken down to release energy), the stored energy is released not as chemical energy but as heat. Human infants are born with a lot of brown fat in their back and shoulder regions – it comprises about 5% of their body weight. Because infants have a high surface area-to-volume ratio, they tend to lose a lot of heat. One way that they keep warm is to produce heat in their brown fat tissues. ---- Adults have mostly white fat, which generates less heat when the fat is catabolised.

A) As a child grows up, the brown fat content of the body is reduced.

B) In summer time, temperature can reach suffocating levels for infants and adults alike.

C) Recent studies are comparing white fat cells with brown fat cells in infants and adults.

D) Brown fat may be somehow associated with a tendency to remain lean.

E) Children tend to be active all day long and thus use ample energy.

60

(I) In many places around the world, vehicles and industry emit harmful gases and particles of pollution in the air that can lead to health risks when inhaled. **(II)** Some eco-friendly buildings in cities are designed to act as urban air purifiers. **(III)** The towers of Bosco Verticale in Milan, Italy, have many plants on their outsides. **(IV)** Scientists are working to develop machines that can suck carbon dioxide directly from the air. **(V)** These catch polluting particles and absorb carbon dioxide gas to use in a process called photosynthesis.

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

61

(I) The discovery of a lake of liquid water underneath the south polar ice cap on Mars is very exciting for astrobiology and the search for life beyond Earth. **(II)** Liquid water is one of the major prerequisites for life, and similar environments on Earth, such as Lake Vostok, sealed deep beneath the Antarctic ice sheet, provide analogues for what sort of microbial life we might hope to find on Mars. **(III)** But this subsurface lake water on Mars would be an extremely challenging environment for life to survive in. **(IV)** Scientists have known for a long time that there was water on the Martian surface in the distant past, due to the erosion patterns in the rock and the existence of hydrated materials. **(V)** The water, although liquid, is still punishingly frigid at around -70°C, and is probably also very salty to keep it liquid at such low temperatures.

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

62

(I) The assignment of meanings to certain numbers may date back to the origin of counting. **(II)** In the mantic tradition, which is probably at least as old as the invention of writing, words and names reveal hidden meanings and associations when interpreted as numbers. **(III)** Pythagoras and his followers adopted traditional meanings for the numbers in the decad (the numbers from 1 to 10). **(IV)** Yet, they also expanded upon traditional meanings in numbers by attending to arithmetical properties. **(V)** For instance, the number 10 evoked a special reverence because it represented at once the decad and the sum of the first four numbers of the decad.

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

63

(I) The 17th-century English scientist Robert Boyle is generally considered to be the founder of modern chemistry. **(II)** Before Boyle's time, chemistry was the province of the alchemists and of such craftsmen as dye makers and metallurgists. **(III)** By the time Boyle died, chemistry had become a science. **(IV)** Although it was Boyle's influence that caused the 'al' to be dropped from alchemy, he was also an alchemist who spent years passionately seeking the Philosopher's Stone. **(V)** Boyle amassed enormous wealth, but in some respects, he had a checkered career.

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

64

(I) Game theory is a branch of mathematics concerned with the analysis of conflict situations. **(II)** It involves determining a strategy for a given situation and the costs or benefits realised by using the strategy. **(III)** First developed in the early 20th century, it was originally applied to parlour games such as chess. **(IV)** Now, game theory is applied to a wide range of subjects such as economics, behavioural sciences, sociology, military science, and political science. **(V)** The theory received little attention until 1944 when John von Neumann and economist Oskar Morgenstern wrote the classic treatise *Theory of Games and Economic Behavior*.

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

65

(I) Frostbite is the freezing of tissues which occurs when body parts, most commonly the fingers, toes, and the tips of ears and the nose, are exposed for long periods to the cold. **(II)** It is a direct result of limited blood circulation. **(III)** Recognising and treating the first signs of frostnip, the least serious form of frostbite, may prevent the development of the more serious forms of frostbite. **(IV)** Prolonged exposure to the cold can constrict blood vessels, causing blood circulation within tissues to slow down. **(V)** When tissues are deprived of the warmth of circulating blood, ice crystals can then form, leading to tissue death and loss of the affected body parts.

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

The essential physics required for space travel had been known since the days of Galileo and Newton, and history is full of visionaries who saw the potential of space travel in the laws of motion. What made the prospect real in the 20th century was the advent of rocketry. It was Germans, who built the world's first usable rocket: the V-2 missile. The discreet assistance of Germans to the US government eventually resulted in NASA's Marshall Space Flight Centre. This expensive scientific and engineering effort, pushed by nationalism and federal funding, led to Americans' landing on the Moon and returning home. Thanks to all these, satellite telecommunications now let us send information around the globe pretty much instantaneously and at extremely low cost. We can also study our planet from above, leading to significant advances in weather forecasts, understanding the climate, quantifying changes in ecosystems and human populations, analysing water resources and – through GPS – letting us precisely locate and track people. The irony of space science is that its greatest payoff has been our ability to know in real time what is happening here on Earth. Like radio and TV, space has become a medium for moving information.

66

It is stated in the passage that space travel ----.

A) has already been a focus of scientists throughout the history
B) started with visualisation of rocketry beginning with the days of Galileo and Newton
C) is a relatively new area since it is different now from the historical perceptions
D) has eventually accelerated the developments in rocketry
E) requires a deeper understanding of the laws of motion than of space itself

67

It can be understood from the passage that the US ----.

A) owes its initial success in space science to Germans
B) had founded a space agency long before Germans invented the first rocket
C) has always been in competition with other countries in space race
D) was inspired by the early works of visionaries such as Galileo and Newton
E) failed to establish satellite communication due to its high cost

68

Which of the following is not one of the benefits of space science?

A) Synchronous information sharing between distant places
B) Tracking changes in ecosystems and human populations
C) Detecting people's exact position via GPS
D) Gaining further knowledge about the Earth
E) Reducing the cost of rocket production

Recent years have seen British national energy system, with its foundations in the Victorian era, begin to recalibrate for the future, and home-grown British renewables are at the forefront. Indeed, the supply of British renewable energy is improving all the time. The weather – with plenty of wind and sun – is helping to generate more sustainable power for homes and businesses. In fact, 2020 and 2021 were the highest years on record for the amount of renewable energy generated from wind, solar, hydro and biofuels – at the end of 2021, wind alone had contributed 26.1% to the UK's total electricity generation. And, as that number grows, it becomes even more imperative to improve the UK's energy storage capacity, as on particularly blustery days or during periods of extended sunshine, a lot of surplus energy is produced that goes to waste. The reason to remain frustratingly reliant on expensive fossil fuels today is that the sun does not always shine and the wind does not always blow when needed, and only so little of that renewable energy can be stored up for future use.

69

It is stated in the passage that British national energy system ----.

A) is working to update itself for the following years despite being established long ago
B) has been developed by national engineers as it was traditionally done in the Victorian era
C) falls behind in providing the necessary energy to the whole country as it is very old
D) has substantially solved the storage issue of renewable energy
E) has abandoned the use of fossil fuels because of environmental concerns

70

It can be inferred from the passage that the data from the years 2020 and 2021 ----.

A) showed the large capacity of the country to produce sustainable energy and also the need to improve the storage systems accordingly
B) proved that the UK meets its energy needs without depending on fossil fuels
C) differed from each other in terms of the types of the energy resources used to generate electricity throughout the country
D) supported the idea that the UK could benefit from natural resources to produce energy and supply it to the other countries across Europe
E) reflected the solar energy generation capacity of Britain despite being a windy region throughout nearly the whole year

71

According to the passage that the dependence on fossil fuels today ----.

A) results from the unreliability of the presence of environmentally-friendly resources
B) is a natural result of the old-fashioned energy systems in the UK
C) leads to attempts to seek for energy resources other than the existing ones
D) will disappear in the future thanks to the high amount of renewable energy
E) worsens the problem of access to electricity due to the high cost

Large animals are vulnerable to rapid temperature changes because their big bodies tend to hold on to heat. To investigate how they evolve thermal tolerance, Erik Svensson from Lund University Sweden looked to the world's largest bird: the common ostrich. From 2012 to 2017, Svensson took nearly 5,600 infrared photos of 794 ostriches at a research farm in Klein Karoo, South Africa. He found that their neck was a 'thermal window', emitting excess heat in hot conditions and retaining heat in the cold, stabilising the temperature of the head and brain. The farm hosts three populations of the birds: South African 'black' ostriches, Zimbabwean 'blue' ostriches and the Kenyan 'red' ostriches. Ostriches that evolved in what is now South Africa or Zimbabwe, regions with more climatic variability, were more efficient at shifting the temperature in their necks. On hot days, female ostriches with a greater difference between their head and neck temperatures laid more eggs in the following days compared with those with a smaller heat gap. This all suggests that the neck is a buffer for heat stress, Svensson says. The researcher also suggests that, as the planet warms, ostrich necks could evolve to become even longer. Using genealogical data from ostriches on the farm, Svensson confirmed that the neck radiator's efficiency is heritable.

72

Which of the following is true according to the passage?

A) Svensson focused on how the weight of ostriches affected their brain temperature

B) Kenyan male ostriches are not as competent as female ostriches at shifting the temperature in their necks.

C) Each kind of ostriches at the research farm in South Africa has developed their own way of coping with sudden temperature shifts.

D) When the difference between their head and neck temperatures increases, ostriches lay more eggs.

E) Thermal tolerance can be best investigated in birds thanks to their body shape and their ability to control body temperature.

73

Which of the following is true according to the passage?

A) Big animals, particularly ostriches, hold on to heat when exposed to sudden climatic changes as a survival mechanism.

B) Female ostriches lay more eggs by keeping their head and the neck at the same temperature.

C) South African and Zimbabwean ostriches tend to alter their body temperature throughout the day in order to lay more eggs.

D) The effectiveness of ostriches' necks at adjusting their body temperature is an inherited feature.

E) The ostriches that evolved in regions of South Africa use their neck more effectively as a buffer than those from Zimbabwe.

74

What is the passage mainly about?

A) The need for further research to support the findings by Svensson's study on ostrich neck

B) The increased probability of much longer neck evolution of ostriches

C) Rapid temperature changes and the ways that ostriches overcome them

D) A comparison of ostriches from different regions in terms of egg production in the heat

E) Ostriches' necks functioning like a thermal regulator to control head temperature

The main resource challenges of the 21st century will be concerned with environmental impacts of resource use rather than with resource availability. The most intractable global concern is the loss of those natural resources that are critical for maintaining irreplaceable environmental services. Destruction of tropical and marine biodiversity and large-scale transformation of remaining natural ecosystems due to human interference in grand biospheric cycles are high on this list of worries. There are justifiable local and regional concerns about the future availability of some key resources. The most acute of these is the availability of water in some 40 arid African and Asian countries extending from Mali to Iran. As with nearly every other perceived resource scarcity, a large part of the solution to water shortages lies not in tapping new sources but in reducing considerable waste, caused by low and subsidised prices and by poor efficiencies of water use due to improper irrigation, outdated industrial processes, and leaky urban distribution, and by deploying available techniques that allow for virtually perfect water recycling.

75

Which of the following is the main environmental challenge in the 21st century?

A) The inability to sustain some critical environmental services
B) The scarcity of water in a large area extending across continents
C) The problems associated with how natural resources are used by humanity
D) Natural environments that have been altered significantly by the human race
E) Reduced biodiversity, not only on land but also in the seas and oceans

76

Which of the following is not one of the problems related to water shortages?

A) Old-fashioned industrial practices
B) Lack of water recycling
C) The inefficient water use in agriculture
D) Inability to find new water sources
E) Lower costs of having access to water

77

Which of the following could be inferred from the passage?

A) Careful use of existing resources could have a marked effect on the efforts to solve contemporary environmental issues.
B) Nowadays, the use of resources is a minor problem, although some parts of the world have arid climates.
C) Challenging the status quo in environmental issues might lead to anxiety rather than resolution to the problems.
D) Quick thinking and decisive action might help solve dire environmental issues currently faced in the world.
E) Appreciating the environment and saving natural resources depend mostly on raising the awareness of world citizens.

An *algorithm* is a recipe, method, or technique for doing something. The essential feature of an algorithm is that it is made up of a finite set of rules or operations that are unambiguous and simple to follow. In this sense, computer scientists, rather, use technical terms for these two properties: definite and effective, respectively. It is obvious from this definition that the notion of an algorithm is somewhat imprecise, a feature it shares with all foundational mathematical ideas – for instance, the idea of a set. This imprecision arises because being unambiguous and simple are relative, context-dependent terms. However, algorithms are usually thought of as methods or techniques for getting computers to do something, and when restricted to computers, the term 'algorithm' becomes more precise, because then 'unambiguous' and 'simple to follow' means 'a computer can do it'. However, the connection with computers is not necessary. If a person equipped only with pencil and paper can complete the operations, then the operations constitute an algorithm.

78

Why is the notion of an algorithm considered imprecise?

A) Its features are evaluated based on the context in which it is employed.
B) It cannot be compared to other mathematical ideas in terms of simplicity.
C) It is defined in a more sophisticated way by computer scientists.
D) There is no consensus among computer scientists regarding its area of application.
E) Even computer scientists are not of the same opinion in defining this term.

79

It is stated in the passage that when algorithms are used for computer operations, ----.

A) it becomes easier to correctly define the term 'algorithm'
B) operations done with pencil and paper can be replicated with greater success
C) the idea of a set, common to all foundational mathematical ideas, takes on a new meaning
D) they become relatively limited in terms of methods and techniques
E) such operations may lead to different cases of imprecision

80

What is the passage mainly about?

A) The increasing efficiency of computer algorithms
B) The difficulty in clarifying what an algorithm refers to
C) The broad variety of contexts in which algorithms are used
D) Differences between mathematical and computational operations
E) The reasons why algorithms are important for computers

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ANSWER KEY

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