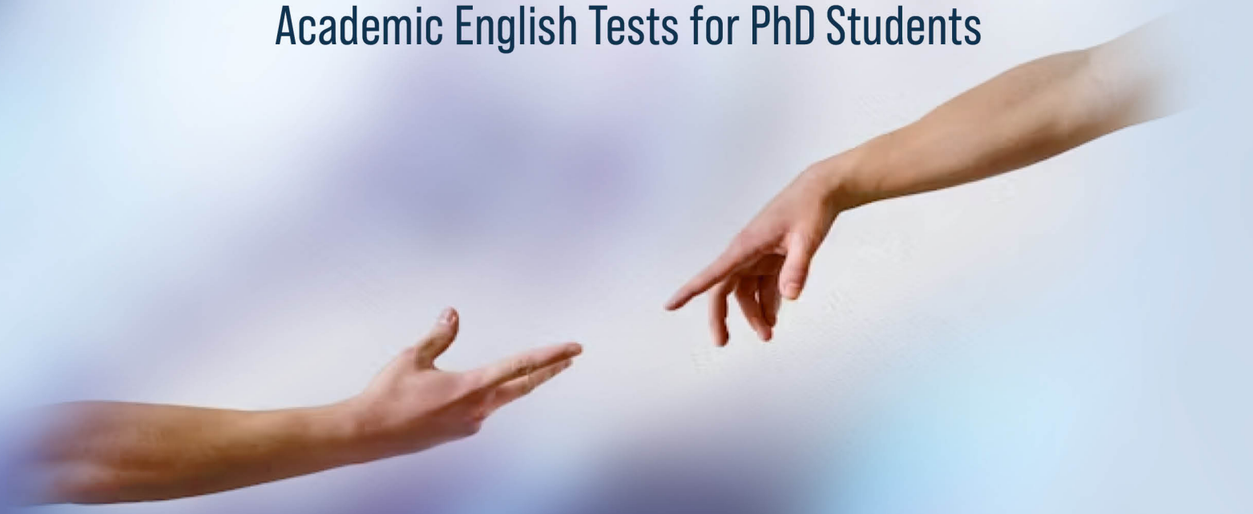
Myroniuk Tetiana

THE LANGUAGE OF SCIENTIFIC DISCOVERY:

Academic English Tests for PhD Students



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Academic English Tests for PhD Students

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Миронюк Т. Мова наукових відкриттів: тести з академічної англійської для аспірантів. The Language of Scientific Discovery: Academic English Tests for PhD Students. – Навчальний посібник. – К.: Видавниче підприємство "ЕДЕЛЬВЕЙС," 2026. – 76 с.

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Навчальний посібник створено для аспірантів та усіх, хто вивчає англійську мову на рівні С1 відповідно до Загальноєвропейських рекомендацій з мовної освіти. Посібник містить тексти, засновані на біографіях видатних учених природничих і точних наук, що відображають еволюцію наукової думки та етичні виклики сучасності. До кожного тексту розроблено тести на розуміння прочитаного, лексико-граматичні завдання, що спрямовані на розвиток аналітичного мислення й вміння аргументовано висловлюватися англійською мовою. Матеріали посібника можуть бути використані як у рамках аудиторного навчання, так і самостійної підготовки до кваліфікаційних і міжнародних іспитів.

The course book is intended for PhD students and advanced learners of English, in accordance with the Common European Framework of Reference for Languages. It brings together texts inspired by the lives and achievements of eminent scholars in the natural and the formal sciences, reflecting the evolution of scientific thought and the ethical challenges of modern research. Each text is accompanied by carefully designed reading comprehension tasks, as well as lexical and grammatical exercises aimed at fostering critical thinking and helping learners communicate complex ideas in English with clarity and precision. The materials are suitable for use in academic classroom settings and for independent preparation for qualification examinations and international proficiency tests.

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PREFACE

"The Language of Scientific Discovery" is a collection of academic English tests for PhD students who aim to refine their command of English for advanced academic and professional purposes. The texts and tasks included here are drawn from biographies of world-renowned scientists across disciplines, including physics, biology, chemistry, mathematics, medicine, and others. This integration of language learning within a scientific context not only strengthens linguistic competence but also promotes a deeper understanding of scientific discourse as a cultural and intellectual phenomenon. Each test combines reading comprehension, vocabulary, and grammar practice to enhance students' ability to process complex academic texts, critically analyze information, and express themselves with precision and fluency.

The collection is guided by current trends in English language teaching and assessment, particularly those emphasizing content and language integrated learning (CLIL), task-based learning, and critical thinking development. It encourages learners to approach scientific texts not merely as linguistic material but as opportunities for inquiry, reflection, and argumentation. The variety of exercises supports learner autonomy, allowing students to monitor their progress and to identify specific areas for improvement.

In addition to language testing, this book promotes academic integrity, cross-cultural communication, and clarity of expression – skills essential for participation in the global research community. The tests are suitable for both classroom use and independent study, including hybrid and online learning formats. They may also serve as preparation for institutional qualification exams or international proficiency tests such as IELTS Academic, TOEFL, or CAE.

By combining scientific content with linguistic precision, "The Language of Scientific Discovery" reflects a broader vision of education – one where language is not simply a tool for communication, but a medium for critical thought, creativity, and the dissemination of knowledge. It is believed that this collection will assist PhD students and researchers in mastering the language of science while cultivating the intellectual curiosity that drives discovery itself.

TEST 1

I. Read the text and answer the questions that follow.

James Lovelock (1919–2022) was a British scientist best known for developing Gaia theory, an idea that changed the way we think about the planet. According to this theory, Earth functions like a living organism, where living beings and the environment interact continuously to keep conditions stable. Although this idea seemed unusual when Lovelock first introduced it in the 1970s, it later became the foundation for Earth systems science, a modern and integrated approach to studying the planet.

Born in 1919, Lovelock lived to the remarkable age of 103. He was a true polymath – a person with expertise in a wide range of scientific fields. His ideas combined deep scientific research with creative thinking. In the 1960s, while working for NASA, Lovelock helped develop an instrument designed to measure atmospheric gases on Mars. The results revealed that Mars lacked signs of life, as its atmosphere consisted of stable gases, without the mixture of oxygen and other elements typically produced by living organisms. This experiment helped Lovelock develop his ideas about life and its effect on a planet.

He later applied the same thinking to Earth. Lovelock explained how tiny ocean organisms such as phytoplankton release chemicals that help form clouds. These clouds then cool the planet by reflecting sunlight. This was one example of how life and the environment are connected through feedback loops that keep the Earth's systems in balance.

Lovelock named his idea "Gaia" after the Greek goddess of the Earth. Some people misunderstood it as a spiritual or religious idea, but Lovelock always said it was a scientific theory. According to Gaia theory, Earth has natural systems that can regulate temperature and other conditions – just like the human body does. However, Lovelock warned that this system has limits. If humans continue to damage the environment, Earth's ability to keep balance could be lost.

Later in his life, Lovelock supported some ideas that were controversial. He believed that nuclear energy and geoengineering – technology designed to change the Earth's climate – might help reduce global warming. He also suggested that people should live in large cities and rely more on artificial intelligence to protect the environment. While not everyone agreed with him, his main goal was always to find ways to avoid environmental disaster.

In addition to being a theorist, Lovelock was also a prolific inventor. He created several scientific instruments, including one that helped scientists discover chemicals that were damaging the ozone layer. Holding around 40 patents, he often worked independently, which allowed him the freedom to explore unconventional ideas.

Through his research and inventions, Lovelock changed how people understand

our relationship with the planet. His Gaia theory continues to remind us that we are not separate from nature, but an integral part of it – and that we share the responsibility to protect our planetary home.

(After: Who was James Lovelock, what is Gaia theory, and why does it matter today? https://www.abc.net.au/news/science/2022-08-06/james-lovelock-legacy-gaia-climate-science-lynn-margulis/101297574)

1. *What is the main idea of the Gaia theory?*
   a. Earth's temperature is controlled by the Sun
   b. Living beings and the environment work together to keep balance on Earth
   c. Weather is controlled only by oceans
   d. Humans can live separately from nature

2. *How did Lovelock's work with NASA influence Gaia theory?*
   a. He created new farming tools
   b. He proved there was life on Mars
   c. He developed an idea about how atmospheres show signs of life
   d. He found oxygen on Mars

3. *Why did some people misunderstand the name "Gaia"?*
   a. It came from a scientific formula
   b. It sounded like a religious or spiritual idea
   c. It was a Greek word for science
   d. It meant balance in chemistry

4. *What warning did Lovelock give about Earth's systems?*
   a. They are unchangeable and permanent
   b. They will always support human life
   c. They can stop working if humans harm the planet too much
   d. They are controlled by technology

5. *What made Lovelock different from many other scientists?*
   a. He never worked with others
   b. He only believed in nature, not in machines
   c. He had many inventions and worked independently
   d. He worked only in universities

6. The underlined phrase scientist could best be replaced by which of the following:
   a. software engineer b. critic c. investigator d. philosopher

7. The underlined word polymath could best be replaced by which of the following:
   a. technician b. multidisciplinary expert
   c. novice d. mathematician
8. The underlined word expertise could best be replaced by which of the following:
   a. guesswork b. hobby
   c. ignorance d. proficiency
9. The underlined phrase feedback loops could best be replaced by which of the following:
   a. simple problems b. repeated warnings
   c. connected systems with effects and responses d. computer programs
10. The underlined word regulate could best be replaced by which of the following:
   a. destroy b. control c. copy d. freeze
11. The underlined word controversial could best be replaced by which of the following:
   a. generally accepted b. difficult to understand
   c. popular d. disputed
12. The underlined phrase prolific could best be replaced by which of the following:
   a. lazy b. inexperienced c. productive d. advanced
13. The underlined word independently could best be replaced by which of the following:
   a. with many sponsors b. autonomously
   c. as a school teacher d. for government labs
14. The underlined word unconventional could best be replaced by which of the following:
   a. alternative b. creative c.basic d. popular
15. The underlined word responsibility could best be replaced by which of the following:
   a. duty b. freedom c. distraction d. opinion

II. Complete the following sentences.

16. Lovelock, _____ groundbreaking ideas combined science and imagination, remained influential for decades.
   a. who b. which c. whose d. whom
17. He believed the planet could keep balance, _____ people didn't push it too far.
   a. unless b. if c. although d. because

18. If he had not worked with NASA, he _____ developed the theory much later.
    a. will have b. would have c. might d. has
19. Lovelock believed that the atmosphere on Mars was too stable _____ life to exist.
    a. so that b. for c. for that d. in order
20. Although his support for nuclear energy was controversial, it _____ from his desire to prevent environmental disaster.
    a. results b. resulting c. resulting in d. resulted
21. If humans _____ more about feedback systems, they might protect the planet better.
    a. understand b. understood c. will understand d. understands
22. One of his inventions is _____ dangerous chemicals in the air.
    a. detecting b. detect c. detected d. detection
23. Not only did Lovelock create influential theories, but he also _____ several scientific instruments.
    a. invents b. invented c. has invented d. inventing
24. Some people didn't agree with his ideas, _____ he continued to share them.
    a. so b. but c. because d. unless
25. Lovelock's theory gained recognition only after other scientists _____ its relevance to Earth system science.
    a. had demonstrated b. demonstrate
    c. demonstrating d. have demonstrated

TEST 2

I. Read the text and answer the questions that follow.

Henri Poincaré (1854–1912) was one of the greatest scientists of his time. He was known for his ability to work in many different fields, including mathematics, physics, astronomy, engineering, and philosophy. Because of his wide knowledge, he is often called "the last universalist."

Poincaré was born in Nancy, France. From a young age, he showed a strong interest in science and a deep curiosity about the world. During his life, he travelled to many countries in Europe, as well as to Africa and the United States. His experiences and education helped him approach science from many perspectives.

He made major contributions to mathematics, especially in a new field called topology, which is the study of shapes and space. He also discovered key ideas in what is now known as chaos theory, which shows how small changes can lead to very different results. In physics, he studied light, motion, and electromagnetism, and some of his work was later connected to Einstein's theory of relativity.

Although Poincaré influenced many areas of science, he was never awarded the Nobel Prize. However, he received many other honors, such as the Gold Medal of the Royal Astronomical Society and the Bolyai Prize. He was also elected to scientific academies around the world and became president of the French Academy of Sciences. Poincaré also taught at the Sorbonne and worked for the Corps des Mines, a French engineering agency.

In addition to his research, Poincaré was interested in how scientific ideas are created. In 1908, he gave a famous lecture on the process of mathematical invention. This talk attracted attention from other scholars, who later studied his methods to understand how creativity works in science.

Henri Poincaré left behind a powerful legacy. His work in mathematics, physics, and scientific thinking continues to inspire researchers today. His ability to connect different fields reminds us that science is not only about facts, but also about imagination and discovery. *(After: A Biography of Henri Poincaré - 2012 Centenary of the Death of Poincaré https://arxiv.org/abs/1207.0759)*

1. *Why is Henri Poincaré often referred to as "the last universalist"?*
   a. Because he focused exclusively on one scientific discipline
   b. Because he contributed to a wide range of scientific fields
   c. Because he developed a universal language
   d. Because he wrote extensively about universal laws

2. *How can topology be best described?*
   a. A mathematical field concerned with the properties of shapes and spatial relationships

b. A branch of physics dealing with motion and forces
c. The study of electrical currents in materials
d. A discipline focused on chemical reactions

3. *What does chaos theory primarily illustrate?*
a. That predictable outcomes result from complex systems
b. That small variations in initial conditions can lead to vastly different outcomes
c. That all scientific theories are uncertain
d. That celestial bodies follow perfect circular orbits

4. *Despite his many contributions, which major scientific award did Poincaré never receive?*
a. The Fields Medal
b. The Nobel Prize
c. The Bolyai Prize
d. The Gold Medal of the Royal Astronomical Society

5. *What was the main focus of Poincaré's 1908 lecture that attracted scholarly attention?*
a. The historical development of physics
b. The study of electromagnetic phenomena
c. The practical applications of engineering
d. The methods underlying mathematical creativity and invention

6. The underlined word <u>universalist</u> could best be replaced by which of the following:
a. expert in one subject b. polymath
c. local scientist d. beginner

7. The underlined word <u>curiosity</u> could best be replaced by which of the following:
a. interest b. sadness c. pressure d. fear

8. The underlined word <u>approach</u> could best be replaced by which of the following:
a. explore b. defend c. ignore d. repeat

9. The underlined word <u>contributions</u> could best be replaced by which of the following:
a. failures b. interruptions c. suggestions d. discoveries

10. The underlined word <u>chaos</u> could best be replaced by which of the following:
a. confusion b. control c. unpredictability d. simplicity

11. The underlined word <u>connected</u> could best be replaced by which of the following:
a. linked b. compared c. separated d. ignored

12. The underlined word honors could best be replaced by which of the following:
a. gifts b. awards c. punishments d. names
13. The underlined word elected could best be replaced by which of the following:
a. chosen b. avoided c. dismissed d. removed
14. The underlined word invention could best be replaced by which of the following:
a. disruption b. mistake c. damage d. design
15. The underlined word legacy could best be replaced by which of the following:
a. future b. story c. heritage d. legal principles

II. Complete the following sentences.

16. Henri Poincaré _____ born in Nancy, France, in 1854.
a. is b. was c. has been d. had been
17. Despite his many achievements, Poincaré ____never awarded the Nobel Prize.
a. was b. is c. has been d. had been
18. If Poincaré _____ more widely recognized during his lifetime, he might have influenced more scientists.
a. was b. were c. has been d. had been
19. Poincaré gave a famous lecture in 1908, _____ attracted attention from scholars interested in creativity.
a. which b. who c. whom d. whose
20. He worked across many fields, _____mathematics, physics, and philosophy.
a. including b. include c. included d. includes
21. The ideas that Poincaré introduced _____ important in the development of modern physics.
a. is b. was c. are d. has been
22. Poincaré made discoveries in what is now known as chaos theory, a field that _____ how minor changes can produce major effects.
a. explore b. explores c. explored d. exploring
23. Not only ___ Poincaré contribute to theoretical science, but he also _____ his ideas to engineering, demonstrating his practical mindset.
a. does … applied b. had … applies
c. did … applied d. was … applying
24. By the time he gave his famous lecture in 1908, Poincaré _____ several major contributions to mathematics and physics.
a. makes b. had made c. has made d. was making
25. Poincaré's ability to connect different fields is one reason why his legacy still _____ today.
a. continue b. continues c. continued d. has continued

TEST 3

I. Read the text and answer the questions that follow.

Daniel Augusto da Silva (1814–1878) was a Portuguese mathematician whose visionary work in number theory and combinatorics earned him posthumous recognition as a pioneer of discrete mathematics.

Born in Lisbon during a period of civil unrest, da Silva showed early talent in mathematics and science. He entered the Royal Navy Academy at the age of 15 and later continued his studies at the University of Coimbra, graduating with distinction. He returned to the Navy Academy to teach subjects such as mechanics, astronomy, optics, geography, hydrography, artillery, and fortification. However, chronic health issues disrupted his career, forcing him to retire from active military service and relocate to the island of Madeira to recover.

Despite physical limitations and relative isolation, da Silva remained intellectually active. He was elected a corresponding member of the Lisbon Academy of Sciences, and later became a full member. Working largely alone and publishing only in Portuguese, he produced research of remarkable quality – although his language and location made international recognition difficult.

Da Silva's most well-known contribution is the formulation of the Principle of Inclusion-Exclusion, a technique in combinatorics that allows for the precise counting of elements in overlapping sets. While today this method is standard in discrete mathematics, da Silva was the first to formally articulate it. He also made progress in solving systems of linear congruences, contributing to what would later become foundational results in number theory. Furthermore, his research extended into other areas, including statistics, binomial congruences, and continued fractions. Some of his results were rediscovered decades later by others who were unaware of his original publications. In addition to pure mathematics, da Silva explored problems in applied science, including fluid dynamics and the modelling of flame propagation. These studies anticipated developments in thermodynamics and combustion theory, fields not yet fully developed during his lifetime.

Although he never gained a university chair or widespread academic fame, da Silva continued his work until his death. He left behind not only a family but also a legacy of intellectual integrity and creativity. His writings reflect a poetic sensitivity to mathematical structure, which is why contemporary scholars describe him as a "poet of mathematics."

Today, da Silva is recognized as one of the most important Portuguese scientists of the 19th century. His ideas – once hidden by language and geography – now hold a respected place in the history of mathematics. His life illustrates the challenges faced by isolated scholars and the enduring value of clear, original thought.

(After: Daniel Augusto da Silva, Poet of Mathematics https://arxiv.org/abs/1812.06267)

1. *What is implied by the term "posthumous recognition" in this context?*
   a. He was awarded prizes shortly before his death
   b. His recognition began during retirement
   c. His work was translated during his lifetime
   d. He became appreciated only after his death

2. *What is Daniel da Silva best known for?*
   a. Teaching at Coimbra University
   b. Writing a poetry collection
   c. Creating the Principle of Inclusion-Exclusion
   d. Studying astronomy

3. *Why did Daniel da Silva's contributions remain largely unnoticed during his lifetime?*
   a. His work was considered incorrect by his peers
   b. He worked in isolation and published in a non-dominant language
   c. He focused on military rather than academic topics
   d. He refused to publish his theories

4. *What does the author mean by "rediscovery" of his results?*
   a. Other scientists replicated his methods without reading him
   b. His manuscripts were lost and later found
   c. He plagiarized others
   d. He copied his own work in new forms

5. *Why was da Silva described as "a poet of mathematics"?*
   a. He wrote poetry on scientific subjects
   b. His proofs often included metaphors
   c. His mathematical writing displayed clarity and elegance
   d. He taught literature as well

6. The underlined word <u>visionary</u> could best be replaced by which of the following:
   a. unimaginative b. short-sighted c. forward-thinking d. outdated
7. The underlined phrase <u>disrupted his career</u> could best be replaced by which of the following:
   a. improved his work b. paused his vacation
   c. interrupted his career d. supported his goals

8. The underlined word isolation could best be replaced by which of the following:
   a. partnership b. poverty c. connection d. separation
9. The underlined word corresponding could best be replaced by which of the following:
   a. part-time b.travelling c.associate d.financial
10. The underlined word remarkable could best be replaced by which of the following:
    a. impressive b. ordinary c. forgettable d. doubtful
11. The underlined word decade could best be replaced by which of the following:
    a. a year b. a century c. a month d. ten years
12. The underlined word anticipated could best be replaced by which of the following:
    a. ignored b. predicted c. rejected d. delayed
13. The underlined word legacy could best be replaced by which of the following:
    a. inheritance b. forgetfulness c. burden d. obstacle
14. The underlined word sensitivity could best be replaced by which of the following:
    a. indifference b. awareness c. hardness d. ignorance
15. The underlined word enduring could best be replaced by which of the following:
    a. temporary b.forgotten c. weak d. lasting

II. Complete the following sentences.

16. Daniel da Silva _____ born in 1814.
    a is b. was c. has been d. had
17. He continued to work, _____ serious illness.
    a. despite b. because c. instead d. although
18. He published his research _____ Portuguese, which limited international recognition.
    a. despite b. in c. on d. at
19. If he had published in English, he _____ better known.
    a. is b. would be c. would have been d. was
20. Da Silva's work _____ rediscovered decades after his death by other mathematicians.
    a. is b. was c. has been d. had been
21. His contributions to combinatorics, _____ the Principle of Inclusion-Exclusion, remain fundamental today.
    a. including b. included c. includes d. include

22. Da Silva's contributions, some of _____ were only recognized much later, show the depth of his originality.
    a. which b. them c. whom d. whose
23. Not only _____ an excellent researcher, but he also explored problems in applied science.
    a. he was b. was he c. he did d. did he
24. Some of his findings _____ by other mathematicians without realizing he had already published them.
    a. have been duplicated b. were duplicated
    c. are duplicating d. duplicated
25. The method he developed is now widely used, _____ it was largely unknown during his lifetime.
    a. unless b. because c. although d. so

TEST 4

I. Read the text and answer the questions that follow.

Murray Gell-Mann (1929–2019) was a pioneering American physicist whose work transformed our understanding of the fundamental building blocks of matter. Often described as one of the most creative minds in 20th-century science, he developed theories that laid the foundation for particle physics as we know it today.

Born in New York City to immigrant parents, Gell-Mann showed signs of exceptional intelligence from a young age. He entered Yale University at 15 and completed his PhD at MIT by the age of 21. His career was marked by outstanding academic achievements and collaborations with some of the most important physicists of his time, including Victor Weisskopf and Richard Feynman. In 1955, he joined the California Institute of Technology (Caltech), where he spent much of his career.

Gell-Mann's most celebrated contribution to physics was the classification system known as the "Eightfold Way", a method he used to organise subatomic particles called hadrons. This elegant framework was based on symmetry principles and helped scientists make sense of what had become known as the "particle zoo"– a growing list of elementary particles being discovered in the mid-20th century. His model led directly to the prediction of the omega-minus particle, which was later observed experimentally, confirming the accuracy of his approach.

Building on this success, Gell-Mann proposed the idea of quarks – tiny, indivisible units that make up hadrons such as protons and neutrons. He chose the term "quark" from a line in James Joyce's novel *Finnegans Wake*, showing his flair for connecting science with literature. Although quarks were initially a theoretical idea, they have since become central to the Standard Model of particle physics.

In 1969, Gell-Mann was awarded the Nobel Prize in Physics for his contributions to the theory of elementary particles. His work went far beyond classification; he also made major advances in quantum field theory, including work on the renormalization group – a concept that explains how physical systems behave differently at different scales. His insights have shaped areas ranging from quantum electrodynamics to statistical mechanics.

Gell-Mann's intellectual interests extended well beyond physics. He co-founded the Santa Fe Institute, an interdisciplinary research centre focused on complex systems. He was fascinated by patterns and order not just in the universe, but also in language, biology, and human behaviour. His later work often explored connections between scientific disciplines, showing how deep structures govern complexity across nature and society. His theories about symmetry, structure, and simplicity have influenced generations of physicists and remain essential to our understanding of the universe at its most fundamental level. *(After: The Science of Murray Gell-Mann https://arxiv.org/abs/1909.07354)*

1. *What is Murray Gell-Mann most famous for?*
   a. Inventing a new type of microscope
   b. Organising subatomic particles through the Eightfold Way
   c. Teaching literature at Yale
   d. Developing nuclear energy

2. *What did the discovery of the omega-minus particle confirm?*
   a. That Gell-Mann's work was based on chemistry
   b. That quarks do not exist
   c. That Gell-Mann's classification of particles was correct
   d. That symmetry principles are unreliable

3. *Why did Gell-Mann choose the name "quark"?*
   a. It was a Greek word for symmetry
   b. It was the name of a scientist
   c. He liked short, simple words
   d. He found it in a line from a novel

4. *What was the goal of the Santa Fe Institute?*
   a. To study particle accelerators
   b. To research physics education
   c. To explore complex systems across disciplines
   d. To promote government science funding

5. *What does the text suggest about Gell-Mann's personality?*
   a. He worked only in physics and had narrow interests
   b. He enjoyed connecting ideas from different fields
   c. He avoided teamwork
   d. He was not interested in theory

6. The underlined word <u>pioneering</u> could best be replaced by which of the following:
   a. cautious b. traditional c. innovative d. uncertain
7. The underlined word <u>classification</u> could best be replaced by which of the following:
   a. mixing b.organisation c. destruction d. observation
8. The underlined word <u>zoo</u> could best be replaced by which of the following:
   a. laboratory b. machine c. chaotic collection d. wild animals
9. The underlined word <u>prediction</u> could best be replaced by which of the following:
   a. denial b. calculation c. forecast d. mistake

10. The underlined word theoretical could best be replaced by which of the following:
    a. practical b. lab-tested c. unimportant d. conceptual
11. The underlined word insight could best be replaced by which of the following:
    a. emotion b. guesswork c. understanding d. discovery
12. The underlined word interdisciplinary could best be replaced by which of the following:
    a. team-based b. slow-paced c. online d. cross-field
13. The underlined word symmetry could best be replaced by which of the following:
    a. balance and regularity b. surprise c. speed d. danger
14. The underlined word structure could best be replaced by which of the following:
    a. framework b. confusion c. decoration d. movement
15. The underlined word fundamental could best be replaced by which of the following:
    a. easy b.essential c. fashionable d. entertaining

II. Complete the following sentences.

16. Gell-Mann's ideas remained influential long after he _____ active research.
    a. stopped b. has stopped c. had stopping d. was stopped
17. By the time he turned 21, he _____ a PhD from MIT.
    a. has earned b. earned c. had earned d. was earning
18. If he had not worked at Caltech, he _____ fewer resources.
    a. will have b. would have c. has d. had
19. The classification system Gell-Mann developed, known as the "Eightfold Way," _____ on principles of symmetry.
    a. was based b. is basing c. has based d. based
20. If the omega-minus particle had not been found, it _____ his model.
    a. would have weakened b. weakened c. will weaken d. had weakened
21. It was Gell-Mann _____ introduced the concept of quarks into physics.
    a. whom b. what c. who d. which
22. The idea, _____ by many at first, became central to modern physics.
    a. to reject b. rejecting c. rejected d. reject
23. Not only _____ explore physics, but also linguistics and biology.
    a. he did b. did c. he d. did he
24. The ability to explain complex ideas clearly made his lectures worth _____.
    a. attend b. to attend c. attending d. attended
25. He was sure that the classification system _____the discovery of new particles.
    a. would lead to b. will lead to c. had led to d. is leading to

TEST 5

I. Read the text and answer the questions that follow.

Alfred Russel Wallace (1823–1913) was a 19th-century British naturalist who played a major role in the development of evolutionary theory. Although Charles Darwin is more widely remembered for the theory of natural selection, Wallace independently reached similar conclusions. In 1858, he sent Darwin a paper that outlined his ideas, prompting Darwin to publish *On the Origin of Species* the following year.

Wallace's background was very different from Darwin's. He came from a modest family and lacked the financial and social advantages that helped many scientists of the time. In 1848, Wallace travelled to the Amazon to collect animal and plant specimens to support his scientific work. On the way back, however, his ship caught fire, and he lost almost everything he had collected. Although he survived, the loss made it difficult for him to establish a strong scientific reputation early on.

Despite this setback, Wallace continued his research. He later travelled to the Malay Archipelago, where he collected over 125,000 specimens and discovered thousands of new species. These years of fieldwork helped him develop his ideas about how species adapt to their environments and change over time.

While Wallace made significant scientific contributions, his reputation declined during his lifetime. This was partly due to his support for ideas that were considered controversial, such as spiritualism and phrenology. These views led some of his peers to regard him as unscientific, which affected how his work was evaluated.

Unlike Darwin, Wallace never held a formal university position or became part of the scientific elite. He supported himself by writing articles and books for the public, rather than by working at academic institutions. This made it more difficult for him to gain recognition among professional scientists of the era.

In recent years, however, Wallace's work has received more attention. Several biographies have explored his life and career, helping to restore his place in the history of science. Researchers now view Wallace not only as Darwin's colleague but as an independent thinker who contributed important ideas to evolutionary theory.

Wallace's story is one of dedication, field-based science, and persistence despite limited support. While Darwin remains the central figure in most accounts of evolution, Wallace is now being remembered as a key contributor who helped shape one of the most important theories in modern biology. *(After: Missing Link https://www.newyorker.com/magazine/2007/02/12/missing-link)*

1. *Why did Wallace send his 1858 paper to Darwin?*
   a. To ask for financial support
   b. To criticize Darwin's theory
   c. To share his own discovery of natural selection

d. To apply for a job

2. *What made Wallace's background different from Darwin's?*
   a. He studied at Oxford
   b. He had no formal education
   c. He came from a less wealthy and privileged family
   d. He was trained as a doctor

3. *Why was the fire on the ship such a major setback for Wallace?*
   a. He lost years of scientific specimens and data
   b. He became ill
   c. He lost his passport
   d. He had to return to the Amazon

4. *What was a major reason Wallace was not accepted by the scientific elite?*
   a. He refused to publish his work
   b. He supported controversial ideas such as spiritualism
   c. He didn't travel abroad
   d. He disagreed with Darwin

5. *How has Wallace's reputation changed in recent years?*
   a. It has declined further
   b. It is now mostly forgotten
   c. It is no longer relevant to modern biology
   d. It has improved due to new biographies and historical research

6. The underlined word <u>outlined</u> could best be replaced by which of the following:
   a. erased b. summarised c. denied d. confused
7. The underlined word <u>advantages</u> could best be replaced by which of the following:
   a. benefits b. beliefs c. dangers d. weaknesses
8. The underlined phrase <u>caught fire</u> could best be replaced by which of the following:
   a. was attacked b. ignited c.got lost d. went faster
9. The underlined word <u>establish</u> could best be replaced by which of the following:
   a. ignore b. damage c. build d. remember
10. The underlined word <u>controversial</u> could best be replaced by which of the following:
    a. common b. new c. widely accepted d. disputed

11. The underlined word formal could best be replaced by which of the following:
    a. part-time b. official c. flexible d. private
12. The underlined word public could best be replaced by which of the following:
    a. scientists b. colleagues c. general population d. universities
13. The underlined word recognition could best be replaced by which of the following:
    a. acknowledgement b. conflict c. agreement d. instruction
14. The underlined word restore could best be replaced by which of the following:
    a. hide b. erase c. re-establish d. doubt
15. The underlined word independent could best be replaced by which of the following:
    a. unsure b.autonomous c. narrow-minded d. isolated

II. Complete the following sentences.

16. If Wallace had not sent his paper, Darwin _____have published his book later.
    a. will b. would c. would have d. had
17. He collected specimens while he _____ in the Amazon.
    a. works b. working c. was working d. had worked
18. Wallace did not achieve the same recognition _____ Darwin.
    a. as b. than c. like d. so
19. In 1858, he sent Darwin a paper that _____ his ideas.
    a. outline b. outlined c. has outlined d. was outline
20. Wallace's ship caught fire, and he _____ almost everything he had collected.
    a. loses b. was losing c. lost d. had lost
21. Wallace never held a formal university position, nor _____ part of the scientific elite.
    a. did he become b. he became c. does he become d. has he become
22. He supported himself by _____ articles and books for the public.
    a. writing b. to write c. written d. write
23. While Darwin remains more famous, Wallace _____ as a key contributor.
    a. was now recognized b. is now recognized
    c. now recognizes d. recognized now
24. Wallace lost nearly all his research in the fire, _____ he did not give up on his scientific work.
    a. because b. so c. although d. yet
25. Wallace was one of the few scientists of his time who _____ most of their research through fieldwork.
    a. conduct b. conducted c. conducting d. was conduct

TEST 6

I. Read the text and answer the questions that follow.

Carl Linnaeus (1707–1778), often called the "father of modern taxonomy," changed our understanding of life on Earth through a simple yet powerful naming system. In his seminal work *Systema Naturae*, he introduced binomial nomenclature – classifying every species with two Latin names (genus and species). This approach brought clarity to an otherwise chaotic "zoo" of living creatures and laid the groundwork for future biological studies, from molecular biology to evolutionary ecology.

Born in rural Sweden, Linnaeus developed his love of plants and animals early on. His father, a parish pastor and amateur gardener, encouraged him to learn plant names. Though a mediocre student at first, he gravitated toward medicine and botany, subjects that shared a classroom at Uppsala University.

At Uppsala, Linnaeus met Peter Artedi, with whom he formed a mission: to catalogue the world's living organisms systematically. They agreed to divide the work – Artedi would handle fish and reptiles, Linnaeus birds and plants. Linnaeus soon gained attention for teaching that flowering plants reproduced sexually – an insight key to his method of classification, based on pollen-producing stamens and seed-bearing pistils.

While working for a wealthy Dutch patron, he authored *Hortus Cliffortianus* and famously grew bananas in northern Europe – a botanical feat that impressed the Swedish royal court. Back in Sweden, he practiced medicine before becoming a full professor at Uppsala, where he continued his influential work and lectured on botany and zoology. His accomplishments earned him titles such as Knight of the Order of the Polar Star and ennoblement.

Despite his contributions, Linnaeus's legacy is complex. He insisted that species were fixed and created by God, resisting ideas like spontaneous generation. Yet he also proposed that humans belong to the animal kingdom, a radical move at the time. His classification of human "varieties" and implicit racial hierarchy remains controversial.

Today, Linnaeus is remembered as a polymath whose work shaped botany, zoology, and ecology. His pioneering system of classification – simple, structured, and systematic – allowed later naturalists, including Darwin, to explore life's diversity with confidence. His story reminds us that scientific breakthroughs are built on both innovation and context, and Linnaeus's life embodies both.

(*After: How Carl Linnaeus Set Out to Label All of Life* *https://www.newyorker.com/magazine/2023/08/21/the-man-who-organized-nature-the-life-of-linnaeus-gunnar-broberg-book-review*)

1. *What was the key benefit of Linnaeus's binomial system?*
   a. It encouraged artistic naming in biology
   b. It allowed species to evolve faster
   c. It organized nature into a universal scientific structure
   d. It removed Latin from scientific naming

2. *What early influence helped shape Linnaeus's interest in plants and animals?*
   a. His university professor's scientific lectures
   b. His father's encouragement and gardening interests
   c. His travels to northern Europe
   d. A childhood job cataloguing species

3. *Why was growing bananas significant in Linnaeus's time?*
   a. It symbolized national pride in Sweden
   b. It proved plants could grow in any soil
   c. It showed his mastery of botany in a cold climate
   d. It led to new religious beliefs

4. *What made Linnaeus's view on humans controversial?*
   a. He denied human evolution
   b. He placed humans outside the natural world
   c. He rejected language as a trait
   d. He classified humans within the animal kingdom

5. *What is the text's final view on Linnaeus's contributions?*
   a. His work is outdated and mostly symbolic
   b. His system is still fundamental and influential
   c. He should be studied only as a historical figure
   d. He had little impact on future scientists

6. The underlined word <u>groundwork</u> could best be replaced by which of the following:
   a. conclusion b. foundation c. decoration d. revision

7. The underlined word <u>gravitated</u> could best be replaced by which of the following:
   a. leaned b. disagreed c. struggled d. hesitated

8. The underlined word <u>mission</u> could best be replaced by which of the following:
   a. argument b. routine c. purpose d. restriction

9. The underlined word <u>insight</u> could best be replaced by which of the following:
   a. confusion b. understanding c. doubt d. disagreement

10. The underlined word patron could best be replaced by which of the following:
    a. opponent b. rival c. bystander d. benefactor
11. The underlined word accomplishments could best be replaced by which of the following:
    a. failures b. achievements c. opinions d. obligations
12. The underlined word resisting could best be replaced by which of the following:
    a. questioning b. accepting c. opposing d. proving
13. The underlined word implicit could best be replaced by which of the following:
    a. hidden b. deliberate c. false d. detailed
14. The underlined word confidence could best be replaced by which of the following:
    a. certainty b.hesitation c. indifference d. ignorance
15. The underlined word context could best be replaced by which of the following:
    a.conclusion b. consequences c. subject d. setting

II. Complete the following sentences.

16. If Linnaeus hadn't introduced his naming system, the taxonomy today _____ very different.
    a. will be b. had been c. would be d. has been
17. His classification methods have _____ studied by generations of scientists.
    a. be b. being c. was d. been
18. The university _____ he studied encouraged both medicine and botany.
    a. where b. that c. which d. when
19. Linnaeus was one of the first scientists _____humans as a part of the animal kingdom.
    a. classified b. classifies c. to classify d.classifying
20. Only after his return to Sweden _____ recognition from the royal court.
    a. he gained b. did he gain c. he had gained d. gained he
21. He is credited with _____ a systematic approach to classification.
    a. create b. creating c. to create d. created
22. His scientific method emphasized both classification _____ observation.
    a. or b. nor c. and d. than
23. He became _____ full professor at Uppsala University.
    a. a b. the c. an d. no article
24. By the time he returned to Sweden, he ____ already grown bananas in Holland.
    a. was b. has c. have d. had
25. His naming system laid the foundation _____ future studies in biology.
    a. for b. between c. on d. at

TEST 7

I. Read the text and answer the questions that follow.

Charles Robert Darwin (1809–1882) was a renowned British naturalist whose work laid the foundation for modern biology through his theory of evolution by natural selection. Born in Shrewsbury, England, to a well-to-do family of doctors and intellectuals, he initially studied medicine at Edinburgh and then theology and the natural sciences at Cambridge.

At the age of 22, Darwin joined the HMS Beagle (1831–1836) as a naturalist, a journey that shaped his scientific thinking. On the Galápagos Islands, he observed closely related species adapted to different environments, especially finches, which helped him realize that species are not fixed but change over time. He formulated his theory in the late 1830s but waited until 1859 to publish *On the Origin of Species*.

Darwin's theory had five key principles: (1) individuals within a species vary; (2) these variations are inherited; and (3) traits that improve survival and reproduction become more common through "natural selection"; (4) over generations, more offspring inherit useful traits, and (5) these traits spread, helping the whole species adapt better to its environment. He illustrated natural selection using analogies such as breeders choosing traits in pigeons, and applied a Malthusian framework – population growth pressures lead to a "struggle for existence" that favors adaptive traits.

On the Origin of Species was controversial, challenging religious and cultural beliefs about human uniqueness. Darwin himself remained cautious, influenced by his religious upbringing and health issues. He spent most of his life at Down House in Kent, publishing further works such as *The Descent of Man* (1871), where he addressed human evolution and sexual selection, and *The Expression of the Emotions in Man and Animals* (1872), a pioneering study in evolutionary psychology.

Although he lacked knowledge of genetics, Darwin's ideas found later validation in Mendelian inheritance and modern natural sciences. Natural selection is now accepted as the primary mechanism of evolution and remains central to the life sciences .

While some critics applied his work to justify eugenics and "Social Darwinism," misrepresenting his cautious writings, Darwin himself was an abolitionist and reevaluated his own views, reflecting thoughtful and evolving beliefs rather than ideological extremes.

Darwin is regarded as one of history's most influential scientists. His systematic methods, grounded in meticulous observation, careful reasoning, and extensive correspondence, made him central to the scientific revolution of the 19th century. His legacy persists in his vision of life as an evolving process shaped by variation and selection, changing our understanding of ourselves and the natural world.

(After: Charles Darwin: Biography, Theories, Contributions https://www.verywellmind.com/charles-darwin-biography-theories-contributions-7557154)

1. *Why was Darwin's voyage on the HMS Beagle important?*
   a. It helped him establish marine laws
   b. It inspired his theory by exposing him to biodiversity
   c. It allowed him to map South America
   d. It convinced him to abandon science

2. *What key idea did Darwin develop from observing finches?*
   a. All species are genetically identical
   b. Animals change rapidly due to weather
   c. Similar species adapt differently based on environment
   d. Natural selection doesn't affect birds

3. *What delayed Darwin's publication of On the Origin of Species?*
   a. Religious hesitation and health concerns
   b. Scientific disagreements
   c. Financial problems
   d. Pressure from universities

4. *What made The Descent of Man different from On the Origin of Species?*
   a. It focused on plant evolution
   b. It applied evolution ideas to humans
   c. It avoided controversial topics
   d. It rejected natural selection

5. *How does the text describe Darwin's overall influence?*
   a. Temporary and political
   b. Limited by his lack of genetics knowledge
   c. Overrated and outdated
   d. Foundational to biology and scientific thought

6. The underlined phrase <u>natural selection</u> could best be replaced by which of the following:
   a. chance breeding b. careful planting
   c. survival of the fittest d. animal hunting
7. The underlined word <u>inherited</u> could best be replaced by which of the following:
   a. created b. passed on c. erased d. shared randomly
8. The underlined word <u>analogies</u> could best be replaced by which of the following:
   a. metaphors b. emotions c. translations d. comparisons

9. The underlined word challenging could best be replaced by which of the following:
   a. questioning b. easy to explain c. popular d. unrelated
10. The underlined phrase cultural beliefs could best be replaced by which of the following:
   a. scientific methods b. mathematical theories
   c. traditional worldviews d. ecological systems
11. The underlined phrase upbringing could best be replaced by which of the following:
   a. emotional control b. raising
   c. genetics d. human relationship
12. The underlined word validation could best be replaced by which of the following:
   a. correction b. confirmation c. rewriting d. replacement
13. The underlined word misrepresenting could best be replaced by which of the following:
   a. distorting b. praising c. teaching correctly d. approving
14. The underlined word cautious could best be replaced by which of the following:
   a. dramatic b. lazy c. conservative d. uncertain
15. The underlined word meticulous could best be replaced by which of the following:
   a. careless b.fast-paced c. experimental d. precise

II. Complete the following sentences.

16. By the time Darwin published *On the Origin of Species*, he _____ his theory decades earlier.
   a. was formulating b. formulated c. had formulated d. formulates
17. Darwin's ideas _____ widely studied and debated over the years.
   a. have been b. were being c. has been d. are
18. Darwin was deeply influenced _____ his religious upbringing and health issues.
   a. from b. by c. with d. of
19. Darwin may _____ more credit during his lifetime if he had published earlier.
   a. receive b. received c. have received d. receiving
20. Darwin noted that species _____ over time.
   a. change b. changed c. had changed d. will change
21. He is credited with _____ a scientific framework for evolution.
   a. to create b. create c. creates d. creating
22. Natural selection explains how traits _____ through generations.
   a. pass b. passed c. are passed d. were passing

23. His journey on the HMS Beagle _____ when he was 22.
    a. began b. had begun c. was beginning d. begins
24. Darwin's writings show that science is based on evidence, _____ belief.
    a. and b. not c. or d. also
25. Darwin published his theory in *On the Origin of Species*, which laid _____ foundation for modern biology.
    a. a b. an c. no article d. the

TEST 8

I. Read the text and answer the questions that follow.

Isaac Newton (1643–1727) stands as one of history's most significant scientists. While best known for his law of gravity, he also deeply influenced physics, mathematics, astronomy, chemistry, and even monetary reform. His life and work shaped the Enlightenment and laid the groundwork for our scientific age.

Newton was born prematurely on January 4, 1643, in Woolsthorpe, England. His father died before his birth, and his mother remarried and left young Newton in the care of his grandparents. Despite a challenging childhood, Newton showed a strong aptitude for mechanics and mathematics. He was fascinated by building clocks, windmills, and sundials – early signs of his inventive mind.

In 1661, Newton entered Trinity College, Cambridge. Though he initially followed traditional Aristotelian teachings, he soon found them inadequate for explaining natural phenomena. He explored new ideas by reading works by thinkers like René Descartes and Galileo Galilei. In 1665, Cambridge temporarily closed due to the Bubonic Plague, and Newton returned home. During this time – often referred to as his "Annus Mirabilis" or "Year of Wonders" – he made extraordinary advances: formulating the beginnings of calculus, experimenting with optics, and conceiving the laws of motion and universal gravitation. Legend recounts how a falling apple inspired his thoughts on gravity, though Newton himself noted the tale emerged later and may be more symbolic than literal.

Newton's first public success came in 1668, when he built a reflective telescope that used mirrors rather than lenses. This design eliminated issues found in traditional telescopes and produced clearer observations. Admired by the Royal Society, Newton shared his optical experiments through notes that eventually became the book *Opticks*.

In 1684, astronomer Edmond Halley prompted Newton to formalize his ideas. Three years later, Newton published *Philosophiæ Naturalis Principia Mathematica* – known as the *Principia*. This seminal work included his three laws of motion and the universal law of gravitation, explaining both falling apples and orbiting planets. These laws described motion in precise mathematical language and remained the foundation of physics until Einstein's theories emerged centuries later.

Newton's influence expanded beyond science. In 1696, he became the Warden of the Royal Mint and later its Master. He led a campaign to stop widespread coin counterfeiting, personally tracking criminals and reforming England's monetary system. By 1703, he was elected the President of the Royal Society, the position he held until his death in 1727. In this role, he secured his scientific authority and shaped scholarly standards.

Despite his extraordinary achievements, Newton had a passionate and sometimes bitter nature. He engaged in long disputes over the invention of calculus

with Gottfried Leibniz, and had tense relations with other scientists like Robert Hooke. Newton also delved into alchemy and biblical prophecy – now seen as mystical but which reflected the intellectual diversity and uncertainty of his era.

Newton was knighted in 1705 and died in March 1727. He was buried in Westminster Abbey, among Britain's greatest. His legacy endures: his laws still guide everyday technology, his mathematical frameworks underpin modern engineering, and his methodology – combining mathematical theory with careful experiment – remains central to science.

In summary, Newton's life exemplifies the unity of observation, mathematics, and experimentation. His innovations in motion, optics, and gravitational theory helped build the Scientific Revolution, and his influence continues across every field of modern science *(After: Isaac Newton https://www.history.com/articles/isaac-newton)*

1. *What period of Newton's life is referred to as the "Annus Mirabilis"?*
   a. His early years at Cambridge
   b. The time he spent reforming the Royal Mint
   c. His stay at home during the plague
   d. His presidency at the Royal Society

2. *What was revolutionary about Newton's telescope design?*
   a. It could detect gravity
   b. It used mirrors instead of lenses
   c. It measured motion mathematically
   d. It captured sound waves

3. *What motivated Newton to publish Principia?*
   a. A debate with Leibniz
   b. A request from the king
   c. Encouragement from Edmond Halley
   d. Financial necessity

4. *Why was Newton's time at the Royal Mint significant?*
   a. He introduced paper money
   b. He prevented a banking crisis
   c. He reduced inflation
   d. He helped eliminate counterfeit coins

5. *How did Newton influence the scientific community as the president of the Royal Society?*
   a. By shaping scholarly norms and supporting scientific inquiry
   b. By sponsoring architectural projects

c. By standardizing religious practices
d. By banning foreign scientists

6. The underlined word influenced could best be replaced by which of the following:
   a. hindered b. ignored c. guided d. separated
7. The underlined word emerged could best be replaced by which of the following:
   a. disappeared b. arose c. failed d. removed
8. The underlined word eliminated could best be replaced by which of the following:
   a. reduced b. caused c. exposed d. avoided
9. The underlined word prompted could best be replaced by which of the following:
   a. discouraged b. reminded c. encouraged d. interrupted
10. The underlined word seminal could best be replaced by which of the following:
    a. brief b. repetitive c. outdated d. influential
11. The underlined word precise could best be replaced by which of the following:
    a. vague b. exact c. risky d. visual
12. The underlined word tense could best be replaced by which of the following:
    a. relaxed b. timely c. strained d. playful
13. The underlined word delved into could best be replaced by which of the following:
    a. explored b. withdrew from c.ignored d. denied
14. The underlined word endures could best be replaced by which of the following:
    a. fades b. collapses c. continues d. replaces
15. The underlined word frameworks could best be replaced by which of the following:
    a. decorations b. surfaces c. fireworks d. structures

II. Complete the following sentences.

16. Newton _____ many of his early experiments during the university closure.
    a. conducting b. conduct c. conducted d. conducts
17. Newton's theories explained how planets and apples _____ by the same laws.
    a. govern b. governed c. are governing d. are governed
18. Newton worked independently, _____ he also collaborated when needed.
    a. but b. so c. despite d. unless

19. He helped establish laws of motion that are still _____ taught.
    a. widely b. wide c. widened d. width
20. Newton's approach to experimentation, _____ on careful observation, changed science.
    a. base b. basing c. based d. bases
21. Had Newton not developed his laws of motion, modern physics _____ very different today.
    a. would be b. was c. has been d. would have been
22. _____ all his fame, Newton remained a private and reclusive figure.
    a. because b. despite c.although d. even
23. The telescope Newton built was superior to earlier models _____ its clarity and precision.
    a. of b. in c. for d. to
24. _____ his theories were revolutionary, some of his views on alchemy were considered outdated.
    a. however b. even though c. in spite of d. as
25. The publication of *Principia* was one of _____ events in scientific history.
    a. the most significant b. more significant
    c. the more significant d. most significant

TEST 9

I. Read the text and answer the questions that follow.

Sir Chandrasekhara Venkata Raman (1888–1970) is celebrated worldwide for his discovery of the Raman Effect, a breakthrough that earned him the Nobel Prize in Physics in 1930. However, Raman was not only a pioneering physicist but also a gifted communicator who bridged the gap between advanced scientific research and public understanding.

The story of the Raman Effect began on February 28, 1928, when Raman and his student K. S. Krishnan noticed an unusual scattering of light as it passed through liquids. Instead of observing simple fluorescence, they detected a new kind of modified scattering that offered deeper insights into how light interacts with matter. This discovery fundamentally changed the study of optics and quantum physics. Yet what made the finding especially powerful was Raman's ability to present it in clear, precise, and persuasive language, allowing colleagues and non-specialists to grasp its significance. His explanation ensured that the phenomenon quickly gained recognition in the international scientific community.

Raman's communication skills extended beyond technical papers. While his scientific writing was rigorous and concise, his talks to broader audiences displayed warmth and accessibility. He had the rare ability to simplify complex ideas without distorting them, a skill that made his lectures memorable for students, researchers, and lay audiences. In this way, Raman embodied the dual role of scientist and teacher: he pushed the boundaries of physics while also nurturing intellectual curiosity in others.

As a mentor, Raman fostered independent thinking. He encouraged his students to pursue careful experimentation and to question assumptions, while still providing guidance when needed. His collaboration with Krishnan, for instance, was not merely that of senior and junior researcher; it was a partnership grounded in mutual respect and shared intellectual exploration. This balance of rigour and openness characterized his approach to both science and communication.

Thus, Raman's life reminds us that research does not end in the laboratory – it continues in the lecture hall, the written page, and the public imagination. His story remains a model for today's researchers, showing how scientific brilliance can be magnified through the art of communication *(After: C.V. Raman as a Science Communicator: A Historical Perspective https://arxiv.org/abs/2403.04773).*

1. *What was C. V. Raman awarded the Nobel Prize for?*
   a. His theory of relativity
   b. His discovery of the Raman Effect
   c. His invention of the microscope
   d. His work on cosmic radiation

2. *Why was Raman's discovery accepted so rapidly by the scientific community?*
   a. It was easily replicated and explained with clarity
   b. It was supported by strong political influence
   c. It aligned with existing theories without change
   d. It was kept secret for many years

3. *What aspect of Raman's career distinguished him from many other scientists?*
   a. His refusal to publish in journals
   b. His talent for communicating complex ideas simply
   c. His complete rejection of collaborations
   d. His work in financial reforms

4. *What was notable about his partnership with K. S. Krishnan?*
   a. It was based on competition
   b. It limited Krishnan's independence
   c. It led to no meaningful results
   d. It reflected mentorship and respect

5. *Why does the text emphasize Raman's style of teaching and public speaking?*
   a. To show how he promoted pseudoscience
   b. To criticize his lack of scientific rigour
   c. To demonstrate his ability to inspire wide audiences
   d. To contrast him with European scientists

6. The underlined word <u>gifted</u> could best be replaced by which of the following:
   a. talented b. ordinary c. lazy d. doubtful
7. The phrase <u>bridged the gap</u> could best be replaced by which of the following:
   a. separated groups b. connected differences
   c. ignored problems d. widened distance
8. The underlined word <u>persuasive</u> could best be replaced by which of the following:
   a. convincing b. doubtful c. misleading d. decorative
9. The underlined word <u>recognition</u> could best be replaced by which of the following:
   a. refusal b. doubt c. fame d. neglect
10. The underlined word <u>concise</u> could best be replaced by which of the following:
    a. clear and brief b. lengthy c. confusing d. vague
11. The underlined word <u>memorable</u> could best be replaced by which of the following:
    a. forgettable b. ordinary c. remarkable d. irrelevant

12. The phrase lay audiences could best be replaced by which of the following:
    a. professional scientists b. technical experts
    c. university professors d. general public
13. The underlined word assumptions could best be replaced by which of the following:
    a. inventions b. instruments c. traditions d. beliefs
14. The underlined word rigour could best be replaced by which of the following:
    a. strictness b. laziness c. carelessness d. weakness
15. The underlined word brilliance could best be replaced by which of the following:
    a. dullness b. intelligence and talent c. weakness d. hesitation

II. Complete the following sentences.

16. Raman's discovery was recognized, ____ he was still underestimated early in his career.
    a. or b. and c. but d. so
17. If Raman _____ clearer explanations, his discovery might not have spread so quickly.
    a. gave b. had not given c. gives d. was giving
18. The Raman Effect was discovered while light _____ through liquids.
    a. passes b. passed c. was passing d. has passed
19. Raman, together with Krishnan, _____ experiments that changed physics.
    a. conducted b. conduct c. was conducting d. conducts
20. Raman believed that science should be shared _____ the wider public, not only in journals.
    a. with b. to c. in d. by
21. The Nobel Prize in Physics _____ to Raman in 1930.
    a. awarded b. awarding c. had awarded d. was awarded
22. Raman emphasized that clarity of expression is just as important as _____ experimentation.
    a. accurate b. accuracy c. accurately d. more accurate
23. Raman, _____ lectures drew large crowds, was admired across India.
    a. who b. whose c. that d. which
24. Raman gave lectures so that students _____ understand difficult ideas.
    a. can b. will c. could d. may
25. His vision was to make science a part of everyday life, _____ only an academic subject.
    a. not b. and c.or d. but not

TEST 10

I. Read the text and answer the questions that follow.

James Chadwick (1891–1974) is best known for his 1932 discovery of the neutron, a breakthrough that reshaped atomic physics. However, less often discussed are his early insights into nuclear forces and his contributions to establishing modern subatomic theory.

Born in Cheshire, England, Chadwick was drawn to physics from a young age. After studying at Manchester, he worked under Ernest Rutherford at the Cavendish Laboratory in Cambridge. There, he developed a reputation for keen experimental skills and his readiness to follow the evidence – even when surprising results appeared.

Chadwick's greatest achievement was identifying the neutron. By measuring the radiation emitted from beryllium and interpreting its penetrating power and lack of electrical charge, he concluded that a neutral particle must exist within the nucleus. This discovery explained previously confusing results in atomic mass and charge calculations. For this, he received the 1935 Nobel Prize in Physics, yet his work went far beyond.

Early in his career, Chadwick proposed the existence of what are now known as the weak and strong nuclear forces, long before they were formally defined. He noted that certain radioactive processes required forces beyond electromagnetism and gravity – insights foundational to particle physics decades ahead of their time.

Chadwick's experimental rigour is emphasized. For example, his precise measurement of the neutron's mass and the careful calibration of instruments laid the groundwork for later physicists. He was not content to hypothesize; he tested, measured, and verified. In contrast to theorists, Chadwick maintained a disciplined, empirical mindset.

Chadwick's professional life was marked by integrity and quiet dedication. During both World Wars, he made substantial contributions to Britain's scientific efforts. After the war, he served as the Master of Gonville and Caius College, Cambridge, guiding scientific education at a key institution.

In summary, Chadwick's career reflects a blend of experimental genius and intellectual foresight. He emerges as a foundational figure who shaped the direction of physics in subtle but profound ways *(After: James Chadwick: ahead of his time https://arxiv.org/abs/2007.06926).*

1. *How is Chadwick's discovery of the neutron described in the text?*
   a. A minor contribution
   b. His only contribution
   c. His most famous, but not only contribution
   d. A theoretical prediction

2. *Why were Chadwick's early notes on nuclear forces significant?*
   a. They were published much later
   b. They anticipated future discoveries
   c. They focused on electromagnetic forces
   d. They were ignored by Rutherford

3. *How did Chadwick differ from theorists, according to the summary?*
   a. He focused on theory instead of experiment
   b. He tested his hypotheses with precision
   c. He avoided measurements
   d. He worked alone without collaboration

4. *What does the article suggest about Chadwick's legacy?*
   a. He is less important than his name suggests
   b. He was primarily a teacher
   c. He did not contribute during wartime
   d. He is undervalued for his broader insights

5. *How did Chadwick contribute during the World Wars?*
   a. He supported Britain's scientific efforts
   b. He refused to participate
   c. He was a battlefield medic
   d. He left academia

6. The underlined word <u>keen</u> could best be replaced by which of the following:
   a. weak b. strong c. limited d. precisely
7. The underlined word <u>interpreting</u> could best be replaced by which of the following:
   a. ignoring b. measuring c. explaining d. recording
8. The underlined word <u>neutral</u> could best be replaced by which of the following:
   a. charged b. uncharged c. shining d. moving
9. The underlined word <u>foundational</u> could best be replaced by which of the following:
   a. decorative b. temporary c. essential d. secondary
10. The underlined word <u>careful</u> could best be replaced by which of the following:
   a. rough b.precise c. casual d.careless
11. The underlined word <u>later</u> could best be replaced by which of the following:
   a. former b. previous c. future d. present

12. The underlined word <u>empirical</u> could best be replaced by which of the following:
    a. chaotic b. ordered c. inconsistent d. abstract
13. The underlined word <u>integrity</u> could best be replaced by which of the following:
    a. honesty b. independence c. fame d. wealth
14. The underlined word <u>Master</u> could best be replaced by which of the following:
    a. head b.janitor c. student d. professor
15. The underlined word <u>profound</u> could best be replaced by which of the following:
    a. shallow b. deep c. ordinary d. careless

II. Complete the following sentences.

16. Chadwick, _____ work anticipated later discoveries, is often overlooked.
    a. whose b. who c. which d. that
17. If Chadwick had not measured radiation, he _____ the neutron.
    a. would not have detected b. will not detect
    c. had not detected d. would not detect
18. His experiments _____ in Cambridge under Rutherford.
    a. conducted b. were conducted
    c. were conducting d. have conducted
19. He _____ the Nobel Prize in 1935.
    a. won b. was won c. had won d. winning
20. Chadwick _____ developed insights years before formal theories appeared.
    a. are b. have c. were d. had
21. He worked _____ empirical evidence instead of theory.
    a. in b. with c. by d. from
22. Although he discovered the neutron, he _____ other contributions overlooked.
    a. had b. have c. has d. have had
23. Chadwick's reputation is largely _____ his discovery of the neutron.
    a. tied to b. separate from c. opposed to d. beyond
24. Long before nuclear forces were fully understood, Chadwick _____ their potential significance.
    a. recognized b. recognizes c. recognizing d. had recognized
25. Following his wartime contributions, Chadwick later _____ the position of the Master at Gonville and Caius College.
    a. takes on b. taking on c. took on d. taken on

TEST 11

I. Read the text and answer the questions that follow.

Richard Phillips Feynman (1918–1988) was one of the 20th century's most influential and charismatic physicists. After earning his PhD at Princeton in 1942, he joined the Manhattan Project before becoming a prominent theorist at Cornell and later at Caltech, where he spent nearly four decades.

Feynman revolutionised physics through his path-integral formulation of quantum mechanics and the introduction of Feynman diagrams. These pictorial tools transformed complex calculations in quantum electrodynamics (QED) into intuitive visual representations and became standard across particle and condensed-matter physics. His approach emphasized clarity in reasoning – he believed that truly understanding physics meant being able to "show how the solution unravels" step by step. His career included work on QED, liquid helium, turbulence, weak force theory, quantum computing, and quantum gravity. In each area, he made innovative contributions marked by intellectual boldness and technical precision.

Feynman was also a gifted teacher. His *Feynman Lectures on Physics*, delivered in 1961–62 at Caltech, remain widely used today. His teaching style combined informal language, concrete examples, and a deep respect for rigorous thought. He challenged authority: "Science is the belief in the ignorance of experts," he famously remarked. His Nobel Prize came in 1965, awarded for his work in QED, particularly the development of Feynman diagrams. In his Nobel banquet speech, he spoke not as a remote academic, but as someone who treasured the joy of discovery and its shared happiness.

Feynman's personality was as unique as his physics. Raised in Queens, New York, by modest parents, he retained an informal and playful demeanour. He often spoke freely against pretense in science, embodying a "boy-from-the-countryside" image. He interwove humor and cultural flair into academic life – playing bongo drums, cracking jokes, and enjoying life's simple pleasures – even as he pushed intellectual boundaries.

Thus, Feynman's legacy is twofold: he changed how physics is done through powerful new tools and he changed how it is taught and perceived – with warmth and clarity. His methods and philosophies continue to inspire scientists worldwide *(After: The Science and Legacy of Richard Phillips Feynman https://arxiv.org/abs/1810.07409)*

1. *What is Feynman best known for?*
   a. Teaching philosophy
   b. Creating Feynman diagrams and path-integrals
   c. His work on general relativity
   d. His leadership in World War II

2. *Why did Feynman believe diagrams were important?*
   a. They replaced all mathematical formulas
   b. They helped visualize and simplify complex calculations
   c. They were easier to draw than write
   d. They were only for particle physics

3. *What attitude did Feynman take towards scientific authority*?
   a. He fully respected expert consensus
   b. He believed experts were always wrong
   c. He valued questioning expert opinions
   d. He avoided disagreeing with senior scientists

4. *How did Feynman's personality affect his teaching style?*
   a. He used formal and academic language
   b. He avoided humor and casual examples
   c. He made science accessible and engaging
   d. He focused solely on theoretical rigour

5. *What dual impact did Feynman have on physics?*
   a. He changed both scientific methodology and science culture
   b. He invented two separate theories
   c. He worked only on quantum theory and education
   d. He focused solely on popular writing

6. The underlined word <u>influential</u> could best be replaced by which of the following:
   a. minimal b.impactful c. written d. infrequent
7. The underlined word <u>prominent</u> could best be replaced by**:**
   a. unknown b. eminent c. ordinary d. inexperienced
8. The underlined word <u>transformed</u> could best be replaced by which of the following:
   a. delayed b. revolutionized c. summarized d. complicated
9. The underlined word <u>standard</u> could best be replaced by which of the following:
   a. unpopular b. obsolete c. widely accepted d. temporary
10. The underlined word <u>rigorous</u> could best be replaced by which of the following
   a. careless b.superficial c. abstract d. thorough
11. The underlined word <u>authority</u> could best be replaced by which of the following:
   a. expert opinion b.government c. classroom rules d. religion

12. The underlined word <u>academic</u> could best be replaced by which of the following:
    a. practitioner b. bureaucrat c. scholar d. teacher
13. The underlined word <u>demeanour</u> could best be replaced by which of the following:
    a. appearance b. behavior c. wealth d. attitude
14. The underlined phrase <u>pushed intellectual boundaries</u> could best be replaced by
    a. followed traditional ideas b. memorized known facts
    c. avoided difficult concepts d. explored new ideas
15. The underlined word <u>twofold</u> could best be replaced by:
    a. single b. double c. complex d. insignificant

II. Complete the following sentences.

16. By the time Feynman joined the Manhattan Project, he _____ his PhD at Princeton.
    a. had completed b. completed c. was completing d. has completed
17. Feynman's methods _____ across many subfields.
    a. spread b. spreads c. had spread d. were spreading
18. He used simple examples _____ explain complex ideas.
    a.so b. for c. in order d. to
19. To follow Feynman's reasoning, students _____ pay attention to every step in his explanations.
    a. may b. must c. might d. could
20. Despite his informal style, he _____ scientific rigour.
    a.upholds b. upward c. upheld d. upholding
21. Not only did he teach, _____ he also conducted research.
    a. but b. and c. but also d. also
22. He was both a brilliant theorist _____ a gifted teacher.
    a. or b. nor c. and d. but
23. His approach placed strong emphasis _____ clarity and step-by-step reasoning.
    a. with b. in c. on d. by
24. Feynman's lectures combined informal language, concrete examples, and deep _____ for rigorous thought.
    a. respected b. respect c. respecting d. respectful
25. Feynman's Nobel lecture _____ remembered for its humor and human warmth.
    a. is b. has c. were d. be

TEST 12

I. Read the text and answer the questions that follow.

Steven Weinberg (1933–2021) was one of the most distinguished theoretical physicists of the late 20th century. Born in New York City to immigrant parents, he earned his bachelor's degree at Cornell and his PhD in 1957 at Princeton. He later held positions at Columbia, UC Berkeley, MIT, Harvard, and the University of Texas.

In 1979, Weinberg received the Nobel Prize for unifying electromagnetic and weak nuclear forces – a monumental step in particle physics. Working together with Glashow and Salam, he placed electroweak theory alongside Newton's and Maxwell's as one of the great unification breakthroughs in science.

However, his impact extended far beyond the Nobel-winning achievement. Weinberg introduced the concept of effective field theory, showing that scientific laws provide approximate descriptions at certain energy scales and may break down outside them. This philosophical shift changed how physicists think about the limits and structure of scientific theories. He also made major theoretical contributions to quantum chromodynamics – the theory of strong nuclear interactions – helping to integrate it with the electroweak framework and shaping the Standard Model of particle physics. His work extended into early-universe cosmology, exploring how fundamental particles and forces influence cosmic evolution.

Weinberg was not only a researcher – he was a prolific educator and author. He wrote eight influential textbooks in theoretical physics, each marked by clarity and comprehensiveness. His popular science works, like *The First Three Minutes*, made cutting-edge science accessible to broader audiences. Beyond formal writing, he contributed essays on science, society, justice, critical thinking, and the relationship between science and religion – reflecting his belief that scientists must engage with wider cultural and ethical issues .

Steven Weinberg held prestigious academic positions and served on national science boards and committees, playing a public role in scientific discourse. His career spanned over six decades of research, leadership in science writing, and institutional influence. Nowadays his ideas continue to shape research in particle physics and cosmology, confirming him as a towering figure in modern science

(After: Steven Weinberg: A Scientific Life https://arxiv.org/abs/2502.10979).

1. *What major scientific unification is Weinberg credited with?*
   a. Electroweak interaction
   b. Quantum gravity
   c. General relativity
   d. Thermodynamics

2. *What concept describes how scientific laws may vary by energy scale?*
   a. Quantum uncertainty
   b. Effective field theory
   c. Divergence theory
   d. Electroweak symmetry

3. *How did Weinberg influence theoretical physics' structure?*
   a. By rejecting all prior models
   b. By making laws exact at every scale
   c. By showing theories are approximate
   d. By focusing solely on mathematics

4. *Which field did Weinberg NOT significantly contribute to?*
   a. Particle physics
   b. Cosmology
   c. Biochemistry
   d. Science education

5. *What broader roles did Weinberg embrace beyond research?*
   a. Political campaigning
   b. Institutional leadership and public discourse
   c. Sports narration
   d. Private business

6. The underlined word <u>distinguished</u> could best be replaced by which of the following:
   a. obscure b. eminent c. inexperienced d. mediocre
7. The underlined word <u>unifying</u> could best be replaced by which of the following:
   a. separating b. blending c. ignoring d. observing
8. The underlined word <u>approximate</u> could best be replaced by which of the following:
   a. complete b. general c. rough d. perfect
9. The underlined word <u>contributions</u> could best be replaced by which of the following:
   a. donations b. obstacles c. mistakes d. innovations
10. The underlined word <u>prolific</u> could best be replaced by which of the following:
    a. productive b. rare c. careless d. hesitant
11. The underlined word <u>clarity</u> could best be replaced by which of the following:
    a. opacity b. length c. complexity d. clearness
12. The underlined phrase <u>cutting-edge science</u> could best be replaced by which of

the following:

a. outdated research b. advanced knowledge

c. basic facts d. simple experiments

13. The underlined word justice could best be replaced by which of the following:

a. lawful matters b. social fairness

c. financial markets d. scientific formulas

14. The underlined word decade could best be replaced by which of the following:

a. 10 years b.10 days c.century d.generation

15. The underlined word towering could best be replaced by which of the following:

a. minor b. insignificant c. prominent d. declining

II. Complete the following sentences.

16. Weinberg believed that _____ effective field theory could describe nature within a given energy scale.

a. the b. an c. a d. no article

17. Weinberg often remarked that scientific laws _____ approximate, not absolute.

a. are b. were c. had been d. is

18. Electroweak theory _____ as one of the great unifications in science.

a. is regarded b. regards c. has regard d. regarding

19. Such theories _____ break down when applied outside their intended scales.

a. must b. may c. shall d. ought to

20. In 1979, Weinberg _____ the Nobel Prize, which confirmed his global reputation.

a. had received b. receives c. received d. was receiving

21. Only after winning the Nobel Prize _____ worldwide fame.

a. he achieved b. did he achieve c. had he achieve d. was he achieving

22. Weinberg wrote influential essays, _____ his conviction that scientists must engage with society.

a. reflect b. reflected c. reflecting d. reflects

23. He predicted that the Standard Model _____ the foundation of particle physics for decades.

a. has remained b.will remain c. remained d. would remain

24. By the end of his career, Weinberg's books ___ translated into many languages.

a. were b.will be c. are d. had been

25. Weinberg's writings help readers think about science _____ culture.

a. compared to b. beside c. within d. against

TEST 13

I. Read the text and answer the questions that follow.

Lise Meitner (1878–1968) was a physicist whose work fundamentally advanced our understanding of nuclear fission, although she was frequently underestimated by her contemporaries. Born into a Jewish family in Vienna at a time of strict gender roles, she overcame significant barriers to become the first woman admitted to the University of Vienna's physics department. Later, she joined Otto Hahn's research team in Berlin, contributing significantly to early nuclear physics.

Meitner's path was shaped by both her work and the turbulent era. During World War I, she served as a radiology volunteer for wounded soldiers, demonstrating not only scientific dedication but also a strong social conscience. Her long collaboration with Hahn produced many discoveries, but in 1934, they began researching neutron bombardment of uranium, leading to the misinterpretation of transuranic elements. Meitner recognized the true outcome – fission – a discovery that reshaped physics. Despite being central to the discovery, Meitner did not share the 1945 Nobel Prize with Hahn, sparking controversy around recognition and gender bias in science.

Her professional difficulties deepened in 1933, when the Nazis revoked her academic appointment because of her Jewish heritage and their moral hostility toward her. Meitner escaped to Sweden in 1938, and later settled in Stockholm, continuing her research despite financial and institutional limitations.

Historians emphasize Meitner's personal integrity: she avoided the title of "mother of the atomic bomb," remained skeptical about military science, and criticized the direction of research during wartime. Despite adversity, she continued publishing influential work in radiochemistry and nuclear physics well into later life. Her commitment to ethical science and her opposition to both misogyny and anti-Semitism are described as key components of her enduring legacy *(After: Lise Meitner and the Dawn of the Nuclear Age https://arxiv.org/abs/physics/0007009).*

1. *Which aspect of Meitner's biography does the summary emphasise?*
   a. Her mathematical discoveries only
   b. Her ethics, science, and social life together
   c. Her career in Sweden
   d. Her focus on military applications

2. *What major scientific discovery is Meitner credited with?*
   a. Neutron isolation
   b. Quantum mechanics
   c. Nuclear fission

d. Electron theory

3. *Why did Meitner not receive the Nobel Prize?*
   a. She was not a physicist
   b. She died before the award
   c. Gender bias and Nazi exclusion
   d. She refused the prize

4. *What role did Meitner play during World War I?*
   a. Military strategist
   b. Radiology volunteer for the wounded
   c. Spy for Austria
   d. Nuclear weapons designer

5. *Which aspect of Meitner's life is emphasized as integral to her legacy?*
   a. Her administrative leadership in Stockholm
   b. Her work on the atomic bomb
   c. Her collaborations with European universities
   d. Her scientific responsibility and opposition to prejudice

6. The underlined word <u>underestimated</u> could best be replaced by which of the following:
   a. undervalued b. admired c. celebrated d. promoted
7. The underlined word <u>overcame</u> could best be replaced by which of the following:
   a. ignored b. succeeded despite c. reinforced d. exaggerated
8. The underlined word <u>dedication</u> could best be replaced by which of the following:
   a. indifference b. carelessness c. apathy d. commitment
9. The underlined word <u>sparking</u> could best be replaced by which of the following:
   a. igniting b. preventing c. avoiding d. silencing
10. The underlined word <u>revoked</u> could best be replaced by which of the following:
    a. ignored b. granted c.cancelled d. postponed
11. The underlined word <u>appointment</u> could best be replaced by which of the following:
    a. duty b. position c. meeting d. discovery
12. The underlined word <u>integrity</u> could best be replaced by which of the following:
    a. honesty b. weakness c. dishonesty d. silence

13. The underlined word <u>adversity</u> could best be replaced by which of the following:
    a. hardship b. support c. confidence d. advertisement
14. The underlined word <u>enduring</u> could best be replaced by which of the following:
    a. forgotten b. temporary c. lasting d. fragile
15. The underlined word <u>legacy</u> could best be replaced by which of the following:
    a. award b. lawsuit c. lifelong mistake d.contribution

II. Complete the following sentences.

16. The story reminds us that science _____ not occur in isolation.
    a. did b. do c. does d. doing
17. Her discovery of nuclear fission is considered one of the most significant scientific advances of the 20th century, _____ it was initially overlooked.
    a. although b. because c. so d. unless
18. Meitner continued her research in Stockholm despite financial and institutional limitations, but she _____ more support if conditions had been fairer.
    a. would receive b. received
    c. was receiving d. would have received
19. The Nobel Prize in 1945 _____ only to Otto Hahn, sparking controversy over gender bias in science.
    a. awarding b. was awarded c. has awarded d. awards
20. Her lectures and writings reflected a belief that scientists must engage _____ the moral dimensions of their work.
    a. on b. with c. at d. within
21. Meitner's rejection of the title "mother of the atomic bomb" illustrates her belief that science _____ separated from military aims.
    a. ought to be b. mustn't c. is not d. had
22. The experiments _____ in Berlin were later reinterpreted by Meitner as evidence of fission.
    a. to conduct b. conducted c. conducting d. having conducted
23. Meitner was the first woman admitted to _____ physics department of the University of Vienna.
    a. – b. a c. the d. one
24. She opposed not only misogyny _____ also anti-Semitism, speaking against both openly.
    a. and b. but c. or d. so
25. Meitner's critics claimed she had little influence, but in fact she _____ a central role in identifying nuclear fission.
    a. plays b. has played c. playing d. had played

TEST 14

I. Read the text and answer the questions that follow.

Augusta Ada Byron (1815–1852), known as Ada Lovelace, is recognized today as the world's first computer programmer. Born into privilege yet beset by familial tension – her father was Lord Byron, and her mother a mathematician – Ada was raised apart after her parents separated when she was an infant.

Despite delicate health, including a year-long struggle with measles, Ada received rigorous homeschooling designed to focus on logic and mathematics rather than romantic arts. This early academic foundation set her apart from her contemporaries.

At 18, Ada met Charles Babbage, inventor of the Difference Engine. Captivated by it, she joined him in studying its successor – the Analytical Engine – an early mechanical computer concept. Babbage invited her to translate Luigi Menabrea's French account of the machine. Instead of a direct translation, Ada added extensive annotations – nearly three times longer than the original – illustrating how the machine could calculate Bernoulli numbers. This work is now regarded as the first algorithm intended for machine use.

Ada also foresaw the future potential of computers, suggesting they could compose music or create graphics, not just perform arithmetic. Her concept of "poetical science" combined creativity with analytical thinking.

She later married William King and had three children, though persistent health issues – including heart problems and cancer – limited her productivity. She died in 1852 at the age of 36 and was buried beside her father in Nottingham.

While her contributions were largely overlooked during her short lifetime, modern recognition has grown. Ada Lovelace Day (the second Tuesday of October) commemorates her legacy annually, and the U.S. Department of Defense named a programming language "Ada" in her honor. Scholars continue to debate her role, but it's widely accepted that her vision helped shape computing's future *(After: Ada Lovelace's Endnotes Foretold the Future of Computation https://www.scientificamerican.com/article/ada-lovelaces-180-year-old-notes-previewed-the-future-of-computers/).*

1. *Why is Ada considered the first programmer?*
   a. She built the Analytical Engine
   b. She wrote the first algorithm for it
   c. She taught programming in university
   d. She named the programming language Ada

2. *In what way was Ada's schooling distinct from her family background?*
   a. It focused on poetry and literature

b. It emphasised arts over math
c. It prioritised mathematics and logic
d. It left her without formal tutors

3. *What did her annotations on the Engine include?*
   a. A music composition
   b. Her translation of Menabrea
   c. An algorithm for Bernoulli numbers
   d. A biography of Babbage

4. *What idea did Ada predict computers could do?*
   a. Build physical engines
   b. Compose art and music
   c. Diagnose diseases
   d. Teach humans

5. *How has Ada's reputation changed over time?*
   a. She was honored by naming a programming language
   b. She became less recognized
   c. She was celebrated only during her life
   d. She led major computing companies

6. The underlined word <u>received</u> could best be replaced by which of the following:
   a. gave b. endured c. obtained d. ignored
7. The underlined phrase <u>set her apart</u> could best be replaced by which of the following:
   a. distinguished her b. isolated her from friends
   c. discouraged her progress d. delayed her studies
8. The underlined word <u>extensive</u> could best be replaced by which of the following:
   a. brief b. simple c. detailed d. optional
9. The underlined word <u>foresaw</u> could best be replaced by which of the following:
   a. remembered b. predicted c. doubted d. ignored
10. The underlined word <u>creativity</u> could best be replaced by which of the following:
    a. repetition b. accuracy c. complexity d. imagination
11. The underlined word <u>limited</u> could best be replaced by which of the following:
    a. enhanced b. restricted c. expanded d. ignored

12. The underlined construction has grown could best be replaced by which of the following:
    a. has decreased b. has expanded c. has remained d. has restarted
13. The underlined word commemorates could best be replaced by which of the following:
    a. forgets b. criticizes c. celebrates d. criticizes
14. The underlined word debate could best be replaced by which of the following:
    a. ignore b. avoid c. forget d. argue
15. The underlined phrase widely accepted could best be replaced by which of the following:
    a. generally agreed b. frequently challenged
    c. seldom noted d. never addressed

II. Complete the following sentences.

16. By the time Ada met Charles Babbage, she _____ already received extensive homeschooling.
    a. has b. had c. was d. would
17. Captivated by the machine, she joined him in studying its successor, _____ the Analytical Engine.
    a. called b. calling c. was called d. which calls
18. She wrote with clarity, _____ she lacked formal programming tools.
    a. although b. unless c. because d. since
19. Ada _____ imagined that computers could create art as well as perform arithmetic.
    a. was b. must c. is d. might have
20. Her concept of "poetical science" was considered as innovative as _____ ideas of her contemporaries.
    a. much b. many c. those d. that
21. Ada's health limited her work, but she _____ to publish ideas.
    a. continued b. continues c. was continued d. continuing
22. She died in 1852, after _____ years of illness.
    a. much b. several c. hundreds d. little
23. Ada Lovelace Day is celebrated _____ scientists remember her vision.
    a. although b. in case c. unless d. so that
24. She is admired as someone _____ imagination changed science.
    a. whose b. whom c. who's d. that's
25. Ada's contributions were overlooked for many years, but they _____ increasingly recognized today.
    a. are b. is c.has been d. were

TEST 15

I. Read the text and answer the questions that follow.

Edward Jenner (1749–1823), an English country doctor, changed the course of medical history with his discovery of vaccination. At a time when smallpox was devastating Europe, Jenner made the observation that dairymaids who had contracted cowpox – a relatively mild disease – did not seem to fall ill with smallpox. This inspired his landmark 1796 experiment where he deliberately inoculated an eight-year-old boy, James Phipps, with cowpox, and later exposed him to smallpox. The boy remained healthy. This simple but revolutionary method introduced the world to the concept of immunization.

Jenner's scientific approach was shaped by his mentorship under the eminent surgeon John Hunter, who helped cultivate his empiricism. Rather than relying on abstract theory, Jenner focused on observation, experimentation, and repetition. Despite initial criticism from the medical establishment, his vaccine method gained public acceptance and government support. The British Parliament awarded him financial grants to continue his work.

What distinguished Jenner's work was his idea of using a safer virus (cowpox) to generate immunity against a more dangerous one (smallpox). The term *vaccine* itself stems from the Latin word *vacca* (cow), reflecting this origin. His innovation directly contributed to the eventual global eradication of smallpox, declared by the World Health Organization in 1980.

Jenner's impact extended beyond smallpox. He contributed research on other medical and biological topics, including the parasitism of cuckoo birds. Nevertheless, it was his unwavering commitment to immunology that earned him recognition as the "father of immunology." He was knighted and honored during his lifetime and remains a central figure in the history of medicine *(After: Edward Jenner and the history of smallpox and vaccination https://pmc.ncbi.nlm.nih.gov/articles/PMC1200696/)*

1. *What inspired Jenner's vaccine idea?*
   a. Cowpox's effect on smallpox resistance
   b. Snake venom immunity
   c. Church medical doctrines
   d. Indian herbal medicine

2. *What was the significance of James Phipps?*
   a. He later vaccinated others against smallpox
   b. He invented the practice of inoculation
   c. He introduced the term "vaccine"
   d. He became part of Jenner's first vaccination experiment

3. *Why was Jenner's approach innovative?*
   a. It used heat to kill viruses
   b. It employed cowpox to prevent smallpox
   c. It used antibiotics
   d. It involved genetic modification

4. *What was Jenner's professional background?*
   a. Herbalist
   b. Chemist
   c. Physician trained through practical experience
   d. Statistician

5. *What happened as a result of Jenner's discovery?*
   a. A vaccine was created for influenza
   b. Smallpox mortality remained unchanged
   c. Smallpox was eventually eradicated
   d. Vaccines were banned in Europe

6. The underlined word <u>landmark</u> could best be replaced by which of the following:
   a. ordinary b. seminal c. temporary d. insignificant
7. The underlined word <u>inoculated</u> could best be replaced by which of the following:
   a. contaminated b. studied c. healed d. injected
8. The underlined word <u>revolutionary</u> could best be replaced by which of the following:
   a. traditional b. political c. groundbreaking d. simplistic
9. The underlined word <u>empiricism</u> could best be replaced by which of the following:
   a. logic b. practical experimentation c. medicine d. religion
10. The underlined word <u>criticism</u> could best be replaced by which of the following:
    a. disapproval b. recognition c. funding d. support
11. The underlined word <u>immunity</u> could best be replaced by which of the following:
    a. resistance to a disease b. ignorance of symptoms
    c. acceptance by society d. genetic superiority
12. The underlined word <u>eradication</u> could best be replaced by which of the following:
    a. avoidance b. reduction c. complete elimination d. treatment

13. The underlined word <u>parasitism</u> could best be replaced by which of the following:
    a. co-living b.protection c. breeding d. exploitation
14. The underlined word <u>unwavering</u> could best be replaced by which of the following:
    a. inconsistent b. flexible c. steady d. public
15. The underlined word <u>recognition</u> could best be replaced by which of the following:
    a. remembrance b. fame c. doubt d. legal ownership

II. Complete the following sentences.

16. Smallpox ____ one of the deadliest diseases in Europe before Jenner conducted his experiments.
    a. was b. had been c. has been d. is
17. Milkmaids who had caught cowpox rarely _____ smallpox.
    a. developed b. develop c. had developed d. are developing
18. Jenner's findings, published in 1798, _____ the foundation for modern immunology.
    a. laid b. lie c. had laid d. laying
19. The method of using cowpox as protection against smallpox was safer than _____ smallpox directly.
    a. to infect with b. infected with c. infect with d. infecting with
20. The procedure spread quickly, _____ modified to suit local practices in different countries.
    a. was b. having c. being d. had been
21. Jenner's discovery was more practical _____ theoretical.
    a. or b. than c. to d. as
22. Without Jenner's careful observations, vaccination _____ have taken much longer to develop.
    a. will b. would c. should d. can
23. His achievement, _____ controversial at first, gradually transformed into a cornerstone of medicine.
    a. although b. unless c. despite d. since
24. Jenner's success, along with his persistence, ensured that vaccination _____ as a legitimate medical practice.
    a. established b. establishes c. was established d. establishing
25. Jenner was honored, _____ some critics still doubted his contribution
    a. yet b. because c. since d. and

TEST 16

I. Read the text and answer the questions that follow.

Alexander von Humboldt (1769–1859) was a German naturalist, geographer, and explorer whose pioneering work laid the foundation for modern fields such as ecology, climatology, and biogeography. Born into a wealthy Prussian family, Humboldt received a rigorous education in mining engineering, botany, and natural philosophy. Rejecting a comfortable administrative life, he embarked on a five-year scientific expedition through Latin America (1799–1804), collecting tens of thousands of plant, animal, and mineral specimens.

During his travels, Humboldt climbed volcanoes, explored the Amazon, and produced maps showing how the Orinoco and Amazon river systems are connected. He documented altitude's effects on vegetation and proposed early theories of isothermal zones. His observations became key to understanding how geography, climate, and biodiversity interact. Notably, he described what is now called the Humboldt Current, an oceanic flow that shapes the climate and marine life along South America's west coast.

Humboldt's most famous publication, *Kosmos* (Cosmos: A Sketch of a Physical Description of the Universe), sought to unite all scientific knowledge into a single, harmonious vision of nature. He portrayed the Earth as a dynamic, interconnected system where physical forces and life forms are interdependent. This holistic worldview inspired later ecologists, including Darwin, who referred to Humboldt as "the greatest scientific traveler who ever lived."

Although he was widely celebrated in Europe, Humboldt also held socially progressive views. He criticized colonialism, slavery, and environmental destruction, even as he corresponded with global elites. His writings blended rigorous data with vivid, almost poetic prose, which helped communicate science to a broad public.

In addition to his discoveries, Humboldt contributed greatly to the modernization of scientific discourse. He encouraged the use of detailed graphics and maps, supported standardization of measurements, and advocated for open data sharing. By linking disciplines and cultures, Humboldt's legacy continues to influence how we study and protect the planet today *(After: Biography of Alexander Von Humboldt https://www.yourarticlelibrary.com/biographies/alexander-von-humboldt-biography-of-alexander-von-humboldt/24565).*

1. *What major concept did Humboldt help establish?*
   a. Microbiology
   b. Ecology and biogeography
   c. Newtonian physics
   d. Nuclear chemistry

2. *What was the purpose of Humboldt's Latin American expedition?*
   a. Trade negotiations
   b. Colonization
   c. Scientific exploration
   d. Military survey

3. *What is the Humboldt Current?*
   a. A river current in Europe
   b. A cultural movement
   c. An ocean flow shaping climate
   d. A political document

4. *Why is Humboldt's Kosmos significant?*
   a. It unified scientific disciplines
   b. It provided a political theory
   c. It outlined legal reforms
   d. It was a religious text

5. *How did Humboldt influence science communication?*
   a. He hid results for security
   b. He only used Latin
   c. He refused to publish
   d. He encouraged open data and visuals

6. The underlined word <u>embarked</u> could best be replaced by which of the following:
   a.began b. delayed c. refused d. ended
7. The underlined word <u>expedition</u> could best be replaced by which of the following:
   a. a short local walk b. a journey
   c. a lecture d. a vacation
8. The underlined word <u>documented</u> could best be replaced by which of the following:
   a. ignored b. guesswork c. recorded d. opposed
9. The underlined word <u>observations</u> could best be replaced by which of the following:
   a. distractions b. inventions c. calculations d. insights
10. The underlined word <u>shapes</u> could best be replaced by which of the following:
    a. destroys b. ignores c. influences d. separates

11. The underlined word <u>interconnected</u> could best be replaced by which of the following:
    a. functionally separate b. physically distant
    c. mutually linked d. culturally mixed
12. The underlined phrase <u>holistic worldview</u> could best be replaced by which of the following:
    a. seeing nature as interconnected b. a focus on personal development
    c. a religious theory d. emphasis on European science
13. The underlined word <u>progressive</u> could best be replaced by which of the following:
    a. financially driven b. outdated
    c.aggressive d. forward-thinking
14. The underlined word <u>communicate</u> could best be replaced by which of the following:
    a. convey b. distort c. distort d. conceal
15. The underlined word <u>disciplines</u> could best be replaced by which of the following:
    a. rules b. academic fields c. penalties d. offices

II. Complete the following sentences.

16. Humboldt's travels _____ him to collect vast amounts of scientific data.
    a. enabled b. enable c. were enabling d. had enable
17. While he _____ volcanoes, Humboldt also recorded atmospheric measurements.
    a. climbs b. was climbing c. had climbed d. was climb
18. Not only did he collect data, but he also _____ conclusions.
    a. drawn b. drawing c. drew d. draws
19. By the time he returned to Europe, he _____ countless observations about climate, geography, and biology.
    a. has made b. will have made
    c. had made d. was making
20. Humboldt insisted that nature should not be studied in isolation, but rather _____ a unified system.
    a. as b. like c. for d. about
21. His accounts showed how deforestation _____ affect rainfall and climate.
    a. should b. might have c. must d.could
22. The lectures Humboldt delivered in Berlin in the 1820s _____ attended by thousands.
    a. are b. were c. had been d. will be

23. His observations, which _____ carefully recorded, shaped later scientific methods.
    a. were b. are c. have d. will
24. Many of his findings continue to be cited today, proving that his influence _____ diminished.
    a. has not b. did not c. was not d. had not
25. His writings were translated widely, _____ his impact beyond Germany.
    a. extended b. extend c. extending d. having extend

TEST 17

I. Read the text and answer the questions that follow.

Hans Albrecht Bethe (1906–2005) was a German-American theoretical physicist whose pioneering research fundamentally reshaped our understanding of stellar structure and nuclear processes in stars. Born in Strasbourg (then part of Germany), Bethe studied theoretical physics in Frankfurt and Munich, earning his PhD under Arnold Sommerfeld. As a Jewish scientist during the rise of Nazism, Bethe was forced to emigrate in the 1930s. He settled in the United States, joining Cornell University, where he remained for most of his career.

In 1938, Bethe published a groundbreaking paper explaining the nuclear reactions that power stars. He demonstrated how hydrogen atoms fuse into helium under immense temperature and pressure, releasing energy – a process known as the proton-proton chain and the CNO (carbon–nitrogen–oxygen) cycle. These theories earned him the Nobel Prize in 1967 and placed him at the forefront of nuclear physics and astrophysics.

Bethe also played a central role in the development of the atomic bomb. During World War II, he led the Theoretical Division of the Manhattan Project at Los Alamos. Though proud of his scientific contributions, Bethe later expressed deep concern over the ethical implications of nuclear weapons. After the war, he became a leading advocate for arms control and international cooperation, contributing to policy debates on nuclear testing and anti-ballistic missile systems.

Bethe was also a prolific educator and mentor. At Cornell, he trained four generations of physicists, many of whom became prominent in their own sphere. He published hundreds of papers across multiple disciplines, including electrodynamics, nuclear physics, astrophysics, material physics, and hydrodynamics. Even in his 80s and 90s, he continued to publish and participate in scientific discourse.

By the time of his death in 2005, Hans Bethe was recognized as a towering figure in 20th-century physics. His legacy is not only scientific but also moral. Bethe exemplified the dual responsibility of the scientist: to pursue knowledge and to reflect on its consequences. He was a rare figure who contributed to both the creation of nuclear power and the movement to contain its destructive potential *(After: Hans Albrecht Bethe https://arxiv.org/pdf/astro-ph/0602203)*.

1. *What earned Hans Bethe the Nobel Prize?*
   a. Inventing the hydrogen bomb
   b. Discovering radioactive decay
   c. Explaining how stars produce energy
   d. Building a nuclear power plant

2. *Why did Bethe emigrate from Germany?*
   a. To avoid conscription
   b. Due to poor research opportunities
   c. To join the Manhattan Project
   d. Because of persecution of the Jewish

3. *What was Bethe's role during World War II?*
   a. Leader of theoretical research at Los Alamos
   b. A tank engineer
   c. A diplomat in Switzerland
   d. Advocate for pacifism

4. *How did Bethe's perspective on nuclear weapons change after the war?*
   a. He supported continued testing
   b. He became an advocate for arms control
   c. He avoided political topics
   d. He denied any ethical responsibility

5. *What aspect of Bethe's legacy is emphasized most in the text?*
   a. Business success
   b. His stance against technological progress
   c. His scientific and moral leadership
   d. His invention of the internet
6. The underlined word pioneering could best be replaced by which of the following:
   a. repetitive b. introductory c.groundbreaking d. misguided
7. The underlined word reshaped could best be replaced by which of the following:
   a. altered b. ignored c. concealed d. weakened
8. The underlined word groundbreaking could best be replaced by which of the following:
   a. innovative b. traditional c. trivial d. outdated
9. The underlined word immense could best be replaced by which of the following:
   a. immediate b. enormous c. moderate d. tiny
10. The underlined word forefront could best be replaced by which of the following:
    a. outskirts b. background c. retirement d. cutting edge
11. The underlined phrase ethical implications could best be replaced by which of the following:

a. financial rewards b. political arguments
c. legal gaps d. moral consequences

12. The underlined word advocate could best be replaced by which of the following
a. critic b. promoter c. bystander d. experimenter
13. The underlined word prolific could best be replaced by which of the following:
a. productive b. critical c. retired d. charismatic
14. The underlined word towering could best be replaced by which of the following
a. minor b. insignificant c. leading d.ordinary
15. The underlined word consequences could best be replaced by which of the following:
a. inheritance b. beginnings c. outcomes d. disappointment

II. Complete the following sentences.

16. The reactions he described _____ deep within stars.
a. happen b. happens c. happening d. is happening
17. Many scientists today are inspired _____ Bethe's ethical stance.
a. by b. with c. from d. on
18. He is remembered as someone _____ intellect served humanity.
a. which b. whose c. that d. whom
19. Bethe's research demonstrated how hydrogen atoms fuse into helium, _____ energy under immense pressure.
a. released b. having released c. release d. releasing
20. Bethe contributed to electrodynamics and astrophysics, as well as to fields _____ hydrodynamics and material physics.
a. such that b. so c. such as d. like to
21. Had Bethe not left Germany in the 1930s, his scientific career _____ been severely restricted.
a. will have b. would have c. might d. had
22. Bethe suggested that nuclear science _____ guided by ethical responsibility.
a. be b. is c. was d. being
23. The fact that Bethe continued publishing into his nineties shows his _____ commitment to science.
a. endures b. endure c. endurance d. enduring
24. Bethe's role at Los Alamos, _____ leading the Theoretical Division, placed him at the heart of the Manhattan Project.
a. which involved b. it was c. that was d. involving in
25. Bethe's legacy, both scientific and moral, is regarded as one of the most significant of the 20th century, _____ many still debate the full extent of his contributions.
a. because b. despite c. although d. even

TEST 18

I. Read the text and answer the questions that follow.

Barbara McClintock (1902–1992) is remembered as one of the most original minds in modern biology. Her discovery of transposable elements –"jumping genes" – transformed genetics by showing that the genome is not fixed but dynamic, able to rearrange itself in response to internal and external factors. Today, her ideas underpin much of molecular biology and biotechnology, from gene regulation to CRISPR.

Born in Hartford, Connecticut, McClintock studied at Cornell University, where she completed her bachelor's, master's, and PhD in botany. Fascinated by maize genetics, she became a pioneer in cytogenetics, linking chromosome behavior with inherited traits. Despite her achievements, Cornell denied her a faculty post, reflecting the gender barriers of her era.

After a brief period in Germany, she returned to the United States and later joined the University of Missouri. In 1941, seeking independence, she moved to Cold Spring Harbor Laboratory, where she could devote herself entirely to research. There she made her boldest discovery. While crossbreeding maize and examining kernels under the microscope, she noticed irregular color patterns that suggested genes could move within chromosomes. In 1951, she announced her findings, showing that these "jumping genes" could activate or silence other genes, reshaping observable traits. Her theory, however, challenged the accepted view of a stable genome. Many dismissed her work, and she was sometimes labeled eccentric. McClintock nevertheless persisted, trusting her observations: "I just knew I was right," she later recalled.

For decades, her research was overlooked. Only in the 1970s, when molecular biologists found similar elements in bacteria, did the scientific community recognize the importance of her discovery. Suddenly, her long-ignored work was seen as visionary. Recognition came late but decisively. In 1983, at the age of 81, McClintock received the Nobel Prize in Physiology or Medicine, becoming the first woman to win it alone. The award honored not just her discovery, but her perseverance, independence, and scientific integrity *(After: By Studying Corn, Barbara McClintock Unlocked the Secrets of Life https://www.smithsonianmag.com/smithsonian-institution/by-studying-corn-barbara-mcclintock-unlocked-secrets-life-180981555/)*

1. *Why was McClintock's discovery of transposable elements initially rejected by the scientific community?*
   a. It lacked experimental evidence
   b. It challenged established genetic theories
   c. It was published in an obscure journal
   d. It contradicted her own earlier findings

2. *What was the significance of McClintock's move to Cold Spring Harbor in 1941?*
   a. It allowed her to focus on research
   b. She became the first female professor there
   c. She collaborated with German scientists on maize genetics
   d. It marked the end of her active career

3. *How did McClintock's research method contribute to her success?*
   a. She relied on mathematical models rather than experiments
   b. She studied animal genetics instead of plant genetics
   c. She avoided laboratory work and focused on theory
   d. She used meticulous crossbreeding and cytogenetic analysis

4. *Why is McClintock's Nobel Prize in 1983 considered historically significant?*
   a. It was awarded jointly with Otto Hahn
   b. It was the first Nobel Prize ever given for plant biology
   c. She was the first woman to win the Physiology/Medicine Prize alone
   d. It marked the last Nobel Prize awarded for genetics

5. *What personal quality of McClintock is highlighted by her statement, "I just knew I was right… nobody can turn you off no matter what they say"?*
   a. Arrogance
   b. Intellectual humility
   c. Persistence and confidence
   d. Preference for teamwork

6. The underlined word <u>underpin</u> could best be replaced by which of the following:
   a. complicate b. underestimate c.oppose d. support
7. The underlined word <u>despite</u> could best be replaced by which of the following:
   a. during b. because c.regardless of d. after
8. The underlined phrase <u>denied her a faculty post</u> could best be replaced by which of the following:
   a. offered her a job b. refused her a position
   c. gave her recognition d. promoted her immediately
9. The underlined word <u>devote</u> could best be replaced by which of the following:
   a. dedicate b. avoid c. divide d. replace
10. The underlined word <u>findings</u> could best be replaced by which of the following
   a. results b. failures c. beliefs d. questions
11. The underlined word <u>challenged</u> could best be replaced by which of the following:
   a. accepted b. questioned c. supported d. denied

12.The underlined word visionary could best be replaced by which of the following:

a. ordinary b. innovative c. outdated d. highlighted

13.The underlined word perseverance could best be replaced by which of the following:

a. avoidance b. laziness c. hesitation d. persistence

14.The underlined word independence could best be replaced by which of the following:

a. autonomy b. dependence c. obedience d. connection

15.The underlined word integrity could best be replaced by which of the following

a. talent b. popularity c. ethics d. education

II. Complete the following sentences.

16. She not only challenged existing theories _____ proved them wrong.

a. and b. also c. but d. but also

17. She preferred to work alone rather _____ lead a large team.

a. than b. then c. or d. and

18. Nobel recognition came long after she _____ her greatest work.

a. have done b.had done c. has done d. was done

19.Her research findings were initially dismissed, _____ they later transformed genetics.

a. unless b. though c. so d. since

20. It was Barbara McClintock's persistence, not external approval, _____ kept her research alive.

a. which b. what c. that d. who

21. Had Cornell offered McClintock a faculty post, her career _____ very differently.

a. may proceed b. might have proceeded

c. would proceed d. had proceeded

22.Her discovery of transposable elements _____ revolutionary by modern scholars.

a. considered b. has considered c. is considered d. considers

23.She received the Nobel Prize in 1983, becoming the first woman to win _____ award alone in Physiology or Medicine.

a. – b. an c. a d. the

24.She preferred solitude in the lab to _____.

a. teaching students or writing reports b. to teach students and writing reports

c. teach students or wrote reports d. teaching students and to write reports

25. It is essential that her work __ acknowledged in historical accounts of genetics.

a. is b. was c. be d. being

TEST 19

I. Read the text and answer the questions that follow.

John Clive Ward (1924–2000) was a brilliant but modest theoretical physicist whose work helped lay the foundation of modern quantum physics.

Ward was born in East Ham, London, and studied at Oxford University, where he worked under physicist Maurice Pryce. Although he was not a prolific writer, Ward published a number of highly influential papers. One of his most famous contributions is the Ward Identity, a key result in quantum electrodynamics (QED). This principle helps remove infinities from calculations in particle physics and ensures that equations describing interactions between particles remain mathematically consistent. Today, the Ward Identity is a standard part of quantum field theory.

In addition to his work on QED, Ward also made early contributions to quantum entanglement. Together with Pryce, he published one of the first theoretical studies of two photons produced during electron-positron annihilation. This work predicted how pairs of particles could remain connected, even when separated by long distances – a concept that would later become central in quantum mechanics and quantum information science.

Throughout his career, Ward worked in broad range of physical theories. He collaborated with Nobel laureate Abdus Salam on theories about weak nuclear forces, and he also studied statistical mechanics, including the behavior of electron gases and superfluid helium. His research was known for its clarity and accuracy.

Ward's scientific knowledge was also applied to national defense. In 1955, he joined the UK Atomic Weapons Research Establishment at Aldermaston, where he led a theoretical group working on hydrogen bomb designs. His understanding of complex equations helped improve the accuracy of nuclear models.

Although Ward received many honours, including the Dirac Medal, Hughes Medal, and election to the Royal Society, he chose a quiet academic life. He preferred to focus on his own ideas rather than seek fame or influence. He worked at several universities around the world, including the Institute for Advanced Study in Princeton and Macquarie University in Sydney. Remarkably, he never supervised PhD students and avoided the administrative side of academic life. Though his name is not widely known outside the scientific community, Ward's legacy lives on in the tools, methods, and ideas that physicists use every day *(After: John Ward: Memoir of a Theoretical Physicist https://arxiv.org/pdf/2007.16199)*

1. *Why is John Ward considered important in modern physics?*
   a. He was a famous inventor of lab equipment
   b. He helped build quantum field theory
   c. He taught hundreds of students
   d. He wrote many popular science books

2. *What is the Ward Identity used for?*
   a. To calculate the weight of atoms
   b. To measure gravity
   c. To solve problems with equations in particle physics
   d. To find new elements

3. *What was special about Ward's work on photons?*
   a. He discovered how light bends in space
   b. He proved photons have mass
   c. He studied how pairs of photons can remain connected
   d. He invented a new type of laser

4. *Why did Ward's research group at Aldermaston matter?*
   a. They worked on military defense projects
   b. They studied animals in space
   c. They created new farming methods
   d. They produced science textbooks

5. *What made Ward's academic career different from others?*
   a. He became a politician
   b. He started a university
   c. He refused to do any research
   d. He avoided fame and worked alone

6. The underlined word <u>brilliant</u> could best be replaced by which of the following:
   a. intelligent b. dim c. average d. dull
7. The underlined word <u>modest</u> could best be replaced by which of the following:
   a. arrogant b. humble c. famous d. proud
8. The underlined word <u>foundation</u> could best be replaced by which of the following:
   a. base b. roof c. decoration d. surface
9. The underlined word <u>consistent</u> could best be replaced by which of the following:
   a. unstable b. random c. chaotic d. regular
10. The underlined word <u>predicted</u> could best be replaced by which of the following:
   a. foresaw b. ignored c. guess d. delayed
11. The underlined word <u>clarity</u> could best be replaced by which of the following:
   a. secrecy b. confusion c.clearness d. noise
12. The underlined word <u>accuracy</u> could best be replaced by which of the following:
   a. mistake b. precision c. doubt d. vagueness

13.The underlined word honours could best be replaced by which of the following:
a. punishments b.awards c. duties d. challenges
14.The underlined word remarkably could best be replaced by which of the following:
a. surprisingly b. rarely c. poorly d. typically
15.The underlined word avoided could best be replaced by which of the following:
a. met b. confronted c. faced d. evaded

II. Complete the following sentences.

16. John Ward _____ in London in 1924.
a. born b. is born c. was born d. has been born
17. Although he _____ few papers, they were highly important.
a. write b. wrote c. has written d. was writing
18. He never _____ awards for popularity, only for science.
a. receives b. received c. has received d. receiving
19.If more people knew his story, they _____ see his true impact.
a. can b. will c.would d. must
20.By the time he moved to Sydney, he _____ already published several groundbreaking papers.
a. had b.has c. was having d. will have
21.If Ward _____ more interested in publicity, his name might have been more widely known outside physics.
a. were b. was c. had been d. is
22.Although he collaborated with many leading scientists, he preferred _____ independently.
a. to work b. working c. work d. having worked
23.Rarely ___ a scientist so respected for precision choose such a modest lifestyle.
a. has b. did c. do d. had
24.The fact that Ward never supervised PhD students remains unusual, _____ his long academic career.
a. given b. but c. although d. because
25.His theories, being _____ explained, became standard tools in quantum field theory.
a. carefully b. careful c. care d. be careful

TEST 20

I. Read the text and answer the questions that follow.

Marie Curie (1867–1934) remains one of the most remarkable figures in modern science, not only for her pioneering research in radioactivity but also for her role as an educator and mentor. Born in Warsaw and later working in Paris, she overcame poverty, political restrictions, and discrimination against women to transform physics and chemistry.

Curie's most famous scientific accomplishments include the discovery of two new elements, polonium and radium, and the development of methods to isolate and measure radioactive substances. Her rigorous work laid the foundation for nuclear physics and medical applications such as radiation therapy. She became the first person, and remains the only woman, to win Nobel Prizes in two different sciences – physics and chemistry.

Yet her influence extended far beyond her own experiments. Curie believed that science had to be pursued with honesty, precision, and a sense of moral responsibility. She trained many young researchers, insisting on careful measurement, transparency of results, and persistence in the face of uncertainty. Her laboratory became a model of scientific integrity, where intellectual curiosity and ethical responsibility were inseparable.

During World War I, Curie applied her scientific expertise to humanitarian needs. She organized mobile X-ray units for battlefield hospitals and personally trained medical staff, including young students, to use the machines safely. In doing so, she not only saved lives but also demonstrated how scientific knowledge could be applied directly to urgent social problems.

Curie's life also revealed the challenges of balancing personal commitments with professional ambition. She raised two daughters while maintaining an intense research schedule, often working in conditions that endangered her health due to prolonged exposure to radiation. Her struggles with illness, as well as with public scrutiny, show the personal costs of groundbreaking science. Still, she remained committed to discovery and teaching until her final years.

Her legacy is therefore twofold. Scientifically, she changed our understanding of matter and energy, and her discoveries continue to underpin modern physics, chemistry, and medicine. Culturally, she demonstrated that a scientist's duty extends beyond the laboratory to education, ethical practice, and the service to society. Curie's example shows that scientific progress requires not only intelligence and creativity, but also resilience, mentorship, and moral courage *(After: The Elements of Marie Curie by Dava Sobel review – the great scientist who created her own school https://www.theguardian.com/books/2024/nov/11/the-elements-of-marie-curie-by-dava-sobel-review-the-great-scientist-who-created-her-own-school)*

1. *What made Marie Curie unique among Nobel laureates?*
   a. She was the first scientist to work in Paris
   b. She won prizes in both physics and chemistry
   c. She developed nuclear weapons
   d. She trained only medical doctors

2. *What role did Curie play during World War I?*
   a. She discovered new radioactive elements
   b. She moved her lab to the United States
   c. She provided medical equipment and trained staff
   d. She developed a cure for radiation sickness

3. *Which of the following best describes Curie's laboratory environment?*
   a. A place of secrecy and competition
   b. A factory for producing radium
   c. A space where ethics and research combined
   d. A hospital for training doctors

4. *What personal challenge most directly affected Curie's health?*
   a. Exposure to radioactive materials
   b. Stress from teaching
   c. Long diplomatic missions
   d. Frequent travel to Warsaw

5. *What is presented as Curie's lasting legacy?*
   a. Fame and wealth
   b. Nuclear power plants
   c. Political leadership
   d. Knowledge and moral responsibility in science

6. The underlined word <u>remarkable</u> could best be replaced by which of the following:
   a. ordinary b. exceptional c. typical d. unimportant
7. The underlined word <u>accomplishments</u> could best be replaced by which of the following:
   a. mistakes b. shortcomings c. estimations d. achievements
8. The underlined word <u>transparency</u> could best be replaced by which of the following:
   a. openness b. secrecy c. dishonesty d. bias

9. The underlined phrase urgent could best be replaced by which of the following:
   a. optional b. minor c. pressing d. trivial
10. The underlined phrase personal commitments could best be replaced by which of the following:
   a. social duties b. experiments c. awards d. discoveries
11. The underlined word endangered could best be replaced by which of the following:
   a. protected b. saved c. threatened d. healed
12. The underlined word scrutiny could best be replaced by which of the following:
   a. criticism b. protection c. isolation d. secrecy
13. The underlined word resilience could best be replaced by which of the following:
   a. weakness b. endurance c. simplicity d. fragility
14. The underlined word mentorship could best be replaced by which of the following:
   a. control b. secrecy c. separation d.guidance
15. The underlined phrase moral courage could best be replaced by which of the following:
   a. financial aid b. ethical bravery
   c. intellectual curiosity d. social politeness

II. Complete the following sentences.

16. Marie Curie _____ in Warsaw in 1867.
   a. born b. had born c. has born d. was born
17. By the time she won her second Nobel Prize, she _____ already discovered two elements.
   a. has b. had c. was having d. will have
18. It was not until 1911 _____ Curie was finally recognized with her second Nobel Prize, this time in Chemistry.
   a. which b. when c. what d. how
19. Not only _____ radium, but she also measured its properties.
   a. she discovered b. did she discover
   c.discovered she d.has she discovered
20. Despite _____ many barriers, she succeeded in her career.
   a. facing b. face c. faced d. faces
21. Her laboratory became a place where science and ethics _____ inseparable.
   a. are b. had been c. have been d. were
22. She helped young women _____ careers in science.
   a. to start b. starting c. have started d. started

23. If Curie _____ alive today, she would likely support girls in STEM.
    a. is b. was c. were d. be
24. Curie was admired not only for her knowledge but also for her _____.
    a. determined b. determine c.determiner d. determination
25. Curie's legacy, both scientific and moral, remains influential, _____ the many obstacles she faced as a woman in science.
    a. in case of b. due to c.in spite of d. so that

ANSWER KEY

Test 1. James Lovelock

1.b	6.c	11.d	16.c	21.b
2.c	7.b	12.c	17.b	22.a
3.b	8.d	13.b	18.b	23.b
4.c	9.c	14.a	19.b	24.b
5.c	10.b	15.a	20.d	25.a

Test 2. Henri Poincaré

1.b	6.b	11.a	16.b	21.c
2.a	7.a	12.b	17.a	22.b
3.b	8.a	13.a	18.d	23.c
4.b	9.d	14.d	19.a	24.b
5.d	10.c	15.c	20.a	25.b

Test 3. Daniel Augusto da Silva

1.d	6.c	11.d	16.b	21.a
2.c	7.c	12.b	17.a	22.a
3.b	8.d	13.a	18.b	23.b
4.a	9.c	14.b	19.c	24.b
5.c	10.a	15.d	20.b	25.c

Test 4. Murray Gell-Mann

1.b	6.c	11.c	16.a	21.c
2.c	7.b	12.d	17.c	22.c
3.d	8.c	13.a	18.b	23.d
4.c	9.c	14.a	19.a	24.c
5.b	10.d	15.b	20.a	25.a

Test 5. Alfred Russel Wallace

1.c	6.b	11.b	16.b	21.a
2.c	7.a	12.c	17.c	22.a
3.a	8.b	13.a	18.a	23.b
4.b	9.c	14.c	19.b	24.d
5.d	10.d	15.b	20.c	25.b

Test 6. Carl Linnaeus

1.c	6.b	11.b	16.c	21.b
2.b	7.a	12.c	17.d	22.c
3.c	8.c	13.a	18.a	23.a
4.d	9.b	14.a	19.c	24.d
5.b	10.d	15.d	20.b	25.a

Test 7. Charles Darwin

1.b	6.c	11.b	16.c	21.d
2.c	7.b	12.b	17.a	22.c
3.a	8.d	13.a	18.b	23.a
4.b	9.a	14.c	19.c	24.b
5.d	10.c	15.d	20.b	25.d

Test 8. Isaac Newton

1.c	6.c	11.b	16.c	21.d
2.b	7.b	12.c	17.d	22.b
3.c	8.a	13.a	18.a	23.b
4.d	9.c	14.c	19.a	24.b
5.a	10.d	15.d	20.c	25.a

Test 9. Chandrasekhara Venkata Raman

1.b	6.a	11.c	16.c	21.d
2.a	7.b	12.d	17.b	22.a
3.b	8.a	13.d	18.c	23.b
4.d	9.c	14.a	19.a	24.c
5.c	10.a	15.b	20.a	25.a

Test 10. James Chadwick

1.c	6.b	11.c	16.a	21.b
2.b	7.c	12.b	17.a	22.a
3.b	8.b	13.a	18.b	23.a
4.d	9.a	14.a	19.a	24.d
5.a	10.b	15.b	20.d	25.c

Test 11. Richard Feynman

1.b	6.b	11.a	16.a	21.a
2.b	7.b	12.c	17.a	22.c
3.c	8.b	13.b	18.d	23.c
4.c	9.c	14.d	19.b	24.b
5.a	10.d	15.b	20.c	25.a

Test 12. Steven Weinberg

1.a	6.b	11.d	16.a	21.b
2.b	7.b	12.b	17.b	22.c
3.c	8.c	13.b	18.a	23.d
4.c	9.d	14.a	19.b	24.d
5.b	10.a	15.c	20.c	25.c

Test 13. Lise Meitner

1.b	6.a	11.b	16.c	21.a
2.c	7.b	12.a	17.a	22.b
3.c	8.d	13.a	18.d	23.c
4.b	9.a	14.c	19.b	24.b
5.d	10.c	15.d	20.b	25.d

Test 14. Augusta Ada Byron

1.b	6.c	11.b	16.b	21.a
2.c	7.a	12.b	17.a	22.b
3.c	8.c	13.c	18.a	23.d
4.b	9.b	14.d	19.d	24.a
5.a	10.d	15.a	20.b	25.a

Test 15. Edward Jenner

1.a	6.b	11.a	16.b	21.b
2.d	7.d	12.c	17.a	22.b
3.b	8.c	13.d	18.a	23.a
4.c	9.b	14.c	19.d	24.c
5.c	10.a	15.b	20.c	25.a

Test 16. Alexander von Humboldt

1.b	6.a	11.c	16.a	21.d
2.c	7.b	12.a	17.b	22.b
3.c	8.c	13.d	18.c	23.a
4.a	9.d	14.a	19.c	24.a
5.d	10.c	15.b	20.a	25.c

Test 17. Hans Albrecht Bethe

1.c	6.c	11.d	16.a	21.b
2.d	7.a	12.b	17.a	22.a
3.a	8.a	13.a	18.b	23.d
4.b	9.b	14.c	19.d	24.a
5.c	10.d	15.c	20.c	25.c

Test 18. Barbara McClintock

1.b	6.d	11.b	16.d	21.b
2.a	7.c	12.c	17.a	22.c
3.d	8.b	13.d	18.b	23.d
4.c	9. a	14.a	19.b	24.a
5.c	10.a	15.c	20.c	25.c

Test 19. John Clive Ward

1.b	6.a	11.c	16.c	21.c
2.c	7.b	12.b	17.b	22.a
3.c	8.a	13.b	18.b	23.b
4.a	9.d	14.a	19.c	24.a
5.d	10.a	15.d	20.a	25.a

Test 20. Marie Curie

1.b	6.b	11.c	16.d	21.d
2.c	7. d	12.a	17.b	22.a
3.c	8. a	13.b	18.b	23.c
4.a	9. c	14.d	19.b	24.d
5.d	10.a	15.b	20.a	25.c

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НАЦІОНАЛЬНА АКАДЕМІЯ НАУК УКРАЇНИ

ЦЕНТР НАУКОВИХ ДОСЛІДЖЕНЬ ТА ВИКЛАДАННЯ ІНОЗЕМНИХ МОВ

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Миронюк Т. Мова наукових відкриттів: тести з академічної англійської для аспірантів. The Language of Scientific Discovery: Academic English Tests for PhD Students. – Навчальний посібник. – К.: Видавниче підприємство "ЕДЕЛЬВЕЙС," 2026. – 76 с.

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