For each question, the answer choice E. NOTA means None Of The Above. Good luck!

1. What man is considered to be the founder of mathematical physics?
    A. Edward Witten
    B. Albert Einstein
    C. Al-Biruni
    D. Christiaan Huygens
    E. NOTA

2. Which of the seven Millennial Problems deals with an area in physics (specifically fluids)?
    A. Yang-Mills Problem
    B. Hodge Conjecture
    C. Birch and Swinnerton-Dyer Conjecture
    D. Navier-Stokes Equation
    E. NOTA

3. What mathematician created a new way to analyze mechanics, now named for him, by transforming Newtonian mechanics into a branch of analysis with the use of variational calculus?
    A. Joseph-Louis Lagrange
    B. Pierre-Simon Laplace
    C. Gottfried Wilhelm Leibniz
    D. Adrien-Marie Legendre
    E. NOTA

4. What ancient mathematician is credited for explaining the principle of the lever and the fulcrum, saying “Give me a place to stand, and I will move the world?”
    A. Eratosthenes
    B. Pythagoras
    C. Archimedes
    D. Eudoxus
    E. NOTA

5. What mathematician played a leading role in developing the branch of mathematical physics, with extensive work in differential equations including discovering his namesake “transform” as well as his namesake differential operator?
    A. Joseph-Louis Lagrange
    B. Pierre-Simon Laplace
    C. Gottfried Wilhelm Leibniz
    D. Adrien-Marie Legendre
    E. NOTA

6. Although most well-known for his 23 problems in mathematics, David Hilbert also contributed to physics. He published "The Foundations of Physics" in which he gave an axiomatic derivation of the field equations of gravitation, a theory he came up with along with what other mathematician and physicist?
    A. Isaac Newton
    B. William Herschel
    C. Albert Einstein
    D. Andre Fuzfa
    E. NOTA

7. What mathematician, born in 1629, is well-known for inventing the pendulum clock, discovering the formulas for the laws of elastic collision, and discovering the shape of the rings on Saturn?
    A. Christiaan Huygens
    B. Jean le Rond d'Alembert
    C. Robert Hooke
    D. Isaac Newton
    E. NOTA

8. What mathematician created his namesake "principal function," that brings together math, optics, and mechanics, and which also helped to form the wave theory of light? He also had a natural aptitude for languages.
    A. Christiaan Huygens
    B. William Hamilton
    C. James Maxwell
    D. Robert Hooke
    E. NOTA

9. What is the name of the process, named for a member of Napoleon's expedition to Egypt, which allows modern amplification systems to create waves of sound by a combination of other, simpler, waves?
    A. Newton's Process
    B. Rosetta Amplification
    C. Hall's Algorithm
    D. Fourier Transform
    E. NOTA

10. Albert Einstein's birthday falls on what mathematical day?
    A. e day, 1/27 (or 27/1, as is the notation in many countries outside of the US)
    B. Pi day, 3/14
    C. Tau day, 6/28
    D. Fibonacci day, 11/23
    E. NOTA

11. Carol heats up a mug of cocoa to 170 degrees Fahrenheit, and accidentally leaves it on the counter for 21 minutes. Knowing Joanne likes to keep the room at a frigid 55 degrees, Carol wants to know exactly how cold her hot chocolate is when she returns to it. What mathematician discovered the law used to solve this problem?
    A. Gottfried Wilhelm Leibniz
    B. Joseph-Louis Lagrange
    C. Leonhard Euler
    D. Edward Witten
    E. NOTA

12. Although he founded statistical mechanics (a branch of mathematical physics in which physical phenomena are analyzed through the probabilities of different states of particles in a system) on the basis of the work of two other physicists, what mathematical physicist actually coined the phrase? The "free energy" variable in a chemical reaction equation is also named for him.
    A. James Maxwell
    B. Ludwig Boltzman
    C. Enrico Fermi
    D. Josiah Willard Gibbs
    E. NOTA

13. What female mathematician, in addition to important contributions to abstract algebra, wrote a theorem in physics explaining the connection between symmetry and conservation laws? Albert Einstein described her as the greatest female mathematician in history.
    A. Sophie Germain
    B. Mary Somerville
    C. Ada Lovelace
    D. Emmy Noether
    E. NOTA

14. What mathematician, after writing several treatises in which he rigorously defined many theorems in calculus, was the first to introduce the concept of studying forces across continuous materials instead of individual particles, leading to the creation of the branch of physics known as continuum mechanics?
    A. Augustin-Louis Cauchy
    B. Adrien-Marie Legendre
    C. Pierre Girard
    D. Evariste Galois
    E. NOTA

15. Leonhard Euler worked in many different fields during his lifetime, including graph theory, number theory, and music. Which of the following contributions to physics were by Euler?
    A. The principle of superposition
    B. The equations for inviscid flow
    C. The corpuscular theory of light
    D. The law of elasticity
    E. NOTA

16. Like Euler, Carl Friedrich Gauss is known as one of the greatest mathematicians of all time and made contributions to many different fields, including some in physics. Which of these discoveries was made by Gauss?
    A. An equation relating net flux of an electrical field to the enclosed electric charge
    B. An equation relating electrical current to the rate of voltage increase in a capacitor
    C. An equation relating the electrical charge of a particle to its force of magnetic attraction
    D. An equation relating the charge density of the surface of a conductor to the electrical field inside the conductor
    E. NOTA

17. Since the 17th century, mathematicians and physicists have come up with four most well-known theories to explain the nature of light. Which of the following gives the correct order of the publishing of these four theories, from oldest to most recent?
    A. Wave Theory, Corpuscular Theory, Electromagnetic Theory, Quantum Theory
    B. Electromagnetic Theory, Wave Theory, Corpuscular Theory, Quantum Theory
    C. Wave Theory, Electromagnetic Theory, Corpuscular Theory, Quantum Theory
    D. Corpuscular Theory, Wave Theory, Electromagnetic Theory, Quantum Theory
    E. NOTA

18. What physicist was the first woman to win the Abel prize, "for her pioneering achievements in geometric partial differential equations, gauge theory and integrable systems, and for the fundamental impact of her work on analysis, geometry and mathematical physics?"
    A. Karen Uhlenbeck
    B. Maryan Mirzakhani
    C. Christine Darden
    D. Ingrid Daubechies
    E. NOTA

19. Which of the following physicists were not a part of the Manhattan project?
    A. Albert Einstein
    B. J. Robert Oppenheimer
    C. Leo Szilard
    D. Klaus Fuchs
    E. NOTA

20. Which of the following correctly states one of Johannes Kepler's three laws of planetary motion?
    A. All planets move in elliptical orbits, counterclockwise as viewed from the Sun's north pole
    B. A line that connects a planet to the sun sweeps out arcs of equal lengths in equal times
    C. The square of the orbital period of any planet is proportional to the cube of the major axis of its orbit
    D. All planets move in elliptical orbits, clockwise as viewed from the Sun's north pole
    E. NOTA

21. This mathematician claimed to be able to dam the Nile, but when he failed he feigned madness to avoid dying for his failure. While locked away in a dark room (for his own protection) with only a tiny hole for light, he realized light moved in straight lines. He later performed numerous experiments to support his ideas, and wrote the *Kitab al-Manazir*, which influenced the study of optics around the world. Who was this man?
    A. Al-Biruni
    B. Omar Khayyam
    C. Thabit Ibn Qurra
    D. Ibn Al-Haytham
    E. NOTA

22. William Rowan Hamilton, possibly most well known for inventing the quaternion, attended and taught at which of the following famous colleges?
    A. King's College in London
    B. University of Cambridge
    C. Trinity College in Dublin
    D. Princeton University
    E. NOTA

23. What was the name of the first logically consistent, modern formulation of quantum theory, developed by Werner Heisenberg, in which its namesakes were used to represent the physical quantities and to predict the outcome of physical measurements?
    A. Series Mechanics
    B. Matrix Mechanics
    C. Wave Mechanics
    D. Fourier Mechanics
    E. NOTA

24. What mathematician is considered to be the first ever physicist, proposing that materials were made out of a single, fundamental building block (although he thought it was water, not atoms), and even gave the field of physics its name?
    A. Dephysis
    B. Thales
    C. Eudoxus
    D. Archytas
    E. NOTA

25. What female mathematician did extensive work on partial differential equations, including Hilbert's nineteenth problem, provided the first rigorous proof of the convergence of a finite difference method for the equations of viscous flow, and was even considered for the Fields Medal in 1958?
    A. Olga Ladyzhenskaya
    B. Emmy Noether
    C. Sophie Germain
    D. Emilie du Chatelet
    E. NOTA

26. What mathematician solved the "Conjecture of the Ten Martinis," concerning mathematical operators in quantum physics, and later won the Fields Medal in 2014 for work in dynamical systems theory?
    A. Artur Avila
    B. Svetlana Jitomirskaya
    C. Barry Simon
    D. Maryam Mirzakhani
    E. NOTA

27. Which of the following stories of Isaac Newton, an apple, and the theory of gravity is accepted to be true, based on historical documentation?
    A. Newton was hit on the head with an apple while sitting under an apple tree, leading him to wonder why the apple fell straight down
    B. A friend told Newton of being hit on the head with an apple while sitting under an apple tree, leading Newton to wonder why the apple fell straight down
    C. Newton saw an apple fall from a tree, leading him to wonder why the apple fell straight down
    D. A friend, after seeing an apple fall from a tree, wondered to Newton why the apple fell straight down
    E. NOTA

28. Leonardo da Vinci is famous for applying math both to his paintings and his music, as well as to many visionary mechanical designs. Which of the following was not one of da Vinci's designs?
    A. A two-wheeled vehicle sometimes thought of as the precursor to the modern-day bicycle
    B. A humanoid automaton intended to serve as a knight
    C. An alarm clock, using running water to activate a mechanism that lifted the person's legs into the air
    D. A "one-man orchestra" contraption, combining a harpsichord, an organ, and a viola
    E. NOTA

29. Jean le Rond d'Alembert was a mathematician and physicist, whose accomplishments include creating a formula for obtaining solutions to the wave equation as well as creating the d'Alembert operator while analyzing the vibration of strings. What is the origin of his first name, Jean le Rond?
    A. A small river in his hometown
    B. The name of a church, on the steps of which his parents abandoned him as a baby
    C. It was his mother's maiden name, which he assumed after his father's name became ill-regarded as a result of the political turmoils throughout France
    D. A moon of Mercury, which was suspected to exist at the time he chose the name
    E. NOTA

30. Robert Hooke discovered a formula relating the force of a spring to the length it is pulled in 1660. What anagram, translating roughly to "As the extension, so the force," did he use to first announce his findings?
    A. Cceghiiknnprs
    B. Ceiiinosssttuv
    C. Aceeefinnooorssstx
    D. Abceeefhhimoorttuwyy
    E. NOTA