

IMSANITY

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Tossups

- (1) The Chapman-Enskog equation can be used to estimate this quantity if the collision diameter, maximum energy of attraction, and collision integral are known. The Grashof number is inversely proportional to the square of this quantity, and rhyolitic lavas have higher values for this than basaltic lavas. In the CGS system, its kinematic variety is measured in stokes, while its * dynamic form is measured in poise. Newtonian fluids have a constant value of this property. FTP, name this quantity that is studied in rheology, measured in Pascal seconds, a substance's resistance to flow.

ANSWER: Viscosity

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- (2) These people were given permission to settle in empty land by the local ruler, but were expelled after flaying his daughter. These people spent fifty years as a tributary before rebelling along with the Acolhuas and Tepanecs in what was called the Triple Alliance. After that rebellion by * Itzcoatl, these people built their own empire by conquering other lands, although they were never able to conquer Tlaxcala before their 1521. These people, notorious for human sacrifice, used a place where they found an eagle with a snake in its mouth on a cactus to establish their capital of Tenochtitlan. Annexed into the Spanish empire after being conquered by Cortez, FTP, name this Mesoamerican people, of whom Moctezuma was emperor.

ANSWER: Aztecs or Mexica [Pronounced: "Meh-SHEE-kah"]

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- (3) Riemann's namesake type of this figure is another term for the extended complex plane, and Kepler's Conjecture concerns the most efficient way to pack these. For triangles embedded on this surface, the properties of similarity and congruence coincide, since area is proportional to the angular excess. This figure * maximizes volume for a given surface area, the latter of which is four times the area of one of its great circles. The collection of points in 3-dimensional-space equidistant from the center is, FTP, this higher-dimensional analog of a circle.

ANSWER: sphere

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- (4) In Chapter 17 of Matthew, it is told that he was the personification of the prophet Elijah, although in Chapter 1 of John, he denied being Elijah or the Messiah. He was the son of Zachariah and Elizabeth, who was sterile, and when she was six months pregnant, this man jumped for joy while still in utero. In Eastern Orthodox tradition, he is known as the Forerunner, and he was the first person to acknowledge * Jesus as the Messiah. He was imprisoned at Machaerus, where he was beheaded, supposedly at the request of Salome, who ordered his head presented on a platter. Put to death by Herod, FTP, name this cousin of Jesus who preached and cleansed people in the river Jordan.

ANSWER: John the Baptist (accept John the Forerunner before it is mentioned)

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- (5) In one of this man's works, a woman nurses a count's child while she lets her own son starve with a laborer's family. In another, a butterfly fails to find a wife. In addition to *The Butterfly* and *Anne Lisbeth*, in one of this man's stories, a piece of a mirror enchanted by a demon falls in Kay's eye and he goes to be with the titular character while his best friend Gerda goes to look for him. In addition to * "The Snow Queen", the titular character of another of his works turns into sea foam after being rejected by a prince for whom she had lost her voice and painfully grown legs. FTP, name this Danish author of "The Emperor's New Clothes", "The Ugly Duckling", and "The Little Mermaid".

ANSWER: Hans Christian Andersen

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- (6) One of his latest works was a portrait of Emmanuel Joseph Sieyes, and he also depicted Antoine Lavoisier with his wife in another painting. More famously, he depicted an assembly of people, with the focus on a central figure standing on a table with one hand raised in* *The Tennis Court Oath*. He also depicted a French revolutionary stabbed in his bathtub in addition to creating a work with three arches in the background with three young men receiving swords. FTP, name this French artist who created *The Death of Marat* and the *Oath of the Horatii*.

ANSWER: Jacques Louis David

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- (7) Upon learning that this author wrote his second novel in three weeks, Truman Capote retorted, “That’s not writing, that’s typing!” One of this author’s novels begins with Jack Duluoz at the top of the mountain Hozomeen and includes the character of Irwin Garden, a thinly-veiled depiction of Allen * Ginsberg. In that work, *Desolation Angels*, the author directly refers to another of his novels, *Dharma Bums*. Most famous, though, is his novel which follows Sal Paradise’s adventures with Dean Moriarty as they travel to Denver, Frisco, and Mexico City. Credited with coining the term “Beat Generation” is, FTP, this author of *On the Road*.

ANSWER: Jack Kerouac

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- (8) These can occur in Wadati-Benioff zones. Although these rarely occur in the middle of continental plates, a notable series of them occurred in New Madrid,* now part of Missouri. The depth to which these can occur is limited by the increasing temperature and loss of rigidity in deeper rock. Most of their activity can be found in the Ring of Fire due to the collision of crustal plates. These can create tsunamis when their epicenters are below bodies of water. FTP, name these events that result in the release of energy through the earth’s crust and create seismic waves, usually along fault lines.

ANSWER: earthquakes

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- (9) In 2004, Marcus and Tardos proved a conjecture of Stanley and Wilf on the number of these avoiding a certain pattern. These can be classified as even or odd depending on the number of transpositions needed to express them. One is called a derangement if no object occupies its original position. A random one can be generated with the Knuth * shuffle. There are six of these for the letters ABC, 120 for the numbers one through five, and 5040 for seven people standing in line. A reordering of a set of objects is, FTP, this mathematical structure, often paired with combinations.

ANSWER: permutations

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- (10) **The Mount Kembla one of these occurred in 1902 in Australia, and in 2003 China earned the distinction of having the most fatalities related to this kind of event. The Monongah one of these was the worst in American history, and one of these occurred at *** Massey Energy's Upper Big Branch facility in West Virginia in 2010. Later that year, another of these took place near Copiapó, Chile, in which thirty-three people were trapped underground for sixty-nine days. FTP, name this kind of industrial disaster, which includes exposure to poisonous gases, explosions, and cave-ins.

ANSWER: mine accident (accept clear-knowledge equivalents)

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- (11) **This city was originally named Terminus, but it adopted its current name in 1847. In 1994, it became sister cities with Ancient Olympia. In the early 1990s, its public transportation system, MARTA, received upgrades totaling \$350 million, and that system's Red/Gold line serves the Hartsfield-Jackson * airport. In between its Philips Arena and Centennial Olympic Park is the headquarters of CNN, and on the north side of that Park is the World of Coca-Cola. The primary hub of Delta Airlines and the world's busiest passenger airport are in, FTP, this capital city of Georgia.**

ANSWER: Atlanta

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- (12) **The eukaryotic kind of these organelles are able to recognize the Kozak box. These organelles in bacterial and eukaryotic cells are different in size and have different structures, so antibiotics such as streptomycin can be used to inhibit the function of these organelles exclusively in prokaryotes. Their A site binds to an amino-acyl tRNA, whereas the P site binds to a peptidyl-tRNA, when they link together * amino acids to form proteins as they read mRNA transcribed by the nucleus. Floating free in the cytoplasm or attached to the rough endoplasmic reticulum, FTP, name these organelles that perform translation.**

ANSWER: ribosomes

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- (13) **One of this artist's works shows a divine hand in the upper right corner. In that work, the titular king is told that his "kingdom is given to the Medes and Persians." In addition to *Belshazzar's Feast*, this artist also created an etching featuring Christ as the central figure with his left hand up while he gestures for a woman with her child to approach entitled * *The Hundred Guilder Print*. He also created a scene in which a woman with a chicken hanging from her waist stands near William van Ruytenburch and Franz Banning Cocq. FTP, name this Dutch artist famous for his *Anatomy lesson of Dr. Nicolaes Tulp* as well as *The Night Watch*.**

ANSWER: Rembrandt Harmenszoon van Rijn (accept either underlined part)

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- (14) **One of these asks "Why is my verse so barren of new pride", while another claims that it will outlast marble and "the gilded monuments of princes". Yet another describes a woman who "treads on the ground" and whose hair is like "black wires". Dedicated to T.H., some of these are written to a * "Young Gentleman" and a "Dark Lady". It is said that "rough winds may shake the gentle buds of May, And summer's lease hath all too short a date" in the eighteenth of these, which opens "Shall I compare thee to a summer's day?" FTP, name these fourteen-line poems by a notable English writer.**

ANSWER: Shakespearean sonnets (Accept equivalents. Prompt on partial answer)

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- (15) **When the royal Governor of Massachusetts wrote letters plotting to take away colonial rights, this man sent them to America, causing the Hutchinson Affair. This man's home was almost attacked after the passage of the Stamp Act, but he later testified to Parliament for its repeal. During the Seven Years' War, this man proposed a Plan for Union at the * Albany Congress. He wrote articles in his brother's newspaper under the pseudonym Silence Dogood, and later became the publisher of the Pennsylvania Gazette, in which he debuted his "Join, or Die" cartoon. FTP, name this founding father, the first Postmaster General of the United States, also known for publishing *Poor Richard's Almanack*.**

ANSWER: Benjamin Franklin

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- (16) **The Chebyshev Inequality guarantees that the probability that a random variable differs from its mean by more than alpha is at most this quantity divided by alpha squared. This quantity preserves addition when applied to independent random variables. For the outcome of a fair die, this quantity is thirty-five twelfths, or about 2.92. Defined as the * expectation of the square of the quantity of a random variable minus its mean, this parameter is usually calculated as the mean of the square minus the square of the mean. Usually denoted by sigma squared, FTP, name this measure of the spread of a probability distribution.**

ANSWER: variance

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- (17) **One poem states that this poet “brings an unaccustomed wine”, and another states that “the mushroom is the elf of plants.” One of this poet’s works has two versions, in one of which “June” becomes “day” and “advertise” becomes “banish us”. * She calls a book “the chariot that fires a human’s soul” and claims that it will “take us lands away” in one poem, and in another she discusses something that “perches in the soul.” FTP, name this poet of “Hope is the thing with feathers”, “I’m nobody”, and “Because I could not stop for Death”.**

ANSWER: Emily Dickinson

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- (18) **The demands of his bands and his personal preferences brought about the development of a new instrument. He served as director of the Marine Band for twelve years; during his tenure, he composed the official * march of the Marine Corps “Semper Fidelis”. Another of his better known works was commissioned for a newspaper’s essay contest awards ceremony, “Washington Post March”. His most famous composition is noted for a piccolo obbligato in the trio; that piece is “The Stars and Stripes Forever”. FTP, name this American composer also known as “The March King”.**

ANSWER: John Philip Sousa

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- (19) **A purely relativistic form of this phenomenon takes into account the time dilation between atomic electrons and the nucleus since Lorentz boosts do not commute. Another type of this phenomenon occurs when an electron in orbit around a nucleus experiences a torque perpendicular to its angular momentum and is named after Larmor.** * As a result of this phenomenon, the earth experiences a 26,000-year cycle of regular climate change according to a theory proposed by Milutin Milankovic. Coming in the Thomas, torque-free, and torque-induced varieties, FTP, name this change in orientation of the axis of a rotating body, notably seen in gyroscopes.

ANSWER: precession (accept Thomas precession before “Another”)

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- (20) **In Boeotian tradition, there are only three of these, namely, Melete, Mneme, and Aoide, but it is more commonly believed that there are nine. The daughters of King Pierus were turned into magpies for challenging them. Their origins are disputed, as some hold that they emerged from a spring created by Pegasus on Mount** * Helicon, whereas they are also said to be the daughters of Gaia and Uranus or of Mnemosyne and Zeus. The lyre and veil are the emblems of two of them, respectively, Terpsichore and Polyhymnia, while another of them, Calliope, represents epic poetry. FTP, name these patron goddesses of the arts from Greek mythology.

ANSWER: Muses

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- (21) **This term was coined by Iain Macleod in a 1965 speech to the House of Commons which declared “We now have the worst of both worlds.” This entity is achieved when the Misery Index is high, which can happen in response to a supply shock or if expansionary policies of central banks are coupled with excessive market regulation. The existence of this condition** * contradicts theories of the Phillips curve. It began in the United States in response to the 1973 oil crisis and continued into the 1980’s, when a rise in interest rates slowed monetary growth. FTP, name this economic ill in which inflation occurs without growth.

ANSWER: stagflation

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Bonuses

(1) It opens “It was the best of times. It was the worst of times.” FTPE:

[10] Name this Dickens novel set during the French Revolution that takes place in London and Paris.

ANSWER: A Tale of Two Cities

[10] This protagonist of *A Tale of Two Cities* does not appear until the second chapter. At the end of the novel, he gives his life to save Charles Darnay.

ANSWER: Sydney Carton

[10] This Frenchwoman leads a band of revolutionaries. She dies in a fight with the maid Miss Pross.

ANSWER: Madame Therese Defarge (accept either underlined part)

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(2) Answer these questions about throwing people out of windows FTPE:

[10] The First Defenestration of Prague was sparked by the burning at the stake of this heretic, who had spoken out against some practices of the Catholic Church. A series of religious wars were named for his followers.

ANSWER: Jan Hus

[10] The Second Defenestration of Prague was the incident that began this long religious war between the Catholics and Protestants in Germany. It was concluded with the Peace of Westphalia.

ANSWER: Thirty Years' War

[10] In 1948, this foreign minister of Czechoslovakia purportedly committed suicide by jumping out of a window at the same time that a Communist coup occurred. His father Tomas had been the first Czechoslovakian President.

ANSWER: Jan Masaryk

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(3) Among his symbols are the lotus and his four hands, which represent the four cardinal directions. FTPE:

[10] Residing on Satyaloka, this member of the Trimurti is the Hindu god of creation.

ANSWER: Brahma

[10] One of Brahma's consorts was this Hindu goddess of knowledge and the arts, sometimes called the Mother of the Vedas.

ANSWER: Saraswati or Sarasvati

[10] Sarasvati was the sister of this goddess of wealth and consort of Vishnu, who is worshipped during the festival of Diwali.

ANSWER: Lakshmi

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(4) Answer the following about hypothetical particles in physics FTPE:

[10] Also referred to as the God particle, name this hypothetical particle thought to be the mediator of mass. CERN is using the Large Hadron Collider to search for evidence of it.

ANSWER: Higgs boson (prompt on partial answer)

[10] This hypothetical particle is believed to mediate this weakest of the fundamental forces. If it exists, then it is massless and has a spin of 2, which gives its force unlimited range.

ANSWER: graviton

[10] This hypothetical particle is thought to move faster than the speed of light, leading to its namesake telephone paradox.

ANSWER: tachyon

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(5) Identify the following about psychological behaviors involving dogs FTPE:

[10] This Russian psychologist demonstrated classical conditioning in dogs by training them to salivate at the sound of a bell in anticipation of food.

ANSWER: Ivan Petrovich Pavlov

[10] This 1920 experiment by John B. Watson demonstrated classical conditioning in humans when the namesake subject was trained to fear rats, and by extension all furry things including dogs, in anticipation of a loud sound.

ANSWER: Little Albert experiment

[10] This effect was observed in dogs who were subjected to electrical shocks without the ability to end them. Even after a method to end the shocks was introduced, the subject dogs submitted to them as if inevitable.

ANSWER: learned helplessness

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(6) Answer the following about theorems in calculus FTPE:

[10] This theorem states that, on the interval from a to b , a continuous function f must output every value between f of a and f of b . It is often applied to determine zeroes of a function.

ANSWER: Intermediate Value Theorem or IVT

[10] This special case of the Mean Value Theorem states that a differentiable function f on an interval from a to b must have a point with a horizontal tangent if f of a equals f of b .

ANSWER: Rolle's Theorem

[10] The Extreme Value Theorem guarantees that a continuous function on an interval achieves a maximum and minimum if the interval is closed and satisfies this condition.

ANSWER: bounded or compact

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(7) It is the basis for the standard outline of the symphony, trio, string quartet, and more. FTPE, identify the following about sonata-allegro form:

[10] Sonata-allegro form was the most widely used musical form of this period of Western music that lasted from 1750 to 1820 and featured composers such as Clementi, Haydn, and Mozart.

ANSWER: classical period

[10] The standard sonata contains an introduction, exposition, development, and this repeat of the exposition. There is a notably long and detailed one in the first movement of Beethoven's *Eroica* symphony.

ANSWER: recapitulation

[10] A major feature of the exposition, development, and recapitulation is this process of shifting from one key to another for a lengthy phrase. It should not be confused with tonicization.

ANSWER: modulation

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(8) According to tradition, this is where Abraham went to sacrifice his son Isaac. FTPE:

[10] Name this religious site where Solomon built his temple and which currently contains the Dome of the Rock.

ANSWER: Temple Mount or Mount Moriah or Noble Sanctuary

[10] In the sixteenth century, Suleiman the Magnificent issued a firman allowing Jews to pray at this wall that helps to enclose Temple Mount. Many Jews come here to grieve the destruction of Solomon's Temple by the Romans, giving this wall a familiar nickname.

ANSWER: Western Wall or Wailing Wall

[10] The State of Israel first took control of the Western Wall during this war with Egypt, Jordan, and Syria.

ANSWER: Six-Day War or 1967 Arab-Israeli War or Third Arab-Israeli War

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(9) Let's see what you know about hormones FTPE:

[10] This "male" sex hormone can is a steroid hormone. It promotes characteristics such as increased muscle mass and hair growth.

ANSWER: testosterone

[10] This hormone, sometimes called the "cuddle hormone," acts as a neurotransmitter, but also stimulates uterine contractions in labor. It has also been hypothesized to mediate pair bonding and female orgasms.

ANSWER: oxytocin

[10] This hormone, released by the anterior pituitary gland, is secreted in response to stress; its major effect is the stimulation of the adrenal glands to produce cortisol and corticosteroids.

ANSWER: adrenocorticotrophic hormone or ACTH

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(10) Answer the following about punctuation usage common to C++ and Java FTPE:

[10] In C++ and Java, this punctuation separates the initial, update, and termination conditions in a for-loop as well as ending almost all lines of code.

ANSWER: semicolon

[10] These two characters are used to delimit multiple-line comments. In one order they begin the comment and in the other order they end it.

ANSWER: forward slash and asterisk (in either order, accept equivalents such as “star” for “asterisk”)

[10] These two punctuation marks are used for the ternary conditional operator.

ANSWER: question mark and colon (in either order)

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(11) Its episodes ended with the title character typing a journal entry into his IBM PS/2 computer. FTPE:

[10] Name this television series which originally aired from 1989 to 1993 whose eponymous character was a teenage medical doctor struggling to balance a demanding career with adolescence.

ANSWER: Doogie Howser, M.D.

[10] This man, immortalized in the movie *Harold and Kumar Go to White Castle*, played the title character in Doogie Howser, M.D.

ANSWER: Neil Patrick Harris or NPH

[10] Since 2005, Neil Patrick Harris has played the womanizing Barney Stinson on this CBS comedy.

ANSWER: How I Met Your Mother

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(12) It ends with Martha saying “I am, George, I am” to the titular question. FTPE:

[10] Name this play in which George, Martha, Nick, and Honey play alliterative “games”, such as “Humiliate the Host”, “Get the Guests”. and “Humping the Hostess”.

ANSWER: Who’s Afraid of Virginia Woolf?

[10] This playwright of *Who’s Afraid of Virginia Woolf?* also wrote *A Delicate Balance* and *Seascape*.

ANSWER: Edward Albee

[10] In this Albee play, Jerry dies at the hands of Peter in Central Park.

ANSWER: Zoo Story

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(13) The United States has Congress. Identify these national legislatures FTPE:

[10] This bicameral legislature, formed under the Meiji Constitution, legislature begins its parliamentary session with a speech from the emperor in which he outlines goals for the nation of Japan.

ANSWER: Diet

[10] With members referred to as deputies, this chamber replaced the Supreme Soviet. Name this lower house of Russia's Federal Assembly.

ANSWER: State Duma

[10] The oldest parliamentary council in the world is this nation's Althing.

ANSWER: Iceland

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(14) His works include *Fruitdish and Glass* and *Man with a Guitar*. FTPE:

[10] Name this man who founded cubism with Pablo Picasso.

ANSWER: Georges Braque

[10] This Picasso work features an elderly man sitting with his legs crossed holding the title instrument. It is part of his blue period.

ANSWER: The Old Guitarist

[10] This period of Picasso's works contain cheerful elements, shown in works such as *Boy with a Pipe*. He often employed orange and other bright colors, such as in other works from this period which included *The Family of Saltimbanques*.

ANSWER: Rose period

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(15) These objects can be classified as carbonaceous, silicate, or metal-rich. FTPE:

[10] Name these small bodies, most of which in our solar system are located between Mars and Jupiter.

ANSWER: asteroids

[10] Some of these gaps in the asteroid belt are in 4 to 1, 3 to 1, or 5 to 2 orbital resonances with Jupiter. The Alinda and Griqua families of asteroids are also located in these regions.

ANSWER: Kirkwood gaps

[10] This largest object in the asteroid belt is also the smallest of our solar system's five dwarf planets.

ANSWER: Ceres

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(16) Answer the following about an American compromise FTPE:

[10] Opposed by John C. Calhoun, this Compromise included a fugitive slave law and established borders for Texas.

ANSWER: Compromise of 1850

[10] This Kentucky politician, called “The Great Compromiser”, helped draft the Compromise of 1850 while serving in the Senate. He had previously held the offices of Secretary of State and Speaker of the House.

ANSWER: Henry Clay, Sr.

[10] Originally introduced as an amendment to a war appropriations bill, this provision would have banned slavery in any territory acquired from Mexico. It died twice in the Senate, but the attempts necessitated the Compromise of 1850.

ANSWER: Wilmot Proviso

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(17) Though he had been the sole provider for his family, they feel relief upon his death. FTPE:

[10] Name this novella in which Gregor Samsa awakens to find that he has transformed into a bug.

ANSWER: The Metamorphosis (or Die Verwandlung)

[10] This Czech author wrote of a torture machine which stabs the Officer to death in his short story *In The Penal Colony* in addition to writing *The Metamorphosis*.

ANSWER: Franz Kafka

[10] Franz Kafka also wrote this short story about a circus performer who fasts for audiences before dying and being replaced with a panther.

ANSWER: The Hunger Artist (or Der Hungerkuenstler)

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(18) This artist created works such as *The Rehearsal* and *The Dance Class*. FTPE:

[10] Name this French artist famous for his depictions of ballerinas.

ANSWER: Edgar Degas

[10] In this Degas painting, the two central subjects are dressed in suits and examine the titular commodity placed on top of a wooden table. A man on the far right appears to be completing paperwork.

ANSWER: The New Orleans Cotton Exchange or Cotton Exchange in New Orleans

[10] In this other Degas work, a man wearing a hat stares off to the left of the canvas, while a woman sitting at a table looks downwards at the glass filled with green liquid.

ANSWER: L’Absinthe or The Absinthe Drinker or Glass of Absinthe

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(19) This problem intrigued mathematicians for three and a half centuries before finally being resolved. FTPE:

[10] Name this 1637 conjecture of Fermat, incorrectly called a theorem due to an unsubstantiated marginal claim that the author had found a “truly marvelous proof”. It stated that the equation x to the n plus y to the n equals z to the n has no integer solutions if n is larger than 2.

ANSWER: Fermat’s Last Theorem (prompt on “FLT”)

[10] This Princeton mathematician proved Fermat’s Last Theorem in 1995. Two years earlier, he had announced a proof which was discovered to be erroneous.

ANSWER: Andrew Wiles

[10] The Beal Conjecture generalizes Fermat’s Last Theorem by stating that, in any integer solution to x to the a plus y to the b equals z to the c , the numbers x , y , and z share one of these.

ANSWER: common prime factor

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(20) The Wolff-Kishner type of this process converts ketones and aldehydes into alkanes. FTPE:

[10] Name this type of reaction exemplified by aqueous zinc II solution turning into solid zinc, a process which results in the gain of electrons.

ANSWER: reduction (do not accept or prompt on “redox” or “reduction-oxidation reactions”)

[10] This electrochemical equation can be used to calculate standard reduction potential of redox reactions given the equilibrium constant. It was modified into the Goldman-Hodgkin-Katz equation to calculate membrane potential.

ANSWER: Nernst equation

[10] These objects connect the cathode and anode of a galvanic cell. They usually contain inert electrolytes, such as sodium chloride, and come in glass tube or filter paper types.

ANSWER: salt bridges

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(21) “Horse and hero fell” under heavy cannon fire which “volley’d and thunder’d.” FTPE:

[10] Name this poem in which “half a league onward” “into the valley of Death/rode the six hundred,” and poses the question “when can their glory fade?”

ANSWER: The Charge of the Light Brigade

[10] This English poet of “The Charge of the Light Brigade” also wrote “Break, Break, Break” and “Tears, Idle Tears.” He also commemorated his best friend Arthur Hallam in his “In Memorium.”

ANSWER: Alfred, Lord Tennyson

[10] Tennyson claims to “hope to see my Pilot face to face” in this poem.

ANSWER: Crossing the Bar

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