

IMSANITY

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Tossups

- (1) One of this sculptor's works shows a man walking with his right hand outstretched, and another similar work of this sculptor shows a headless and armless man in motion; those works are *St. John the Baptist Preaching* and *The Walking Man*. He also depicted Eustache de Saint Pierre leading five other representatives to Edward III during a siege of the Hundred Years' War in * *The Burgers of Calais*. He was accused of using a living model for his sculpture *The Age of Bronze*, and he also depicted a scene from "The Inferno" in his *Gates of Hell*. His most famous work was intended to depict Dante. FTP, name this sculptor of *The Thinker*.

ANSWER: Auguste Rodin

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- (2) His early career included a raid against the Gepids and a victory at the battle of Dara against the Persians. He successfully defended Rome against the Goths, and captured the cities of Ravenna and Milan. This man deposed Pope Silverius in 537 at the command of the empress, and won his final campaign defending * Constantinople from the Bulgars. Although he was later pardoned by the emperor, he was convicted of corruption in 562 by a likely-biased judge, Procopius. He fittingly died in 562 within a few weeks of Emperor Justinian. FTP, name this general, one of the "Last of the Romans", who quelled the Nika Riots in 532.

ANSWER: Flavius Belisarius

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- (3) This force is interpreted on the atomic level by a nanotip being dragged over a corrugated landscape in the Tomlinson model. Amontons's Second Law tells that this force is independent of the surface area in contact. * Coulomb's Law of this force tells us that the kinetic form of this is independent of velocity, and the complete absence of this force is known as superlubricity. FTP, name this force, computed as a namesake coefficient times the normal force, which opposes motion.

ANSWER: friction

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- (4) **One in C sharp minor was dedicated to the violin virtuoso Joseph Joachim, while another in E flat major depicts a “Carnival at Pest”. The tenth in E major imitates the sounds of a cimbalom using rapid tremolos and arpeggios. The fifteenth is built upon arrangements of a traditional and nationalist tune, the famous * *Rákóczi March*. Despite being written originally for solo piano, these pieces are also commonly heard scored for a full orchestra. All nineteen of these pieces were heavily influenced by the sounds of Gypsy music found throughout the countryside of the composer’s homeland. FTP, identify this set of virtuosic piano pieces by Franz Liszt named for his native country.**

ANSWER: Hungarian Rhapsodies

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- (5) **The British originally referred to this location as Al Wasl, and its current name may be derived from words for “locusts” or “bees”. The Umayyads developed its waters both for aquafarming and as a trading port. The “Exclusive Agreement” of 1892 gave it protection by the British from the Ottomans. Its economy was severely damaged in the 1920s when the advent of artificial pearls undermined its pearl harvesting industry, but the economy recovered when * oil was discovered in 1966. Currently, real estate and development is its largest industry. Subdivided into namesake Maritime, Media, and Internet cities is, FTP, this emirate, home to the Burj al Arab and the Burj Khalifa.**

ANSWER: Dubai

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- (6) **The Sylvester-Gallai Theorem states that if a finite collection of points in the plane does not have this property, then some line contains exactly two of them. The center of the nine-point circle, orthocenter, and circumcenter of a triangle have this property, and a set of points in the plane is said to be in general position if no * three have this property. Two vectors have this property if they are multiples of each other. Any three points not having this property determine a unique plane. Any two points have, FTP, this property in which a single line can be drawn through them.**

ANSWER: collinear (accept word forms)

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- (7) **The Solomon Amendment and this policy were upheld by the court case *Rumsfeld v. Forum for Academic and Institutional Rights Incorporated*, and it can be traced back to the Truman administration in the Uniform Code of Military Justice of 1950. The death of Allen R. Schindler in 1992 provided support for this policy, and more recently *** Lieutenant Daniel Choi handcuffed himself to the White House fence in protest of it. Passed by Bill Clinton in 1993 and repealed during a lame duck session of Congress in 2010 under Barack Obama, FTP, name this military policy which bans openly homosexual people from serving in the military.

ANSWER: Don't Ask Don't Tell or DADT

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- (8) **Shortly before his death, he convinced a woman in the city of Endor to conjure up his dead mentor. His daughter Michal was married off to his successor, whom she helped avoid her father's attempt on his life. He failed to regain God's favor by looting the *** Amalekites after defeating them, as revealed to him by the prophet Samuel. His successor spared his life on two separate occasions, taking his spear and canteen the second time, and, while fighting alongside the Philistines, he died by falling on his sword at the Battle of Mount Gilboa. FTP, name this first king of Israel who was succeeded by David.

ANSWER: Saul

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- (9) **Signs of a past infection with this disease are left by surface-healed granulomas, calcifications, or scars, which make up Ghon's complex. XDR strains of it cannot be treated with isoniazid or rifampin, leaving few treatment options. While most people infected with this disease have the latent form, it may still progress to the *** active form. The Mantoux test for the presence of this disease sometimes returns false negative results for patients whose immune systems are compromised. FTP, name this disease, once known as consumption, that primarily affects the lungs.

ANSWER: tuberculosis or TB

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- (10) **This writer wrote about children “arm in arm”, “joined hand in hand/go[ing] round and round” in the poem “Circle Game”. Some survivors of an environmental catastrophe, the God’s Gardeners, are found in a sequel to this author’s novel about human-like creatures called Crakers who help Snowman. In addition to writing** * *The Year of the Flood* and *Oryx and Crake*, she wrote about the Sons of Jacob killing the President and suspending the U.S. Constitution in order to form a republic called Gilead. FTP, name this Canadian author who wrote about Serena Joy and Offred in the dystopian novel *A Handmaid’s Tale*.

ANSWER: Margaret Atwood

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- (11) **This election featured the first vice president to be renominated since John C. Calhoun, but that man, James S. Sherman, died a week before the election. Eugene V. Debs ran for president as the socialist candidate for the fourth time and got nine hundred thousand votes. John Schrank attempted to assassinate a third party candidate in this election, but, after being shot, that candidate delivered a ninety minute speech. The Republican party** * split at a Chicago convention where Robert LaFollette Sr. and a former president failed to prevent the nomination of a candidate who only won two primaries. FTP, name this election in which Teddy Roosevelt ran from the Bull Moose Party, in which he and sitting president William Howard Taft were defeated by Woodrow Wilson.

ANSWER: Presidential election of 1912

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- (12) **One of these seeks a method to find generators of rational points on elliptic curves, and another investigates the complexity gap between computability and verifiability. Two of these have applications in physics, one in fluid mechanics and the other in quantum field theory. The most famous of these involves the distribution of prime numbers. To date, only one of these seven problems. The solution to any one of these comes with a** * \$1,000,000 prize from the Clay Mathematics Institute. First introduced in May 2000, FTP, give the collective name of these problems, including the Poincare Conjecture, P versus NP, and the Riemann Hypothesis.

ANSWER: Clay Millennium Problems (prompt on “Clay Problems” or variants)

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- (13) **This writer of *Bread and Butter* wrote a two-character play about Erie Smith and hotel clerk Charlie Hughes in *Hughie*. The sequel to his most famous work is titled *A Moon for the Misbegotten*, and he wrote about Wint Selby drinking with prostitutes and Muriel's lover, Richard Miller, in * *Ah, Wilderness!* Eben has an affair and a child with his father's new wife, Abbie Putnam, but Ephraim Cabot is oblivious in his *Desire Under the Elms*. The protagonist discovers insanity runs in the Evans family, causing her to have a child with Ned Darrell in another of his works. FTP, name this American playwright of *Strange Interlude* and *Long Day's Journey into Night*.**

ANSWER: Eugene O'Neill

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- (14) **One example of this is virga, which has been observed on the Canadian Prairies and the planet Venus. Another example is called graupel, which accrues on a better known example of this phenomenon. This phenomenon is governed by the * Bergeron process, and it is used to classify climates. It can be specified as orographic if it is caused by mountains, and a lack of it caused a devastating drought in Sub-Saharan Africa. FTP, name this meteorological phenomenon in which water falls from clouds to the ground, common examples of which are sleet, hail, snow, and rain.**

ANSWER: Precipitation (prompt on more specific answers before mentioned)

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- (15) **This mathematician generalized the binomial theorem to powers of multinomials. His unpublished proof of Fermat's Little Theorem is the first known to exist. He made two trips to England in the 1670's, which would later become a source of contention. Among his most well-known contributions are notational, including the * elongated "S" and "d y over d x". These appeared in his book *New Method for Maxima and Minima, and Also for Tangents, Which is Not Obstructed by Irrational Quantities*, in which he laid out his most important discoveries. FTP, name this German mathematician who, independently of Newton, developed calculus.**

ANSWER: Wilhelm Gottfried von Leibniz

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- (16) **On the far right side of this work, a metal pot and spoon can be seen lying on a small white cloth. While the foreground of this work is brightly lit, the background is darker, presumably due to cloud cover. One of the central figures is young, and appears facing away from the viewer. His clothes are torn, and he is carrying a basket * filled with the title objects. The other central figure kneels on the ground on one knee, holding a pickaxe while performing the title action. It was destroyed during the British bombing of Dresden in 1945. Painted by the leader of the realist movement, FTP, name this 1849 painting by Gustave Courbet.**

ANSWER: The Stone Breakers

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- (17) **In this work, one character's birthday is on Lammas-eve, which is a little over two weeks after the work takes place. In one scene, a servant needs to find someone literate to read a guest list for him. One character in this work is in love with Rosaline and goes uninvited to a masquerade ball that she is attending. Before the ball, this character's friend tells him to beware the * fairies' midwife, Queen Mab. At the ball, he meets the girl whom he later marries after their first discussion in sonnet form. FTP, name this Shakespearean play about the romance between a Montague and a Capulet.**

ANSWER: Romeo and Juliet

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- (18) **His wife Nanna died shortly after he did, and the two were buried together at sea. After he dreamt of his own death, his mother forced all objects of the world, except one, to vow never to hurt him. He was killed by a spear poisoned with his only vulnerability when his blind brother Hodur was tricked by * Loki. After his death, with the help of the giant Hyrokkin, his funeral pyre was launched at sea on his ship Hringhorni. Susceptible only to mistletoe, FTP, name this son of Frigg and Odin, the Norse god of love and beauty.**

ANSWER: Baldr or Balder or Baldir or Baldur

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- (19) **While working for the Treasury, this man implemented the federal tax withholding program as advocated in Keynes's *How To Pay for the War*. He also posited that governments should increase the monetary supply at a constant rate in his *k*-Percent Rule. He argued that long-term expectations are the key factor in consumption in his *** Permanent Income Hypothesis, which he published in his 1957 *Theory of the Consumption Function*. For his monetarist work, he won the 1976 Nobel Memorial Prize in Economics, and the following year he retired from the University of Chicago. FTP, name this American economist who wrote *A Monetary History of the United States*.

ANSWER: Milton Friedman

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- (20) **It can have a negative value in the Casimir effect, and the radiation variety counteracts the force of gravity in stars. A fluid exerts the stagnation variety of this when force is used to stop its motion. *** Baroreceptors detect this value while blood flows through them, and a device invented by Evangelista Torricelli also measures this quantity. Dalton's Law concerns its partial values, and Boyle's Law relates this quantity and volume. FTP, name this quantity measured by manometers, calculated by taking the force divided by area, coming in units such as bars, millimeters of mercury, pascals, and atmospheres.

ANSWER: pressure (accept vacuum pressure before "variety")

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- (21) **One of this author's works begins with a very "un-English" boy standing in the most forlorn place in London. This boy befriends a street urchin known as the Rat and eventually discovers that he is rightful heir of Samavia. In addition to *** *The Lost Prince*, in one work, an orphan is adopted by an Indian gentleman and befriends a scullery maid named Betty. This orphan, Sara Crewe, attends Miss Minchin's boarding school. In another work, Mary goes to live with a widower at Misselthwaite manor. There, she discovers an abandoned garden, which she tends with her friends Dickon and Colin. FTP, name this author of *Little Lord Fauntleroy*, *A Little Princess*, and *The Secret Garden*.

ANSWER: Frances Hodgson Burnett

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Bonuses

(1) Many presidents had successful military careers. FTPE:

[10] This president from 1901 to 1909 had previously served as a general, leading the Rough Riders to victory at the Battle of San Juan Hill.

ANSWER: Theodore “Teddy” Roosevelt

[10] Known as “Old Rough and Ready”, this Virginian general won the battles of Monterrey and Buena Vista in the Mexican-American War before being elected President in 1848. He died in office in 1850.

ANSWER: Zachary Taylor

[10] During the Civil War, he recruited the 70th Indiana regiment and rose from Second Lieutenant to Brigadier General.

ANSWER: Benjamin Harrison

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(2) They consist of a mixture of a weak acid and its conjugate base, or a weak base and its conjugate acid. FTPE:

[10] Name these solutions which resist changes in pH. The mixture of carbonic acid and bicarbonate ions serves as one of these solutions in our blood.

ANSWER: buffer solution

[10] This equation is useful for finding the pH of a buffer solution. One version of it states that pH is equal to pKa plus the log of the concentration of conjugate base divided by the concentration of undissociated weak acid.

ANSWER: Henderson-Hasselbalch equation

[10] They are frequently weak acids or bases, and change color in response to changes in pH. Examples include methyl red and bromothymol blue.

ANSWER: pH indicators

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(3) At the end, the titular character is called “Kleinzach”. FTPE:

[10] Name this opera in which the titular poet describes his love for Olympia, Giulietta, and Antonia, who turn out to be three different aspects of the same woman, Stella. Stella ultimately abandons that man for being a drunk.

ANSWER: The Tales of Hoffman or Les Contes d’Hoffman

[10] This German-born French romantic composer wrote *The Tales of Hoffman* in addition to many operettas such as *The Beautiful Helen*, *Daphne and Chloe*, and *Robinson Crusoe*.

ANSWER: Jacques Offenbach

[10] In this Offenbach operetta, the titular character travels to Hell to recover his wife, Eurydice, in order to please Public Opinion.

ANSWER: Orpheus in the Underworld

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(4) Identify the following about the states of Mexico FTPE:

[10] This largest state in Mexico by area, with capital at Ciudad Juarez, is home to a namesake desert and small dog.

ANSWER: Chihuahua

[10] Mexicali is the capital of this northernmost Mexican state, although its largest city is Tijuana.

ANSWER: Baja California

[10] This is the number of Mexican states.

ANSWER: 31

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(5) The offense that was inflicted upon the narrator, Montresor, is never specified. FTPE:

[10] Name this short story in which Fortunato calls out “for the love of God, Montresor!” in response to being entombed alive.

ANSWER: The Cask of Amontillado

[10] This writer of “The Cask of Amontillado” also wrote about the “tintinnabulation” of “The Bells” as well as a “kingdom by the sea” in “Annabel Lee”.

ANSWER: Edgar Allen Poe

[10] Montresor displays a trowel to Fortunato, proving that he is part of this fraternal organization in England.

ANSWER: Free Masons

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(6) Identify the following about dot products FTPE:

[10] This is the dot product of two perpendicular vectors.

ANSWER: zero

[10] This doubly-eponymous inequality states that, for two vectors v and w , the square of v dot w is less than or equal to the square of v dot v times the square of w dot w .

ANSWER: Cauchy-Schwarz inequality

[10] This scalar, computed by the formula v dot w divided by the magnitude of w , gives the distance traveled by v in the direction of w .

ANSWER: component of v along w (accept alternative clear-knowledge-equivalent prepositions)

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(7) Its title references the story of Lazarus in the Gospel of John, and defines “self” as the “relation’s relating itself to itself in the relation.” FTPE:

[10] Name this philosophical book which equates despair with the sin of not having faith in God, a work of Christian existentialism.

ANSWER: The Sickness Unto Death or Sygdommen til Døden

[10] This Danish philosopher and author, a prolific user of pseudonyms, wrote *Sickness Unto Death* as well as *Fear and Trembling* and *Stages on Life’s Way*.

ANSWER: Søren Kierkegaard

[10] This Kierkegaard work explores the aesthetic and ethical phases of life. Its most famous section, “The Seducer’s Diary,” tells of Johannes Climacus’ attempts to maximize aesthetic pleasure by seducing Cordelia.

ANSWER: Either/Or or Enten/eller

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(8) It featured eight housemates living in a summer share in Seaside Heights. FTPE:

[10] Name this MTV reality series starring Snooky, J-WOW, and The Situation which debuted in 2009.

ANSWER: Jersey Shore

[10] This author began his career as a sports reporter in the town of Jersey Shore, Pennsylvania before developing gonzo journalism in works like *The Kentucky Derby is Decadent and Depraved* and *Fear and Loathing in Las Vegas*.

ANSWER: Hunter S. Thompson

[10] Born in Jersey Shore, Pennsylvania, this kicker walked onto the Penn State football team before being signed by the Chicago Bears in 2005.

ANSWER: Robbie Gould

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(9) Her first three husbands were “good” because they were “rich, old, and submissive,” whereas her fourth husband was “bad” because he died while she was on a pilgrimage to Jerusalem. FTPE:
 [10] This character ripped pages from Jenkin’s “book of wicked wives” titled Valerie and Theofraste, leading to a fight between the two.

ANSWER: Wife of Bath or Alison

[10] The Wife of Bath is a character in this Middle English collection of stories told by travelers making a pilgrimage from the Tabard Inn to visit St. Thomas Becket’s relics.

ANSWER: The Canterbury Tales

[10] This author of *The Canterbury Tales* also penned *Troilus and Criseyde* and *Parlement of Foules*.

ANSWER: Geoffrey Chaucer

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(10) Answer the following about the Spanish Civil War FTPE:

[10] Name the town that was the target of the first carpet bombing in history during the Spanish Civil War, the subject of a 1937 painting by Pablo Picasso.

ANSWER: Guernica

[10] The planes that bombed Guernica were fighting for this side that eventually won the Spanish Civil War and instituted a Fascist regime.

ANSWER: Nationalists or Nacionales

[10] This Nationalist General claimed that he had four columns ready to march on Madrid, and a fifth inside ready to rise. He was leader of the Nationalists until his death in a plane crash in 1937 left Francisco Franco in charge.

ANSWER: Emilio Mola

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(11) Answer these questions about the endocrine system FTPE:

[10] These female analogues of the testes are responsible for the development of the follicle during the menstrual cycle. They secrete both progesterone and estrogen.

ANSWER: ovaries

[10] The anterior part of this “master” endocrine gland is responsible for production of hormones such as TSH, growth hormone, and prolactin. Its posterior portion releases only oxytocin and vasopressin.

ANSWER: pituitary gland

[10] In women, a significant rise in this hormone released by the pituitary gland results in the release of the ovum into the oviducts. In men, it stimulates the production of testosterone by heightening cholesterol desmolase activity in Leydig Cells.

ANSWER: luteinizing hormone or interstitial cell-stimulating Hormone

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(12) This French painter was inspired by Theodore Gericault's *Raft of the Medusa*. FTPE:

[10] Name this painter who created *The Barque of Dante* and *The Massacre at Chios*.

ANSWER: Eugene Delacroix

[10] Delacroix's most famous work depicts a woman directing militiamen over the bodies of wounded fighters. She raises a red, white, and blue flag in one arm while holding a musket with a bayonet in the other.

ANSWER: Liberty Leading the People or La Liberté guidant le peuple

[10] Delacroix traveled to this African location after the French conquered Algeria. His works include "A Jewish Wedding in" this place and the "Sultan of" this present day country.

ANSWER: Morocco

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(13) Answer the following about infinite sets FTPE:

[10] The smallest infinite ordinal is this set of numbers recursively defined to consist of 0 and the successor of each of its elements. It is most commonly denoted with a capital *N*.

ANSWER: natural numbers

[10] This is the assertion that there are no infinite sets whose size lies strictly between that of the natural numbers and that of the real numbers.

ANSWER: Continuum Hypothesis

[10] Paul Cohen won a Fields Medal in 1966 for proving that the Continuum Hypothesis is this, meaning that it cannot be proven or disproven by the axioms of Zermelo-Frankel set theory.

ANSWER: independent of the axioms

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(14) This phenomenon occurs when the direction of a wave is changed due to a change in its speed. FTPE:

[10] Name this phenomenon responsible for causing a straw to appear broken in a glass of water.

ANSWER: refraction

[10] This Law describes the relationship between angles of incidence and refraction by equating the ratio of the sines of incident angles to the ratio of velocities when waves pass through a boundary of two different media. It is based off of Fermat's principle of least time.

ANSWER: Snell's Law (or Descartes's Law, or Snell-Descartes Law, prompt on an answer like "Law of Refraction")

[10] This type of refraction occurs when a wave is decomposed into two rays when passing through material. Calcite crystals, as well as plastics and cellophane, often display this.

ANSWER: birefringence (or double refraction)

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(15) Several Indian children are born at midnight on the Indian Independence Day from Britain, giving them special powers. FTPE:

[10] Saleem Sinai and Shiva switch places at birth, causing Saleem to be have huge knees in this novel.

ANSWER: Midnight's Children

[10] This author of *Midnight's Children* also wrote *The Moor's Last Sigh* and *The Jaguar Smile*.

ANSWER: Salman Rushdie

[10] Two Indian Muslim actors, Gibreel Farishta and Saladin Chamcha, are trapped on a hijacked plane in this other Rushdie novel.

ANSWER: The Satanic Verses

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(16) The author's work helped convince the Allies to retain the Japanese emperor after the end of World War II. FTPE:

[10] Name this 1946 study, subtitled "Patterns of Japanese Culture", in which the author used newspapers, literature, and art to compare the guilt culture of the West with the shame culture of Japan.

ANSWER: The Chrysanthemum and the Sword

[10] This American anthropologist and former student of Franz Boas at Columbia wrote *The Chrysanthemum and the Sword*.

ANSWER: Ruth Fulton Benedict

[10] *The Chrysanthemum and the Sword*, as well as Benedict's *Patterns of Culture*, espoused this belief that the ideas and behaviors of an individual can only be judged in the context of that individual's culture.

ANSWER: cultural relativism

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(17) Answer these questions about satellites in our solar system FTPE:

[10] Name this second brightest object in the sky, with apparent magnitude between -12.5 to -12.6 .

ANSWER: Earth's Moon

[10] This largest satellite in the solar system is a satellite of Jupiter, observed by Galileo in the 17th century.

ANSWER: Ganymede

[10] This satellite of Neptune is the only known satellite that orbits in retrograde motion. As tidal forces slow the speed of its orbit, it will eventually crash into Neptune.

ANSWER: Triton

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(18) Every connected graph contains this type of subgraph. FTPE:

[10] This is the name given to a connected subgraph of a graph with one fewer edge than vertices. Such a subgraph contains no cycles, and the minimum-weight type was first computed with Boruvka's Algorithm.

ANSWER: spanning tree

[10] This greedy algorithm for finding minimum-weight spanning trees works by iteratively adding the lightest edge which does not create a cycle.

ANSWER: Kruskal's Algorithm

[10] Through the implementation of union-find trees, the runtime of Kruskal's Algorithm is at most a constant times the number of edges of the graph times alpha of the number of vertices, where alpha is the inverse of this fast-growing, non-primitive recursive function.

ANSWER: Ackermann function

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(19) The Old Women soak the Old Men with water when they try to burn down Acropolis, and a woman named Reconciliation is used at the end to make peace. FTPE:

[10] The women of Acropolis, led by the title character, attempt to end the Peloponnesian war by depriving the men of sex in this play.

ANSWER: Lysistrata

[10] This Athenian playwright of *Lysistrata* also wrote about Euripides and Aeschylus fighting over the title of "Best Tragic Poet" in *The Frogs*.

ANSWER: Aristophanes

[10] Socrates is the leader of the Thinkery, which is later set on fire, by Strepsiades in this Aristophanes play.

ANSWER: The Clouds

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(20) Identify the following about the sun in Egypt FTPE:

[10] Worshipped at Heliopolis, this hawk-headed Egyptian sun god made a daily journey through the sky followed by a nightly journey through the underworld.

ANSWER: Ra

[10] This Egyptian god represented the disk of the sun. Pharaoh Amenhotep IV changed his name in honor of this god, and the original name of Tutankhamun was an homage to him.

ANSWER: Aten

[10] In some traditions, Ra was combined with Horus to form this single entity, whose name translates as "Horus of the two horizons".

ANSWER: Ra-Horakhty

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(21) Examples include “Fish” and “Horizontal Yellow”. FTPE:

[10] Name this kind of sculpture which utilizes pieces hanging by wire to facilitate motion, particularly rotation.

ANSWER: mobiles

[10] This American sculptor is credited with inventing the mobile in addition to creating many works depicting circuses.

ANSWER: Alexander Calder

[10] In addition to mobiles, Calder produced many large stabile sculptures for public display, including *Flamingo* and *Flying Dragon* in this city.

ANSWER: Chicago, Illinois

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