

# **IMSANITY**

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## Tossups

- (1) **This process was first observed in a controlled environment in the Greenhouse Item test. One variety of this process reportedly occurred during the electrolysis of heavy water on a palladium electrode in an experiment by Martin Fleischmann and Stanley Pons; that was the \* “cold” variety. For nuclei heavier than iron, this process absorbs energy, while for lighter nuclei, it releases energy. Stars convert both helium to carbon and hydrogen to helium through this process in their cores. FTP, name this process of joining multiple atomic nuclei to form a heavier nucleus.**

**ANSWER:** nuclear fusion

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- (2) **One of these dictates the use of forty-nine stones to be thrown at a wall symbolizing the Devil, and another demands that one-fortieth of one’s wealth be given to ease hardships for others. A third of these requires postpubescent adherents to spend the ninth month \* fasting. In addition to Zakah, Sawm, and Hajj, these include Shahada and Salah, which combine to the professment of a unique God to whom believers must pray five times daily and whose prophet is Muhammad. FTP, name these guiding principles of Sunniism.**

**ANSWER:** Five Pillars of Sunni Islam (accept Five Pillars of Sunniism)

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- (3) **One character in this book cares greatly for a doll named Joanna that is missing all its limbs. Another character wishes she had a Grecian nose and is reprimanded for bringing pickled limes to school. At Sallie Gardner’s New Year’s Party, the protagonist first meets her neighbor whom she calls \* Teddy. He proposes to the protagonist but is rejected and ultimately marries the protagonist’s younger sister in Paris. The protagonist instead marries a German professor named Fritz Bhaer. FTP, name this book about the March sisters, Meg, Jo, Beth, and Amy, by Louisa May Alcott.**

**ANSWER:** Little Women

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- (4) **This was established in 1913 by a namesake Act which had been modeled off of the Aldrich Plan. It charges a discount rate to its clients and sets the overnight rate that its clients can charge, and it is tasked with issuing loans as a \* last resort during credit crises. Labeled A through L, it operates twelve regional banks across America. Its Federal Open Market Committee sets monetary policy for the nation. Currently chaired by Ben Bernanke, FTP, identify this central banking system of the United States.**

**ANSWER:** Federal Reserve System (prompt on “Fed”)

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- (5) **The large impact that created the basin Caloris sent shockwaves through this body, causing it to have an extremely rugged surface. Since the sun is not a perfect sphere, and due to the gravitational pull from other planets, this body’s position of closest approach to the sun drifts at a rate of 1.56 degrees per century. It has the largest orbital \* eccentricity of the planets in our solar system, and by tidal friction, it has an unequal 3 to 2 resonance between its period of rotation and period of revolution about the sun. FTP, name this planet with the shortest period of revolution, the innermost planet.**

**ANSWER:** Mercury

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- (6) **The strings alone play a mournful adagio for the passing of the title character’s mother in the movement “The Death of Ase”. He is later entranced by the beautiful daughter of a Moroccan Bedouin chieftain, portrayed in Anitra’s Dance. The fourth act opens with a famous depiction of the sunrise in \* “Morning Mood”. In perhaps the most famous movement, a single theme gradually increases in tempo and dynamic before climaxing to represent a frantic escape from the Hall of the Mountain King. These are all parts of, FTP, this set of musical suites commissioned by Henrik Ibsen for one of his plays and composed by Edvard Grieg.**

**ANSWER:** Incidental music to Peer Gynt (or Peer Gynt Suite)

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- (7) **One story says that unifier of this polity was the only person ever to lift a legendary 3,000 pound stone. That man's "law of the splintered paddle" protects civilians during war and is included in the current constitution of this polity. Father Damien was canonized for his missionary and medical work on one of the islands here. A meeting called by Lorrin Thurston and \* Sanford Dole forced a king of this polity to accept the Bayonet Constitution in 1887. Grover Cleveland refused to allow the annexation of the islands of this polity, but the McKinley administration did annex them in 1898. FTP, name this island nation unified by King Kamehameha the Great which became a U.S. state with capital at Honolulu.**

**ANSWER:** Hawaii

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- (8) **This band received a nomination for Video of the Year at the MTV Video Music Awards for their first video, which parodied mint commercials. They later won a Grammy for their video in which the lead singer appeared as a flight attendant, a pilot, passengers both male and female, a musician, himself, and a federal agent. Taking its name from a \* World War II era term for UFOs, this band was formed by the former drummer from Nirvana. Taylor Hawkins and Dave Grohl are members of, FTP, this band, whose notable songs include "Big Me", "Learn To Fly", and their Grammy-winning 2008 track "The Pretender".**

**ANSWER:** Foo Fighters

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- (9) **All solutions to a logistic differential equation have either one or two of these. Their name was coined by Appolonius to mean "not meeting", although modern interpretation allows them to \* intersect their corresponding curves. For rational functions, the quotient resulting from long division yields the horizontal and oblique types and the zeroes of the denominator help determine the rest. The graph of arctangent of  $x$  has two of these, but the graph of tangent of  $x$  has infinitely many vertical ones separated by distances of  $\pi$ . The limiting behavior of functions near positive or negative infinity are, FTP, these lines that graphs approach.**

**ANSWER:** linear asymptotes (accept "horizontal asymptotes" before mentioned)

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- (10) **This thinker analyzed definite and indefinite descriptions as well as differentiated between the meaning and the denotation of a phrase in his essay “On Denoting”. He argued that God did not exist with the analogy of an object that floats in space between Earth and Mars, his namesake “teapot.” In addition to writing “The Problems of Philosophy” and “Why \* I Am Not a Christian,” he argued against the theories of Frege and Meinong with a statement about a set that contains all sets not elements of themselves, his namesake “paradox.”** FTP, name this British logician who, with Albert North Whitehead, wrote *Principia Mathematica*.

**ANSWER:** Bertrand Russell

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- (11) **He created a phallic solar reflection in the background of one of his works whose main scene is dominated by a woman in red dress and a man in black dancing. One of his self-portraits depicts himself in black, with an arm only made of bone, while another of his self-portraits depicts himself after a bout with Spanish influenza. *The Dance of Life*, as well as his most famous work \* , is part of his series *The Frieze of Life*. FTP, name this Norwegian artist who depicted three people on a bridge with one performing the title cry in *The Scream*.**

**ANSWER:** Edvard Munch

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- (12) **In algebra, a field must have at least this many elements. This is the sum of the reciprocals of the triangular numbers as well as the minimum possible sum of a positive number and its reciprocal. The \* Goldbach Conjecture asserts that this is the largest even number not expressible as a sum of two primes. The number of subsets of a set of size  $n$  is this number to the  $n$ th power. The base of binary arithmetic is, FTP, this smallest prime number.**

**ANSWER:** 2

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- (13) **King Albert let this entity borrow the island of Gotland. This entity's defeat at the Battle of the Ice in 1242 to Alexander Nevski was a source of Russian nationalism. This entity lost the Battle of Tannenberg in 1410 to a \* Polish and Lithuanian army, and their loss of Prussia in 1525 ended their time as a political power. The current Grandmaster of this organization is Bruno Platter, and their modern headquarters is in the city of Bad Mergentheim. FTP, name this German monastic organization of knights founded in 1190 that forcibly converted Prussia and Lithuania to Christianity.**

**ANSWER:** Order of the House of St. Mary of the Germans in Jerusalem or Teutonic Order or Teutonic Knights

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- (14) **In one of his works, one character who is afraid of cuckoldry, Monsieur de la Souche, forbids Horace from marrying Enrique's daughter, Agnès. He also wrote of Cléonte dressing up as the son of the Sultan in order to marry the daughter of Mr. Jourdain. In addition to *The Bourgeois Gentleman* and *The \* School for Wives*, he wrote of the marriage of Eliante and Philinte at the end of a work which sees Célimène being loved by the title character. In his most famous work, a family trusts the title character, a criminal, too much, which results in his advances on Elmire that go unnoticed by Orgon. FTP, name this French playwright of *The Misanthrope* and *Tartuffe*.**

**ANSWER:** Molière (accept Jean-Baptiste Poquelin)

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- (15) **William Wilson has called this painting and one by Thomas Lawrence "the Romeo and Juliet of Rococo portraiture". While it was painted in 1770, the central subject wears seventeenth century apparel in homage to Anthony Van Dyck. That subject stands out against a dark landscape, and holds a feathered \* hat in his right hand and is thought to be the son of a wealthy hardware merchant. FTP, name this painting whose title refers to the color of the clothes worn by the central subject, painted by Thomas Gainsborough.**

**ANSWER:** The Blue Boy

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- (16) **The Du Noüy Ring method and Wilhelmy plate method are ways of measuring this phenomenon, which also accounts for Plateau-Rayleigh instability in liquids. This quantity, which is linearly inversely proportional to temperature, can be calculated via the Eötvös rule. Defined as Gibbs’s free energy \* per unit of surface area, it is measured in dynes per centimeter. Responsible for phenomena such as capillary action, menisci, and tears of wine, it has a high value in water due to hydrogen bonding. FTP, name this quantity that is lowered by surfactants and explains why some bugs can walk on water.**

**ANSWER:** surface tension

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- (17) **One character in this book praises reading after having spent the evening watching another character reading his book instead of reading her own. Slightly later, this character asks the protagonist to take a turn about the room. Meanwhile, another character writes a letter to his sister \* Georgiana, whom the protagonist later learns was seduced by George Wickham. Wickham later elopes with the protagonist’s sister, Lydia. The protagonist herself marries a man she originally disliked and whose first proposal she rejected, Fitzwilliam Darcy. FTP, name this novel about Elizabeth Bennet written by Jane Austen.**

**ANSWER:** Pride and Prejudice

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- (18) **This work includes data previously collected by Adolph Wagner and Henry Morselli, which led to criticisms that its results were only valid in German-speaking Europe. Other criticisms cite the conclusions of this work as instances of Simpson’s Paradox, resulting from the author’s aggregation of the data by, for example, religious affiliation, in particular in the claim that \* Protestants perform this titular action more than Catholics. It popularized the term “anomie”, which is one of the four types of the eponymous action. FTP, identify this 1897 sociological work by Emile Durkheim about the killing of one’s self.**

**ANSWER:** Suicide or Le Suicide

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- (19) **This molecule inhibits the enzyme pyruvate kinase in glycolysis. The enzyme that produces this molecule consists of a F0 subunit, through which protons pass, and a catalytic F1 subunit, its namesake synthase. The enzyme adenylyl cyclase synthesizes an important second messenger from this molecule, which is involved in regulating \* sugar and lipid metabolism. It is composed of an adenine ring, ribose sugar, and stores energy in the covalent bonds between its three phosphate groups. FTP, name this energy currency of the cell.**

**ANSWER:** ATP or adenosine triphosphate or adenosine 5 prime phosphate

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- (20) **Roth's Theorem guarantees the existence of these groups of numbers in any dense subset of the natural numbers, and the Green-Tao Theorem guarantees arbitrarily long ones in the primes. Dirichlet showed that these groups always contain prime numbers if the first two terms are coprime. A young \* Gauss developed a method for summing the elements of one of these, which was to average the first and last terms and multiply by the number of terms. Discrete linear growth characterizes, FTP, this group of numbers formed by iteratively adding a common difference to an initial term.**

**ANSWER:** arithmetic progression or arithmetic sequence (do not accept "arithmetic series")

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- (21) **His first work was about an unemployed man living in Chicago named Joseph waiting to be drafted in *Dangling Man*. This author of *The Dean's December* also wrote about a Holocaust survivor who emerged from the Mezvinski family tomb and later stops Eisen from killing a pickpocket in \* *Mr. Sammler's Planet*. A character created by this author flies to Mexico to use an eagle to catch lizards and has affairs with a Greek hotel maid and Thea but eventually marries Stella in *The Adventures of Augie March*. FTP, name this Jewish Chicagoan who wrote *Ravelstein*, *Herzog*, and *Humboldt's Gift*.**

**ANSWER:** Saul Bellow (accept Soloman Bellow)

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## Bonuses

(1) Answer these questions about cellular respiration FTPE:

[10] Two of these molecules are produced at the end of glycolysis, or the Embden-Meyerhof pathway. It contains three carbon atoms.

**ANSWER:** Pyruvate or Pyruvic acid

[10] Beginning with a reaction between pyruvate and acetyl-CoA, this cycle produces NADH and FADH<sub>2</sub>, which serve as electron carriers to be used in the electron transport chain. It is commonly named after a German-British scientist.

**ANSWER:** Krebs cycle or citric acid cycle or TCA or tricarboxylic acid cycle (accept “Szent-Györgyi-Krebs cycle”)

[10] This element is the final electron acceptor in the electron transport chain and is highly electronegative. It combines with hydrogen ions at the end of the electron transport chain.

**ANSWER:** Oxygen (accept O)

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(2) Answer the following questions about a work of literature FTPE:

[10] This novel is about a family living in rural China. Its characters include O-Lan, the protagonist's wife, the protagonist's three sons, and the protagonist's daughter, called The Poor Fool.

**ANSWER:** The Good Earth

[10] This author won the Pulitzer Prize in 1932 for writing *The Good Earth*, and in 1938 she became the first American woman to receive a Nobel Prize in Literature.

**ANSWER:** Pearl S. Buck

[10] This man is the protagonist of *The Good Earth*. A rickshaw driver by trade, he values his land above all else.

**ANSWER:** Wang Lung

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(3) One of his earlier works depicts a woman sheltered by a green umbrella with a dog in her lap in *The Parasol*. FTPE:

[10] Name this artist of works such as *The Nude Maja* and a series of 80 paintings, *Los Caprichos*, as well as another series, *The Disasters of War*.

**ANSWER:** Francisco Goya

[10] Goya used the al secco technique in creating this series of 14 paintings. Centered around dark themes, name this series that included works such as *Witches' Sabbath* and *Saturn Devouring His Son*.

**ANSWER:** Black Paintings

[10] This later work of Goya depicted a line of French soldiers pointing guns at several kneeling unarmed figures.

**ANSWER:** Third of May, 1808 or Los Fusilamientos del Tres de Mayo

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(4) Identify the following Aztec gods FTPE:

[10] Name this Mesoamerican deity, the Aztec patron god of knowledge, who is referred to as the "feathered serpent."

**ANSWER:** Quetzalcoatl

[10] The Aztec people often drowned children as sacrifices to this Aztec god of rain, who was believed to bring down floods, lightning, and many other water-related disasters.

**ANSWER:** Tlaloc

[10] Quetzalcoatl's twin was this god of lightning and death, often depicted with his feet reversed, who guided souls of the dead through Mictlan.

**ANSWER:** Xolotl

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(5) Answer the following about trigonometry FTPE:

[10] This theorem in trigonometry states that the titular function of an angle of a triangle divided by the length of the opposite side is the same for all three angles.

**ANSWER:** Law of Sines (or Sine Law or Sine Formula or Sine Rule)

[10] Arising when using the Law of Sines to solve a triangle, this is the situation when, given one side length and two angle measures, there are two possible solutions.

**ANSWER:** ambiguous case

[10] The ratio of the sine of an angle of a triangle to the opposite side length gives the diameter of this circle.

**ANSWER:** circumcircle or circumscribed circle

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(6) Answer the following questions about an English novel FTPE:

[10] This Victorian novel tells of the thwarted love between Catherine Earnshaw and an orphan she grows up with. It opens with a framing story about Mr. Lockwood.

**ANSWER:** Wuthering Heights

[10] *Wuthering Heights* is the only novel of this author. She published under the pen name Ellis Bell.

**ANSWER:** Emily Brontë

[10] This man is the love interest of Cathy in *Wuthering Heights*. He is a romantic hero early in the novel but later becomes vengeful and bitter.

**ANSWER:** Heathcliff

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(7) Nations enter into many agreements. FTPE:

[10] Give this type of agreement that recognizes the participation of nations and the obligations of which that the parties are responsible. Many were signed in Paris, and the one that ended World War I was signed in Versailles.

**ANSWER:** treaty

[10] This process, recognized and regulated by some treaties, involves nations or states returning a suspect to the jurisdiction where a crime was committed to face legal process.

**ANSWER:** extradition

[10] This type of treaty is made between nations and the Pope and the Holy See. They provide rights and privileges to the Catholic Church and its members in those countries.

**ANSWER:** concordat

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(8) Answer the following about web programming languages FTPE:

[10] Consisting of tags specified by less-than and greater-than signs, this is the leading markup language for webpages.

**ANSWER:** HyperText Markup Language or HTML

[10] This object-oriented programming language was released in 1995 and quickly gained popularity in web development. It is the leading client-side programming language, but most mobile phone browsers still do not support it.

**ANSWER:** JavaScript (do not prompt on or accept "Java")

[10] This language was introduced to unify and simplify the style elements of HTML. Its name refers to the priority scheme it employs to decide between contradictory commands.

**ANSWER:** Cascading Style Sheets or CSS

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(9) This musical composition was inspired by a poem by Stephane Mallarme. FTPE:

[10] Name this song that opens with a flute solo that descends chromatically to a tritone below the original pitch.

**ANSWER:** Prelude to the Afternoon of a Faun or Prelude a l'apres-midi d'un faune

[10] This composer of *Prelude to the Afternoon of a Faun* also composed *Clair de Lune* as part of his *Suite Bergamasque* as well as *La Mer*.

**ANSWER:** Claude Debussy

[10] This Debussy piano suite for solo piano includes movements such as *Jimbo's Lullaby* and *Golliwog's Cakewalk*, and is dedicated to Debussy's daughter.

**ANSWER:** The Children's Corner

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(10) Identify the following about types of radiation FTPE:

[10] Name this kind of radiation generated by the acceleration of charged particles to near-light speed in the presence of a magnetic field. It is named after a certain type of particle accelerator.

**ANSWER:** synchrotron radiation

[10] This kind of radiation is theorized to exist as a result of pair production in which one particle is caught by a black hole while the other escapes. Its namesake physicist notably suffers from ALS.

**ANSWER:** Bekenstein-Hawking radiation

[10] The existence of cosmic microwave background radiation throughout the universe has provided evidence for this theory concerning the universe's formation.

**ANSWER:** big bang theory (or model)

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(11) Answer the following about a group of European settlers in Africa FTPE:

[10] In this migration out of Cape Colony, Dutch settlers tried to escape British control and the abolition of slavery and fought the Zulu to establish a homeland.

**ANSWER:** The Great Trek or Die Groot Trek

[10] This word, Afrikaans for "Farmer", describes the self-governing states that those Dutch founded. Those states fought two namesake wars with the British Empire, the second of which ended in their annexation.

**ANSWER:** Boer

[10] The Boer Republics were mostly contained within this modern-day republic with three capitals which abolished apartheid in 1994.

**ANSWER:** Republic of South Africa

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(12) The protagonist finds the acronym “W.A.S.T.E” and the name “Kirby” underneath a muted post horn symbol written on a bathroom wall at a bar. FTPE:

[10] Oedipa Maas has an affair with Metzger and uncovers a mystery about her ex-boyfriend Pierce Inverarity in this novel.

**ANSWER:** The Crying of Lot 49

[10] This author of *The Crying of Lot 49* wrote about Tyrone Slothrop in *Gravity's Rainbow* in addition to writing the novels *Mason & Dixon* and *Vineland*.

**ANSWER:** Thomas Ruggles Pynchon

[10] In this Pynchon novel, Benny Profane of the Whole Sick Crew is hired by Herbert Stencil to travel to Malta in his quest to find the mysterious title entity.

**ANSWER:** V.

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(13) He cut off part of his ear after confronting Paul Gauguin with a razor blade, and was hospitalized as a result. FTPE:

[10] Name this artist who created *Self Portrait with Bandaged Ear*, and who was depicted by Paul Gauguin in *The Painter of Sunflowers*.

**ANSWER:** Vincent van Gogh

[10] This famous work of van Gogh depicts a swirly night sky. He later painted it “over the Rhone”.

**ANSWER:** The Starry Night

[10] This van Gogh painting depicts five people crowded around a dimly-lit table. Eating the title food, they appear tired and coarse.

**ANSWER:** The Potato Eaters

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(14) Answer the following about a 13th century city FTPE:

[10] Located on the Riddarfjärden [REE-DAR-FYAR-DEN] bay of the Mälaren [MEH-LAHR-EN] lake, this European capital is home to the Sveriges Riksdag [SVER-YES REEGS-TAWG].

**ANSWER:** Stockholm

[10] Stockholm is the capital of this Scandinavian country.

**ANSWER:** Sweden

[10] Sweden is separated from Finland by this body of water located north of the Baltic Sea.

**ANSWER:** Gulf of Bothnia

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(15) Answer the following about Martin Luther FTPE:

[10] In 1517, Martin Luther posted his *Disputation on Doctor Martin Luther on the Power and Efficacy of Indulgences*, better known by this name, on the door of a Wittenberg church.

**ANSWER:** Ninety-five Theses

[10] In 1521, Emperor Charles V issued this declaration that Luther was a heretic and ordered his capture. He was granted safe passage home, but evaded arrest in Wartburg Castle.

**ANSWER:** Diet of Worms or Edict of Worms

[10] Pope Leo X excommunicated Luther for failing to comply with this papal bull, which had demanded Luther to retract statements in his *Ninety-Five Theses*.

**ANSWER:** Exsurge Domine

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(16) This volcano erupted in 1980 in the state of Washington. FTPE:

[10] Name this volcano 50 miles northeast of Portland, Oregon.

**ANSWER:** Mount St. Helens

[10] Mount St. Helens is this kind of volcano, which is a tall volcano formed by alternating hardened layers of lava and volcanic ash. These kinds of volcanoes erupt periodically in an explosive manner.

**ANSWER:** stratovolcano or composite volcano

[10] This is the most abundant gas released in volcanic eruptions. It is the main driving force behind explosive eruptions.

**ANSWER:** water vapor (also accept steam, prompt on “water”)

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(17) Answer the following about the most comical of philosophies, existentialism, FTPE:

[10] In a namesake web comic, a Family Circus cartoon is randomly paired with a quote from this existentialist philosopher, including “It is always consoling to think of suicide” and “God is dead”.

**ANSWER:** Friedrich Nietzsche

[10] Scot Adams claims that this comic strip’s titular character is a workplace Everyman coping with the futility and absurdity of the modern office.

**ANSWER:** Dilbert

[10] This comic strip explores the “existential angst of a certain young Mr. Jon Arbuckle” in the absence of his cat.

**ANSWER:** Garfield Minus Garfield

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(18) Identify the following works of Truman Capote FTPE:

[10] In this true crime “nonfiction novel”, Capote described the 1959 murders of the Clutter family in Holcomb, Kansas, as well as the ensuing trial and aftermath.

**ANSWER:** In Cold Blood

[10] In this novella, Holly Golightly likes to go to the titular location because “nothing very bad could happen to you there”.

**ANSWER:** Breakfast at Tiffany’s

[10] In this first novel of Capote, Joel Harrison Knox is sent to live with his absent father at Skully’s Landing in the rural south.

**ANSWER:** Other Voices, Other Rooms

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(19) Identify the following about visual representations in mathematics FTPE:

[10] This is a depiction of different sets with regions for their possible intersections. With two or three sets, they are typically drawn as overlapping circles. The number of regions must be a power of two.

**ANSWER:** Venn diagram

[10] In Boolean algebra, these charts contain a column for each variable and a row for every possible combination of inputs with its corresponding outputs.

**ANSWER:** truth table

[10] This diagram, named for an amateur French mathematician, is another term for the complex plane.

**ANSWER:** Argand diagram

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(20) Answer the following questions about the Temperance Movement FTPE:

[10] This constitutional amendment was ratified in 1919 and prohibited the sale, manufacture, and transportation of liquor. It was repealed sixteen years later.

**ANSWER:** Eighteenth Amendment

[10] This party founded in 1869 opposes the use of alcohol and is the oldest existing third party in the United States. Its main objective was passing the Eighteenth Amendment.

**ANSWER:** Prohibition Party

[10] This female prohibitionist was famous for destroying bars with a hatchet. She married and divorced two husbands and was banned from Kansas City.

**ANSWER:** Carry A. Nation

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(21) This type of bond forms between a nonmetal and a metal ion. FTPE:

[10] Name this kind of bond in which electrons are transferred between atoms, exemplified by the bond between sodium and chloride in table salt.

**ANSWER:** ionic bond

[10] This quantity equals the amount of energy required to break an ionic compound into a gas.

**ANSWER:** lattice energy or lattice enthalpy

[10] Although finding lattice energy experimentally is not always feasible, this cycle can be used to measure lattice energy by combining each of the vaporized constituent atoms and allowing the solid to recrystallize.

**ANSWER:** Born-Haber cycle

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