



The Illinois Mathematics and Science Academy of Aurora, IL presents

## IMSANITY 4

### -ROUND 11-

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## Tossups

- (1) **The central figure of this painting was the model for the old woman on the left of Paul Gauguin's *Where Do We Come From? What Are We? Where Are We Going?* This painting, like its artists later *Anxiety*, was set on Ekeberg Hill. The eruption of Krakatoa probably inspired the coloration of the sky in this work, in which two double-masted boats sail toward the central structure. Two men in(\*) top hats walk away from a black robed figure on a wooden bridge in, for ten points, this painting of a bald figure clasping his face and making the title expression by Edvard Munch.**

**ANSWER:** The Scream (or Skrik, accept The Cry)

- (2) **This battle was followed by the Battle of the River Berre near Narbonne. After the treasure of the Abbey of Saint Martin was threatened, the winning commander answered the call of Duke Odo of Aquitaine for help. The winning side at this battle formed in a square-shaped(\*) phalanx, reducing the effect of the loser's uphill cavalry charge. The governor of Al-Andalus, Abd ar-Rahman, died at this battle. For ten points, name this battle which saw the Muslim invasion Gaul by the Umayyad Caliphate defeated by the Frankish army under Charles Martel in 732.**

**ANSWER:** Battle of Tours or Battle of Poitiers

- (3) **This architect's proposed Hotel Attraction was considered for the rebuilding of Ground Zero in New York City. This designer of the Calvet Chair designed a building for Roser Segimon nicknamed The Quarry that features an undulating stone facade. This architect lived in The Pink Tower in a complex he designed which also features a serpentine bench and a mosaic salamander,(\*) the Park Guell. Eight spires representing apostles sit atop a church designed by this man that has been under construction for 130 years. For ten points, identify this Catalanian architect of Barcelona's La Sagrada Familia.**

**ANSWER:** Antoni Gaudi i Cornet

- (4) **An experimental drug for treating this disease interferes with mycolic acid synthesis. A now-abandoned method of treating side-effects of this disease is the pneumothorax technique. Drug-resistant forms of this disease are usually treated with bedaquiline. One vaccine for this disease is abbreviated BCG, and it can present through Pott’s disease. A screening tool for this disease that replaced the Tine test is the(\*) Mantoux skin test. The organism responsible for this disease is a member of the genus mycobacterium. For ten points, name this chronic bacterial disease that usually affects the lungs, historically known as consumption.**

**ANSWER:** tuberculosis (accept TB)

- (5) **An author with this last name created the writer Ruth Cole in *A Widow for One Year*. One author with this last name wrote about the marriage of Guy to Julia Templeton in *Bracebridge Hall*, and another author with this surname wrote about the son of Jenny Fields who marries Helen Holms. This name was shared by the author of(\*) *The World According to Garp* and an author who created a character that became a loan shark in exchange for the treasure of Captain Kidd. That author of *The Devil and Tom Walker* wrote about Katrina Van Tassel and Ichabod Crane in *The Legend of Sleepy Hollow*. For ten points, identify this surname shared by John and Washington.**

**ANSWER:** Irving

- (6) **The Mpemba effect asserts that hot water can attain this property more quickly than cold water. A mixture of two components is called eutectic if it has a lower value of this property than any other combination of them, and a high value of it is correlated with high molecular symmetry in Carnelley’s rule. Although the Gibbs free energy change of this value’s namesake process is zero, its enthalpy change is termed that of(\*) fusion. A change in this property for a solution is observed when adding solutes and is called its “depression.” For ten points, name this colligative property of a substance, the temperature at which a solid changes into a liquid or vice versa.**

**ANSWER:** freezing point or melting point

- (7) **One poem by this author described a manor “That found King James, when, hunting late this way / With his brave son the, the prince, they saw thy fires.” In another work by this author, a prostitute acts like a mad lady that spouts Talmudic commentary, and in another play, Bonario is disinherited and accused of an affair with a woman he rescued. This author of *To Penshurst* wrote “Drink to me only with thine eyes,”(\*) in *To Celia*. In one play, Subtle, Face, and Dol Common try to con Epicure Mammon in Lovewit’s house, and in another, Mosca helps the title character trick Corbaccio and Corvino. For ten points, identify this author of *The Alchemist* and *Volpone*.**

**ANSWER:** Benjamin Jonson

- (8) **Saoshyant participates in one of these events called Frashokereti. Xochiquetzal’s seduction by Texcatlipoca preceded one of these events. Kali Yuga directly precedes this event, and Dajjal fights both Isa and the Mahdi during this event. A figure riding a seven-headed beast who is drunk on blood and inscribed with the name(\*) “Babylon the great” precedes this event. The opening of seven seals occurs during this period, which is heralded by the Four Horsemen. For ten points, name this event in which, according to some traditions, the Messiah returns and quite literally all hell breaks loose.**

**ANSWER:** end of the world (accept equivalents; accept apocalypse or armageddon or eschaton)

- (9) **After the death of Asa Pollard in this battle, many people deserted after being ordered to not give a funeral. This battle saw naval engagements around Moulton’s Point. Three generals for one side arrived on the *Cerberus*, and the outcome of this battle may have caused the rejection of the Olive Branch Petition. The leader of the Massachusetts Committee of Safety, Joseph Warren, died during this engagement, which saw one side setting up camp at(\*) Copp’s Hill. This battle saw the American side ordered to not fire “until you see the whites of their eyes”. For ten points, name this Revolutionary War battle fought mostly at Breed’s Hill outside Boston.**

**ANSWER:** Battle of Bunker Hill (prompt on Battle of “Breed’s Hill” before mention)

- (10) Herman Daly argued this theory is not applicable anymore due to the high degree of capital mobility, and Joseph Schumpeter claimed it caused “creative destruction.” This idea was criticized by the Singer-Prebisch thesis due to the deterioration of manufactured goods over time, and it was modified by a model of Heckscher and Ohlin. Expounded in the work(\*) *On the Principles of Political Economy and Taxation* by David Ricardo, it is often demonstrated with the example of Portuguese wine and English cloth. For ten points, name this economic principle that trade is still beneficial even without an absolute advantage.

ANSWER: comparative advantage

- (11) A Steinmetz solid is an intersection of two or three of these shapes. Archimedes inscribed a sphere in one of these shapes to determine that the sphere’s volume is two-thirds the volume of this shape. One method for determining the volume of a solid of revolution is named for the shells of these objects, which can be generated by revolving a(\*) rectangle around one of its sides. Its lateral surface area is equal to  $2 \pi r h$  and its volume is  $\pi r^2 h$ . For ten points, name this three-dimensional shape with a circular cross-section and straight sides.

ANSWER: cylinder

- (12) This author wrote about Jaromir Hladik being granted a year to finish writing *The Enemies* before his execution in *The Secret Miracle*, and he described another poet’s death in *The Parable of the Palace*. After being thrown from a horse, the title character of one story has perfect recall, and in another, an elaborate kabbalistic plot is created to kill Erik Lonnrot. This author of *Funes the Memorious* and(\*) *Death and the Compass* wrote about a point in Carlos Argentino’s basement which contains all other places, and about Yu Tsun’s murder of Dr. Albert. For ten points, identify this author of *The Aleph* and *The Garden of Forking Paths*.

ANSWER: Jorge Luis Borges

- (13) **This man convinced Franklin Pierce to attack from the west in the Battle of Chapultepec. He fought to stop the Army of the James in the Bermuda Hundred Campaign. Earlier, he had lost to the Know-Nothing Gerald Stith in a mayoral election. This man withdrew from a siege led by Henry Halleck at Corinth. He was replaced by Braxton Bragg in one post, and he also lost one battle after taking control when his superior, (\*) Albert Sidney Johnston, died. In addition to the Battle of Shiloh, this general led his side in a battle that earned Stonewall Jackson his nickname. For ten points, name this Confederate general who won the First Battle of Bull Run.**

**ANSWER:** P(ierre) G(ustave) T(outant) Beauregard

- (14) **One plus the voltage gain times this value is known as its Miller form. Reducing PCB traces is one way to reduce the effects of the parasitic form of this quantity. This value, whose reciprocal is measured in darafs, can be calculated in parallel circuits by summing its individual values. One half times this quantity times  $v$  squared equals the energy (\*) stored in devices that observe this quantity, which is dependent on the permittivity of the dielectric and the size of the two conducting parallel plates. Equal to charge over voltage, for ten points, name this quantity measured in farads that represents a material's ability to hold charge.**

**ANSWER:** capacitance

- (15) **One figure from the myth system of this nation was a hermaphroditic patron of singers who only wore one sandal, while another had the Yellow Millet dream. Another figure in this myth system used the Milky Way to stop his daughter from falling in love with a cow herder, and he ascended to his highest post after defeating a demon even the Three Pure Ones could not. This myth system includes a figure nicknamed (\*) "Iron-Crutch" who lives in the Bohai Sea with the other Eight Immortals and who received his power from Lao Tzu. For ten points, name this nation whose mythology discusses the Jade Emperors and where Daoism was founded.**

**ANSWER:** China or Chinese

- (16) This entity was the inspiration for the Sangraal, which was created to combat the Ori in *Stargate*. Sean Connery plays a scholar on this object in *Indiana Jones and the Last Crusade*. This object is the subject of one film in which a character claims “Tis but a flesh wound!” and other characters are(\*) knights who say “Ni!”. A song with this name includes the line “But I still don’t know why, why I love it so much” sung by Justin Timberlake and appears on a Jay-Z album named *Magna Carta [this object]*. For ten points, name this legendary object, the subject of a Monty Python film parodying Arthurian legends.

ANSWER: Holy Grail

- (17) This artist included the diary *How to Improve the World* and essays on Duchamp, Johns, and Miro in his *A Year from Monday*. Gertrude Stein’s poem *The World is Round* is quoted in the second movement of one of his works, which opens with the *To Begin* section and is called *Living Room Music*. Cymbals and an oscillating muted piano melody interrupt a series of frequency recordings in one work by this composer. Aleatoric compositions based on the I Ching like *Music of Changes* and(\*) *Imaginary Landscapes* were written by this inventor of the prepared piano. For ten points, name this American composer who wrote a work consisting only of rests, 4’33”.

ANSWER: John Milton Cage Jr.

- (18) One poet from this country described the repeated landscape of “Three rocks, a few burnt pines, a lone chapel” and wrote “wherever I travel,” this country “wounds me” in his *Mythistorema* and *In the Manner of G.S.* One town in this country saw characters including Archon(\*) Patriarchis, The Agha, and Priest Grigoris attempt to put on a passion play, and one character from this country seduced Madame Hortense and was called Zorba. The home of Giorgos Seferis and Nikos Kazantzakis, for ten points, identify this country, one of whose epics was the inspiration for Kazantzakis’s *The Odyssey: A Modern Sequel*.

ANSWER: Greece (accept Hellenic Republic or Hellas)

- (19) Paul Erdős [READ: “AIR-dawsh”] conjectured that a set of points whose pairwise distances differ by at least this amount has diameter quadratic in its size. In the discrete metric, this distance separates distinct points. Between four and seven colors are needed to color the plane so that those at this distance from each other get different colors. Compass and straightedge constructions begin with a segment defined to be of this length. The<sup>(\*)</sup> legs of a right triangle whose hypotenuse’s length is this value are the sine and cosine of one of its acute angles. For ten points, name this value, the sum of the squares of sine and cosine and also the radius of a unit circle.

ANSWER: one

- (20) After this ruler’s death, the Battles of Rhamnus and Crannon took place as part of the Lamian War. This man killed his general Cleitus the Black and had an affair with Hephaestion. He calmed a horse by taking its shadow out of view, after which his father noted that his country is “too small for you”; that horse was Bucephalus. He pursued Darius III, and later faced an elephant army under King Porus at the Battle of the<sup>(\*)</sup> Hydaspes River. He died due to a fever after winning Babylonian territory at the Battle of Gaugamela. For ten points, name this man who was tutored by Aristotle and who, as King of Macedon, built an empire stretching to India.

ANSWER: Alexander the Great (prompt on Alexander, accept Alexander III of Macedon)

- (21) The first “sandwich compound” was made by coordinating an ion of this element with two cyclopentadienyl rings, and a complex of this element and cyanide is the pigment Prussian blue. This element possesses the highest nuclear binding energy, and oxides of it, including pure hematite, are often used in its thermite reaction. Trace amounts of potassium hydroxide are added to this element when preparing the commercial catalyst for the<sup>(\*)</sup> Haber-Bosch process, and it is most commonly found in the +2 and +3 oxidation states. For ten points, name this component of hemoglobin found in steel, a magnetic metal with chemical symbol Fe.

ANSWER: Iron (accept Fe before mention)



## Bonuses

- (1) This work is often seen as the female counterpart to Thomas Gainsborough's *The Blue Boy*. For ten points each:
- [10] Identify this Thomas Lawrence portrait of the young Sarah Barrett Moulton in a white dress. Her silky sash and hat are of the title color.  
**ANSWER:** Pinkie
- [10] *Pinkie* was a work of this 18th century art movement whose members included Antoine Watteau and Francois Boucher.  
**ANSWER:** rococo
- [10] Another rococo depiction of a woman in pink was this work of Jean-Honoré Fragonard, in which the central figure sits on the title object and kicks off her shoe.  
**ANSWER:** The Swing (or L'escarpolette)
- (2) One character in this novel donates milk to children of a town, and the lawyer Mr. Carmichael takes on a case pro deo. For ten points each:
- [10] Identify this novel in which Absalom, the son of Stephen Kumalo, is hanged for the murder of Arthur Jarvis.  
**ANSWER:** Cry, the Beloved Country
- [10] *Cry, the Beloved Country* is a work by this author who wrote about the police officer Peter van Vlaanderen in *Too Late the Phalarope*.  
**ANSWER:** Alan Paton
- [10] In *Cry, the Beloved Country*, Stephen Kumalo is extremely inconvenienced by this type of boycott. Gao Xingjian and William Inge both wrote works which describe a location involving these objects.  
**ANSWER:** bus (accept Bus Stop)
- (3) During this war, the *Wasp* captured the *Three Brothers* and the *Bacchus* in order to stop a naval advance. For ten points each:
- [10] Name this war, ended by the Treaty of Ghent, between the United States and Britain. It is sometimes called the "Second War for Independence."  
**ANSWER:** War of 1812
- [10] During the War of 1812, this American fought at battles such as Lundy's Lane and Queenston Heights. This general, known as "Old Fuss and Feathers", also attacked Chapultepec after landing at Veracruz in the Mexican-American War.  
**ANSWER:** Winfield Scott
- [10] This faction of the Creeks led by Peter McQueen in the War of 1812 was commanded by William Weatherford in an attack on Fort Mims.  
**ANSWER:** Red Sticks

- (4) They are either weak acids or weak bases. For ten points each:  
 [10] Name these compounds used in acid-base chemistry to visually represent the pH of a solution. Examples of them include phenolphthalein and Congo red.  
**ANSWER:** indicator  
 [10] An indicator changing color during this analytic laboratory procedure signals the end point of the reaction. This procedure is used to determine the concentration of an unknown acid or base.  
**ANSWER:** titration  
 [10] This is a common indicator used during titrations in which the equivalence point is around 6 or 7. It turns its namesake color in the presence of a base, and is used to indicate carbon dioxide output from respiration or photosynthesis.  
**ANSWER:** bromothymol blue
- (5) The Gran Valira is the largest river in this country. For ten points each:  
 [10] Name this landlocked country that contains cities such as Encamp and La Massana. This mountainous country's highest point lies at Coma Pedrosa.  
**ANSWER:** Andorra  
 [10] Andorra is the only country contained entirely in this mountain range, which stretches from the Bay of Biscay to the Mediterranean Sea and separates France from Spain.  
**ANSWER:** Pyrenees  
 [10] Southeast of the Pyrenees mountain range is this Spanish region, which contains Girona and Lleida. A French province called its "northern" version borders Andorra to the north, and its namesake language is the official language of Andorra.  
**ANSWER:** Catalonia (or Catalunya)
- (6) Identify the following American socialist authors for ten points each.  
 [10] This author wrote about Jurgis Rudkus and attacked the meatpacking industry in *The Jungle*.  
**ANSWER:** Upton Beale Sinclair Jr.  
 [10] This author wrote about a socialist revolution in *The Iron Heel*. He complained to Sinclair that no one appreciated his attack on individualism in *Martin Eden*, though his *To Build a Fire* was little more than a Yukon survival story.  
**ANSWER:** Jack London (or John Griffith Chaney)  
 [10] This author described a feminist society that had moved beyond socialism in *Moving the Mountain*, which she followed by writing *Herland*. Some of her other writings were included in *The Cry for Justice*, a socialist anthology edited by Sinclair.  
**ANSWER:** Charlotte Perkins Gilman

- (7) The Malikis and the Hanafis are credited with the development of this system. For ten points each:  
[10] Name this Islamic legal system in which the will of Allah is interpreted. Saudi Arabia adheres to this system.  
**ANSWER:** Sharia law (accept Shar'iah)  
[10] Sharia is largely derived from the Qu'ran and these sayings of the Prophet Muhammad. They elaborate on much of what is contained in the Qu'ran, including the Last Judgement.  
**ANSWER:** hadiths  
[10] Hadiths can be legally interpreted by this type of person who has received education in Islam. This class includes muftis, mullahs, and maulanahs.  
**ANSWER:** Ulema (accept Ulama or Aalim)
- (8) Underground varieties of these structures can be found at mid-ocean ridges. For ten points each:  
[10] Name these geologic structures that come in shield and strato- varieties. Their eruptions occur when lava escapes from their magma chambers.  
**ANSWER:** volcanoes  
[10] An eruption of a volcano located underneath a glacier or ice formation can result in a large flood given this name, an Icelandic loanword.  
**ANSWER:** jökulhlaup  
[10] Eruptions can also result in the release of this destructive volcanic mudflow, which consists of pyroclastic material mixed with hot water and rock. Jokulhlaups can trigger these events, a deadly one of which occurred after the eruption of Mount Pinatubo.  
**ANSWER:** lahar
- (9) Much of this settlement's trade came from the obsidian from the nearby volcano of Hasan Dag. For ten points each:  
[10] Name this Neolithic archaeological site at which a clay figure of a large-breasted Mother Goddess was found. A relief from this site shows two leopards facing each other.  
**ANSWER:** Catal Huyuk  
[10] Catal Huyuk is located in this modern-day country, home to the Lydian Kingdom as well as the center of Hittite rule. States that ruled from this country included the Sultanate of Rum and the Ottoman Empire.  
**ANSWER:** Republic of Turkey  
[10] These soldiers in the Ottoman Empire were forcefully recruited from Christian families by the devshirme system. They were purged by Mahmud II in the Auspicious Incident.  
**ANSWER:** Janissaries

- (10) Identify the following about mathematical models of population for ten points each:
- [10] The population of rabbits that mature after one month can be modeled by this sequence of numbers, named for the Italian author of *Liber Abaci* [READ: “LEE-bair ah-BAH-chee”]. It predicts the number of pairs of rabbits at the end of each of the first six months to be 1, 1, 2, 3, 5, and 8.  
**ANSWER:** Fibonacci numbers or sequence
- [10] One differential equation to model population states that the change in population is proportional to the current population, whose solution is this type of function. The derivative of this type of function is a constant multiple of itself.  
**ANSWER:** exponential
- [10] In this *S*-shaped population model, change in population is proportional to the product of current population and its difference from the carrying capacity.  
**ANSWER:** logistic model or curve or growth
- (11) Answer the following about British authors who wrote works called *Portrait of a Lady*, for ten points each:
- [10] This author’s poem *Portrait of a Lady* described a woman who “shall sit here, serving tea to friends” and her failed friendship with the narrator. One of his poems about “An old man in a dry month” was *Gerontion*.  
**ANSWER:** Thomas Stearns Eliot
- [10] This author described Isabel Archer’s stay with Ralph Touchett and marriage to Gilbert Osmond, who had previously had an affair with Madame Merle and fathered Pansy in his novel *Portrait of a Lady*.  
**ANSWER:** Henry James
- [10] This American expatriate wrote “Your mind and you are our Sargasso sea” in his *Portrait d’une femme*, which was collected in his poetry collection *Ripostes*.  
**ANSWER:** Ezra (Weston Loomis) Pound
- (12) The shear form of this quantity occurs due to forces acting parallel to the surface, while its normal form lies perpendicular. For ten points each:
- [10] Name this measure of the deformation of a physical body due to internal or external forces. Hooke’s Law quantifies this value in relation to strain for an elastic body.  
**ANSWER:** stress
- [10] This value can be calculated by dividing stress by strain, which quantifies the resistance to linear deformation of a material. This modulus, a form of the elastic modulus, is measured in pascals.  
**ANSWER:** Young’s modulus
- [10] This other value for a substance gives its resistance to compression. Equal to density times the derivative of pressure with respect to volume, this value is divided by density in the Newton-Laplace formula.  
**ANSWER:** bulk modulus

- (13) This hero defeated the Carian pirate Chermarrhus, and defeated the Amazons by dropping boulders on them. For ten points each:  
[10] Name this Greek hero who used a led-block-tipped spear to defeat the Chimera.  
**ANSWER:** Bellerophon  
[10] The grandfather of Bellerophon was this figure, the founder of Ephyra. After chaining up Thanatos in Tartarus so no one would die, this figure was cursed with having to roll a boulder up a hill for all eternity.  
**ANSWER:** Sisyphus  
[10] After slaying the Chimera and defeating the Amazons, Bellerophon won this figure's hand in marriage. This figure was the daughter of Iobates, and her sister Stheneboea also loved Bellerophon.  
**ANSWER:** Philonoe (accept Anticleia)
- (14) Among the rulers of this country were Coloman the Book-Lover and the more modern Janos Kadar and Imre Nagy. For ten points each:  
[10] Name this country, whose 1848 revolution was led by Lajos Kossuth and were on the losing side on the Battles of Lechfeld and Mohacs. This country is largely made up of ethnic Magyars.  
**ANSWER:** Hungary (accept Magyarország)  
[10] The first Christian king of Hungary was this man. He began his rule as Grand Prince Géza, but took the role of King when Pope Sylvester II sent him a crown.  
**ANSWER:** Stephen I or István I  
[10] This ruler of Hungary led it through most of World War II until his 1944 overthrow by Nazi Germany. This man imprisoned Ferenc Szalasi, the leader of the Arrow Cross Party, and his son was wrapped in a carpet and held as a hostage.  
**ANSWER:** Admiral Miklos Horthy
- (15) This show was banned in Mississippi in 1970 for having a racially integrated cast. For ten points each:  
[10] Identify this television program which debuted in 1969 with a cast of Jim Henson's muppets, including Oscar the Grouch, Big Bird, and Bert and Ernie.  
**ANSWER:** Sesame Street  
[10] This Sesame Street character recently parodied Carly Rae Jepsen and Icona Pop with songs entitled *Share It Maybe* and *Me Want It (But Me Wait)*.  
**ANSWER:** Cookie Monster  
[10] This musical, a parody of Sesame Street, based its character of Trekkie Monster on Cookie Monster. In this musical, Kate Monster is offended when asked if she is related to Trekkie before singing the song *Everyone's a Little Bit Racist*.  
**ANSWER:** Avenue Q

- (16) Identify the following about music inspired by the stories of E.T.A. Hoffmann for ten points each.
- [10] This composer used a Hoffmann story about Kleinzach in his opera *The Tales of Hoffmann*. He also wrote operettas based on Greek mythology including *The Beautiful Helen* and *Orpheus in the Underworld*.  
**ANSWER:** Jacques Offenbach
- [10] Hoffmann's story *The Nutcracker and the Mouse King* was the source for this composer's ballet *The Nutcracker*. His ballet *Swan Lake* was inspired by Russian folk tales.  
**ANSWER:** Peter Ilyich Tchaikovsky
- [10] Leo Delibes's ballet *Coppélia* was based on this Hoffmann story about Dr. Coppelius's life-like dolls. In the story, Coppelius scares Nathaniel due to his resemblance to the title eye-stealing figure.  
**ANSWER:** The Sandman
- (17) This country faced a coup against Prime Minister Georgios Papandreou known as the July Apostasia. For ten points each:
- [10] Name this country which was home to the ancient city states of Corinth and Sparta, and it still demands back the Elgin Marbles stolen from the Parthenon.  
**ANSWER:** Greece (accept Hellenic Republic, Hellas, or Elliniki Dimokratia)
- [10] This man fought for Greek independence as a leader of the secret society Filiki Eteria, also known as the Society of Friends. After a defeat at the Battle of Dragasani, this man retreated to Romania.  
**ANSWER:** Alexander Ypsilantis
- [10] After his retreat, Ypsilantis sought refuge in Austria, but was turned away by this politician who represented Austria at the Congress of Vienna.  
**ANSWER:** Klemens von Metternich
- (18) These entities come in the forms of the atom, soul, and God. For ten points each:
- [10] Name these philosophical entities, which were described by one philosopher to be fundamental units of the universe that don't interact with each other but remain unique and synchronized. The book that introduced this concept explored "the best of all possible worlds".  
**ANSWER:** monad
- [10] This philosopher expounded on the idea of monads, but is best-remembered for co-discovering infinitesimal calculus with Isaac Newton.  
**ANSWER:** Gottfried Wilhelm Leibniz
- [10] In a book of this name, Leibniz introduced this title concept which refers to the ability to believe in God while understanding all of the evil in the world. Voltaire responded to Leibniz's definition of this term in his *Poem on the Lisbon Disaster*.  
**ANSWER:** Theodicy

- (19) A magnesium ion lies at the center of the chlorin ring in this molecule. For ten points each:
- [10] Name this green pigment found in thylakoid membranes of chloroplasts in plant cells. The *A* variety of this molecule contains methyl groups as side-chains, one of which is replaced by an aldehyde moiety in its *B* variety.  
**ANSWER:** chlorophyll
- [10] Chlorophyll acts as the primary electron donor in the light-dependent reactions of this process, which converts light to chemical energy.  
**ANSWER:** photosynthesis
- [10] This variation on the light-dependent reaction occurs in C4 plants and purple sulfur bacteria. In this pathway, electrons travel only through photosystem I, producing ATP but not NADPH.  
**ANSWER:** cyclic photophosphorylation
- (20) Answer the following about literary depictions of Saint Joan of Arc, for ten points each:
- [10] This author wrote a biography of Joan of Arc, but was more famous for his novels *Penguin Island* and *The Revolt of the Angels*.  
**ANSWER:** Anatole France (or François Anatole Thibault)
- [10] This author made Joan a member of the Black Straw Hats in his play *Saint Joan of the Stockyards*. He also wrote a play about Grusha Vashnadze, *The Caucasian Chalk Circle*.  
**ANSWER:** Bertolt Brecht
- [10] This author wrote a play which sees Joan visit the dreams of Charles VII, *Saint Joan*. He is better known for writing about Eliza Doolittle and Henry Higgins in *Pygmalion*.  
**ANSWER:** George Bernard Shaw
- (21) This play employs a screen with text such as “Où sont les neiges”. For ten points each:
- [10] Identify this play in which Amanda Wingfield hopes Jim O’Connor will be a gentleman caller for her daughter, Laura.  
**ANSWER:** The Glass Menagerie
- [10] *The Glass Menagerie* is a work by this American playwright, who also wrote about Stanley Kowalski and Blanche Dubois in *A Streetcar Named Desire*.  
**ANSWER:** Thomas Lanier Tennessee Williams
- [10] Williams also wrote this play in which Lawrence Shannon meets Hannah Jelkes while working as a tour guide in a resort in Mexico.  
**ANSWER:** The Night of the Iguana