Question #1: Literature – Mythology

15 points

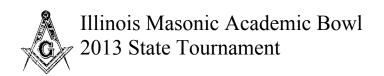|	
In the *Iliad* [ILL-ee-ud], Homer claimed that her father was Phoenix. Her father was the twin brother of Belus [BEL-us], the father of Aegyptus [ee-JIP-tus] and Danaus [DAN-ay-us]. Cilix [KIL-ix] was exiled from Tyros [TIE-rose] for failing to find her. The Oracle at Delphi [DEL-fie] told one of her brothers to not worry about her, and instead follow a cow; that led to the founding of Thebes [THEEBS]. This maiden, the only daughter of Agenor [ah-JEN-or], was given a dog that never missed its prey, and a spear that never missed its target. Zeus took the form of a bull to kidnap this maiden. Name this sister of Cadmus and namesake of a continent.	**Europa**

Question #2: Science – Astronomy

15 points

This moon's chain of thirteen craters, Enki Catena [en-kee kah-TEE-nah], probably was caused by a comet. Its southern hemisphere contains a large impact basin named Gilgamesh, and its impact crater Memphis Facula [FA-kyoo-lah] is located in its Galileo Regio [REE-jee-oh]. It is the four in the four two one resonance of the three inner Galilean moons of Jupiter, located outside Io [I-oh] and Europa but closer to Jupiter than Callisto. Name this largest moon in our solar system.	**Ganymede**

Question #3: Social Studies – US History

15 points

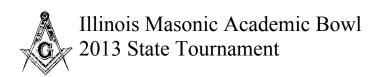|	
A jury in this state acquitted Roy Bryant and J.W. Milam of the murder of Emmitt Till. This state's Neshoba [neh-SHOW-bah] County was where the murders of Michael Schwerner, James Chaney, and Andrew Goodman were engineered by Deputy Sheriff Cecil Price. Before leading the Confederacy, Jefferson Davis represented this state in Congress. Name this state where Ulysses [yoo-LIS-ees] Grant laid siege to John Pemberton at Vicksburg.	**Mississippi**

Question #4: Science – Biology

15 points

Glutamic [gloo-TA-mik] acid reacts with this molecule to turn into a molecule that combines with ammonia to form glutamine [GLOO-tah-meen]. When this molecule is used and not replenished, the pH [p h] level in the body is lowered, and that condition, often caused by a lack of oxygen in cells, is lactic acidosis [LAK-tik as-i-DOE-sis]. This molecule and NADPH are created by the light-dependent reactions in the chloroplasts of plants. In animals, these molecules are typically created in the mitochondria [mie-toe-KON-dree-uh]. Name this molecule produced by oxidative phosphorylation [oks-uh-DATE-iv fos-for-uh-LAY-shun] to supply energy to living cells.	**ATP** (accept **Adenosine Triphosphate**)

Question #5: Miscellaneous – Pop Culture

15 points

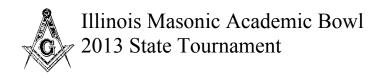|	
At Road Wild 1998, he pinned Eric Bischoff in a tag team match that involved Diamond Dallas Page and Hollywood Hogan. Katie Couric served as a guest host of his show on the same day he hosted *The Today Show*. In 1995, Branford Marsalis was replaced as the bandleader on his show by Kevin Eubanks. Controversy erupted when he was chosen to replace Johnny Carson instead of David Letterman. Name this host of NBC's *The Tonight Show*.	Jay **Leno**

Question #6: Literature – British Literature

15 points

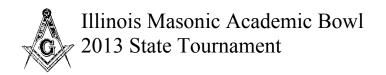|	
The speaker of this work describes pebbles flung that "bring the eternal note of sadness in." In this poem, the "Sea of Faith" is compared to "the folds of a bright girdle furled." The speaker in this poem laments that "on the French coast the light gleams, and is gone." It also describes "a darkling plain…where ignorant armies clash by night." Name this poem set on the southern coast of England, by Matthew Arnold.	"**Dover Beach**"

Question #7: Math – Probability

10 points per part

	This two word phrase is sometimes described as the universal set.	
1	Name this set of all possible outcomes from an experiment.	<u>**sample space**</u>
2	If there are three people selected from a group of six people without replacement, and order does not matter, this is the size of the sample space of groups.	<u>**20**</u>
3	If there are three boys and three girls in that original group of six, this is the probability that two boys and one girl will be selected when three people are selected without replacement.	<u>**9/20**</u> (or 0.<u>**45**</u>)

Question #8: Math – Probability

10 points per part

	This probability distribution is generated by repeated experiments with an expected value.	
1	Name this distribution named for a Frenchman which sometimes approximates a bell curve, though this distribution generally is not symmetric.	<u>**Poisson**</u> distribution
2	Often abbreviated CDF, this is applied to any distribution to find the probability of getting a result up to a particular value.	<u>**cumulative distribution function**</u>
3	If the mean of a Poisson distribution is 4, this is its standard deviation.	<u>**2**</u>

Question #9: Science – Physics

10 points per part

	Answer the following about sound waves:	
1	Sound waves are mechanical compressional pressure waves, so they are classified as this type of wave contrasted with transverse waves.	**longitudinal** waves
2	The dense part of a wave is called a compression, while the other part of the wave is called this.	**rarefaction**
3	This phenomenon of a large amplitude standing wave when a driving frequency matches a natural frequency explains why instruments are able to create certain notes.	**resonance** (accept other word forms)

Question #10: Science – Physics

10 points per part

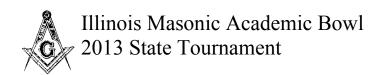|	Concave mirrors are sometimes used to make objects appear larger.	
1	If a light ray goes into a concave mirror parallel to the principal axis, it is supposed to go through this point.	**focal point** (accept **focus**)
2	This is the ratio of the radius of curvature divided by the focal length for a concave mirror.	**2**
3	When an object is placed closer to the mirror than its focal point, it forms this type of image defined by diverging rays.	**virtual** image

Question #11: Social Studies – Psychology

10 points per part

	They have been described as unlearned tendencies to experience things in a certain way.	
1	Name these things, also called dominants or primordial images. The syzygy [SI-zeh-jee] consists of two of them, the anima and animus.	**archetype**s
2	Archetypes make up the contents of this entity, a reservoir of all of humanity's experiences that all people are born with.	**collective unconscious**
3	The collective unconscious was first theorized by this founder of analytic psychology.	Carl Gustav **Jung**

Question #12: Social Studies – Psychology

10 points per part

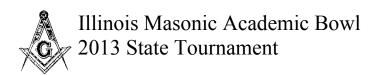|	As a research assistant, he helped to run Solomon Asch's conformity experiments.	
1	Name this psychologist whose small world experiment began with 300 letters being given to residents of Omaha and Boston that would later be the source of the phrase "six degrees of separation."	Stanley **Milgram**
2	Milgram generated controversy with his obedience experiment, in which subjects were put into this role. More than 60% of the subjects in this role administered the maximum voltage to the learners, who were actually in on the experiment.	**teacher**s
3	Milgram's obedience experiment was designed to analyze the testimony of men arrested and convicted for their roles in this massacre.	the **Holocaust** (accept **Shoah** or equivalents)

Question #13: Literature – World Literature

10 points per part

	One section of this work describes a man who "builds a wall of indifference and remoteness between reality and himself.	
1	Name this poem, which describes a man who "shuts himself away to protect himself," whether he be "young or old, criollo [kree-OE-yoe] or mestizo [mes-TEE-zoe]."	"**Labyrinth of Solitude**" (accept "El **laberinto de la soledad**: Vida y pensamiento de México")
2	"Labyrinth of Solitude" was written by this poet of "Sun Stone." His time as ambassador to India inspired his *The Monkey Grammarian*.	Octavio **Paz**
3	Octavio Paz served as a diplomat from this country. Carlos Fuentes, also a native of this country, wrote *The Old Gringo*.	**Mexico**

Question #14: Literature – World Literature

10 points per part

	During a duel in this novel, before one participant can fire into the air as he indicated, the other pulls the trigger on himself.	
1	Name this novel in which Settembrini and Naphta engage in philosophical discussions at the International Sanatorium Berghof at Davos-Platz.	*The **Magic Mountain*** (accept *Der **Zauberberg***)
2	*The Magic Mountain* was written by this German Nobel Laureate, who wrote about the Polish boy Tadzio dying from cholera [KOL-uh-rah] in *Death in Venice*.	Thomas **Mann**
3	The sanatorium is located in the mountains of this country. Hans initially travelled here to visit his cousin, Joachim Ziemssen [JOE-keem ZEEM-sen].	**Switzerland**

Question #15: Math – Conceptual Math

15 points

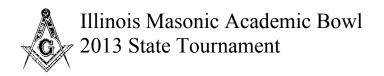|	
This shape is a special case of a hypotrochoid [hie-poe-TROE-koid] with the circle sizes having a ratio of two. One of its generating equations only gives this shape if you get a negative value for B squared minus four A C. This can be generated parametrically by setting x equal to one constant times the cosine of theta and setting y equal to a different constant times the sine of theta. This is used to create whispering galleries because in one reflection all sound goes from one focus to the other. Name this conic section equivalent to a circle that has been stretched in one direction.	**ellipse**

Question #16: Social Studies – World History

15 points

This country's civil war saw the Baltic Division help take the stronghold of Tampere [TAHM-peer]. Prior to conflict, this country's leaders were offered land and the right to fortify the Aaland [A-land] islands in exchange for a number of islands such as Suursaari [suh-ur-sah-ahr-ee]. Immediately following independence, German forces aided the Carl Gustaf Mannerheim-led White Army in a civil war against the Reds. This country beat back a Soviet invasion in the Winter War. Name this country where the Helsinki Accords were signed.	**Finland**

Question #17: Fine Arts – Art History

15 points

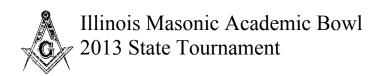|	
This artist painted three portraits of a waterseller showing him facing sideways with a large jug in the foreground. He completed two paintings showing an older man on the left side of a square table telling a story to younger men, *The Lunch* and *The Farmers' Lunch*. He also depicted Cupid holding up a mirror for Venus in a work housed in Rokeby Park. Another one of his works shows Maria Barbola [bahr-BOLE-ah] and Nicolas Pertusato [per-too-SAH-toe], two dwarves who are about the same size as the blonde girl dressed in white who is the focus of the work. Name this Spanish artist of *Las Meninas* [meh-NEE-nahs].	Diego **Velazquez**

Question #18: Literature – US Literature

15 points

This author wrote about a former businessman who compared a relationship with a pet cat to his daughter's fourth failed marriage. He wrote of a man who blamed spoilt liver paste for allegedly killing him, leading to an encounter with two sea people. This author of *A Delicate Balance* and *Seascape* wrote a play in which a man poisoned his landlady's dog; that character impaled himself on a knife in Central Park. He also wrote a play in which Nick and Honey are the guests of George and Martha. Name this author of *Zoo Story* and *Who's Afraid of Virginia Woolf?*	Edward **Albee**

Question #19: Social Studies – Economics

15 points

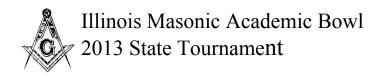|	
A recession is defined as a period in which two consecutive quarters see a decline in the "real" form of this value. Its "real" form is expressed in constant units of currency. The rate of inflation is determined by the percentage change in its deflator, and this does not include money earned from investments abroad. Calculated as the sum of consumption, investment, government purchases, and exports less imports, name this measure of goods and services produced within a country.	**Gross Domestic Product** (accept **GDP**, do not accept or prompt on "GNP", accept an early buzz of "real GDP")

Question #20: Science – Chemistry

15 points

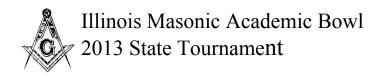|	
The change in this quantity equals the temperature times the change in entropy plus the volume times the change in pressure. The derivation of that formula takes advantage of the fact that change in energy equals the amount of work done to a system minus the work done by a system. Gibbs free energy is found by subtracting temperature times entropy from this quantity, which is a sum of internal energy plus the product of volume times pressure. In a constant pressure system, the change in this quantity also equals the energy added through heat. Name this quantity represented with a capital H.	**enthalpy** (prompt on "H")

Question #21: Fine Arts – Classical/Opera Music

10 points per part

	In this ballet, the parts of Odette [oh-DET] and Odile [oh-DEEL] are often danced by the same person.	
1	Name this work in which Von Rothbart, who has cast a spell on Odette, tries to trick Prince Siegfried.	***Swan Lake*** (or ***Lebedinoye ozero***)
2	*Swan Lake*, *Sleeping Beauty*, and *The Nutcracker* are the three ballets by this composer.	Pyotr "Peter" Ilyich **Tchaikovsky**
3	Tchaikovsky wrote six symphonies that are traditionally numbered and this symphony based on a poem by Lord Byron.	**Manfred** Symphony in B minor

Question #22: Fine Arts – Classical/Opera Music

10 points per part

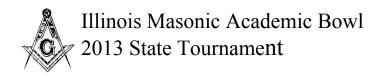|	His son Carl Philipp Emanuel wrote a Solfeggio [sole-FEJ-ee-oh] and several other pieces that are still commonly performed.	
1	Name this Baroque composer of the Brandenburg Concertos [kon-CHEER-toes].	Johann Sebastian **Bach**
2	Bach wrote many of these contrapuntal [KON-truh-poon-tel] works, which he usually placed after a prelude, toccata [toe-KAHT-uh], or fantasia.	**fugue**s
3	Bach wrote one organ piece in which this type of music that originated in Spain is used to introduce a fugue.	**Passacaglia** (or **pasacalle**)

Question #23: Literature – British Literature

10 points per part

	The title character of this play set a trap for Turkish leaders involving boiling hot liquid, but died in it instead.	
1	Name this play in which Barabas feigned conversion to frame Friar Jacomo [JAH-koe-moe] for the murder of Bernardine [ber-nahr-deen].	*The **Jew of Malta***
2	*The Jew of Malta* was penned by this author of the poem "The Passionate Shepherd to His Love" and *Doctor Faustus*.	Christopher **Marlowe**
3	The opening of *The Jew of Malta* is spoken by this Italian, the author of *Discourses on Livy*.	Niccolo **Machiavelli**

Question #24: Literature – British Literature

10 points per part

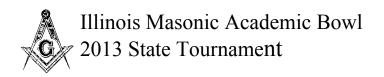|	He is the target of Hindley's jealousy, and his wife Isabella left him to live with their son Linton.	
1	Name this foundling, found in Liverpool, who was given the name of a child who died as an infant.	**Heathcliff**
2	In this Emily Brontë [BRON-tay] novel, Heathcliff becomes the favorite of Mr. Earnshaw at the title Yorkshire locale. Catherine Earnshaw ended her relationship with Heathcliff after marrying another man and moving to Thrushcross Grange.	***Wuthering Heights***
3	Catherine rejected Heathcliff's proposal in favor of this man, the father of Cathy and brother of Isabella.	**Edgar** Linton (prompt on "Linton")

Question #25: Math – Algebra

10 points per part

It is used to determine how many x-intercepts the graph of a quadratic function has.		
1	Name this quantity inside the square root in the quadratic function.	**discriminant** (prompt but do not say "b^2-4ac")
2	Find the discriminant for the function $y=x^2$-3x-2.	**17** (do not accept the square root of 17)
3	Give the name for the segment in a parabola that goes through the focus parallel to the directrix with both of its endpoints on the parabola.	**Latus Rectum**

Question #26: Math – Algebra

10 points per part

This states that every non-constant polynomial has at least one root.		
1	Name this theorem stating that a polynomial of degree n has n complex roots, with multiplicity.	**Fundamental Theorem of Algebra** (prompt partial answer)
2	Factor completely over the integers: x^2-x-30	**(x-6)(x+5)** (or **(x+5)(x-6)**)
3	Factor completely over the integers: x^3-27	**(x-3)(x^2+3x+9)** (or **(x^2+3x+9)(x-3)**)

Question #27: Social Studies – World History

10 points per part

This speech was given shortly before the hour struck midnight on August 14, 1947.		
1	Name this oration, which describes a "star of freedom in the East," and claims that "freedom and power bring responsibility."	**Tryst with Destiny**
2	The "Tryst with Destiny" speech was given by this first Indian Prime Minister.	Jawaharlal **Nehru**
3	In the speech, Nehru praised this leader, who "held aloft the torch of freedom and lighted up the darkness." As part of his policy of *satyagraha* [saht-yah-grah-hah], he led the Salt March.	**M**ohandas Karamchand "Mahatma" **Gandhi** (prompt on "Gandhi")

Question #28: Social Studies – World History

10 points per part

This ruler's subjects called him "Setsen," meaning wise.		
1	Name this grandson of Genghis [GAYNG-is] Khan, the Mongol ruler who conquered China.	**Kubla** Khan (accept **Kublai** Khan or **Khubilai**)
2	After conquering China, Kubla [KOO-blah] Khan became the first ruler of this Chinese dynasty, which moved the capital to Beijing. Marco Polo met with rulers of this dynasty during his trip to China.	**Yuan** (prompt on "Mongol")
3	This name was given to the region of the Mongol empire covering the area between the Urals and Carpathians [kahr-PATH-ee-uns], stretching south to the Black Sea.	**Golden Horde** (accept **Kipchak** Khanate or **Ulus Juchi**)

Question #29: Science – Physics

15 points

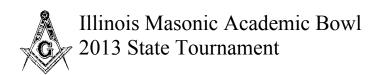|	
This is used to interpret the phase shift when measuring blood flow during echocardiography [eh-koh-kar-dee-AH-gruh-fee]. The relativistic version of this effect is calculated by multiplying by the square root of a ratio that includes both one plus beta [BAYT-ah] and one minus beta, where beta is a ratio of speeds. An example of this, used to calculate the speeds of distant objects in the universe, is the red shift. Name this effect caused by the motion of a source or observer of wave phenomena such as light or sound that leads to a change in frequency.	**<u>Doppler</u>** (Effect or Shift) (prompt on "red shift")

Question #30: Literature – World Literature

15 points

In this novel, the arrival of a letter triggered fear in the heart of the protagonist, as it could never be closed again. The protagonist, a reverend, is told by the Bishop to return to Ndotsheni [en-DOTE-shee-nee]. The aforementioned letter was sent by Msimangu [meh-see-MAHN-goo], asking the main character to help his sister, the prostitute Gertrude. The protagonist was befriended by Mr. Jarvis, whose son Arthur was shot by the protagonist's son Absalom. Name this novel about the travels of Reverend Stephen Kumalo [koo-MAHL-oh] in South Africa, written by Alan Paton [PAY-ton].	***<u>Cry, the Beloved Country</u>***

Question #31: Math – Conceptual Math

15 points

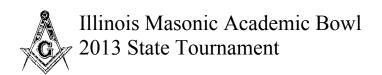| A sequence of prime ideals is used to find this value with respect to rings, in which case this value is named after Wolfgang Krull. One type of this based on open covers is named Lebesgue [leh-beg] covering. In linear algebra, the number of elements in a basis is used to measure this quantity, which can be closely related to the rank of a matrix. In a coordinate system, this number equals the number of independent coordinates. The prefix hyper is used when this quantity equals four. Name this quantity which equals zero for a point and one for a line.	**dimension** (accept Krull **dimension**, Lebesgue (covering) **dimension**, or **dimensionality**, prompt on "rank")

Question #32: Social Studies – US History

15 points

During the Civil War, the Battle of Corydon was fought in this state, where Thomas Hines and John Hunt Morgan led Confederate raids. During the Revolution, Colonel Henry Hamilton surrendered Fort Sackville in this state at the battle of Vincennes [vin-SENZ]. Robert Dale Owen founded the community of New Harmony in this state. In Tecumseh's War, the Battle of Tippecanoe was fought in this state. Name this "Hoosier State."	**Indiana**

Extra Question #1: Science – Biology

15 points

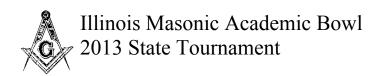|	
In plants, this problem also known as corky scab or dropsy is more likely when there is warm soil and humid air. Often occurring in succulents, it is characterized by water-soaked blisters that can rupture or become sunken. In humans, it can be a sign of congestive heart failure or kidney disease, though it is often caused by pregnancy or eating salty food. It is characterized by puffiness under the skin, and a dimple often remains after you push on somebody who has this condition. Name this swelling caused by excess fluid.	**Edema**

Extra Question #2: Literature – US Literature

15 points

He jokingly suggested using the Port Authority Bus Terminal for the ceremony for "the Wedding of the Close of the Century." While working as a censor, he sometimes signed with the name Washington Irving. He was unable to complete his tour because Colonel Cathcart continuously raised the number of required missions. Doc Daneeka explained to him why Doc could not ground him on account of being crazy, as he could not be crazy since he wanted to avoid combat. Name this fictional World War II Air Force pilot, the protagonist of Joseph Heller's *Catch-22*.	John **Yossarian**

Extra Question #3: Fine Arts – Classical/Opera Music

15 points

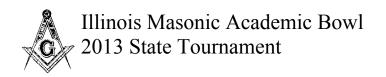|	
This composer turned music he wrote as a child into his *Wand of Youth Suites*. His oratorio about Jesus restoring the sight of a beggar is titled *The Light of Life*. He wrote four marches in the first decade of the 20th century, the first of which is dedicated to Alfred Rodewald [ROH-deh-wahld] and contains the trio "Land of Hope and Glory." Before that, he wrote a piece which he claimed was the counterpoint of a popular song he refused to identify, his *Enigma Variations*. Name this composer of *Pomp and Circumstance*.	Edward **Elgar**

Extra Question #4: Social Studies – World History

15 points

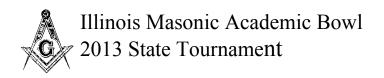|	
Its "functional constituencies" provide half of the members of its Legislative Council. Through the Convention of 1898, the New Territories were added to this region. It became a Special Administrative Region once the Basic Law was ratified by the National People's Congress. Control of it changed hands through the Treaty of Nanking. Name this Chinese territory that until 1997 was under British control.	**Hong Kong** (accept **Xianggang** or **Hsiang-kang**)

Extra Question #5: Math – Conceptual Math

15 points

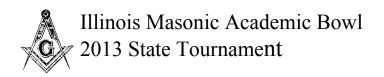|	
Albert Girard [jeh-RAHRD] and this person are the namesakes of a series of formulas giving the relationship between sums and powers of symmetric polynomials. Roger Cotes [KOTES] and this person are the namesakes of a series of integration approximation formulas that include the trapezoid rule and Simpson's Rule. He generalized the binomial formula to allow for fractional exponents, and this person is the namesake of a method of successive linear approximations to find the roots of a function. His best known work is *Philosophiae* [fil-os-uh-FEE-ay] *Naturalis Principia* [prin-SIP-ee-ah] *Mathematica*. Name this thinker who, along with Gottfried Leibniz [LEEB-niz], is credited for independently discovering calculus.	Sir Isaac **Newton**

Extra Question #6: Social Studies – US History

10 points per part

The pretext for it was provided when the USS *Maddox* was fired upon, triggering an international incident.		
1	Name this bill passed by Congress, which allowed for the President to deploy conventional military forces in Southeast Asia.	**Gulf of Tonkin** Resolution (accept **Southeast Asia** Resolution)
2	Despite campaigning on the platform that he would not send Americans to Vietnam, this president used the authority provided by the Gulf of Tonkin resolution to do just that.	**L**yndon Baines **Johnson** (accept **LBJ**)
3	This Secretary of Defense, and former president of Ford Motor Company, later admitted that the incident as it was portrayed at the time did not in fact happen.	Robert Strange **McNamara**

Extra Question #7: Social Studies – US History

10 points per part

In a debate, he argued that the territories must be kept free, so that poor people can go and better their condition.		
1	Name this statesman who called slavery a "moral, social, and political wrong" during a speech in Quincy, Illinois.	Abraham **Lincoln**
2	As a Whig Congressman, Lincoln criticized James Polk's decision to send the US to war, and demanded that this series of questions be answered regarding the bloodshed used as a pretext to declare war.	**spot** resolutions
3	When Lincoln ran for President in 1860, he appointed this former Democratic Governor of Maine as his running mate.	Hannibal **Hamlin**

Extra Question #8: Science – Chemistry

10 points per part

	It is element number 89 on the Periodic Table.	
1	Name this element usually placed below Lanthanum. This is the first element in the series that fills the 5f electron shell.	**Actinium** (prompt on "Ac")
2	Many of the actinides, which follow actinium on the Periodic Table, were discovered by this scientist, the namesake of element 106.	Glenn **Seaborg**
3	The 241 isotope of this actinide discovered by Seaborg is often used in smoke detectors.	**Americium** (prompt on "Am")

Extra Question #9: Science – Chemistry

10 points per part

	The alkaline earth metals, or group 2 elements, are all silvery-white.	
1	This lightest alkaline earth metal is element 4.	**Beryllium** (prompt on "Be")
2	Marie Curie discovered two elements, polonium and this alkaline earth metal.	**Radium** (prompt on "Ra")
3	A famous experiment used alpha particles from radium to get beryllium to emit these particles.	**neutron**s

Question #1: Literature – US Literature

15 points

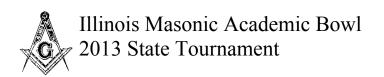|	
One figure in this work follows her father's motto, "the reason for living was to get ready to stay dead a long time." Another character warns that a central object is not on a balance. In this novel, a duck-shaped woman married a man who travelled to procure a set of false teeth. Darl was taken to Jackson after attempting to burn down a barn. One chapter in this novel consists of the sentence "My mother is a fish." Name this novel about the Bundren family written by William Faulkner.	***As I Lay Dying***

Question #2: Science – Chemistry

15 points

This scientist and J.A. Le Bel worked independently to derive the basic ideas of stereochemistry. The equation named for him, also known as the Vukancic-Vukovic [VOO-kahn-sik VOO-koh-vich] equation, can now be derived from the Gibbs-Helmholtz equation to give a straight-line relationship between the reciprocal of temperature and the natural log of the equilibrium constant. He is also the namesake of the number that tells how many ions are formed from a solute, which is useful in the study of colligative [ko-LIG-uh-tiv] properties. Name this Dutch chemist who won the first Nobel Prize in Chemistry.	Jacobus Henricus **van't Hoff** (prompt on "Hoff")

Question #3: Social Studies – World History

15 points

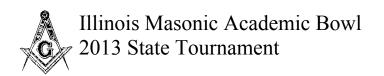|	
His reign saw an invasion across the Rhine result in the Varian Disaster, a massacre in the Teutoberger [TOY-toe-berg-er] Forest. He restored power to the Senate in the "First Settlement" and gave up his consulship in the second. He had planned to make Marcellus [mahr-SELL-us] and then Agrippa his successors, but following his death, Tiberius was his only heir. This ruler was the first to use the title "princeps [PRIN-seps]." With Marc Antony and Lepidus, he formed the Second Triumvirate. He would later defeat Marc Antony at Actium. Name this Roman who succeeded Julius Caesar as emperor.	Caesar **Augustus** (accept **Octavian** or Gaius **Octavius** Thurinus)

Question #4: Fine Arts – Classical/Opera Music

15 points

This composer turned his *The Seven Last Words of Our Saviour on the Cross* into both an oratorio and a string quartet. Pieces nicknamed *The Joke*, *The Bird*, and *How Do You Do* are part of his Russian Quartets, and pieces like those and his *Sun Quartets* led to him being called "The Father of the String Quartet." His opera based on Orlando furioso was titled *Orlando paladino* [PAHL-ah-DEEN-oh]. Name this 18th century composer who wrote the Palindrome, Philosopher, Bear, Military, Clock, Surprise, and Farewell symphonies, among others.	Joseph **Haydn**

2

Question #5: Math – Conceptual Math

15 points

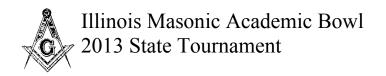|	
A plot of the sine integral versus the cosine integral generates a shape of this type named after Nielsen. The type of this shape named after Theodorus is generated by a series of right triangles. Jacob Bernoulli [ber-NOO-lee] labeled one of these as miraculous, and another type of this shape is named after either Cornu or Euler [OY-ler] and has a curvature that varies with arc length. A common type named after Archimedes [ARK-uh-mee-dees] is generated by the polar equation r equals theta, and this shape can be found in nature in galaxy arms and mollusk shells. Name this shape formed by an object revolving as it moves outward.	**spiral**

Question #6: Social Studies – Geography

15 points

After a naval reaction to a revolution in 1848 on this island, King Ferdinand II earned the nickname King Bomba. Cape Punta [POON-tah] del Faro is found off the coast of this island. The Simeto [see-MAY-toe] River flows through this island's province of Catania [kah-TAHN-yah]. The ancient Akagras Agrigentum [ah-KAH-grahs ah-gree-GENT-oom] was built on this island. Its gorges include the Valley of the Oxen and the Alcantara [ahl-kahn-TAHR-ah] River Park. Its major cities include Messina, Palermo, and Syracuse. Name this island off the southern tip of Italy.	**Sicily**

Question #7: Science – Biology

10 points per part

	They are made of chains of amino [uh-MEEN-oh] acids.	
1	Name these macromolecules that the body uses as enzymes [EN-zimes], antibodies, and in many other ways.	**protein**s
2	This protein composite gives texture to foods made from wheat.	**gluten**
3	Proteins form this protective shell around a virus.	**capsid**

Question #8: Science – Biology

10 points per part

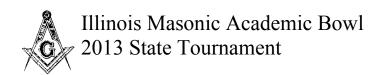|	They are between the arterioles [ahr-TEHR-ee-oles] and venules [VEN-yools].	
1	Name these tiny blood vessels that allow exchanges with surrounding tissue.	**capillary** (accept **capillaries**)
2	The discovery of capillaries in animals is often credited to this Italian whose name is used for the excretory tubules in many insects.	Marcello **Malpighi** (prompt on "Malpighian" tubules)
3	This dense ball of capillaries in the kidney is enclosed by the Bowman's capsule.	**glomerulus** (accept **glomeruli**)

Question #9: Social Studies – Religion

10 points per part

Along with Admah, Zeboiim [zeh-BOY-eem], and Zoar [ZOE-ahr], they formed the "cities of the plain."		
1	Name these two cities, destroyed with fire and brimstone after God offered to spare them if ten righteous men could be found.	**Sodom** and **Gomorrah** (either order)
2	In Genesis 19, the Lord sent this many angels to Sodom. The people of Sodom were proven to be wicked when they demanded the opportunity to "know" the angels.	**two**
3	In verses 14 and 15 of Chapter 10 of this Gospel, Jesus warns of a fate worse than that which befell Sodom and Gomorrah for those who will not welcome guests.	Gospel According to **Matthew**

Question #10: Social Studies – Religion

10 points per part

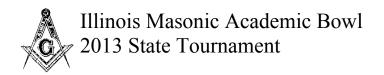|		
Exodus Book 25, Verses 31 through 40 outlines the proper procedure for the creation and use of one of these.		
1	Name this multi-branched candelabrum, a symbol of the nation of Israel. A chanukiyah [HAH-noo-kee-yah] is a specific form of it.	**menorah**
2	A menorah used during Hanukkah has this many branches; one for each night, and a distinct one above the rest.	**nine**
3	This term describes the distinct candle that is lit first during Hanukkah. It is used to light the other candles and stands above the other eight.	**shamash**

Question #11: Literature – US Literature

10 points per part

	This big red-headed Irishman got transferred from prison for fighting.	
1	Name this protagonist of *One Flew Over the Cuckoo's Nest* who felt guilty for inadvertently causing Cheswick's suicide.	**Randle** Patrick **McMurphy** (accept either underlined portion)
2	This head of the ward refused to change a policy to let McMurphy watch the World Series. After blaming McMurphy for Billy Bibbit's death, McMurphy ripped her dress open and exposed her.	Nurse **Ratched** (accept **Big Nurse**)
3	In the personal battle between McMurphy and Nurse Ratched, the Nurse won after forcing McMurphy to undergo this surgical procedure.	**lobotomy**

Question #12: Literature – US Literature

10 points per part

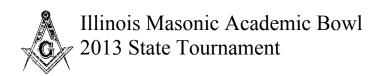|	The protagonist of this novel killed one of her children before she was captured by Mr. Garner's brother, a schoolteacher.	
1	Name this novel, in which the title character is a ghost representing a baby. That ghost haunts a house in Ohio, where Denver lives with Baby Suggs.	***Beloved***
2	*Beloved* was penned by this author of *Song of Solomon* and *The Bluest Eye*.	Toni **Morrison** (accept Chloe **Wofford**)
3	This mother of Denver slit Beloved's throat with a handsaw. Upon learning of what she did to Beloved, Paul D abandoned her, only to return.	**Sethe**

6

Question #13: Math – Statistics

10 points per part

	One type of standard deviation, the population type, is found by dividing by n.	
1	Name the type of standard deviation found by dividing by n-1 instead.	**Sample**
2	This is the value of the sample standard deviation for the sample just containing the numbers 4 and 6.	**Square Root of 2** (accept **Root 2** or **Radical 2**, do not accept 2)
3	This value is found by squaring the standard deviation. For the example you just worked on, this equals 2.	**Variance**

Question #14: Math – Statistics

10 points per part

	One form of this is named after Emile [eh-meel] Borel.	
1	Name this law which states that as experiments are performed more often, the average value tends to approach the expected value.	Law of **Large Numbers**
2	This is the expected value when rolling a single die with its faces labeled one through six.	**3.5** (or **7/2** or **3 ½**)
3	A company builds products that have a 5% defective rate. If they make a $20 profit on the good ones but take a $40 loss on the defective ones, what is the expected value of the profit from a product?	**17** dollars

Question #15: Miscellaneous – Consumer Ed

15 points

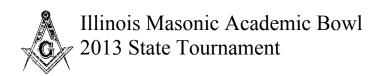|	
Due to controversy, in 2011 this company cancelled a line of shoes featuring a pair of shackles. This company's founder provided the spikes Jesse Owens wore when he won four golds at the 1936 Olympics. In 2006, it became the official clothing provider of the NBA. After its acquisition of Reebok in 2006, it became the second largest athletic shoe manufacturer in the world, behind Nike. Name this clothing manufacturer whose signature logo features three stripes.	**Adidas** AG

Question #16: Literature – World Literature

15 points

[NOTE TO MODERATOR: There are some nonsense words in this question that can be pronounced as you wish.] In this work, one man voyages to Paraguay, hoping to fight Jesuits. Following an earthquake in this novel, two shipwrecked travelers are blamed; one was hanged, another was whipped. The whipped traveler later killed both a Jew and an inquisitor who came to see that man's cousin. The protagonist of this novel, a student of metaphysico-theologo-cosmolonigology, is the nephew of Baron Thunder-ten-tronckh. The man hanged for the earthquake in Lisbon believed that "this is the best of all possible worlds." Name this novel featuring Cunegonde [KYOON-eh-gond] and the optimistic Dr. Pangloss, written by Voltaire.	***Candide***

Question #17: Science – Earth Science

15 points

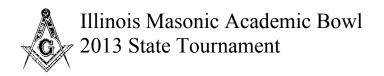|	
One of the late subdivisions of this period, the Carnian, left behind several fossils at Ischigualasto [is-chee-gwah-LAHS-toe], Argentina. Animals that started during this period include ichthyosaurs [IK-thee-oh-soars] and archosaurs [AHR-koe-sores]. It was also late in this period that Laurasia and Gondwana separated from Pangaea [pan-JEE-uh]. It followed the Great Dying, largely considered the worst extinction event in world history, at the end of the Permian [PER-mee-un] Period. The first period of the Mesozoic Era, it was followed by the Jurassic Period. Name this period given its name because its remains were stored in three layers.	**Triassic** (Period)

Question #18: Social Studies – US History

15 points

Immediately prior to this event, its participants had met in the Old South Meeting House and waited for a word from Francis Rotch. This event targeted the *Dartmouth*, which was moored in Griffin's Wharf, as Governor Thomas Hutchinson refused to allow the ship to leave. It was led by a group of people dressed as Mohawk Indians. Name this protest where imports of a certain beverage were dumped into a harbor.	**Boston Tea Party**

9

Question #19: Science – Biology

15 points

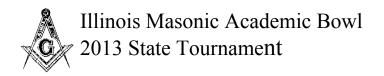| This group of chemicals is degraded in the body by diamine [dee-ah-MEEN] oxidase [OKS-ih-dase]. In the body, they are created by enterochromaffin [en-tear-oh-kroe-MAFF-in]-like cells, and they are also created along with heparin [HEP-uh-rin] in mast cells. These are released when other molecules bond to IgE [I G E] antibodies, and these activate the unmyelinated [un-MY-uh-lin-ate-id] C-fiber neurons to cause pruritis [prur-IE-tis], which is commonly known as an itch. Other symptoms of the release of these chemicals are arrhythmia [ay-RITH-mee-uh], wheezing, and nasal congestion. Name these chemicals associated with anaphylaxis [an-ah-fi-LAKS-is] and other allergic reactions.	**Histamine**s

Question #20: Literature – British Literature

15 points

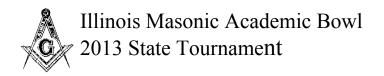| This author wrote of a son of Bacchus [BAHK-us] and Circe [SEHR-see] that gave humans the heads of animals thanks to a magic wine. He also penned a dramatic poem in which Harapha, a giant, refused to challenge a slave. He quoted Euripidies' [yuh-RIH-pih-dees] *The Suppliants* in a speech to Parliament in which he railed against government censorship of printed material. This author of *Samson Agonistes* [ag-oh-NIS-tees] and "Areopagitica" [AHR-ee-oh-pah-jih-tih-kah] also wrote a poem in which Pandemonium was depicted as the capital of Hell. Name this author of "Paradise Lost."	John **Milton**

Question #21: Fine Arts – Art History

10 points per part

	His work *The Thinker* appears on *The Gates of Hell*.	
1	Name this French sculptor.	Auguste **Rodin**
2	This Rodin [roh-dan] sculpture depicts six wealthy heroes from the Hundred Years War.	*The **Burghers of Calais*** (or *Les **Bourgeois de Calais***)
3	This Rodin sculpture without arms or a head was the subject of a Carl Sandburg poem.	*The **Walking Man*** (or *L'**homme qui marche***)

Question #22: Fine Arts – Art History

10 points per part

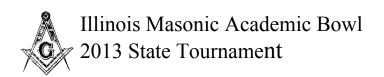|	This house was built for the Kaufmann family in 1935.	
1	Name this house in southwest Pennsylvania.	***Fallingwater***
2	This Prairie School architect designed *Fallingwater* and named his studios Taliesin [TAL-ee-ess-in].	Frank Lloyd **Wright**
3	Wright used this term to describe a series of one-story houses he built starting with the Jacobs House in Madison, Wisconsin.	**Usonia**n

Question #23: Math – Geometry

10 points per part

	This type of quadrilateral has four congruent sides, but it does not necessarily have right angles.	
1	Name this type of parallelogram.	**Rhombus**
2	This is the area of a rhombus whose diagonals are of length 4 and 10.	**20**
3	This is the area of a different rhombus with side lengths of 2 and an interior angle of 75 degrees. Give an answer that does not include a square root within a square root.	**Root 6 Plus Root 2** (or **Root 2 Plus Root 6**)

Question #24: Math – Geometry

10 points per part

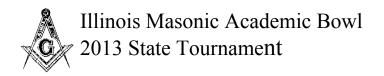|	This is the set of all segments connecting a circle to a point not in its plane.	
1	Name this shape like a pyramid but with a circular base.	**cone**
2	This is the term for the surface area of the cone that does not include the area of the circle.	**lateral** surface area
3	This is the lateral surface area of a cone that has a radius of 3 and a height of 4.	**15 pi**

Question #25: Social Studies – US History

10 points per part

	This agreement was seen as the "Great Betrayal" by many African-Americans.	
1	Name this deal which saw federal troops removed from southern states, and included a provision that a second transcontinental railroad be built in the South.	**Compromise of 1877** (prompt on, but do not say, "Hayes-Tilden" or "Tilden-Hayes" Compromise)
2	The biggest outcome of the Compromise of 1877 was the granting of 20 electoral votes to this candidate, giving him the victory over Samuel Tilden.	Rutherford Birchard **Hayes**
3	Hayes agreed to appoint one southern Democrat to his Cabinet. That appointment went to David Key, who was given this now-defunct position.	**Postmaster General**

Question #26: Social Studies – US History

10 points per part

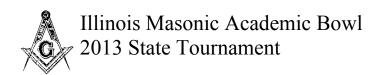|	This commander of the Pacific Theater was the leader behind the tactic of "island hopping."	
1	Name this Supreme Commander of the Allied Powers who was the de facto ruler of Japan immediately following World War II.	General Douglas **MacArthur**
2	In 1932, Douglas MacArthur commanded Dwight Eisenhower and George Patton during an attack on this group of ex-veterans.	**Bonus Army**
3	MacArthur publicly questioned President Truman's order to not cross this river. After MacArthur's subsequent dismissal, Joseph McCarthy accused Truman of being drunk when dismissing the general.	**Yalu** River

Question #27: Science – Chemistry

10 points per part

	Legend has it that Archimedes [ahr-kuh-MEE-dees] ran naked through the streets yelling Eureka after finding a way to measure volume so he could compare this value for two objects.	
1	Give this quantity equal to mass per volume.	mass **density**
2	Using just one significant figure, give the density of fresh water at standard temperature and pressure in kilograms per cubic meter.	**1000** (or **10^3** or **$1x10^3$**)
3	This phrase equivalent to relative density is the ratio of the density of a substance to a standard substance. For liquids, water generally is the standard substance.	**specific gravity** (prompt on "SG")

Question #28: Science – Chemistry

10 points per part

	This value typically is calculated by dividing the product of the concentrations of constituents by the concentration of their combined form.	
1	Name this type of equilibrium constant represented by the letter k with a subscript.	**dissociation** constant (accept more specific answers)
2	To one significant digit in scientific notation, give the dissociation constant of water under standard conditions.	**10^{-14}** (accept **$1x10^{-14}$**)
3	When measuring equilibrium constants for gases, you are supposed to use this value instead of pressure to account for the gas not being an ideal gas.	**fugacity**

Question #29: Literature – Mythology

15 points

Graback [GRAH-bahk] and Grafvolluth [GRAF-vole-looth] were tasked with destroying it. Deer that represent the four winds gnaw on this entity. Urdarbrunnr [ur-dahr-BROON-ur] and Hvergelmir [VERG-el-mir] lie at the base of it. During Ragnarok, Lif and Lifthrasir will hide within it. At its top lives Vidofnir [vi-DOFE-nir], a golden cock. The squirrel Ratatosk runs along its branches. Name this "World Tree" of Norse myth.
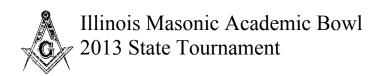
Yggdrasil (accept **World Tree** or **World Ash** before mentioned, accept **Laerad**, **Hoddmimir's Wood**, **Mimameidr** or **Odin's Horse**)

Question #30: Math – Conceptual Math

15 points

One theorem named after this person determines which prime numbers can be expressed as the sum of squares, and another theorem named after him has the consequence that every number is the sum of three or fewer triangular numbers. The numbers named after him equal two raised to the two to the nth power plus one. Another theorem named after him was shown to be implied by the Taniyama-Shimura [tah-nee-yah-mah shee-moor-ah] conjecture and was proven 350 years after this person claimed he had done so by Andrew Wiles [WILES]. Name this 17th century Frenchman whose last theorem uses the equation $a^n+b^n=c^n$ [a to the n power plus b to the n power equals c to the n power].

Pierre de **Fermat**

15

Question #31: Social Studies – World History

15 points

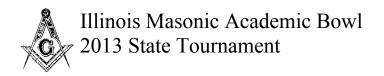|	
While serving as Education and Science Secretary in Edward Heath's Cabinet, this leader eliminated free milk to schoolchildren. Rising to the top post as a leader of the "Dry Conservatives" following the "Winter of Discontent," during this leader's second term the National Union of Mineworkers went on strike. On top of presiding over the establishment of an independent Zimbabwe [zim-BAHB-way], this politician sent forces to re-assert British control of the Falklands. Name this former British Prime Minister, the "Iron Lady."	Margaret **Thatcher** (prompt on "Iron Lady")

Question #32: Science – Physics

15 points

Virtual versions of these particles are impacted by uncharged plates in the Casimir effect. The leading theory behind Hawking radiation is based on the creations of pairs of these particles, one of which escapes. These particles lose energy to electrons in the Compton effect and the photoelectric effect. The fact that these particles are massless explains the infinite range of the electromagnetic force, which these carry. Name these light quanta.	**photon**s (prompt on "x-ray" or "gamma ray")

16

Extra Question #1: Literature – British Literature

15 points

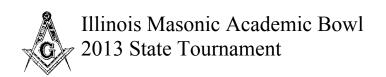|	
In this novel, Major Callendar, the protagonist's boss, believes that "white is right." At the end, Ralph reunites the protagonist with the principal of the Government College. At the Marabar [MAHR-ah-bahr] Caves, one character was frightened, and accused the protagonist of rape. The subsequent trial divided the town of Chandrapore [CHAHN-drah-pore]. Featuring Adela Quested, Cecil Fielding, and Dr. Aziz [ah-zeez], name this novel by E. M. Forster set on the subcontinent.	A ***Passage to India***

Extra Question #2: Fine Arts – Art History

15 points

This architect designed 8 Spruce Street in Manhattan, which was originally known as Beekman Tower. Some of his early work was used to alter his house in Santa Monica, and a nine-story building in Hanover, Germany is named after him. Currently working on the National Eisenhower Memorial, he also designed the Nationale-Nederlanden [neh-der-LAHND-en] building in Prague, which is nicknamed Ginger & Fred or The Dancing House. Name this architect whose twisting designs include Walt Disney Concert Hall and the Experience Music Project.	Frank **Gehry**

Extra Question #3: Social Studies – US History

15 points

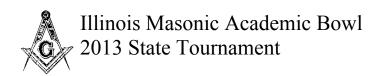|	
As his predecessor's War Secretary, he served as the provisional governor of Cuba, but drew that man's ire after firing Gifford Pinchot [PEEN-choe]. William McKinley tapped him to succeed Arthur MacArthur as Governor-General of the Philippines. His attempts to expand trade in the Americas were given the moniker "dollar diplomacy." He so disappointed his predecessor that the Bull Moose Party was formed in opposition to his re-election bid. Name the only President to also serve as Chief Justice of the Supreme Court.	William Howard **Taft**

Extra Question #4: Math – Conceptual Math

15 points

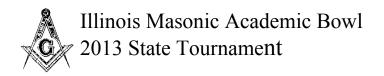|	
The three most common types of this are known as Pythagorean and can be pictured for two values by combining those values to form a circle diameter, with one of them equaling the radius and another equaling the height of half the circle where the values meet. One of these values is the reciprocal of the reciprocal of n times the sum of the reciprocals of the values. Another one is found by taking the nth root of the product of the values. Give this value that, in addition to harmonic and geometric types, has an arithmetic type equal to the common notion of an average.	**mean** (prompt on "average", accept **arithmetic mean**, **geometric mean**, or **harmonic mean**)

Extra Question #5: Science – Astronomy

15 points

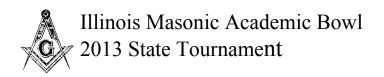|	
Around the year 2000, it was found that this object's magnetic flux did not vary widely based on latitude and that its southern magnetic pole moved more than expected. Those results were found by the Ulysses [yoo-LIS-ees] spacecraft, and a more recent mission to image this object is named STEREO. Its activity was low from 1645 to 1715, which is known as the Maunder Minimum. Classified as a G-type, its activity level typically goes through eleven year cycles judging by regions of magnetic activity seen as dark spots. Name this object located one astronomical unit from Earth, the center of our solar system.	<u>**Sun**</u>

Extra Question #6: Math – Algebra

10 points per part

	This is useful when all of the coefficients in a polynomial are integers.	
1	Name this theorem that generates a list of potential roots of a certain type. It uses the leading coefficient and constant term.	**Rational Root** Theorem (or **Rational Root** Test)
2	How many distinct potential solutions are generated by the Rational Root Test for the polynomial $2x^3-7x+3$?	**8**
3	This mathematician's rule of signs is also used to limit a search for polynomial roots.	Rene **Descartes**

Extra Question #7: Math – Algebra

10 points per part

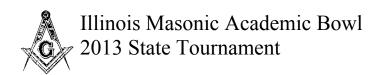|	When a polynomial is divided by x-k, this value is equal to the value of the polynomial when k is plugged into it for x.	
1	Give this term associated with division as it is learned in elementary school.	**remainder**
2	This is the remainder when x^2+3x+2 is divided by x-1.	**6**
3	Ignoring the remainder, this polynomial is the result when x^2+3x+2 is divided by x-1. Do not include the remainder in your answer.	**x+4** (accept equivalents such as **1x+4** or **x^1+4x^0**)

Extra Question #8: Literature – British Literature

10 points per part

	He wrote about the scientist George Ponderevo [pon-day-RAY-voe], who created the quack medicine Tono-Bungay.	
1	Name this science fiction writer who penned a novel about a man who travelled to 802,701 AD and fell in love with Weena, an Eloi.	Herbert George **Wells**
2	H. G. Wells penned this novel, in which an alien cylinder lands in Horsell Common, Woking. The title conflict is ended thanks to native bacteria.	*The **War of the Worlds***
3	The protagonist of this novel drove his father to suicide through theft. Griffin threatened to use Dr. Kemp's rooms for terror, but Griffin ended up catching a fatal spade to the head.	***The Invisible Man*** (do not accept or prompt on "Invisible Man")

Extra Question #9: Literature – British Literature

10 points per part

	He described one title object as an "unravished bride of quietness," a "foster-child of silence and slow time."	
1	Name this poet, who claimed that "beauty is truth; truth beauty" in "Ode on a Grecian Urn."	John **Keats**
2	In another poem, John Keats describes this bird as a "light-winged Dryad of the trees." It was "not born for death," and the speaker will fly to it "on the viewless wings of Poesy."	**nightingale** (the poem is "Ode to a Nightingale")
3	This poem describes a knight-at-arms who was warned in a dream by kings, princes, and warriors, all death-pale. After waking up, the speaker found himself on the cold hill's side.	"La **Belle Dame Sans Merci**"

Question #1: Literature – Mythology

15 points

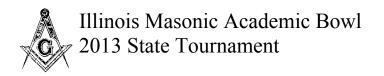|	
He used the Govardhana [gov-ahr-dah-nah] hill to establish his superiority to Indra. Accused of eating mud, he opened his mouth and showed his mother the entire universe. He danced on the hood of the naga Kaliya [nuh-GAH KAY-lee-yah] after defeating the beast. A flying ogress [OH-gress] tried to poison him, but he sucked the life from the demon. Radha [RAHD-hah] was his favorite among the *gopis* [GOPE-ees], who loved his music making. The eighth avatar of Vishnu [VISH-noo], he was born to defeat the demon king Kamsa. Name this Hindu deity who participated in the Kurukshetra [koo-rook-SHAYT-rah] War as Arjuna's [ahr-JOON-ahs] charioteer.	**Krishna**

Question #2: Fine Arts – Composers of the Modern Era

15 points

One of this composer's ballets, about a father who must choose between his two daughters, is *The Prince of the Pagodas*. Because pianist Paul Wittgenstein [WIT-gen-steen] lost his right arm in World War One, this composer wrote *Diversions for Piano Left Hand and Orchestra*. One of his operas, based on a section of the George Crabbe poem "The Borough," is about a fisherman accused of killing his apprentice. Another work is based on a Henry Purcell rondeau [ron-DOE] and is designed to demonstrate the sections of the orchestra. Name this composer of *Peter Grimes* [grimes] and *The Young Person's Guide to the Orchestra*.	Benjamin **Britten**

Question #3: Science – Physics

15 points

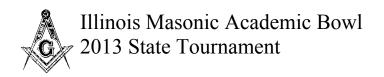|	
The first one of these objects contained a triangular piece of plastic held in place by a spring and coated in part in gold foil. Containing an emitter and a collector, it was the point-contact type. Later examples of these are the field-effect and bipolar junction types. Developed by Walter Brattain, John Bardeen, and William Shockley, these have at least three terminals and first became commercially successful in radios. Name these doped semiconductor devices that have become the building blocks of computer integrated circuits.	**transistor**s

Question #4: Social Studies – US History

15 points

Following the murder of Michael Donald, this organization lost a lawsuit which saw it forfeit its national headquarters in Tuscaloosa, Alabama. A grand jury report commissioned by President Ulysses [yoo-LIS-ees] Grant called this organization an "invisible empire." Its first leader was Nathan Bedford Forrest, who held the title Grand Wizard. Name this white supremacist organization whose members wear white robes with pointed hoods.	**Ku Klux Klan** (accept **KKK** or **United Klans of America**)

Question #5: Science – Health

15 points

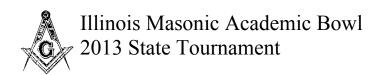| This type of cancer affects the cells that use the enzyme tyrosinase [TIE-roe-si-nase]. One type of this, lentigo maligna [len-TEE-go mah-LIG-nah], very rarely affects people before they are elderly. The acral lentiginous [AK-rul len-TIJ-uh-nus] type has a lower rate among Caucasians than other groups, while the opposite is true for the most common type, superficial spreading. Doctors recommend looking for signs that are asymmetric with irregular borders and have a mixture of colors. Name this cancer that affects cells that produce pigment, sometimes found in the eyes but generally affecting the skin.	**melanoma**s (prompt on "skin" or "skin cancer")

Question #6: Literature – World Literature

15 points

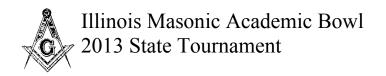| A manager in this work told an egg-beater that he was the shell of the eggs he was beating. In this play, the author described himself as one who "plays the fool with us all," and in his plays, "nobody understands anything." Subtitled *A Comedy in the Making*, at the end, the manager got upset over losing an entire day thanks to the other actors. Name this play in which the Stepdaughter, Father, and four other figures pursue a writer.	___Six Characters in Search of an Author___ (accept ___Sei personaggi in cerca d'autore___)

Question #7: Fine Arts – Art History

10 points per part

	One of the best known artists of the 20th century was Pablo Picasso.	
1	This Picasso work which includes a severed arm holding a severed sword was inspired by the horrors of the Spanish Civil War.	*Guernica*
2	This painting from Picasso's Blue Period shows a musician facing down with his legs crossed.	*The **Old Guitarist***
3	This cubist painted *The Open Window* in addition to a famous portrait of Picasso.	Juan **Gris** (or Jose Vicoriano **Gonzalez**)

Question #8: Fine Arts – Art History

10 points per part

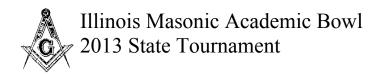|	His painting *The Last Judgment* is in the Sistine Chapel.	
1	Name this artist famous for his work on the Sistine [sis-teen] Chapel ceiling.	**Michelangelo** di Lodovico **Buonarroti** Simoni (accept either underlined part)
2	The Sistine Chapel ceiling includes five portraits of these prophetic women who predicted the birth of Christ. Among them are the Lybian [LIB-ee-un], Persian, and Cumaean [kyoo-MAY-un].	**Sibyl**s
3	For the tomb of Pope Julius II, Michelangelo made a sculpture of this Biblical figure with horns on his head.	**Moses**

Question #9: Social Studies – World History

10 points per part

	During this tumultuous period, President Antonin Novotny [noe-VOT-nee] was replaced by Ludvik Svoboda [svoe-BOE-dah].	
1	Name this short-lived period of reforms that ended when Warsaw Pact countries invaded Czechloslovakia.	**Prague Spring** (accept **Pražské jaro**)
2	This Communist leader in Czechloslovakia promulgated such reforms as freedom of speech and freedom of assembly. After the Soviet invasion, he was replaced as First Secretary by Gustav Husak [GOO-stahv HYOO-sak].	Alexander **Dubček** (be generous with pronunciations)
3	The measures Dubček [DOOB-chek] implemented were part of an Action Program that proposed a "new model of" this. The program was later called this "with a Human Face."	**Socialism**

Question #10: Social Studies – World History

10 points per part

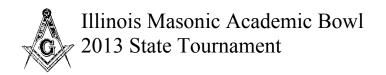|	Boudicca [BOO-dik-ah] led a revolt in Britain against this Roman emperor.	
1	Name this leader, who kicked to death his wife Poppaea [pop-PAY-ah]. Rising to power with the help of his mother Agrippina [a-grip-PEEN-ah], he allegedly fiddled while Rome burned.	**Nero** (accept **Nero** Claudius Caesar Augustus Germanicus)
2	Nero succeeded this emperor, Agrippina's [a-grip-PEEN-ahs] uncle. He was proclaimed emperor by the Praetorian [pray-TOR-ee-un] Guard two days after the assassination of Caligula [kah-LIG-yoo-lah].	**Claudius** (accept Tiberius **Claudius** Caesar Augustus Germanicus)
3	The fall of Claudius and ascension of Nero were described in detail in Book 12 of the *Annals* by this Roman historian.	Publius Cornelius **Tacitus**

Question #11: Literature – US Literature

10 points per part

His father contracted consumption at the same plant where this man earned $45 a month.		
1	Name this Lithuanian immigrant, who ended up working in a hotel managed by a fellow socialist.	**Jurgis** **Rudkus** (accept either)
2	Jurgis Rudkus is the main character of this author's novel *The Jungle*.	Upton Beall **Sinclair**, Jr.
3	Jurgis was thrown in jail and blacklisted in Packingtown for attacking Connor. Connor deserved it, as he had seduced this woman, Jurgis' wife.	**Ona**

Question #12: Literature – US Literature

10 points per part

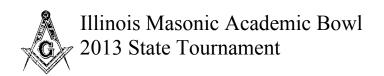|		
This friar sees the death of five travelers as an opportunity to prove the wisdom of an act of God.		
1	Name this religious figure who was burned at the stake for writing a book about the collapse of a bridge.	Brother **Juniper**
2	Brother Juniper attempted to tell the story of the Marquisa [mar-KEE-sah] de Montemayor [mone-TAY-mah-yor], Uncle Pio [PEE-oh], and Esteban [ES-tay-bahn] in this novel.	*The **Bridge of San Luis Rey***
3	*The Bridge of San Luis Rey* was written by this author, who created the fictional town of Grover's Corners, New Hampshire in *Our Town*.	Thornton **Wilder**

Question #13: Science – Biology

10 points per part

	This process creates RNA from DNA.	
1	Name this process that occurs before translation in protein biosynthesis.	**transcription**
2	This unit of DNA containing a promoter and operator is sometimes considered a unit of transcription.	**operon**s
3	This protein prevents transcription by binding DNA at an operator site.	**repressor**

Question #14: Science – Biology

10 points per part

	This compound is also known as carbamide [KAR-bah-mide].	
1	Name this compound produced in the body along with ornithine [ORN-uh-theen]. It includes two NH_2 groups.	**urea** (prompt on "urine", do not accept "uric acid")
2	The urea cycle was discovered by this person who also discovered the citric acid cycle.	Hans Adolf **Krebs**
3	This waste product is also found in urine. If its urine level is low, the test may have been diluted. High levels in the blood can signify kidney disease.	**creatinine** (do not accept "creatine")

Question #15: Social Studies – Religion

15 points

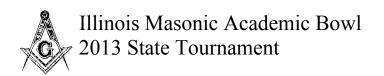|	
Early followers of this figure worshipped him as a rain deity and the father of Manat [mah-naht]. His omnipresence to man is compared to the vein in a man's neck. This figure originally ordained 500 prayers per day. Alternate names for this deity, which are recited during zikr [ZIK-ur], include "Most Gracious" and "Most Merciful," and no mortal is allowed to take an equivalent name. Worshippers declare their faith to this deity through a statement saying there is no god but this god; that statement is the shahadah [shah-hah-dah]. Name this supreme deity of Islam.	**Allah** (prompt on the Abrahamic "God"; accept **God of Islam** or **God of Muslims** before end; if one of the 99 other names is given, accept after confirming existence)

Question #16: Math – Conceptual Math

15 points

Van Aubel's Theorem states if you add four of these shapes around a quadrilateral, then connecting the opposite centers of these shapes creates perpendicular segments. The circumradius and inradius of this shape have a ratio of the square root of two, and this shape can be generated by the absolute value of x plus the absolute value of y equals one. Its diagonals not only bisect its angles, they also bisect each other and are perpendicular. Name this quadrilateral which has both four congruent sides and four right angles.	**square**

8

Question #17: Miscellaneous – Journalism

15 points

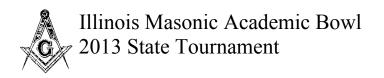|	
Mark Kellogg, working on behalf of this organization, claimed he would be with General Custer at his death. It was founded to hasten the delivery of news concerning the Mexican War to New York City. In 1945, the Supreme Court held that its restraint of trade did not abridge its First Amendment rights. In 1936, it was the first organization to use a poll to determine the best college football team. Name this longtime rival of United Press International, an independent news organization.	**Associated Press** (accept **AP**)

Question #18: Social Studies – US History

15 points

Walter Cronkite accused him of making "implied threats to freedom of speech" when he called televised news broadcasters a "biased unelected elite." After defeating segregationist George Mahoney in one election, he took a hard line against students occupying the Bowie State administration building, sending state troops under his authority as governor of Maryland. He referred to his critics as "nattering nabobs of negativism." Charges of bribery and tax evasion later led to his resignation from a national position in 1973. Name this man, Richard Nixon's first vice president.	Spiro **Agnew** (accept Spiro **Anagnostopoulos**)

9

Question #19: Science – Chemistry

15 points

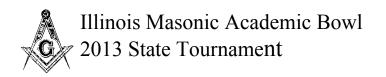|	
The relation named after this person and Einstein, which is simpler than the Stokes-Einstein equation, shows the direct variation between particle mobility and the diffusion coefficient. The coefficient named after him equals the ratio of an electric field divided by a perpendicular magnetic field divided by the temperature gradient. He also determined that it is impossible to reach absolute zero, which is the Third Law of Thermodynamics. Name this scientist whose namesake equation uses the log of the reaction quotient to calculate the reduction potential in an electrochemical cell.	Walther **Nernst**

Question #20: Language Arts – Grammar

15 points

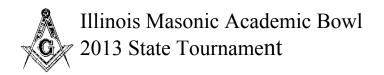|	
The zero form of them is used when modifying the names of languages, sports, and academic subjects. Partitive ones are used with a mass noun. If the noun is identifiable, a definite one is used; otherwise an indefinite one is required. Name these words used to provide specificity to nouns, whose examples in English include "a," "an," and "the."	**article**s

Question #21: Social Studies – US Government

10 points per part

	Elmer Irey gathered information on Al Capone on behalf of this government body.	
1	Name this bureau, responsible for ensuring that people and businesses pay taxes owed the United States government.	**Internal Revenue Service** (accept **IRS**)
2	If a single individual does not itemize, then he or she is eligible to take this. For 2011, it was $5,800 for single filers, $11,600 for those who were married and filed a joint return.	**standard deduction** (prompt on "deduction")
3	This form of income is reported on a Schedule D. If short-term, it is taxed at the same rate as ordinary income. If long-term, it has been taxed at either 0% or 15%.	**capital gain**s (do not accept "capital losses", prompt on "interest" or "dividends")

Question #22: Social Studies – US Government

10 points per part

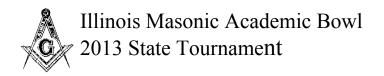|	This government agency was established by the National Security Act of 1947.	
1	Name this department, tasked with gathering and analyzing information which affects national security.	**Central Intelligence Agency** (accept **CIA**)
2	During World War II, William Donovan headed this immediate predecessor to the CIA. It garnered praise and additional support for its role in Operation Torch, the Allied invasion of North Africa.	**Office** of **Strategic Services** (accept **OSS**)
3	Following an investigation by the Taylor Committee, this CIA director was forced to resign following the failed Bay of Pigs invasion.	**A**llen **Dulles** (prompt on "Dulles")

Question #23: Science – Physics

10 points per part

	The law named after him relates antenna height and signaling distance.	
1	Name this Italian scientist who considered himself the creator of wireless telegraphy [the-LEH-gru-fee]. He is widely considered the inventor of radio.	Guglielmo **Marconi**
2	Marconi [mahr-KOE-nee] built on the work of this scientist whose namesake unit is the reciprocal second.	Heinrich **Hertz**
3	Marconi [mahr-KOE-nee] shared his Nobel Prize with Karl Braun, who developed a crystal one of these objects similar to a diode that converts alternating current into direct current.	**rectifier**

Question #24: Science – Physics

10 points per part

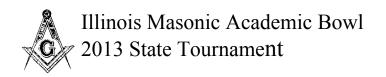|	There are six of these fundamental particles, and all of them are fermions.	
1	Name this group of particles that includes electrons.	**lepton**s
2	Three of the leptons are the electron, muon, and tau. Each of those three particles has one of these particles associated with it, giving a total of six leptons.	**neutrino**s
3	To detect neutrinos, scientists search for this radiation caused by particles traveling faster than light in their medium.	**Cherenkov** radiation

Question #25: Literature – Mythology

10 points per part

	After re-marrying, the children of Athamas and Nephele [neh-FEL-ee] were targeted by Ino [eye-NOE].	
1	Before Phrixus could be sacrificed, Nephele [neh-FEL-ee] sent one of these animals to carry away the child and his sister, Helle [ELL-ee].	**ram** (prompt on "sheep", accept but do not say **golden ram**)
2	The ram was later sacrificed, and became the source for this mythical object, owned by Aeetes [ay-EE-tees].	**Golden Fleece** (prompt on "Fleece")
3	The Golden Fleece was later snagged by this leader of the Argonauts, with the help of Medea.	**Jason**

Question #26: Literature – Mythology

10 points per part

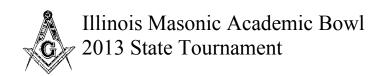|	This god created an invisible net with which he caught his wife sleeping with the god of war.	
1	Name this god of fire, and patron of craftsmen. He used water and earth to create Pandora.	**Hephaestus** (accept **Vulcan**)
2	Ereichthonius [ehr-ik-THOE-nee-us] was born from Gaea [GAY-uh] after Hephaestus' [heh-FEST-us] failed attempt to rape this goddess, the daughter of Metis [MEE-tis].	**Athena** (accept **Minerva**)
3	Among the gifts given to Europa was this bronze giant, which was defeated when Medea magically pulled the bronze nail that kept its vein closed.	**Talos**

Question #27: Math – Algebra

10 points per part

	The only perfect square greater than one in this sequence is 144.	
1	Name this sequence whose first two terms each equal one in which each term equals the sum of the previous two terms. In some conventions, this type of Lucas sequence starts with zero.	**Fibonacci** sequence
2	As n approaches infinity, this is the limit of nth term of the Fibonacci sequence divided by the n minus first term.	**Golden Mean** (accept golden section, divine proportion, divine section, golden proportion, golden number, mean of Phidias, phi, or $(1 + sqrt(5))/2$ or equivalents)
3	Of the first fifteen terms of the Fibonacci sequence, this is how many of them are odd.	**10**

Question #28: Math – Algebra

10 points per part

	In the inverse form of this, the product of two variables equals a constant.	
1	Name this relationship in whose direct type one variable equals a constant times another variable.	**variation**
2	If y varies directly with x, and y=20 when x=5, find the value of y when x=12.	**48**
3	If y varies inversely with x, and y=20 when x=5, find the value of y when x=12.	**8 1/3** (or **25/3** or **8.3 repeating**)

Question #29: Social Studies – World History

15 points

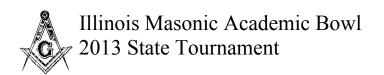|	
Following Yahya Khan's announcement that this country's National Assembly would not convene, the Awami League led a successful revolution in the east. Its people elected Liaquat [lee-ah-kaht] Ali Khan as its first Prime Minister, as Lord Mountbatten was rejected as governor-general in favor of "Great Leader" Mohammed Ali Jinnah. Name this country involved in the conflict over Kashmir opposite India.	Islamic Republic of **Pakistan** (prompt on "East Pakistan" or "Bangladesh" before Liaquat Ali Khan is named, do not accept them afterwards)

Question #30: Science – Biology

15 points

Toll genes in this genus [JEE-nus] were studied by Nobel Prize winners Christiane Nusslein-Volhard [NOOS-leen VOLE-hard] and Eric Wieschaus [WIESCH-haus], leading to a greater understanding of innate immune systems. These are similar to, but less colorful than, Tephritidae [tef-ri-TEE-day]. Another Nobel Prize winner to study this genus was Thomas Hunt Morgan, who demonstrated that genes control heredity by studying the melanogaster [mehl-ah-no-GAS-ter] species. Because these grow to adulthood in ten days, they are easily used to study genetic mutations. Name these insects commonly called fruit flies.	**Drosophila** (prompt on "fruit flies")

Question #31: Math – Conceptual Math

15 points

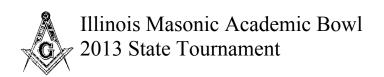|	
The monic [MONE-ik] type of these is addressed by Gauss' Lemma, and Alexander and Jones types of these are used to distinguish types of knots. Lagrange [lah-GRAHNJ] interpolation is used to create one of these that passes through n specified points, and graphs of these must follow Descartes' [day-karts] Rule of Signs. In simple cases, these can be divided using synthetic division, and they can otherwise, like numbers, be divided by long division. Their degree is calculated by taking the largest of the sums of the variable exponents of each term, and their variables' exponents must be whole numbers. Name these expressions, examples of which include binomials and trinomials.	**polynomial**s

Question #32: Literature – US Literature

15 points

The source for it was edited by John Ray, Jr. The protagonist of this novel signed over his money and possessions in Ramsdale before heading to Parkington to kill a writer. The title character of this novel was kidnapped and taken to Coalmont, but was kicked out after refusing to perform in home movies. The title character in this novel, the daughter of Charlotte Haze, was kidnapped by "some old woman," Clare Quilty. Subtitled "The Confessions of a White Widowed Male," name this novel in which Humbert Humbert falls for a nymphet [nim-FET], by Vladimir Nabokov.	*Lolita*

Extra Question #1: Math – Conceptual Math

15 points

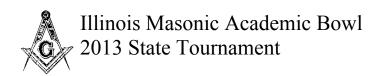|	
This person's integral theorem, integral formula, and argument principle, all of which use closed paths, helped form the basis of complex analysis. This mathematician designed a distribution usually named for him, though Hendrik Lorentz's name is sometimes included, that has no mean. His name is also used for sequences in which the difference between terms approaches zero. Peano [PEE-ah-no], Lagrange [lah-GRAHNJ], and this person developed formulas for the remainder of Taylor's theorem. Name this Frenchman who attempted to prove the theorems of calculus, sometimes credited for developing delta-epsilon proofs and limits.	Augustin-Louis **Cauchy**

Extra Question #2: Fine Arts – Classical/Opera Music

15 points

This composer's *Trepak* and *The Field Marshal* end his song cycle *Songs and Dances of Death*, and he also wrote the cycles *The Nursery* and *Sunless*. One of his pieces, which was revised by Rimsky-Korsakov and incorporated in this composer's opera *The Fair at Sorochyntsi* [sor-oh-CHIN-tsee], is *Saint John's Night on the Bare Mountain*, which is often called *Night on Bald Mountain*. Another work, written soon after the sudden death of Viktor Hartmann, was *Pictures at an Exhibition*. Name this Russian composer who was one of The Mighty Five.	Modest **Mussorgsky**

Extra Question #3: Science – Chemistry

15 points

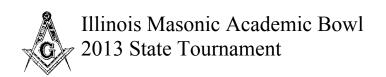| A molecule of this shape is used in the final step of the Kroll process, which removes that molecule's chlorine atoms from titanium. This also is the shape of the most common fluoride of silicon. Also the shape of thiazyl [thigh-AZ-il] trifluoride, its bond angles are approximately one hundred nine point five degrees when there is symmetry. This shape exists when the steric number is four and there are no lone pairs. Give this shape exemplified by methane, which has chemical formula CH₄.	**tetrahedral** (accept other word forms such as **tetrahedron**)

Extra Question #4: Social Studies – World History

15 points

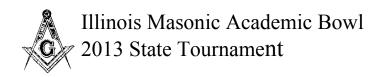| The Moncada army barracks in this country were the target of a failed revolution by a group that would later form the July 26 Movement. The leader of that attack later set up a base in the Sierra Maestras [mah-EHS-trahs] in this country. That insurrection targeted the man who ousted President Carlos Prio in a coup, Fulgencio Batista [ful-HEN-see-oh bah-TEES-tah]. Name this nation ruled since 1959 by Fidel Castro and his brother Raul.	**Cuba**

Extra Question #5: Literature – Mythology

15 points

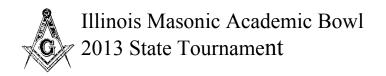|	
Hermes [HER-mees] returned a stolen sandal to this goddess, also called the Lady of Cyprus. She gave Hippomenes [hip-POE-meh-nees] three golden apples. Hippolytus [hip-poe-LITE-us] angered this deity with his complete devotion to Artemis [AHR-teh-mis]. During the Trojan War, Athena told Diomedes [die-OM-eh-dees] that he could only take on this goddess head-on. Aglaea [ah-GLAY-ah] and Euphrosyne [yoo-FROE-sin-ee] are among the attendants of this deity. She feuded with Persephone [per-SEF-oh-nee] over the mortal Adonis [uh-DON-is]. Name this mother of Eros and Greek love goddess.	**Aphrodite** (accept **Venus**)

Extra Question #6: Literature – World Literature

10 points per part

	During the middle of the night, he cried "Noman is killing me by fraud, noman is killing me by force!"	
1	Name this Cyclops and son of Poseidon [poe-SIGH-dun], who threw mountains at a ship whose crew had blinded him.	**Polyphemus**
2	Polyphemus [pol-ee-FEEM-us] was bested by Odysseus [oh-DIS-ee-us], who upon arriving home in Ithaca was informed of the treachery of the suitors by this swineherd. He owned the faithful dog Argos.	**Eumaeus**
3	Eumaeus [yoo-MAY-us] described this suitor as having a good birth, but evil words. After threatening to give an old beggar Egypt and Cyprus over again, he threw a footstool at the man, who was Odysseus in disguise.	**Antinous**

Extra Question #7: Literature – World Literature

10 points per part

	In a letter to Wilhelm, he described his cottage, as well as the nearby hamlet of Walheim, wherein he could drink good coffee and read Homer in solitude.	
1	Name this lovestruck young man who borrowed two pistols from Albert which he used to take his own life. He would later inspire a fashion trend, as well as a streak of suicides across Europe.	Young **Werther**
2	Young Werther was a fictional creation of this German author, who wrote about Mephistopheles [meh-fis-TOF-uh-lees] and Gretchen in *Faust*.	Johann Wolfgang von **Goethe**
3	Young Werther became desolate after being driven away by this young woman, who was already betrothed to Albert. She asked Werther to read passages from Ossian before locking herself in her room to escape him.	**Lotte** (accept **Charlotte** S.)

Extra Question #8: Science – Chemistry

10 points per part

Examples include bronze and steel.		
1	Name these combinations of two or more metallic elements.	**alloy**s
2	While bronze is an alloy of copper and tin, this alloy combines copper and zinc.	**brass**
3	This adjective describes alloys that have a single melting point. That temperature is always lower than any other combination of the same metals.	**eutectic**

Extra Question #9: Science – Chemistry

10 points per part

One example of this process leads to xenon [ZEE-non], strontium, and an extra neutron.		
1	Name this process in which a nucleus splits into two or more parts.	nuclear **fission**
2	This value, the difference between the mass of a nucleus and the mass of its constituent parts, is used to determine how much energy is released during a fission reaction.	mass **defect**
3	This is the type of nuclear reactor in which more fissile material is produced than consumed.	**breeder** reactor

Question #1: Literature – Mythology

15 points

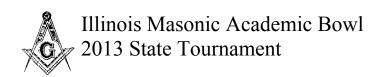|	
One of them trained Heracles [HEAR-uh-klees] in fencing; that figure was given the epithet "Tamer of Horses." After abducting the daughters of Leucippus [LOO-kip-pus], they were attacked by Idas [EYE-dahs] and Lynceus [lin-KAY-us]. They assisted Peleus [PEE-lay-us] in his assault on Iolcus [eye-ol-KUS]. One of them defeated King Amycus [AM-uh-kus] in a boxing match. They kidnapped Aethra [AY-thra] after rescuing their sister Helen. After one died, the other gave up half his immortality. The male offspring of Leda [LAY-dah], name these male twins from Greek mythology.	**Dioscuri** (accept **Castor** and **Pollux** (accept **Polydeuces** for "Pollux"), accept **Gemini**, accept **Heavenly Twins**, prompt on "Argonauts" until "attacked")

Question #2: Science – Chemistry

15 points

The combination of this ion [EYE-on] with platinum and possibly potassium creates a good electrical conductor useful in nanotechnology called Krogmann's salt. This ion also combines with iron to form Prussian blue, and it is combined with hydrogen using the Andrussow [ahn-DRUS-sow] process. In animals, this ion inhibits cytochrome c oxidase [SIGH-toe-krome see OKS-i-dase], which causes death because it prevents the body from using oxygen. Name this ion created from methane and ammonia, consisting of a triple bonded combination of carbon and nitrogen.	**cyanide** (prompt on "CN" or "CN⁻")

Question #3: Social Studies – US Government

15 points

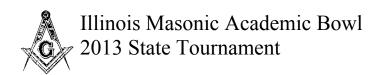|	
When this was introduced to Congress, John Garner held his nose and motioned a thumbs down. It also included ideas put forth by William Denman, including "proctors" and floating officials to alleviate backlogged dockets. Its undoing began with Owen Roberts' vote in West Coast Hotel v. Parrish, referred to as "the switch in time." Put into motion by the Judicial Procedures Reform Bill of 1937, name this attempt by President Franklin Roosevelt to expand the highest judicial body in the United States.	FDR **court packing** scheme (accept **Judicial Procedures Reform Bill** of 1937 before mentioned, accept equivalents)

Question #4: Miscellaneous – Agriculture

15 points

To help Georgia farmers grow this crop, researchers developed a new form of this crop called L-Star, which lacks lipoxygenase [li-POKS-uh-jen-ase]. The forced evictions of Paraguayan landowners have led to this crop's namesake "Wars." Found in the Chinese dish douchi [DOW-chee], it is the primary ingredient of tempeh [tem-pay], as well as textured vegetable protein, miso [MEE-soe] and edamame [eh-dah-MAH-may]. Name this plant, the source of a key component in miso and tofu.	**soybean**s (accept **soya** bean, **soja** bean, or **glycine max**)

2

Question #5: Science – Astronomy

15 points

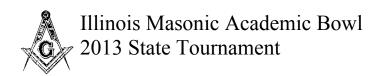|	
The closest part of this to Earth is at the South Atlantic Anomaly, which slowly expands northward and shifts westward, probably due to the weakening of the magnetic field. It is believed that its particles, mostly protons and electrons, come from cosmic radiation and possibly solar wind. Existing in the magnetosphere [mag-NEE-toe-sphere], this is in the shape of an inner and outer torus. Name these regions named after the scientist who headed the missions to find them in 1958.	**Van Allen** radiation belts

Question #6: Social Studies – World History

15 points

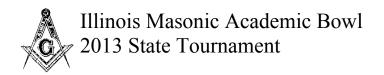|	
During it, a power struggle occurred at Mao'ergai [mow-er-guy] involving Zhang Guotao [zaing go-tou], whose forces had joined it at the Sichuan-Shaanxi [si-shwan SHAIN-tsee] border. Sparked by a series of attacks on the Jiangxi-Fujian [JAING-jee FOO-jee-un] border, Zhu De initially commanded the army that undertook this campaign. It ended in Yan'an, where the Communists built up a base to take on the Nationalists. Name this 6,000-mile trek undertaken by Chinese Communists led by Mao Zedong.	**Long March**

Question #7: Fine Arts – Musical Theatre

10 points per part

	Identify these musicals based on plays.	
1	Based on George Bernard Shaw's *Pygmalion*, this musical includes the songs "The Rain in Spain" and "I Could Have Danced All Night."	***My Fair Lady***
2	This Rodgers and Hart musical based on Shakespeare's *The Comedy of Errors* includes the song "Falling In Love With Love."	*The **Boys from Syracuse***
3	This Cole Porter musical is set during the production of Shakespeare's *Taming of the Shrew*.	***Kiss Me, Kate***

Question #8: Fine Arts – Musical Theatre

10 points per part

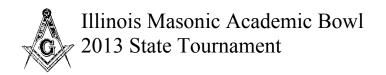|	Identify these musicals associated with Stephen Sondheim.	
1	Sondheim wrote the lyrics for this Leonard Bernstein musical involving gang fights between the Sharks and the Jets.	***West Side Story***
2	This Sondheim musical is about actress Desiree Armfeldt and includes the song "Send in the Clowns."	*A **Little Night Music***
3	This musical includes many Brothers Grimm characters and includes the songs "Agony" and "No One Is Alone."	***Into the Woods***

Question #9: Literature – Mythology

10 points per part

	In his predominant role, he is called "He Who Counts the Hearts."	
1	Name this jackal-headed deity, who Osiris [oh-SIGH-ris] replaced as lord of the dead. He resides in the Hall of the Two Truths.	**Anubis** (accept **Ienpw**)
2	When Anubis weighs a heart that is heavier than the feather of Ma'at [mah-aht], the heart is then fed to this demon.	**Ammit**
3	Ammit is usually depicted with the head of this animal. Sobek [SOE-bek], the Egyptian god of fertility, is depicted as one, or as a human with the head of one of these river-dwelling animals.	**crocodile** (do not accept "alligator")

Question #10: Literature – Mythology

10 points per part

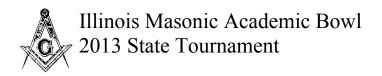|	This god is also known as Ekadanta [eh-kah-dahn-tah], "The Lord who has only one tusk."	
1	Name this elephant-headed mouse-riding Hindu deity, a son of Shiva [SHI-vah] and Parvati.	**Ganesh**a
2	Ganesh lost a tusk after Parasurama, an avatar of Vishnu, threw this weapon at him. When Odysseus returned, he took his own bow and shot an arrow through twelve of them.	**axe**
3	Ganesh defeated his brother Karthik in a race to do this by either reading scriptures or walking around his parents.	**circumnavigate the world** (accept clear equivalents)

5

Question #11: Science – Biology

10 points per part

Each of these specify an amino acid.		
1	Name this sequence of three nucleotides in messenger RNA.	**codon**s
2	Name the nucleotide that pairs with cytosine [SIGH-toe-seen] in DNA.	**guanine** (prompt on "G")
3	Name either of the two acidic amino acids. They are created by codons that start with guanine [GWAH-neen] and adenine [A-duh-neen].	**aspartic** acid or **glutamic** acid (do not accept other word forms, prompt on "Asp", "D", "Glu", or "E")

Question #12: Science – Biology

10 points per part

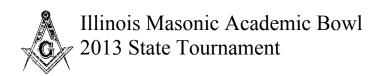| The Miller-Urey experiment showed how natural conditions could create amino acids.		
1	This classification is used for amino acids that must be ingested because they are not created by the organism.	**essential** (accept **indispensable**)
2	This bond between a carboxyl [kahr-BOKS-il] group and amino group is used in chains of amino acids.	**peptide** bonds
3	One process that occurred during the Miller-Urey experiment is this synthesis named after a German that creates amino acids from aldehydes [AL-duh-hides] or ketones [KEE-tones].	Adolph **Strecker** amino-acid synthesis

Question #13: Math – Geometry

10 points per part

	Two vertices of a triangle are on opposite sides of the diameter of a circle, and the third vertex is on the circle.	
1	Find the measure in degrees of the angle at the vertex that is not on the diameter.	**90** degrees
2	The theorem stating that the angle is right is named after this ancient mathematician from Miletus [mi-LAY-tus] who was born about fifty years before Pythagoras.	**Thales**
3	If the diameter of the circle is 4 and it is a 30-60-90 triangle, this is the area of the triangle.	**2 Root 3** (or **2 radical 3** or equivalents)

Question #14: Math – Geometry

10 points per part

	This term refers to two figures that have the same shape but may be scaled differently.	
1	Name this relationship referring to shapes that have congruent corresponding angles but proportional lengths.	**similar**ity (accept **similarness**)
2	If triangle ABC is similar to triangle DEF, and the sides are labeled with the same letter as the angle they are across from in their triangle, find the length of the side 'a' if b is 15, d is 8, and e is 12.	**10**
3	Two conic sections must be similar to each other if they share this value.	**eccentricity** (prompt on "e")

Question #15: Literature – World Literature

15 points

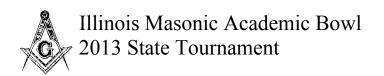|	
In one tale in this collection, an arrow fired in an archery contest goes so far that it cannot be found. The arrow landed in the door belonging to the mountain fairy Periebanou [peer-ee-ban-ow]. In another story, Morgiana [mor-JAN-ah] killed people hiding in oil jars. Those thieves were after treasure found in a cave guarded by the password "Open Sesame." One of its stories described a Chinese vagabond who married a sultan's daughter with help from a genie. Name this collection of tales told to the Persian emperor Shahriar [SHAH-ree-ahr] by Scheherezade [sheh-HERE-eh-zahd].	*One **Thousand and One Nights** (accept The **Arabian Nights' Entertainment**, One **Thousand and One Arabian Nights**, A **Thousand Nights and a Night**, or **Alf layla wa-layla**)*

Question #16: Social Studies – US History

15 points

The Tower Commission determined that the President made the events of this scandal possible, but could not tie him directly to it. The Lebanese newspaper Al-Shiraa [SHE-rah] published an exposé of this scandal's hostage negotiations. The full extent was revealed when Attorney General Edwin Meese found a large financial discrepancy that was explained by Oliver North. Name this scandal, in which Nicaraguan rebels were funded by American arms sales to a Middle Eastern country.	**Iran-Contra** affair

Question #17: Math – Conceptual Math

15 points

The geometric type of this, also known as the Fermat-Weber [fehr-mah VAY-ber] point, is used to locate transportation hubs and is defined as the point that minimizes the total distance to a given set of points. This term also is used to describe a very simple non-linear rank-conditioned rank-selection noise reduction filter. This term also describes segments whose lengths can be calculated using Apollonius' [ap-pol-LONE-ee-us] theorem, which meet, in the case of a uniformly weighted triangle, at the center of mass, and in the case of any triangle, at the centroid. Give this term that names a segment going from a vertex to the midpoint of an opposite side of a triangle and which also names the middle number in a ranked list of values.
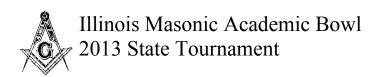
median

Question #18: Fine Arts – Art History

15 points

This artist built the casing that holds the Chair of Saint Peter that is in Saint Peter's Basilica. One of his works, which was supposed to include a male above it, is a woman with her foot on a round object and is titled *Truth Unveiled by Time*. Many of his sculptures, including *Apollo and Daphne*, are located in the *Galleria Borghese* [GAL-uh-ree-uh bor-GAY-say]. Name this 17th century Baroque [buh-ROKE] sculptor whose work in the Cornaro Chapel showing an angel with a spear and a nun wrapped in sheets in called *The Ecstasy of Saint Teresa*.

Gian Lorenzo (or Giovanni) **Bernini**

Question #19: Literature – British Literature

15 points

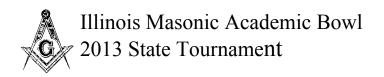|	
In one of his novels, the "Enemy Above" manifests itself as an asphyxiating [as-FIX-ee-ay-teeng] cloud, and is a representation of God. In that play, the patient's death during a bombing attack allows the title figure the opportunity to devour his nephew Wormwood. This author also wrote about the talking mouse Reepicheep, an object of scorn for Eustace, a cousin of the Pevensies [peh-VEN-sees], Lucy, Peter, Susan, and Edmund, four British children who are pursued by Jadis [JAY-dis], the White Witch. Name this author of *The Chronicles of Narnia*.	Clive Staples "C.S." **Lewis**

Question #20: Science – Physics

15 points

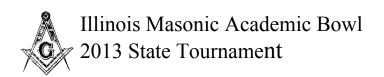|	
This can lead objects to move in an inertial circle, and either inertia or this phenomenon can be used to explain how a mass flow meter works. The frequency associated with this effect's parameter is twice the Earth's angular velocity times the sine of the angle of latitude, and this is most noticeable when objects move long distances along a longitudinal line. It can be explained using inertia and the conservation of angular momentum, and it has little impact near the equator and causes a rightward curvature in the Northern Hemisphere. Name this fictitious force caused by a circular reference frame.	**Coriolis** Effect (accept other second words as long as the first word is Coriolis)

Question #21: Math – Pre-Calculus

10 points per part

	This is the name of a collection of vertices and edges.	
1	Name these structures used to solve the Konigsberg Bridge Problem.	undirected multi**graph**
2	In this type of graph, each vertex is connected to every other vertex with a single edge.	**Complete** (accept **K** or K followed by another letter)
3	This is the number of edges in a complete graph with five vertices.	**10**

Question #22: Math – Pre-Calculus

10 points per part

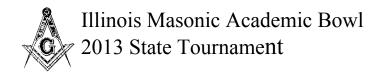|	This begins with a basis case.	
1	Name this method of proof which typically uses the nth case to prove the n plus first case.	proof by **induction** (accept **inductive** proof)
2	Induction can be used to show that $x^n - y^n$ is always divisible by this binomial.	**x-y** (accept equivalents such as x+(-y))
3	Induction can also be used to show that $n^3 + 2n$ for any integer n is always divisible by this whole number greater than 1.	**3**

11

Question #23: Literature – British Literature

10 points per part

	This resident of Highbury was passed over by the Reverend Philip Elton in favor of Augusta Hawkins.	
1	Name this spoiled daughter of the hypochondriac Henry. She and her older sister Isabella married brothers.	**Emma** Woodhouse (prompt on "Woodhouse")
2	The matchmaker Emma Woodhouse was created by this author of *Sense and Sensibility* and *Persuasion*.	Jane **Austen**
3	Emma married this brother of John. Her senior by sixteen years, she married him after learning that Harriet Smith was in love with him.	**George** **Knightley** (accept either underlined part)

Question #24: Literature – British Literature

10 points per part

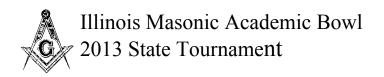|	This poem describes a work created when Fra Pandolf "worked busily a day."	
1	Name this poem describing a portrait of the deceased title figure who was given a "nine-hundred-years-old name." The narrator also commissioned a bronze of Neptune taming a sea-horse that was created by Claus of Innsbruck.	"**My Last Duchess**"
2	"My Last Duchess" was penned by this author of "Fra Lippo Lippi [LIP-pie]" and "Porphyria's [por-FIR-ee-uhs] Lover."	**R**obert **Browning** (prompt on "Browning")
3	Robert Browning penned a collection of four vignettes, one of which describes the adulterous Ottima [OH-tee-mah] murdering her husband. After Ottima and Sebald reconcile following the murder, this title character is heard singing "God's in his heaven, all's right with the world."	**Pippa** (the collection is *Pippa Passes*)

Question #25: Science – Chemistry

10 points per part

This occurs when a chemical decreases its oxidation number, often by gaining electrons.		
1	Name this process often contrasted with oxidation.	**reduction**
2	In organic chemistry, reduction reactions generally involve the addition of this element to a molecule.	**Hydrogen** (prompt on "H")
3	Many molecules containing this group consisting of a double bond between carbon and oxygen can be reduced. This group includes esters, amides [A-mides], aldehydes [AL-deh-hides], and others.	**Carbonyl**

Question #26: Science – Chemistry

10 points per part

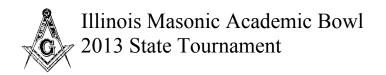| Rheopectic [ray-oh-PEK-tik] materials increase in this quantity when they are under stress.		
1	Name this resistance in liquids to flow.	**viscosity** (accept other word forms)
2	This number gives the ratio of inertial forces to viscous forces. High values are associated with turbulent flow.	**Reynolds** number
3	This number used to study convection gives the ratio of fluid viscosity to thermal conductivity, which is the same as the ratio of viscous diffusion rate to thermal diffusion rate.	**Prandtl** number

Question #27: Social Studies – US History

10 points per part

	Rudolph Schnaubelt was accused of instigating this event but was released without charge.	
1	Name this violent incident that stemmed from a meeting organized by August Spies, a leader within the International Working People's Association.	**Haymarket** Square riot
2	The Haymarket Square riot took place in this major city. Federal troops were sent here by President Cleveland to stop the Pullman strike.	**Chicago**, Illinois
3	While holding this office, John Altgeld pardoned three of the men hanged for their role in the Haymarket riot.	**Governor** of **Illinois** (prompt on "Governor")

Question #28: Social Studies – US History

10 points per part

	This commander of the División del Norte [NOR-tay] joined the uprisings that overthrow Porfirio [por-FEER-ee-oh] Díaz and Victoriano Huerta.	
1	Name this leader of the "pistoleros," who was later pardoned by Adolfo de la Huerta [WEHR-tah].	Francisco "Pancho" **Villa** (accept José Doroteo **Arango** Arámbula)
2	After hearing of the atrocities committed by Pancho Villa and his followers, President Wilson sent forces into Mexico to capture him, led by this Brigadier General who would later head the American Expeditionary Force.	John Joseph **Pershing** (prompt on "Blackjack")
3	This major Texas city was put under martial law after news spread of the Villas' murder of 17 businessmen onboard a train in Santa Ysabel.	**El Paso**

Question #29: Math – Conceptual Math

15 points

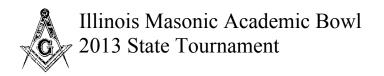|	
Like the identity function, the antiderivative of this function equals half its output times x plus the constant of integration. This function is equivalent to multiplying by the signum [SIG-num] function, and its application to sums gives a result very similar to the triangle inequality. Its complex analogue is the modulus, giving the magnitude of a quantity. Name this function that when graphed produces a v shape, which multiplies negative numbers by negative one and has no effect on positive numbers.	**absolute value**

Question #30: Social Studies – World History

15 points

His wives included his sister Henutmire [heh-nut-mire] as well as Isinofre [is-in-OH-fray], who birthed his successor, Merneptah [mer-NEP-tah]. As a commander, a task force from Simyra [si-MIR-ah] saved his forces after he was fed false information regarding opposing forces at Aleppo [uh-LEP-poe]. His reign saw the construction of the temple of Amun at Karnak. His forces fought to a draw against the Hittites at the Battle of Kadesh. This successor to Seti I was also the husband of Nefertari. Name this long-serving Egyptian pharaoh.	**Ramses II** (accept **Ramses the Great**, accept **Ramesses II** or **Ramessu II**, prompt on "Ramses")

Question #31: Science – Biology

15 points

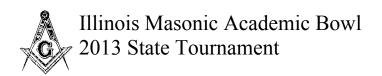| One treatment of prostate cancer lowers the pituitary gland production of this hormone. In men, high levels of prolactin [proe-LAK-tin] enhance the main purpose of this hormone, which is to cause Leydig [LEE-dig] cells to create testosterone. Breastfeeding women produce very little of this hormone, which explains why they rarely become pregnant. This hormone, whose name resembles the name of the second half of a menstrual cycle, surges during the middle of the cycle around the same time as follicle stimulating hormone. Name this hormone that triggers the release of eggs.	**Luteinizing hormone** (accept **LH**)

Question #32: Literature – US Literature

15 points

He wrote of a deaf-mute who led a group of soldiers to his own home as it burned to the ground in "Chickamauga." In one work, this author wrote that residents of the Southern States do not know of the term "Yankee." He "came to Mexico to die" in a novel by Carlos Fuentes. He wrote a short story in which a Federal spy tricked Confederate sympathizer Peyton Farquhar. Name this author of *The Devil's Dictionary* and "An Occurrence at Owl Creek Bridge."	Ambrose **Bierce** (prompt on "Old Gringo")

Extra Question #1: Fine Arts – Composers of the Modern Era

15 points

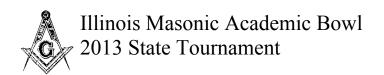|	
This composer quoted from the Song of Solomon at the beginning of each of the six sections of his *Flos Campi* [floes kam-pee], and his seventh symphony is based on music he wrote for a movie about Robert Falcon Scott's attempt to reach the South Pole in Antarctica. He also wrote a one act opera based on John Millington Synge's [seengs] *Riders to the Sea*. Another work, inspired by a George Meredith poem, is *The Lark Ascending*. Name this composer who wrote a Fantasia based on the Third Psalter Tune of Thomas Tallis.	Ralph **Vaughan Williams** (prompt on "Vaughan" or "Williams")

Extra Question #2: Social Studies – US History

15 points

In the build-up to this engagement, the losing side in this battle was delayed by Leonidas Polk's refusal to march without a written order. The losing side at this battle attempted to preempt the arrival of Don Carlos Buell, whose reinforcements swung the result. In the aftermath of this battle, P.G.T. Beauregard retreated to Corinth, Mississippi. The site of the bloody "Hornet's Nest," Albert Sidney Johnston was killed at this battle. Name this victory for Ulysses [yoo-LIS-ees] S. Grant in 1862 in Tennessee.	Battle of **Shiloh** (accept Battle of **Pittsburg Landing**)

Extra Question #3: Science – Health

15 points

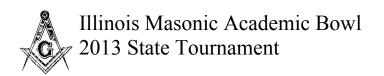|	
A lack of this element in the diet or a lack of selenium [seh-LEEN-ee-um] can ruin growth plates of bones, which is called Kashin-Beck disease. Its lack also can lead to the stunted physical and mental growth known as cretinism [KREET-in-ism]. Those deficiencies are more common in mountain regions because this element is often ingested through seafood, especially kelp. In order to prevent deficiencies, this element often is added to salt. Name this element important in thyroid hormones, a lack of which can lead to a swelling of the neck called goiter.	**Iodine** (prompt on "I")

Extra Question #4: Literature – World Literature

15 points

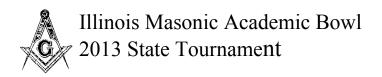|	
This novelist wrote of a baby being left at the British Import and Export Company; her gifted memory allows her to recall the box of Marseilles [mahr-SAY] soap that was once her crib. This author wrote of a green-haired girl nicknamed "the Beautiful" who died from sipping poisoned brandy. That woman's widow was a miner before moving to Tres [trays] Marias. This author of *Daughter of Fortune* and *Eva Luna* penned a novel focusing on the Trueba [troo-EH-bah] family headed by Esteban. Name this author of *The House of the Spirits*, a Chilean novelist.	Isabel **Allende**

Extra Question #5: Math – Conceptual Math

15 points

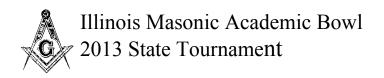| This is the number of convex regular polychora [pol-ee-KOR-ah], which are the four-dimensional versions of the Platonic solids. The smallest non-abelian [ah-BEEL-yun] group has this many elements, and a circle can be surrounded by this number of congruent circles. This is the greatest number of sides that a regular polygon that tessellates the plane can have. This is the number of vertices of an octahedron, and it is the smallest perfect number. Give this number equal to the product of the two lowest prime numbers.	**6**

Extra Question #6: Math – Trigonometry

10 points per part

This law is used to calculate missing side lengths of triangles when one side length and the angle measures are known.	
1 Name this law that uses proportions.	Law of **Sine**s
2 In a triangle, a side of length 10 is across from a 30 degree angle. Find the side length across from a 60 degree angle in the same triangle.	**10 Root 3** (accept equivalents such as **10 Radical 3**)
3 This law related to the Law of Sines is used to find the ratio of the quantity a-b divided by the quantity a+b.	Law of **Tangent**s

Extra Question #7: Math – Trigonometry

10 points per part

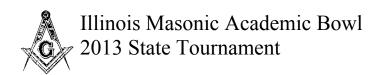| These formulas can be derived from the angle addition formulas. One of them gives the value of two sine theta cosine theta, and another gives the value of cosine squared theta minus sine squared theta.	
1 Name these identities commonly used in trigonometry.	**double angle** (formulas or identities)
2 If sine theta equals three-fifths, and theta is in the first quadrant, find the value of sine two theta.	**24/25** (or 0.**96**)
3 If sine theta equals three-fifths, and theta is in the first quadrant, find the value of cosine of the quantity theta plus pi.	**-4/5** (or **-0.8**)

Extra Question #8: Social Studies – World History

10 points per part

	While serving as President of this country, Mohammad Daud Khan was overthrown in a military coup led by Nur Mohammad Taraki.	
1	Name this nation, the target of a 1979 Soviet invasion meant to back the government of Banner Party leader Babrak Karmal.	Democratic Republic of **Afghanistan** (prompt on "DRA," do not accept "Islamist Republic of Afghanistan")
2	The opposition to the invasion was led by these groups of militant Muslims, who received significant support from supplies sent by the United States and funneled through Pakistan.	**mujahideen** (accept **mujahidun**)
3	A ceasefire was signed by the governments of Afghanistan, Pakistan, the United States, and the USSR in 1988 in this Swiss city.	**Geneva**

Extra Question #9: Social Studies – World History

10 points per part

	Australia is not exactly a military superpower, but they have mixed it up in major conflicts. Answer the following about conflicts involving Australian forces.	
1	Australian forces fought in this World War I campaign, where Mustafa Kemal led the forces that beat back the ANZAC Corps. A failed attempt to take the Dardanelles, the Allies ended up evacuating after losing over 200,000 troops.	**Gallipoli** Campaign
2	In February 1942, the Japanese targeted this capital city of the Northern Territories, in order to prevent the Allies from using it as a base. It was the first of many raids by the Japanese on Australian soil.	**Darwin**
3	Australia sent group of advisors from a training team to provide support to the government of Ngo Dinh Diem in this conflict.	**Vietnam** War

Question #1: Math – Conceptual Math

15 points

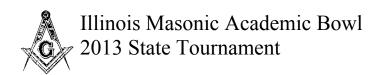|	
The existence of one of these of a particular size is guaranteed by van der Waerden's theorem when all of the integers are put into a certain number of classifications, and that problem was originally known as Baudet's [bau-days] conjecture. Dirichlet's [dir-ich-lays] Theorem gives a condition under which these must contain an infinite number of primes, and Szemeredi's [she-meh-REH-dees] theorem was used by Ben Green and Terence Tao to show that these can be made of prime numbers of arbitrary length. The sum of these can be found by adding the first and last numbers and then multiplying the sum by half the number of numbers. Name these structures in which each number is a common difference more than the preceding number.	**arithmetic sequence** (accept **arithmetic progression**, prompt on "arithmetic", do not accept "sequence" or "arithmetic series")

Question #2: Science – Earth Science

15 points

One of the two types of these named after regions in Sweden are also called ribbed because of their appearance. The minor type are sometimes referred to as corrugated or washboard because of their appearance. Consisting of unsorted till, other types of these include lateral, ground, and terminal. An example of this in Wisconsin is named Kettle. Name these stones and earth sometimes on a glacier but often left behind when the glacier melts.	**moraine**s

Question #3: Social Studies – World History

15 points

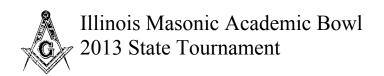|	
This head of state sent troops to Tigray to counter an invasion; those forces won at the Battle of Tembien, but lost at Maychew. He was overthrown in a military coup which would see Aman Andom tapped as the head of state; that coup was led by the Derg. He was crowned following the death of Zauditu [zau-dee-too], the daughter of Menelik [meh-neh-leek] II, in 1930, and his country was later invaded by Italy. Name this 20th century emperor of Ethiopia.	Haile **Selassie** (accept Ras Tafari **Makonnen**, prompt on "Lion of Judah" or "Ras Tafari")

Question #4: Miscellaneous – Industrial Arts

15 points

An early form of one of these utilized a Sprengel pump to create the necessary vacuum, as well as platinum wires. Ones used for heating purposes have an envelope made from fused quartz. The gas found within modern ones is a mix of argon and nitrogen. Tungsten is used for the filament found within it. Many countries are starting to phase out these in favor of compact fluorescent lamps. Name this form of illumination that usually comes in 40, 60, or 100-watt varieties.	incandescent **light bulb** (prompt, partial answer, do not accept any answer involving "fluorescent bulbs")

Question #5: Science – Biology

15 points

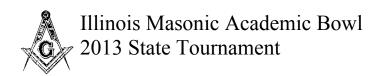|	
These structures are the primary producers of colicin [KOLE-i-sin] proteins, which can be toxic for some strains of E. coli [ee KOE-lie]. These are generally reliant on transfer genes, and some of these are also responsible for the hok/sok system which kills future E. coli bacteria that do not contain these structures. Like viruses, these replicate within a host, and it is possible that viruses evolved from these structures. Name this naked DNA that is often circular.	**Plasmid**s

Question #6: Literature – British Literature

15 points

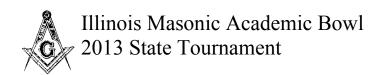|	
The antagonist in this play would rather be a canker in a hedge than a rose in the grace of his brother; at the end, that man was said to have brought armed men to Messina [mes-SEEN-ah]. In this play, Conrade insults the man that arrested him; Dogberry then insists that he is a wise fellow. The conflict in this play centers on Don John's attempt to break up Don Pedro's arrangement of marriage for Claudio and Hero. Name this Shakespeare play in which Beatrice and Benedick constantly fight, and then get married.	*Much Ado About Nothing*

Question #7: Social Studies – Current Events

10 points per part

	Answer the following about a flare-up over a group of islands.	
1	In August 2012, Lee Myung-Bak, the president of this country, visited the Takeshima [TAHK-uh-shee-mah] Islands, known to its residents as Dokdo [DOK-doe].	**South Korea** (accept **Republic of Korea**, do not accept "Democratic People's Republic of Korea")
2	This other country laying claim to the islands incorporated them into its Shimane [shi-mah-nay] prefecture. It occupied the islands as part of its invasion of the Far East during World War II.	**Japan**
3	Japan's claim stemmed from the fact that the chain was not included as part of the territory returned under the peace treaty it signed to end World War II, signed in this California city.	**San Francisco**

Question #8: Social Studies – Current Events

10 points per part

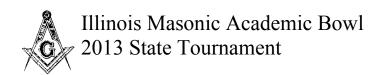|	Answer the following about British banks being called to the carpet for various shenanigans.	
1	In 2012, New York's banking regulators accused Standard Chartered of laundering money through transactions with this nation, which has been the subject of sanctions since the overthrow of the Shah in 1979.	**Iran**
2	In August 2012, HSBC set aside 700 million dollars to cover potential fines from the US Justice Department shortly after this North American country issued a 28 million dollar fine relating to charges of money laundering on behalf of drug traffickers.	**Mexico**
3	A number of executives at Barclays resigned after it was revealed that key employees were colluding to manipulate this rate, which determines how much banks charge to lend money to each other.	**LIBOR** (accept **London inter-bank lending rate** or **London inter-bank offer rate**)

Question #9: Math – Trigonometry

10 points per part

Functions of this type follow the rule f of x equals f of the quantity x+p for some nonzero p.	
1	Identify these types of functions of which trigonometric functions are an example.	**period**ic
2	The transform named after this French mathematician approximates periodic functions as linear combinations of trigonometric functions.	Joseph **Fourier**
3	If a function is odd, it will have this coefficient multiplied by the cosine function in its Fourier transform.	**0**

Question #10: Math – Trigonometry

10 points per part

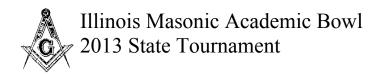| These are sometimes called cyclometric functions.	
1	Give the prefix which is used to signify the inverse of trigonometric functions.	**arc**
2	This is the difference when you subtract the largest and smallest values in the domain of the arcsine function.	**2**
3	This is the y-coordinate of the asymptote of the arcsecant function.	**pi/2** (accept **one-half pi**)

Question #11: Literature – World Literature

10 points per part

	After preventing Joseph Grand's suicide, Cottard called for this doctor.	
1	Name this resident of Oran, Algeria. Raymond Rambert questioned him for a story about living conditions.	Dr. **Bernard** **Rieux** (accept either)
2	Bernard Rieux [roo] is the main character of *The Plague*, a novel by this author. He wrote about Mersault [mehr-sol] shooting an Arab in *The Stranger*.	Albert **Camus**
3	This religious leader claimed that the plague was retribution, but he is thrown for a loop by the death of Monsieur Othon's son.	Father **Paneloux**

Question #12: Literature – World Literature

10 points per part

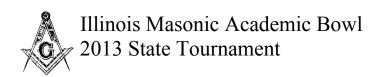|	In this story, Tomsky claimed that Herman's German heritage meant he was economical, and not one to gamble.	
1	Name this story, in which Herman ended up confined to a hospital in Oboukov [oh-BOO-kof], after playing the title card instead of an ace.	"The **Queen of Spades**"
2	"The Queen of Spades" was penned by this Russian author of *Eugene Onegin* and *Boris Godunov*.	Alexander **Pushkin**
3	Herman became involved in gambling at faro after being told by the Countess to play three cards in order. The ace was the third. In either order, name the other two.	**three** and **seven** (accept **trey** for three)

6

Question #13: Science – Physics

10 points per part

	This type of magnetism is due to spins that line up with each other.	
1	Name this type of magnetism associated with iron, nickel, and cobalt.	**ferromagnetism** (accept other word endings)
2	This is the tendency of a ferromagnet to maintain its magnetism even when the field causing it is removed. It is a general term used for any system dependent on past conditions and names the resulting loop on a graph.	**hysteresis**
3	This is the measure of the magnetization left when the external field is removed.	**remanence**

Question #14: Science – Physics

10 points per part

	This phenomenon is based on the principle of superposition.	
1	Name this wave phenomenon sometimes classified as constructive or destructive.	**interference**
2	This scientist is credited for discovering double-slit interference in 1803.	Thomas **Young**
3	This is the shape of a node in the interference pattern formed by two sources in a wave tank.	**hyperbola**

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Question #15: Social Studies – US History

15 points

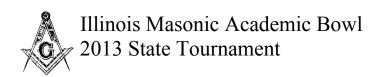|	
Article IX of this treaty stipulated that both sides would cease conflicts with Indian tribes, and would return all captured land to the natives. One party to its negotiations included admiralty lawyer Williams Adams and Undersecretary for War Henry Goulburn. After negotiations stalled, the Duke of Wellington suggested to Lord Castlereagh [KAS-ul-ray] that he agree to *status quo ante* [AN-tee] *bellum*. The Battle of New Orleans took place after it was signed. Name this treaty meant to end the War of 1812.	Treaty of **Ghent**

Question #16: Literature – Mythology

15 points

His father owned a set of horses that were fathered by the mares of Diomedes [die-OM-uh-dees]. Two of his sons became rulers of Alba Longa [LONE-gah]. He was eventually deified as Indiges [IN-dih-jees]. This son of Venus would later kill a Rutulian [roo-TOO-lee-un] king in single combat. When he visited the underworld, he was shunned by Queen Dido [DIE-doe], whom he had abandoned. Name this son of Anchises [an-KISE-es], a Trojan War hero and subject of an epic by Virgil.	**Aeneas**

8

Question #17: Fine Arts – Classical/Opera Music

15 points

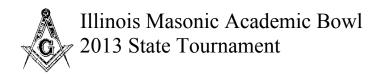|	
Otto Deutsch [doytsch] cataloged this composer's songs, and one of his last works was, appropriately enough, entitled *Swan Song*. One of his string quartets, which has a third movement scherzo that has been called "dance of the demon fiddler," is called *Death and the Maiden*. In addition to his Fourth Symphony being labeled Tragic, he wrote symphonies nicknamed Little C and Great C. Some musicologists theorize that the first part of his incidental music for *Rosamunde* was supposed to be the last part of his 8th Symphony. Name this composer who died in 1828, leaving behind his *Unfinished Symphony*.	Franz **Schubert**

Question #18: Science – Chemistry

15 points

The results of this test are interpreted using the Van Deemter [DAYM-ter] equation, and some liquid types of this process use eluents [EL-yoo-ents] as carriers and follow filtration. One type of this method, which uses a solvent and a sheet coated with silica [SIL-i-kah], is the thin layer type. The output of this process can be a graph with several peaks, with the different peaks showing the concentrations of various ions or other constituents in the original mixture. Name this process with mobile and stationary phases used to separate liquid or gas mixtures.	**chromatography**

Question #19: Social Studies – Geography

15 points

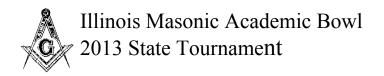|	
Antonio Guzman Blanco [GOOZ-mahn BLAHN-koe] attempted to transform this city into a replica of Paris. Royalists cited divine punishment when describing this city's 1812 Holy Thursday earthquake. Its Altamira [ahl-tah-MEER-ah] neighborhood was severely damaged by another earthquake in 1967. This city's cabildo [kah-BEEL-doe] served as a national government before being sacked by English buccaneers. Major suburbs of this city include El Hatillo [ah-TEEL-oh] and Chacao. It was the site of an unsuccessful coup attempt in 1992, but the leader of that effort became president and held off a different coup attempt in 2002. Name this home of Hugo Chavez, the capital of Venezuela.	**Caracas**

Question #20: Literature – World Literature

15 points

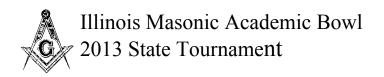|	
He wrote of a man who, in the process of writing three fictitious autobiographies, sought out an expert on the *I Ching*. That master abandoned his post to tutor Tito, but drowned in an icy mountain lake. In another novel, he wrote of a man who saw an electric sign over a Gothic door that read "FOR MADMEN ONLY." In that novel, Pablo fit Hermine's body into his pocket after the woman was stabbed by Harry Haller. Name this author of *The Glass Bead Game*, *Siddhartha*, and *Steppenwolf*.	Hermann **Hesse**

Question #21: Math – Algebra

10 points per part

The proper type of this cannot be equivalent to the set it is taken from.		
1	Give this term for a set that is contained within another set.	**subset**
2	This is the set of all subsets of a given set.	**power** set
3	Including the empty set and the full set, this is the cardinality of the power set of a set with a cardinality of five.	**32**

Question #22: Math – Algebra

10 points per part

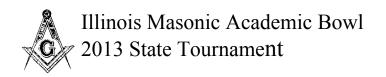| These numbers are not algebraic.		
1	Name this type of irrational number that does not solve any polynomials with rational coefficients.	**transcendental** number
2	This transcendental number equals the limit as n approaches infinity of the quantity one plus one over n, end quantity, raised to the n.	**e** (accept **Euler**'s **number** but not "Euler's constant")
3	Approximate e by adding the four terms one over zero factorial plus one over one factorial plus one over two factorial plus one over three factorial.	**2 2/3** (or **8/3** or **2.6 repeating**)

Question #23: Fine Arts – Art History

10 points per part

He created the *Mona Lisa* and *The Last Supper*.		
1	Name this Renaissance artist.	**Leonardo** di ser Piero da **Vinci** (accept either underlined part)
2	Leonardo made two versions of this painting showing Mary outside with baby Jesus and John the Baptist.	***Virgin of the Rocks*** (or ***Madonna of the Rocks***)
3	One Leonardo work shows Mary and Jesus both looking at this type of flower being held by Mary.	**carnation**

Question #24: Fine Arts – Art History

10 points per part

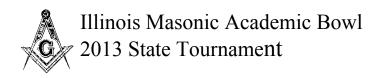| In 1893, he painted a man on a bridge with a horrified look.		
1	Name this painter of *The Scream*.	Edvard **Munch**
2	Munch [moonk] was a native of this country.	**Norway**
3	This Munch [moonk] painting shows a kneeling woman. The title figure is looking at the woman and under a green blanket.	*The **Sick Child*** (or *Det **syke barn***)

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Question #25: Social Studies – US History

10 points per part

	Thomas Reed served as Speaker during this Congress, which saw the passage of the Morrill Act.	
1	Give the monetary nickname for the 51st Congress, which sat from 1889 to 1891.	**Billion Dollar** Congress
2	The Billion Dollar Congress oversaw the passage of this tariff, which increased the average tariff to almost fifty percent. The Wilson-Gorman Tariff, passed shortly after this one, helped generate a panic.	**McKinley** Tariff
3	This Ohio senator sponsored two key pieces of legislation during the Congress, including one that increased the amount of silver the government was required to purchase.	John **Sherman**

Question #26: Social Studies – US History

10 points per part

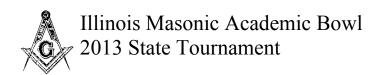|	He completed a thirty-six day "Fast for Life" in 1988, which was followed by a number of important leaders and celebrities fasting for three days.	
1	Name this union leader who died fighting a lawsuit brought by vegetable producer Bruce Church, Inc.	Cesar Estrada **Chavez**
2	With Dolores Huerta [WEHR-tah], Cesar Chavez founded this organization, symbolized by a black Aztec eagle in a red field.	**U**nited **F**arm **W**orkers (prompt on "National Farm Workers Association")
3	This three-word phrase is the motto of the United Farm Workers. It literally translates as "Yes You Can."	**Sí Se Puede**

Question #27: Literature – British Literature

10 points per part

	After swearing to not touch alcohol for twenty years, the protagonist of this novel became a successful grain merchant.	
1	Name this novel in which Susan Henchard and her daughter Elizabeth-Jane were sold to the sailor Richard Newson for five guineas.	*The **Mayor of Casterbridge**: The Life and Death of a Man of Character*
2	This author of *The Mayor of Casterbridge* set many of his novels in the fictional region of Wessex.	Thomas **Hardy**
3	Thomas Hardy penned this novel in which a minister's son courts a dairy maid raped by Alec. After causing Angel Clare to desert her twice, the protagonist stabbed Alec in his sleep.	***Tess of the D'Urbervilles***

Question #28: Literature – British Literature

10 points per part

	The protagonist of this novel hosts a party whose attendees include the Prime Minister and Lady Rossetter, later revealed to be Sally Seton.	
1	Name this novel in which the titular host loved both Richard and Peter Walsh, but married the former as the latter left for India.	***Mrs. Dalloway***
2	*Mrs. Dalloway* was written by this author of *A Room of One's Own*. She took her own life by drowning in the River Ouse [ooz].	Virginia **Woolf** (accept Adeline Virginia **Stephen**)
3	In this other Virginia Woolf novel, Lily Briscoe proclaimed "I have had my vision" after finishing a painting. At six, James Ramsay wanted to visit the title structure; the journey is completed ten years later, with James steering the boat.	***To the Lighthouse***

Question #29: Social Studies – World History

15 points

A constitutional crisis led to Gough Whitlam's dismissal from this post; the crisis was triggered by the opposition leader Malcom Fraser. In this role, Harold Holt upped his country's involvement in the Vietnam War, but along with Joseph Lyons and John Curtin died in office. Before assuming office, Holt served as the deputy to Sir Robert Menzies [MENZ-is]. The first person to hold this position was Edmund Barton in 1901. Name this post, recently held by John Howard and Kevin Rudd, and currently held by Julia Gillard.
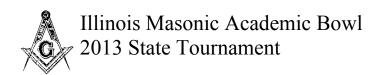
Prime **M**inister of the Commonwealth of **Australia** (prompt on "PM" or "Prime Minister", accept Australia before the word "post" in the first sentence)

Question #30: Math – Conceptual Math

15 points

This operation only exists in three or seven dimensions, and it is combined with the del operator to calculate curl. This must be performed first when calculating a triple product. One way to calculate this operation places the two inputs in the second and third rows of a matrix. This is anticommutative, and it can be used to calculate the areas of triangles or parallelograms once you take the magnitude of its result. Name this operation on vectors that produces a new vector perpendicular to both inputs.

cross product (accept **vector product** or **Gibbs product**, prompt on "product", do not accept answers using the word dot or inner)

Question #31: Literature – US Literature

15 points

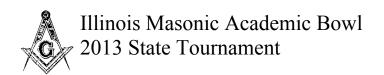|	
This author wrote of Senator Henry killing his son Taylor with a cane in *The Glass Key*. He wrote about the murder of Julia Wolf by Herbert Macaulay, and its subsequent investigation by Nick Charles, in *The Thin Man*. He also wrote of a detective who demanded payment of ten thousand dollars and a fall guy, suggesting Wilmer Cook take the rap for the murders of Floyd Thursby and Miles Archer, the latter being the partner of Sam Spade. Name this author of *The Maltese Falcon*.	Dashiell **Hammett**

Question #32: Science – Physics

15 points

An attempt to measure the impact of this matter was made in an underwater experiment by Fizeau [fee-zoe], which he believed confirmed a theory put forth by Fresnel. Used by Newton to explain refraction, an attempt to explain a property of this led to the contraction hypothesis put forward by George Fitzgerald, Oliver Lodge, and Hendrik Lorentz. The contractions were used in the theory which explained how this substance does not exist, the special theory of relativity. Name this substance not found by the Michelson-Morley Experiment which was supposed to be responsible for carrying forces and light.	luminiferous **aether** (accept **ether**)

Extra Question #1: Fine Arts – Art History

15 points

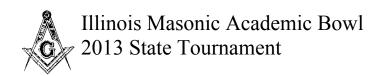|	
This artist gave his depiction of Mary with four angels to his doctor Giovanni Chellini [CHEL-lee-nee]. He used white poplar to create a sculpture showing the effect of fasting on a penitent Mary Magdalene. This artist collaborated with Michelozzo [MIE-kel-oe-zoe] on the Tomb of Antipope John the 23rd. In separate works, he placed David's left hand on his hip in both his clothed marble and his unclothed bronze statues, each of which shows the head of Goliath near David's feet. Name this 15th century Italian sculptor.	**Donatello** (or **Donato** di Niccolo di Betto Bardi)

Extra Question #2: Math – Conceptual Math

15 points

An inequality named for this mathematician states that the probability that at least one event happens is less than or equal to the sum of the individual probabilities, which is also known as the union bound. This 19th century thinker attempted to update Aristotle's system of syllogisms [SIL-oe-jis-ums] to better handle algebra, and he wrote *The Laws of Thought*. The algebra named after him uses De Morgan's laws and operations such as the Exclusive Or. Identify this mathematician whose namesake algebra deals with truth and falsehood.	George **Boole** (prompt on "Boolean")

Extra Question #3: Literature – US Literature

15 points

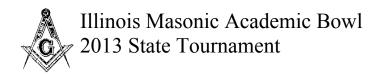|	
In one poem, this author compared a flower to a "drooping star in the west." That flower was located near "an old farm-house, near the white-washed palings." In another of his poems, the speaker heard the bells near port, but mourned the title figure, "fallen cold and dead." The speaker asks "if the body were not the soul, what is the soul" and is engirthed by "the armies of those I love" in "I Sing the Body Electric." Name this author of "Song of Myself" and the poetry collection *Leaves of Grass*.	Walt **Whitman**

Extra Question #4: Science – Physics

15 points

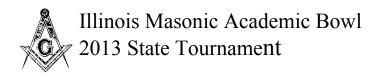|	
This person considered his most important invention to be a boundary layer turbine that has several disks in a chamber but does not have blades. He is also the namesake of an MKS unit that measures a quantity whose divergence is zero according to Gauss's Law for Magnetism. That unit of magnetic flux density equals ten thousand gauss and is used to measure the strength of magnetic fields. Name this inventor who helped popularize alternating current and produced a device that can produce high voltage alternating currents, his namesake coil.	Nikola **Tesla**

Extra Question #5: Social Studies – US History

15 points

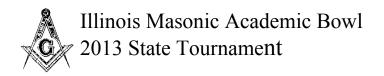|	
He campaigned for the presidency as a "rejuvenated Republican," and won the nomination after John Sherman could not secure it. When seeking re-election, he had to compete with James Blaine and William McKinley for his party's nomination. During his presidency, he signed the Sherman Antitrust Act and the McKinley Tariff, one of the main causes of the Panic of 1893. Name this President who served between Grover Cleveland's non-consecutive terms.	**B**enjamin **Harrison** (prompt on "Harrison")

Extra Question #6: Science – Biology

10 points per part

	His book originally titled *Journal and Remarks* is now commonly called *The Voyage of the Beagle*.	
1	Name this naturalist who wrote *On the Origin of Species*.	Charles **Darwin**
2	This other British naturalist wrote the paper "On the Law which has Regulated the Introduction of New Species" in 1855 and is the namesake of an effect explaining reproductive barriers.	Alfred Russel **Wallace**
3	This author of *Principles of Geology* who popularized the theory of uniformitarianism impacted the thinking of Darwin and Wallace, but he was hesitant to believe in evolution.	Sir Charles **Lyell**

Extra Question #7: Science – Biology

10 points per part

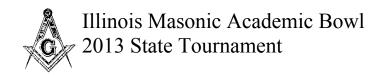|	These anatomical features are near the bottom of your body.	
1	This bone, also called the shinbone, is next to the fibula [FIB-yoo-lah].	**tibia**
2	This bone, also called the heel bone, is the largest of the tarsus bones.	**calcaneus**
3	This connective tissue supports the arch and connects the calcaneus [kal-kah-NAY-us] to the metatarsals [meh-tah-TAR-suls] near the toes.	**plantar fascia** (prompt on either half of answer)

Extra Question #8: Literature – Mythology

10 points per part

	According to Hesiod [HESS-ee-od], a bronze anvil dropped from Earth would take nine days and nine nights to reach here.	
1	Name this nether-region that the Titans were condemned to after losing to the Olympians.	**Tartarus**
2	This resident of Tartarus was chained to a wheel of fire that spun in all directions. This murderer of Deioneus [day-oh-NEE-us] was tricked into sleeping with a cloud that looked like Hera.	**Ixion**
3	This son of Ixion became irate when centaurs [SEN-taurs] tried to kidnap his wife Hippodameia. He later paid the price for wanting to kidnap Persephone [per-SEF-oh-nee].	**Pirithous**

Extra Question #9: Literature – Mythology

10 points per part

	This mythical hero is one-third man, two-thirds god.	
1	Ishtar sent the Bull of Heaven after this king, whom had rebuffed her advances.	**Gilgamesh**
2	Gilgamesh and Enkidu [en-KEE-doo] teamed up to slay this guardian of the cedar forest.	**Humbaba**
3	To achieve immortality, Gilgamesh agreed to stay awake for six days and seven nights, but instead fell asleep. To prove he slept, the wife of Utnapishtim [oot-nah-peesh-teem] laid one of these at Gilgamesh's feet every day.	**loaf** of bread

Question #1: Science – Chemistry

15 points

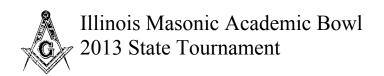|	
The amount of this element in a substance is found by reacting it with sulfuric acid and combining the resulting salts with lye, which is the Kjeldahl [KYEL-dahl] method. One combination of it with hydrogen is hydrazoic [hie-drah-ZOE-ik] acid, which is also known as hydrogen azide [AY-zide]. After the gold foil experiment, Ernest Rutherford bombarded this element with alpha particles to isolate protons. It is combined with oxygen in the Ostwald process, and it is combined with hydrogen in the Haber process. Name this element that combines with hydrogen in ammonia.	**Nitrogen** (prompt on "N")

Question #2: Social Studies – Religion

15 points

This text describes a meeting in which the Lord rebukes the devil, who had been in a dispute with the archangel Michael about the body of Moses. It is addressed to "those who are called, beloved in God the Father and kept safe for Jesus Christ." Written by "a servant of Jesus Christ and brother of James," it describes the Lord coming "with countless holy ones to execute judgment on all." Name this New Testament book found immediately before Revelation, named for the patron saint of lost causes.	Epistle of **Jude** (accept **Letter of Jude** or **Book of Jude**, prompt on "Bible" or "New Testament" until "those")

Question #3: Language Arts – Grammar

15 points

Its hortatory or jussive [JUS-siv] forms are sometimes used when issuing commands. Its formulaic form is seen in statements like "God bless you" and "Long live the King." Used with conjunctions like "lest" or "whether," it is used when making counterfactual statements as well as "if" statements. Name this mood used to express wishes or desires.	**subjunctive**

Question #4: Miscellaneous – Technology

15 points

Early versions of this product included vCard capability, and featured the game Brick as an easter egg. One of its' smaller models featured VoiceOver technology that spoke in twenty different languages. The "mini" model was the first to utilize the four-button click wheel, and was later replaced by the first line to use flash memory, the "nano." Name this line of portable mp3 players produced by Apple.	Apple **iPod**

Question #5: Science – Health

15 points

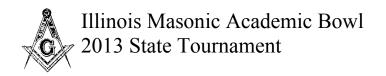|	
This disease causes the body to create tracheal [TRAYK-ee-ul] cytotoxin [SIGH-toe-toks-in] and is caused by Bordetella [BOR-deh-tell-uh] genus [JEE-nus] bacteria. It results in an inflammation of the respiratory tract, which prevents the removal of secretions. While most teens and adults do not suffer permanent symptoms, it can cause pneumonia, and care must be taken to prevent it from spreading to infants, in whom it can cause convulsions, apnea, and occasional death. Name this disease whose vaccine is often combined with diphtheria and tetanus and can be acellular.	**pertussis** (accept **whooping cough**)

Question #6: Social Studies – US History

15 points

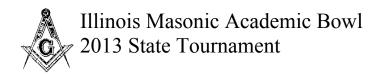|	
This agreement's signatories were "sensible of their solemn duty," and it featured exceptions for violations of the Monroe Doctrine. John Blaine was the only Senator to vote against its ratification. Its first alleged violation came via the Mukden Incident, but the Great Depression impacted signatories' willingness to enforce it, and it had no enforceable provisions for violations of it. Fifteen nations signed this in August 1928 in Paris, and forty-seven more did so eventually. Identify this treaty named for the American secretary of state and French foreign minister that supposedly outlawed war.	**Kellogg-Briand** Pact (accept **Pact of Paris**, do not accept "Treaty of Paris")

3

Question #7: Fine Arts – Jazz

10 points per part

	Name these famous saxophonists.	
1	This bebop performer's compositions include "Ornithology" and "Yardbird Suite."	Charlie **Parker**
2	This saxophonist was the lead performer on the albums *Giant Steps* and *A Love Supreme*.	John **Coltrane**
3	This performer known as "The Sound" recorded a popular version of "The Girl from Ipanema [IP-uh-nee-mah]" with vocalist Astrud Gilberto.	Stan **Getz**

Question #8: Fine Arts – Jazz

10 points per part

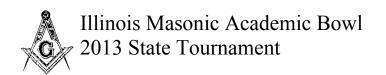|	Name these jazz pianists.	
1	This performer and composer is associated with the songs "Round Midnight" and "Straight, No Chaser."	Thelonius **Monk**
2	This pianist sang the song "Unforgettable." Twenty-six years after he died, his daughter Natalie turned it into a duet.	Nat King **Cole**
3	This performer worked with vibraphonist Gary Burton on *Crystal Silence*, and his song "Spain" appears on his album *Light as a Feather*.	Armando Anthony "Chick" **Corea**

4

Question #9: Science – Chemistry

10 points per part

	Examples include yellow, gray, and black arsenic.	
1	Name these different physical forms of an element based on how the elements are bonded together.	**allotrope**s
2	The most common allotropes of this element are white and red. Confusingly, it does not exhibit the type of photoluminescence named after it.	**Phosphorus** (prompt on "P")
3	The 2010 Physics Nobel Prize was awarded for study on this allotrope of carbon consisting of planar sheets of graphite.	**graphene**

Question #10: Science – Chemistry

10 points per part

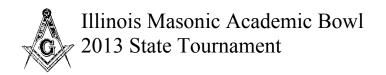|	This quantity can be measured in kilijoules per mole and represented as E sub a.	
1	Name this quantity equal to the amount of energy necessary for a chemical reaction.	**activation** energy
2	This equation uses activation energy in the exponent to find the rate constant.	**Arrhenius** equation
3	Many reactions use a catalyst to reduce activation energy, including this esterification that uses an acid to combine an alcohol with a carboxylic [kar-boks-IL-ik] acid.	**Fischer**-Speier esterification

Question #11: Social Studies – World History

10 points per part

The victorious army at this battle charged down from Gillies Hill to the west of an area bordered by the River Forth.		
1	This 1314 English defeat re-established Scottish independence, and was an embarrassment for Edward II.	Battle of **Bannockburn**
2	Following the Battle of Bannockburn, this Scottish hero was crowned King of Scotland. He signaled his intent to claim the crown with the murder of John Comyn.	**Robert the Bruce** (accept **Robert I** or **Robert VIII de Bruce**)
3	The English forces at Bannockburn were sent to try to relieve the garrison at this location. Its governor stated that this castle would be surrendered if reinforcements did not arrive by June 24.	**Stirling** Castle

Question #12: Social Studies – World History

10 points per part

The colonial forces in this conflict organized recruits into the African Home Guard, which fought against a group which included Embu and Meru recruits.		
1	Name this bloody uprising which pitted British forces against militant members of the Kenya African Union.	**Mau Mau** Uprising (accept equivalents for "Uprising")
2	After being jailed for leading the Mau Mau uprising, this Kenyan went on to lead the Kenyan African National Union and became Kenya's first president.	Jomo **Kenyatta**
3	The rebels who fought in the Mau Mau uprising primarily consisted of members of this ethnic group who primarily live in the highlands of south-central Kenya.	**Kikuyu** (accept **Giguyu**, **Gekoyo**, or **Agekoyo**)

Question #13: Math – Algebra
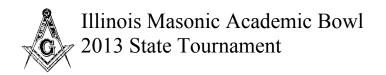
10 points per part

	A matrix of this type has a transpose equal to its inverse.	
1	Name this type of matrix whose columns are not only perpendicular, but also orthonormal, vectors. Each of these matrices is also unitary.	**orthogonal** matrix (do not accept "orthonormal" matrix)
2	This type of orthogonal matrix has 1's on the main diagonal and zeroes everywhere else.	**identity** matrix
3	Find the inverse of the matrix with top row 2 and 0, and with bottom row 0 and 2.	**top row ½ 0, bottom row 0 ½** (accept .5 in place of ½)

Question #14: Math – Algebra

10 points per part

	For a number equal to a+bi, this value is a-bi.	
1	Name this number often used to rationalize denominators.	complex **conjugate**
2	Find the product of 3+2i times its conjugate.	**13**
3	Give the reciprocal of 3+2i. Do not give your answer as a single fraction—use two fractions to express it in a+bi form.	**3/13 – (2/13)i** (accept **3/13 – 2i/13**, accept adding a negative instead of subtracting)

7

Question #15: Literature – Mythology

15 points

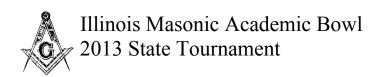|	
He offered an opponent the opportunity to make merry with his aunt, who had designed a marvel to frighten a queen. Morgan le Fay changed him into Bernlak de Hautdesert. He told an adversary to keep a silk girdle as a token of his frailty. He intentionally missed with two swings of an axe on account of two kisses given him as part of an agreement. On Christmas Eve, he challenged a group of "beardless children" to go blow for blow, with a delay of a year and a day. Name this subject of a poem by the Pearl Poet who challenged Sir Gawain [GAW-wain].	the **Green Knight** (accept **Knight of the Green Chapel**, accept **Bernlak de Hautdesert** early, accept "Bertilak" for Bernlak)

Question #16: Science – Physics

15 points

The spontaneous breaking of this requires two particular bosons [BOE-zons] to be massless, which in turn requires the Higgs mechanism to match measured results. The fundamental use of this in Standard Model physics involves the reversal of charge, parity, and time. The similarities between bosons and fermions [FER-mee-ons] is the super type of this. This concept involves the lack of change during transformations. Name this quantum physics concept which also has an everyday meaning that has radial or bilateral forms, applying to objects that can be reflected over a line without change.	super**symmetry**

Question #17: Social Studies – US Government

15 points

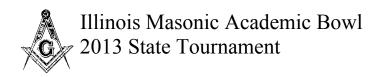|	
In *Pennsylvania v Nelson*, Chief Justice Warren's opinion cited this clause when striking down a law prohibiting advocating violent overthrow of the government. The *Gonzalez v Oregon* case hinged on whether the Controlled Substances Act was an application of this. The Supreme Court held that the tax ruled unconstitutional in *McCulloch v Maryland* violated this clause of the Constitution. Name this clause enshrined in Article VI of the Constitution that establishes federal law's preemption of state law.	**supremacy** clause (accept **Article VI, Clause 2** until "Article VI," prompt afterward)

Question #18: Literature – US Literature

15 points

One character in this novel grew up on Bickel Street in Kansas City, and is the son of evangelists. The protagonist of this novel worked at the Union League Club in Chicago before his uncle Samuel got him a job at a factory in Lycurgus, New York. The central couple in this novel stopped in Utica before heading to Big Bittern Lake, where their boat overturned and one drowned. Name this novel centering on Roberta Alden's murder at the hands of Clyde Griffiths, penned by Theodore Dreiser.	*An **American Tragedy***

9

Question #19: Fine Arts – Art History

15 points

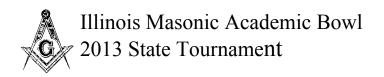|	
This artist's painting of a red tree titled *Avond* shows the influences of post-impressionism, and his *The Gray Tree* was influenced by cubism. His second *Still Life with Ginger Pot* starts the transition to the style he is associated with. After that, many of his works were called tableaus or compositions, though his later works include *Trafalgar Square* and *Place* [plahs] *de la Concorde*. Name this 20th century Dutch painter known for his use of red, blue, yellow, and white rectangles with black borders who created *Broadway Boogie Woogie*.	Pieter "Piet" **Mondrian**

Question #20: Math – Conceptual Math

15 points

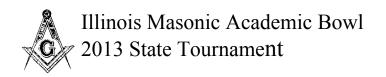|	
This point is at the center of a Conway Circle. Like the centroid and Nagel point, this lies on the Nagel line. If a right triangle is placed so that its legs meet at the origin and are on the positive x- and y-axes, then this point will always be located on the line y equals x. For any triangle, the distance between this point and each side equals the triangle area divided by semiperimeter [she-my-per-IM-eh-ter]. Name this point at the intersection of the angle bisectors, the center of an inscribed triangle.	**incenter** (accept center of inscribed circle or equivalents before it is mentioned at the end)

10

Question #21: Literature – US Literature

10 points per part

	At the end of Act III in this play, the landlord compares his relationship with Josie Hogan to the one with his mother, Mary, that he ruined.	
1	Name this play, set on a run-down farm in Connecticut. In it, Mike accuses his sister and father of trying to scheme their landlord James out of money.	A ***Moon for the Misbegotten***
2	The landlord in *A Moon for the Misbegotten* is James Tyrone Jr, whose cheapskate actor father, James, and morphine-addicted mother, Mary, feature prominently in this play.	***Long Day's Journey into Night***
3	*A Moon for the Misbegotten* and *Long Day's Journey into Night* were both written by this American dramatist. He wrote about a Pullman porter becoming the leader of a Caribbean island in *The Emperor Jones*.	Eugene Gladstone **O'Neill**

Question #22: Literature – US Literature

10 points per part

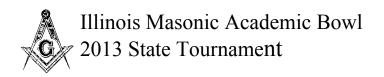|	Its narrator describes reading while listening to Ray Charles blues shout blind on the phonograph.	
1	Name this poem that also describes Death as "that remedy that all singers dream of…dreaming back through life, your time and mine, accelerating towards Apocalypse."	"**Kaddish**"
2	Dedicated to Carl Solomon, this poem describes "the best minds of my generation destroyed by madness, starving hysterical naked, dragging themselves through the negro streets at dawn."	"**Howl**"
3	"Kaddish" and "Howl" were both written by this Beat Generation poet.	Irwin Allen **Ginsberg**

Question #23: Math – Analytic Geometry

10 points per part

	These graphs are generated by the equations x equals p times cosine q t, and y equals r times sine s t.	
1	Name these figures, also called Bowditch curves, that can be generated by oscilloscopes.	**Lissajous** (curve or figure)
2	Find the area enclosed inside the graph of x equals cosine t, and y equals sine t.	**pi**
3	Find the area enclosed inside the graph of x equals 3 cosine 5t, and y equals 2 sine 5t.	**6 pi**

Question #24: Math – Analytic Geometry

10 points per part

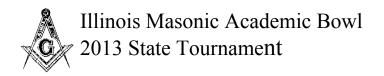|	One way to generate this shape is setting x equal to t minus sine t, and setting y equal to one minus cosine t.	
1	Name this shape that solves the brachistochrone [brah-KIS-toe-krone] problem, giving the fastest path for a sliding object. It can be generated by tracing the path of a point on the rim of a rolling object.	**cycloid** (prompt on "trochoid")
2	This related shape is generated by following a point on a circle that is rolling inside a larger circle.	**hypocycloid**
3	This is the number of cusps on the hypocycloid formed when a circle of area 1 rolls inside a circle of area 9.	**3**

12

Question #25: Social Studies – Economics

10 points per part

For two goods A and B, if the price of A is increased, the demand for B also increases.		
1	In this scenario, A and B are this kind of good.	**substitute** goods
2	If the demand for B goes down following an increase in the price of A, then they are this kind of good. An oft-cited example is peanut butter and jelly.	**complement** goods
3	For this kind of inferior good, as its price rises, consumers cut back on luxury items and buy more of it. Thus, the demand curve for this kind of good is upward-sloping.	**Giffen** good

Question #26: Social Studies – Economics

10 points per part

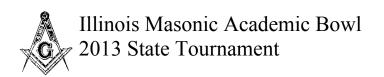| At the secondary level, an example of this practice is a large retailer coercing a seller into cutting a deal for large quantities of goods.		
1	Name this illegal tactic of charging different buyers different prices for the same or similar goods.	**price discrimination** (accept **price differentiation**)
2	Section 2 of this 1914 antitrust act prohibits certain types of price discrimination. It also has provisions banning interlocking directorates and conditions preventing buyers from doing business with a seller's competitors.	**Clayton** Antitrust Act
3	The Clayton Antitrust Act also contains a provision preventing these from occurring horizontally should market concentration be negatively impacted, utilizing the Herfindahl-Hirschman Index as a standard.	**merger**

13

Question #27: Science – Biology

10 points per part

	This is about 23 feet long on average in adults.	
1	Name this passage with three main sections that food enters after leaving the stomach.	**small intestine**s (do not accept or prompt partial answers)
2	This last of the three main sections of the human small intestine absorbs vitamin B-12.	**ileum**
3	These aggregated lymphoid nodules differentiate the ileum [ILL-ee-um] from the jejunum [jeh-JOO-num]. They are small round thick regions.	**Peyer**'s **patch**es (prompt on "Peyer" or "patch")

Question #28: Science – Biology

10 points per part

	This phase of meiosis [my-OH-sis] involves the pairing of chromosomes known as synapsis [si-NAP-sis].	
1	Being specific, name this first stage of meiosis. It follows the Growth 2 phase of interphase and ends with diakinesis [die-uh-ki-NEE-sis].	**Prophase I** (called prophase one, do not accept or prompt partial answers)
2	This process during synapsis [si-NAP-sis] involves the exchange of segments of genetic material between homologous chromosomes.	chromosomal **crossover** (accept **crossing over** or **chiasma**typy)
3	This is the first part of prophase one. The chromosomes become thin filaments.	**leptotene** (accept **leptonema**)

14

Question #29: Social Studies – World History

15 points

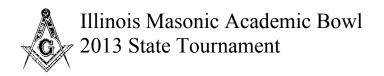|	
This country's first emperor gave the Fico [FEE-koe] speech in defiance of the Cortes [kor-tes], who ordered his return. One rebellion in this nation was led by Tiradentes [tir-ah-DEN-tays], the "Tooth Puller." During colonization [kol-un-i-ZAY-shun], this country was divided into fifteen captaincies, which were given to *donatarios* [doe-nah-TAHR-ee-oes]. After Napoleon's invasion, King John VI escaped to this nation, and later appointed his son Dom Pedro as regent. Name this South American country with Portuguese as its official language.	**Brazil**

Question #30: Math – Conceptual Math

15 points

The finite quotient types of these are isomorphic [eye-soe-MOR-fik] according to the Jordan-Holder Theorem. The attempt to classify the finite simple examples of these left 26 exceptional ones known as sporadic, and the ones containing all permutations of n symbols along with the composition operation are classified as symmetric. In order to be classified as this, a system has to follow four given properties, including having an identity and each element having an inverse, and the examples which are also commutative are called abelian [uh-BEEL-yun]. Name these structures, some of which are cyclic, that are defined by a set and a single operation.	**group**s

Question #31: Literature – British Literature

15 points

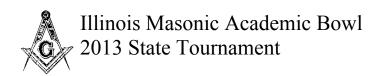|	
His father led a group of noblemen seeking to overthrow Richard the Lionhearted. In a tournament at Ashby-de-la-Zouch [zuj], he was aided by the Black Sluggard in group combat after winning in single combat as the Disinherited Knight. His wife was charged with being a sorceress by the Knights Templar, but he freed her after defeating Bois-Guilbert. Name this husband of Lady Rowena, created by Sir Walter Scott.	Wilfred of **Ivanhoe**

Question #32: Science – Biology

15 points

Cysts [sists] form on this organ in cystic fibrosis patients. This organ's duct of Wirsung connects it to the common bile duct at the ampulla of Vater, and gallstones in those areas can cause this to enlarge. This organ is difficult to operate on, which is a major reason that its cancers have a high mortality rate. It contains alpha, beta, delta, and epsilon cells in its Islets [IS-lets] of Langerhans. Name this organ that produces glucagon [GLOO-kah-gon] and the hormone which opposes glucagon in controlling blood-sugar levels, insulin.	**pancreas**

Extra Question #1: Math – Conceptual Math

15 points

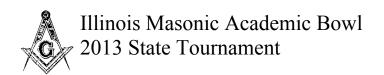|	
This is the first double Mersenne [mer-sen] number, and this is the highest possible number of regions formed by three lines in a plane. It is also the smallest number of sides for a regular polygon that cannot be constructed with straightedge and compass, and that is also the first polygon whose interior angles are not a whole number of degrees. Dividing a whole number by this one-digit number gives a decimal with a sequence of six digits that repeats. This is the most likely sum that results from a roll of two dice, and it is the sum of the numbers on opposite sides of a die. Give this number equal to the number of sides of a heptagon.	<u>**7**</u>

Extra Question #2: Fine Arts – Classical/Opera Music

15 points

This composer wrote the aria "Miei rampolli femminini [mee-ay rahm-pole-lee fem-i-nee-nee]" for the Don Magnifico character in his opera *La Cenerentola* [chen-eh-ren-toe-lah], which is based on *Cinderella*. He wrote two similar operas about Moses, an Italian work titled *Moses in Egypt* and a French work titled *Moses and Pharaoh*. His best-known pieces are his March of the Swiss Soldiers, which appears at the end of the last overture he wrote, and an aria titled "Largo al factotum della citta [chee-tah]," in which the title character repeats his name. Name this composer who wrote the *William Tell Overture* and *The Barber of Seville*.	Gioachino **Rossini**

Extra Question #3: Literature – British Literature

15 points

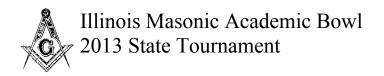|	
Ben Cranage is the only villager in Hayslope who does not like this man. His boss, Jonathan Burge, wanted him to marry his daughter Mary. His drunken father Matthias drowned in the Willow Brook. After his dog scared away his love, he got into a fistfight with Captain Arthur Donnithorne. His brother Seth had fallen for the preacher Dinah Morris, but this protagonist marries her. Name this carpenter and title character of a George Eliot novel.	**Adam Bede** (accept either part)

Extra Question #4: Social Studies – World History

15 points

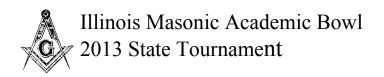|	
At this battle, an attack at Maisoncelles [mai-son-sell] delayed the march to Calais [ka-lay]; it led to the murder of the captured prisoners. Prior to opening fire, the archers from the victorious army at this battle stuck their staves in the ground. The subsequent charge by the losing side was slowed due to the heavy rains that fell the day before St. Crispin's Day. Name this major victory for Henry V over the French in 1415.	Battle of **Agincourt**

Extra Question #5: Science – Earth Science

15 points

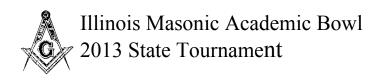|	
One place this kind of rock is taken from is the Murphy Belt near the Great Smoky Mountains and going south into Georgia. The yule type notable for its pure color is taken from a town named after this in Colorado. A metamorphic rock, it usually comes from limestone or dolomite, and like chalk it is a source of calcium carbonate. Carrara, a town in Tuscany, was a major source of this rock for sculptors. Name this rock that often has streaks of bluish color but is generally white.	**marble**

Extra Question #6: Math – Probability

10 points per part

	The Pascal and Polya distributions are examples of this type of distribution based on the probability that it will take a certain number of attempts for a success to happen a certain number of times.	
1	Name this type of probability distribution based on, for example, the number of times you must flip a coin to get two heads.	**negative binomial** distribution (prompt partial answer)
2	If you flip a coin until you get two heads, this is the probability that it will take you exactly three trials. It is the probability of getting exactly one of the first two and then getting the third.	**1/4** (or 0.**25**)
3	If you toss a standard die until you get the first 6, this is the probability that it will take exactly three tries.	**25/216**

Extra Question #7: Math – Probability

10 points per part

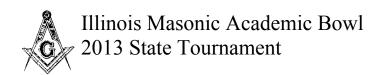|	If one of these graphs has n vertices [VER-tuh-sees], then it has n-1 edges.	
1	Name these graphs or data structures often used to model decisions on their branches.	**tree**s
2	This type of tree taken from a graph contains all of the vertices from a graph connected by a subset of the graph's edges.	**spanning** tree
3	Given four vertices, how many possible trees are there connecting them? Keep in mind that three edges are necessary, and you cannot take three edges that form a triangle.	**16**

Extra Question #8: Social Studies – US History

10 points per part

	This policy was embodied by a declaration at the Montevideo [mone-tay-vee-DAY-oe] conference that "no state has the right to intervene in the internal or external affairs of another," which was backed by Secretary of State Cordell Hull.	
1	Name this policy, whose name comes from a term its promulgator used to describe one "who resolutely respects himself and, because he does so, respects the rights of others."	**Good Neighbor** Policy
2	The Good Neighbor Policy was a key tenet of this president's foreign policy. He issued an order abrogating a treaty with Cuba that allowed for US intervention.	Franklin Delano **Roosevelt** (accept **FDR**)
3	A clear shift away from the Good Neighbor Policy was seen when the CIA engineered a coup in this country which led to the overthrow of Jacobo Arbenz Guzman in 1954.	Republic of **Guatemala**

Extra Question #9: Social Studies – US History

10 points per part

	It was set in motion shortly after five men with direct ties to CREEP were arrested.	
1	Name this late-night event, which saw Elliot Richardson resign after refusing to fire Archibald Cox.	**Saturday Night Massacre**
2	During the Saturday Night Massacre, this Solicitor General was promoted to Attorney General. After Ronald Reagan nominated him for the Supreme Court, Ted Kennedy led a scathing attack that led to the Senate rejecting the nomination.	Robert Heron **Bork**
3	In the immediate aftermath, the White House claimed that it had fired this deputy of Richardson, who had also resigned rather than fire Cox. He was later tapped as the first head of the EPA.	William Doyle **Ruckelshaus**

Question #1: Literature – US Literature

15 points

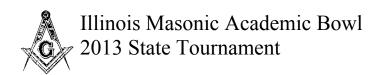| This play opens in a room where everything has been scrubbed too often. Before the curtain comes down in the final scene, the matriarch of the central family grabs her plant. One suitor in this play likens his partner's heritage to nothing but spirituals and grass huts. Three business partners planned to open a liquor store together, but one took off with the $10,000, including $3,500 meant to go towards medical school. Karl Linder tries to keep the central family from moving to Clybourne Park, but with backing from Lena and Ruth, Walter refuses the payoff. Name this play about the Younger family penned by Lorraine Hansberry.	*A **Raisin in the Sun***

Question #2: Science – Biology

15 points

This material can be isolated using hydrochloric acid, sodium hydroxide, and ethanol to remove the living substance it usually is part of, and it can then be used to cover solar panels because of its high light transmittance. A layer of this substance coats the midgut in many arthropods, and it provides hardness in the gladius [GLA-dee-us] of some cephalopods [SEH-fah-loe-pods]. Though it does not exist in vertebrae and plants, it is found in fungi [fun-gie] cell walls and arthropod exoskeletons. Name this substance with similarities to keratin [KEHR-ah-tin] and cellulose.	**Chitin**

Question #3: Miscellaneous – Sports

15 points

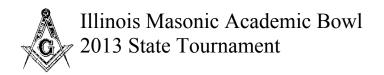|	
In 2008, financier Sir Allen Stanford sponsored a seven-game series in this sport, culminating in a single match with a $20 million purse. Legendary players in this sport include Sir Don Bradman and Sachin [SACH-in] Tendulkar. Beginning in 1882, England and Australia have competed in a five-match series in this sport known as the Ashes. Test matches in this sport can last for five days, while one-day matches feature innings of either 50 or 20 overs. Name this sport that utilizes two sets of wooden stumps called wickets.	**cricket**

Question #4: Math – Conceptual Math

15 points

These quantities are found along the diagonal of the R in the QR algorithm, and they correspond to energy in the Schrodinger equation. A common way to find these scalars is to solve a characteristic equation, which is generated by setting a determinant equal to zero. The product of these values equals the determinant of the matrix they come from. These values are multiplied by their corresponding vectors to give the same result as multiplying those vectors by the generating matrix. Name these values often represented by a lambda.	**eigenvalue**s

Question #5: Literature – Mythology

15 points

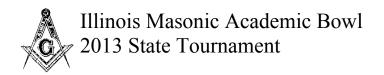|	
His song was said to have created the deities of the Ogdoad [og-doe-ad]. His cult, centered on Khnum [ku-NOOM], believed that this god laid the egg from which Ra [rah] hatched. This god, the "Interpreter of the Two Lands," was said to have created the deities of the Ogdoad through song. During the day, this god and Ma'at directed the course of Ra's barge. Horus' left eye, injured by Set, was restored by this deity. To bring back Hathor [HATH-or] from Nubia [NOOB-ee-ah], Ra sent this deity. Before one's heart was weighed after death, this god questioned the owner. The Greeks called this god Djeheuty [jeh-HOO-tee]. Name this ibis-headed scribe of Egyptian myth.	**Thoth** (accept **Toth** or early buzz of **Djeheuty**)

Question #6: Social Studies – World History

15 points

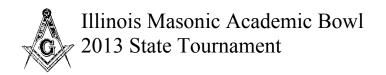|	
To aid the losing side in it, a ship disguised as a Norwegian merchant ship was sent by the Germans, but the *Aud* was captured at gunpoint. At its outset, a General Post Office was seized by forces under the head of the Republican Brotherhood and the founder of the Citizen Army, Patrick Pearse and James Connolly. In its aftermath, Eamon de Valera was pardoned. Name this Irish revolt that coincided with a Christian holiday in 1916.	**Easter Rising** (accept **Easter Rebellion**)

Question #7: Math – Probability

10 points per part

	This is the number of ways to select elements from a set if order matters.	
1	Name this operation often represented with the letter P.	**permutation**
2	This type of permutation using all of the items in a list does not allow any elements to appear in their original position.	**derangement**
3	How many derangements are there for a list with three items? Do not count the original order.	**2**

Question #8: Math – Probability

10 points per part

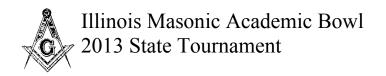|	The probability of an event plus the probability of another event with this relationship to the first must equal one.	
1	Give this name for an event that occurs whenever another event does not and vice versa.	**complement**ary
2	If you flip a coin four times, this is the probability of getting at least one head.	**15/16** (or 0**.9375)**
3	If you roll two standard dice, this is the probability of getting a sum of at least four.	**11/12** (or 0**.916 with the 6 repeating**)

Question #9: Social Studies – Geography

10 points per part

	The island of Vieques [vee-EH-kays] is a principality belonging to this commonwealth.	
1	Name this territory of the United States found in the Caribbean Sea.	Commonwealth of **Puerto Rico**
2	Also known as "La Ciudad [see-yoo-dahd] Amurallada [ah-moo-rall-ah-dah]" or "The Walled City," this is the capital of Puerto Rico.	**San Juan** (accept Municipio de la Ciudad Capital **San Juan** Bautista)
3	This city, the "Sultan of the West," is home to the only zoo on Puerto Rico. Its Plaza Colon is a tribute to Christopher Columbus.	**Mayaguez**

Question #10: Social Studies – Geography

10 points per part

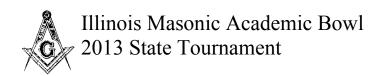|	The exclave of Cabinda [kah-bin-dah] is governed by this African country.	
1	Name this former Portuguese colony, with its capital at Luanda.	Republic of **Angola**
2	On land, Cabinda is separated from Angola by this country, with its capital at Kinshasa. Be careful with its name.	**Democratic Republic** of the **Congo** (accept **DRC** or **Republique democratique du Congo**, do not accept "Zaire," "Congo," or "Republic of the Congo," prompt on "Congo-Kinshasa")
3	In the fight against the UNITA [yoo-nie-tah] rebels, Angola received help from this southern neighbor, a former South African colony.	Republic of **Namibia**

Question #11: Science – Physics

10 points per part

	It is explained by Quantum Flavordynamics.	
1	Name this force that was unified with the electromagnetic force by Abdus Salam, Sheldon Glashow, and Steven Weinberg.	**weak** nuclear force (accept **weak** interaction)
2	The carriers of the weak force are the W bosons and the bosons represented by this letter.	**Z**
3	The discovery of this weak interaction involving the Z boson led to the unification of the electromagnetic and weak forces.	**neutral current**s

Question #12: Science – Physics

10 points per part

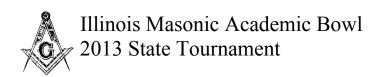|	The development of these led to a Nobel Prize for Dennis Gabor.	
1	Name these images that appear to be three-dimensional.	**hologram** (accept **holograph**)
2	The creation of a hologram involves a split beam of light. This is the beam that does not reflect off the object.	**reference** beam
3	Holograms maintain this effect in which the position of an object changes by different amounts when viewed from different directions.	**parallax**

Question #13: Literature – World Literature

10 points per part

	One character in this novel describes the descriptions within "The Wanderings of Our Lady Through Hell" to those created by Dante [DAHN-tay].	
1	Name this novel by Fyodor Dostoyevsky [FYOE-dor doe-stoy-YEV-skee], in which Smerdyakov [smerd-yah-kof], the illegitimate son of Fyodor, killed his father. Dmitri was convicted of the crime, as Ivan's attempt to reveal the truth was written off as the ramblings of an insane man.	The ***Brothers Karamazov*** [accept ***Bratya Karamazovy***]
2	In *The Brothers Karamazov*, Ivan told Alyosha a tale about this figure, who, on behalf of the Church, "vanquished freedom and have done so to make men happy." He was eventually kissed on his "bloodless aged lips" by a prisoner.	The **Grand Inquisitor**
3	The prisoner described in the aforementioned legend was this religious figure. The Inquisitor claimed that men's hearts were bound by mystery, miracle, and authority, a parallel to the three temptations the Devil offered him.	**Jesus Christ** (accept either)

Question #14: Literature – World Literature

10 points per part

	After being rejected, he threatened to "flee this bitter world where vice is king, and seek some spot unpeopled."	
1	Philinte [fil-int] and Celimene [seh-lee-meen] agreed to attempt to change the mind of this "unhappy man," who called it scandalous "to falsify the heart's affections."	**Alceste** (prompt on "The Misanthrope")
2	Alceste [ahl-sest] is the title character of this play, in which he pigeonholed Oronte's [or-onts] sonnet, which led to a potential arbitration by the Marshals.	The ***Misanthrope*** (accept ***Le Misanthrope***)
3	*The Misanthrope* was written by this French dramatist, who died shortly after performing the role of Argan in his play *The Imaginary Invalid*.	**Moliere** (accept Jean-Baptiste **Poquelin**)

Question #15: Social Studies – US History

15 points

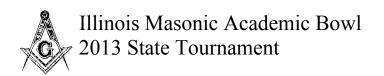| During the War of 1812, he captured the *Macedonian* while heading to the *United States*, but he was forced to surrender in New York Harbor. He sat on the court martial that suspended James Barron, the man who would later kill him in a duel. He led the victorious forces at the Battle of the Gunboats, and after forcing the end of tribute payments to Algeria, proclaimed "our country, right or wrong." Name this naval commander who led the torching of the USS *Philadelphia* in Tripoli during the Barbary Wars.	Stephen **Decatur**

Question #16: Science – Astronomy

15 points

This name is given to a set of observatories located on Mauna Kea [MAUN-ah KAY-ah] in Hawaii and Cerro Pachon [SEHR-oh pah-CHONE] in Chile. This is also the name of the program that used Titan rockets and included Edward White taking the first American spacewalk and Walter Schirra maneuvering the first space rendezvous. This is also the constellation where the Medusa and Eskimo Nebulas are located. That constellation is located between Taurus and Cancer. Give this term coming from the Latin word for twins.	**Gemini**

Question #17: Literature – World Literature

15 points

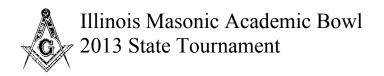|	
One character in this work was "capable of reciting all Nekrasoff's poetry by heart;" her son stated that she must be praised for her acting in "La Dame Aux Camelias [lah dahm oh cah-may-lee-ahs]." That actress was the object of affection for a novelist the protagonist lamented as a novelist who paled in comparison to Tolstoy or Zola. In this play, the protagonist brought in the title object, having shot it to use it to claim that he will soon commit suicide. Name this play in which Konstantin Treplev compared himself to a bird, authored by Anton Chekhov.	*The **Seagull*** [accept ***Chayka***]

Question #18: Fine Arts – Classical/Opera Music

15 points

This composer wrote a series of suites called *Years of Pilgrimage*, starting with works on Switzerland and then Italy. A poem by Ferdinand Freiligrath [fray-lee-grath] inspired this composer's third and final Liebestraum [LEE-beh-straum]. He also wrote a series of works, many of which have a slow lassan and fast friska. His *La Lugubre Gondola* was written when he got a premonition of the death of his son-in-law, the opera composer Richard Wagner [VOG-ner]. Name this composer who in the middle of the 19th century composed a series of nineteen *Hungarian Rhapsodies*.	Franz **Liszt**

9

Question #19: Science – Chemistry

15 points

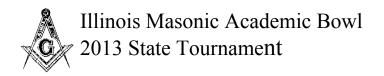| One value named after this scientist equals mole fraction times activity coefficient, is represented as 'a sub w', and is referred to as water activity. That value is combined with the Kelvin term to study the behavior of droplets in cloud formation known as Kohler theory. The related law named after this scientist can be combined with Dalton's Law of Partial Pressures to find mole fractions, and it uses the same assumptions as the Ideal Gas Law. Name this French scientist who stated that the vapor pressure of an ideal solution depends on the vapor pressure of each component and its mole fraction.	Francois-Marie **Raoult**

Question #20: Social Studies – Economics

15 points

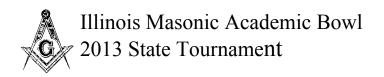| Jude Wanniski argued that this does not hold at one extreme, suggesting that people in such an economy would turn to bartering. At points on its prohibitive range, the income effect is no longer dominant, and the economic effect outweighs the arithmetic effect. This key tenet of supply-side economics was allegedly written by its formulator on a dining napkin. Name this curve that shows the relationship between gross tax revenues and tax rates.	**Laffer** curve (accept **Laffer-Khaldun** curve)

Question #21: Fine Arts – Art History

10 points per part

	One of his famous works is *Starry Night*.	
1	Name this Dutch artist who is rumored to have cut off his ear.	Vincent **van Gogh**
2	Van Gogh painted two portraits of this doctor who took care of him late in life.	Dr. Paul **Gachet**
3	Van Gogh often painted these fruit bearing trees, including one painting with them in a mountainous landscape.	**Olive**s trees

Question #22: Fine Arts – Art History

10 points per part

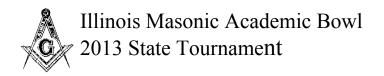|	This 17th century Dutch artist painted many self-portraits.	
1	Name this artist of *Night Watch*.	**Rembrandt** Harmenszoon van Rijn
2	*Night Watch* depicts a company led by this captain and his lieutenant Willem van Ruytenburch [ROY-ten-burch].	Frans Banning **Cocq**
3	One of Rembrandt's works shows this legendary princess chained to a rock.	**Andromeda**

Question #23: Social Studies – US History

10 points per part

He won the election for the House seat of Joe Evins, who had succeeded his father.		
1	Name this leader, who as Vice President was a major advocate of the Kyoto Protocol.	Albert Arnold **Gore**, Jr.
2	Al Gore served as a Congressman from this state, the site of the Civil War battles of Forts Henry and Donelson.	**Tennessee**
3	Gore's bid for the presidency in 2000 was marred by controversy, as the Supreme Court ruled in *Bush v. Gore* that the certified count issued by this Florida Secretary of State would stand.	Katherine **Harris**

Question #24: Social Studies – US History

10 points per part

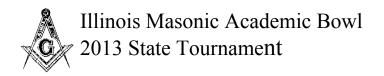|		
One group of people forced to travel along it called it "Nunna daul Tsuny."		
1	Name this path, which the Cherokee took from allocated lands to the Indian Territory.	**Trail of Tears** (accept The **Trail Where They Cried**)
2	The Cherokee had protested against their forced removal, and the Supreme Court sided with them in this case. However, President Jackson refused to enforce the decision.	**Worcester** v. **Georgia** (accept either underlined portion)
3	The Cherokees eventually signed this treaty in its national capital, in which the natives agreed to give up their land claims in Georgia.	Treaty of **New Echota**

Question #25: Literature – Mythology

10 points per part

	This entity was created from the combination of ice from Niflheim and hot air from Muspelheim.	
1	Name this primordial giant of Norse myth.	**Ymir**
2	Ymir was nourished by the milk from this cow. Her sustenance was salt and hoar frost from Niflheim.	**Audhumla**
3	After Odin, Vili, and Ve were born, they slew Ymir and made great use of the corpse. From his eyebrow they created Midgard, the realm for this race.	**human**s (accept equivalents)

Question #26: Literature – Mythology

10 points per part

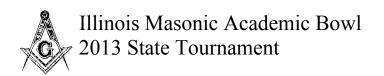|	After going to Argos and raising an army, this prince attacked his home city, after being denied the right to rule for a year.	
1	Name this Theban prince, who killed his brother and was also killed by his brother.	**Polynices**
2	In order to gain support from King Amphiaraus [am-fie-ar-aus], Polynices [pol-ee-NIE-kees] gave Eriphyle [ehr-i-fi-lee] this piece of jewelry that used to belong to Harmonia.	**necklace**
3	During the conflict, Capaneus made the mistake of climbing the walls of Thebes [theebs]. His climb stopped when he was struck by one of these objects.	**thunderbolt** (accept bolt of **lightning** or equivalents)

Question #27: Science – Chemistry

10 points per part

One definition of this adjective is containing all of the solute that can be held by the solvent.	
1 Give this term that is also used to refer to organic molecules that do not have double or triple bonds or rings.	**saturated** (accept other word forms)
2 This group of saturated hydrocarbons is also known as paraffins.	**alkane**s (prompt on "alkyl")
3 Cycloalkanes, on the other hand, have a ring structure. Give the number of hydrogen atoms in a molecule of the simplest cycloalkane, cyclopropane.	**6**

Question #28: Science – Chemistry

10 points per part

A solution is a solvent containing a solute.	
1 This is an insoluble solid that is not dissolved by the liquid solution it is in.	**precipitate** (accept other word forms)
2 This law gives the solubility of gases in solvents, stating that it varies directly with partial pressure at a constant temperature.	**Henry**'s Law
3 These two scientists published "On the Theory of Electrolytes" in 1923, explaining how to calculate activity coefficients giving the deviations from ideal solutions.	Peter **Debye** and Erich **Huckel** (either order, must have both correct)

Question #29: Social Studies – World History

15 points

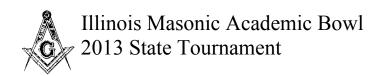|	
One of this empire's rulers emerged victorious at Nicopolis [ni-KOE-pol-is] over a Hungarian-Venetian army but died after being captured by forces under Tamerlane [TAMM-er-lane]. Another of its rulers put down a Kizilbash [KIZ-il-bahsh] revolt by winning the Battle of Chaldiran against Ismail. That ruler's son would defeat Louis II of Hungary at the Battle of Mohacs. Its rulers included Bayezid I Thunderbolt and Suleiman. Name this empire, the successor to the Byzantine [BIZ-un-teen] empire in modern-day Turkey.	**Ottoman** Empire

Question #30: Science – Physics

15 points

The impact of this effect is calculated using two Lande [lahn-day] g-factors and the Bohr magneton [MAG-neh-ton] if the orbital and spin angular momenta are separated. If the two angular momenta are decoupled, then this effect is no longer relevant, and the changes caused by the magnetic field are called the Paschen-Back Effect. In some cases, electron spin is used to explain the presence of more than three lines, which for historical reasons is called anomalous. This is similar to the Stark effect, which is caused by an electric field. Name this splitting of spectral lines.	**Zeeman** Effect (accept **Paschen-Back** Effect before it is mentioned)

Question #31: Literature – British Literature

15 points

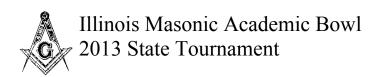|	
He writes to Martha under the name Henry Flower, Esquire. At the funeral of Paddy Dignam, he is reminded of his own father's suicide. His daughter, who works in Mullingar, sent him a letter that reminded him of Rudy, his deceased son. This resident of Number 7 at Eccles Street, Sandycove is a Jewish advertising salesman. His wife carries on an affair with tour manager Blazes Boylan, and he offers Stephen Dedalus a place to stay. Name this husband of Molly Bloom in James Joyce's *Ulysses*.	**Leopold** Bloom (prompt on "Bloom")

Question #32: Math – Conceptual Math

15 points

This curve can be called Richards' curve and is similar to the Gompertz function, and it is used to create scales under the Rasch model. A graph of this function has the same shape as the hyperbolic tangent, and its derivative is equal to the function itself times the quantity of a constant minus the function itself. This can be expressed as a number divided by the quantity of a number plus an exponential function. Name this function that starts off with approximately exponential growth but slows, especially as it approaches the carrying capacity.	**logistic** (curve or function)

16

Extra Question #1: Fine Arts – Art History

15 points

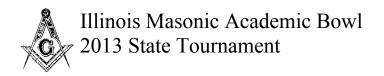|	
This artist was compared with Cimabue [chee-mah-bway], who might have been his teacher, in Dante's [DAHN-tays] *Divine Comedy*, and he is likely to have painted Dante's portrait in the Bargello palace chapel. One of his early works showing perspective is called *Ognissanti Madonna*, or *Madonna Enthroned*. He designed the bell tower in Florence located near Ghiberti's *Gates of Paradise*. Name this 14th century Florentine artist who completed the fresco cycle in Scrovegni [SCROE-ven-yee] Chapel in Padua.	**Giotto** di Bondone

Extra Question #2: Social Studies – US History

15 points

Prior to a move to Guyana [gie-yan-ah], this state was the home of Jim Jones' Peoples Temple. The "White Night riots" in this state were sparked by the assassination of George Moscone [mos-KONE-ay] and Harvey Milk. Following the recall of Gray Davis, voters in this state elected Arnold Schwarzenegger as governor. Name this state, the site of a gold rush centered on Sutter's Mill.	**California**

Extra Question #3: Science – Physics

15 points

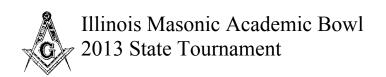|	
Changes in these particles are handled mathematically by the Cabibbo-Kobayashi-Maskawa [kah-BEEB-boe koe-bye-YAH-shee mahs-KAW-wah] matrix, whose complex number terms are used to handle CP violation. One of the forces containing them gets stronger as distance increases, leading to their confinement, but explaining why they are free to move about within other particles, their asymptotic freedom. Efforts to separate them create mesons, which are a combination of these particles with their antiparticles. Name these fundamental particles, three of which make baryons such as protons and neutrons.	**quark**s

Extra Question #4: Literature – Mythology

15 points

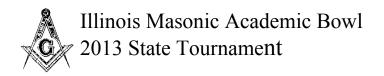|	
During the Gigantomachy [jie-gan-TOE-muh-kee], this god utilized Hades' [HAY-dees] magic helmet to slay Hippolytos [hip-poe-LIE-tose]. At the very first Olympic games, he lost a foot race to Apollo. For refusing to attend the wedding of Zeus and Hera, he changed Chelone [keh-LOE-nee] into a tortoise. Battos was changed into a rock after deceiving this deity. This psychopomp and slayer of Argos invented the lyre [lire], and traded it to Apollo for the caduceus [kah-doos-yus]. Name this Greek god of travelers, thieves, and merchants.	**Hermes** (accept **Mercury**)

Extra Question #5: Math – Conceptual Math

15 points

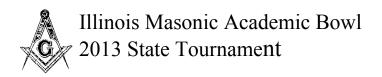|	
This shape can be inverted to form a cissoid [SIS-soid] of Diocles [DIE-oh-klees] or a cardioid [KAHR-dee-oid]. A drawing of all lines whose x- and y-intercepts have a constant sum generates this curve. This is generated when the x y term coefficient equals four times the product of the other two second degree coefficients when an equation contains only second degree polynomials. This also is generated by setting the polar r equal to a constant divided by the quantity one plus cosine theta. This is also the set of all points equidistant from a fixed point focus and fixed line directrix. Name this shape also generated by the equation $y=x^2$.	**parabola** (prompt on "conic" section)

Extra Question #6: Math – Geometry

10 points per part

	This quadrilateral has two pairs of adjacent congruent sides, though it does not necessarily have four congruent sides.	
1	Name this shape in which one diagonal bisects two angles and is the perpendicular bisector of the other diagonal.	**kite**
2	This British physicist is the namesake of an aperiodic tiling that consists of kites and darts.	Roger **Penrose**
3	The kite in a Penrose tiling has three angles that are each 72 degrees. Find the measure of the other internal angle in degrees in that kite.	**144** degrees

Extra Question #7: Math – Geometry

10 points per part

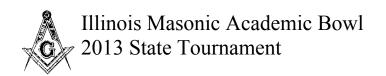|	This type of polygon has interior angles that total 720 degrees.	
1	Name this regular polygon with both central angles and exterior angles each equal to 60 degrees. Its interior angles are each 120 degrees.	**hexagon** (prompt on "6-gon")
2	This is the ratio of the length of a regular hexagon apothem to the length of a side.	**root 3 / 2** (accept **one-half root 3** or **.5 root 3** or equivalents)
3	This is the area of a regular hexagon whose sides are one unit long.	**3 root 3 / 2** (accept **three-halves root 3** or **1.5 root 3**)

Extra Question #8: Literature – US Literature

10 points per part

This poem describes a group of pool players at the Golden Shovel that thins gin and left school.		
1	Name this poem, published in *The Bean Eaters*, in which the title group "jazz June" and "die soon."	"**We Real Cool**"
2	"We Real Cool" was written by this African-American poet, whose poem "Men of Careful Turns" is found within her collection *Annie Allen*.	Gwendolyn Elizabeth **Brooks**
3	In one poem, Brooks wrote about a reporter from this city's *Defender* newspaper being sent to cover the Little Rock Nine. This city also served as the setting for Richard Wright's *Native Son*.	**Chicago**, Illinois

Extra Question #9: Literature – US Literature

10 points per part

He held the title master-at-arms aboard the *Indomitable*.		
1	Name this petty officer who was killed after falsely accusing a sailor of attempting to mutiny.	**Claggart**
2	Claggart tried to set up this foretopman, but ended up dying from being slugged by this sailor.	**Billy Budd** (accept either)
3	Billy Budd was created by this author of *Typee*, *Omoo*, and *Moby Dick*.	Herman **Melville**

Question #1: Social Studies – US History

15 points

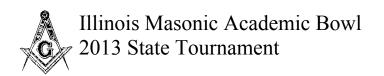|	
Early favorites for the Democratic nomination in this election included Chief Justice Levy Woodbury and James Buchanan, but settled on a Michigan senator. The Free Soil Party nominated a former President in this election but won zero electoral votes. However, they pulled enough popular votes from Democratic candidate Lewis Cass to hand victory to the Whig candidate. Name this presidential election in which Zachary Taylor was elected to succeed James K. Polk.	United States Presidential Election of **1848**

Question #2: Math – Conceptual Math

15 points

A theorem this person developed on inverse function theorems on Banach [bah-NAHK] spaces is now named after him and a person who applied it, Jurgen Moser. That theorem was used to develop this person's theorem on Riemannian [ree-MAHN-ee-un] manifolds, his embedding theorem. He is sometimes used as the namesake of the bargaining game, which he solved in a way that is Pareto [pah-REE-toe] efficient. His name is also attached to the solution of the Prisoner's Dilemma and several other problems from game theory with his namesake equilibrium. Name this mathematician who was the subject of the book and film *A Beautiful Mind*.	John Forbes **Nash**, Junior

Question #3: Literature – British Literature

15 points

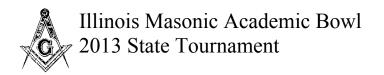| This character establishes that it is not mad by using a premise involving a dog, but had previously claimed that everyone is mad. It was the subject of a debate between the King and executioner as to whether one could cut off a head without a body. Owned by the Duchess, after he vanishes, only his smile lingers. Name this feline character from *Alice's Adventures in Wonderland*.	**Cheshire Cat**

Question #4: Fine Arts – Art History

15 points

When this artist died, he left an unfinished work showing a dark Adam standing behind a fair-skinned Eve. For a palace in Brussels, he completed his *Stoclet Fries* [frees] showing the swirling branches of a tree of life. A leader in the Vienna Secession, his works include two portraits of Adele Bloch-Bauer. One of his works shows a woman with her head tilted sideways and her hands in front of her neck as she is kissed. Name this 19th and 20th century artist known for his *Beethoven Frieze* and his use of gold foil.	Gustav **Klimt**

2

Question #5: Science – Physics

15 points

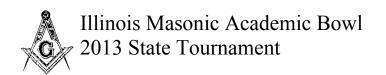|	
When this is caused by phonons, the impact is comparable to a diffraction grating and the type is named after Leon Brillouin [bree-yone]. Another type of this is similar to fluorescence in that it involves an inelastic collision, but it does not involve resonance. That type is used for remote sensing, while a different type is used to explain the dispersion that makes the sky blue. This phenomenon in x-rays is used to find the structure of crystals with Bragg's law. Give this phenomenon that has types named after Rayleigh and Raman [rah-mahn].	**scatter**ing

Question #6: Literature – World Literature

15 points

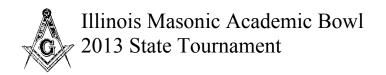|	
In this drama, one man compares himself to God on the sixth day. Damon claims that this play opens in an office featuring printed posters with the slogans "Reduce the Cost of your Products" and "The Cheapest Workforce You Can Get." In Act III, Hallemeier and Fabry are cursed for not writing down secrets on top of the ones burned in the fireplace. A revolution by the title figures results in Alquist being the only human left on Earth. The title objects were created by a company headed by Harry Domin and founded by old Rossum. Name this play which introduced the term "robot," written by Karel Capek.	**_R.U.R_**: *Rossum's Universal Robots*

Question #7: Fine Arts – Classical/Opera Music

10 points per part

	He wrote a series of operas that begins with *Das Rheingold* and includes *Siegfried*.	
1	Name this composer of The Ring Cycle.	Richard **Wagner**
2	The full name of the Ring Cycle calls it the ring of this race of dwarfs. The ring is made by Alberich [ahl-beh-rik].	**Nibelung**en
3	This opera by Wagner [VAHG-ner], not part of The Ring Cycle, is about the son of King Parsifal and contains Wagner's *Wedding March*.	*Lohengrin*

Question #8: Fine Arts – Classical/Opera Music

10 points per part

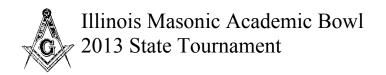|	This opera opened in Cairo, Egypt in 1871.	
1	Name this work in which Radames [rah-DAH-mays] falls in love with a slave from Ethiopia.	*Aida*
2	*Aida* was one of about thirty operas by this composer.	Giuseppe **Verdi**
3	This Verdi opera is about a candidate for the doge of Genoa who had a child with Fiesco's daughter.	*Simon Boccanegra*

Question #9: Literature – British Literature

10 points per part

The titular animal is described as a "wee, sleekit, cow'rin, tim'rous beastie.		
1	Name this poem, subtitled "On turning her up in her nest with the plough." The speaker claims that the animal proves foresight may be in vain, as the "best laid plans... oft go awry."	"**To a Mouse**"
2	This other poem addressed to an animal seen "on a lady's bonnet at church." The speaker asked some power for the gift to see himself as others see him.	"**To a Louse**"
3	"To a Mouse" and "To a Louse" were both penned by this Scottish poet.	Robert **Burns**

Question #10: Literature – British Literature

10 points per part

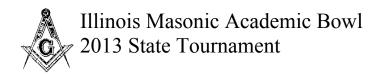| He committed the crime for which Justine Moritz was executed.		
1	Name this murderer of William, Henry Clerval, and the newly-married Elizabeth Lavenza.	**Frankenstein**'s **monster** (accept equivalents, do not accept "Frankenstein" on its own)
2	This author of *The Fortunes of Perkin Warbeck* and *Valperga* wrote *Frankenstein*.	**Mary** Wollstonecraft **Shelley** (do not accept Mary Wollstonecraft)
3	In *Frankenstein*, the story is told through letters written by this English explorer. His knowledge of the tale comes from conversations with both Victor and the monster.	**Robert Walton** (accept either)

5

Question #11: Math – Geometry

10 points per part

This segment is perpendicular to the side of a regular polygon.		
1	Name this segment drawn from the center of the polygon to the center of a side.	**Apothem** (do not accept "altitude")
2	For an equilateral triangle, this number is the ratio when the length of the radius of the circumscribed circle is divided by the length of the apothem.	**2**
3	For a square, this is the ratio when the length of the radius of the circumscribed circle is divided by the length of the apothem.	**Square Root of 2** (accept equivalents such as **Radical 2** or **Root 2**)

Question #12: Math – Geometry

10 points per part

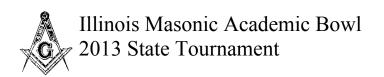| This shape can be generated in its namesake coordinates by setting rho equal to a constant.		
1	Name this shape formed by all points equidistant from a fixed point in 3-space.	**sphere**
2	This person is the namesake of spheres that are tangent to both a plane and the inside of a cone.	Germinal Pierre **Dandelin**
3	This is the volume of a sphere that has a radius of 3.	**36 pi**

6

Question #13: Science – Biology

10 points per part

These organic compounds are insoluble in water but soluble in alcohol.		
1	Name these compounds sometimes referred to as fat that include fatty acids, sterols, and waxes.	**lipid**s
2	This arrangement of lipids makes up cell membranes.	lipid **bilayer**s (accept phospholipid bilayer or **double layer**)
3	This is the name of an artificial vesicle generally consisting of a spherical lipid bilayer enclosing some molecules.	**liposome**s

Question #14: Science – Biology

10 points per part

These layers surround cell membranes and generally are more rigid than them.		
1	Name these structures that exist for many organisms, including plants, but not animals.	cell **wall**s
2	These channels in cell walls allow transport between cells.	**plasmodesma**ta
3	This polymer, also known as murein[MYUR-ee-in], forms the cell wall in bacteria.	**peptidoglycan**

7

Question #15: Miscellaneous – Pop Culture

15 points

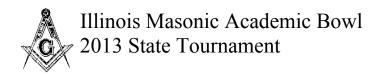|	
He sang about longtime friend Long John Baldry in "Someone Saved My Life Tonight." Amid controversy about a rapper's alleged homophobic lyrics, this singer performed with Eminem at the 2006 Grammys. The death of Marilyn Monroe inspired his smash hit "Candle in the Wind," which he later re-dedicated to Princess Diana. For the soundtrack to The Lion King, this singer performed "I Just Can't Wait to Be King" and "Circle of Life." Name this English singer behind such hits as "Crocodile Rock" and "Rocket Man."	Elton **John** (accept Sir Reginald **Dwight**)

Question #16: Social Studies – World History

15 points

Occurring at the Bohemian Chancellery, its targets were regents from the court of Emperor Rudolf II who were found guilty of violating the right of freedom of religion. Its perpetrators were appointed under the Letter of Majesty to defend the rights of Protestants in the Hapsburg empire. Occurring at Hradcany [heh-rahd-CHA-nee], its victims were Fabricius, Jaroslav Martinic, and William Slavata. Name this event which saw three men land in manure after being thrown out of a window in a modern-day Czech city.	Second **Defenestration of Prague** (do not accept "First Defenestration of Prague")

Question #17: Literature – US Literature

15 points

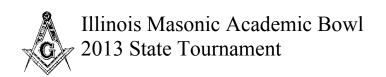| In one of his stories, the title event "came about as a result of a five dollar bet over highballs." In that story, the Cosmic AC was able to reverse entropy, but could not indicate this to man. Another of his stories opens with Aton 77 staring at young newspaperman Theremon 762. This author of "The Last Question" and "Nightfall" developed a three-law ethical hierarchy involving protecting humans, following reasonable orders, and protecting oneself; those were the Three Laws of Robotics. Name this science fiction author of the *Foundation* trilogy and *I, Robot*.	Isaac **Asimov**

Question #18: Science – Astronomy

15 points

This part of the spectrum is the focus of the SOFIA project which became operational in 2010, long after the Kuiper [KIE-per] Airborne Observatory became obsolete. The far part of it is studied by the Herschel Space Observatory, which has made discoveries about protostars to improve understanding of star formation. This spectrum is used to search for Brown Dwarfs because they are too cold to radiate significant visible light. Name this part of the spectrum a little above 0.75 micrometers, on the other end of the visible spectrum from ultraviolet.	**infrared**

9

Question #19: Social Studies – US History

15 points

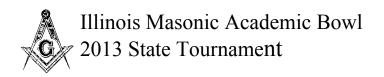|	
In stating his opposition to the Compromise of 1850, he delivered a speech describing "a higher law than the Constitution." He served as an Anti-Masonic Senator from New York before being elected to one term as Governor. He was stabbed by Lewis Powell on the same night Abraham Lincoln was shot. Name this man, Abraham Lincoln's Secretary of State who, under Andrew Johnson, negotiated the purchase of the Alaska territory, originally known as his "folly."	William Henry **Seward**

Question #20: Science – Biology

15 points

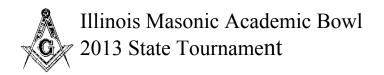|	
This process is inhibited naturally by TFPI or by the drug heparin [HEP-ah-rin]. It takes advantage of the production by intestinal bacteria of menaquinone [men-uh-KWIN-own], and it involves the Christmas factor. Its Fletcher factor is known scientifically as prekallikrein [pre-KAL-i-kray-in], and it is activated by Hageman [HAG-uh-mun] factor. A major step in this process is the conversion of fibrinogen [fie-BRIN-oh-jen] to fibrin [FIE-brin] using thrombin. Name this process which ends when the fibrin joins platelets to cover a wound.	blood **coagulation** cascade (accept blood **clotting** cascade, prompt on "cascade", "wound", "scar", or their word forms)

Question #21: Literature – US Literature

10 points per part

	His ghost, dressed in a white cap and morning gown, is said to haunt a swamp and Indian fort.	
1	Name this miser, who found his wife's heart and liver in her apron.	**Tom Walker** (accept either)
2	Tom Walker is killed by Old Scratch, an incarnation of this figure. He established his identity by burning an imprint of his finger in Tom's forehead.	the **Devil** (accept **Satan**, **Lucifer**, or other equivalents)
3	"The Devil and Tom Walker" was penned by this author, who told the story through the narrator Geoffrey Crayon.	Washington **Irving**

Question #22: Literature – US Literature

10 points per part

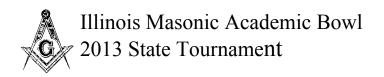|	Despite saving Hiram Doolittle's daughters from a panther, the magistrate convinced Judge Temple to have him arrested.	
1	Name this hunter, a companion of Chingachgook and Oliver Edwards, who also answered to the name Leatherstocking.	**Natty Bumppo** (accept either, accept **Straight-Tongue**, **Pigeon**, **Lap-Ear**, **Hawkeye**, **Pathfinder**, La **Longue Carabine**, or **Trapper**)
2	In this novel, Natty Bumppo proved that Judge Temple did not shoot a buck, instead hitting Oliver Edwards.	*The **Pioneers***
3	*The Pioneers* is included, along with *The Last of the Mohicans* and *The Pathfinder*, as part of this novelist's *The Leatherstocking Tales*.	James Fenimore **Cooper**

Question #23: Math – Trigonometry

10 points per part

	Consider the graph of y equals three plus the quantity five times the sine of the quantity two x minus pi, with x in radians.	
1	This is the name of the quantity equal to five in the function, the vertical distance between the midline and the maximum value.	**amplitude**
2	Find the period of the function.	**pi**
3	Find the phase shift of the function.	**pi over two** (accept **one-half pi** or equivalent) (if additional information is given, it should be right or positive)

Question #24: Math – Trigonometry

10 points per part

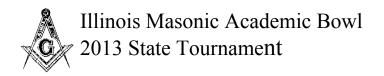|	Instead of being based on the graph of $x^2+y^2=1$, the unit circle, these trigonometric functions are based on the graph of $x^2-y^2=1$.	
1	Give the collective name for these variants on the circular trigonometric functions.	**hyperbolic** trigonometric functions (prompt on "hyperbola")
2	This is the name for the shape of the hyperbolic cosine graph. It matches the shape of a hanging chain.	**catenary**
3	This is the value of the hyperbolic cosine of zero.	**1**

Question #25: Social Studies – World History

10 points per part

In the build-up to it, Heinrich Muller sent an order to all police units to not interfere with the violence against Jews that was about to take place.		
1	Name this violent uprising against Jews in Germany, which saw insurance claims confiscated by the Reich, and a one-billion mark fine assessed on the Jewish community.	**Kristallnacht** (accept **Crystal Night**, **Night of Broken Glass**, or **November Pogroms**)
2	This other violent event was a response to the rising power of the SA. The SS were ordered to murder SA leaders, including Ernst Rohm, Kurt von Schleicher, and Gregor Strasser.	**Night of the Long Knives** (accept **Nacht der langen Messer** or **Blood Purge**)
3	Georgi Dimitrov was acquitted of this act, for which Marinus van der Lubbe was convicted. Joseph Goebbels devised a scheme involving this act being blamed on the Communists.	**burn**ing of the **Reichstag** (accept equivalents for burning)

Question #26: Social Studies – World History

10 points per part

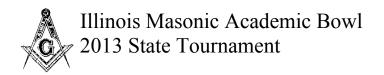|		
He was the eldest son of Charles Louis, and brother of the emperor Franz Joseph.		
1	Name this archduke, whose murder set off declarations of war that culminated in World War I.	**Franz Ferdinand**, archduke of Austria-Este (accept **Francis Ferdinand**, prompt on partial answers)
2	Founded by Dragutin Dmitrijevic [drah-GOO-tin di-mee-tree-JEH-vik], members of this organization targeted the car of Franz Ferdinand with a grenade, but in the end it took a gun fired by Gavrilo Princip to murder the archduke and his wife.	**Black Hand** (accept **Ujedinjenje Ili Smrt** or **Union or Death**)
3	The ulterior goal of the Black Hand was the liberation of these peoples from Hapsburg and Ottoman rule.	**Serb**s

Question #27: Science – Physics

10 points per part

With a constant gravitational field, this is calculated using the formula mass times gravitational field strength times height.	
1 Name this energy based on an object's position.	**potential** energy
2 For any field, potential energy can be calculated by performing this operation with respect to force using displacement.	**integral** (accept word forms such as integration)
3 A function named after this 18th century Italian-French solves classical mechanics problems by subtracting kinetic minus potential energy. Name the scientist or the function.	Joseph-Louis **Lagrange** (accept **Lagrangian**)

Question #28: Science – Physics

10 points per part

This animal is both alive and dead until it is observed, at which point it is one or the other.	
1 Name this animal in a famous thought experiment related to quantum mechanics.	**Schrodinger's cat** (prompt partial answer)
2 That thought experiment was used to criticize the interpretation of quantum mechanics associated with this city, the home of Niels Bohr.	**Copenhagen**, Denmark
3 This scientist followed the Schrodinger's Cat thought experiment with the idea that a friend performs the experiment and reports the result.	Eugene **Wigner**

Question #29: Literature – Mythology

15 points

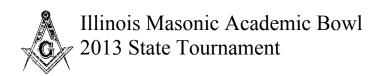|	
In the *Theogony* [thee-OG-uh-nee], Hesiod [HESS-ee-od] called this Titan "scatter-brained." His daughter threw rocks over her shoulder to create a race of women. The father of Pyrrha [PEER-ah], Plato claimed that he was tasked with creating animals before the deluge. Zeus gave his wife a jar as a wedding present, with instructions to never open it. He ignored his brothers' warnings about taking Pandora as a wife. Name this brother of Prometheus.	**Epimetheus**

Question #30: Math – Conceptual Math

15 points

Other than a triangle, this is the simplest regular polygon that can be constructed using Carlyle circles, though before that discovery its construction had already been shown in Ptolemy's [TOLE-uh-mee's] *Almagest*. The ratio of the length of one of its diagonals to the length of one of its sides is the golden ratio. Its internal angles are one hundred eight degrees, and it is the only polygon with the same number of diagonals as sides. Name this polygon that has central angles of 72 degrees and that has five sides.	regular **pentagon** (prompt on "5-gon")

Question #31: Social Studies – US History

15 points

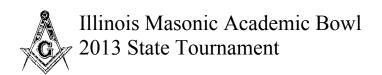|	
It was superseded by the Second Peirce Patent, which was authorized by King James I, who was called a "dread Sovereign Lord" within it. Its signers agreed to form a "civil body politic" and when necessary agree to "just and equal laws and ordinances," which all would submit to and obey. Name this agreement signed by Pilgrims aboard a namesake ship.	**Mayflower Compact**

Question #32: Science – Chemistry

15 points

Reagents [ree-AY-jents] containing this group are used to turn alkenes [al-keens] into epoxides [ee-POKS-ides], which are used as adhesives. Because compounds with this group generally are explosive, manufacturers try to limit its concentration, but it naturally arises from isopropyl [eye-soe-PROE-pul] ether, 2-propanol [PROE-puh-nol], and other compounds. The most common example of this group is in an inorganic molecule which together with iron is known as Fenton's reagent. That molecule, which places hydrogen atoms at both ends of this group, is a bleach commonly used to color hair. Name this group consisting of two oxygen atoms with a single bond.	**peroxide** (prompt on "O_2")

Extra Question #1: Math – Conceptual Math

15 points

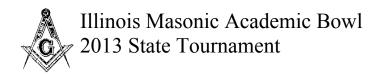|	
This can be proven using Levy's continuity theorem. It holds under Lindeberg's condition, which does not require different variables to be identically distributed, and it also holds under the Lyapunov [LYAH-poo-nof] condition. The de Moivre-Laplace [de-MOV lah-PLAHS] theorem specifically addresses the case of a binomial distribution with fixed probability. Name this theorem that predicts a normal distribution.	**Central Limit** Theorem

Extra Question #2: Fine Arts – Art History

15 points

One work by this artist has as its central figure a person with black floral clothes, a green head, and white hands playing a bent guitar. That work, made with paper cutouts, is *The Sorrows of the King*. Several of his works are set at the southern tip of France in Collioure [KOE-lyur], including his *Open Window*. His work *The Joy of Life* exemplifies the colors and subjects of the fauvist movement. Name this painter, some of whose works show a circle of dancers.	Henri **Matisse**

Extra Question #3: Literature – World Literature

15 points

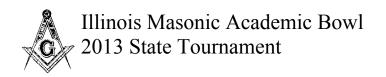|	
He had a fishing pavilion and artificial lake built on the site of his mansion. He frequently contemplated "leaving the world" and becoming a Buddhist. His first wife, whom he married at twelve years of age, died giving birth to Yugiri [yoo-geer-ee]. He then turned his affections to the niece of Fujitsubo [foo-jeet-soo-boe]. His first wife was Princess Aoi [AY-oy]. Name this prince, the subject of a "Tale" by Lady Murasaki Shikibu.	Prince **Haikaru Genji** (accept either underlined portion, accept *The **Tale of Genji***)

Extra Question #4: Science – Biology

15 points

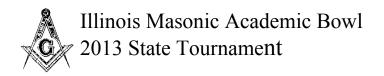|	
The whip and tongue method of this procedure is done to increase surface area when starting with thin pieces and is similar to the four flap, or banana, method. When this happens naturally, it is called inosculation, and one of the parts that goes into this is the scion [SIE-on]. In addition to its use with plants, this procedure is also used on human bone or skin, repairing certain fractures or burns. In plants, it is important to keep the vascular cambium [KAM-bee-um] of the scion in contact with the vascular cambium of the rootstock. Name this method of physically combining two plants.	**Graft**ing (do not accept "budding")

Extra Question #5: Social Studies – World History

15 points

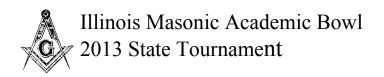|	
By its terms, France regained control of Gorée as well as Belle-Ile-en-Mer, but was forced to evacuate Hanover and Hesse. Britain regained control of Minorca and Fort St. Philip. In its aftermath, King George III issued the Proclamation of 1763, as it gained control of French territory in Canada and east of the Mississippi. Name this treaty that brought an end to the Seven Years' War.	Treaty of **Paris**

Extra Question #6: Science – Physics

10 points per part

	It is used in neon signs and some televisions.	
1	Name this state of matter made up of charged particles.	**plasma**
2	Plasma exists in this weather phenomenon. Sometimes confused with ball lightning, it often hit ship masts.	**Saint Elmo's fire**
3	Scientists at Brookhaven have recently claimed to create this phase of matter while reaching a temperature of 4 trillion Celsius.	**quark-gluon plasma** (accept **QGP** or **quark soup**)

Extra Question #7: Science – Physics

10 points per part

	We often try to avoid collisions, though they are sometimes interesting.	
1	This type of collision conserves kinetic energy.	**Elastic**
2	Assuming no external forces, this point moves at a constant speed in any system, even during a collision.	**center of mass** (accept **barycenter**, do not accept "centroid")
3	This value, the ratio of two velocity differences, is used to quantify the elasticity of a collision.	**coefficient of restitution** (accept **COR**)

Extra Question #8: Social Studies – World History

10 points per part

	A former assistant to Manuel Roxas, as a Nationalist he defeated Liberal candidate Diosdado Macapagal [dee-ose-DAH-doe mah-kah-PAH-gahl] to win his first term as President.	
1	Name this authoritarian leader, who was opposed by the New People's Army after declaring martial law. He was criticized for appointing his wife to such posts as governor of Metropolitan Manila.	Ferdinand Edralin **Marcos**
2	Ferdinand Marcos suspended habeas corpus in this country, where he claimed to have been a leader in the guerrilla resistance movement during World War II.	Republic of the **Philippines**
3	Marcos was accused of ordering the assassination of this opposition leader as he arrived from the United States on a plane. After his death, his wife Corazon stood for president, and was inaugurated around the time Marcos fled the country.	**B**enigno **Aquino**, Jr.

Extra Question #9: Social Studies – World History

10 points per part

	Before its passage, the defeat of this act in the House of Lords led to a riot in Bristol.	
1	Name this bill, which restricted voting rights to males who owned homes worth at least 10 pounds.	Second **Reform** Bill of 1832
2	The Reform Bill was passed shortly after this king asked Lord Grey to form a new government, as the Duke of Wellington could not do so.	King **William IV**
3	The Reform Bill was passed in the House of Lords once William IV agreed to create a number of new peers belonging to this political party.	**Whig** Party