



Question #1: Literature – British Literature

10 points

This poem describes stars that “threw down their spears, and watered heaven with their tears.” In this poem, when the title creature’s heart began to beat, the speaker asked “what dread hand and what dread feet?” The speaker also asks if the maker of the lamb also made the title predator. Name this poem about an animal “burning bright in the forests of the night” that is in the collection *Songs of Experience* by William Blake.

“The Tyger”

Question #2: Science – Astronomy

10 points

One of the dark features on the surface of this object is Ontario **Lacus** [LAH-koos], and some of its bright locations are Dilmun, Adiri, and Xanadu. The dark objects are believed to be hydrocarbon lakes, as opposed to the water ice which makes up much of this object. Its Xanadu region is close to where the **Huygens** [HOY-gens] probe landed in 2005. After our moon and the **Galilean** [gal-uh-LAY-un] moons, this was the first moon discovered, and this has the densest atmosphere of all satellites in our solar system. Name this large moon of Saturn.

Titan



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
1st Section
Toss-up Questions

Question #3: Miscellaneous – Pop Culture

10 points

In one film, this actor delivered the line, “What we do in life echoes in eternity.” This person starred as a programmed serial killer being pursued by Denzel Washington in <i>Virtuosity</i> . He earned Oscar nods for playing Jeffrey Wigand and John Nash in <i>The Insider</i> and <i>A Beautiful Mind</i> . In <i>Man of Steel</i> , he played Jor-El, the father of Superman, and in an upcoming film he will play Noah. Name this actor from New Zealand who starred as Maximus in <i>Gladiator</i> .	Russell <u>Crowe</u>
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Question #4: Social Studies – U.S. History

10 points

Current promulgators of this law are relying on precedents set by <i>Dillon v. Gloss</i> and <i>Coleman v. Miller</i> in pursuing a “three-state strategy.” This law was originally named for Lucretia [loo-KREE-shuh] Mott by its author Alice Paul, and it faced strong opposition from Phyllis Schlafly. Despite a three-year extension, this did not meet the 38-state requirement for ratification by June 1982. Name this failed amendment that would forbid discrimination of any kind on the basis of gender.	<u>Equal Rights</u> Amendment (accept <u>ERA</u>)
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Question #5: Literature – Mythology

10 points

This character met Eldir in the forest after he was driven away for killing **Fimafeng [FEE-mah-fayng]**. Odin claimed that this god lived under the earth for eight winters. Before declaring that **Aegir [AE-jir]** could never give a feast again, this character criticized **Idun [EE-doon]** for embracing her brother's killer. He handed **Hodur [HODE-ur]** enchanted mistletoe and aimed it at **Baldr [BAL-dur]**, killing the god. He is the father of Fenrir and the mother of **Sleipnir [SLAYP-nir]**. Name this Norse trickster god.

Loki

Question #6: Science – Biology

10 points

Some of the hormones produced by this gland are derived from **tyrosine [TIE-ruh-seen]**, and another hormone is produced in this gland's parafollicular C cells. This gland is overactive in people with Graves' disease, which can lead to bulging eyes. Responsible for secreting **calcitonin [kal-sih-TOE-nin]**, this gland is swollen in people with iodine deficiencies that cause goiter. Name this gland that surrounds the **trachea [TRAY-kee-uh]** just below the Adam's apple in the neck.

thyroid gland



Question #7: Mathematics – Probability

10 points per part

This problem is named for an 18 th century Frenchman.		
1	Name this problem in which an object was repeatedly dropped on a floor with regularly sized strips.	Buffon's needle problem (prompt partial answer)
2	If the needle is shorter than the strips, the probability of the needle touching two strips equals two times the needle length divided by this number times the strip width. This number also equals the ratio of the circumference to the diameter of a circle.	Pi
3	Because it measures pi based on a random process, Buffon's [boo-fon's] needle is one of these types of problems named for a region in Monaco.	Monte Carlo (accept additional words)

Question #8: Mathematics – Probability

10 points per part

The inequality named for this person, also known as the union bound, says the probability of at least one event occurring is less than or equal to the sum of the individual probabilities.		
1	Name this mathematician whose namesake algebra has variables that can only equal zero or one.	George Boole (or Boole's inequality, prompt on "Boolean")
2	If six variables are independently set equal to either zero or one with equal probabilities, what is the probability that all six will equal one?	1/64 (or 0.015625)
3	If the variables x, y, and z are independently set equal to zero or one with equal probabilities, what is the probability that at least one of x or y or z equals one?	7/8 (or 0.875)



Question #9: Literature – World Literature

10 points per part

In one tale in this collection, the daughter of a king marries the nephew of moneylenders instead of a king of Scotland.		
1	Name this work in which each of the ten central characters is made king or queen for a day. One of its tales concerns a pot of basil.	<i>The <u>Decameron</u></i> (or <i>Book of <u>Prince Galehaut</u></i> or <i><u>Decamerone</u></i>)
2	This author of <i>The Decameron</i> wrote of a woman who fell in love with a merchant in <i>The <u>Elegy</u></i> [el-uh-jee] of Lady <i><u>Fiammetta</u></i> [fyahm-MEHT-tah].	Giovanni <u>Boccaccio</u>
3	In the introduction, <u>Boccaccio</u> [boe-KAH-chyoe] claimed that the text was written for women who stayed home, comparing them to this legendary queen.	Queen <u>Guinivere</u>

Question #10: Literature – World Literature

10 points per part

Upon seeing this woman, one author claimed that his vital spirit trembled, his animal spirit was amazed, and his natural spirit wept.		
1	Name this woman who was shown a fiery object by Love and told to “behold your heart.” She then ate the object.	<u>Beatrice Portinari</u> (accept either underlined part)
2	Name this poet who wrote as though he was guided by Virgil and Beatrice in <i>The Divine Comedy</i> .	<u>Dante</u> Alighieri (accept <u>Durante</u> Alagherius, prompt on “Alighieri” or “Alagherius”)
3	Before ascending the mountain of Purgatory, <u>Dante</u> [DAH-N-tay] is given this many marks on his forehead. As Dante ascends each level, one of the marks is removed.	<u>seven</u>



Question #11: Science – Physics

10 points per part

This is the emission of electrons caused by photons.		
1	Name this effect whose explanation won a Nobel Prize for Albert Einstein.	<u>Photoelectric</u> Effect
2	Einstein's explanation built on Max Planck's [plahnk's] work explaining the radiation of this type of idealized object that absorbs all incident electromagnetic radiation.	<u>blackbody</u> (accept longer answers)
3	If the photon has a very high amount of energy, it can have this reaction with the nucleus of an atom, creating an electron instead of releasing one.	<u>pair production</u> (accept other word forms)

Question #12: Science – Physics

10 points per part

The leading explanation for this phenomenon used to be BCS theory, but that theory does not work in some cases.		
1	Name this complete lack of electrical resistance.	<u>superconductivity</u> (accept other word forms)
2	BCS theory claimed that electrons were bound together in a pair named for this scientist.	Leon <u>Cooper</u> (or <u>Cooper</u> pairs)
3	The tunneling of Cooper pairs across a link between two superconductors is named for this scientist.	Brian David <u>Josephson</u> (allow additional words such as effect or junction)



Question #13: Social Studies – Psychology

10 points per part

This field of psychology drew on structural psychologist Oswald Kulpe's [kul-peh's] ideas of imageless thoughts.		
1	Name this field of perception theory which holds that the whole is greater than the sum of its parts. Kulpe oversaw the dissertation of one of its founders, Max Wertheimer.	<u>Gestalt</u> psychology
2	An object often discussed in Gestalt theory is one of these shapes designed by Louis Necker. Objects are passed through it to show the different two-dimensional perspectives.	<u>cube</u>
3	Another classic image discussed in Gestalt theory is that of the ambiguous image of two faces and one of these objects.	<u>vase</u>

Question #14: Social Studies – Psychology

10 points per part

In one controversial experiment, this person raised infant macaques [mah-KAKS] in total isolation for two years.		
1	Name this formulator of the “learning to learn” theory who ran one experiment that led to some subjects becoming “motherless mothers.”	Harry <u>Harlow</u>
2	In the experiment that led to the “motherless mothers,” Harlow created two artificial surrogates to mother these animals. Macaques are examples of these animals.	<u>monkeys</u> (prompt on “mammal”s or “primate”s)
3	In another experiment, Harry Harlow developed these surrogate mothers that stabbed with sharp spikes or blew out a forceful blast of cold air. Surprisingly, the babies still clung to them.	<u>iron maidens</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
3rd Section
Toss-up Questions

Question #15: Science – Chemistry

10 points

In contrast to the Helmholtz free energy, the **Massieu** [mas-syoe] potential is also known as the Helmholtz free amount of this quantity. The amount of this added to a system is calculated in the Clausius inequality, and this value is maximized at equilibrium. This equals the reciprocal of temperature integrated with respect to energy, and this is proportional to the log of the number of states a gas can occupy. Name this quantity which, according to the Second Law of Thermodynamics, never decreases in an isolated system.

entropy

Question #16: Social Studies – Economics

10 points

Per the Humphrey-Hawkins Act, this body is required to submit a semiannual report on the goal of full employment. The Consumer Advisory Council formerly within this was subsumed by the Consumer Financial Protection Bureau. Its primary policymaking body is the Open Market Committee. This body also oversees the majority of Automated Clearing House transactions, including Social Security payments and tax refunds. Name this American central banking authority.

Federal Reserve Bank of the United States



Question #17: Mathematics – Math Concepts

10 points

One of these structures that applies the fundamental theorem of arithmetic is named for Peter Shor. Donald **Knuth** [keh-NOOTH] designed one of these for matrices named X. One of these that is used for the shortest path problem is named for Edsger **Dijkstra** [DIKE-strah]. The worst-case complexity of these is described by big **O** [oe] notation. Name this type of construct often converted into a computer program which gives a procedure for solving a problem or carrying out a task.

algorithms (accept quantum algorithm before the end of the 2nd sentence, prompt on “method”s, “technique”s, or “process”es)

Question #18: Social Studies – World History

10 points

During this war, the cruiser **Novik** [NOE-veek] was lost at the Battle of Korsakov. That happened soon after Feodor Keller lost the Battle of Motien Pass. One fleet in this conflict had sailed from the Baltic in an attempt to reach Port Arthur, but was defeated at **Tsushima** [tsoo-SHEE-mah] Strait by the forces of **Togo Heihachiro** [toe-goe hay-hah-CHIH-roe]. Concluded via the Treaty of Portsmouth, which was mediated in part by Teddy Roosevelt, name this war fought in the early 20th century.

Russo-Japanese War



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
3rd Section
Toss-up Questions

Question #19: Fine Arts – Art History

10 points

This artist included two floating stepping stools and the title figure hovering above a floating pedestal in front of a swan in his work *Leda Atomica* [LAY-dah ah-TAH-mih-kah]. That work used his wife Gala [GA-lah] as a model, as did his work *Galatea of the Spheres*. His work showing skulls within the eye sockets and mouths of larger skulls is *The Face of War*. He showed ants crawling inside an orange timepiece in a work that included several other timepieces. Name this Spanish surrealist who painted *The Persistence of Memory*.

Salvador Dali

Question #20: Literature – U.S. Literature

10 points

This author wrote of an American sculptor who fell for the daughter of a *Cavaliere* [ka-vah-lee-EHR-ay], but died on his way to see her in *Interlaken* [in-ter-LAH-ken]. In another novel, he wrote of a protégé [PROE-teh-jay] of Olive Chancellor who is conscripted into the women's rights movement, but Verena falls for Basil. This author of *Roderick Ransom* and *The Bostonians* penned a novella concerning the pursuit by Giovanelli [jyoe-vah-NEL-lee] and Winterbourne of an American tourist. Name this author of *The Turn of the Screw* and *Daisy Miller*.

Henry James



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
4th Section
Teamwork Questions

Question #21: Mathematics – Algebra

10 points per part

These types of sequences follow patterns of exponential growth or decay.		
1	Name this type of sequence in which each number equals a constant times the previous number.	<u>geometric</u> (sequence or progression) (do not accept “geometric series”)
2	If the third term of a geometric sequence is 64 and the common ratio is 2, what is the value of the first term?	<u>16</u>
3	If a geometric series has a first term of 10 and a common ratio of one-third, what is the value of the limiting sum?	<u>15</u>

Question #22: Mathematics – Algebra

10 points per part

This structure has a set and an operation that satisfies its four namesake axioms, and it has commonalities with a ring or a field.		
1	Name this mathematical structure that is closed under an associative operation that has an identity, and in which every element has an inverse.	<u>groups</u>
2	Rings are groups with an additional operation, which has this property over the group operation.	<u>distributive</u> property (accept <u>distributivity</u>)
3	Find the answer to this arithmetic problem that is easier to solve if you take advantage of the distributive property: the quantity 72 times 13 end quantity plus the quantity 72 times 7.	<u>1440</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
4th Section
Teamwork Questions

Question #23: Fine Arts – Classical/Opera

10 points per part

This composer wrote several humoresques, including one that was given lyrics starting with, “Passengers will please refrain.”		
1	Name this Czech composer whose ninth symphony was nicknamed “From the New World.”	Antonin <u>Dvořak</u> (be lenient, but the pronunciation should be dvorjahk)
2	Dvořak wrote this set of sixteen nationalist pieces, finishing eight of them in 1878 and the other eight in 1886.	<u>Slavonic Dances</u> (or <u>Slovanske tance</u>)
3	Dvořak gave this Slavic subtitle to his fourth piano trio.	“ <u>Dumky</u> ” (or “ <u>Dumka</u> ”)

Question #24: Fine Arts – Classical/Opera

10 points per part

This composer is credited with 106 symphonies, including a group of six known as his Paris symphonies and a group of twelve known as his London symphonies.		
1	Name this Austrian composer also credited with 68 string quartets, including a group of six known as Russian and a group of six known as Prussian.	Joseph <u>Haydn</u> (be lenient, but the pronunciation should be HIE-den)
2	Near the end of the first performance of this Haydn symphony, the musicians one by one blew out a candle and left the stage.	<u>Farewell</u> (or <u>45th</u>)
3	Haydn also wrote 45 of these pieces, including three dedicated to Theresa Jansen Bartolozzi and one nicknamed “Gypsy” that ends with a rondo.	<u>piano trio</u> (prompt partial answer)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
4th Section
Teamwork Questions

Question #25: Social Studies – World History

10 points per part

He replaced Edward Gierek [GEER-ek] as the leader of his nation's Communist Party, also known as the United Workers' Party.		
1	Name this leader whose imposition of martial law led to nine miners being killed during a strike at the Wujek [VOO-yek] coal mine.	Wojciech Witold <u>Jaruzelski</u>
2	This labor leader helped Tadeusz Mazowiecki [tah-DA Y-ooz mah-zoe-vee-EHS-kee] become prime minister before succeeding Jaruzelski [ha-roo-ZEL-skee] as president in 1990.	Lech <u>Walesa</u>
3	Lech Walesa founded this nation's Solidarity Party. As a union leader, Walesa became the figurehead for the 1980 Gdansk shipyard strike.	<u>Poland</u>

Question #26: Social Studies – World History

10 points per part

He was the target of an assassination plot concocted by his sister Lucilla [loo-CHEEL-lah].		
1	Name this Roman emperor who renamed the capital as his "Colony." He was assassinated by a wrestler after he announced that he would assume the consulship in gladiatorial garb.	Caesar Marcus Aurelius <u>Commodus</u> Antoninus Augustus (accept Lucius Aelius Aurelius <u>Commodus</u>)
2	Commodus was co-ruler with this emperor, his father, who died campaigning against the Germanic tribes in 180 AD.	Caesar <u>Marcus Aurelius</u> Antoninus Augustus (accept <u>Marcus Annius Verus</u>)
3	Marcus Aurelius was the last of this succession of emperors that began with Nerva and included Trajan and Antoninus Pius.	<u>Five Good Emperors</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
4th Section
Teamwork Questions

Question #27: Literature – British Literature

10 points per part

The speaker in this poem can be found in a dive on 52 nd Street.		
1	In this poem, Thucydides [thoo-SIH-dih-dees] is cited as an expert on “democracy, and what dictators do.” The speaker claims to only have “a voice, to undo the folded lie.”	<u>“September 1, 1939”</u>
2	“September 1, 1939” was penned by this co-librettist on <i>The Rake’s Progress</i> and poet of “Musee de Beaux Arts.”	Wystan Hugh <u>Auden</u>
3	Inspired by his translations of Dag Hammar skjold’s [HAM-mur-skyold’s] journals, Auden wrote in this poetic form in “Symmetries and Asymmetries” and the collection <i>Marginalia</i> . Japanese poet Mastuo Basho was a major proponent of this form.	<u>haikus</u>

Question #28: Literature – British Literature

10 points per part

In the opening to this play, Ariel warns the female protagonist to beware of jealousy, pride, and men.		
1	In this play, Lord Petri compared the steel of scissors to Greek swords after committing the title action.	<i>The <u>Rape of the Lock</u></i>
2	<i>The Rape of the Lock</i> was written by this author of <i>The Dunciad</i> [DUN-see-ad] and <i>An Essay on Man</i> .	Alexander <u>Pope</u>
3	In the end, Belinda’s cut lock of hair becomes one of these objects, as observed by the muse of poetry.	<u>star</u>



Question #29: Social Studies – U.S. History

10 points

<p>This person's namesake commission led to the creation of the Department of Health, Education, and Welfare. This person claimed to be the first Stanford University student, and a library he started there is now a think tank. He oversaw the creation of the Reconstruction Finance Corporation to stabilize the economy, but he did indelible damage after signing the Hawley-Smoot Tariff, later claiming that, "Prosperity is just around the corner." Name this President who was succeeded during the Great Depression by Franklin Roosevelt.</p>	<p>Herbert Clark <u>Hoover</u></p>
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Question #30: Mathematics – Math Concepts

10 points

<p>This is the expected value of money won in which a gambler receives two raised to the k minus one dollars if it takes k coin flips for the first tail to appear. Hilbert's Paradox of the Grand Hotel addresses sets of this size, and this is the surface area of Gabriel's Horn and the perimeter of a Koch [koach] snowflake, which is a type of fractal. The symbol aleph-null is used for the countable version of this value. Name this value that is large beyond any limit.</p>	<p><u>infinity</u> (or <u>infinite</u> or <u>unbounded</u>, accept "countable" before it is mentioned, prompt on "undefined")</p>
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Question #31: Literature – World Literature

10 points

In one poem, this writer described the “infinite oblivion” shattering a woman, which held “infinite tenderness, like a jar.” He also described a time that “cold stars heave up, black birds migrate;” that being the hour of departure. This writer compared the stabbing of knives to “an Amazon of buried jaguars” in a poem whose speaker asked his brother to “arise to birth with me.” Name this writer of “The Song of Despair” whose *Canto General* [hen-er-AHL] includes *The Heights of Macchu Picchu*, a Chilean poet.

Pablo Neruda (accept Ricardo Eliecer Neftalí Reyes Basoalto)

Question #32: Science – Physics

10 points

This scientist and Hendrika Johanna van Leeuwen [LAY-ven] discovered independently that classical physics could not explain the spontaneous magnetization of iron. A conference he spoke at in Göttingen [GOE-tin-gen] in 1922 became known as his festival and was where he met his future student Werner Heisenberg. His interpretation of quantum mechanics allowing mutually exclusive measurements was known as complementarity and became known as the Copenhagen Interpretation. Name this physicist who explained energy levels using circular orbits in his model of the hydrogen atom.

Niels Bohr



Extra Question #1: Social Studies – World History

10 points

Its emblem quoted Psalm 73, “Rise Up, O Lord, and Judge Thine Own Cause!” Among its appointed leaders was St. Peter of **Arbues** [AHR-bwehs], who was later killed by *marranos*. Thrice it issued edicts against the mystical Alumbrados, and it also martyred *moriscos* [moe-REE-skoes]. Overseen by Tomas de **Torquemada** [tor-kay-MAH-dah], name this group which prosecuted alleged heretics, begun during the reign of Ferdinand and Isabella.

Spanish **Inquisition**

Extra Question #2: Science – Biology

10 points

This scientist worked with Charles Manning Child to show that a small piece of a **planarian** [pluh-NAR-ee-un] could regenerate an entire organism. Following the work of William Bateson, this scientist found that coupling and repulsion are incomplete, and before the work of Barbara McClintock, he explained Janssens’ discovery of crossover. The unit measuring genetic linkage is named for him, and he demonstrated that a white eyed mutation is sex-linked. Name this scientist famous for his work on **Drosophila** [dro-soe-FEE-lah] melanogaster, or fruit flies.

Thomas Hunt **Morgan**



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
Extra Section
Toss-up Questions

Extra Question #3: Literature – U.S. Literature

10 points

<p>This author described a gangster utilizing weather descriptions to send messages from Sing Sing prison. He wrote of an author who rode horses through Central Park before a love interest planned to leave the country with Jose Ybarra-Jaegar. This novelist also wrote of Alvin Dewey's investigation into the murder of the Clutters by Dick Hickock and Perry Smith. Name this author of <i>Breakfast at Tiffany's</i> and <i>In Cold Blood</i>.</p>	<p>Truman <u>Capote</u></p>
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Extra Question #4: Mathematics – Math Concepts

10 points

<p>One way to create these things is to use Fermat's [fehr-mah's] method of infinite descent, which was applied by Euler [OY-ler] to Fermat's theorem on the sum of two squares. One type of these things has a strong, or complete, variant in which an assumption applies to a set of numbers instead of just one. That type, which includes a basis step, is induction. The indirect type of this uses reductio ad absurdum, building a contradiction. Name this argument establishing a truth that can come in the form of a paragraph or two columns.</p>	<p><u>proofs</u> (accept <u>inductive proof</u> or <u>proof by induction</u>, prompt on "induction")</p>
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Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
Extra Section
Toss-up Questions

Extra Question #5: Fine Arts – Classical/Opera

10 points

This composer wrote a choral work about an Indian poet who sends a message to his wife, *The Cloud Messenger*. A few years later, he used the gospels for *The Hymn of Jesus*. The first public performance of one of this composer's pieces was conducted by Adrian Boult, and its last section uses two women's choruses in an adjoining room. That work was originally titled *Seven Pieces for Large Orchestra*, and its last section is "The Mystic." Name this composer who used astrology themes in his work *The Planets*.

Gustav von Holst



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
Extra Section
Teamwork Questions

Extra Question #6: Social Studies – U.S. History

10 points per part

He led his party's delegation to the 1865 Hampton Roads Conference.		
1	Name this author of <i>A Constitutional View of the Late War Between the States</i> . After seven states seceded from the Union, he gave the "Cornerstone Speech."	Alexander Hamilton <u>Stephens</u>
2	Alexander Stephens was elected to this post in the Confederacy. He had a strained relationship with Jefferson Davis, calling him "a weak timid aspirant for military domination."	<u>Vice President</u>
3	After the Civil War, Stephens served as a congressman and later governor of this state originally started as a colony by James Oglethorpe.	<u>Georgia</u>

Extra Question #7: Social Studies – U.S. History

10 points per part

The plaintiff in this Supreme Court case was a minor who was targeted for wearing a black armband.		
1	Name this case for which Abe Fortas wrote a majority opinion that criticized the arbitrary nature of a ban on the armband, as it did not extend to buttons or Iron Crosses.	<u>Tinker</u> vs Des Moines
2	The protest in question took place within this establishment. <i>Tinker</i> established the precedent that those within it do not lose all rights upon entering through its "gate."	high <u>school</u>
3	The black armbands targeted by the unconstitutional ban were worn in 1965 in protest against this conflict.	<u>Vietnam</u> War



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 1
Extra Section
Teamwork Questions

Extra Question #8: Science – Chemistry

10 points per part

This is the second most abundant gas in the universe, but there is very little in Earth's atmosphere.		
1	Name this lightest noble gas.	<u>helium</u>
2	Helium was the first element observed in this state, a liquid with no viscosity.	<u>superfluidity</u>
3	This name is given to a transition point between fluid helium and superfluid helium, which at one atmosphere is slightly over two kelvin.	<u>lambda</u> point

Extra Question #9: Science – Chemistry

10 points per part

He played a role in the discovery of about ten elements, and element 106 is now named for him.		
1	Name this chemist who shared a Nobel Prize with Edwin McMillan.	Glenn <u>Seaborg</u>
2	Most of Seaborg's discoveries, but not seaborgium, are in this series on the periodic table below the lanthanides.	<u>actinides</u>
3	Seaborg named this set of isotopes that he believed would have longer half-lives than the ones he discovered. These isotopes have not yet been created.	<u>island of stability</u>



Question #1: Social Studies – World History

10 points

This nation was the site of an uprising led by **Juhayman al-Utaybi** [joo-HAY-mahn ahl oo-TIE-bee], who accused this country's leaders of being Christian allies. It secured its region of Asir following a 1934 war in the Treaty of Taif. 19 Americans were killed in 1996 in the Khobar Towers bombing in this country. On top of fiercely defending its town of **Ras al-Khafji** [rahs ahl KAHF-jee], it coordinated the victorious Muslim forces of the Persian Gulf War. This was formed by the union of the **Hejaz** [hay-jaz] and **Najd** [nehjd] kingdoms, and it was the home country of most of the 9/11 terrorists. Name this Middle East kingdom with capital at Riyadh.

Kingdom of **Saudi Arabia** (accept Al-Mamlakah al-**Arabiyyah** al-**Su'ūdiyyah**)

Question #2: Mathematics – Math Concepts

10 points

This is the number of faces of a truncated tetrahedron. The **Platonic** [plah-TAH-nik] solid with this number of faces has six **vertices** [VER-tuh-sees], and the Platonic solid with this number of vertices has six faces. This is the number of sets in a power set developed from a set with three elements, and this is the **Fibonacci** [fih-buh-NAH-chee] number between 5 and 13. A polygon with this number of sides is created by making straight cuts at the corners of a square. Identify this power of two, equal to the number of sides of an octagon.

8



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
1st Section
Toss-up Questions

Question #3: Literature – U.S. Literature

10 points

This author wrote a short story in which a man built an exact replica of the mansion from “The Fall of the House of Usher.” The prologue to one of his novels describes Halloween occurring at 3 AM on October 24. That novel described the arrival of the Pandemonium Shadow Show to Green Town. This author of *Something Wicked This Way Comes* wrote of atomic war survivors as “living books” that escaped the Mechanical Hound. Name this author of *The Martian Chronicles* and *Fahrenheit 451*.

Ray Bradbury

Question #4: Science – Chemistry

10 points

When this value is calculated for different elements, hydrogen is given a value above two so that all elements have positive values. This was calculated by taking the square root of the difference of a dissociation energy and the average of two other dissociation energies. This value depends largely on the number of spaces in the outer energy level and its distance from the nucleus. Name this value invented by Linus Pauling measuring the ability of an atom to attract electrons, a value high in fluorine.

electronegativity (accept word forms)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
1st Section
Toss-up Questions

Question #5: Social Studies – Geography

10 points

In retaking this island during World War Two, the Allies sprung an invasion from Apra Harbor. The Cabras and Cocos Islands lie directly off the coast of this area. Home to the Andersen Air Force Base, natives of this island speak Chamorro, which borrows heavily from Spanish. Its capital is Hagatna, and this is the largest Mariana Island. Name this US Territory lying north of Micronesia in the Pacific Ocean.

Territory of **Guam** (accept **Guahan**)

Question #6: Fine Arts – Classical/Opera

10 points

This composer referenced a choral work by Bach in the last of his six organ sonatas, which he wrote soon after starting the **Leipzig [LIPE-zig]** Conservatory. He wrote eight volumes of six works each, some of which are known as Venetian Boat Songs, which he called *Songs Without Words*. A trip to Scotland inspired this composer's third symphony, and a trip to Italy inspired his fourth symphony. Name this composer whose *A Midsummer Night's Dream* includes his *Wedding March*.

Felix **Mendelssohn** Bartholdy
(prompt on "Bartholdy")



Question #7: Mathematics – Statistics

10 points per part

Answer the following about curve fitting, which is related to regression analysis and the method of least squares.		
1	This is the smallest number of points necessary to fit a cubic function to the points if you do not have additional information about the situation.	<u>4</u>
2	The question as to how well a curve fits points can be measured with the Pearson product-moment correlation coefficient, which is generally represented by this lower-case letter.	<u>r</u>
3	This is the value of r for a linear regression using two points when the point on the right is lower than the point on the left.	<u>-1</u>

Question #8: Mathematics – Statistics

10 points per part

This statement often claims that there is no relationship between two quantities and that any measured similarities are due to chance.		
1	Name this statement that typically is disproven to establish correlation.	<u>null hypothesis</u>
2	This type of error occurs when a false null hypothesis is not rejected.	type <u>two</u> error (or error of the <u>second</u> kind or equivalent, prompt on “false negative”)
3	Bayes Theorem is sometimes used to strengthen or weaken a null hypothesis. Find the probability of B given A if the probability of A given B is 0.5, the probability of A is 0.3, and the probability of B is 0.2.	<u>1/3</u> (or <u>0.3 repeating</u>)



Question #9: Science – Biology

10 points per part

This is made of cisternae [sih-STER-nay] and used for packaging proteins.		
1	Identify this organelle named for an Italian scientist.	<u>Golgi</u> apparatus (or <u>Golgi body</u> or <u>Golgi complex</u>)
2	Proteins are taken to and from the Golgi [GOAL-jee] apparatus in these round bubbles that are natural liposomes [LIP-uh-soems].	<u>vesicles</u>
3	While the cis [sis] face of the Golgi apparatus is the end closest to the endoplasmic reticulum, this is the end farthest from the endoplasmic reticulum.	<u>trans</u>

Question #10: Science – Biology

10 points per part

These are often shaped as spheres or rods.		
1	Name these microorganisms that are classified as gram-positive or gram-negative.	<u>bacteria</u> (or <u>bacterium</u>)
2	This Latin name is used for rod-shaped bacteria.	<u>bacilli</u> (or <u>bacillus</u>)
3	One of the types of spherical bacteria is this one whose name refers to its ability to form grapelike clusters.	<u>staphylococcus</u> (prompt on <u>staph</u>)



Question #11: Social Studies – Religion

10 points per part

This set of statements was set out in the first forest sermon.		
1	Name this collection of declarations, which outline how life is about suffering. The last one of these addresses the Noble Eightfold Path.	<u>Four Noble Truths</u> (or <u>Catvari Aryasatvani</u> , prompt partial answer)
2	The Four Noble Truths are the basic tenets of this Eastern religion. Its sects include Rinzai and Zen.	<u>Buddhism</u> (or <u>Buddhist</u>)
3	In Buddhist tradition, this concept often translated as suffering is the true nature of all existence. Broken down into pain, pleasure turning into pain, and being susceptible to pain, it can be suppressed by following the Eightfold Path.	<u>dukkha</u>

Question #12: Social Studies – Religion

10 points per part

An angel came to see him while he was on a retreat in a cave on Mount Hira.		
1	Name this prophet of Islam. His sayings are collected in the <i>hadith</i> [hah-DEETH].	Abū al-Qāsim <u>Muhammad ibn ‘Abd Allāh ibn ‘Abd al-Muttalib ibn Hāshim</u> (accept <u>Mohammad</u>)
2	This term meaning ‘sacred’ refers to the part of the hadith that includes Muhammad’s sayings.	<u>Qudsi</u>
3	This was the angel who came to see Muhammad and revealed the truth about the one true God, according to Islamic tradition.	<u>Gabriel</u> (accept <u>Jibril</u> or <u>Jibrail</u>)



Question #13: Literature – U.S. Literature

10 points per part

In this poem, passengers ask the conductor, “What place is this? Where are we now?”		
1	Name this poem in which the title speaker asks that bodies be piled high at Gettysburg, Ypres, and Verdun, stating “shovel them under and let me work.”	“ <u>Grass</u> ”
2	This author of “Grass” wrote of fog that comes “on little cat feet.”	Carl August <u>Sandburg</u>
3	Carl Sandburg’s six-volume biography of this man included <i>The Prairie Years</i> and <i>The War Years</i> .	Abraham <u>Lincoln</u>

Question #14: Literature – U.S. Literature

10 points per part

The central couple in this novel moved from rural Virginia to Harlem.		
1	Name this novel in which Joe Trace cheated on Violet with Dorcas Manfred. After Joe shot Dorcas, Violet cut the young girl’s face at the funeral.	<u>Jazz</u>
2	In this other novel, Sethe [SEH-thuh] cut the throat of one daughter with a handsaw, and almost smashed the head of Denver in order to prevent their capture by the master.	<u>Beloved</u>
3	<i>Jazz</i> and <i>Beloved</i> were both penned by this author of <i>Song of Solomon</i> .	Chloe Anthony (Toni) <u>Morrison</u> (accept Chloe Anthony <u>Wofford</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
3rd Section
Toss-up Questions

Question #15: Social Studies – U.S. History

10 points

During the primaries, the winner of this election faced allegations involving Gennifer Flowers. The highest-finishing third-party candidate in this election featured James Stockdale on the ticket, and took almost 19% of the popular vote. To keep campaigners focused, a sign including the slogans “Don’t Forget Health Care” and “the economy, stupid” was hung up by James Carville. Name the year in which incumbent George H.W. Bush lost to Bill Clinton.	<u>1992</u> United States Presidential Election
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Question #16: Science – Biology

10 points

This organ is held in place by the falciform [FAL-suh-form] ligament, and its round ligament is a remnant of the umbilical vein. Hemosiderin [hee-moe-SIH-deh-rin] is stored in this organ’s Kupffer cells. This organ contains glucuronic [gloo-kyuh-RAH-nik] acid, which is used to make bilirubin [BIH-lee-roo-bin] soluble in water, which then goes to the gallbladder within bile. When this organ does not function, people’s skin turns yellowish, a condition known as jaundice. Name this organ that filters blood and which is damaged in people with cirrhosis [sir-ROE-sis] or hepatitis.	<u>liver</u>
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Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
3rd Section
Toss-up Questions

Question #17: Literature – British Literature

10 points

This poem describes the drowning of the “ceremony of innocence” by the “blood-dimmed tide.” The speaker imagines seeing “A shape with lion body and the head of a man;” the “vast image out of **Spiritus Mundi [SPIH-rih-toos MOON-dee]**” troubled the narrator’s sight. As “the falcon cannot hear the falconer” in this poem, “things fall apart, the center cannot hold.” Name this poem by William Butler Yeats concerning the return of a beast.

“The Second Coming”

Question #18: Miscellaneous – Consumer Education

10 points

These are called share drafts when they are issued by credit unions. These are involved in the illegal act of kiting, which involves accounts at different financial institutions. Magnetic Ink Character Recognition was developed to facilitate the processing of these. Banks guarantee payment of the cashier’s or certified type of this document. Name this common written instrument used to promise payment.

checks



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
3rd Section
Toss-up Questions

Question #19: Literature – World Literature

10 points

The protagonist of this novel receives his nickname from the family of General Epanchin. A scandal erupted following an argument between **Aglaya** [ah-GLIE-yah] and **Natasya** [nah-TAHSH-yah], who left the title character at the altar only to be killed by **Rogozhin** [roe-GOE-zhin]. During an introduction to local society, the main character in this novel knocked over a vase before having an epileptic fit. Name this novel about Prince **Myshkin** [MISH-kin] written by Fyodor Dostoyevsky.

The Idiot

Question #20: Science – Earth Science

10 points

A formation in Texas of this type of sedimentary rock is named for John Barnett. This rock is laminated and **fissile** [FIH-sil], which means that this breaks into chips rather than clumps, and differentiates this from mudstones. This turns into slate when it is hardened. This rock and dolomite make up the Bakken formation in Montana and North Dakota. Name this rock that often contains **kerogen** [KER-uh-jen], which can be turned into a substitute for crude oil.

shale



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
4th Section
Teamwork Questions

Question #21: Mathematics – Geometry

10 points per part

This shape has the fewest number of faces of all the Platonic solids.		
1	Name this shape that can also be called a triangle-based pyramid and a three-dimensional simplex.	<u>tetrahedron</u>
2	This is the number of faces of a tetrahedron.	<u>4</u>
3	If a tetrahedron has an edge length of 2, this is its total surface area.	<u>4 root 3</u> (or <u>4</u> times the <u>square root of 3</u> or <u>4 radical 3</u> or equivalents)

Question #22: Mathematics – Geometry

10 points per part

Any set of three points has this property, while it is sometimes true for sets of four or more points.		
1	Name this property used to describe a set of objects which are all in a common flat surface.	<u>coplanarity</u>
2	This term describes two lines that are not coplanar [koe-PLAY-nur], meaning that they do not intersect and are not parallel.	<u>skew</u> lines
3	Find the distance between the origin and the plane $x+y+z=1$. Rationalize the denominator in your answer.	<u>root three over three</u> (or <u>one-third root three</u> or <u>radical three over three</u> or the <u>square root of three over three</u> or equivalents)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
4th Section
Teamwork Questions

Question #23: Social Studies – U.S. History

10 points per part

In an attempt to discredit this consumer advocate, General Motors hired a private detective to follow him.		
1	Name this consumer advocate and founder of Public Citizen who ran for President in 2000.	Ralph <u>Nader</u>
2	Twice Ralph Nader has run for President as the candidate of this party, including 2000. It articulates its views in “Ten Key Values,” which include gender equality and social justice in addition to environmentalism.	<u>Green</u> Party
3	Nader drew the ire of GM and other automakers after publishing this scathing attack on the industry in 1965. This book led to the government establishing safety standards for all motor vehicles in the US.	<u>Unsafe at Any Speed</u>

Question #24: Social Studies – U.S. History

10 points per part

This conflict began due to a disagreement over colonial policy regarding Native Americans, whom William Berkeley wanted to open trade with.		
1	Name this uprising, whose leader accused Berkeley of playing favorites regarding trade policy.	<u>Bacon</u> ’s Rebellion
2	Bacon’s Rebellion took place within this colony, which would later be the home of Patrick Henry, James Monroe, and Thomas Jefferson.	<u>Virginia</u>
3	Berkeley tried to have Nathaniel Bacon put on trial in front of King Charles II, but this Virginia legislative body blocked the measure. Ironically, Bacon was elected to it, and attended the Assembly of June 1676.	<u>House of Burgesses</u> (prompt on “Burgesses”, do not accept “House of Burgess”)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
4th Section
Teamwork Questions

Question #25: Science – Chemistry

10 points per part

This element used to be known as brimstone.		
1	Name this element below oxygen on the periodic table that is a major component of acid rain.	<u>sulfur</u>
2	This element combines with sulfur to form the ore galena.	<u>lead</u>
3	The production of sulfuric acid through the contact process commonly uses the pentoxide of this element as a catalyst.	<u>vanadium</u>

Question #26: Science – Chemistry

10 points per part

Some important processes in thermodynamics are isothermal.		
1	This is the quantity that is held constant in an isothermal process.	<u>temperature</u> (do not accept “heat”)
2	Isothermal processes are sometimes contrasted with these processes in which no heat goes into or out of a system.	<u>adiabatic</u>
3	While a Carnot [kahr-noe] cycle involves two isothermic and two adiabatic steps, this cycle involves two isothermic and two constant volume steps.	Robert <u>Stirling</u> cycle



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
4th Section
Teamwork Questions

Question #27: Fine Arts – Art History

10 points per part

Identify these painters who sort of were impressionists.		
1	This painter tried to avoid having his works shown with impressionists, though he was friends with many of them and influenced them. He painted <i>The Luncheon on the Grass</i> .	Edouard <u>Manet</u> (do not accept “Monet”)
2	This artist did join some impressionist exhibitions but is now usually considered to be a post-impressionist. He made several paintings of Mount Saint Victoire [vik-twah] and card players.	Paul <u>Cezanne</u>
3	This painter started out as an impressionist, but he and Georges Seurat started neo-impressionism with their use of pointillism. He painted <i>The Dining Room</i> and a colorful portrait of Felix Feneon [feh-nay-own].	Paul <u>Signac</u>

Question #28: Fine Arts – Art History

10 points per part

Name these sculptors.		
1	This Frenchman sculpted <i>The Burghers of Calais</i> and <i>The Thinker</i> .	Auguste <u>Rodin</u>
2	This sculptor created <i>The Column of the Infinite</i> and <i>Bird in Space</i> .	Constantin <u>Brancusi</u>
3	This 18 th and 19 th century sculptor created <i>Napoleon as Mars the Peacemaker</i> and <i>Psyche Revived by Cupid's Kiss</i> .	Antonio <u>Canova</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
5th Section
Toss-up Questions

Question #29: Social Studies – World History

10 points

He led his forces to victory at Mortemer and Varaville, both against an alliance between Geoffrey Martel and Henry the First. His daughter Adela was the mother of Stephen of Blois. In one battle, his horsemen twice feigned retreat before doing away with foot soldiers before his chief opponent was struck in the eye with an arrow. Name this Norman who defeated Harold Godwinson at the Battle of Hastings during his invasion of England.

William I (accept **William the Conqueror**, **William the Bastard**, **William of Normandy**, **Guillaume le Conquérant** or **Guillaume le Bâtard** or **Guillaume de Normandie**, prompt on “William”)

Question #30: Science – Physics

10 points

One of the confirmations of this experiment was performed by Gustaf Wilhelm Hammar in Idaho after this was brought into question by experiments performed by Dayton Miller on top of Mount Wilson. Originally moved from Berlin to Potsdam because of vibrations, this experiment eventually was conducted on a stone slab floating in a pool of mercury in Cleveland. Its null result was explained at first by drag but is now explained by relativity. Name this attempt to measure the **luminiferous ether** [loo-meh-NIH-fuh-rus EE-thur].

Michelson-Morley Experiment



Question #31: Literature – U.S. Literature

10 points

In one collection, this writer described a maid allegedly scared by a white cow while pregnant, as well as forging a white man's signature to check out library books. This author of "The Ethics of Living Jim Crow" wrote about moving from Jackson to Chicago and joining the Communists in his autobiography. He also wrote of a college student who was accidentally killed by her black chauffeur. Name this man who wrote about Bigger Thomas in *Native Son* and whose autobiography was titled *Black Boy*.

Richard Wright

Question #32: Mathematics – Math Concepts

10 points

Pappus' theorem is sometimes named for this point because it uses the distance traveled by this point to find a volume or surface area. The location of this point can be found by averaging the coordinates of the vertices of the shape it is associated with. This point is always twice as far from the orthocenter as it is from the circumcenter. For a shape of uniform density, this point is equivalent to the barycenter or the center of mass. Name this intersection of the three medians of a triangle.

centroid (prompt on "center of mass", "center of gravity", or "barycenter")



Extra Question #1: Literature – British Literature

10 points

This man was described as an artist's "ideal of youth," and that artist dissuaded an elderly caller from pursuing this man. As a sign of reform, he chose to spare Hetty Merton. A sailor pursuing this man known as "Prince Charming" was warned at an opium den about his appearance; that sailor was James Vane, the brother of **Sibyl** [SIH-bul]. Name this owner of a magical painting that aged in lieu of its owner, created by Oscar Wilde.

Dorian Gray (accept either, prompt on "Prince Charming")

Extra Question #2: Fine Arts – Art History

10 points

One of this painter's works showing a shepherd on its right side and Saint Catherine on its left is known as *The Madonna of the Rabbit*. He was the favorite portrait artist of Emperor Charles the Fifth. This artist is buried in the basilica of Santa Maria Gloriosa dei Frari, where he painted the altarpiece. The background of one of his works shows a kneeling girl with her back towards the viewer going through a chest. Name this painter from Venice who in 1538 completed a work showing a reclining nude, *Venus of Urbino*.

Titian (or **Tiziano** or **Vecellio**)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
Extra Section
Toss-up Questions

Extra Question #3: Science – Astronomy

10 points

This constellation is the location of Ross 128. This is the second largest constellation in the night sky after Hydra, and it is between Hydra and **Bootes [BOO-tus]**. It includes the binary star **Porrima [por-REE-mah]**, and its brightest star is **Spica [SPIH-kah]**. Markarian's Eyes are part of its galaxy cluster, which according to some astronomers includes the Local Group and therefore the Milky Way. Name this constellation between Leo and Libra that is associated with young women.

Virgo

Extra Question #4: Social Studies – U.S. History

10 points

The murders in this state of Nick Ray and Nate Champion set off the Johnson County War. A city in this state was the source of the moniker of Harry Longbaugh, the Sundance Kid. This is the home state of former senator Alan Simpson, who was replaced by current senator Mike Enzi. Before becoming Secretary of Defense, Dick Cheney represented this state in the House. Name this western US state with capital Cheyenne.

Wyoming



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
Extra Section
Toss-up Questions

Extra Question #5: Mathematics – Math Concepts

10 points

Even though he credited somebody else for it, the property named for this person states that, given any real number, there is a larger number. A trammel named for this person is used to draw an ellipse, and the equation r equals a plus $b \theta$ generates his namesake spiral. He wrote one book estimating the number of grains of sand the universe could contain, and he used the method of exhaustion to approximate pi. Name this Greek who found a way to measure volume using water displacement.

Archimedes of Syracuse



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 2
Extra Section
Teamwork Questions

Extra Question #6: Mathematics – Algebra

10 points per part

This type of scale is used for the Richter and decibel systems.		
1	Name this type of scale for which regular increases in the input produce smaller changes in the output as both values increase.	semi- <u>logarithmic</u> scale (accept more specific answers such as <u>common log</u> or <u>log base 10</u>)
2	For the Richter scale, multiplying the wave amplitude by ten causes the Richter number to increase by one. If the Richter number increases by four, what is the corresponding number that the wave amplitude is multiplied by?	<u>ten thousand</u> (or <u>10⁴</u>)
3	As opposed to amplitude, multiplying the energy by ten raised to the one point five power causes the Richter number to increase by one. If the Richter number increases by four, what is the corresponding number that the energy is multiplied by?	<u>one million</u> (or <u>10⁶</u>)

Extra Question #7: Mathematics – Algebra

10 points per part

This function has no impact on positive numbers and takes the opposite of negative numbers.		
1	Name this function on real numbers whose output is always greater than or equal to zero.	<u>absolute value</u> (or <u>modulus</u>)
2	Absolute value has this quality, referring to functions that have the same value no matter how many times they are applied. That is, the absolute value of the absolute value of a number is the same thing as its absolute value.	<u>idempotent</u> (or <u>idempotence</u>)
3	Give both solutions to the equation the absolute value of the quantity x-3 equals 5.	<u>-2</u> and <u>8</u> (both answers must be given in either order, the word ‘or’ or no word at all can be used between the numbers)



Extra Question #8: Literature – British Literature

10 points per part

The speaker in this poem is deaf to the sounds of “five-nines that dropped behind.”		
1	Name this poem in which the speaker is part of a group that is “knock-kneed, coughing like hags.”	“ <u>Dulce et Decorum Est</u> ”
2	“Dulce et Decorum Est” was written by this English poet who fought in World War I. He also wrote “Anthem for Doomed Youth.”	Wilfred Edward Salter <u>Owen</u>
3	The title of “Dulce et Decorum Est” is a barb at this ancient Roman who wrote that “it is sweet and fitting to die for one’s country” in one of his odes.	<u>Horace</u> (accept Quintus <u>Horatius</u> Flaccus)

Extra Question #9: Literature – British Literature

10 points per part

The title event is held by Meg Boles in the hope that Stanley Webber will play his piano.		
1	Name this play in which Stanley is given a drum, but in the end is taken to Monty for special treatment.	<i>The <u>Birthday Party</u></i>
2	<i>The Birthday Party</i> was written by this 2005 Nobel Laureate. In another play, this dramatist wrote of two men coming to blows over lighting a kettle.	Harold <u>Pinter</u>
3	In this Harold Pinter play, Gus and Ben argue constantly in a basement room as notes come in through the title object.	<i>The <u>Dumb Waiter</u></i>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
1st Section
Toss-up Questions

Question #1: Science – Physics

10 points

The Nyquist value of this quantity is half the sampling value and is used for filters preventing **aliasing** [AE-lee-uh-seeng]. These values give the domain when a signal is broken down into its components using a **Fourier** [fur-ee-ay] transform. When the driving value of this quantity equals the natural value of this quantity for a system, resonance occurs. For a moving wave, this quantity equals speed divided by wavelength, and this is the reciprocal of period. Name this quantity measured in Hertz.

frequency (or **frequencies**)

Question #2: Literature – Mythology

10 points

This god is sometimes depicted reclining on a **Shesha** [SHAY-shah], a serpent found within an ocean of milk. After almost dying in single combat with **Jalamdhara** [jah-lahm-DAH-rah], his consort begged for his life. Two hairs plucked from this god's head impregnated **Devaki** [DAY-vah-kee]. This god's mount was born from an egg laid by **Vinata** [vee-NAH-tah]. He took the form of seafoam in aiding Indra in the killing of **Vritra** [VREE-trah]. This husband of **Lakshmi** [LAHK-shmee] will be Kalki in his tenth incarnation. Name this "preserver" of the Hindu **trimurti** [tree-MUR-tee], a god with ten avatars.

Vishnu



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
1st Section
Toss-up Questions

Question #3: Social Studies – U.S. History

10 points

One work attributed to Samuel Willard about this incident is presented as a dialogue between S and B. Those accused in this incident included the wife of Governor William Phips. A special court featuring Sam Sewall, John Hathorne, and William Stoughton heard cases stemming from it, and it came to an end following “spectre evidence” being thrown out. It ultimately was traced to the West Indian slave **Tituba** [tih-TOO-bah] and her tales of voodoo. Name this series of cases which saw 19 women hanged for witchcraft.

Salem witch trials (prompt on partial answer)

Question #4: Literature – World Literature

10 points

This author wrote of a man who had fleeting thoughts of a new science called “phonoscopy.” That character, a philologist named Rubin, called Stalin “the Robespierre and the Napoleon of our Revolution wrapped up into one.” One work by this author describes what happens to a soldier who returns to the Soviet Union after being captured by the Germans. Another work gives the history from 1918 to 1956 of forced labor camps in the Soviet Union. Name this author of *The First Circle*, *The Gulag Archipelago* [GOO-lahg ahr-keh-PEH-lah-goe], and *One Day in the Life of Ivan Denisovich* [deh-NEE-soe-vich].

Aleksandr **Solzhenitsyn**



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
1st Section
Toss-up Questions

Question #5: Science – Health

10 points

This type of disorder, along with a rash and fever, can be caused by Still's disease. This often develops in people who have the skin disease **psoriasis** [suh-RIE-uh-sis]. One type of this problem is caused by an autoimmune response against the **synovial** [sih-NOE-vee-ul] membrane, which is the **rheumatoid** [ROO-mah-toid] type. The most common type of this disorder is caused by the stiffening of cartilage over time, leading to pain in tendons. Name this joint pain that becomes more common with age.

osteo**arthritis** (accept **arthralgia**, before joint is mentioned accept joint pain, joint disorder, or joint disease)

Question #6: Fine Arts – Composers of the Modern Era

10 points

The third movement of this composer's first symphony is a type of French music called a **gavotte** [gah-VOT]. One of his ballets is *The Prodigal Son*, and another includes "Dance of the Knights." In one of this composer's operas, **Truffaldino** [troof-fahl-DEE-noe] knocks over **Fata Morgana** [FAH-tah mor-GAH-nah], causing the Prince to laugh. That prince, the son of the King of Clubs, becomes obsessed with some fruit. Another work by this composer features an argument between a bird and a duck. In that work, the bird has a theme performed on flute, and the duck has a theme performed on oboe. Name this composer of *The Love for Three Oranges* and *Peter and the Wolf*.

Sergei **Prokofiev**



Question #7: Science – Biology

10 points per part

One example of this process is diffusion.		
1	Name this movement across a membrane that does not use chemical energy and is often contrasted with active transport.	<u>passive</u> transport
2	This name is given to the passive transport of solvents such as water towards solutes.	<u>osmosis</u>
3	This process separates molecules based on their differing rates of diffusion across a semipermeable membrane. A well-known version of this process removes urea [yoo-REE-uh] from blood.	peritoneal <u>dialysis</u> (or <u>hemodialysis</u>)

Question #8: Science – Biology

10 points per part

DNA uses thymine instead of this base.		
1	Name this base which is paired with adenine in DNA.	<u>uracil</u>
2	In any order, list the four chemical elements that are in a molecule of uracil.	<u>carbon</u> , <u>hydrogen</u> , <u>nitrogen</u> , <u>oxygen</u> (any order, must give all four without prompting)
3	Cytosine, thymine, and uracil are classified as these types of bases. The other two are purines.	<u>pyrimidines</u> (do not accept “pyridine”s)



Question #9: Literature – U.S. Literature

10 points per part

After he gave his two children air rifles for Christmas, he told them to shoot all the bluejays they wanted.		
1	Name this character who lived up to his old nickname when the local sheriff asked him to shoot a dog that had gone mad.	<u>Atticus</u> Finch (prompt on “Finch”)
2	This child of Atticus tore a pair of pants trying to run away from the Radley home, only to later find them mended and folded over the fence.	<u>Jeremy</u> Finch (accept <u>Jem</u>)
3	Jem and Atticus Finch feature prominently in this author’s novel <i>To Kill a Mockingbird</i> .	Nelle Harper <u>Lee</u>

Question #10: Literature – U.S. Literature

10 points per part

This real estate broker handles his business with “zip and zowie.”		
1	Name this character who became a different person after Paul Riesling was imprisoned for shooting Zilla, but returned to his former self after his wife Myra fell ill.	George F. <u>Babbitt</u>
2	This author of <i>Babbitt</i> wrote about a football captain turned minister in <i>Elmer Gantry</i> .	Harry Sinclair <u>Lewis</u>
3	When George’s son Ted chose to marry the girl next door and become a mechanic, George told him to not be scared of the people of this locale.	<u>Zenith</u> , Winnemac



Question #11: Social Studies – World History

10 points per part

Thomas Wolsey expanded the utilization of this entity for breaches of the peace and encouraged suitors to turn to it.		
1	Name this entity abolished by the Long Parliament, whose punishments were arbitrary but did not include death. Its unpopularity was due in part to it not being bound by common law.	Court of <u>Star Chamber</u>
2	During the reign of this monarch, the Star Chamber was a rallying point against him and Archbishop William Laud. To fund wars against Spain and France, he instituted a forced loan, then arrested those who failed to contribute.	<u>Charles I</u> (prompt on “Charles”)
3	The act that abolished the Star Chamber guaranteed this writ, which allows a person to determine whether his arrest is lawful.	Writ of <u>habeas corpus</u> (prompt on that you “have the body”)

Question #12: Social Studies – World History

10 points per part

Through her marriage to Francis the Second, she was queen consort of France.		
1	Name this queen accused by James Douglas of writing the Casket Letters found in the possession of James Hepburn. They were used to implicate her in the murder of her husband Lord Darnley.	<u>Mary Stuart</u> (accept <u>Mary, Queen of Scots</u>)
2	Mary Stuart backed the Ridolfi plot, an attempt to assassinate this English monarch.	<u>Elizabeth I</u> (prompt on “Elizabeth”)
3	Sir Francis Walsingham intercepted letters stemming from this other plot to dispatch of Elizabeth I. Once the letters were uncovered, John Ballard was imprisoned, and likely tortured. This plot is named for one of Ballard’s co-conspirators.	<u>Babington</u> Plot



Question #13: Fine Arts – Art History

10 points per part

Name these women who were successful painters.		
1	This woman who moved to New Mexico in 1949 painted many pictures of flowers, animal skulls, and clouds.	Georgia <u>O’Keeffe</u>
2	This American, who moved to Paris in 1866 and often showed her works with the impressionists, painted many pictures of children, sometimes with their mothers.	Mary <u>Cassatt</u>
3	This painter gained fame in 1938 at the age of 78. Most of her works are set outside in small towns, often to commemorate holidays.	Anna Mary Robertson “Grandma” <u>Moses</u>

Question #14: Fine Arts – Art History

10 points per part

He painted <i>The Surrender of Breda</i> .		
1	Name this 17 th century painter who worked for King Philip the Fourth of Spain.	Diego <u>Velazquez</u>
2	This Velazquez painting shows Philip’s daughter Margaret Theresa, a dog, two dwarfs, and a few other people. The background includes Velazquez and the king and queen.	<i>Las</i> <u>Meninas</u> (or <i>The</i> <u>Maids of Honor</u>)
3	Velazquez also painted a work showing Venus and Cupid that is sometimes named for this location in Yorkshire where it was on display for almost one hundred years.	<u>Rokeby</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
3rd Section
Toss-up Questions

Question #15: Social Studies – U.S. History

10 points

This organization's Special Counsel was victorious in *McLaurin v Oklahoma State Regents*, which affected graduate and professional schools. The current publisher of *The Crisis*, retaliatory actions against this group included the murders of field secretaries Harry Moore and Medgar Evers. This group is now headed by Benjamin Jealous, and one of its founders was W.E.B. DuBois. Name this association that bestows Image Awards and Springarn Medals and which lobbies for the constitutional rights of African Americans.

NAACP (accept **National Association for the Advancement of Colored People**)

Question #16: Science – Chemistry

10 points

Zinc only has this quality between 100 and 150 degrees Celsius, which is one of several examples of materials that can transition between having this property and being brittle. The element lead has this property, which describes how materials react to compressive stress. These materials can be hammered or put through rollers without breaking, especially elements such as gold and aluminum that can be made into foils. Name this property of metals that is similar to ductility.

malleability (or **malleable**)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
3rd Section
Toss-up Questions

Question #17: Language Arts – Grammar/Usage

10 points

In *Art of Grammar*, this part of speech was put in the same classification as an adjective, as it inflects for case. If used in reference to possession, these are classified as inalienable. Depending on the accompanying words, these are divided into count and mass subclasses. These are always capitalized in German. The verbal types of these are gerunds, and these are classified as concrete if they can be sensed directly. Name these parts of speech classified into persons, places, things, and ideas.

nouns

Question #18: Social Studies – Religion

10 points

This doctrine was allegedly proven true when its subject appeared with a certain title to St. Bernadette at Lourdes. This concept was “a singular grace and privilege of almighty God and by virtue of the merits of Jesus Christ.” Its feast day was originally held in honor of St. Anne. Initially promulgated in *Ineffabilis Deus* [in-ehf-fah-BEE-lis DAY-oos] by Pius the Ninth, it did not exempt its subject from the temporal penalties of Adam. Name this Christian belief that original sin did not apply to the Virgin Mary.

immaculate conception (accept
divine maternity)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
3rd Section
Toss-up Questions

Question #19: Mathematics – Math Concepts

10 points

This is the least restrictive quadrilateral in which the product of the areas of the triangles formed by one diagonal equals the product of the areas of the triangles formed by the other diagonal. This shape is used to derive a formula in which the first and last y-coordinates from a set of points are multiplied by one, while the others are multiplied by two, used to approximate an integral. Name this quadrilateral in which two pairs of adjacent angles are supplementary and in which one pair of opposite sides is parallel.

trapezoid (prompt on “trapezium”)

Question #20: Miscellaneous – Journalism

10 points

In 2003, Bob Dole and Bill Clinton were featured in a short revival of this show’s “Point/Counterpoint” segment. Executive Producer Don Hewitt drew criticism for his handling of a story involving Big Tobacco. Until his death, Andy Rooney provided commentary to close this show. In 2013, this show apologized for a report on the 2012 Benghazi attack. Always starting with its trademark ticking Aristo stopwatch, name this long-running CBS program that airs every Sunday at 6 PM Central Time.

60 Minutes



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
4th Section
Teamwork Questions

Question #21: Mathematics – Algebra

10 points per part

Euclid [YOO-klid] proved that there are an infinitely many of these numbers.		
1	Name these whole numbers only evenly divisible by one and themselves.	<u>primes</u> (or <u>prime numbers</u>)
2	This is the name of pairs of prime numbers that differ by two.	<u>twin</u> primes (or <u>twins</u>)
3	This is the only prime number that is in two pairs of twin primes.	<u>5</u>

Question #22: Mathematics – Algebra

10 points per part

The period of a pendulum varies with this function applied to its length.		
1	Name this function equivalent to raising a number to the one-half power.	square <u>root</u> (accept <u>radical</u>)
2	Simplify the square root of 18.	<u>3 root 2</u> (or <u>3</u> times the square <u>root</u> of <u>2</u> or <u>3 radical 2</u> or equivalents)
3	Find the square root of the quantity 16 raised to the fourth power. Give your answer without using any exponents or roots.	<u>256</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
4th Section
Teamwork Questions

Question #23: Social Studies – U.S. Government

10 points per part

The corruption of one's blood on account of this is forbidden, outside of the person committing the act.		
1	Name this act of levying war against the United States, or giving aid and comfort to the enemy.	<u>treason</u>
2	The definition of treason, and Congress' authority to decide the punishment for it, is outlined in Section 3 of <i>this</i> article of the US Consitution.	Article <u>Three</u> (or <u>3rd</u>)
3	If the accused does not confess in open court, then at least this many witnesses must testify to the overt act for a treason conviction.	<u>two</u>

Question #24: Social Studies – U.S. Government

10 points per part

The immediate predecessor to this amendment was struck down by the Supreme Court in <i>Pollock v Farmers' Loan and Trust</i> .		
1	Name this amendment, which gave Congress the power to lay and collect taxes on income.	<u>Sixteenth</u> Amendment (or <u>16</u>)
2	The tax that was ruled unconstitutional in <i>Pollock</i> was a 2% tax on income above \$4,000. That tax was passed by Congress as part of this 1894 Tariff.	<u>Wilson-Gorman</u> Tariff (accept <u>Revenue</u> Act of 1894)
3	In <i>United States v Sullivan</i> , the Supreme Court ruled that the right in this amendment against being a witness against oneself could not be used by bootleggers as a shield against paying taxes.	<u>Fifth</u> Amendment (or <u>5</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
4th Section
Teamwork Questions

Question #25: Science – Physics

10 points per part

This law is often expressed with the equation F equals k times x . A negative sign is sometimes used to show that the force and displacement are in opposite directions.		
1	Name this law, often applied to springs, named for a British scientist.	<u>Hooke's</u> law
2	This three-word phrase is used to describe the movement of objects that are influenced only by Hooke's law.	<u>simple harmonic motion</u> (prompt on "SHM")
3	To apply Hooke's law to three dimensions, these mathematical constructions are used that relate vectors to each other and look like matrices [MAY-trih-sees].	<u>tensors</u>

Question #26: Science – Physics

10 points per part

These particles include leptons.		
1	Name these particles, contrasted with bosons [BOE-sons], that have half-integer spins.	<u>fermions</u>
2	Fermions follow this principle often applied to electron orbitals stating that two identical fermions cannot be in the same quantum state at the same time.	<u>Pauli exclusion</u> principle
3	The fact that particles have intrinsic spin that is quantized was demonstrated in this 1922 experiment.	<u>Stern-Gerlach</u> experiment



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
4th Section
Teamwork Questions

Question #27: Literature – Mythology

10 points per part

This goddess conceived Hebe [HEE-bee] with the help of lettuce.		
1	Name this queen of Olympus and wife of Zeus.	<u>Hera</u> (accept <u>Juno</u>)
2	As was tradition, Hera became furious upon learning that Hebe was to be supplanted as Olympus' cupbearer by this most beautiful of mortals. This man's father was given two horses by Zeus in exchange for kidnapping the lad.	<u>Ganymede</u>
3	Annually, Hera bathed in the well of Canathus to restore this quality. Hestia swore by the head of Zeus to maintain this quality for eternity.	<u>virginity</u> (accept equivalents)

Question #28: Literature – Mythology

10 points per part

To announce the coming of Ragnarok [RAG-nah-rok], this god will blow the Gjallarhorn [GYAL-lahr-horn] such that the whole world will hear it.		
1	Name this mythical watchman of Asgard. This god has much in common with Agni from the Rigveda [rig-vay-dah].	<u>Heimdallr</u> (prompt on "Rig")
2	Heimdall is the guardian of this "rainbow bridge," the only entrance to Asgard.	<u>Bifrost</u> (accept <u>Asbru</u>)
3	Heimdall had this many mothers. In Greek mythology, this is how many muses there are.	<u>9</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
5th Section
Toss-up Questions

Question #29: Science – Biology

10 points

The rate of this process is graphed on the y-axis of a P.I. curve, and one of the first scientists to demonstrate this was Jan **Ingenhousz** [EEN-gen-house]. Near the end of this process, the iron-containing protein **ferredoxin** [fehr-uh-DAHK-sin] is used for **phosphorylation** [fahs-for-uh-LAY-shun], and an earlier part of this process uses **pheophytin** [fee-ah-FIE-tin] for electron transfer. This process often creates sucrose and oxygen, using up water and carbon dioxide. Name this process that uses light in green plants.

photosynthesis (prompt on “light”-dependent “reaction”s or “photophosphorylation”)

Question #30: Mathematics – Math Concepts

10 points

This theorem could be proved in a new way if Grunbaum’s conjecture was proven. Attempts to prove this theorem led to the development of Kempe chains and to snarks, the latter of which is a type of graph. Heinrich Heesch’s work on reducibility and discharging was used in the proof by Wolfgang **Haken** [HAH-ken] and Kenneth Appel, which used a computer to consider 1,936 cases. Name this theorem which, assuming that regions are contiguous, provides a limit to the number of hues needed to fill in a map.

four-color map theorem



Question #31: Literature – U.S. Literature

10 points

A letter this character was meant to carry to Fort Edward was used by Montcalm in negotiations with Munro. He was taken prisoner during the rescue of Wah-ta-Wah. Before Abiram confessed, Ishmael Bush believed this man to be the killer of Asa. He correctly established that Oliver Edwards was shot by Judge Temple. Name this frontiersman sometimes referred to as Hawkeye who is a close friend of **Chingachgook** [CHING-gach-gook] in James Fenimore Cooper's *Leatherstocking Tales*.

Natty Bumppo (accept either, accept **Trapper**, **Pathfinder**, the **Last of the Mohicans**, or **Deerslayer**, accept **Hawkeye** or **Leatherstocking** until they are mentioned)

Question #32: Social Studies – World History

10 points

This person wrote of aspirations to lead “55 million Arabs, then 224 million Africans, then 420 million followers of Islam” in *Philosophy of the Revolution*. Though it was nominally headed by Muhammad **Naguib** [nah-GEEB], this person controlled the Revolutionary Command Council. He blocked access to the Straits of **Tiran** [tih-RAHN] in response to the withdrawal of funding for the Aswan High Dam. Convinced not to resign following the Six-Day War, he oversaw the exile of King **Farouk** [fah-ROOK] the First. Anwar **Sadat** [sah-DAHT] replaced this man after his death. Name this first president of Egypt.

Gamal Abdel **Nasser** (accept Jamal Abd al-**Nasir**)



Extra Question #1: Science – Chemistry

10 points

As with the element below it on the periodic table, this element is isolated when its **tetrachloride** [teh-trah-KLOR-ide] is combined with liquid magnesium or sodium in the Kroll process. The **dioxide** [die-OK-side] of this element, a white pigment, is found in the minerals **anatase** [A-nah-tase], brookite, and **rutile** [ROO-til]. This element often is combined with aluminum and other metals to create lightweight temperature-resistant alloys for expensive engines and sports equipment. Name this transition metal following scandium on the periodic table.

Titanium

Extra Question #2: Fine Arts – Classical/Opera

10 points

It is believed that this composer used the premier of his *Israel in Egypt* to also premier his 13th organ concerto, which, due to some high-pitched sections that sound like bird calls, is now nicknamed “The Cuckoo and the Nightingale.” Another work by this composer is now nicknamed “The Harmonious Blacksmith.” English coronation ceremonies use this composer’s *Zadok the Priest*. Name this composer who repeats the words “forever and ever” near the end of his *Messiah* oratorio in the *Hallelujah* chorus.

George Frideric **Handel**



Extra Question #3: Literature – British Literature

10 points

<p>This character was almost fired after calling his boss “subject to hallucinations and generally potty” in front of Mortimer. Along with Bates, this man was the victor in the Great Sermon Handicap. Among the plans executed by this man are ruining the engagement of Honoria Glossop, as well as removing Claude and Eustace from the immediate family. Employed by Bertie Wooster, name this man created by P. G. Wodehouse, the consummate butler.</p>	<p><u>Jeeves</u></p>
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Extra Question #4: Mathematics – Math Concepts

10 points

<p>This number gives the ratio of the side lengths of Penrose tile kites and darts. The Fibonacci [fih-boe-NAH-chee] sequence can be expressed using powers of this number and its reciprocal, and the limiting ratio of successive terms of the Fibonacci sequence equals this number. Removing a square sharing a side with a rectangle whose side lengths are in this ratio leaves another rectangle whose side lengths are in this ratio. Name this solution of $x^2-x-1=0$, an irrational number that approximately equals 1.618.</p>	<p><u>golden ratio</u> (or <u>golden mean</u> or <u>golden section</u> or <u>golden cut</u> or <u>mean of Phidias</u>, accept <u>divine</u> in place of golden, prompt on “phi”)</p>
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Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
Extra Section
Toss-up Questions

Extra Question #5: Social Studies – World History

10 points

Extended to maritime conflict through the efforts of Mikhail **Muravyov** [myoo-RAH-voev] and **Tsar** [tsahr] Nicholas the Second, one protocol added later to this agreement extended its guidelines to those involved in “self-determination.” Its initial negotiations were instigated by Henri **Dunant** [doo-nahn], the founder of the Red Cross. The US is not party to its second protocol, which prohibits the taking of hostages and torture. Name this set of international protocols regarding civilians and military conflict.

Geneva Conventions (prompt on “Geneva Protocol”s, do not accept “Geneva Accords”, which are tied to the liberation of Vietnam)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 3
Extra Section
Teamwork Questions

Extra Question #6: Science – Chemistry

10 points per part

This person and Antoine Bussy were the first people to isolate beryllium [beh-RIL-ee-um].		
1	Name this scientist whose namesake synthesis converts ammonium cyanate into urea [yoo-REE-uh].	Friedrich <u>Wöhler</u>
2	Wöhler was the first person to isolate this element found in bauxite [BAWK-site].	<u>Aluminum</u>
3	Wöhler's synthesis of urea was a strike against this belief that living organisms are governed by different chemical principles than non-living things.	<u>vitalism</u> (accept different word forms)

Extra Question #7: Science – Chemistry

10 points per part

This person predicted the existence of several elements, often using the prefix eka-.		
1	Name this Russian credited for developing a Periodic Table of the Elements.	Dmitri <u>Mendeleev</u>
2	One of Mendeleev's predictions was for ekamanganese, which turned out to be this element without any stable isotopes that became the first element produced artificially before it was found in nature.	<u>technetium</u>
3	Technetium [tek-NEE-shum] was created with the help of this person who invented the cyclotron. A different element is named for this person.	Ernest Orlando <u>Lawrence</u>



Extra Question #8: Literature – World Literature

10 points per part

In this novel, a dragon turned into a horse after devouring the horse belonging to Tripitaka [trih-PIT-uh-kuh].		
1	Name this novel in which the protagonist defeated three Taoist magicians in a contest of miracles involving decapitation and boiling oil.	<u><i>Journey to the West</i></u> (accept <u><i>Hsi-yu chi</i></u> , <u><i>Xiyou ji</i></u> , or <u><i>Monkey</i></u> , but do not mention the last title)
2	<i>Journey to the West</i> features the character of Tai Tsung [tie soong], an emperor of this nation's Tang [tahng] dynasty.	People's Republic of <u>China</u>
3	The protagonist of <i>Journey to the West</i> is Sun Wukong, one of these animals. After learning the 72 transformations and the cloud trapeze, he is able to leap great distances.	<u>Monkey</u> King

Extra Question #9: Literature – World Literature

10 points per part

Its sections concerning comedy have been lost forever.		
1	Name this treatise that described mimesis [mee-MEE-sis] as a creative process that could build upon human nature. It also described six elements of tragedy, including spectacle, rhythm, and song.	<u><i>Poetics</i></u> (accept <u><i>De Poetica</i></u>)
2	<i>Poetics</i> was written by this Greek philosopher and tutor to Alexander the Great.	<u>Aristotle</u>
3	Aristotle coined this term to describe the actions of a protagonist having the opposite of the intended effect.	<u>peripeteia</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
1st Section
Toss-up Questions

Question #1: Science – Astronomy

10 points

The emission type of these objects absorbs ultraviolet light and emits visible light, and that type often is known as an H two region because it contains large amounts of atomic hydrogen. Those H two regions are also classified as the diffuse types of these, as are supernova remnants. Some famous examples of these are the Trifid, Eagle, and Lagoon, and the type of these objects formed in the creation of a white dwarf is the planetary type. Name these objects, including the Crab, that are interstellar clouds.

nebulae (or nebulas)

Question #2: Social Studies – U.S. Government

10 points

John Nance Garner took this post a year before being elected as Vice President. While holding this post, Thomas Reed introduced rules that established the principle of party responsibility. President Ronald Reagan said he was friends after 6 PM with the holder of this office, Tip O'Neill. The first holder of this office was Frederick Muhlenberg. After the Vice President, the holder of this post is next in the line of presidential succession. Name this post currently held by John **Boehner** [BAY-ner].

Speaker of the United States House of Representatives



Question #3: Literature – U.S. Literature

10 points

The narrator of this work speaks of a “dove that listens, while she gloats on the moon!” That narrator “shivers with affright at the melancholy menace” of the subject of this poem. The narrator of this poem describes “a world of merriment” foretold by the title objects. “Keeping time, time, time in a sort of Runic rhyme,” those objects are silver, golden, brazen, and iron. Name this poem by Edgar Allan Poe which describes the tintinnabulation of the title noisemakers.

“The Bells”

Question #4: Miscellaneous – Agriculture

10 points

During fallow periods in this process, hairy vetch and clovers serve as covers. During this, **brassicas** [BRAS-ih-kahs] are popular for nutrient scavenging and pest control. **Ergot** [UR-got] is recommended in this process as a weed-killer, while **legumes** [LEG-ooms] are recommended for their ability to fix nitrogen. This process generally produces row crops, close-growing grains, and sod-forming crops from the same ground. Name this practice of planting a succession of different crops on the same land.

crop rotation (accept equivalents such as rotating crops)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
1st Section
Toss-up Questions

Question #5: Science – Chemistry

10 points

The transportation of ions of this element is hindered by both **apamin** [AP-uh-min] and dendrotoxin, which explains why bee stings and snake bites can be painful and dangerous. Its nitrate is known as **niter** [NIE-ter] in mineral form and is a major component in gunpowder and fertilizers. A common way to date rocks is based on the decay of this element into argon. Name this alkali metal very similar to sodium whose chemical symbol comes from its neo-Latin name of kalium.

Potassium

Question #6: Social Studies – World History

10 points

His rule saw the conquest of **Badakhshan** [bah-DAHK-shahn] and **Ahmadnagar** [ah-MAHD-nah-gahr], and moved the imperial capital to Delhi. This ruler commissioned a fortification containing the Halls of Public and Private Audience; that structure is the Red Fort. He also ordered the construction of several Pearl Mosques. With the support of Asaf Khan, this ruler proclaimed himself emperor following the death of his father **Jahangir** [jah-HAHN-ger]. This **Mughal** [MOO-gahl] ruler was the father of **Aurangzeb** [AWR-ung-zeb]. Name this leader who honored his wife who died in 1631 by ordering the construction in Agra of the Taj Mahal.

Shah **Jahan** (accept Prince **Khurram**)



Question #7: Mathematics – Geometry

10 points per part

If a circle has this relationship to a regular polygon, then the circle is tangent to all of the polygon's sides.		
1	Name this relationship. If a regular polygon has this relationship to a circle, then the vertices [VER-tuh-sees] of the polygon are on the circle.	<u>inscribed</u> (accept word forms such as inscription)
2	If a circle has a radius of length 1, this is the area of its inscribed square. Do not worry about units.	<u>2</u>
3	If a square has a side length of 2, this is the area of its inscribed circle. Do not worry about units.	1 <u>pi</u>

Question #8: Mathematics – Geometry

10 points per part

Pierre Wantzel proved that certain problems were unsolvable using only this instrument and a straightedge.		
1	Name this instrument used for drawing arcs of circles.	<u>compass</u>
2	One of the problems Wantzel showed to be unsolvable was doing this to an angle.	<u>trisecting</u> (accept other word forms or answers equivalent to dividing into three congruent parts, do not accept "bisect"ing)
3	If you trisected a right angle and used one of those angles in a right triangle, this would be the ratio of the longer leg of the triangle to the shorter leg.	<u>square root of 3</u> (or <u>root 3</u> or <u>radical 3</u>)



Question #9: Literature – Mythology

10 points per part

One epithet of this goddess is <i>potnia theron</i> , meaning “mistress of the animals.”		
1	Name this goddess, the daughter of Leto [LEE-toe] and twin of Apollo.	<u>Artemis</u> (accept <u>Diana</u>)
2	When Apollo killed this queen’s sons, Artemis killed her daughters. This daughter of Tantalus who became a Theban [THEE-bun] queen insulted Leto for only having two children before losing fourteen.	<u>Niobe</u>
3	This hunter made the fatal mistake of seeing Artemis bathe nude. The goddess turned him into a stag, and his own dogs hunted him down.	<u>Actaeon</u>

Question #10: Literature – Mythology

10 points per part

In “The Destruction of Mankind,” this goddess turned into Sekhmet [SEK-met] in order to punish mankind.		
1	Name this goddess usually depicted with the sundisk. Her name can be translated as “The House of Horus.”	<u>Hathor</u>
2	Hathor was “The House of Horus” in her role as the embodiment of the sky in the form of this animal. In Greek mythology, Io [IE-oh] was changed into one of these animals.	Celestial <u>Cow</u> (accept <u>heifer</u> or <u>cattle</u>)
3	Priestesses of Hathor often wore the menit [MEH-nit], one of these objects with a crescent in front and a counterweight in the back.	<u>necklace</u> (prompt on “amulet” or “jewelry”)



Question #11: Science – Biology

10 points per part

Some of these cells are classified as helpers.		
1	Name these small lymphocytes [LIM-foe-sites] that work with B cells in the immune system.	<u>T</u> cells (or <u>T lymphocytes</u>)
2	T cells get their name from the fact that they develop in this organ.	<u>thymus</u>
3	Antibodies produced by B cells are also given this name. Specific examples of these are assigned the letter A, D, E, G, or M.	<u>immunoglobulins</u>

Question #12: Science – Biology

10 points per part

This fluid is similar to blood plasma.		
1	Name this fluid that brings bacteria to its namesake nodes.	<u>lymph</u>
2	An example of lymphoid tissue is this pair of objects in the pharynx [FA-reenks] at the back of the throat. If these become swollen, they can be removed.	<u>tonsils</u>
3	Lymph enters the bloodstream through this vein that is fed by the axillary vein and that joins with the internal jugular vein.	<u>subclavian</u> vein



Question #13: Fine Arts – Musical Theater

10 points per part

Identify these Andrew Lloyd Webber musicals.		
1	Based on a Gaston Leroux [leh-ROE] novel, this musical with the song “The Music of the Night” is about a disfigured man who lives under a stage.	<i>The <u>Phantom of the Opera</u></i>
2	Based on the New Testament, this musical with the song “I Don’t Know How to Love Him” ends with a crucifixion.	<i><u>Jesus Christ Superstar</u></i>
3	Built up from Webber’s earlier musical <i>Cricket</i> , this musical begins with the song “Love Changes Everything”, which is sung by Alex Dillingham, a fan of actress Rose Vibert.	<i><u>Aspects of Love</u></i>

Question #14: Fine Arts – Musical Theater

10 points per part

This musical is set in the Kit Kat Klub in Berlin at the beginning of the Nazi Era.		
1	Name this Kander and Ebb musical that asks, “What good is sitting alone in your room?”	<i><u>Cabaret</u></i>
2	This daughter of Judy Garland won an Oscar for her performance in the movie version of <i>Cabaret</i> .	Liza <u>Minnelli</u>
3	This musical also deals with running from the Nazis. It is about the Trapp Family Singers and includes the songs “My Favorite Things” and “Do-Re-Mi”.	<i>The <u>Sound of Music</u></i>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
3rd Section
Toss-up Questions

Question #15: Literature – British Literature

10 points

In this novel, an Officer of the Guards caught his cheating wife with the Lord of the Powder Closet. The chief exponent of the title concept was a charity pupil at Miss Pinkerton's School. John Osborne cut off his son's inheritance over his choice of wife, but that son dies at the Battle of Waterloo. Focusing on the contrasting Amelia Sedley and Becky Sharp, name this "Novel Without a Hero" written by William Makepeace Thackeray.

Vanity Fair: A Novel Without a Hero

Question #16: Science – Physics

10 points

The waves named for this person, which are very similar to Lamb waves, travel along solid surfaces and are generated by earthquakes. His name also is used for the situation when the minimum amplitude of one diffraction image coincides with the maximum amplitude of another, his namesake criterion. This person is also named for the elastic scattering of light, which is used to explain why the sky is blue. Name this scientist whose namesake scattering is often contrasted with **Raman** [RAH-mun] scattering.

3rd Baron Lord **Rayleigh** (or John William **Strutt**)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
3rd Section
Toss-up Questions

Question #17: Fine Arts – Art History

10 points

A revival of this period of artwork was led by John Henry Belter. Early examples of this style can be found in the Basilica of the Fourteen Holy Helpers, the Pilgrimage Church of **Wies [vees]**, and **Ottobeuren [ah-toe-BOY-ren]** Abbey, all of which are in Bavaria. Paintings from this period include *Diana Leaving the Bath* and *The Toilet of Venus* by **Francois Boucher [fran-swah boo-shay]**. Decorative colors such as gold were used during this period. Name this era featuring Antoine **Watteau [wah-too]** and **Jean-Honore Fragonard [zhahn on-oh-ray frah-goe-nahr]** that started in Paris in the 18th century as a reaction to Baroque.

Rococo (accept **Late Baroque** before the end, do not accept “Baroque”)

Question #18: Social Studies – U.S. History

10 points

John Randolph refused to fire at this person during a duel that both men survived. He successfully defended Aaron Burr on charges of treason. This politician was passed over as a presidential candidate twice, by William Henry Harrison and Zachary Taylor, who were elected as Whigs. He was offered the Secretary of State post as part of the “Corrupt Bargain” which led to the election of John Quincy Adams. Name this Kentucky Congressman known as the “Great Compromiser.”

Henry **Clay**



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
3rd Section
Toss-up Questions

Question #19: Mathematics – Math Concepts

10 points

These numbers can be generated by adding successive powers of two until the sum is prime and then multiplying that prime times the last number added. That method is the only successful one ever used to find these numbers. That method, stated by **Euclid** [YOO-klid], gives the relationship between these numbers and **Mersenne** [mer-sen] numbers. These whole numbers, which are not superabundant or deficient, have no known odd examples. Name these numbers that equal the sum of their proper divisors.

perfect numbers

Question #20: Literature – World Literature

10 points

In one work, this author defined suicide as “the confession that life is not worth living,” and cited the “leap of faith” as a philosophical suicide. He wrote of a man who went to the Home for Aged Persons in **Marengo** [mah-RAIN-goe] following his mother’s death; the Home’s warden later testified at that man’s trial. This author of *The Myth of Sisyphus* [SIH-suh-fus] also wrote a novel set in Oran that describes the exploits of Dr. Bernard **Rieux** [roo]. Name this author of *The Plague* who wrote about **Meursault** [mehr-sole] in *The Stranger*.

Albert Camus



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
4th Section
Teamwork Questions

Question #21: Science – Chemistry

10 points per part

Light with shorter wavelengths is scattered when going through these solutions, which is known as the Tyndall effect.		
1	Name these suspensions of a molecule of one substance throughout another substance.	<u>colloids</u> (or <u>colloidal solutions</u> or <u>colloidal suspensions</u>)
2	This type of colloid consists of a liquid dispersed throughout another liquid.	<u>emulsion</u>
3	This is the movement of dispersed particles caused by an electric field.	<u>electrophoresis</u>

Question #22: Science – Chemistry

10 points per part

This theory developed by Linus Pauling describes the electron orbitals in many molecules.		
1	Name this mixing of orbitals to form new orbitals.	orbital <u>hybrid</u> ization
2	In methane, one <i>s</i> orbital joins with this number of <i>p</i> orbitals to form a hybrid orbital.	<u>3</u>
3	This molecular shape occurs in molecules with sp^3d [<i>s p 3 d</i>] hybridization.	<u>trigonal bipyramidal</u> (prompt on “bipyramid”al, do not accept “trigonal”)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
4th Section
Teamwork Questions

Question #23: Literature – British Literature

10 points per part

He demoted his chief of staff for getting into a drunken brawl with Roderigo [ro-deh-REE-goe].		
1	Name this commander who refused to fight his father-in-law Brabantio [brah-BAHN-choe] on account of pending action concerning Cyprus.	<u>Othello</u> (prompt on “the Moor of Venice”)
2	Due to accusations of infidelity, this wife of Othello was smothered in her bedchamber.	<u>Desdemona</u>
3	This item, Othello’s first gift to Desdemona, was used by Iago [ee-AH-goe] to further the false accusations against Cassio and Desdemona.	<u>handkerchief</u>

Question #24: Literature – British Literature

10 points per part

He wrote about his experiences fighting in the Spanish Civil War in <i>Homage to Catalonia</i> .		
1	Name this author who wrote of a dystopian [dis-TOE-pee-un] future ruled by Big Brother in 1984.	George <u>Orwell</u> (accept Eric Arthur <u>Blair</u>)
2	In another memoir, Orwell wrote about being a sub-divisional police officer. In that role, he was tasked with eliminating one of these animals that had killed an immigrant worker.	<u>elephant</u>
3	Orwell’s <i>Shooting an Elephant</i> was set in the city of Moulmein [mole-main] in this modern-day country.	<u>Burma</u> (accept <u>Myanmar</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
4th Section
Teamwork Questions

Question #25: Social Studies – U.S. History

10 points per part

Its capture was immediately preceded by a victory at Kettle Hill.		
1	Name this hill whose capture by forces under John Miley provided a strategic viewpoint for a later siege on Santiago.	<u>San Juan</u> Hill (accept <u>San Juan Ridge</u>)
2	The capture of San Juan Hill was a key victory for the American forces fighting in this 19th century conflict.	<u>Spanish-American</u> War
3	Following the Spanish-American War, this colony's Moro people fought a war in which Leonard Wood ordered the massacre of 600 people hiding inside a crater on the island of Jolo.	<u>Philippines</u>

Question #26: Social Studies – U.S. History

10 points per part

Its motto was "Our country is the world - our countrymen are mankind."		
1	Name this newspaper whose founder lambasted gradualists, writing that "I am in earnest, I will not equivocate, I will not excuse, I will not retreat a single inch, and I will be heard."	<i>The</i> <u>Liberator</u>
2	This Quaker publisher of <i>The Liberator</i> ceased publication after the passage of the Thirteenth Amendment.	William Lloyd <u>Garrison</u>
3	Garrison drew even more controversy for defending this founder of the League of Gileadites [GIL-ee-uh-dites], a slave-catcher resistance group. This person was later hanged for raiding an armory in what was then Virginia.	John <u>Brown</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
4th Section
Teamwork Questions

Question #27: Mathematics – Pre-Calculus

10 points per part

The type of curvature named for this person is the product of two other curvatures, and his name is combined with Wilhelm Jordan's to name a type of matrix algorithm.		
1	Identify this mathematician and scientist whose name is sometimes used for the normal distribution.	Carl Friedrich <u>Gauss</u>
2	One legend about Gauss is that as a young boy he was able to quickly find the sum of the first 100 positive integers. What is that sum?	<u>5050</u>
3	Find the solution to a system if the augmented matrix representing it can be put in echelon [eh-sheh-lon] form with top row 1 1 1 8, second row 0 1 1 6, and bottom row 0 0 1 1. Give your answer as an ordered triple without naming variables.	(<u>2</u> , <u>5</u> , <u>1</u>) (order matters)

Question #28: Mathematics – Pre-Calculus

10 points per part

Make sure you give the three dimensional name rather than the two dimensional name.		
1	Name the shape of the surface generated by the equation $z=x^2+y^2$.	<u>paraboloid</u>
2	Find the x- and y-coordinates that give the minimal value of the expression $x^2-4x+y^2+10y+3$. Remember that you only need to give the x- and y-coordinates.	(<u>2</u> , <u>-5</u>) (or <u>x=2</u> , <u>y=-5</u> or equivalents)
3	Name the shape formed by the intersection of the plane $z=5$ and the paraboloid $z=x^2+3y^2$.	<u>ellipse</u> (do not accept "ellipsoid")



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
5th Section
Toss-up Questions

Question #29: Science – Biology

10 points

These organisms can be genetically engineered to test for interactions between proteins, which is known as two-hybrid screening. These organisms include a relatively small number of **basidiomycota** [bah-SIH-dee-oh-mie-koe-tah] and all of the other **dikaryas** [die-KAR-ee-uhs]. Some of these **fungi** [FUN-jie] create **zymase** [ZIE-mase], and many of them are **Ascomycota** [as-koe-mie-KOE-tah], including the genus **Saccharomyces** [sa-kah-roe-MIE-sees]. Name these organisms, some of which are used in baking to convert carbohydrates into carbon dioxide or alcohol.

yeasts

Question #30: Literature – U.S. Literature

10 points

One character's love in this novel is revealed when a stolen glove is discovered. One character in this novel is seen weeping after selling her chestnut hair for \$25. That decision was made to raise money to visit the family patriarch, a Civil War chaplain. At the end of this novel, Plumfield is turned into a school for boys by Professor Bhaer and his wife. One of its sequels was *Jo's Boys*. Jo's sisters were Meg, Beth, and Amy. Name this first novel about the March sisters, written by Louisa May Alcott.

Little Women



Question #31: Mathematics – Math Concepts

10 points

This type of math is used with exponents to define the Carmichael function, and this is also used to succinctly state the Chinese Remainder Theorem and Fermat's Little Theorem. Equivalent to a quotient ring, this can be represented with a Z slash n Z , and this places all integers into residue or congruence classes. Name this system in which two numbers are congruent if they give the same remainder when they are divided by the same number, an example of which is clock arithmetic.

modular arithmetic (prompt on "clock" arithmetic)

Question #32: Social Studies – World History

10 points

Immediately prior to this event, its target suspended the penal laws against dissenters and recusants through a Declaration of Indulgence. During this, the Convention Parliament derided the forced disarmament of Protestants and the creation of a court for **Ecclesiastical** [eh-KLEE-see-as-tih-kul] Causes, later outlawed via a Bill of Rights. This was precipitated by the birth of James Francis Edward Stuart, and this ended the reign of the last Catholic English monarch. Name this event which saw the overthrow of James the Second and the ascension of William & Mary to the English throne.

Glorious Revolution (or
Revolution of 1688)



Extra Question #1: Mathematics – Math Concepts

10 points

This person and Richard Taylor co-authored the article “Ring-Theoretic Properties of Certain **Hecke** [HECK-eh] Algebras.” Helped by a paper on the Eisenstein ideal by Barry **Mazur** [MAY-zur], this person matched modular forms to elliptic curves. That work was noteworthy because of a proof of the epsilon conjecture by Ken **Ribet** [RIH-bet], which increased the notoriety of the **Taniyama-Shimura** [tah-nee-yah-mah shee-muh-rah] conjecture. Name this man who proved that there are no integer nonzero solutions to $a^n + b^n = c^n$ [a to the n plus b to the n equals c to the n] for n greater than two, which is **Fermat’s** [fehr-mah’s] Last Theorem.

Andrew Wiles

Extra Question #2: Literature – World Literature

10 points

This work describes light, fire, and darkness as the three forces of nature. It also outlines three paths, those of wisdom, action, and devotion, as ways to transcend the three **gunas** [GOO-nahs]. This tale begins with a warrior focusing on the fact that he must fight his relatives. It consists of a dialogue between **Arjuna** [ar-JOO-nah] and his charioteer, Krishna. Name this Hindu philosophical text, a sub-section of the **Mahabharata** [mah-hah-bah-rah-tah].

Bhagavad-Gita (prompt on “Mahabharata” until “fight”)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
Extra Section
Toss-up Questions

Extra Question #3: Science – Health

10 points

A genetic disease impacting the body's use of this element is **acrodermatitis enteropathica** [a-kroe-dehr-mah-TIE-tis en-TEH-roe-pa-thih-kah]. A deficiency in this nutrient contributes to anorexia and prevents the creation of testosterone. This nutrient is often found in high concentrations in the same foods that contain iron, calcium, magnesium, and proteins, including oysters and veal liver. Too much of this nutrient can prevent the body from using copper. Name this element whose oxide is used to decrease sunburn and which shortens cold symptoms.

Zinc

Extra Question #4: Social Studies – U.S. History

10 points

In the unanimous opinion in this case, the Court drew comparisons to *Sweatt v Painter*, which lacked the “tangible factors” presented in this case. The cases of *Gebhart v Ethel* and *Briggs v Elliot* were combined with the namesake case in this decision. The attorney for the plaintiff argued that the Equal Protection Clause was violated due to the creation of an inferiority complex. This case overruled the doctrine established in *Plessy v Ferguson* of separate but equal. Name this landmark decision that ruled school segregation unconstitutional.

Brown v Board of Education of
Topeka, KS



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
Extra Section
Toss-up Questions

Extra Question #5: Fine Arts – Composers of the Modern Era

10 points

This composer did not allow a company to stage his *Europera 4* without staging his *Europera 3*. He used text from *Finnegans Wake* in his works *Nowth upon Nacht*, *The Wonderful Widow of Eighteen Springs*, and *Roaratorio*. This composer also created a series of five pieces called *Imaginary Landscape*, the fourth of which uses twelve radios. One of his pieces was first performed by David Tudor, who sat at a piano without playing it. Name this avant-garde composer of *Four Minutes, Thirty-Three Seconds*.

John Cage



Extra Question #6: Mathematics – Trigonometry

10 points per part

Answer the following about angle addition formulas.		
1	Applying this trigonometric function to the sum of two angles is equivalent to evaluating this function on the angles separately, adding those function values together, and then dividing that sum by the quantity one minus the product of those values.	<u>tangent</u>
2	If the sine of a first quadrant angle is three-fifths, find the sine of two times that angle.	<u>24/25</u> (or <u>0.96</u>)
3	If the cosine of an angle is zero, find the cosine of two times that angle.	<u>-1</u>

Extra Question #7: Mathematics – Trigonometry

10 points per part

Consider the six circular trigonometric functions.		
1	Which two of the six are positive in the fourth quadrant?	<u>cosine</u> and <u>secant</u> (both answers must be given without prompting in either order, do not accept sine or cosecant)
2	Which two of the six never have outputs between negative one and one?	<u>secant</u> and <u>cosecant</u> (both answers must be given without prompting in either order, accept <u>csc</u> in place of cosecant)
3	Find the value of x in the first quadrant in radians for which the secant of x equals the cosecant of x.	<u>pi/4</u> (or <u>one-fourth pi</u> or equivalents)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 4
Extra Section
Teamwork Questions

Extra Question #8: Social Studies – World History

10 points per part

This period was sparked by the assassination of Jorge Eliecer Gaitan [HOR-gay el-ee-EH-ser GIE-tahn].		
1	Name this extended period of upheaval during which Mariano Ospina Perez attempted to stifle the opposition Liberal Party. General Rojas Pinilla sought an end to it after taking over in a coup d’etat [coo day-tah].	La Violencia (do not accept “Bogotazo”)
2	<i>La Violencia</i> claimed over 200,000 lives in this South American nation. During the presidency of Guillermo Leon Valencia, the ELN, a Marxist guerrilla group, began an insurrection.	Colombia
3	Around the same time that the ELN formed, this still-active former Communist military wing formed out of the “resistance committees” that began during La Violencia. In 2008, Colombian troops invaded one of this group’s camps in Ecuador.	FARC (accept Colombian Revolutionary Armed Forces or Fuerzas Armadas Revolucionarias de Colombia)

Extra Question #9: Social Studies – World History

10 points per part

It is sometimes named for Dandi [DAH-nee], where it concluded.		
1	Name the tax protest, a 240-mile journey from Sabermati [sah-ber-mah-tee] to the coast of the Arabian Sea. Upon arrival, its participants symbolically broke the law by picking up its eponymous [ih-PAH-nih-mus] substance along the shore.	Great Salt March (prompt on “Dandi March,” accept Salt Satyagraha or Gandhi Salt March , but do not mention them)
2	The Salt March was led by this nationalist leader who was shot 18 years later by Nathuram Godse [na-thoo-rahm god-say].	Mohandas Karamchand Gandhi (accept Mahatma Gandhi)
3	The Salt March was an embodiment of this form of protest, advocated by Gandhi. Drawing from the Jain [jane] concept of ahimsa [ah-him-sah], it mandates non-violent resistance to evil.	satyagraha (prompt on “insistence for truth” or equivalents)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
1st Section
Toss-up Questions

Question #1: Miscellaneous – Industrial Arts

10 points

In the early stages of this process, the wellbore is broken up with diluted acid, then filled with slickwater. Pits are used to hold used up fluids as well as waste, but those pits are not required by the EPA. This process primarily targets shale several thousand feet below the surface. Name this controversial process in which high-pressure water and chemicals are used to extract oil and gas.

fracking (accept induced hydraulic fracturing or hydrofracturing)

Question #2: Science – Biology

10 points

The inclusive type of this property is addressed by Hamilton's Rule, which multiplies the benefit to the recipient of an altruistic act by the genetic relatedness to the actor. An example of the inclusive type of this property is kin selection, and this is used to explain the continued existence of bees, ants, and other organisms studied by sociobiologists. The absolute measure of this property is the ratio of the number of individuals after and before selection. Name this quality of certain populations to survive and reproduce.

(Darwinian or evolutionary) fitness (accept adaptive value, selective value, or adaptability, prompt on ability to "survive" or "altruism")



Question #3: Social Studies – World History

10 points

The Treaty of **Zanjon** [**zahn-HONE**] ended a ten-year fight for independence in this country, which began when the “Cry of Yara” was issued by Carlos Manuel de **Cespedes** [**ses-PEH-dehs**]. The US backed this nation’s “sergeants’ revolt” that overthrew Gerardo Machado and installed a leader who was later overthrown by the 26th of July Movement. That leader was Fulgencio Batista, and the movement was supported by Che Guevara. Name this nation whose government was overthrown in 1959 by Fidel Castro.

Cuba

Question #4: Mathematics – Math Concepts

10 points

A linear combination of vectors is said to be this type of combination if the coefficients add to one and are all non-negative. If a function with a continuous second derivative has this property, then it is concave up. If a polygon with n vertices has this property, then its number of interior diagonals equals one-half times n times the quantity n minus three. If a set of points has this property, then it contains the entirety of all segments connecting two of its points. Name this property belonging to polygons whose interior angles are all less than 180 degrees.

convex



Question #5: Literature – British Literature

10 points

This play pulls material from Plautus' [PLAH-tus-es] *Menaechmi* [meh-NIEK-mee] and John Gower's *Apollonius* [a-po-LOE-nee-us] of Tyre [tire]. The protagonists of this play were born at Epidamnum [eh-pih-DAM-num], and were raised separately by Aemilia and Aegeon [AE-jee-on] following a storm. The centerpiece of this play's plot was Solinus' extension regarding a thousand-mark fine or execution. Solinus, the Duke of Ephesus [eh-FEE-sus], was talking about a merchant from Syracuse. Name this Shakespeare comedy about the mass confusion resulting from two sets of long-lost twins.

The Comedy of Errors

Question #6: Science – Earth Science

10 points

The size of this atmospheric layer can be measured by observing aerodynamic drag on satellites, and this layer became much smaller in 2008 and 2009. The location of the International Space Station, this area and the ionosphere [ie-ON-uh-sfehr] are the target of storm probes being sent up by NASA. The ionosphere goes throughout the altitude of this region in addition to some areas above and below it. This layer is the primary location of auroras. Name this region above the mesopause [MEH-soe-paws] named for its high temperatures.

troposphere



Question #7: Social Studies – Current Events

10 points per part

This financial giant came under intense scrutiny after a spreadsheet detailed its “Sons and Daughters” program.		
1	Name this bank headed by Jamie Dimon [DIE-mon] that was also hit with billions of dollars in fines following the “London whale” trading scandal.	<u>JPMorgan</u> Chase
2	JPMorgan Chase faced bribery investigations concerning the hiring of children of powerful politicians in this nation. They made payments to Lily Chang, whose real name was Wen Ruchun.	People’s Republic of <u>China</u>
3	The SEC’s investigation concerned potential violations of this act, which forbids bribery of foreign officials.	<u>Foreign Corrupt Practices</u> Act

Question #8: Social Studies – Current Events

10 points per part

His father came to power after having Salah al-Jadid arrested.		
1	Name this Alawite President of Syria who lost both his Minister of Defense and brother-in-law in July 2012 when a bomb went off inside a government building.	President Bashar al- <u>Assad</u>
2	Due in large part to a reaction against events in Syria, this organization was awarded the 2013 Nobel Peace Prize.	<u>Organisation for the Prohibition of Chemical Weapons</u> (or <u>OPCW</u>)
3	After the assassination of Rafik Hariri [rah-FEEK hah-REE-ree] in 2005, Syria was forced to remove occupying forces from this nation.	<u>Lebanon</u>



Question #9: Science – Physics

10 points per part

This quantity is measured in charge per time.		
1	Name this quantity often measured in amperes.	electric(al) <u>current</u>
2	This Prussian scientist is the namesake of two circuit laws used to find currents, the junction rule and the loop rule.	Gustav <u>Kirchhoff</u>
3	This two-word phrase is used for the average speed of an electron that is part of an electric current.	<u>drift velocity</u> (or <u>drift speed</u>)

Question #10: Science – Physics

10 points per part

These devices typically have iron cores.		
1	Name these devices that have two coils of wire that are useful because the electromotive forces of the wires are proportional to the number of loops.	<u>transformers</u>
2	Transformers only work in this type of circuit, which was supported heavily by George Westinghouse and Nikola Tesla against the wishes of Thomas Edison.	<u>alternating current</u> (or <u>AC</u>)
3	These devices convert alternating current to direct current.	<u>rectifiers</u>



Question #11: Literature – World Literature

10 points per part

While eating dinner with a professor and the professor's wife, the couple lambasted his column concerning German guilt for World War I.		
1	Name this protagonist who then responded by ridiculing a painting of Goethe [GOE-teh]. Near the end of the novel, he stabbed Hermine [hehr-MEE-nuh], whose body was shrunk to figurine size by Pablo.	Harry Haller (accept either, prompt on, but do not say, "Steppenwolf")
2	Harry Haller encounters a sign that reads "For Madmen Only" in this novel.	<i>Der <u>Steppenwolf</u></i>
3	<i>Steppenwolf</i> was written by this author of <i>Siddhartha</i> .	Hermann <u>Hesse</u>

Question #12: Literature – World Literature

10 points per part

This character's attempt to head home early from a trip was thwarted due to his belongings ending up in Como.		
1	Name this writer who encounters a comedian who reminds him of a rouged [roojd] old man, and a man who stood in the doorway of a mortuary chapel.	<u>Gustav</u> von <u>Aschenbach</u>
2	The encounter in the graveyard inspired Gustav von Aschenbach to travel to this city, where the writer stayed at the Hotel des Bains.	<u>Venice</u> , Italy
3	Gustav von Aschenbach is the protagonist of this German author's novel <i>Death in Venice</i> .	Thomas <u>Mann</u>



Question #13: Mathematics – Trigonometry

10 points per part

Answer these questions about triangle areas.		
1	Give the area of a triangle if it has a side of length 2, a side of length 4, and a 30 degree angle between those two sides.	<u>2</u>
2	In general, the area of a triangle can be found by applying this function to the angle between two sides and multiplying the result times half the product of the lengths of those sides.	<u>sine</u>
3	Find the area of a triangle if it has a side of length 6, a side of length 7, and a 90 degree angle between those two sides.	<u>21</u>

Question #14: Mathematics – Trigonometry

10 points per part

Answer these questions regarding the relationship between angle and slope.		
1	Find the angle in degrees that a line makes with the positive x-axis if the slope of the line is the square root of 3.	<u>60</u> degrees
2	The slope of a line is equal to this trigonometric function applied to the angle between the line and the positive x-axis.	<u>tangent</u>
3	Equivalently, the slope of a line is equal to this trigonometric function applied to the angle between the line and the positive y-axis.	<u>cotangent</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
3rd Section
Toss-up Questions

Question #15: Social Studies – U.S. History

10 points

A 19th century mayor of this city, Henry Perrin Coon, was supported by a militia called the Committee of Vigilance. The international meeting that formally established the UN was held in this city. This city's "White Night Riot" occurred following a trial which saw the use of the "Twinkie defense." Dianne Feinstein became mayor of this city following Dan White's shooting of George **Moscone** [**mos-KOE-nee**] and Supervisor Harvey Milk. Name this California city, site of the Golden Gate Bridge.

San Francisco, California

Question #16: Literature – Mythology

10 points

At **Aulis** [**AW-lis**], one group was delayed in its voyage to this conflict due to **Artemis** [**AHR-teh-mis**] sending an unfavorable wind. During this conflict, the horses Xanthus and **Balius** [**BAHL-yus**] were struck dumb by the Furies. As prophesied, **Protesilaus** [**proe-teh-SIH-la**] was the first to die during it, as he was the first on land. **Helenus** [**HEL-uh-nus**] was forced to reveal what would bring about the end of it, which included capturing the **Palladium** [**puh-LAY-dee-um**] statue. This conflict was sparked by Paris' kidnapping of Helen. Name this decade-long conflict which saw the invading Greeks conquer a city in Asia Minor, the subject of *The Iliad*.

Trojan War



Question #17: Science – Chemistry

10 points

<p>In 2013, bismuth was used by Joel Rosenthal as a catalyst to create this compound. This compound is combined with water vapor in the water-gas shift reaction, and this is mixed with hydrogen to make synthetic fuel in the Fischer-Tropsch [tropsch] process. This compound combines with hemoglobin to create carboxyhemoglobin [kahr-BOK-see-hee-moe-gloe-bin], which causes oxygen deprivation. Name this compound that can be created by incomplete combustion so that there is not enough oxygen to create carbon dioxide.</p>	<p><u>carbon monoxide</u> (prompt on "CO")</p>
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Question #18: Social Studies – Geography

10 points

<p>John Woodruff and Cyrus Avery founded a national association to promote the use of this road, and CC Pyle organized the "Bunion Derby" which was set on it. In <i>The Grapes of Wrath</i>, this road was called the "Mother Road." Once called the "Main Street of America," a song sung by Nat King Cole implored the listener to "get your kicks on" this road. Name this historic highway that ran from Chicago to Santa Monica, California.</p>	<p>US Route <u>66</u> (accept <u>Highway 66</u> or Will <u>Rogers</u> Memorial Highway)</p>
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Question #19: Literature – World Literature

10 points

In Aristotle's *Poetics*, this playwright was said to present individuals as they are, not as they should be. In one of his plays, Athena ordered **Thoas** [THOE-az] to not defy the will of Apollo, who had sent a Greek to capture a statue of Artemis. Another of his plays saw **Menoeceus** [meh-noe-KAY-us] and Jocasta stabbing their own throats, the latter following the dual murder of **Eteocles** [eh-TEE-oe-klees] and **Polyneices** [po-lee-NAY-kees]. This author of *Iphigenia* [if-ih-jeh-NEE-uh] in *Tauris* and *The Phoenician Women* also wrote of Pentheus' attempts to use reason, and suffering at the hands of **Dionysus** [die-oe-NIE-sus-es] followers. Name this author of *The Bacchae*.

Euripides

Question #20: Fine Arts – Classical/Opera

10 points

A song in this opera comparing the black eyes of one woman to the blue eyes of a woman posing for a painting is *Recondita Armonia*. The title character in this opera asks why she has suffered misfortune despite her sincere faith in *Vissi d'arte* [AHR-tay]. The singer of the song about eyes, who also sings "E lucevan le stele [eh LOO-chay-van lay STEH-lay]," is the painter Mario **Cavaradossi** [kah-vah-rah-DOE-see]. Name this opera also featuring Police Chief Baron Scarpia, a work by **Giacomo Puccini** [jah-KOE-moe poo-CHEE-nee].

Tosca



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
4th Section
Teamwork Questions

Question #21: Social Studies – U.S. History

10 points per part

Its victims included Frank and Pete Gusenberg.		
1	Name this 1929 mass murder of unarmed bootleggers by gangsters disguised as policemen.	<u>Saint Valentine's Day</u> Massacre (prompt on "Valentine's Day" Massacre)
2	The St. Valentine's Day Massacre was perpetrated in this city by members of Al Capone's gang.	<u>Chicago</u> , Illinois
3	The victims of the Massacre were members of this man's gang. Along with Earl Weiss, he inherited the gang left behind by Dion O'Bannion.	George "Bugs" <u>Moran</u>

Question #22: Social Studies – U.S. History

10 points per part

Under Franklin Pierce, he was chosen as minister to Britain.		
1	Name this man who worked with William Marcy in drafting the Ostend Manifesto. During a presidential campaign, he was jeered as "ten-cent Jimmy" for claiming that ten cents per day was sufficient for a working man.	James <u>Buchanan</u>
2	Buchanan oversaw the annexation of Texas as Secretary of State for this President.	James Knox <u>Polk</u>
3	During his campaign for President, Polk promulgated this slogan as a response to the Oregon question, indicating how far north the border should be.	<u>"Fifty-four Forty or Fight"</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
4th Section
Teamwork Questions

Question #23: Mathematics – Algebra

10 points per part

This set of numbers is sometimes represented by a double struck Z to represent the German word Zahlen [ZAH-len].		
1	Name this set that includes all of the whole numbers and their additive inverses.	<u>integers</u> (or <u>integer numbers</u>)
2	This name is given to a class of problems that requires integer solutions. Give either the name of the equations or the name of the third century mathematician they are named for.	<u>Diophantine</u> (or <u>Diophantus</u> of Alexandria)
3	A famous Diophantine [DIE-oh-fahn-teen] equation is $a^2+b^2=c^2$. If a, b, and c are all positive integers, then what is the smallest possible value of c?	<u>5</u>

Question #24: Mathematics – Algebra

10 points per part

This process is most straightforward when the divisor is linear.		
1	Name this method of dividing polynomials in which the coefficients of the dividend are written across the top, to the right of the number that is subtracted from x in the divisor.	<u>synthetic</u> division
2	Find the remainder when the quantity x^3+x^2+x+1 is divided by the quantity $x-1$. Your answer should be just an integer, so do not express your answer as a fraction.	<u>4</u>
3	Leaving out the term generated by the remainder, find the polynomial quotient from the same problem, namely the quantity x^3+x^2+x+1 is divided by the quantity $x-1$.	<u>x^2+2x+3</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
4th Section
Teamwork Questions

Question #25: Literature – British Literature

10 points per part

He strangled Bernardine, then framed Friar Jacomo for the murder. He also used his daughter to bring about the deaths of Dons Lodowick and Mathias.		
1	Name this character who, after being imprisoned by Ferneze [fer-NEH-zay] , used poppy essence and mandrake root to fake death. He was undone by a trap he set for Turkish troops.	Barabas (accept The Jew of Malta , but do not mention it)
2	Barabas is the protagonist of this late 16 th century play, which sees him fall into a pot of boiling oil at its resolution.	<i>The Jew of Malta</i>
3	<i>The Jew of Malta</i> was written by this dramatist. This writer invites the reader to “come live with me and be my love” in the poem “The Passionate Shepherd to His Love.”	Christopher Marlowe

Question #26: Literature – British Literature

10 points per part

This fictional locale is home to Upper Weatherbury Farm and the King’s Arms Hotel.		
1	Name this county that contains Buck’s Head Inn. One resident of this county abandoned his wife and left for Brazil, only to return shortly before she was hanged.	Wessex , England
2	This is the woman whose husband Angel Clare went to Brazil. Upon her husband’s return, she kills Alec.	Tess Durbeyfield (accept either underlined part, accept Tess of the d’Urbervilles)
3	The fictional county of Wessex served as the setting for many of the works of this author of <i>Tess of the d’Urbervilles</i> , <i>Far From the Madding Crowd</i> and <i>Jude the Obscure</i> .	Thomas Hardy



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
4th Section
Teamwork Questions

Question #27: Fine Arts – Art History

10 points per part

This school existed from 1919 to 1933.		
1	Name this school started by Walter Gropius [GROE-pee-us] that started in Weimar [VIE-mahr] and ended in Berlin.	Staatliches <u>Bauhaus</u>
2	In between its time in Weimar and Berlin, the school spent seven years in this city, where it met in a building designed primarily by Gropius.	<u>Dessau</u> , Germany
3	This person was the last leader of the school. He was later a leader at the Illinois Institute of Technology and designed the Farnsworth House in Plano, Illinois.	Ludwig <u>Mies</u> van der Rohe (prompt other parts of answer)

Question #28: Fine Arts – Art History

10 points per part

His bright red stabile in Chicago is <i>Flamingo</i> .		
1	Name this sculptor who also created many mobiles.	Alexander <u>Calder</u>
2	Calder made this mobile for the stairwell of the Museum of Modern Art.	<u>Lobster Trap and Fish Tail</u>
3	This large Calder work combining a stabile and a mobile is in the Hart Senate Office Building.	<u>Mountains and Clouds</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
5th Section
Toss-up Questions

Question #29: Social Studies – World History

10 points

One king of this country was killed at the Battle of the Three Kings in a failed attempt to conquer Morocco. The Castilian right to the throne of this country was lost at the Battle of **Aljubarrota** [ahl-joo-bah-ROE-tah], where English archers backed the forces of John the First of **Aviz** [ah-VEEZ]. The MFA launched a 1974 coup in this country known as the Carnation Revolution. It continued to support explorers such as Vasco de **Gama** [GAH-mah] after the death of Henry the Navigator. Name this country where in 1755 an earthquake struck the capital, Lisbon.

Portugal (accept **Portugese Republic** or **Republica Portuguesa**)

Question #30: Science – Physics

10 points

This value is quantized so that it must equal an integer times the reduced Planck constant. Its components do not commute, so they are complementary variables in Heisenberg's Uncertainty Principle. Its derivative with respect to time, which can be found using the product rule, gives one term equal to zero and the other equal to torque. This conserved quantity equals moment of inertia times angular velocity. Name this quantity equal to the cross product of position with linear momentum.

angular momentum (do not accept "momentum")



Question #31: Literature – U.S. Literature

10 points

This writer apologized for not following Ford Madox Ford's dictum regarding memoirs in *My Life and Hard Times*. He wrote of a non-smoker buying a pack of cigarettes as part of a plan to kill Mrs. **Ulgine [OOL-jeen]** Barrows in "The Catbird Seat." In another story, this author wrote of a character who refused to see Dr. Renshaw, whom that character then imagines referring a patient to him. That same character later imagines himself facing a firing squad. Name this author of "The Secret Life of Walter Mitty."

James Thurber

Question #32: Mathematics – Math Concepts

10 points

The **Bienayme [byen-ae-may]** formula states that two values of this quantity can be added to find the new value when two uncorrelated random variables are added or subtracted. In the central limit theorem, this variable is divided by the number of samples. This quantity is equal to the expected value of the quantity variable squared, end quantity, minus the expected value squared. In a **Poisson [pwie-son]** distribution, this quantity equals the expected value. The units of this quantity are found by squaring the units of the variable. Name this measure of spread whose square root equals standard deviation.

(sample or population) variance



Extra Question #1: Fine Arts – Art History

10 points

This artist's portrait of his wife Margaret shows her with a white headdress and what appear to be horns of coiled hair. That same hair arrangement can be seen in another portrait by this artist, in which a woman wearing a green dress over a blue underdress has her left hand just over her stomach and her right hand held by a man. This artist also worked with his brother Hubert on *The Adoration of the Mystic Lamb*, which is also known as the **Ghent [gent]** Altarpiece. Name this Flemish painter of *The Arnolfini [ahr-noel-FEE-nee] Wedding*.

Jan van **Eyck** (or Johannes de **Eyck**)

Extra Question #2: Mathematics – Math Concepts

10 points

This is the least restrictive quadrilateral for which the sum of the squares of the distances from any point in the interior to two opposite diagonals equals the same sum for the other opposite diagonals. It is also the least restrictive quadrilateral for which the intersection of the diagonals is the same distance from each of the four vertices. Its four angles are all congruent, but its sides are not necessarily congruent. Name this quadrilateral with four right angles.

rectangle



Extra Question #3: Literature – U.S. Literature

10 points

<p>This novelist wrote of the tale of Fray Baltazar, whose exploits were described to a man on his way to the mesa at Acoma [ah-KOE-mah]. Earlier in that novel, Magdalena reported the murders committed by her husband Buck Scales. She also wrote of a Bohemian peasant taken in by Mrs. Harling at the insistence of the grandmother of Jim Burden. Name this author of <i>Death Comes for the Archbishop</i> and <i>My Antonia</i>.</p>	<p>Willa <u>Cather</u></p>
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Extra Question #4: Science – Physics

10 points

<p>Shortly after Yuri Manin [MAH-neen] wrote <i>Computable and Uncomputable</i>, this scientist gave a talk titled “Simulating Physics with Computers” that discussed building a quantum computer. Based on work with John Archibald Wheeler, this scientist developed the use of path integrals. Freeman Dyson showed that this person’s work on quantum electrodynamics was equivalent to work by Tomonaga and Schwinger [SHWEENG-er]. Name this person who used arrows and wavy lines to demonstrate quantum interactions in his namesake diagrams.</p>	<p>Richard <u>Feynman</u></p>
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Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
Extra Section
Toss-up Questions

Extra Question #5: Social Studies – U.S. History

10 points

Ex Parte [PAHR-tay] *Young* created the Stripping Doctrine, an exception to this amendment involving unconstitutional acts that allows for injunctive relief. The scope of this amendment was expanded by the decision in *Hans v. Louisiana*. This amendment was passed in reaction to the ruling in *Chisholm v. Georgia*. Name this constitutional amendment that established the sovereign immunity of the states, the first amendment passed after the Bill of Rights.

Eleventh Amendment to the United States Constitution



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
Extra Section
Teamwork Questions

Extra Question #6: Literature – U.S. Literature

10 points per part

In this story, Ying-ying confides in the Moon Lady, Chang-o, only to learn that Chang-o is a man.		
1	Name this novel in which Jing-mei replaces her mother in a mah-jongg game.	<i>The <u>Joy Luck Club</u></i>
2	<i>The Joy Luck Club</i> was written by this author of <i>The Kitchen God's Wife</i> .	Amy Ruth <u>Tan</u>
3	In <i>The Joy Luck Club</i> , Waverly Jong was named after a location in this city. More successful families moved to its Ashbury Heights neighborhood.	<u>San Francisco</u> , California

Extra Question #7: Literature – U.S. Literature

10 points per part

This attorney began to hate Julius Beaufort [BOE-fort] when the businessman began pursuing his cousin.		
1	Name this husband of May Welland who moved up the date of his wedding in order to curb his feelings for a countess who had returned from Poland.	<u>Newland Archer</u> (accept either)
2	Newland Archer pursued a relationship with Ellen Olenska while engaged to May in this novel.	<i>The <u>Age of Innocence</u></i>
3	<i>The Age of Innocence</i> was written by this author of <i>The House of Mirth</i> .	Edith <u>Wharton</u> (accept Edith Newbold <u>Jones</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 5
Extra Section
Teamwork Questions

Extra Question #8: Science – Biology

10 points per part

The embryonic type of these is found inside blastocysts [BLAS-toe-sists], while the adult type is found in bone marrow and a few other places in the body.		
1	Name these cells whose study has been politically controversial.	<u>stem</u> cells
2	Ranking between totipotency [toe-teh-POE-ten-see] and multipotency, this term refers to the ability of many stem cells to differentiate into nearly any cell.	<u>pluripotency</u> (or <u>pluripotent</u>)
3	This adjective is used in an alternative name for adult stem cells. This adjective is also used for any cell that is not a gamete or closely related to gametes.	<u>somatic</u>

Extra Question #9: Science – Biology

10 points per part

Problems with this chromosome can cause hemophilia or color blindness.		
1	Name this chromosome. Generally, women have two of them, but men only have one.	<u>X</u> chromosome(s)
2	This syndrome leading to low fertility males is caused by a person having two X chromosomes and a Y chromosome.	<u>Klinefelter</u> 's syndrome
3	This gene on the X chromosome plays a major role in lionization [lie-un-ih-ZAY-shun]. Research by Jeanne Lawrence published in 2013 suggest that this gene may be able to cancel the effects of trisomies.	<u>Xist</u> (or <u>X-inactive specific transcript</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
1st Section
Toss-up Questions

Question #1: Science – Chemistry

10 points

This scientist's last paper, written with one of his students, used Fenton chemistry to explain the generation of **hydroxyl [hie-DROK-sil]** radicals from hydrogen peroxide and superoxide. In addition to that work with Joseph Weiss, this scientist worked with Max Born on a method to calculate lattice energies, which is known as their cycle. In 1909, this person used osmium as a catalyst in a very high pressure reaction that combines hydrogen and nitrogen. Name this scientist whose process for creating ammonia was improved by Carl Bosch.

Fritz Haber

Question #2: Language Arts – Grammar/Usage

10 points

In the Estonian alphabet, W immediately precedes an O with this diacritical mark. In Vietnamese, this mark is used to indicate a vowel with a higher tone. This mark can be placed above the letter G in the Guarani language. In Portuguese, this is utilized above the letters O and A to show that the speaker should use more nasalization when pronouncing the letter. Name this diacritical mark used as a part of a letter in the Spanish alphabet, where it appears over the letter **ene [EHN-ay]** to form the letter **enye [EHN-YAY]**.

tilde (accept **flourish** or **swung dash**, prompt on “squiggly”, do not accept “dash”)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
1st Section
Toss-up Questions

Question #3: Social Studies – U.S. History

10 points

Iconic photos of this event were taken by Bill Eppridge, including that of busboy Juan Romero holding the victim. Its perpetrator claimed he was driven by his target's desire to send jets to Israel. It occurred shortly after its victim had claimed victory in a California presidential primary. Perpetrated by a Jordanian immigrant, name this action at the Ambassador Hotel in Los Angeles by Sirhan Sirhan against a candidate for President in 1968.

assassination of **Robert Kennedy**
(accept synonyms for assassination, the player must give at least part of the first name, prompt if not given, accept Bobby in place of Robert)

Question #4: Miscellaneous – Technology

10 points

Virgil Griffith developed a tool to detect conflicts of interest in relation to this website. In April 2013, one of its volunteers was threatened by the DCRI, a French intelligence agency, over information about a military radio station. Software called **Xowa** [**KSOE-wah**] allows users to view this website's contents while offline. This was founded by Larry Sanger and Jimmy Wales in 2001, and a 2005 article in *Nature* magazine compared the accuracy of its science content to *Encyclopedia Britannica*. Name this "Free Encyclopedia."

Wikipedia.org



Question #5: Science – Health

10 points

The most common fungal cause of this disease is Cryptococcus, and a common bacterial cause is from the same **genus [JEE-nus]** that causes gonorrhea, which is **Neisseria [nie-SEHR-ee-uh]**. This disease is now less common due to the influenza B vaccine. The most common causes are viral, and this can be diagnosed by finding low glucose and high protein and **lymphocyte [LIM-foe-site]** levels in the fluid drawn from a spinal tap. This disease generally causes strong headaches and neck stiffness. Name this inflammation of the membranes around the brain and spinal cord.

meningitis

Question #6: Social Studies – Religion

10 points

According to Armenian legend, this person planted a long kiss on his mother's arm when ordered to bite it. In some Islamic sources, this person was born at the same time as Kelimia, and was slated to marry Lubda. In the Book of Matthew, Jesus compared the death of this person to the death of Zachariah son of Barachiah. The first shepherd, he sacrificed to God the firstlings of his flock, and the result drew the ire of his brother. This is the first person to die in The Bible. Name this second son of Adam and Eve, the brother of Cain.

Abel



Question #7: Mathematics – Algebra

10 points per part

This set is often contrasted with the domain of a function. Depending on context, this term can be equivalent to the codomain or the image.		
1	Name this set of function outputs.	<u>range</u>
2	This term, a synonym of onto, is used to describe functions that have an image equal to their codomain. This can be described as the function using its entire range.	<u>surjective</u> (accept <u>surjection</u>)
3	Give the only real number that is not in the range, or image, of the function the quantity $x+2$, end quantity, divided by the quantity $x+5$.	<u>1</u>

Question #8: Mathematics – Algebra

10 points per part

The relationship between two variables is often a type of variation.		
1	Name the type of variation which exists when one variable increasing causes the other variable to also increase.	<u>direct</u> variation
2	If y varies directly with x, and $y=10$ when $x=8$, then find the value of y when $x=12$.	<u>15</u>
3	If y varies directly with the cube of x, and $y=10$ when $x=2$, the find the value of y when $x=8$.	<u>640</u>



Question #9: Social Studies – World History

10 points per part

The main goal of this 1944 conference was to rectify deficiencies of the international use of the gold standard.		
1	Name this conference used to set up a system which used the US Dollar as the reserve currency. Its namesake system came to an end when President Nixon put a stop to the sale of gold.	Bretton Woods Conference (or United Nations Monetary and Financial Conference)
2	The Bretton Woods Conference set out the plans for the creation of two organizations; one is a source of long-term capital for states reliant on foreign aid, the other looks to correct short-term exchange rate fluctuations. Name either.	World Bank or International Monetary Fund (accept IMF) or International Bank for Reconstruction and Development (accept IBRD)
3	The Uruguay Round organized under the auspices of this agreement laid the groundwork for the creation of the World Trade Organization. This outgrowth of the Bretton Woods Conference focused on international commerce.	General Agreement on Tariffs and Trade (accept GATT)

Question #10: Social Studies – World History

10 points per part

As Prime Minister, this successor to Winston Field issued a Unilateral Declaration of Independence, which was rejected by Great Britain.		
1	Name this leader who reversed his attempt to enshrine white minority rule when international pressure compelled him to negotiate with the United African National Council, led by Abel Muzorewa [ay-bel muz-oe-rae-wah].	Ian Douglas Smith
2	Ian Smith's declaration led to the creation of this republic that lasted for fourteen years. Earlier, it was part of a federation that included modern-day Zambia as well as Nyasaland [NYAH-sah-land], which is now Malawi.	Rhodesia (accept Southern Rhodesia , do not accept "Zimbabwe")
3	After blacks gained majority rule, Rhodesia became this modern-day country. Since its founding, Robert Mugabe [moo-GAH-bay] has held the title of President.	Republic of Zimbabwe



Question #11: Fine Arts – Jazz

10 points per part

Name these jazz standards.		
1	This Billy Strayhorn song performed by Duke Ellington and many others is about transportation going to Harlem.	<u>“Take the ‘A’ Train”</u>
2	This song from Porgy and Bess talks about when the “livin’ is easy, Fish are jumpin’, And the cotton is high.”	<u>“Summertime”</u>
3	This song written for Gertrude Lawrence but performed by many artists includes the lyrics, “I tell you I mean it, I’m all for you.”	<u>“Body and Soul”</u>

Question #12: Fine Arts – Jazz

10 points per part

This trumpeter and singer won a Grammy for his recording of “Hello, Dolly!”		
1	Name this musician nicknamed Satchmo.	Louis <u>Armstrong</u>
2	This song by Armstrong has a title that states what the narrator thinks to himself after seeing, “Trees of green, red roses too.”	<u>“What A Wonderful World”</u>
3	A probably false legend states that Armstrong invented scat when he dropped his sheet music for this song about a dance with a strange name.	<u>“Heebie Jeebies”</u>



Question #13: Science – Chemistry

10 points per part

Catalysts are used in many reactions.		
1	Catalysts lower this energy found in the exponent in the Arrhenius [uh-REE-nee-us] equation.	activation energy
2	This name is given to substances that lower the rate of a reaction, sometimes by reducing the impact of a catalyst.	(catalytic or reaction) inhibitor
3	These two people are the namesake of catalysts used to polymerize olefins [OH-luh-fins].	(Giulio) Natta and (Karl) Ziegler (must give both names in either order without prompting)

Question #14: Science – Chemistry

10 points per part

These solids are often contrasted with amorphous solids.		
1	Name these solids whose molecules are in an ordered pattern.	crystals (or crystal solid(s) or crystalline or polycrystalline)
2	This name is given to the arrangement of atoms in a crystal. This same term is used in mathematics for the points with integer coordinates on a graph.	lattice (accept longer answers)
3	The 14 different crystal lattices are named for this 19 th century Frenchman.	Auguste Bravais



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
3rd Section
Toss-up Questions

Question #15: Mathematics – Math Concepts

10 points

Russell's paradox was developed to discredit one of this mathematician's theorems. The function named for this person has a derivative that is **Lebesgue** [lah-BEG] integrable, but that integral does not equal the change of the function. That function, which is not absolutely continuous, can be called the Devil's staircase, and it is based on repeatedly removing middle thirds to form this mathematician's namesake set. Name this person who showed real numbers are not countable by diagonalization and who discovered transfinite numbers.

Georg Cantor

Question #16: Literature – U.S. Literature

10 points

One of this writer's plays was based on the fairy tale *Snow White and Rose Red*, and centers on the stepsisters Bianca and Beatrice. In another work by this writer of *The Lamp and the Bell*, a woman who looked "nineteen, and not a day older" stayed up the night before Christmas making clothes for her son. This writer "had a little Sorrow, Born of a little Sin" in the poem "The Penitent." This poet and playwright wrote that "my candle burns at both ends" in the first poem of *A Few Figs From Thistles*. Name this author of "Ballad of the Harp-Weaver" and **Renascence** [reh-NA-sens], and *other Poems*.

Edna St. Vincent Millay (accept
Nancy Boyd)



Question #17: Science – Physics

10 points

This concept has been more successful than Modified **Newtonian** [new-TOE-nee-un] dynamics at explaining the galaxy rotation problem. An equation relating average kinetic energy to potential energy called the **virial** [VEHR-ee-ul] theorem and observations of the Coma cluster were used by Fritz Zwicky in 1933 to predict the existence of this substance. Accounting for about 27 percent of the mass-energy of the universe, identify this substance that does not absorb or emit light and therefore cannot be seen directly.

dark matter (do not accept “dark energy”)

Question #18: Social Studies – U.S. Government

10 points

In the Magna Carta, the use of this power required immediate cash appropriation. A state supreme court weakened a federal supreme court decision on this matter in *Norwood, Ohio v. Horney*. That Supreme Court decision, which found that this power can be used in the name of economic development as long as it is in the “public interest,” is **Kelo** [KEE-loe] v. *New London*. Some countries refer to this power as compulsory purchase. Authorized by the Fifth Amendment takings clause, name this ability of the government to appropriate private property while compensating the owner.

eminent domain (accept compulsory purchase before it is mentioned, do not accept “confiscation”)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
3rd Section
Toss-up Questions

Question #19: Fine Arts – Art History

10 points

This city is the home of **Sasseti** [sah-SEH-tee] Chapel, which contains works by Domenico **Ghirlandaio** [gehr-lahn-DIE-oh] and which is in a church that used to hold the *Santa Trinita* **Maesta** [my-STAH] by city resident **Cimabue** [chim-ah-bway]. This city also contains Fra **Angelico's** [ahn-JEH-lee-koe's] Altarpiece for San Marco. This is also the home of the Galleria dell'Accademia and the **Ponte Vecchio** [POEN-tay VEH-kee-oe] Bridge. Its Baptistry di San Giovanni contains works by Andrea Pisano and Lorenzo Ghiberti, including the doors nicknamed Gates of Paradise. Its large cathedral has a dome designed by Filippo **Brunelleschi** [broo-nehl-LEH-schee]. Name this Italian city in Tuscany whose largest museum is the **Uffizi** [oo-FEE-zee].

Florence, Tuscany, Italy

Question #20: Literature – Mythology

10 points

In the *Iliad*, Homer wrote that this god's wife was the youngest Grace, **Aglaea** [ah-GLAY-uh], after his divorce. During the Trojan War, this god fought the river-god **Scamander** [SKAH-man-der]. He once arrived to Olympus on the back of a mule after **Dionysus** [die-oh-NIE-sus] got him drunk. This god is credited with designing the sandal of Hermes and the aegis of Athena. His palace was on Lemnos, where he landed after he was struck from Olympus. That fall made him a cripple, and he was often cheated on by his beautiful wife Aphrodite. Name this Greek god of smithing, volcanoes, and fire.

Hephaestus (accept **Vulcan** until "Greek")



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
4th Section
Teamwork Questions

Question #21: Science – Biology

10 points per part

The primary classes in this phylum [FIE-lum] are adenophorea [ah-deh-noe-FOR-ee-uh] and secernentea [seh-ser-NEN-tee-uh].		
1	Name this phylum often referred to as roundworms.	<u>nematodes</u> (or <u>nematoda</u>)
2	The fate of every somatic cell in this transparent nematode species has been mapped. Sydney Brenner encouraged its use as a model organism.	C(aenorhabditis) <u>elegans</u>
3	The spiralis [spih-RAL-is] species of roundworms is responsible for this disease usually caused by eating undercooked pork. Make sure you name the disease.	<u>trichinosis</u> (or <u>trichinellosis</u> or <u>trichiniasis</u>)

Question #22: Science – Biology

10 points per part

These can cause evolution or cancer.		
1	Name this change in genetic material affecting a nucleotide sequence.	<u>mutations</u> (accept more specific answers)
2	Name the type of insertion or deletion mutation in which the number of genes gained or lost is not divisible by three, causing the grouping of genes into codons [KOE-dons] to change.	reading <u>frameshift</u> mutation (or <u>framing</u> error)
3	This DNA sequence, nicknamed jumping genes and discovered by Barbara McClintock, can cause mutations by moving to a different location in a gene sequence.	<u>transposon</u> (or <u>transposable element</u> or <u>retrotransposon</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
4th Section
Teamwork Questions

Question #23: Literature – U.S. Literature

10 points per part

In this play, the protagonist was promoted to garbage truck driver after filing a complaint about how African Americans never received such promotions.		
1	Name this play in which Cory is convinced to attend his father's funeral after singing his father's song about Old Blue.	<u>Fences</u>
2	<i>Fences</i> was written by this playwright of the ten-play Pittsburgh Cycle, which included <i>Fences</i> and <i>The Piano Lesson</i> .	August <u>Wilson</u> (accept Frederick August <u>Kittel</u>)
3	After Cory changes his mind about attending the funeral, Uncle Gabe pulled out this instrument to signal to St. Peter to let Troy in.	<u>trumpet</u>

Question #24: Literature – U.S. Literature

10 points per part

Some of her poetry is found in the collection "Poems on Various Subjects, Religious and Moral."		
1	Name this colonial poet who described peace as a woman "divinely fair, olive and laurel binding her golden hair" in "Liberty and Peace."	Phyllis <u>Wheatley</u>
2	In one poem, Phyllis Wheatley wrote that this general deserved "a crown, a mansion, and a throne that shine."	General George <u>Washington</u> (the poem is "To His Excellency General Washington")
3	In "To the King's Most Excellent Majesty," Wheatley praised King George the Third for assenting to this legislation, which was paired with the Declaratory Act.	<u>repeal</u> of the <u>Stamp Act</u> (accept equivalents, but an answer of "Stamp Act" is wrong)



Question #25: Mathematics – Analytical Geometry

10 points per part

This operation starts with two vectors and gives a vector as a result.		
1	Name this type of product in three dimensions whose result has a magnitude equal to the product of the magnitudes of the original vectors times the sine of the angle between them.	cross product (prompt on “vector product”)
2	This product combines the cross product with the dot product. It is used to find the volume of a parallelepiped [pa-ruh-le-luh-PIE-ped].	(scalar or mixed) triple product (accept box product)
3	Find the cross product of the vector (1,1,0) with the vector (0,1,1).	(1,-1,1)

Question #26: Mathematics – Analytical Geometry

10 points per part

This name is given to a triangle that has three congruent sides and three congruent angles.		
1	Give this adjective that means the same thing as regular when applied to a triangle.	equilateral (or equiangular)
2	If two of the vertices of an equilateral triangle are at (0,0) and (2,0), and the other vertex is in the first quadrant, give the coordinates of the other vertex.	(1, root 3) (the y-coordinate can be given as square root of 3 or radical 3 or equivalents)
3	Give the final coordinates of the point that starts at (2,0) if that triangle is rotated 135 degrees counterclockwise around the origin.	(negative root 2, root 2) (root 2 is the same thing as square root of 2 or radical 2)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
4th Section
Teamwork Questions

Question #27: Social Studies – Economics

10 points per part

In one work, this person claimed that classical economics could not solve real-world problems, since its assumptions are rarely satisfied.		
1	Name this British economist and author of <i>The General Theory of Employment, Interest, and Money</i> .	John Maynard <u>Keynes</u>
2	In <i>The Economic Consequences of the Peace</i> , Keynes [kayns] railed against the economic sanctions set down by this treaty.	1919 Treaty of <u>Versailles</u>
3	Keynes' first economic text was focused on the "Finance and Currency" of this region, where he had previously worked as a civil servant.	<u>India</u>

Question #28: Social Studies – Economics

10 points per part

According to the economist who coined the term, this practice leads to a society characterized by wasted time and money.		
1	Name this practice of consumers to purchase goods and services in order to "show off." Laggards attempt to catch up through "pecuniary emulation."	<u>conspicuous consumption</u> (accept <u>conspicuous leisure</u> , but do not mention this answer if not given)
2	Conspicuous consumption was coined by this Norwegian American whose namesake goods have an upward-sloping demand curve once the price reaches a level that makes it a status symbol.	Thorstein <u>Veblen</u>
3	Veblen wrote a book about "The Theory of" this class, in which he railed against conspicuous consumption and called this concept a "nonproductive consumption of time."	<u>leisure</u>



Question #29: Mathematics – Math Concepts

10 points

The number of these structures of a given size is given by the formula n raised to the $n-2$ power, which is named for Arthur Cayley. An attempt to build a minimal one of these objects is a problem named for Jakob Steiner. Binary heaps use a binary type of this structure, in which nodes beyond the first one are classified as left or right when they are added. Each pair of vertices in these structures are connected by exactly one simple path. Name these types of undirected bipartite graphs.

trees

Question #30: Literature – British Literature

10 points

In one novel, this author wrote of an astrologer who predicted hazards befalling a newborn on his fifth, tenth, and twenty-first birthdays, with the first being his kidnapping while riding with a revenue officer. He also wrote of an outlaw whose son later ran a sword through him; that son was kidnapped by Meg Murdockson. This author of *Guy Mannering* and *The Heart of Midlothian* wrote about the son of Cedric the Saxon and his disinherited son. Name this Scottish author of *Ivanhoe*.

Sir Walter Scott



Question #31: Science – Biology

10 points

These fibers often are attracted to **netrin** [NET-trin]. These are packed tightly but not able to touch each other because of cytoplasm inside a **Remak** [ray-MAHK] bundle. This part of a cell extends from its namesake hillock, and these are often surrounded by a type of cell that produces electrically insulating material. Those surrounding cells are Schwann cells, and the insulator is **myelin** [MIE-uh-lin]. Name these nerve fibers that conduct electricity away from a neuron.

axons

Question #32: Social Studies – World History

10 points

Following this event, one leader departed for home with the aid of Roger of Sicily, while another left for Constantinople to plot against the Italian leader. During this, Prince Raymond suggested an attack on Antioch in response to the massacre at **Edessa** [eh-des-sah]. Backed by the Papal Bull *Quantum* **praedecessores** [pray-deh-SEH-soh-res] issued by Pope Eugenius III, it was led by Louis VII and Conrad III, the latter after being convinced by St. Bernard of **Clairvaux** [klar-voe]. Name this failed attempt to take Damascus in the 12th century.

Second Crusade (prompt on “Crusade”s)



Extra Question #1: Fine Arts – Classical/Opera

10 points

The title character in this opera sings “Pari siamo” after a discussion with the assassin **Sparafucile** [spa-rah-foo-CHEE-lay]. One of this opera’s main characters, a duke, advises to avoid fidelity like the plague in the aria “Questa o quella.” That duke later has a relationship with the title character’s daughter Gilda and sings the aria “La donna e **mobile** [MOE-bee-lay].” Name this work in which a curse is placed on the duke and the title character, a jester, an opera by Giuseppe Verdi.

Rigoletto

Extra Question #2: Literature – British Literature

10 points

This character sought to purchase the Carfax estate near London, and he later took control of Bersicker. Arriving in England near Whitby on the **Demeter** [deh-MEE-ter], he later fled via the *Czarina Catherine*, which he forced up the Danube. When a guest asked to leave, he opened the door to a pack of wolves waiting outside. Name this creation of Bram Stoker who was a vampire.

Count Dracula



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
Extra Section
Toss-up Questions

Extra Question #3: Science – Earth Science

10 points

These are quantified by Doodson Numbers, and these do not exist at **amphidromic** [am-fih-DROE-mik] points. Depending on location, these can be **diurnal** [die-UR-nul], semi-diurnal, or mixed. When these are at their largest, they are classified as spring, and the location where these are largest is the Bay of Fundy. The spring type of this occurs twice a month, as does the low type, which is called neap. Name these ocean phenomena in which the water level rises and falls during the course of a day.

Tides

Extra Question #4: Social Studies – World History

10 points

Expelled from the Commonwealth following two coups led by Sitiveni Rabuka, George Speight led another coup here in 2000. The prohibition of land sales and taxes of produce in lieu of cash were implemented here by Sir Arthur Gordon. The Colonial Sugar Refining Company imported Indian laborers to this nation, whose descendants make up about one-third of the population. Name this Polynesian nation with capital Suva.

Republic of Fiji



Extra Question #5: Mathematics – Math Concepts

10 points

Soon after Lobachevsky [loe-bah-CHEV-skee] developed hyperbolic geometry, this person developed elliptic geometry. This person's namesake geometry is differential, allowing for the use of his namesake metric and manifolds. This person's paper "On the Number of Primes Less Than a Given Magnitude" introduced a function named his zeta function. Name this German mathematician whose name is used for the integral approximation method that uses rectangles.

Bernhard Riemann



Extra Question #6: Mathematics – Probability

10 points per part

Methods to generate the pseudo- type of these numbers include Blum Blum Shub.		
1	Name these numbers that are selected in a way such that each number has an equal probability of being selected each time a selection is made.	<u>random</u> number(s)
2	If two digits are selected at random, what is the probability that they are both fives?	<u>1/100</u> (or <u>0.01</u>)
3	If a random letter and a random digit are selected, what is the probability that the letter is either A or B, and the digit is odd?	<u>1/26</u>

Extra Question #7: Mathematics – Probability

10 points per part

The type of process named for this person has a future that may be influenced by its present state but cannot be influenced by its past state.		
1	Name this Russian mathematician whose chains are used to give transitions between one state and the next.	Andrey <u>Markov</u> (or <u>Markov chains</u>)
2	Markov chains are used in these processes, also called random processes, which follow a random variable over time.	<u>stochastic</u> process(es)
3	In the transition matrix for a Markov chain, the numbers in a given row must add to this number in order to account for the sum of all probabilities.	<u>1</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 6
Extra Section
Teamwork Questions

Extra Question #8: Social Studies – U.S. History

10 points per part

While testifying before the Senate Committee on Foreign Relations, he was unable to come up with a single name of a “card-carrying Communist.”		
1	Name this Wisconsin senator who was later censored for conduct “contrary to Senate traditions.”	Joseph Raymond <u>McCarthy</u>
2	The ultimate downfall for McCarthy came during a 36-day hearing on charges of subversion by members of this Armed Forces branch.	United States <u>Army</u>
3	During the hearing, this special counsel for the Army asked McCarthy, “Have you no sense of decency sir, at long last? Have you left no sense of decency?”	Joseph Nye <u>Welch</u>

Extra Question #9: Social Studies – U.S. History

10 points per part

This federal organization hears petitions regarding working conditions and wages.		
1	Name this agency which investigates retaliations against protected concerted activity.	<u>National Labor Relations Board</u> (accept <u>NLRB</u>)
2	The NLRB was established by this act, also called the National Labor Relations Act. It prohibited employers from forming their own unions, but initially excepted agricultural and domestic laborers.	<u>Wagner</u> Act
3	Per the Taft-Hartley Act, 60 days’ notice had to be given before unions could do this. If it involved federal employees, an 80-day injunction could be sought.	<u>strike</u> (accept word forms)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
1st Section
Toss-up Questions

Question #1: Literature – U.S. Literature

10 points

The protagonist of this collection routinely walked along **Trunion** [TRUN-yun] Pike on the outskirts of the central town. Upon leaving on a train, that character thought of Turk Smollett and the lamp lighter Butch Wheeler. In this anthology, one character fell asleep while trying to grasp something a teacher was trying to tell him. That teacher was Kate Swift, the object of George Willard's affection. Name this story collection centering on a small midwestern town written by Sherwood Anderson.

Winesburg, Ohio

Question #2: Mathematics – Math Concepts

10 points

The first constant named for this shape equals pi times Gauss' constant. This shape is the inverse curve of a hyperbola. One form of the equation for this shape is the square of the sum of the squares of the coordinates equals the difference of the squares of the coordinates. Its equation is easier to state in polar coordinates, where r squared is proportional to the cosine of two theta. Name this shape sometimes named for **Bernoulli** [ber-NOO-lee] that is used to represent infinity and looks like a figure eight.

lemniscate of Bernoulli



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
1st Section
Toss-up Questions

Question #3: Miscellaneous – Sports

10 points

<p>The original trophy given to the winners of this event was named for Jules Rimet [ree-may]. Controversial events at this gathering have included the “Disgrace of Gijon [hee-HONE]” match and Harald Schumacher’s hip-check to Patrick Battiston’s face. Marco Materazzi [mah-teh-RAH-zee] was headbutted by Zinedine Zidane [zahn-deen zee-don] in the 2006 Final of this event. Allegations of bribery have surrounded the votes that awarded a future iteration to Qatar [KAH-tur]. Name this quadrennial soccer tournament that crowns a global champion.</p>	<p>Federation Internationale de Football Association <u>World Cup</u></p>
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Question #4: Science – Biology

10 points

<p>[Note to moderator: When reading this question, just spell out aaRS, TPsiC, and DHU.] Amino acids are connected to this molecule by a synthetase [SIN-thuh-tase] made using an aaRS gene, and this molecule is called charged when the amino acid is attached. Robert Holley mapped the example of this molecule that binds to alanine [A-luh-neen]. A mapping of these molecules generally includes a TPsiC arm, DHU arm, and anticodon [an-tie-KOE-don] as part of its cloverleaf structure. Name these molecules that move amino acids to ribosomes [RIE-boe-soems], a type of ribonucleic [rie-boe-new-KLAY-ik] acid.</p>	<p><u>transfer</u> RNA (accept <u>tRNA</u> or <u>transfer ribonucleic acid</u>, prompt on “RNA” or “t” or “ribonucleic acid”)</p>
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Question #5: Social Studies – World History

10 points

Aristodemus [ah-ris-toe-DEE-mus] led a Greek force that repelled an invasion at **Cumae** [KOO-mae] from these people. The Greeks later chose to abandon Corsica after fighting them at **Alalia** [ah-lah-LEE-uh]. Also called the Rasenna, the “Linen Book of Zagreb” was written in their language. Defeated at the Battle of Silva Arsia, Lucius Junius Brutus drove out their last king, Tarquinus Superbus, in 509 BC. Name these predecessors to the Romans as the predominant Italic people.

Etruscans (accept **Etrusci**, **Tusci**, **Tyrsenoi**, **Tyrrhenoi**, accept “Rasenna” before mentioned)

Question #6: Literature – British Literature

10 points

The speaker in this poem found a singer of godly hymns made in the wood who could wash away blood. A woman with red lips, golden locks, and skin as white as leprosy won the title character in a game of dice against Death. Afterwards, the speaker saw two hundred companions drop one by one. In this poem, he tells his story to the Wedding-Guest. The turning point in this poem was the shooting of an albatross. Name this poem about a sailor written by Samuel Coleridge.

“Rime of the Ancient Mariner”



Question #7: Science – Physics

10 points per part

This concept is closely related to invariance because it applies to features that are unchanged by transformations.		
1	Name this concept whose super type pairs up particles.	supers <u>ymmetry</u>
2	This type of symmetry applies to factors that do not change when a system goes through the equivalent of a three-dimensional mirror.	<u>parity</u> (or <u>p</u> -symmetry)
3	A violation of charge parity symmetry was found in the decay of kaons [KAY-ons], which are an example of these particles consisting of a quark with an antiquark.	<u>mesons</u>

Question #8: Science – Physics

10 points per part

This form of Einstein's theory of relativity was developed before the other one.		
1	Name this theory of relativity which assumes non-accelerating frames of reference.	<u>special</u> relativity
2	The mathematical transformations of time and space under special relativity are named for this Dutch scientist.	Hendrik <u>Lorentz</u> (transformation)
3	Shortly after Einstein developed special relativity theory, this former teacher of his demonstrated how to picture them in his now namesake four dimensional spacetime.	Hermann <u>Minkowski</u> (spacetime)



Question #9: Social Studies – Geography

10 points per part

The Cape York Peninsula forms the northern tip of this state.		
1	Name this Australian state, home to the Sunshine Coast. This state is east of the Northern Territory.	<u>Queensland</u>
2	This capital of Queensland is linked to Sydney via the Pacific Highway and is near Moreton Bay.	<u>Brisbane</u>
3	This second-most populous city of Queensland lying on the border with New South Wales recieved its moniker from real estate investors.	<u>Gold Coast</u>

Question #10: Social Studies – Geography

10 points per part

The Satpura and Vindhya [VIN-die-uh] ranges separate it from the Gangetic [gahn-JEE-tik] Plain.		
1	Name this large plateau made primarily of basalt. Its Golconda region is a site of diamond and gold mining.	<u>Deccan</u> Plateau
2	The Deccan [DEH-kun] Plateau makes up most of the geographical area of this Asian nation.	<u>India</u>
3	These two mountain ranges run along either side of the Deccan. Both run as far south as Tamil Nadu province.	Western and Eastern <u>Ghats</u> (accept <u>Sahyadri and Purva</u> Ghat)



Question #11: Mathematics – Probability

10 points per part

An argument over a dice game led to the early development of probability theory in the 17 th century.		
1	The dispute arose over the probability of whether or not you would get a double six in 24 tries rolling two dice at a time. This problem can be solved by raising what number to the 24 th power?	<u>35/36</u>
2	This person wrote the first probability text, <i>De ratiociniis [RAY-show-sih-nee-is] in ludo aleae [A-lee-ay]</i> . This person also devised the theory that every point reached by light can be treated as the source of a spherical wave.	Christiaan <u>Huygens</u>
3	In 1812, this Frenchman contributed to the development of probability theory by popularizing work by Bayes on conditional probability and work by de Moivre [mov] on binomial distributions. His work in probability led to the development of his namesake transforms used in calculus that are similar to Fourier [fur-ee-ay] transforms.	Pierre-Simon <u>Laplace</u>

Question #12: Mathematics – Probability

10 points per part

This person wrote “On certain limit theorems of the theory of probability” with Mark Kac, and this person wrote “Random Graphs” with Alfred Renyi.		
1	Name this Hungarian famous for writing lots of papers with lots of collaborators. His life was the subject of the book <i>The Man Who Loved Only Numbers</i> .	Paul <u>Erdos</u>
2	The Erdos-Renyi work looked at how many ways you could get a particular graph. If you have three distinguishable vertices, how many ways can you get a simple graph with two edges?	<u>3</u>
3	If loops are allowed on the graph but not multiple edges, how many ways can you have three distinguishable vertices with two edges?	<u>15</u>



Question #13: Literature – World Literature

10 points per part

The central family in this novel drove 600 kilometers across the veld to escape the revolution.		
1	Name this novel in which the Smales family took shelter with their servant and his relatives after escaping.	<u><i>July's People</i></u>
2	This Nobel Laureate and author of <i>July's People</i> wrote of a pig-iron tycoon who left behind 400 acres of land in <i>The Conservationist</i> .	Nadine <u>Gordimer</u>
3	The action of <i>July's People</i> took place against the backdrop of revolution against apartheid in this country.	Republic of <u>South Africa</u>

Question #14: Literature – World Literature

10 points per part

In this tale, a youth adopted the philosophy of Arthur Schopenhauer.		
1	Name this novel in which Noburu is number three within a group of top students which poisons the title character for merely rebuking his stepson for utilizing a peephole.	<i>The <u>Sailor Who Fell from Grace with the Sea</u></i> (accept <u>Goko no eiko</u>)
2	This author of <i>The Sailor Who Fell from Grace with the Sea</i> wrote about a place of worship being set ablaze in <i>Temple of the Golden Pavilion</i> .	Yukio <u>Mishima</u> (accept Kimitake <u>Hiraoka</u>)
3	In one ritual in the novel, the schoolboys kill one of these animals to symbolize the emptiness of existence.	<u>cat</u> (accept <u>kitten</u> or other equivalents)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
3rd Section
Toss-up Questions

Question #15: Science – Chemistry

10 points

One example of these compounds is produced by the oxidation of 2-**butanol** [BYOO-tah-nol], and a common test for these substances looks for the creation of **iodoform** [ie-oe-doe-FORM]. When humans produce too much of these chemicals because of too much fatty acid breakdown, their blood turns acidic, which is a diabetes symptom. The simplest example of this, used as nail polish remover, is **acetone** [A-suh-tone]. Name these **carbonyls** [KAHR-buh-nils] that are not **aldehydes** [AL-duh-hides] because the central carbon is bonded to two other carbons.

ketones (prompt on “carbonyl”)

Question #16: Social Studies – Economics

10 points

Two fixed-weight variants of this measure are **Laspeyres** [las-pear] and **Paasche** [pa-sheh]. In the United States, the example of these focused on producers is called wholesale. To calculate real GDP, the United States utilizes the chain-weighted version of this, which accounts for changes in quantities. One common calculation of this involves a fixed bundle in the base period, and is referred to as the “consumer” one. Name this value which compares the cost of the same goods in different periods, often used as a measure of inflation.

consumer **price index** (accept **cost index** or **CPI**, prompt on “index” or “inflation”, accept indices for index)



Question #17: Fine Arts – Classical/Opera

10 points

This composer wrote a piece based on an Arnold Böcklin painting and the song *Krislov* based on “The Pied Piper.” His 2nd piano **concerto** [kone-CHEER-toe] has a 2nd section opening with slow chords labeled “**Adagio sostenuto** [ah-DAH-jyo soes-teh-NOO-toe] – Più animato”, and he made cuts to his 3rd piano concerto to make it easier to play. The influence of Rimsky-Korsakov can be found in this composer’s *Symphonic Dances*. Name this composer who wrote 24 variations of the 24th and final **caprice** [kuh-PREES] in his *Rhapsody on a Theme of Paganini*.

Sergei **Rachmaninoff**

Question #18: Social Studies – U.S. History

10 points

One side in this conflict sought provisions from the “trembling lands” around Lake **Koshkonong** [KOSH-kuh-nong]. The losing side in this conflict did not abide by the Treaty of St. Louis, which included the ceding of all land claims east of the Mississippi. Following a loss at Stillman’s Run, Governor John Reynolds called out more militia. Jefferson Davis escorted the namesake of this conflict after that leader was taken prisoner, and one of the volunteers in this conflict was Abraham Lincoln. Name this 1832 conflict fought in Iowa and Illinois between US forces and a band of Sauk and Fox Indians.

Black Hawk War



Question #19: Science – Astronomy

10 points

This term credited to **Hipparchus** [hih-PAHR-kus] is still used even though his reason for using it was incorrect. Hipparchus classified objects into six classes, while one of the two modern measurements of this quantity is based on comparisons to the star Vega. To keep values on the y-axis between negative ten and positive twenty on a Hertzsprung-Russell diagram, astronomers use this quantity instead of luminosity. Name this quantity whose apparent and absolute values are measures of brightness.

magnitude (accept **apparent magnitude** or **absolute magnitude**)

Question #20: Literature – World Literature

10 points

In this drama, one character claims to conquer all, though he does not fight. The Great Boyg admitted defeat to a man backed by women. That character attempted to talk up his slave dealing in America and how he saved himself at the expense of a cook in order to escape the ladle of the Button Moulder, but **Solveig** [SOOL-vay] claimed that the title character made life beautiful. This work opens with a description of a reindeer hunt. Name this play about a Norwegian farmer by Henrik Ibsen that inspired a musical suite penned by Edvard Grieg.

Peer Gynt



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
4th Section
Teamwork Questions

Question #21: Fine Arts – Art History

10 points per part

This artist led the Vienna Secession movement.		
1	Name this artist who used gold leaf in many of his works, such as <i>The Kiss</i> and his first portrait of Adele Bloch-Bauer.	Gustav <u>Klimt</u>
2	The Secession Building in Vienna has a large frieze painted by Klimt to honor this famous person.	Ludwig van <u>Beethoven</u>
3	Klimt created three mosaics that form a frieze in a mansion in Brussels built for this person. The mansion is sometimes called a palace.	Adolphe <u>Stoclet</u>

Question #22: Fine Arts – Art History

10 points per part

This artists's <i>Not to Be Reproduced</i> shows the back of a man's head twice, once as though it is somehow being reflected in a mirror.		
1	Name this Belgian surrealist who often included bowler hats in his works.	Rene <u>Magritte</u>
2	These words appear at the bottom of Magritte's painting <i>The Treachery of Images</i> . Feel free to give the original French or an English translation.	" <u>Ceci n'est pas une pipe</u> " (accept " <u>This is not a pipe</u> " or equivalents)
3	Magritte's <i>The Portrait</i> shows one of these in the middle of a slice of ham.	<u>eye</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
4th Section
Teamwork Questions

Question #23: Social Studies – U.S. History

10 points per part

This incident was sparked by an order given by Commander Salisbury Humphreys.		
1	Name this controversy surrounding the alleged deserters William Ware, Daniel Martin, and John Strachan, who had actually been impressed into service.	<u>Chesapeake-Leopard</u> (Affair or Incident)
2	In the aftermath of the affair, Thomas Jefferson signed this act, which closed down all exports. It was later repealed via the Non-Intercourse Act.	<u>Embargo</u> Act of 1807
3	In 1810, a bill offering to resume trade with Great Britain or France contingent on the reversal of trade restrictions was named for this head of the House Foreign Relations Committee.	Nathaniel <u>Macon</u> (accept <u>Macon's Bill Number 2</u>)

Question #24: Social Studies – U.S. History

10 points per part

John Behan tried to prevent this incident from happening, but he was pushed aside by the local marshal.		
1	Name this incident whose perpetrators were exonerated by Judge Wells Spicer for their actions on Fremont Street.	<u>Gunfight at the OK Corral</u> (accept equivalents)
2	The Gunfight at the OK Corral took place in this state's city of Tombstone.	<u>Arizona</u>
3	This local marshal brought in his brothers Wyatt and Morgan, as well as Doc Holliday, for the Gunfight.	<u>Virgil Earp</u> (prompt on "Earp")



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
4th Section
Teamwork Questions

Question #25: Science – Chemistry

10 points per part

One definition of a salt is a compound in which the hydrogen atom of an acid is replaced by a metal.		
1	Give the chemical formula of table salt.	<u>sodium chloride</u> (or <u>NaCl</u>)
2	Road salt is often used to prevent ice from forming by taking advantage of this colligative property of water.	<u>freezing-point depression</u> (accept equivalent answers)
3	This is the mineral name of sodium chloride.	<u>halite</u>

Question #26: Science – Chemistry

10 points per part

The primary types of these molecules are similar to alkanes, but one of the hydrogen atoms has been replaced by an oxygen atom and a hydrogen atom.		
1	Name this class of compounds that includes ethanol.	primary <u>alcohols</u>
2	Also called wood alcohol, this is the name of the alcohol with the simplest molecular structure.	<u>methanol</u> (or <u>methyl alcohol</u> , do not accept “menthol”)
3	Also called rubbing alcohol, this is the IUPAC name of the secondary alcohol with the simplest molecular structure.	<u>isopropyl</u> alcohol (or <u>propan-2-ol</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
4th Section
Teamwork Questions

Question #27: Literature – U.S. Literature

10 points per part

In this drama, an alcoholic choir leader advised a newly-dead mother that life is a time of ignorance, bliss, and folly.		
1	Name this play in which George Gibbs fell for a next-door neighbor and passed up going to agricultural school to marry her.	<u>Our Town</u>
2	This author of <i>The Bridge of San Luis Rey</i> wrote <i>Our Town</i> .	Thornton Niven <u>Wilder</u>
3	<i>Our Town</i> is primarily set in this fictional New Hampshire locale, across the tracks from Polish Town.	<u>Grover's Corners</u>

Question #28: Literature – U.S. Literature

10 points per part

In this story, one elder is anxious to visit her connections in Tennessee, and adamant about not travelling to Florida.		
1	Name this story in which the grandmother tried in vain to beg the Misfit from shooting her but ended up with three shots in the chest.	"A <u>Good Man is Hard to Find</u> "
2	This author of "A Good Man is Hard to Find" wrote about preacher Hazel Motes in "Wise Blood."	Mary Flannery <u>O'Connor</u>
3	The central family in "A Good Man is Hard to Find" was travelling from this state. John Wesley called it "a lousy state," while also calling Tennessee a "hillbilly dumping ground."	<u>Georgia</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
5th Section
Toss-up Questions

Question #29: Science – Physics

10 points

The **Gargamelle** [GAHR-guh-mel] bubble chamber at **CERN** [sern] that was used to make early quark measurements was designed to detect these particles. It gave evidence of these particles during the 1970s by finding evidence of interactions involving W and Z bosons in the electroweak force. The oscillation of these particles and the discovery that they have mass explains why we detect fewer of these from the Sun than were expected earlier. Name these leptons, each type of which correlates with one of the other leptons.

neutrinos

Question #30: Social Studies – World History

10 points

Following his refusal to ratify the Treaty of **Regensburg** [RAY-gens-burg], the Hapsburgs appealed for this person's excommunication. The target of a conspiracy led by the **Marquis** [mahr-kee] of **Cinq-Mars** [seenk-mahrs], this founder of the Academie **Francaise** [frahnsaess] rose to Secretary of State during a crisis in the **Valtellina** [val-tay-LEE-nah] region of Italy. This leader of the siege at La Rochelle rose to prominence during the regency of Marie de **Medici** [MEH-dee-chee]. Name this religious leader, the French Prime Minister under Louis the Thirteenth.

Cardinal Richelieu (accept Duke Richelieu or Armand-Jean du Plessis, prompt on "Red Eminence" or "L'eminence Rouge")



Question #31: Mathematics – Math Concepts

10 points

An efficient ellipsoid method for solving these problems was introduced by Narendra Karmarkar. An older method developed by George Dantzig to solve these problems using pivot operations inside a **tableau** [ta-BLOE] is the simplex algorithm. If there are only two variables, these problems can be solved by drawing a polygon to represent the feasible region from the constraints. Name these optimization problems in which the goal is to maximize or minimize the value of a first-degree objective function.

linear programming (accept **LP**, prompt on linear “optimization”)

Question #32: Literature – British Literature

10 points

In one work of criticism, this writer used the backdrop of a naval battle between the English and Dutch for a discussion of literature. He utilized Neander as a mouthpiece for his own opinions in *Of Dramatic Poesy*. He wrote of a monarch who chose a man “mature in dullness from his tender years” and “stands comfirm’d in full stupidity.” In one satire, this writer compared King Charles II to David, and the Duke of Monmouth and the Earl of Shaftesbury to the title characters. His longest poem, describing his conversion to Catholicism, is *The Hind and the Panther*. Name the author of “MacFlecknoe” and *Absalom and Achitophel*.

John **Dryden**



Extra Question #1: Social Studies – U.S. History

10 points

Philip Amadas and Arthur Barlowe returned to England from this site with Manteo and **Wanchese** [wahn-chay-say]. Its early leaders included Sir Richard Grenville and Ralph Lane. John White founded a second iteration of a colony here; when White returned here in 1590, he found the word **CROATOAN** [KROE-uh-toe-un] carved into a tree. Founded by Sir Walter Raleigh, name this island off the coast of North Carolina, home to the Lost Colony.

Roanoke Island (prompt on “North Carolina” until “Richard”, prompt on “Lost Colony”)

Extra Question #2: Science – Physics

10 points

The temperature named for this person is similar to the **Unruh** [un-ruh] Temperature, though it is based on gravitational field strength rather than acceleration. He worked closely with Roger Penrose, applying Penrose’s work on singularities to the state of the universe before the Big Bang. This person’s later work led to predictions that Black Holes would eventually use up their energy and vanish because they emit his namesake radiation. Name this scientist who suffers from ALS and wrote *A Brief History of Time*.

Stephen **Hawking**



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
Extra Section
Toss-up Questions

Extra Question #3: Fine Arts – Art History

10 points

A memorial to this architect says in Latin “If you seek his memorial, look about you.” One of his buildings is called a hospital, though it is a retirement home for veterans located in Chelsea. This architect of Saint Clement Danes designed another church that is on top of Ludgate Hill. Name this architect of the Royal Observatory at **Greenwich** [GREN-ich] who, after the Great Fire of London, oversaw the construction of many churches, including Saint Paul’s.

Sir Christopher Wren

Extra Question #4: Mathematics – Math Concepts

10 points

One of these things is classified as homogeneous if it does not contain any functions in terms of x that are not multiplied by other functions, which means that it has no constant terms. The ordinary types of these use only one independent variable, and some ordinary types are initial value problems. Solutions to common types of these are exponential or logistic functions, and the simplest examples can be solved using the separation of variables. Name this type of equation that relates a function to its rate of change.

(ordinary) differential equations



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
Extra Section
Toss-up Questions

Extra Question #5: Literature – U.S. Literature

10 points

One actor in this story draws on the horrors of World War Two in decrying the punishment of people “for walking round the world in the wrong skin.” One messenger in this drama frequently proclaims that “I only am escaped alone to tell thee,” and also claims that witnesses also suffer. The protagonist of this play learns of his son being shot, two other children dying in a car wreck, and a fourth being raped. Name this allegorical play with parallels to the story of **Job [jobe]**, by Archibald MacLeish.

J. B.



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
Extra Section
Teamwork Questions

Extra Question #6: Mathematics – Geometry

10 points per part

There are several ways to prove two triangles congruent.		
1	There are six pieces of information to know about a triangle—three side lengths and three angle measures. To prove that two triangles are congruent, what is the least number of corresponding congruencies necessary?	<u>3</u>
2	This name is given to the side-side-angle case, which is when you have three corresponding congruencies and still have not proven that the two triangles are congruent.	<u>ambiguous</u> case
3	If there are two different triangles where you know the congruent measures of side b, side c, and angle B, then this is the sum of the two measures of angle C in the two different triangles.	<u>180</u> degrees (or <u>pi</u> radians)

Extra Question #7: Mathematics – Geometry

10 points per part

In a triangle the three of these segments meet at the orthocenter.		
1	Name this segment, used to measure height, that has one endpoint at a vertex and forms a right angle with the opposite side.	<u>altitude</u>
2	This is the area of a three four five right triangle. Ignore units.	<u>6</u>
3	This is the length of the altitude to the hypotenuse in a three four five right triangle. Ignore units.	<u>12/5</u> (or <u>2 2/5</u> or <u>2.4</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 7
Extra Section
Teamwork Questions

Extra Question #8: Literature – U.S. Literature

10 points per part

In one poem, he “died blind and still by faith he trod.”		
1	Name this figure who “led boldly with his big bass drum.” While halting by the curb for prayer, he “saw his master through the flag-filled air.”	General William <u>Booth</u>
2	This poet utilized the tune of “The Blood of the Lamb” in writing “General William Booth Enters into Heaven.”	Vachel <u>Lindsay</u>
3	General William Booth earned his title as the founder of this charity organization.	<u>Salvation Army</u>

Extra Question #9: Literature – U.S. Literature

10 points per part

The action of this play takes place in a small town on Labor Day. It opens with a meddling neighbor speaking to a vagabond in cowboy boots and a tee shirt.		
1	Name this play in which Madge, the prettiest girl in town, is contrasted with her intellectual tomboyish sister Millie. In the end, Flo regretted not passing on her wisdom to her elder daughter.	<u>Picnic</u>
2	This author of <i>Picnic</i> wrote about a blizzard forcing a group of passengers to stay at a restaurant overnight in <i>Bus Stop</i> .	William Motter <u>Inge</u>
3	<i>Picnic</i> was set in a small town in this state. In one book, Alvin Dewey was the head of its Bureau of Investigation, which hunted Perry Smith and Dick Hickock for the murder of the Clutter family.	<u>Kansas</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
1st Section
Toss-up Questions

Question #1: Mathematics – Math Concepts

10 points

Starting with a circle and fixed point P, this curve is the locus of all points X so that PX is perpendicular to a tangent line of the circle, which means that this is the **pedal** [PEED-ul] curve of a circle. Similar to a **hypocycloid** [hie-poe-SIE-kloid], this can be generated by following a point inside one circle as that circle rolls around outside another circle. There are three forms this shape can take, one of which includes a loop and another one of which is a cardioid. Name this shape generated by the equation $r = c + d \sin \theta$.

limaçon

Question #2: Social Studies – U.S. History

10 points

In the build-up to this battle, Grant's forces utilized the fleet of David Porter to move northeast, where his forces took Port Gibson and Grand Gulf before blocking the forces of Joseph Johnston. John Pemberton's forces retreated from Big Black River to the site of this battle, which culminated in isolating the western part of the Confederacy. Won a day after Gettysburg, name this siege fought on a key port in Mississippi.

Battle of Vicksburg



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
1st Section
Toss-up Questions

Question #3: Literature – British Literature

10 points

A number of Cavalier poets, including Robert Herrick and Richard Lovelace, were members of this writer's "tribe." In one work, he wrote of a five-thousand-pound wager concerning a trip to Constantinople. In that play, Brisk is undone when **Macilente** [mak-ih-lent] poisons a dog. This author of *Every Man Out of His Humour* also wrote a play in which Subtle poses as an astrologer and the title character. Name this author of *Volpone* and *The Alchemist*.

Ben Jonson

Question #4: Science – Physics

10 points

This person developed a device more complicated than a Wheatstone bridge that is used for measuring small resistances. The effect named for this person and James **Joule** [jool] explains the temperature change of a gas that expands without any heat transfer. He made improvements to the mirror **galvanometer** [gal-vah-NOM-ih-ter], which he used on his trans-Atlantic cable. Name this scientist whose work in thermodynamics led him to create an absolute temperature scale with its zero corresponding to absolute zero temperature.

1st Baron Lord Kelvin (or William Thomson)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
1st Section
Toss-up Questions

Question #5: Fine Arts – Art History

10 points

This city's 23 Marina was the world's tallest residential building in the world until it was surpassed by this city's Princess Tower. This city, the current home of ocean liner *Queen Elizabeth 2*, is near an artificial **archipelago** [ahr-keh-PEL-uh-goe] in the shape of a world map and other groups of islands in the shape of palm trees. Taipei 101 was surpassed as the world's tallest skyscraper by this city's **Burj Khalifa** [burj kah-LEE-fah]. Name this city that lies on the Persian Gulf coast northeast of Abu Dhabi in the United Arab Emirates.

Dubai, United Arab Emirates

Question #6: Literature – World Literature

10 points

After reaching an agreement regarding financing for procuring timber from a local monastery, this character took to dancing. In a discussion with the narrator, he claimed that a man would burn in hell for letting a woman sleep alone. This man cited gifts of rose water and Christmas cookies as proof of a widow's interest in the narrator, his boss. Conned into marrying Madame Hortense, name this Grecian miner, the title character of a novel by **Nikos Kazantzakis** [NEE-koes kah-zahnt-ZAH-kis].

Alexis Zorba the Greek (accept either underlined part)



Question #7: Fine Arts – Classical/Opera

10 points per part

The first part of his 8 th symphony uses words from the hymn “Veni Creator Spiritus.”		
1	Name this composer who wrote “Symphony of a Thousand” in 1907.	Gustav <u>Mahler</u>
2	After completing “Symphony of a Thousand,” Mahler wrote this song cycle using Hans Bethge’s [BETH-geh’s] translations of Chinese poetry.	<i>Das <u>Lied von der Erde</u> (or <u>The Song of the Earth</u>)</i>
3	This is the longest of Mahler’s symphonies and is the longest commonly performed orchestral music. Its “Midnight Song” uses words from Friedrich Nietzsche [NEE-schee].	<u>3rd</u> symphony (or <u>Pastoral</u>)

Question #8: Fine Arts – Classical/Opera

10 points per part

This composer wrote <i>Variations on a Theme by Haydn</i> and <i>A German Requiem</i> .		
1	Name this composer whose “Good evening, good night” is known as his lullaby.	Johannes <u>Brahms</u>
2	Brahms wrote this piece for the University of Breslau after it awarded him an honorary doctorate.	<i><u>Academic Festival Overture</u> (or <u>Akademische Festouvertüre</u>)</i>
3	Inspired by violinist Eduard Remenyi, Brahms also wrote this set of 21 pieces, completing the first ten in 1869 and the last eleven in 1880.	<i>The <u>Hungarian Dances</u> (or <u>Ungarische Tanze</u>) (prompt partial answers)</i>



Question #9: Science – Biology

10 points per part

This substance is able to convert light into energy that is useful for living organism.		
1	Name this green pigment in plants and cyanobacteria [sie-a-noe-bak-TEHR-ee-uh].	<u>chlorophyll</u>
2	Along with heme [heem] in blood, chlorophyll is classified as this type of organic compound containing a ring of pyrrole [PEER-ole] rings.	<u>porphyrin</u> (prompt on “porphin”)
3	While heme has iron at the center of its ring, chlorophyll has this other element at the center.	<u>Magnesium</u>

Question #10: Science – Biology

10 points per part

These are also known as flowering plants.		
1	Name these plants often contrasted with gymnosperms.	<u>angiosperms</u>
2	Classified based on their seed structure, this term usually refers to the angiosperms whose flower parts are multiplies of three.	<u>monocotyledons</u>
3	Monocots are generally classified as sessile [SEHS-il] because they lack these stalks connecting leaf blades to the stem.	<u>petioles</u>



Question #11: Literature – British Literature

10 points per part

He told his story through letters to Robert Walton.		
1	Name this Swiss doctor whose wife Elizabeth was murdered on their wedding night.	<u>Victor Frankenstein</u> (accept either)
2	This is Victor's brother, who was killed by the monster, who framed Justine Moritz for the crime.	<u>William</u> Frankenstein
3	The monster framed Justine by planting this object of William's in her pocket.	<u>miniature</u> (accept <u>necklace</u>)

Question #12: Literature – British Literature

10 points per part

Unferth gave this hero his sword, but it failed spectacularly.		
1	Name this man who became King of the Geats [geets]. In his final battle, only Wiglaf stood by his side.	<u>Beowulf</u>
2	After this creature captured Aeschere [ash-HAR-eh], Beowulf ventured into a marsh to do battle with it. Beowulf slew it with a sword he found on the ground, but it melted as Beowulf came to the surface.	<u>Grendel's mother</u> (accept equivalents, do not accept "Grendel")
3	After a golden goblet was taken, one of these creatures ravaged Beowulf's kingdom. It delivered a fatal blow to Beowulf, but ended up dying from combat wounds as well.	<u>dragon</u>



Question #13: Mathematics – Geometry

10 points per part

In this type of polyhedron, at most two of the faces are not parallelograms. Commonly, at most two of the faces are not rectangles.		
1	Name these shapes in which two opposite faces are congruent polygons.	<u>prisms</u>
2	This is the total number of faces of a pentagonal [pen-TAG-uh-nul] prism.	<u>7</u>
3	This is the volume of a triangular prism in which each edge is length one.	<u>root 3 over 4</u> (or <u>one-fourth root 3</u> or <u>radical 3 over 4</u> or equivalents)

Question #14: Mathematics – Geometry

10 points per part

Name these parts of a circle.		
1	This is a part of a circle bounded by two radii and the arc of the circle between them.	circular <u>sector</u>
2	If you connect the ends of the radii used to bound a sector, it breaks the sector up into a triangle and this region between a chord and an arc.	circular <u>segment</u>
3	If a circle has an area of 36, this is the area of a sector with a central angle of 120 degrees. Ignore units.	<u>12</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
3rd Section
Toss-up Questions

Question #15: Science – Astronomy

10 points

A new example of one of these objects confirmed in 2013 is named 2011 QF99, though that object probably spent more time as a centaur than as one of these. That confirmation came two years after Martin Connors announced the discovery of another example of one of these, 2010 TK7, an object which is also an asteroid. Saturn has two moons that each have objects of this type associated with them. Name these objects found at **Lagrangian** [lah-GRAHN-jee-un] points that share an orbital path with a larger object.

trojans (or **trojan asteroid**, accept Lagrangian object before it is mentioned, prompt centaur before it is mentioned, prompt “Lagrangian”)

Question #16: Social Studies – U.S. History

10 points

The Annapolis Convention was convened to revise this document. One provision allowed for Canada’s immediate entry, but any other areas had to have the approval of nine members. Its major weakness was from Section Two, which allotted to Congress only the powers expressly delegated therein. Name this precursor to the Constitution, an agreement between the former colonies regarding government.

The **Articles of Confederation** and Perpetual Union Between the States



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
3rd Section
Toss-up Questions

Question #17: Miscellaneous – Pop Culture

10 points

The company “Strategic Investments” involved college students from MIT earning money in this activity. Ben Mezrich wrote about those students in a book that was made into a movie starring Kevin Spacey as a professor. Edward Thorp wrote the seminal book “Beat the Dealer” on how to win at this game, and within it outlined basic card counting. Name this card game in which the player tries to get to 21.

blackjack (accept **21** until the end, accept **card counting** and prompt on “gambling” until “game”)

Question #18: Literature – U.S. Literature

10 points

The plan at the center of this story’s plot was devised “during a moment of temporary apparition,” and attempted to play on the philoprogenitiveness of semi-rural communities. The title event was supposed to net two thousand dollars but ended up losing two hundred fifty dollars. That event was poorly planned by the narrator and Bill Driscoll. Name this O. Henry story in which the central figure drove the two kidnappers crazy.

“The **Ransom of Red Chief**”



Question #19: Science – Biology

10 points

This hormone and adrenaline both bind to 7TM receptors, which increases cyclic AMP, which in turn activates protein kinase A [KIH-nase A]. This hormone stimulates a process involving malate [MAL-ate] that takes place largely in the liver. The level of this hormone increases when somebody is hungry, especially during hypoglycemia [hie-poe-glie-SEE-mee-uh]. Created in the alpha cells in the islets [is-lets] of Langerhans, this hormone is inhibited by insulin. Name this chemical that stimulates the body to convert glycogen into glucose.

glucagon

Question #20: Social Studies – World History

10 points

After leaving his highest post, this leader was in charge of foreign affairs on behalf of his son Hidetada [hie-dee-tah-dah], and in that role sought to expel all Christians from his nation. Held as a hostage by both the Oda and Imagawa clans as a youth, this head of Hideyori's [hih-deh-yoh-ree's] regency council rose to power following victory over Ishida Mitsunari at the Battle of Sekhigahara [seh-kee-gah-hah-rah]. Name this founder of the last Japanese shogunate.

Tokugawa Ieyasu (accept
Matsudaira Takechiyo or
Matsudaira Motoyasu)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
4th Section
Teamwork Questions

Question #21: Science – Physics

10 points per part

An object with this initial speed will keep moving away from an object attracting it. This is the speed a projectile needs if it is going to leave Earth's orbit.		
1	Name this speed that leads to a straight, hyperbolic, or parabolic path through space.	<u>escape</u> velocity (or <u>escape speed</u>)
2	For a fixed distance from the center of the attracting object, the escape velocity varies directly with the mass of the attracting object raised to this power.	$\frac{1}{2}$ (or 0. <u>5</u> , prompt on "square root")
3	The escape velocity can be found by multiplying the speed necessary for a circular orbit by this number.	<u>square root of 2</u> (or <u>root 2</u> or <u>radical 2</u> or <u>2 to the $\frac{1}{2}$ power</u> or equivalents)

Question #22: Science – Physics

10 points per part

The confirmation that this particle has been found was announced in 2013.		
1	Name this Standard Model particle that was found at the Large Hadron Collider at CERN [sern].	<u>Higgs</u> boson (or <u>Higgs particle</u>)
2	The Higgs boson gives mass to the W and Z bosons, which are classified as this type of boson because they are force carriers.	<u>gauge</u> bosons
3	The Higgs boson is classified as this type of boson because its spin is zero.	<u>scalar</u> boson



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
4th Section
Teamwork Questions

Question #23: Literature – U.S. Literature

10 points per part

In this play, the protagonist “came into manhood” after kicking Karl Linder out of his apartment.		
1	Name this drama in which Walter was called a “toothless rat” by Beneatha for agreeing to give up on the house that Lena had put a down payment on.	A <u><i>Raisin in the Sun</i></u>
2	<i>A Raisin in the Sun</i> was written by this dramatist, who wrote of a Jewish newspaper owner becoming politically active in <i>The Sign in Sidney Brustein’s Window</i> .	Lorraine Vivian <u>Hansberry</u>
3	As the Lee family leaves the apartment for the last time, Lena makes a point of grabbing this item as the lights dim.	her <u>plant</u>

Question #24: Literature – U.S. Literature

10 points per part

The protagonist of this novel compared himself to a squirrel that ran away like a coward.		
1	Name this novel in which that feeling of cowardice left when Wilson handed over a pack of letters. After the regiment’s color-bearer is killed, the main character takes up the task.	<i>The</i> <u><i>Red Badge of Courage</i></u>
2	This author of <i>The Red Badge of Courage</i> published two collections of poems, <i>War is Kind</i> and <i>The Black Riders</i> .	Stephen <u>Crane</u>
3	In this Stephen Crane tale, the central object was compared to a bucking bronco. At one point, the cook and the correspondent argued about houses of refuge and life-saving stations.	“The <u>Open Boat</u> ”



Question #25: Mathematics – Trigonometry

10 points per part

Answer these questions about half angles.		
1	If the cosine of theta is seven ninths, this is the value of the sine of the quantity theta over two. In this problem, you should assume that the angle is in the first quadrant, so you only need to give the positive possible answer.	<u>1/3</u> (or <u>0.3 repeating</u>)
2	If the sine of theta is twelve thirteenths, and the cosine of theta is five thirteenths, this is the value of the tangent of theta over two. In this problem, you already know that the angle is in the first quadrant, so you should only give the positive answer.	<u>2/3</u> (or <u>0.6 repeating</u>)
3	The tangent of theta over two can be evaluated by subtracting this function from the cosecant [koe-SEE-kant] of theta.	<u>cotangent</u> (of) theta (do not accept “tan”gent theta)

Question #26: Mathematics – Trigonometry

10 points per part

In a triangle, a side of length 2 is across from an angle of 45 degrees.		
1	Find the length of a side in that triangle if it is across from an angle of 30 degrees.	<u>square root</u> of <u>2</u> (accept <u>root 2</u> or <u>radical 2</u> or equivalents)
2	The problem you just attempted can be solved using this law stating that within a triangle the ratio of a side length to this law’s namesake function applied to the side’s opposite angle is constant.	law of <u>sines</u>
3	Each of those ratios equal not only each other but the diameter of this circle that passes through the triangle vertices.	<u>circumcircle</u> (or <u>circumscribed circle</u>)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
4th Section
Teamwork Questions

Question #27: Social Studies – World History

10 points per part

Despite assenting to the legitimacy of it, Charles Albert of Bavaria later contested it.		
1	Name this decree that attempted to codify how Hapsburg lands were to be passed down via inheritance.	<u>Pragmatic Sanction</u> of Holy Roman Emperor Charles VI
2	Following the Treaty of Aix-la-Chappelle [aiks la shah-pel], this husband of Maria Theresa was recognized as Holy Roman Emperor.	<u>Francis Stephen</u> of Lorraine (accept <u>Francis I</u>)
3	Despite being the Hapsburg heir, this law prevented Maria Theresa from inheriting the crown. This law required potential heirs to have only males as direct ancestors.	<u>Salic</u> Law of Succession

Question #28: Social Studies – World History

10 points per part

After a violation of the Treaty of Margus, this person led attacks on the Danubian frontier which included the razing of Singidunum.		
1	Name this leader who, during his invasion of Greece, was stopped at Thermopylae [ther-MAH-pih-lay]. After murdering his brother Bleda, he aimed his forces at Lower Scythia [SIH-thee-uh] and Moesia [mee-shee-uh].	<u>Attila</u> the Hun (prompt on “Flagellum Dei” or “Scourge of God”)
2	After a number of his raids, Attila raised the rates of tribute that this empire had to pay. It was doubled via the Treaty of Margus, and tripled after Attila smashed this empires’ forces at Gallipoli [guh-lip-uh-lee].	<u>Eastern Roman</u> Empire (prompt “Roman Empire”)
3	After this sister of Valentinian III sent Attila her ring, the ruler demanded half of the Western Roman Empire as a dowry.	<u>Honorio</u>



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
5th Section
Toss-up Questions

Question #29: Science – Chemistry

10 points

These particles are emitted by radioactive static neutralizers as one of the final steps when producing paper. Already used to treat bone cancers, research is being done to attach bismuth and **actinium** [ak-TIH-nee-um] to sites near tumors to treat other cancers. These particles can cause lung cancer, most commonly doing so after the inhalation of radium. These were aimed at gold foil when the atomic nucleus was discovered by Ernest Rutherford. Name these particles equivalent to a helium nucleus.

alpha particles (or **alpha radiation**, prompt on “helium nucleus”)

Question #30: Literature – World Literature

10 points

In this story, General Monk is snuck out of England in a coffin before backing Charles the Second as King of England. An intendant in this tale rose to power following the capture of the finance minister. That finance minister learned of a plot to abduct the king at a ball put on by **Fouquet** [foo-keh]. Name this novel by Alexander **Dumas** [doo-mah] concerning an alleged twin brother of King Louis the Fourteenth.

The Man in the Iron Mask (accept *The Vicomte de Bragelonne* or *Louise de la Vallière* or *L'Homme au Masque de Fer*)



Question #31: Mathematics – Math Concepts

10 points

Some versions of the theorem named for this person have the Radius of Convergence Theorem built into them. His namesake theorem applies to functions that are smooth at $x=0$. Additionally, some versions have a term attributed to **Lagrange [lah-GRANJ]** or **Cauchy [cow-shee]** to account for errors. His theorem develops polynomials from repeatedly differentiable functions. Name this person whose namesake polynomials, a specific case of which are MacLaurin series, use derivatives and factorials to approximate a function.

Brook Taylor

Question #32: Social Studies – U.S. History

10 points

In 2000, this state saw John Ashcroft lose a Congressional election to a deceased candidate. This state saw the first Civil War battle west of the Mississippi at Wilson's Creek. Dred Scott was ruled to be a slave based on his owner's residence in this state. It gained statehood simultaneously with Maine under a namesake 1820 compromise. Name this state, the site of the 1904 World's Fair held in St. Louis.

Missouri



Extra Question #1: Literature – World Literature

10 points

In one form, this figure predicted the death of **Berlioz** [behr-lee-oze] and later hosts a ball in the dead editor's apartment. In one novel, he isolates a man trying to obtain the unobtainable, and later utilizes the Witch's Kitchen in a wager. In another wager, he offered the "empire of the mind," but was countered with the sacred texts of the Hebrews by Jesus. Name this ruler of Hell.

Satan (accept **Woland**, **Lucifer**, the **Devil**, **Diabolus**, **Beelzebub**, **Belial**, **Beliar**, or equivalents)

Extra Question #2: Mathematics – Math Concepts

10 points

Just before he died, this mathematician introduced what he called mock theta functions, which in 2012 were confirmed to be mock modular forms. The prime numbers named for this mathematician signify twofold increases in the prime counting function. A conjecture named for this person led to a conjecture named for him and Hans Petersson. Name this person who immediately recognized that 1,729 is the smallest number expressible as two different sums of cubes, an Indian whose talent was discovered by G.H. Hardy.

Srinivasa **Ramanujan**



Extra Question #3: Social Studies – World History

10 points

The paramilitary groups “Order and Freedom” and “Common Protection and Sovereignty” were organized by Michael Townley in the build-up to this event. Project FUBELT was part of this operation, which the *Tanquetazo* failed to accomplish. Carlos Prats went into exile following it, but was targeted by DINA with a car bomb. Its target allegedly committed suicide inside La Moneda. Name this event in which the Socialist President of Chile was overthrown in a military coup led by Augusto Pinochet.

the overthrow of Salvador
Allende (accept clear equivalents)

Extra Question #4: Science – Biology

10 points

This group of vertebrates included placodermi, whose heads and necks were covered by bones. Currently considered to consist of several classes, some of these vertebrates contain photophores that emit light. This group includes the agnatha, which is jawless. Some of these animals have gas bladders, and these vertebrates include **chondrichthyes** [kon-DRIK-thees] and **osteichthyes** [oh-STIK-thees]. Name these vertebrates that do not have limbs with digits and which include lampreys, rays, sharks, and guppies.

fish



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
Extra Section
Toss-up Questions

Extra Question #5: Fine Arts – Art History

10 points

This artist's portrait of a bride wearing red shows a man playing clarinet in the lower right corner and a fish in the upper right corner. He used five sections around a circle and portrayed characters from famous operas to paint the ceiling of the Paris Opera House. One of his paintings shows an upside down female violinist near a man walking away with a **scythe [sieth]**. Name this artist who showed a white goat and a green man staring at each other in his painting *I and the Village*.

Marc **Chagall**



Extra Question #6: Science – Physics

10 points per part

Forms of this equation are classified as time-dependent or time-independent.		
1	Name this equation fundamental to quantum mechanics that uses the Hamiltonian operator.	<u>Schrödinger</u> 's equation
2	The development of Schrödinger's equation was influenced by this scientist's postulate that all objects have a wave-particle duality.	Louis <u>de Broglie</u>
3	Shortly after Schrödinger developed his equation, this scientist developed his similar equation taking relativity and half spins into account.	Paul <u>Dirac</u>

Extra Question #7: Science – Physics

10 points per part

This law states that if one object exerts a force on a second object, then the second object exerts a force on the first.		
1	Name this law sometimes called the action-reaction law.	<u>Newton</u> 's <u>Third</u> Law (accept any answer that mentions Newton and three, prompt on "Third" or "3")
2	Newton's Third Law is often used to explain this type of force that propels a vehicle such as an airplane forward by pushing its fuel or its environment backwards.	<u>thrust</u>
3	Because the gravitational force of two planets affects both of them, Newton's Third Law has helped locate planets. Name the disturbance of motion in an orbit caused by something other than the central force.	<u>perturbation</u> (accept word forms)



Illinois Masonic Academic Bowl
2014 State Tournament

Round # 8
Extra Section
Teamwork Questions

Extra Question #8: Social Studies – World History

10 points per part

Its traditional beginning is traced to the 718 Battle of Covadonga.		
1	Name this campaign in which Alfonso III took Baeza and Ubeda after winning a major victory at Las Navas de Tolosa.	<u>Reconquista</u> (accept <u>Reconquest</u>)
2	The ultimate goal of the Reconquista was the expulsion of these North African Muslims from the Iberian Peninsula.	<u>Moors</u>
3	The Reconquista was completed when this queen and her husband gave significant financial backing to the conquest of Granada.	<u>Isabella</u> I of Spain (accept <u>Isabella the Catholic</u> , allow additional references to Ferdinand II of Aragon)

Extra Question #9: Social Studies – World History

10 points per part

This party's origins can be traced to its country's Peoples' Revolutionary Party.		
1	Name this party that, after taking over the government in 1975, took a page from the French Revolution in implementing "Year Zero."	<u>Khmer Rouge</u> (accept <u>Red Khmer</u>)
2	This leader of the Khmer Rouge [keh-mehr rooj] became involved in Communism while studying in France. In power, he gave himself the title "Brother Number One."	Pol <u>Pot</u> (accept <u>Saloth</u> Sar)
3	This late grandson of King Monivong was placed under house arrest by the Khmer Rouge in 1975. While in exile, led the coalition that fought against the Vietnamese invasion.	Preah Bat Samdech Preah <u>Norodom</u> Sihanouk (prompt on "Sihanouk")