

### Round 8 1st Section Toss-up Questions

#### **Question #1: Mathematics – Math Concepts**

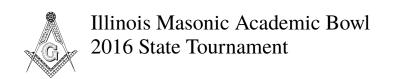
10 points

The "numbers" named for this person are numeric encodings of sentences in formal languages. This person simplified the work of von Neumann [vawn NOY-mun] and Bernays to develop an alternative to Zermelo-Fraenkel set theory. One of this person's theorems stated that a theory including a statement of its own consistency must be inconsistent. That theorem is in this person's *On Formally Undecidable Propositions in Principia [prin-CHI-pee-uh] Mathematica and Related Systems*. Name this mathematician whose most famous result can be phrased as "in any system strong enough to describe arithmetic, some statements are true but unprovable".

#### **Question #2: Literature – British Literature**

10 points

This character drank tobacco-steeped rum before	Robinson Crusoe [accept
reading a bible and throwing his calendar off track. He	either]
was forced into slavery in Sallee following his capture	
by Moors. Purchased simultaneously with Xury by a	
Portuguese man, he later became a plantation owner.	
This character made a cross and carved the date he	
arrived on an island where he fought cannibals and	
rescued Friday. Name this sailor who, in a story	
inspired by the adventures of Alexander Selkirk, is	
marooned in a novel by Daniel Defoe.	



### Round 8 1st Section Toss-up Questions

#### **Question #3: Fine Arts – Art History**

10 points

One painting by this artist shows a man holding up a dagger while he pulls a uniformed man he just stabbed head first off the back of a white horse. The Duchess of Alba, dressed in black, points to his name in the ground in one of his paintings, while another painting of the Duchess shows her in white standing next to her dog with both of them wearing a red bow. Another of his paintings is lit by a square lantern between a man holding his arms out and a firing squad. Name this artist of *The Charge of the Mamelukes* and *The Third of May 1808*.

Francisco (José de) <u>Goya</u> (y Lucientes)

### **Question #4: Science – Physics**

10 points

The power spectral density of thermal noise is proportional to temperature and this quantity. Leon Chua proposed a circuit element whose value for this quantity depends on the history of charge that has passed through it. Three elements with known values for this quantity can be used to measure the unknown value of a fourth object by assembling the four into a configuration called the Wheatstone bridge. For a wire, this quantity is proportional to length and inversely proportional to area. A complex analogue of this quantity used in alternating-current circuits is called impedance. The power dissipated by a circuit component equals the square of the current through the component squared times this property of it. Name this quantity equal to electrical potential difference divided by current, and measured in ohms.

resistance [do not accept
"resistivity"]



# Round 8 1st Section Toss-up Questions

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

10 points

One key participant in this election was quoted by Robert Novak describing the losing candidate as being for "amnesty, abortion, and acid". The source of that quote would later be backed "1000 percent" before withdrawing following revelations concerning electroshock therapy. Actions taken during this election led to Mark Felt becoming an anonymous source for Carl Bernstein and Bob Woodward under the name "Deep Throat". Name this election during which George McGovern lost to Richard Nixon, who then started his second term.

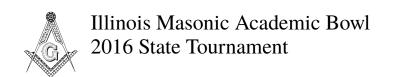
United States presidential election of <u>1972</u> [prompt on answers mentioning '<u>72</u>]

#### **Question #6: Literature – World Literature**

10 points

An actor who is supposed to be playing Jupiter takes a ladder so that he can view this character. This child of Sister Gudule [guh-dool] spared the life of a trespassing poet by agreeing to marry him. This character owned a goat that could spell out the name of her love interest. Threatened with a vise being applied to her feet, she falsely confesses to the murder of Captain Phoebus [FEE-bus], which was actually committed by Claude Frollo. Name this gypsy, the love interest of Quasimodo in Victor Hugo's *The Hunchback of Notre Dame*.

Esmeralda [accept Agnes]



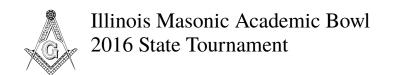
## **Question #7: Fine Arts – Classical Music & Opera**

10 points per part

Eme	erson, Lake, and Palmer performed this Modest	
Mus	ssorgsky suite.	
1	Name this suite ending with "The Great Gate of	Pictures at an Exhibition
	Kiev" that was inspired by the art of Viktor	[or Kartiniki s Veestavskee]
	Hartmann.	
2	A commonly performed version of <i>Pictures at an</i>	(Joseph-)Maurice Ravel
	Exhibition was arranged by this composer of	
	Bolero.	
3	Another popular arrangement of <i>Pictures at an</i>	Leopold (Anthony)
	Exhibition was made by this person, who	<u>Stokowski</u>
	conducted the Philadelphia Orchestra from 1912 to	
	1940.	

## **Question #8: Fine Arts – Classical Music & Opera**

This	s piano quintet in A major is number 667 in the	
Deu	tsch [doych] catalogue.	
1	Name this quintet by Franz Schubert that calls for a piano and a double bass.	Trout quintet [or Das Forellen Quintett; accept Die Forelle]
2	Give the nickname of Schubert's symphony that is usually numbered eighth. It contains two movements and a scherzo ["SCARE"-tsoh].	<u>Unfinished</u> Symphony
3	This nickname is used for Schubert's final finished symphony. English speakers often label it as his ninth symphony, but it is sometimes numbered seventh or eighth.	The <b>Great</b> C Major



## **Question #9: Science – Biology**

10 points per part

The	se compounds undergo beta oxidation to produce	
ener	·gy.	
1	Name these compounds which join with glycerol	fatty acids [prompt on
	[GLIS-ur-awl] to form triglycerides	carboxylic acids]
	["try"-GLISS-ur-"ides"].	
2	One of the products of beta oxidation is this	acetyl-CoA [uh-SEE-tul
	thioester ["thigh-oh-ester"], which consists of a	KOH-ay] or acetyl
	two-carbon group bound to a certain coenzyme	<u>coenzyme A</u>
	[koh-"enzyme"].	
3	The two carbons of the acetyl in acetyl-CoA are	<u>oxaloacetate</u>
	added to this compound at the beginning of the	["OX"-uh-loh-"ASS"-ih-tayt]
	Krebs cycle. In C4 plants, PEP carboxylase [P-E-P	
	kar-"BOX"-ih-"lace"] forms this molecule from	
	pyruvate ["pie"-ROO-vayt] and carbon dioxide.	

## **Question #10: Science – Biology**

This structure is composed of a fibrillar [FIR-ril-ur]

	structure is composed of a normal [PID-III-ul]	
cent	er, dense fibrillar component, and a granular	
com	ponent.	
1	Name this structure within the nucleus.	<u>nucleolus</u>
		[nook-lee-OH-luss] [or
		nucleoli; do not accept
		"nucleus" or "nuclei"]
2	These nucleolar accessory bodies help process	Cajal [kah-HAHL] body/ies
	RNA produced in the nucleolus. They are named	
	for their Spanish discoverer.	
3	The nucleolus is where these organelles are	<b>ribosome</b> s
	produced that are responsible for translation and	
	stud the rough endoplasmic reticulum.	



## **Question #11: Mathematics – Geometry**

10 points per part

An	exterior angle of a regular type of this polygon	
mea	sures 36 degrees.	
1	Name these polygons that have 10 sides.	(regular) <u>decagon</u> s
2	Find the angle measure in degrees of an <i>interior</i>	144 degrees
_	angle of a regular decagon.	<u> </u>
3	How many diagonals does a convex decagon have?	35 diagonals

## **Question #12: Mathematics – Geometry**

addi of co	s theorem, also known as the SAS inequality, resses the situation when two triangles have a pair ongruent sides, but the angle between them is not gruent.	
1	Name the theorem stating that if side $PQ$ is congruent to $XY$ , side $QR$ is congruent to $YZ$ , and angle $PQR$ is greater than angle $XYZ$ , then side $PR$ is greater than $XZ$ .	hinge theorem [or open mouth theorem]
2	If two sides of a triangle are each 6 units long, and the angle between them is 60 degrees, then how long is the other side of the triangle?	<u>6</u> units
3	If two sides of a triangle are each 6 units long, and the angle between them is 90 degrees, then how long is the other side of the triangle?	6 root 2 units [or 6 times the square root of 2 or 6 radical 2 units or equivalents]



### **Question #13: Literature – British Literature**

10 points per part

Tho	ugh he did not create this character, Anthony	
Burg	gess wrote that the inspiration for this character	
cam	e from posters depicting J. M. Bennett.	
1	Name this English Socialist Party leader, who was	Big Brother
	also the leader and the guardian of the Revolution.	
2	This employee of the Ministry of Truth could not	Winston Smith [accept
	distinctly remember when Big Brother rose to	either]
	power. Mr. Charrington trapped him and Julia, and	
	he betrayed his lover once a cage of rats was placed	
	on his head.	
3	Winston Smith is the protagonist of this dystopian	Nineteen Eighty-Four
	George Orwell novel.	

#### **Question #14: Literature – British Literature**

	ch to the chagrin of Jabez Wilson, it was dissolved	
on (	October 9, 1890.	
1	Name this fictional organization that hired Jabez to	The <b>Red-Headed</b> League
	copy out of the Encyclopedia Britannica, which	
	was a pretext for Vincent Spaulding and John Clay	
	to burrow an underground tunnel to a nearby bank.	
2	The elaborate robbery of the City and Suburban	Sherlock Holmes [accept
	Bank was foiled by this detective.	either]
_		
3	After capturing the criminals, Holmes misquotes a	Gustave Flaubert
	line from a letter to George Sand written by this	["flow-bear"]
	author of <i>Madame Bovary</i> .	



### Round 8 3rd Section Toss-up Questions

## **Question #15: Miscellaneous – Popular Culture**

10 points

This channel teamed up with the BBC for the first	MTV [accept Music
season of Liquid Television, and it aired the cartoons	<u>Television</u> or <u>Music TV</u> ]
Clone High and Daria. Carson Daly made his big	
break hosting this channel's top-10 show <i>Total Request</i>	
Live. One of its shows, about a woman looking for her	
biological family, is <i>Finding Carter</i> . Two of this	
channel's annual award shows use golden popcorn and	
a moonman as trophies. This channel airs 16 and	
<i>Pregnant.</i> Name this home of the reality series <i>Jersey</i>	
Shore, which started out in 1981 as a station that	
showed music videos.	

## **Question #16: Science – Astronomy**

10 points

Attempts to explain this object's rotational period of	<u>Haumea</u>
less than four hours have focused on a graze-and-merge	
collision between two objects roughly equal in size.	
This object is believed to be in a 7:12 ["seven to	
twelve"] orbital resonance with Neptune. This object's	
high albedo [al-BEE-doh] is attributed to a surface of	
water ice. Its rotational speed explains why this	
ellipsoidal object has not become approximately	
spherical. The moons of this object are Hi'iaka	
["high"-ee-AH-kah] and Namaka [nah-MAH-kah].	
Name this fifth object to be classified as a dwarf planet,	
receiving the classification just after Makemake	
[mah-kay-mah-kay].	



# Round 8 3rd Section Toss-up Questions

#### **Question #17: Social Studies – World History**

10 points

In Life of Aristeides [ar-iss-TAY-uh-deez], Plutarch [PLOO-tark] described the perversion of this process, citing an agreement between Alcibiades [al-sih-BYE-uh-deez] and Nicias [NISH-ee-uss]. It was introduced due to the actions of Hippias ["hippie-us"], and the first person affected by it was a son of Charmus [KAR-muss] named Hipparchus [hip-ARK-uss]. This process was only successful if there were at least 6,000 votes cast; those votes were cast on pieces of broken pottery. Name this ancient practice of expelling a citizen from Athens for 10 years.

ostracism [accept word
forms; do not accept "exile"
or "banishment"]

#### **Question #18: Literature – U.S. Literature**

10 points

In one work, this writer described an object that "has the power to kill without the power to die" and whose speaker is a "deadly foe", as "none stir the second time." This person wrote of a creature that appeared between the speaker and the light, with a "blue, uncertain, stumbling buzz". This poet also described seeing schoolchildren "at recess in the ring" and a house "that seemed a Swelling of the Ground" while in a carriage that "held Immortality". Name this writer of "Because I Could not Stop For Death", a poet from Amherst.

Emily (Elizabeth) **Dickinson** 



## Round 8 3rd Section Toss-up Questions

## **Question #19: Science – Biology**

10 points

The gene TSIX ["T six"] controls the formation of	Barr bodies [do not prompt
these structures by opposing the action of the effector	on "X chromosome(s)"]
protein XIST ["exist"]. Bruce Beutler's [BOYT-lur'z]	
investigation of women heterozygous	
["hetero"-ZY-guss] for G6PD [G "six" P-D] deficiency	
supported the existence of these structures. Mary	
Lyon's hypothesis explained the formation of these	
structures, which is sometimes called lyonization. The	
randomness of which objects undergo this process	
causes the pattern of calico cats. Women typically have	
one of these per cell, while men usually have none.	
Name these inactivated X chromosomes.	

## **Question #20: Social Studies – U.S. History**

10 points

Thomas Edison improved on this man's creation with	Samuel (Finley Breese)
the Quadriplex system, while Ezra Cornell improved	<u>Morse</u>
the insulation for a key component of his creation.	
During the Whig nominating convention where Clay	
and Freylinghuysen [FREE-ling-hie-sun] were	
victorious, he bested a railroad in a race by two hours.	
This person's main invention improved on a system	
based on five magnetic needles, invented by Cooke and	
Westinghouse, and was used to send to Albert Vail the	
message "what hath God wrought" from Baltimore,	
then to relay it back to this man. Name this inventor of	
the single-wire telegraph and the "code" it used.	



### **Question #21: Literature – U.S. Literature**

10 points per part

This	act was the subject of a poem "copied out of a	
loos	e paper", and it resulted in the loss of both pelf	
and	store.	
1	Occurring at night on July 10, 1666, the speaker	<b>burning</b> of the <b>house</b> of
	looked on the bright side of this event, saying "The	Anne Bradstreet [accept
	world no longer let me love. My hope and treasure	equivalents or "Verses upon
	lie above."	the Burning of our House,
		July 10th, 1666"]
2	Anne Bradstreet's house burned down in this state,	Massachusetts
	the setting of <i>The Scarlet Letter</i> and <i>The Crucible</i> .	
3	the setting of <i>The Scarlet Letter</i> and <i>The Crucible</i> .  In a quaternion [kwuh-TER-nee-un], Bradstreet	Ages of Man [accept "Four
3		Ages of Man [accept "Four Ages of Man"; prompt on
3	In a quaternion [kwuh-TER-nee-un], Bradstreet	- 1
3	In a quaternion [kwuh-TER-nee-un], Bradstreet described the first of these stages as "son of	Ages of Man"; prompt on

## **Question #22: Literature – U.S. Literature**

He g	grew to love being in a hospital setting while	
stati	oned at Lowery Field, Colorado.	
1	Name this character who used the pseudonym	(Captain) (John) <b>Yossarian</b>
	Washington Irving while censoring letters. One of	
	his superiors used the same name and occasionally	
	reversed it.	
2	Yossarian attempts to weasel his way out of flying	Catch-22
	combat missions in this novel by Joseph Heller.	
3	Noting its brevity, Major Major Major Major	John <u>Milton</u>
	switched from using the name "Washington Irving"	
	to the name of this British poet, occasionally	
	reversing his name as well.	



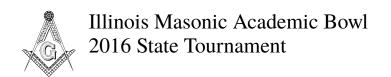
## **Question #23: Mathematics – Trigonometry**

10 points per part

	equals the sin of $y$ , then for a particular set of its, $y$ equals this function of $x$ .	
1	Name this function on x whose derivative equals one divided by the square root of the quantity one minus x squared.	<pre>arcsine (of x) [prompt on answers containing inverse sine but do not prompt on sine]</pre>
2	Give the largest number in the domain of the arcsine function.	one
3	Evaluate the arcsine of negative one-half. Give your answer in radians between negative pi divided by 2, and positive pi divided by 2.	negative pi over 6 [or negative one-sixth (times) pi; accept divided by in place of "over"; do not prompt on partial answers]

## **Question #24: Mathematics – Trigonometry**

This	s angle is used to describe the sight line of an	
obse	erver who is looking upward, but not straight up.	
1	Give the name for the angle between the horizontal and the upward line of sight.	angle of <u>elevation</u> [accept angle of <u>altitude</u> ]
2	If the sine of the angle of elevation to the Sun is three fifths, find the length of the shadow cast by a person who is 120 centimeters tall. Give the height in centimeters.	160 centimeters
3	If the angle of elevation to the Sun is 30 degrees, what is the ratio of the length of a shadow cast to the height of the object casting the shadow?	root 3 [or the square root of 3 or radical 3; do not accept "3"]



## **Question #25: Social Studies – World History**

10 points per part

forth thes	mrao Ambedkar [BIM-rao ahm-BED-kar] put n 22 vows with which hundreds of thousands of e people converted to Buddhism, and he strongly ocated for reserved legislative seats for them.	
1	Name these people whose rights were supported by Namdeo Dhasal, who helped found a Panther organization to agitate for their rights.	Dalits people [or Untouchables or Scheduled or Harijan or Panchamas or or Asprushya]
2	In 1997, Kocheril Narayanan became the first Dalit elected to this office.	President of India
3	This pacifist leader coined the term "Harijan", or "Children of God", for Dalits. During a prayer, this person was assassinated by Nathuram Godse.	Mohandas (Karamchand) Gandhi [accept Mahatma Gandhi; prompt on Gandhi]

## **Question #26: Social Studies – World History**

This	s nation gained territory from Bolivia in the Chaco	
[CH	[AH-koh] War.	
1	Name this country led by Alfredo Stroessner for	(Republic of) Paraguay [or
	much of the 20th century. Francisco Solano López	República del <u>Paraguay</u> ]
	led this country in a war in which it failed to	
	capture Mato Grosso [MAH-toh GROH-soh].	
2	In this conflict, Paraguay was soundly defeated by	War of the <b>Triple Alliance</b>
	Brazil, Uruguay, and another country. It came to an	[prompt on <b>Paraguayan</b>
	end following Francisco Solano López's death at	War]
	Cerro Cora [SAIR-oh KOH-rah].	
3	When Francisco Solano López was in a dispute	Argentina
	with Brazil, this country's president Bartolomé	
	Mitre [bar-TOH-loh-MAY MEE-tray] joined with	
	Brazil and Uruguay to form the Triple Alliance.	



## **Question #27: Science – Physics**

10 points per part

This	field of mathematics incorporates the principle	
of le	ast action used in Lagrangian [luh-GRAN-jee-un]	
mec	hanics.	
1	Name this field in which functionals are optimized	calculus of variations [or
	by solving their associated Euler-Lagrange [OY-lur	variational calculus; do not
	luh-GRAHNJ] equation.	prompt on partial answers]
2	This operator represents total energy, and lends its	Hamiltonian operator
	name to a formulation of mechanics.	
3	The equations of motion in Hamiltonian mechanics	linear <b>momentum</b> [prompt
	can be found by considering the Hamiltonian as a	on <b>p</b> ; do not accept "angular
	function of three quantities, including this product	momentum"]
	of mass and velocity.	
	· · · · · · · · · · · · · · · · · · ·	

## **Question #28: Science – Physics**

	of the laws named for this man states that an ct in motion will continue moving if no forces act n it.	
1	Identify this namesake of three laws of motion.	Isaac Newton
2	In Newton's cannonball thought experiment, an object will leave the orbit of the earth if it exceeds this speed, which for a spherically symmetric body is equal to the square root of the quantity 2 times the universal gravitational constant times mass over radius.	escape speed [accept escape velocity]
3	Newton's rings are an interference pattern that appear when light is reflected between surfaces with these two shapes.	flat [or planar or plane] and spherical [or sphere; prompt on round] [either order]



# Round 8 5th Section Toss-up Questions

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

10 points

This act's perpetrator asserted that its target was "dumb", but being dumb "wasn't against the law". Immediately before this event, Joseph Martin read a letter in which one party wrote "there is no substitute for victory." This event resulted in the promotion of Matthew Ridgway. Shortly afterwards, the target of this event gave the "Old Soldiers Never Die" speech to a joint session of Congress. Name this controversial action towards an Army General by a sitting President during the Korean War.

Harry Truman **firing**Douglas **MacArthur** [accept similar answers mentioning **MacArthur** and the notion of firing or dismissal or relief of duties]

#### **Question #30: Literature – World Literature**

10 points

The person who describes this location states "My solitude is cheered by that elegant hope." The contents of this location can be broken down into 25 characters. One group of its employees, the "Purifiers", seeks out a crimson area, while others seek out the perfect index. This place consists of hexagonal rooms whose contents are 410 pages long and can be used to write any literary work. Name this fictional book depository created by Jorge Luis Borges [HOR-gay loo-EESS BOR-hayss] whose name references a Biblical tower.

the <u>Library of Babel</u> [or La <u>biblioteca de Babel</u>; prompt on "Universe" or "Library"]



# Round 8 5th Section Toss-up Questions

#### **Question #31: Science – Chemistry**

10 points

The presence of one of these ligands results in a weak stretch in the 1600-to-2000-inverse-centimeter range in an IR spectrum. DIBAL ["DIE-ball"] is a reagent that donates this group. Along with alkyl [AL-kul] shifts, this ion commonly shifts in carbocation [KAR-boh-"CAT-ion"] rearrangements. LAH [L-A-H] and a compound consisting of sodium bound to boron bound to this anion ["AN-ion"] are reducing agents that work by donating this ion. Name this monatomic [MAHN-"atomic"] anion whose formula is H<sup>-</sup> ["H minus"].

**hydride** ion [accept  $H^-$ ] before the end; prompt on **hydrogen** ion; do NOT accept "H+""]

### **Question #32: Mathematics – Math Concepts**

10 points

The inequality named for this person states that the quantity one plus x, end quantity, raised to the n power, is greater than or equal to one plus n times x. This person's "golden theorem" is an early version of the law of large numbers. His book  $Acta\ Eruditorum$  described lemniscates [LEM-nih-"skates"]. The processes and trials named for this person, like the algebra named for George Boole, can have two possible outcomes. Name this mathematician whose nephew Daniel used the conservation of energy to develop a law describing the flow of a fluid.

#### Jakob Bernoulli



# Round 8 Extra Section Toss-up Questions

### Extra Question #1: Social Studies – World History

10 points

This island country is where Olaf Frederick Nelson led the "Mau" movement in response to efforts to undermine the power of local chiefs, called *matai*. Despite allegations of negligence during the influenza epidemic, the League of Nations granted New Zealand a mandate over this nation. A typhoon struck this area in 1889, averting an armed conflict between the United States, UK, and Germany. This country is now headed by Tufuga Efi [too-FOO-gah eh-FEE]. Name this Pacific Island nation whose capital is Apia.

Western <u>Samoa</u> [do not accept <u>American Samoa</u>]

## Extra Question #2: Fine Arts – Art History

10 points

One artist in this movement painted another artist in this movement smoking a pipe that is easy to see in front of the subject's white shirt but difficult to see in front of his red and yellow face. That painting by Maurice de Vlaminck shows the painter of *Landscape near Cassis* and *Fishing Boats, Collioure* ["coal"-yoor]. Another artist in this movement painted *Le bonheur de vivre* [lay "bone"-ur day vee-vruh]. Members of this movement built on the strong colors used by post-Impressionists such as Vincent van Gogh. Name this French movement that included Andre Derain and Henri Matisse [awn-ree mah-tees], whose name means "wild beasts".

Fauvism or Fauvist
movement [or les Fauves
[lay fohv]]



# Round 8 Extra Section Toss-up Questions

### Extra Question #3: Mathematics – Math Concepts

10 points

The numbers named for this person equal the number of Boolean functions for a given number of variables. The fact that any set of real numbers has a least upper bound is the type of completeness named for this mathematician. This person and Georg [GAY-ork] Cantor are the namesakes of the axiom that real numbers correspond to points on a line. Another process named for this person defines the real numbers by creating two subsets of the rational numbers, one of which has an upper bound. Name this German number theorist who formally constructed the set of real numbers using namesake "cuts".

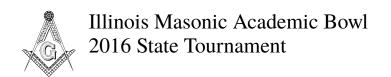
(Julius Wilhelm) Richard **Dedekind** [REEK-hart DAY-day-keent]

#### Extra Question #4: Literature – World Literature

10 points

This person wrote a series of dialogues that took place "in the presence of The Lady Truth"; St. Augustine criticizes his own faith in this author's *Secretum*. This writer used Latin hexameter in an epic poem about the Second Punic War, *Africa*. One of his collections has sections called "In Life" and "In Death", divided by the passing of a woman whom this author met in Avignon [a-veen-yawn]. The rhyme scheme ABBA ABBA CDE CDE [A-A-B-A (pause) A-B-B-A (pause) C-D-E (pause) C-D-E] characterizes this poet's namesake type of sonnet, also called the Italian sonnet. Name this author who wrote about his love Laura in *Il Canzoniere* [eel kahn-zoh-nee-AIR-ay].

Petrarch [or Francesco Petrarca]



# Round 8 Extra Section Toss-up Questions

## Extra Question #5: Science – Biology

10 points

The product of zeta potential and relative permittivity	gel <b>electrophoresis</b>
is proportional to a form of mobility used when	
performing this technique in a capillary. When	
performing this technique, a reference ladder may be	
used, and will result in logarithmic spacing. Isoelectric	
["EYE-so-electric"] focusing is done with a 2D version	
of this technique, which includes SDS-PAGE	
[S-D-S-"page"]. The results of this technique may be	
transferred to a membrane and hybridized in a Southern	
blot. Ethidium bromide [eh-THID-ee-um	
BROH-myde] and UV [U-V] light are commonly used	
to view the results of this technique, which are a series	
of bands that migrate out from wells. Name this	
technique in which particles are separated by size by	
applying an electric field.	



## Extra Question #6: Social Studies – World History

10 points per part

	was the actual ruler during the presidencies of los Mendieta and José Barnet.	
1	Name this person who gained power in a 1952 coup, cancelling an election he probably would have lost. He fled his country early in 1959 after losing the Battle of Santa Clara.	(Rubén) Fulgencio <u>Batista</u> (Zaldívar)
2	Another candidate in the 1952 elections was this young lawyer. In 1953, he failed to spark an uprising with an attack on the Moncada military barracks.	Fidel (Alejandro) <u>Castro</u> (Ruz) [prompt on <u>Castro</u> ]
3	Fidel and this man, his brother, began planning the successful 26th of July movement while in prison for the Moncada attack.	Raúl (Modesto) Castro (Ruz)

### Extra Question #7: Social Studies – World History

Afte	er his mother died, this person instituted a	
year	-long ban on milk consumption, and pregnant	
won	nen were killed alongside their husbands.	
1	Name this African leader credited with introducing	<u>Shaka</u> Zulu [or <u>Shaka</u>
	the buffalo horn formation. He also had his soldiers	kaSenzangakhona; prompt
	carry color-coded shields to indicate their position	on <b>Zulu</b> ]
	within the formation.	
2	Shaka was born and died in what is now this	(Republic of) South Africa
	country.	[prompt on "RSA"]
2		T 1 (C 11 11 1 1 1 1 1
3	This person of Zulu heritage became the president	Jacob (Gedleyihlekisa)
	of South Africa in 2009 and maintained power with	<b>Zuma</b>
	the 2014 election.	



## Extra Question #8: Science – Physics

10 points per part

This quantity's conjugate variable is temperature.		
1	Name this quantity symbolized <i>S</i> , which represents the disorder of a system.	entropy
2	Entropy, like volume and particle number, is this sort of variable whose size scales with the system's.	extensive quantity/ies or extensive variables
3	By taking the mixed partial derivatives of the thermodynamic potentials and considering the symmetry of second derivatives, these equations—which relate the partials of temperature, volume, pressure, and entropy—can be obtained.	Maxwell('s) relations [do not accept "Maxwell's equations"]

## Extra Question #9: Science – Physics

LC circuits display behavior analogous to these		
mechanical systems.		
1	Name these systems that demonstrate undamped sinusoidal motion, such as a mass on a spring without friction.	simple harmonic <u>oscillators</u> [or <u>SHO</u> s; accept <u>simple</u> harmonic motion or <u>SHM</u> ; do not accept or reveal answers mentioning "damped"]
2	Resistance or friction causes a harmonic oscillator to demonstrate this behavior, in which its amplitude decays.	damping [accept dampening]
3	The size of this value, equal to the resonant frequency over the bandwidth, can characterize how damped an oscillator is.	Q factor or quality factor