

# **MASONIC STATE TOURNAMENT 2012**

**These questions were used at the Masonic State Tournament on March 3, 2012. They should not be used for any other interscholastic competitions.**

**These questions were written by David Reinstein and Donald Taylor. Taylor wrote the Brit Lit, World Lit, Religion, and Mythology, and Reinstein wrote the rest.**



**Question #1: Literature & Language Arts – Mythology**

*15 points*

<p>When Procris attempted to utilize one of these animals, it ended up being turned to stone. One of these animals accompanied Yudhisthira to heaven and was actually a god in disguise. One of these was given to Europa that never missed its prey until it encountered the Teumissian fox. If a person gave bread to the poor, one of these animals could be appeased with cake; that creature guards the entrance to Helheim, and similarly Anubis had the head of this animal. Identify this animal, one of which has three heads and guards Hades, Cerberus.</p>	<p>dog (accept hound or jackal, do not accept wolf)</p>
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**Question #2: Mathematics – Conceptual Question**

*15 points*

<p>This person's name is associated with the quartic curve consisting of two ovals and with the graph of the equation <math>x^3+y^3-3axy=0</math>, which is easier to graph in polar coordinates and is asymptotic to a line with a slope of negative one. He also devised a method to determine the maximum number of positive and negative roots for a polynomial, his rule of signs. Name this mathematician whose work influenced Newton and Leibniz when they discovered calculus and who is generally considered to be the founder of analytic geometry, which is why a common name for the coordinate system is based on his name.</p>	<p>(René) Descartes (prompt Cartesian)</p>
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**Question #3: Science – Astronomy**

*15 points*

<p>A superflare from this object was detected in April 2011, and it is located in the visible night sky near Zeta Tauri. In 2003, Saturn passed between the Earth and this object, allowing for the study of the moon Titan, and each June its position creates good images of the Sun's corona. The name of this object came about because of a drawing by the Earl of Rosse, and it is the first object in the Messier Catalogue. A pulsar located near its center emits an enormous amount of radiation, including X-rays. Name this remnant of a supernova that was observed on Earth during the 11th century.</p>	<p>Crab Nebula (prompt Crab or Nebula)</p>
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**Question #4: Social Studies – U.S. Government**

*15 points*

<p>Laws with this name passed in 1941 and 1942 were based on the Overman Act and allowed the government to censor mail. The current law with this name was passed over the veto of Richard Nixon in 1973. It requires Congressional notification within forty-eight hours of certain Presidential actions which should be followed by Congressional approval within sixty days, but this law was ignored by President Clinton in Kosovo and President Obama in Libya. Name this resolution which limits the ability of a President to carry out military actions.</p>	<p>War Powers (Act or Resolution)</p>
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**Question #5: Literature & Language Arts – U.S. Literature**

15 points

<p>A play by this writer deals with Lyle Britten shooting Reverend Meridian Henry's son Richard. A novel by this author is about depressed drummer Rufus Scott. In addition to <i>Blues for Mister Charlie</i> and <i>Another Country</i>, this author wrote essays such as <i>Notes of a Native Son</i> and <i>Down at the Cross</i>, the latter of which was published in <i>The Fire Next Time</i>. Name this African American author who wrote about John Grimes in the semiautobiographical novel <i>Go Tell It on the Mountain</i>.</p>	<p>(James) Baldwin</p>
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**Question #6: Fine Arts – Music Theory**

15 points

<p>This composition technique can be indicated by the Latin phrase <i>per arsin et thesin</i>, such as in Bach's <i>The Art of Fugue</i>. This term is used to describe a musical canon when the follower moves in contrary motion to the leader, and the contrapuntal type involves the high voice changing places with the low one. It also describes chords when the root is not in the bass position, and its use changes an augmented interval into a diminished interval. Give this term which describes a change in melody from rising intervals to descending intervals.</p>	<p>Inversion (accept Inverted or equivalents, accept Counterpoint on a buzz before the word Contrapuntal is completed, prompt Counterpoint after that)</p>
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**Question #7: Mathematics – Analytical Geometry**

*10 points per part*

Given a set of points, find the area of the polygon that has those points as vertices:		
1	(0,0), (5,2), and (0,8)	20
2	(4,0), (0,4), (-4,0), and (0,-4)	32
3	(2,0), (4,0), (4,6), (0,6), and (0,2)	22

**Question #8: Mathematics – Analytical Geometry**

*10 points per part*

There are two vectors, one with displacement (1,2,3) and the other with displacement (3,2,1). A triangle is formed by placing the tails of those two vectors at the origin, with those two vectors as two of the sides and the segment connecting their tips as the third side.		
1	Find the magnitude of either one of the original vectors. They have the same magnitude.	$\sqrt{14}$
2	Find the magnitude of the third side of the triangle.	$2\sqrt{2}$
3	Find the area of the triangle.	$2\sqrt{6}$



**Question #9: Science – Chemistry**

*10 points per part*

Answer these questions about the filling of atomic orbitals:		
<b>1</b>	What German word meaning ‘building up’ is used to describe the way orbitals are filled?	Aufbau
<b>2</b>	The name of which German scientist is associated with the N plus L rule which is used to determine which orbitals fill first?	(Erwin) Madelung
<b>3</b>	Which German scientist devised three rules, starting with the rule that the term with maximum multiplicity has the lowest energy level?	(Friedrich) Hund

**Question #10: Science – Chemistry**

*10 points per part*

Answer the following questions about monosaccharides:		
<b>1</b>	What general chemistry term is used for molecules such as glucose and fructose which have the same molecular formula but different structural formulas?	Isomer(s)
<b>2</b>	What is the chemical formula of both glucose and fructose?	$C_6H_{12}O_6$
<b>3</b>	What is the name of the type of covalent bond used between two monosaccharides to form a disaccharide?	Glycosidic (Bond) (accept Glycoside)



**Question #11: Social Studies – U.S. History**

*10 points per part*

Name these acts of the British Parliament that were unpopular in the American colonies:		
<b>1</b>	This is the popular name of the Duties in American Colonies Act of 1765 that required many printed materials to have an adhesive label attached showing a tax was paid.	Stamp (Act)
<b>2</b>	This act passed when the act in Part A was repealed. It stated that Britain had full authority to make laws for the American colonies.	Declaratory (Act)
<b>3</b>	This name is attached to a series of acts passed in the late 1760s. It is the name of the person who was Chancellor of the Exchequer.	(Charles) Townshend (Acts)

**Question #12: Social Studies – U.S. History**

*10 points per part*

Identify these Supreme Court Justices:		
<b>1</b>	This former President served as Chief Justice throughout the 1920s.	(William Howard) Taft
<b>2</b>	This justice served as Chief Justice from 1836 to 1864 and wrote the Dred Scott decision.	(Roger) Taney
<b>3</b>	This justice was promoted to Chief Justice in 1941 after consistently supporting Franklin Roosevelt.	(Harlan Fiske) Stone



**Question #13: Literature & Language Arts – World Literature**

*10 points per part*

Answer the following concerning a fictional plague in the city of Oran in Algeria.		
1	The plague was written about by this author.	(Albert) Camus
2	This physician had his wife sent to a sanatorium prior to the quarantine. Among his patients is Father Paneloux, who ends up dying.	(Dr.) Bernard Rieux (accept either name)
3	This journalist is unable to return to Paris due to the quarantine. He finds an opportunity to flee, but stays to volunteer.	Raymond Rambert (accept either name)

**Question #14: Literature & Language Arts – World Literature**

*10 points per part*

Identify the following from the fiction of Leo Tolstoy.		
1	Due to his lack of interest in marriage, Kitty chooses Levin over this nobleman. His lover eventually throws herself under a train.	(Count Alexey Kirilich) Vronsky (prompt on Alexei)
2	Set during the War of 1812, one figure in this novel joins the army, only for his wife Lisa to die giving birth while he is away. In the end, Andrey dies from his wound at Borodino.	<i>War and Peace</i> (accept <i>Voyna i Mir</i> )
3	One work set in this city features a speaker who depicts war in its authentic expression – as blood, suffering, and death.	Sevastopol (accept Sebastopol or Sevastopolskiye)





**Question #15: Science – Health**

*15 points*

<p>The impact of an overdose of this substance is tracked using a Rumack-Matthew nomogram, and if caught quickly an overdose of this chemical can be treated with Mucomyst. Classified as an anilide analgesic and antipyretic, this chemical is combined with Oxycodone to make Percocet or with Hydrocodone to make Vicodin. It can be given on an alternating every three hour basis with Ibuprofen. Name this active ingredient in Tylenol.</p>	<p>Acetaminophen (or Paracetamol, prompt Tylenol)</p>
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**Question #16: Miscellaneous – Consumer Education**

*15 points*

<p>Until 1978, this was covered in US Law by the Nelson Act, and the current law has separate provisions for families, farmers, and fishermen. A 2005 law made it more difficult for people to increase their exemptions by switching states or buying homes before gaining this status, and that law also introduced counseling and education requirements. One type of this status is called business reorganization, which is commonly referred to as Chapter 11. Give this term which refers to people or organizations unable to repay their debts.</p>	<p>Bankrupt(cy) (prompt Insolvent or Insolvency)</p>
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**Question #17: Mathematics – Conceptual Question**

*15 points*

<p>These points exist where the Hessian determinant of a function is negative, which is the determinant of the matrix of second partial derivatives. Contour lines seem to cross each other at these points, and one of these points can be found on a hyperbolic paraboloid. Name these points on surfaces in three-dimensions characterized by zero first derivatives which increase in some directions and decrease in others.</p>	<p>Saddle (points)</p>
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**Question #18: Social Studies – Current Events**

*15 points*

<p>An Islamist group in this country linked to one of its Senators, Mohammed Ali Ndume (en-DOO-may), is commonly referred to as Boko Haram. A secessionist group in this country wants to revive a divide which almost took place during the late 1960s led by the late Chukwuemeka Odumegwu Ojukwu in Biafra. Umaru Yar'Adua was recently replaced by Goodluck Jonathan as the President of this nation. Name this most populous nation in Africa whose capital is Abuja.</p>	<p>Nigeria</p>
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**Question #19: Science – Physics**

15 points

<p>Approximately one second after the Big Bang, these particles greatly reduced their interactions with baryons, a time known as their decoupling, and they now interact almost exclusively through the weak force. The antiparticle corresponding to this particle was discovered by Cowan and Reines by observing its interactions with protons to create neutrons and positrons. The three types of this lepton are the tau, the muon, and the electron types. Name these elementary subatomic particles that are very good at passing through matter.</p>	<p>Neutrino(s)</p>
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**Question #20: Literature & Language Arts – World Literature**

15 points

<p>In a competition for the butt of a cigarette in this novel, it is given to the one who neither begs for it nor stares at the smoker. At dinner, one figure is seen with a bloody face and tears. A minor figure in this novel is a Baptist who believes he was called to suffer for the sake of Jesus Christ. A piece of a hacksaw blade is hidden, to be used later in the repairing of shoes. A group in this novel is ordered to build a brick wall, and uses a piece of felt to stay warm. The title character, who also goes by Shukov, is “let off” by being forced to mop the guardhouse. Set in a Soviet gulag on New Year’s Day, name this novel by Alexander Solzhenitsyn that takes place within a 24-hour time frame.</p>	<p><i>One Day in the Life of Ivan Denisovich</i> (or <i>Odin den Ivana Denisovicha</i> or <i>A Day in the Life of Ivan Denisovich</i>)</p>
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**Question #21: Science – Biology**

*10 points per part*

Answer these questions about nerve cells:		
<b>1</b>	What one-word term is commonly used for nerve cells?	Neuron(s)
<b>2</b>	Which cells protect nerve cells in many ways, including the production of myelin?	Glia (or Glial Cells, or Neuroglia)
<b>3</b>	What name is given to the gaps in the myelin sheath?	Node(s) of Ranvier (prompt node(s))

**Question #22: Science – Biology**

*10 points per part*

Answer these questions about muscles:		
<b>1</b>	What is the name for the tissue where muscles attach to bones?	Tendon (prompt Sinew or Aponeurosis)
<b>2</b>	Which protein binds to actin during muscle contraction?	Myosin
<b>3</b>	After binding actin, that protein is then bound by what molecule, causing the release of the actin?	ATP (or Adenosine triphosphate, do not accept ADP or Adenosine diphosphate)



**Question #23: Social Studies – World History**

*10 points per part*

Identify these military victories by Arthur Wellesley, 1st Duke of Wellington:		
<b>1</b>	This battle in present-day Belgium was the final victory over Napoleon.	Waterloo
<b>2</b>	This war from 1807 to 1814 was another victory over Napoleon. Great Britain and Portugal were soon joined by Spain.	Peninsular War (or Campaign)
<b>3</b>	As part of that war, Wellington was promoted to field marshal for this battle, which resulted in Napoleon's brother Joseph fleeing Spain.	Vitoria

**Question #24: Social Studies – World History**

*10 points per part*

Name these Nobel Peace Prize winners from South Africa:		
<b>1</b>	This person shared the prize with Frederik Willem de Klerk, his predecessor as South African President. He had earlier served twenty-seven years in prison.	(Nelson) Mandela
<b>2</b>	During the Apartheid era, this bishop set conditions which other nations were supposed to demand before investing in South Africa.	(Desmond) Tutu
<b>3</b>	The first African to win the prize, this man led the African National Congress from 1952 to 1967.	Albert Lutuli (or Mvumbi)



**Question #25: Literature & Language Arts – Vocabulary**

*10 points per part*

Identify these words that start with the same four letters:		
<b>1</b>	Like a philanthropist, somebody who gives financial assistance to an individual or organization	benefactor
<b>2</b>	Helpful or good, the opposite of detrimental	beneficial
<b>3</b>	Well meaning and kindly	benevolent

**Question #26: Literature & Language Arts – Vocabulary**

*10 points per part*

Identify these words with the same root as each other:		
<b>1</b>	A decision, especially in a legal case delivered by a judge or jury	verdict
<b>2</b>	Allege, affirm, or assert to be true; this is a four-letter word	aver
<b>3</b>	The appearance of truth; this is a fourteen-letter word	verisimilitude



**Question #27: Mathematics – Algebra**

*10 points per part*

Consider different possible races between Abby, who runs at 10 feet per second, and Becky, who runs at 8 feet per second.		
<b>1</b>	If Becky gets a 20 foot head start and keeps running, for how much time in seconds will Abby have to run until Abby catches Becky?	10 (seconds)
<b>2</b>	If Becky gets a 20 second head start and keeps running, for how much time in seconds will Abby have to run until Abby catches Becky?	80 (seconds)
<b>3</b>	If there is a 100 foot race with no head start, how far from the finish line will Becky be in feet when Abby finishes?	20 (feet)

**Question #28: Mathematics – Algebra**

*10 points per part*

For each of the following conditions, find the value of k so that the graph of the equation $y=2x^2-12x+k$ meets that condition:		
<b>1</b>	exactly one x-intercept	18
<b>2</b>	x-intercepts at 1 and 5	10
<b>3</b>	y-intercept at the origin	0



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

15 points

<p>This person titled her autobiography <i>Eighty Years and More</i>, and a popular speech she delivered before a Congressional Committee was titled “Solitude of Self”. She was the head editor and writer of <i>History of Woman Suffrage</i> and <i>The Woman’s Bible</i>. This writer also penned <i>Declaration of Sentiments</i>, which was a major part of the Seneca Falls Convention she helped organize. Name this leader in the woman’s suffrage movement who often worked closely with Susan B. Anthony.</p>	<p>(Elizabeth Cady) Stanton</p>
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**Question #30: Science – Biology**

15 points

<p>This molecule consists of only two large chains in photosynthetic bacteria, but it usually consists of eight large chains and eight small chains. Like chlorophyll, its active site is arranged around a magnesium ion, and it is turned on during the day by the addition of a carbon dioxide molecule. Because it associates with too much oxygen in hot weather, this protein is surrounded by carbon dioxide in C4 plants. This very abundant enzyme attaches carbon dioxide to sugar, playing an important role in carbon fixation. Name this enzyme used in the Calvin Cycle.</p>	<p>Rubisco (or Ribulose (-1,5-) biphosphate carboxylase oxygenase, prompt Ribulose)</p>
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**Question #31: Literature & Language Arts – British Literature**

15 points

A character in this novel gets away with murder by taking a miniature picture from around the victim's neck and planting it in someone's pocket. That character in this novel learned language in parallel with Safie as she was being taught by the DeLacey family, and he identified himself with a character from *Paradise Lost*. He framed Justine Moritz for a murder, and after failing in blackmail, strangled Henry Clerval and Elizabeth Lavenza. In the end, he comes upon Robert Walton, claiming the greatest crime to be the creation of a man without love, friend, or soul. Name this novel featuring a creature created by a scientist by Mary Shelley.

*Frankenstein (or, the Modern Prometheus)* (accept Frankenstein's Monster)

**Question #32: Social Studies – World History**

15 points

This leader died of natural causes while his troops were successfully defeating Nikola Zrinski near where he had forty years earlier defeated Louis the Second of Hungary and Bohemia. This leader and Tahmasp the First agreed to the Peace of Amasya, ending the fighting between this leader and the Safavid Empire, from which he had captured Baghdad in 1534. He also organized the legal codes that had grown unwieldy because of varying opinions by his nine predecessors, leading him to be called the Lawgiver. Name this leader who for forty-six years was Sultan of the Ottoman Empire.

(Sultan) Suleiman the First (or Suleiman the Magnificent, accept Suleiman the Lawgiver before it is mentioned, prompt Suleiman)



**Replacement Question A: Social Studies – U.S. Government**

*15 points*

<p>Like the Department of Education, this cabinet-level department was created during the Carter Administration. It manages Pantex, Oak Ridge, Fermilab, and several other top scientific laboratories around the country, and it also manages the Waste Isolation Pilot Plant and Yucca Mountain nuclear waste repository. The first appointee by President Obama to head this department was Nobel Prize winner Steven Chu. Name this department that was started in reaction to an oil crisis.</p>	<p>(United States Department of) Energy</p>
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**Replacement Question B: Science – Chemistry**

*15 points*

<p>Examples of this type of molecule include many opioid antagonists such as Naltrexone in addition to examples such as aluminum oxide, beryllium hydroxide, and amino acids, the last of which are also classified as zwitterions. Surfactants with this property always contain nitrogen, and this property does not require a molecule to contain hydrogen, unlike a property closely related to it. The behavior of molecules with this property depends on the medium they are placed in, and they have more than one functional group. Name this property often confused with amphiprotic that describes molecules which can behave as an acid or a base.</p>	<p>Amphoteric (accept different word endings and/or additional words, do not accept amphiprotic)</p>
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**Replacement Question C: Mathematics – Math Concepts**

*15 points*

<p>The Weierstrass type of this process uses the function the tangent of the quantity <math>x</math> over two, and this type of cipher is exemplified by the monoalphabetic cipher. This word refers to a type of integration method that often uses hyperbolic or circular trigonometric functions depending on the integrand, though any function can be used. This word also refers to a method for solving systems of equations that is easy to use when one of the equations is in slope-intercept form. Name this term, sometimes referring to a type of transformation, that is synonymous with replacement.</p>	<p>Substitution (accept different word forms)</p>
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**Replacement Question D: Language Arts – Grammar/Usage**

*15 points*

<p>Russian verbs only have this aspect if they are action verbs, and the past form of this aspect in Italian is equivalent to imperfect verbs. Some Asian languages use different verb forms for this aspect and the continuous aspect, though they are not differentiated in European languages. In English, this tense is formed by combining a form of the verb Be with a present participle. An example of the future perfect usage of this tense is ‘will have been thinking.’ Identify this tense used for actions that are on-going.</p>	<p>Progressive</p>
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**Replacement Question E: Literature – U.S. Literature**

*10 points per part*

A group of five books includes <i>The Deerslayer</i> and <i>The Last of the Mohicans</i> .		
<b>1</b>	Give the collective name for these books featuring Natty Bumppo.	( <i>The</i> ) <i>Leatherstocking (Tales)</i>
<b>2</b>	Name the author who wrote them.	(James Fennimore) Cooper
<b>3</b>	Name the son of Bumppo's friends Chingachgook and Wah-to-Wah who is the title character in <i>The Last of the Mohicans</i> .	Uncas

**Replacement Question F: Literature – U.S. Literature**

*10 points per part*

Name these title characters from the works of Sinclair Lewis. (Note to moderator: Prompt if only first names are given for answers.)		
<b>1</b>	This partner in a real estate firm lives in the Floral Heights neighborhood in Zenith with his wife Myra.	(George F.) Babbitt
<b>2</b>	This Baptist and Methodist minister falls in love with Sharon Falconer.	(Elmer) Gantry
<b>3</b>	This judge falls in love with and marries Jinny Marshland.	(Cass) Timberlane



**Replacement Question G: Social Studies – Geography**

*10 points per part*

Identify these US states:		
<b>1</b>	Which state lies south of Oklahoma across the Red River?	Texas
<b>2</b>	Which state has most of its western boundary formed by the Colorado River?	Arizona
<b>3</b>	Which state has part of its western boundary formed by the Chattooga River?	South Carolina

**Replacement Question H: Social Studies – Geography**

*10 points per part*

Identify these Canadian cities:		
<b>1</b>	Which city is the capital of Canada?	Ottawa(, Ontario)
<b>2</b>	Which city is the capital of New Brunswick?	Fredericton
<b>3</b>	Located on Wascana Lake, what is the most populous city in Saskatchewan other than Saskatoon?	Regina



**Question #1: Literature & Language Arts – British Literature**

15 points

Inspiration for one of his poems came as he was plowing; that poem is about an “earth born companion and fellow mortal”. That figure’s house is in ruin, as “it’s feeble walls the winds are strewin”. Another of his poems is subtitled “On seeing one on a lady’s bonnet at church”. It is addressed to a “crawling wonder”, which is also “detested, shunned by saint and sinner.” The speaker in that poem also asks “would some power the gift to give us to see ourselves as others see us.” One of his poems was the inspiration for the title of John Steinbeck’s *Of Mice and Men*. Name this Scottish poet of “Auld Lang Syne”.

(Robert) Burns

**Question #2: Mathematics – Conceptual Question**

15 points

Though it is not a spheroid, variations on this shape include the curtate and the prolate, and it is used to make the gears in a mechanical clock. The formula for the length of one unit of this shape multiplies a different length by eight, and the formula for its area multiplies three pi times that other length squared. Though a path along this shape does not give the shortest distance between two points, it gives the shortest time for an object traveling between two points under gravity, solving the Brachistochrone Problem. Name this shape which follows a point on the surface of a rolling circle.

Cycloid



**Question #3: Social Studies – World History**

15 points

<p>This person's autobiography is titled <i>Suffering Without Bitterness</i>. Before becoming a national leader, this person was arrested during Operation Jock Scott, and he became one of the defendants known as the Kapenguria Six. He served as President until his death in 1978, and his successor was Daniel arap Moi. While in power, this leader was charged with favoring Kikuyu tribe members, and his imprisonment was for being part of the Mau Mau Movement. This leader took his name from the same mountain that the country he helped form took its name from. Name this man who ruled from the capital of Nairobi.</p>	<p>(Jomo) Kenyatta (accept (Johnstone) Kamau (wa Muigai))</p>
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**Question #4: Science – Earth Science**

15 points

<p>The height of this region has a large overlap with the height of the ionosphere, and its top height can range from five hundred to over a thousand kilometers. This is where the collisions that cause Aurora Borealis, or the Northern Lights, take place as well as the orbit of the International Space Station. Its lower boundary is the mesopause, and the next layer above this is the exosphere. Name this region that, when the Sun is active, gets very hot.</p>	<p>Thermosphere</p>
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**Question #5: Literature & Language Arts – U.S. Literature**

15 points

This writer said that his age grudges and grieves in the “Brightness of Distance” section of his poem “Infant Boy at Midcentury”. This writer penned the line, “If hope is hopeless, then fearless is fear,” in the poem “Bearded Oaks”, which is in his collection *Eleven Poems on the Same Theme*, and he won Pulitzer Prizes for his collections *Promises* and *Now and Then*. This writer also wrote a novel narrated by Jack Burden about Willie Stark, who has a lot in common with actual politician Huey Long. Name this author of *All the King’s Men*.

(Robert) Penn Warren  
(prompt Penn or Warren)

**Question #6: Miscellaneous – Sports**

15 points

This martial art includes the blocking technique of chukyo makgi, and its self defense is known as hosinul. Standardized under orders by Syngman Rhee, its name is sometimes translated as the art of kicking and punching. It became an Olympic sport in 2000, making this and Judo the only Olympic Asian martial arts. Name this traditionally Korean martial art.

Taekwondo





**Question #7: Social Studies – Geography**

*10 points per part*

Identify these rivers:		
<b>1</b>	What is the longest river in China, longer than the Yellow River?	Yangtze (or Chang Jiang)
<b>2</b>	Which river forms much of the border between Laos and Thailand and has its delta in Vietnam?	Mekong
<b>3</b>	Which river combines with the Uruguay River to form the Río de la Plata?	Paraná

**Question #8: Social Studies – Geography**

*10 points per part*

Identify these National Parks in the United States:		
<b>1</b>	The oldest National Park in the United States, it contains Old Faithful and is located primarily in Wyoming.	Yellowstone
<b>2</b>	This park in southeastern New Mexico includes Slaughter Canyon Cave.	Carlsbad Caverns (prompt Carlsbad)
<b>3</b>	This is the largest island in Lake Superior.	Isle Royale (prompt Royale)



**Question #9: Science – Physics**

*10 points per part*

Answer these questions about quarks:		
<b>1</b>	How many quarks are in a proton?	3
<b>2</b>	How many types, or flavors, of quarks are there? Two of the types are up and down.	6
<b>3</b>	Which quark is the heaviest and was the last to be discovered?	Top (accept T or Truth)

**Question #10: Science – Physics**

*10 points per part*

Answer these questions about lenses:		
<b>1</b>	Other than concave, what is the main type of lens?	Convex (accept Converging)
<b>2</b>	What type of image created by some lenses and curved mirrors occurs where rays are projected backwards? Such an image cannot be projected onto a screen.	Virtual (Image)
<b>3</b>	Which French physicist designed lenses that are built in sections to use up less material?	(Augustin) Fresnel



**Question #11: Literature & Language Arts – Mythology**

*10 points per part*

Answer the following about Izanami.		
<b>1</b>	Izanami and her husband Izanagi are primordial deities in this official religion of Japan.	Shinto(ism)
<b>2</b>	According to legend, the Japanese archipelago was created from one of these jewel-encrusted weapons.	spear
<b>3</b>	Izanami died giving birth to Kagutsuchi, the god of this.	fire

**Question #12: Literature & Language Arts – Mythology**

*10 points per part*

Given a description, name the Titan.		
<b>1</b>	The wife of Cronus, she was the mother of many of the Olympians, including Zeus.	Rhea
<b>2</b>	With the help of Zeus, this goddess of memory gave birth to the Muses.	Mnemosyne
<b>3</b>	Sometimes shown as an early sun deity, his children include Eos and Selene.	Hyperion



**Question #13: Mathematics – Probability**

*10 points per part*

Give your answers as simplified fractions. Joe flips two coins and rolls a standard six-sided die:		
<b>1</b>	What is the probability that he gets two heads and a six?	$\frac{1}{24}$
<b>2</b>	What is the probability that he gets two heads or a six? Use the inclusive or.	$\frac{3}{8}$
<b>3</b>	What is the probability that he gets at least one head and a value of four or above?	$\frac{3}{8}$

**Question #14: Mathematics – Probability**

*10 points per part*

Given two events A and B, where the probability of A is .4, the probability of B is .3, and the probability of both A and B is .1:		
<b>1</b>	What is the probability of Not A?	.6 (or 3/5)
<b>2</b>	What is the probability of A or B, using the inclusive or?	.6 (or 3/5)
<b>3</b>	If A happens, what is the probability of B?	.25 (or 1/4)



**Question #15: Social Studies – Current Events**

*15 points*

<p>Kenan Evren led a military coup in this country in 1980 that put in place its current Constitution, while a threatened coup in 1997 led to the resignation of its Prime Minister Necmettin (nek-MEHT-tin) Erbakan. Iran has said it will attack this country if Israel attacks Iran, though this country spent over a year demanding an apology from Israel after Israel boarded an aid ship. Name this country where in 2003 Prime Minister Dr. Abdullah Gül was replaced by current leader Recep (REH-zep) Tayyip Erdoğan, the former Mayor of Istanbul.</p>	<p>Turkey</p>
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**Question #16: Fine Arts – Art Theory & Technique**

*15 points*

<p>This writer described in great detail the buildings in Venice to show how they demonstrate Sacrifice, Truth, Power, Beauty, Life, Memory, and Obedience, which were his Seven Lamps of Architecture. He also encouraged what he considered natural truth in painting, promoting the Pre-Raphaelites and J.M.W. Turner. Name this art critic who was once sued for libel by James Whistler.</p>	<p>(John) Ruskin</p>
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**Question #17: Science – Environmental Science**

15 points

<p>Due to research on the impacts of these compounds, Nobel Prizes were awarded to Mario Molina and Frank Rowland. All five Class One Group One compounds in the Montreal Protocol are this type of organic compound. These compounds replaced sulfur dioxide, methyl chloride, and ammonia for some industrial uses after their discovery in the 1920s, but these are now banned. These were used as aerosol propellants, foam-blowing agents, and refrigerants, and the most common one was Freon. Name these compounds which after breaking down caused ozone depletion.</p>	<p>Chlorofluorocarbon(s) (or CFC(s))</p>
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**Question #18: Literature & Language Arts – U.S. Literature**

15 points

<p>This author wrote a short story about a communist named Sue who is threatened by a sheriff. That story, “Bright and Morning Star”, appears in his collection <i>Uncle Tom’s Children</i>. In a novel by this author, the protagonist uses a skillet to kill a rat in front of his brother Buddy and sister Vera. That character, who gets a job driving Mary Dalton, is Bigger Thomas. This author also wrote the autobiography <i>Black Boy</i>. Name this African American who wrote <i>Native Son</i>.</p>	<p>(Richard) Wright</p>
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**Question #19: Mathematics – Conceptual Question**

15 points

<p>This mathematician along with R.L. Hudson criticized the Black-Scholes financial model in his book <i>The Misbehavior of Markets</i>. He studied the water level of the Nile and classified changes as Noah effects and Joseph effects, and he studied cotton prices and determined that there was a symmetry of scale, and he then worked for IBM, where he found a similarity between signal noise and Cantor dust. This mathematician is the namesake of a recursive equation that squares a number and then adds a complex constant which can be used to form a self-similar set. Name this recently deceased mathematician who wrote <i>The Fractal Geometry of Nature</i>.</p>	<p>(Benoit) Mandelbrot</p>
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**Question #20: Social Studies – Geography**

15 points

<p>Over one hundred people died when a boat sank on this river last summer. It is the longest river starting from the Valdai Hills, and its two largest tributaries are the Kama and Oka Rivers. A canal connects this river to the Don River, and the Mariinsk (mahr-EENSK) Canal System connects it to the Baltic Sea. Its delta is near Astrakhan on the Caspian Sea. Name this river that goes through Nizhny Novgorod, the longest river in Europe known as the national river of Russia.</p>	<p>Volga (River)</p>
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**Question #21: Mathematics – Statistics**

*10 points per part*

Given a large continuous set of numbers with a mean of twenty and a standard deviation of five that follow a standard normal distribution, find the following:		
<b>1</b>	Z-score for a value of thirty in the list	2
<b>2</b>	Variance	25
<b>3</b>	Expected Percentile rounded to the nearest whole number of a value of fifteen in the list	16

**Question #22: Mathematics – Statistics**

*10 points per part*

Find the following for the list of numbers that consists of 3, 4, and 8. You should keep in mind that sample variance is higher than population variance:		
<b>1</b>	Mean	5
<b>2</b>	Sample Variance	7
<b>3</b>	Population Variance	$\frac{14}{3}$ (or $4\frac{2}{3}$ or 4.6 repeating)





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

*10 points per part*

Identify these policies of the Clinton Administration:		
<b>1</b>	This policy officially allowed homosexuals to serve in the Armed Forces.	Don't Ask, Don't Tell (or DADT)
<b>2</b>	This bill, named after a former Reagan aide, instituted a waiting period for handgun purchases.	(James) Brady (Handgun Protection Act) (or Brady Bill)
<b>3</b>	This bill provides matching funds to states to cover uninsured children.	(S)CHIP (or (State) Children's Health Insurance Program)

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

*10 points per part*

Identify these United States Generals:		
<b>1</b>	This man commanded US forces in Europe during World War One and was then promoted to General of the Armies.	(John "Black Jack") Pershing
<b>2</b>	This General nicknamed Old Fuss and Feathers occupied Mexico City during the Mexican-American War.	(Winfield) Scott
<b>3</b>	This General took command in Korea after MacArthur was fired.	(Matthew) Ridgway



**Question #25: Science – Health**

*10 points per part*

Answer these questions about tests for cancer:		
<b>1</b>	What name is given for an X-ray radiograph checking for breast cancer?	Mammogram (or Mammograph(y))
<b>2</b>	What name is given for the test for inflammatory bowel disease or cancer using a camera on a flexible tube?	Colonoscopy (or Colonoscope)
<b>3</b>	What blood test is sometimes used to detect prostate cancer? It is controversial because of its high error rate.	PSA (or Prostate-specific antigen)

**Question #26: Science – Health**

*10 points per part*

Answer these questions about eyes:		
<b>1</b>	Which part of the human eye contains rods and cones?	Retina
<b>2</b>	Which condition is commonly called nearsightedness?	Myopia
<b>3</b>	Which German anatomist is the namesake of a canal that collects aqueous humor from the anterior chamber of the eye?	(Friedrich) Schlemm



**Question #27: Literature & Language Arts – British Literature**

*10 points per part*

Answer the following concerning Fortinbras.		
<b>1</b>	Fortinbras' father was the king of this country before being defeated in battle.	Norway
<b>2</b>	Fortinbras delivers the eulogy for this title Shakespeare character, the Prince of Denmark.	Hamlet
<b>3</b>	After being chastised by his uncle, Fortinbras decides to invade this country. For the invasion, he asked for passage through Denmark.	Poland

**Question #28: Literature & Language Arts – British Literature**

*10 points per part*

Name these title Shakespeare characters:		
<b>1</b>	This General becomes the King of Scotland after killing Duncan.	Macbeth
<b>2</b>	This king is the nephew of the Duke of Bedford and Duke Humphrey of Gloucester.	Henry VI (prompt Henry)
<b>3</b>	This king is the father of Imogen, Guiderius, and Arviragus.	Cymbeline



**Question #29: Science – Chemistry**

15 points

<p>This compound is combined with ethylene and oxygen to create VAM, which is used in adhesives and paints. This compound is produced by the Monsanto and Cativa processes, which are methods of methanol carbonylation. Its chemical formula is <math>\text{CH}_3\text{COOH}</math>, making it with the exception of formic acid the simplest example of a carboxylic acid. It is known for being a key ingredient in a liquid with a bitter and sour taste. Name this component of vinegar.</p>	<p>Acetic Acid (prompt <math>\text{CH}_3\text{COOH}</math>)</p>
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**Question #30: Literature & Language Arts – Mythology**

15 points

<p>He once asked a ketaki flower to lie on his behalf, and he may have been cursed as a result. The chief of the prajapatis, Daksha, came from the thumb of this deity. Some sources indicate that his curse came from his pursuit of his consort Saraswati, during which he grew heads so that she would never escape his gaze. One of his four hands contains the <i>Vedas</i>, which were said to come from his four heads. Identify this member of the trimurti regarded as the creator.</p>	<p>Brahma</p>
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**Question #31: Social Studies – U.S. Government**

*15 points*

<p>This constitutional article corresponds to Federalist Papers seventy-eight through eighty-three, where the statement, “A power over a man’s subsistence amounts to a power over his will,” is used to justify its good behavior clause. The third and final section of this article defines Treason, and the second section gives different treatment to ambassadors, other public ministers and consuls compared to the general population when cases are tried. Name this article which defines the role of the Supreme Court specifically and more generally the judicial branch.</p>	<p>(Article) 3 (or 3<sup>rd</sup>)</p>
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**Question #32: Science – Biology**

*15 points*

<p>This material is similar to suberin in that they are both irregular polymer phenylpropanoids, and it can be used to create aromatic compounds. This material has industrial uses when it contains sulfur, and it can be separated from cellulose and hemicellulose using 2-MTHF, though the separation is usually done using the Kraft process. This compound is responsible for many cells being impermeable to water, and it exists naturally with cellulose in secondary cell walls in tissue such as xylem. Name this compound largely responsible for the texture of wood.</p>	<p>Lignin</p>
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**Replacement Question A: Social Studies – U.S. History**

*15 points*

<p>Max Florin, Dora Evans, and four other people were identified in 2011 as victims of this disaster. One of the survivors was Rose Freedman, and the people blamed for it, Isaac Harris and Max Blanck, were acquitted at trial. It took place on the corner of Greene Street and Washington Place in the Asch Building in New York City, and it took place a few months after a similar incident in Newark. Most of the victims were Italian and Jewish immigrants. Name this 1911 disaster which killed many members of the International Ladies' Garment Workers' Union.</p>	<p>Triangle Shirtwaist (Fire) (accept any answer mentioning Triangle Shirtwaist)</p>
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**Replacement Question B: Science – Physics**

*15 points*

<p>This force is represented by the third special unitary group, and the impact of high energy on this is called asymptotic freedom. The existence of this force led Hideki Yukawa to predict the existence of mesons, and his predictions were confirmed by the discovery of pions. The particle that mediates this force is classified into eight types which are referred to as colors. Those particles, gluons, bind baryons together. Name this fundamental force that holds the protons and neutrons together in the nucleus of an atom.</p>	<p>Strong (Nuclear Force) or Strong (Interaction)</p>
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**Replacement Question C: Literature – U.S. Literature**

15 points

After one collection by this poet was repeatedly rejected, he arranged the names of the publishers who turned it down on its dedication page in the shape of a funeral urn and titled it *No Thanks*. This poet wrote, “If you like my poems let them walk in the evening, a little behind you.” Another one of his works is supposed to emulate the leaping of a grasshopper. This writer described how he was imprisoned for supporting his friend’s anti-war sentiments during World War One in his autobiography *The Enormous Room*. Name this writer who wrote a work beginning, “Anyone lived in a pretty how town,” known for avoiding capital letters.

(edward estlin) cummings

**Replacement Question D: Mathematics – Math Concepts**

15 points

This branch of mathematics has been used by Alvin Roth to design aspects of school systems. Roth built upon a system designed by David Gale and Lloyd Shapley, who in turn built upon the work of Oskar Morgenstern and John von Neumann. One of the concepts in this field is the correlated equilibrium, which is based on its Nash equilibrium. Some of the problems studied in this field are referred to as cake cutting, traveler’s dilemma, and prisoner’s dilemma. Name this branch of mathematics that deals with situations when people have conflicting interests.

Game (Theory)



**Replacement Question E: Literature – Mythology**

*10 points per part*

Answer the following about the sun deity, Huitzilopochtli (hoo-EETS-ih-lo-POK-tlee).		
<b>1</b>	Huitzilopochtli served as the sun god and war god for these Mesoamerican people.	Aztec(s)
<b>2</b>	After being born, Huitzilopochtli's 400 siblings tried to kill him, to no avail. Among the victims was Coyolxauhqui (coy-oal-ZOW-kee), whose decapitated head was used for this entity.	(the) moon
<b>3</b>	The sun god was depicted with a black face and holding these two things. Name either.	snake or mirror (accept serpent)

**Replacement Question F: Literature – Mythology**

*10 points per part*

Answer the following about the death of Baldr.		
<b>1</b>	This trickster deity was ultimately held responsible for Baldr's death.	Loki
<b>2</b>	This blind deity actually killed Baldr with some dangerous mistletoe.	Hod(ur)
<b>3</b>	That deity behind Baldr's death later fled to Franag's Falls, but after being caught tried to escape by taking the form of this fish.	salmon





**Replacement Question G: Mathematics – Geometry**

*10 points per part*

Find the volumes for the following figures. You do not need to include units:		
<b>1</b>	triangular prism with each edge of length two	$2\sqrt{3}$
<b>2</b>	hexagonal prism with each edge of length two	$12\sqrt{3}$
<b>3</b>	cone with radius three and height four	$12\pi$

**Replacement Question H: Mathematics – Geometry**

*10 points per part*

Find the following for a 3-4-5 right triangle:		
<b>1</b>	the area	6
<b>2</b>	the length of the median to the side of length four	$\sqrt{13}$
<b>3</b>	the distance from the right angle to the centroid	$\frac{5}{3}$ (or $1\frac{2}{3}$ or 1.6 repeating)



**Question #1: Social Studies – Religion**

*15 points*

At one point, she was not called to her husband for thirty days; at the time, those who came to the king without his bidding were to be executed. Her cousin overheard Bigtan and Teresh plotting to poison her husband. Her husband's first wife refused to show her beauty and was subsequently exiled. At one point, she fasts for three days, after which she invites the King and the Prime Minister to two banquets. In modern times, Jews within Iran are said to be children of this figure. The ritual fasting on the 13th day of Adar is named for this figure, and her eponymous book is read as part of Purim. The second wife of Ahasverus, name this female biblical hero.

Esther (accept Hadassah or Myrtle)

**Question #2: Literature & Language Arts – Vocabulary**

*15 points*

This term referred to the substance of heavenly bodies according to the alchemists, who believed that substance to be generally dormant, though it was active in the Philosopher's Stone. Those alchemists believed that most substances were formed from earth, wind, rain, and fire. Some physicists now use this term to refer to a form of dark energy, and this term now usually refers to the most perfect embodiment of something. Give this term whose prefix is based on the idea that it was supposed to be the fifth element.

Quintessential (accept other word forms such as Quintessence)



**Question #3: Mathematics – Conceptual Question**

*15 points*

<p>If taking the conjugate of each entry in a matrix and performing this operation equals the original matrix, then the original matrix is classified as Hermitian (her-MISH-un). If this process gives the additive inverse of a matrix, then the matrix is skew-symmetric, and if this process does not change the matrix, then the matrix is symmetric. This matrix operation changes rows into columns and vice versa, flipping all entries over the main diagonal. Name this operation denoted by a superscript T.</p>	<p>Transpose (accept other word forms such as Transposition)</p>
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**Question #4: Science – Health**

*15 points*

<p>Thomas McPherson Brown advocated using this type of drug to treat rheumatoid arthritis, usually using the class called tetracyclines (the-truh-SIGH-kleens). Several of these drugs work by decreasing folate synthesis and are known as sulfonamides, while others decrease the synthesis of peptidoglycan and are known as cephalosporins. MRSA is becoming resistant to several of these drugs, and medical societies are trying to decrease their usage overall. Identify these types of drugs that also include penicillins which work by preventing certain microorganisms from dividing or living.</p>	<p>Antibiotic(s) (accept Antibacterial(s), accept Tetracycline before it is mentioned)</p>
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**Question #5: Social Studies – U.S. History**

15 points

<p>A major battle during this six month military campaign was won by Alexander Vandegrift at Edson’s Ridge, and most of the fighting took place at Lunga Point. About halfway through this campaign the US replaced Vice Admiral Ghormley with Fleet Admiral Halsey. By winning this campaign’s main battle, the United States secured an airfield that would be known as Henderson Field. It was the first major Pacific offensive by the United States, taking place soon after the Battles of Midway and Coral Sea. Name this part of the Solomon Islands Campaign.</p>	<p>Guadalcanal (prompt Solomon Islands or (Operation) Watchtower)</p>
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**Question #6: Fine Arts – Art History**

15 points

<p>This artist portrayed a kneeling Cosmas and Damian in his <i>Sant’Ambrogio Altarpiece</i>, which is often called <i>Madonna and Child with Six Saints</i>. He also portrayed four satyrs, including one blowing a conch shell, in his <i>Venus and Mars</i>. On the right side of one of this artist’s paintings, a nymph or Horae wearing a white robe patterned with spring flowers offers a pink robe to the main subject, while in another painting the same main subject stands below Cupid and on slightly higher ground than the Three Graces and three other characters. Name this Florentine painter of <i>The Birth of Venus</i> and <i>Primavera</i>.</p>	<p>(Sandro) Botticelli</p>
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**Question #7: Science – Physics**

*10 points per part*

Identify these fictitious forces: (Note to moderator: Accept additional terms such as force, effect, or acceleration after any of these answers.)		
<b>1</b>	This is the force pushing a body to the outside when it moves in a circle.	Centrifugal (do not accept Centripetal)
<b>2</b>	This is the curvature of paths caused by uniformly rotating reference frames.	Coriolis
<b>3</b>	This is the curvature of paths caused by non-uniformly rotating reference frames.	Euler (normally pronounced oiler, but be generous)

**Question #8: Science – Physics**

*10 points per part*

Answer these questions about the Large Hadron Collider, or LHC, that started working in 2008:		
<b>1</b>	The LHC is part of which major physics laboratory in Europe?	CERN (or European Organization for Nuclear Research or Organisation Européenne pour la Recherche Nucléaire)
<b>2</b>	Much of the work at LHC has focused on finding what elementary particle that supposedly confers mass on other elementary particles?	Higgs (Boson or Particle)
<b>3</b>	The beauty detector at LHC has found violations in a type of symmetry combining charge with what spatial symmetry?	Parity (prompt P)



**Question #9: Literature & Language Arts – U.S. Literature**

*10 points per part*

Carl Sandburg wrote about many subjects.		
<b>1</b>	Which city was described by Sandburg as “Hog butcher for the world”?	Chicago
<b>2</b>	According to Sandburg, what “comes on little cat feet”?	Fog
<b>3</b>	In a poem mentioning several battles, Sandburg claimed to be this substance which covers all.	Grass

**Question #10: Literature & Language Arts – U.S. Literature**

*10 points per part*

The title of this novel refers to a building where the author survived the bombing of Dresden.		
<b>1</b>	Name this work by Kurt Vonnegut.	<i>Slaughterhouse-Five</i>
<b>2</b>	Name the protagonist of that novel who becomes unstuck in time.	(Billy) Pilgrim (prompt Billy)
<b>3</b>	Name the psychiatric patient in the novel who is a huge fan of Kilgore Trout.	(Eliot) Rosewater (prompt Eliot)



**Question #11: Social Studies – Economics**

10 points per part

Answer these questions about a concept used to justify increasing free trade:		
1	Which two-word concept says that countries gain from trade when they have different relative costs for producing goods?	(Law of) Comparative advantage
2	Which economist introduced that principle in the book <i>On the Principles of Political Economy and Taxation</i> in 1817?	(David) Ricardo
3	Which model builds on that economist's theories to predict which countries will export which products? It is named after two Swedish economists.	Heckscher–Ohlin (Model) (prompt H-O (Model))

**Question #12: Social Studies – Economics**

10 points per part

Identify these economists:		
1	He wrote <i>An Essay on the Principle of Population</i> , which claimed that population growth would be stronger than resource growth.	(Thomas) Malthus
2	This economist popularized the term praxeology in his book <i>Human Action</i> and had a major impact on the Austrian school.	(Ludwig von) Mises
3	This economist said that products are paid for with products, which became known as his namesake law.	(Jean-Baptiste) Say



**Question #13: Mathematics – Trigonometry**

*10 points per part*

Find the following if theta is the angle in standard position with a terminal side going through the point (-2,1):		
1	the tangent of theta	$-\frac{1}{2}$ (or -.5 or $-\frac{1}{2}$ )
2	the tangent of the quantity two theta	$-\frac{4}{3}$ (or $-1\frac{1}{3}$ or -1.3 repeating)
3	the tangent of the quantity one-half theta	$2 + \sqrt{5}$ (or equivalent)

**Question #14: Mathematics – Trigonometry**

*10 points per part*

Find the following trigonometric values:		
1	In a right triangle, the tangent of one of the angles is seven-fifths. What is the tangent of the other acute angle?	$\frac{5}{7}$
2	In a scalene triangle a side of length 10 is across from an angle of 45 degrees. What is the length of the side in the same triangle across from an angle of 60 degrees?	$5\sqrt{6}$
3	In a scalene triangle, what is the length of the side across from an angle with a cosine of one-fourth if the two other sides are of lengths 1 and 2?	2





**Question #15: Miscellaneous – Sports**

*15 points*

<p>This sport split into factions in England in 1895 over the issue of whether to compensate athletes, and one of the factions eliminated line-outs. In 2009, Tom Williams of the Harlequins was banned for several months for faking an injury in what became known as Bloodgate. Scoring in this sport is often done with a try and conversion, though there are also penalty kicks and drop goals. Its two factions are called League and Union, and its play can be restarted with a scrum. Name this forerunner of American football.</p>	<p>Rugby</p>
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**Question #16: Science – Astronomy**

*15 points*

<p>In 1920, this became the first star to have its size measured by a beam interferometer, and scientists have measured a fifteen percent shrinkage of its size during the last twenty years. This star, Sirius, and Procyon form the Winter Triangle, and, like Antares, this is a first magnitude supergiant. Though it is usually not as bright as Rigel, this star is classified as their constellation's alpha star. Alternatively known as Al Mankib, name this right shoulder of Orion located opposite from Bellatrix.</p>	<p>Betelgeuse (prompt Alpha Orion(us))</p>
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**Question #17: Social Studies – World History**

*15 points*

<p>At this Conference, the Oder-Neisse Line was agreed to as the border between Germany and Poland, and agreement was reached to give the city of Danzig to Poland. This Conference took place while the United Kingdom was counting votes from an election that replaced Winston Churchill with Clement Attlee, and it happened to start on the same day as the Trinity test at Alamogordo. China joined the United States and United Kingdom in a declaration giving surrender terms to Japan. Name this conference of Allied leaders led by Harry Truman that took place in Germany.</p>	<p>Potsdam (Conference)</p>
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**Question #18: Literature & Language Arts – Grammar/Usage**

*15 points*

<p>These can be classified as either grave or acute, and they can also be classified as either compact or diffuse. Most sources claim that there are forty-four of these units in the English language, and a list of them based on Latin is called the IPA. Some of these are classified as fricative or sibilant, though the primary classification, based on whether there is any closure of the vocal tract, is between vowels and consonants. Name this small unit of sound.</p>	<p>Phoneme(s)</p>
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**Question #19: Mathematics – Conceptual Question**

*15 points*

<p>One example of this type of proposition is the fact that one ball can be taken apart, and the pieces can be used to create two balls identical to the original. In addition to that example named after Banach and Tarski, another example of this phenomenon is based on the question of whether or not the set of all sets that are not members of themselves is a member of itself. In addition to that example associated with Bertrand Russell, another example is based on the question of whether you can ever get from Point A to Point B if you get halfway there an infinite number of times. That example is named after Zeno. Identify these types of statements such as “This statement is false” which lead to a contradiction.</p>	<p>Paradox (or Antinomy)</p>
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**Question #20: Science – Biology**

*15 points*

<p>The bottom of this organ is the carina, and its enlargement is called Mounier-Kuhn syndrome. It exists just below the spiracles of some invertebrates. Though its back is muscular, most of it consists of rings of cartilage, and it contains goblet cells which produce mucin. The top of it is located by the cricothyroid tissues, and it extends from the larynx until it branches into the bronchi. Identify this organ commonly called a windpipe.</p>	<p>Trachea (prompt Windpipe)</p>
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**Question #21: Mathematics – Geometry**

*10 points per part*

Find the number of edges for each type of Platonic solid. Each edge is a segment:		
<b>1</b>	Tetrahedron	6
<b>2</b>	Cube	12
<b>3</b>	Icosahedron	30

**Question #22: Mathematics – Geometry**

*10 points per part*

Answer the following questions about trapezoid PQRS, which has right angles at Q and R and a thirty degree angle at P. Lengths QR and RS each equal two.		
<b>1</b>	the measure of angle S	150 (degrees)
<b>2</b>	the length of side PS	4
<b>3</b>	the area of the figure	$4+2\sqrt{3}$ (or equivalent)



**Question #23: Literature & Language Arts – Mythology**

10 points per part

Answer the following about Ariadne.		
1	Ariadne gave Theseus a ball of thread to help him escape the Labyrinth after slaying this monster.	Minotaur
2	Ariadne was abandoned on this island on the return trip to Athens.	Naxos
3	In the <i>Odyssey</i> , it is told that Ariadne was taken to Dia, where she was killed by this “mistress of the animals.”	Artemis (or Diana)

**Question #24: Literature & Language Arts – Mythology**

10 points per part

Answer the following about a certain Ithacan king.		
1	Odysseus’ men were doomed after some of them slaughtered cattle belonging to this deity.	Helios
2	The disgruntled suitors of Penelope attempted to ambush this figure, Odysseus’ son. In the end, he helps his father kill the group.	Telemachus
3	Three generations fought against the suitors. Athena helped rejuvenate this figure, Odysseus’ father, who helped in the fight against the relatives of the slain suitors.	Laertes



**Question #25: Science – Chemistry**

*10 points per part*

Answer these questions about molecular geometry:		
<b>1</b>	What does VSEPR stand for? (Note to moderator: Spell out VSEPR.)	Valence Shell Electron Pair Repulsion
<b>2</b>	What name is given to the number of atoms bonded to plus the number of lone pairs for the central atom of a molecule?	Steric (Number)
<b>3</b>	What name is given to the shape of sulfur tetrafluoride, which has one lone pair?	Seesaw

**Question #26: Science – Chemistry**

*10 points per part*

Answer the following questions about a semipermeable membrane:		
<b>1</b>	What name is given to the amount of pressure on a solution necessary to prevent inward flow across a semipermeable membrane?	Osmotic (Pressure)
<b>2</b>	The formula to calculate that pressure includes the variable lower-case i which equals one for non-electrolytes. Who is that factor named after?	(Jacobus Henricus) van 't Hoff(, Jr.) (prompt Hoff)
<b>3</b>	Because the amount of pressure depends only on the number of molecules and not their properties, the amount of pressure itself is described as what type of property?	Colligative



**Question #27: Social Studies – World History**

*10 points per part*

Identify the following about the Chinese Kuomintang:		
<b>1</b>	This doctor founded the Kuomintang along with Song Jiaoren and became its first leader.	Sun (Yat-sen) (prompt Yat and/or Sen)
<b>2</b>	This person led the Kuomintang for over thirty years, including after fleeing mainland China for Taipei, Taiwan.	Chiang (Kai-shek) (or Jiǎng Jièshí or Jiǎng Zhōngzhèng, prompt Kai and/or Shek)
<b>3</b>	Give the English name of the recent alliance between the Kuomintang, the People First Party, and the New Party in the Republic of China.	(Taiwanese) Pan-Blue (Coalition or Force) (prompt Blue)

**Question #28: Social Studies – World History**

*10 points per part*

Identify these Roman Emperors: (Note to moderator: Accept longer answers as long as they contain the key name.)		
<b>1</b>	This Emperor supposedly fiddled during the Great Fire in 64 CE.	Nero
<b>2</b>	This Emperor in the Second century wrote <i>Meditations</i> .	(Marcus) Aurelius
<b>3</b>	This Emperor took over upon the suicide of the previous emperor and a few months later was beheaded by followers of Otho.	Galba



**Question #29: Literature & Language Arts – U.S. Literature**

15 points

<p>One of the characters in this novel, who is described as a little peach, gets a job punching holes in leather and moves in with Hanson and Minnie. She eventually takes a role in the play “Under the Gaslight” and later meets Indiana native Robert Ames in New York City. Another character in this novel runs the saloon Fitzgerald and Moy’s until he files for divorce and moves to Montréal. This novel begins in Chicago, where Charlie Drouet and George Hurstwood have affairs with the title character. Name this novel by Theodore Dreiser.</p>	<p><i>Sister Carrie</i></p>
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**Question #30: Science – Chemistry**

15 points

<p>Bouveault synthesis creates compounds in this functional group from an alkyl halide, and Bodroux-Chichibabin synthesis creates this from a Grignard reagent. These compounds are similar to ketones, and one thing they have in common is that manganese dioxide can oxidize an alcohol into one of these. These compounds are part of the carbonyl group, ending with a carbon double bonded to an oxygen and single bonded to a hydrogen. Name this group whose simplest example is used for embalming and preserving tissues.</p>	<p>Aldehyde(s) (prompt formyl (group), carbonyl (group), or formaldehyde)</p>
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**Question #31: Social Studies – Geography**

*15 points*

<p>The northeast part of this country is Cabo Delgado Province, which has its capital at Pemba. Many people in the southwest part of this country speak a Tsonga language such as Ronga, and one of its southern cities is Matola. This country also includes Lake Cahora Bassa, and it is where the Zambezi River flows into the Indian Ocean. Several of its larger lakes are on its border with Malawi, and it reaches from Tanzania to South Africa. Name this country whose capital is Maputo which shares its name with the channel separating it from Madagascar.</p>	<p>Mozambique</p>
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**Question #32: Literature – World Literature**

*15 points*

<p>To one character, he is four different loves, and he asks Zeus to stand by him. One group who opposes him did not go after his mother due to a lack of a blood bond. He indicates that the oracle will defend him, declaring that he'll pay the debt with a life of troubles were he to not. Upon arriving in Argos, he offers a lock of his own hair to Inachus, the stream where he was raised. Apollo tells him that he'll stand with him until the end. Ultimately, the judges tied, and Athena cast her vote in favor of this figure. The brother of Electra, name this son and murderer of Clytemnestra, the central figure of a trilogy by Aeschylus.</p>	<p>Orestes</p>
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**Replacement Question A: Science – Physics**

*15 points*

<p>Researchers from the London Centre for Nanotechnology have found a way to use an X-ray beam to create these types of materials out of oxygen, copper, and lanthanum. Discovered by Heike Onnes, the ease of tunneling between them is known as the Josephson Effect. The act of removing this property from materials is called quenching and often involves boiling helium. The properties of these objects are generally explained with BCS theory, including their use of Cooper pairs of electrons. Name these objects which below a critical temperature do not contain any electric resistance.</p>	<p>Superconductor(s) (accept other word forms, do not accept conductor(s))</p>
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**Replacement Question B: Social Studies – U.S. Government**

*15 points*

<p>When it was created, this government agency created the Documerica Project to help justify its existence. It was created in 1970 according to Richard Nixon's Reorganization Plan Number Three. It currently is headed by Lisa Jackson, who is considered a Cabinet member even though this agency is not a Cabinet department. To encourage the use of more efficient products, this government agency created the Energy Star Program. Name this agency which oversees the Clean Air and Clean Water Acts.</p>	<p>EPA (or Environmental Protection Agency)</p>
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**Replacement Question C: Mathematics – Math Concepts**

15 points

<p>This person devised a method for picking rows from a matrix so that each column contains the number one. Along with Ronald Graham and Oren Patashnik, he wrote a book combining continuous and discrete math titled <i>Concrete Mathematics</i>. This person also made it easier to typeset math by devising Metafont and TeX. This person developed a system for notating large numbers using up-arrows. Name this Stanford professor who authored <i>The Art of Computer Programming</i>.</p>	<p>(Donald) Knuth</p>
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**Replacement Question D: Language Arts – Grammar/Usage**

15 points

<p>A recursive categorical theory of this concept, also known as its algebraic theory, was developed by Michael Brame. This word comes from the ancient Greek term for Arrangement, and a Functional-Typological introduction to this subject was written by Thomas Givon. In addition to language, this concept often applies to logic and computer programming. Give this term referring to the ways that words and phrases are combined to form commands and sentences.</p>	<p>Syntax</p>
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**Replacement Question E: Social Studies – U.S. History**

*10 points per part*

Name these former Presidents who became Third Party candidates in US Presidential elections:		
<b>1</b>	This former President ran for the Progressive Party in 1912, which was nicknamed the Bull Moose Party.	(Theodore “Teddy”) Roosevelt (prompt Roosevelt)
<b>2</b>	This former President ran for the American Party in 1856, which was nicknamed the Know Nothing Party.	(Millard) Fillmore
<b>3</b>	This former President ran for the Free Soil Party in 1848.	(Martin) Van Buren (prompt Buren)

**Replacement Question F: Social Studies – U.S. History**

*10 points per part*

Identify these tariffs from American history:		
<b>1</b>	Some people blame this high 1930 tariff for the Great Depression.	Hawley-Smoot (or Smoot-Hawley)
<b>2</b>	Southerners applied this nickname to the 1828 tariff, the highest in American history.	(Tariff of) Abominations
<b>3</b>	Passage of this tariff was a very high priority for President Taft when he was inaugurated.	Payne-Aldrich (or Aldrich-Payne)



**Replacement Question G: Literature – U.S. Literature**

*10 points per part*

Upton Sinclair was a well-known writer who tried to become Governor of California.		
<b>1</b>	Name Sinclair’s famous 1906 work that provided an unflattering portrayal of the Chicago meatpacking industry.	<i>(The) Jungle</i>
<b>2</b>	Name the Lithuanian protagonist of that book who marries Ona.	Jurgis Rudkus (accept either half of answer)
<b>3</b>	Sinclair also wrote eleven novels, including <i>World’s End</i> and <i>Dragon’s Teeth</i> , about this journalist.	Lanny Budd (accept either half of answer)

**Replacement Question H: Literature – U.S. Literature**

*10 points per part*

Answer these questions about a poem by Emily Dickinson that tells of a carriage ride that, “Paused before a house that seemed a swelling in the ground.”		
<b>1</b>	The poem begins by stating “Because I could not stop for” what?	Death
<b>2</b>	The poem states that the carriage holds ourselves and what else?	Immortality
<b>3</b>	At the end of the poem, the narrator claims she surmised that what objects were towards eternity?	Horse(s’) Heads (prompt partial answer)



**Question #1: Literature & Language Arts – Mythology**

*15 points*

<p>She was worshipped as the town goddess at Argos, and her husband would occasionally tie anvils to her feet. Hebe was conceived after this goddess ate lettuce. She bathed in the well Canathus every year to restore her virginity. Her epithets included <i>Bopis</i>, meaning “cow-eyed”, and the peacock is one of her sacred animals. Jealous of her husband’s philandering, she sent two serpents to kill Heracles in his crib. Name this Greek goddess of marriage and wife of Zeus.</p>	<p>Hera (accept Juno)</p>
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**Question #2: Social Studies – World History**

*15 points*

<p>One of the generals in this war was Peter Dannenberg, who launched an assault on Home Hill and who was earlier defeated by Omar Pasha at the Battle of Oltenitza. His assault on Home Hill came during a battle lost by his superior Prince Menshikov at Inkerman. One of the British leaders in this war was Lord Raglan, who was criticized soon after his victory at the Battle of the Alma for the many deaths at Balaclava, including the Charge of the Light Brigade. This war brought fame to Florence Nightingale. Name this 1850s war which took place on a peninsula into the Black Sea.</p>	<p>Crimea(n War)</p>
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**Question #3: Science – Biology**

*15 points*

<p>Excessive amounts of this hormone cause Zollinger-Ellison syndrome, and this hormone is very similar to a hormone formerly known as pancreaticozym, cholecystokinin (KOH-luh-SIS-tow-ki-nin). They both activate other cells by using five C-terminal amino acids. This hormone activates Enterochromaffin-Like Cells, and it works with histamines to activate parietal cells. Its primary role is to cause the release of potassium chloride and hydrochloric acid. Identify this hormone released by G cells which stimulates digestion in the stomach.</p>	<p>Gastrin</p>
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**Question #4: Mathematics – Conceptual Question**

*15 points*

<p>This shape is combined with a pyramid and a wedge to find the volume of a prismatoid, and the volume of these shapes can be found using a scalar triple product, which combines a dot product and a cross product. This shape can be generated by adding multiples of any three independent vectors using scalars from zero to one. Examples of this shape include a cuboid, rhombohedron, or cube, and they are a subset of hexahedra. Name this three-dimensional figure whose six faces are all parallelograms.</p>	<p>Parallelepiped(s) (prompt hexahedron or hexahedra)</p>
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**Question #5: Social Studies – Current Events**

*15 points*

<p>This person's wife served as George W. Bush's Secretary of Labor, and in his most recent re-election this person defeated Bruce Lunsford. This politician referred to the debt ceiling as a hostage that's worth ransoming, and after Obama's election he stated, "The single most important thing we want to achieve is for President Obama to be a one-term president." Name this politician from Kentucky who followed Bill Frist as head of the Senate Republicans, the current Minority Leader.</p>	<p>(Addison Mitch) McConnell</p>
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**Question #6: Miscellaneous – Technology**

*15 points*

<p>(Note to moderator: The O near the end of the question is the letter O.) This term is used in an alternate name for dynamic memory allocation. A minimum spanning tree is found more efficiently by Prim's algorithm when it uses the binary or Fibonacci type of this structure. This term is used to describe the property of some trees in which each node has a key more extreme than its parent. This term also describes a type of sorting which, like quicksort, is big <math>O n \log n</math>. Name this tree-based data structure.</p>	<p>Heap</p>
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**Question #7: Mathematics – Analytical Geometry**

*10 points per part*

Given a set of lines, find the area of the finite shape bordered by all of them:		
<b>1</b>	$y=x, y=4-x, x=1$	1
<b>2</b>	$x=2, y=3, x=6, y=8$	20
<b>3</b>	$y=x, y=x+4, y=2, y=10$	32

**Question #8: Mathematics – Analytical Geometry**

*10 points per part*

Find the following for the graph of the equation $\frac{(x+3)^2}{9} + \frac{(y-1)^2}{4} = 1$ :		
<b>1</b>	highest point, giving the x- and y-coordinates	(-3,3)
<b>2</b>	focal length, which is the distance from the center to either focus	$\sqrt{5}$
<b>3</b>	eccentricity	$\frac{\sqrt{5}}{3}$



**Question #9: Literature & Language Arts – World Literature**

10 points per part

Identify the following concerning Greek comedies.		
1	In this work, the women of Athens and Sparta refuse to have sex with their husbands until they stop warring against each other.	<i>Lysistrata</i> (accept Lysistrate)
2	In <i>The Clouds</i> , this figure runs the Thoughtery, which Strepsiades ends up burning to the ground after being beaten by his own son.	Socrates
3	In <i>The Frogs</i> , he strains his back while rowing Charon’s boat. Fed up with the playwrights that are alive, this god ends up taking Aeschylus back to earth with him.	Dionysus

**Question #10: Literature & Language Arts – World Literature**

10 points per part

Answer the following concerning the fiction of Fyodor Dostoyevsky.		
1	In this work, a poor student tries to commit the perfect crime but ends up confessing to murdering a pawnbroker and her sister.	<i>Crime and Punishment</i> (accept Prestupleniye i nakazaniye)
2	This figure spent four years in Switzerland as an epileptic, and upon his return meets General Epanchin. His family gives him his nickname. Someone claiming to be Rogozhin’s son tries to extort him, but he proves the con man wrong.	(Prince Lev Nicolaievitch) Myshkin (prompt Lev, accept “(The) Idiot”)
3	In <i>The Brothers Karamazov</i> , Ivan tells the story of this figure, who explains to Jesus that he should have taken Satan up on his temptations.	Grand Inquisitor (prompt Inquisitor)



**Question #11: Science – Chemistry**

*10 points per part*

Answer the following questions about silicon:		
<b>1</b>	Silicon is on a diagonal line on the Periodic Table that starts with Boron. What name is given to elements along that diagonal line?	Metalloid(s)
<b>2</b>	Silicon is also a semiconductor. What name is given to the process of adding impurities such as boron to a semiconductor to change their conductivity level?	Doping (accept other word forms)
<b>3</b>	Which element always occurs with silicon and oxygen in feldspar? There is sometimes sodium, calcium, and/or potassium in addition to those elements.	Aluminum

**Question #12: Science – Chemistry**

*10 points per part*

Answer the following questions about sodium:		
<b>1</b>	Sodium and what other element are the main elements in table salt? Give the element name, not the ion name.	Chlorine (prompt Cl)
<b>2</b>	What is the chemical name for baking soda? Give the chemical name but not the chemical formula.	Sodium Hydrogen Carbonate (accept Sodium Bicarbonate)
<b>3</b>	What name is given to the apparatus with a carbon anode and iron cathode used to electrolyze table salt after it has been heated to a liquid?	Downs (Cell)



**Question #13: Social Studies – Geography**

*10 points per part*

Identify these South American cities:		
<b>1</b>	This is the capital and largest city of Colombia.	Bogotá
<b>2</b>	This is the most populous city in the Western Hemisphere. It is about three hundred miles west of Rio de Janeiro.	São Paulo
<b>3</b>	This is the most populous city of Ecuador but not its capital. It lies on its namesake gulf.	Guayaquil

**Question #14: Social Studies – Geography**

*10 points per part*

Identify these capes:		
<b>1</b>	This is the large cape in Massachusetts. It is south of Cape Ann.	Cod
<b>2</b>	This cape is at the southern end of New Jersey.	May
<b>3</b>	This cape near Land's End in Southwest England shares its name with its county.	Cornwall



**Question #15: Fine Arts – Composers of Modern Era**

15 points

<p>One work by this composer ends with a section titled “On The Dominant Divide”, and another work sets to music one poem by John Donne and two by Emily Dickinson. Those works are <i>Grand Pianola Music</i> and <i>Harmonium</i>. Another work by this composer, alternatively titled <i>Fanfare for Great Woods</i>, is often used by orchestras for encores because it is energetic and takes less than five minutes. After 9/11, he wrote <i>On the Transmigration of Souls</i>. Name this composer of <i>Short Ride in a Fast Machine</i> and the opera <i>Nixon in China</i>.</p>	<p>(John) Adams</p>
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**Question #16: Science – Astronomy**

15 points

<p>In the night sky, this galaxy is located between the Dorado and Mensa constellations, and this is the location of a large supernova which was detected on Earth in 1987. This contains the most active starburst region in the Local Group, the Tarantula Nebula. Until the discoveries of Sagittarius Dwarf and Canis Major Dwarf, this was thought to be the closest galaxy to the Milky Way. Name this galaxy about twice the size of another galaxy it is closely associated with.</p>	<p>Large Magellanic Cloud (accept LMC or Large Cloud of Magellan, prompt partial answers)</p>
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**Question #17: Literature & Language Arts – Mythology**

15 points

<p>He engineered a test that lasted until sunrise in order to prevent his daughter from marrying the dwarf Alvis. Grid warned this god about an impending trap laid by Geirrod. After a threat from this god, Sif's hair was replaced. On a fishing trip, this god used a bull's head as bait, but Hymir ended up cutting the line. The fish on the other end was Jormungandr, who will kill and be killed at Ragnarok by this god. Name this Norse god of thunder.</p>	<p>Thor</p>
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**Question #18: Social Studies – Economics**

15 points

<p>This economist labeled the aggregate demand function in terms of the number of workers as D and stated that the value where it intersected aggregate supply is effective demand. This economist also said, "In the long run, we are all dead." He wrote <i>The Economic Consequences of the Peace</i> after World War One criticizing the Treaty of Versailles, and his best known work is <i>The General Theory of Employment, Interest and Money</i>. Name this economist who during times of low economic demand advocated for government deficit spending.</p>	<p>(John Maynard) Keynes</p>
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**Question #19: Science – Health**

15 points

<p>This disease inhibits Heparin-binding EGF-like growth factor and is caused by a species of <i>Corynebacterium</i>. Béla Schick developed a test that was once used to determine susceptibility to this, and one type of this leads to skin ulcers covered by a gray membrane. The common form of this disease is characterized by the creation of a pseudomembrane that makes swallowing and breathing difficult, especially with the addition of swollen neck glands. Fortunately, this disease has become very rare in most countries due to vaccination. Name this disease whose vaccine is usually combined with pertussis and tetanus.</p>	<p>Diphtheria</p>
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**Question #20: Literature & Language Arts – British Literature**

15 points

<p>A stuttering film producer is shot in this novel; in the aftermath a mountain climber is thrown off a high-rise roof. Many people drown in this novel after their leader is warned that the sea will not part for them on their pilgrimage. A concession concerning the divine status of three local goddesses is recanted in this novel. One character in this novel is “the man of a thousand and one voices,” and is on a plane that is blown up by Sikh terrorists. Name this novel which resulted in a fatwa being issued against Salman Rushdie.</p>	<p><i>(The) Satanic Verses</i></p>
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**Question #21: Mathematics – Probability**

*10 points per part*

Given two events A and B, where the probability of A is .4 and the probability of B is .3:		
<b>1</b>	What is the probability of both A and B if they are mutually exclusive?	0
<b>2</b>	What is the probability of both A and B if they are independent?	.12 (or 3/25)
<b>3</b>	What is the probability of A or B if they are independent, using the inclusive or?	.58 (or 29/50)

**Question #22: Mathematics – Probability**

*10 points per part*

A computer program randomly selects four-digit PIN numbers. Any four-digit sequence is allowed, so there are ten thousand possible PIN numbers:		
<b>1</b>	What is the probability that all four digits are odd?	$\frac{1}{16}$ (or .0625)
<b>2</b>	What is the probability that the first digit is a three and the second digit is an eight?	$\frac{1}{100}$ (or .01)
<b>3</b>	What is the probability that the sum of all four digits is exactly 35?	$\frac{1}{2500}$ (or .0004)





**Question #23: Literature & Language Arts – U.S. Literature**

*10 points per part*

Identify these novels by Toni Morrison.		
<b>1</b>	This book is about the escaped slave Sethe and her daughter Denver. It is named after Sethe's dead daughter.	<i>Beloved</i>
<b>2</b>	This novel concerns two supposed friends, one named Guitar and the other nicknamed Milkman.	<i>Song of Solomon</i>
<b>3</b>	This book includes the characters Nel and Jude, who live in a community known as the Bottom.	<i>Sula</i>

**Question #24: Literature & Language Arts – U.S. Literature**

*10 points per part*

Identify the following about the works of Edith Wharton.		
<b>1</b>	In this book, the title character lives in Starkfield, Massachusetts and goes sledding with Mattie.	<i>Ethan Frome</i>
<b>2</b>	In this book, George and Bertha Dorset take Lily Bart on a cruise.	<i>(The) House of Mirth</i>
<b>3</b>	Name the character in another Wharton novel who loves Ellen Olenska but marries May Welland.	Newland Archer (accept either half)



**Question #25: Science – Astronomy**

*10 points per part*

Identify these planets or dwarf planets:		
<b>1</b>	Now that Pluto is a dwarf planet, this is the outermost planet in our solar system.	Neptune
<b>2</b>	One of the first triumphs of general relativity was explaining the precession in the orbit of this planet, which is more significant than that of other planets.	Mercury
<b>3</b>	This dwarf planet has the moons Hi'iaka and Namaka.	Haumea

**Question #26: Science – Astronomy**

*10 points per part*

Answer these questions about the evolutions of stars:		
<b>1</b>	What diagram shows the evolution of stars by plotting luminosity vs. temperature?	Hertzprung-Russell (diagram) (accept HR(D) or HR Diagram)
<b>2</b>	What name is given to the long diagonal line on that diagram where many stars belong?	Main Sequence
<b>3</b>	What name is given to the path stars usually follow on their way to either joining that long diagonal line or the Henyey track?	Hayashi (track)



**Question #27: Social Studies – World History**

*10 points per part*

Answer the following questions about the history of Mexico:		
<b>1</b>	Which civilization controlled Tenochtitlan, which became Mexico City, during the 15th century?	Aztec
<b>2</b>	Who was the President of Mexico from most of 1876 to 1911 until a revolution led by Francisco Madero?	(Porfirio) Díaz
<b>3</b>	Which political party ran Mexico from 1929 to 2000?	PRI (accept Pree, Partido Revolucionario Institucional, or Institutional Revolutionary Party)

**Question #28: Social Studies – World History**

*10 points per part*

Identify these Ancient Greek battles:		
<b>1</b>	This 490 BCE battle is associated with a legendary run by Pheidippides.	(Battle of) Marathon
<b>2</b>	This decisive victory by Eurybiades and Themistocles over Xerxes the Great near Piraeus led to another victory a year later at Plataea.	(Battle of) Salamis
<b>3</b>	This Athenian victory near the end of the Second Peloponnesian War killed the Spartan leader Callicratidas. Its result was reversed at the Battle of Aegospotami.	(Battle of) Arginusae



**Question #29: Literature & Language Arts – U.S. Literature**

15 points

A reverend in this novel talks about breaking a bell tower window because the strength of God was in him. That character received that strength after seeing a teacher named Kate Swift pray. Several sections of this work, the ones about farmer Jesse Bentley, are titled “Godliness”. The main character of this work, George Willard, is a reporter for the local paper of the titular town. Identify this work by Sherwood Anderson named for the fictional Midwestern town it is set in.

*Winesburg, Ohio*  
(do not accept or prompt partial answers)

**Question #30: Mathematics – Conceptual Question**

15 points

One variable which measures this quantity is named after Maurice Kendall and represented by a Greek letter tau. Another variable for this quantity, which has its calculation involve changing raw scores into rankings, is named after Charles Spearman and represented by the Greek letter rho. The most common measure of this value, which involves summing products of deviations for two different variables, is named after Karl Pearson and represented by the letter r. Name this quantity which measures the dependence between two variables and the precision of a regression equation.

Correlation (coefficient)  
(prompt coefficient)



**Question #31: Social Studies – U.S. History**

*15 points*

<p>A recent group with this name held its first convention at the University of Chicago in 2006, while the original group chose Alan Haber as its first leader in 1960. That first organization broke into factions, one of which won the Healy vs. James Supreme Court Decision, and the other of which was disbanded at the Flint War Council in 1969, which was a meeting of the Weather Underground. This organization spoke out for disarmament and against racism in its Port Huron Statement, which was written primarily by Tom Hayden. Name this New Left organization generally run by people attending college.</p>	<p>SDS (or Students for a Democratic Society)</p>
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**Question #32: Science – Physics**

*15 points*

<p>Attempts to measure two orthogonal components of this quantity are restricted by Heisenberg's Uncertainty Principle, and different aspects of this quantity interact in j-j coupling. When the derivative of this quantity is taken with respect to time, there are originally two terms, but one of them turns out to equal mass times velocity crossed with velocity, which is zero. The nonzero term of this quantity's time derivative equals displacement crossed with force, which is torque, and this quantity itself is often defined as moment of inertia times angular speed. Name this quantity which is always conserved.</p>	<p>Angular Momentum (do not accept Momentum)</p>
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**Replacement Question A: Social Studies – World History**

*15 points*

<p>Count Schwerin convinced this leader to leave the battlefield during their victory over Neipperg at the Battle of Mollwitz, and he is also reported to have left the field during his victory at Lobositz. This leader's victory at the Battle of Chotusitz led to his territorial gains in the Treaty of Breslau, ending the First Silesian War, which was a phase of the War of Austrian Succession. This leader also invaded Saxony to fight Austria in the Seven Years' War. Name this leader from 1740 to 1786 of Prussia.</p>	<p>Frederick the Great (or Frederick the Second, prompt Frederick)</p>
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**Replacement Question B: Science – Chemistry**

*15 points*

<p>This scientist wrote a paper titled "The Quantum Postulate and the Recent Development of Atomic Theory" which introduced the principle of complementarity, and his name is used to name the constant which approximates the spin magnetic moment of an electron. He attempted to explain the Rydberg formula by improving Nagaoka's Saturnian model and Rutherford's planetary model. Unfortunately, his model gave incorrect values for angular momentum and did not generalize well to atoms more complex than Hydrogen. Identify this scientist associated with the Copenhagen interpretation of quantum mechanics.</p>	<p>(Niels Henrik David) Bohr</p>
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**Replacement Question C: Literature – U.S. Literature**

15 points

<p>The main character in this novel blames Captain John for his problems. Pearl does not speak to her husband Lov Bensey, who is carrying a sack of winter turnips when this book begins. The main character in this novel had seventeen children, and the only two left living at home are Ellie May and Dude, the latter of whom decides to marry Sister Bessie Rice when she promises him a car. Turned into a successful play by Jack Kirkland, this is about the family of Ada and Jeeter Lester, who are poor farmers in Georgia. Name this work by Erskine Caldwell.</p>	<p><i>Tobacco Road</i></p>
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**Replacement Question D: Mathematics – Math Concepts**

15 points

<p>This mathematician provided a no-counterexample interpretation of Gentzen's result, leading to their namesake negative translation. The numbering named after him assigns a natural number to each formula and was used to answer Hilbert's Second Question and critique Russell and Whitehead's <i>Principia Mathematica</i>. Name this mathematician who in 1931 proved that the axioms of a system cannot be proven within the system and that any consistent system had to be incomplete.</p>	<p>(Kurt) Gödel</p>
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**Replacement Question E: Social Studies – U.S. History**

*10 points per part*

Identify these United States treaties:		
<b>1</b>	This treaty with Great Britain was named after the first Supreme Court Justice who negotiated it.	Jay('s Treaty)
<b>2</b>	This treaty ended the War of 1812.	(Treaty of) Ghent
<b>3</b>	This 1817 treaty was an agreement with Great Britain to demilitarize the Great Lakes.	Rush-Bagot (Treaty)

**Replacement Question F: Social Studies – U.S. History**

*10 points per part*

Answer the following questions about the Great Depression:		
<b>1</b>	The stock market crash known as Black Thursday took place in what year?	1929
<b>2</b>	What nickname, synonymous with Dirty Thirties, described the poor agricultural conditions in Oklahoma and neighboring states?	Dust Bowl
<b>3</b>	What independent government agency was created in January 1932 to aid state and local governments and give out loans?	RFC (or Reconstruction Finance Corporation)





**Replacement Question G: Mathematics – Algebra**

*10 points per part*

Find the number of pennies you would have in each of the following situations. Make sure you find the number of pennies:		
<b>1</b>	If you had a total of 208 nickels and pennies worth a total of \$10	10
<b>2</b>	If you had a total of 550 dimes and pennies worth a total of \$10	500
<b>3</b>	If you had a total of 952 quarters and pennies worth a total of \$10	950

**Replacement Question H: Mathematics – Algebra**

*10 points per part*

Find the following values, where $i$ represents the square root of negative one:		
<b>1</b>	$i^{20}$	1
<b>2</b>	the square root of $i$ , expressing your answer using simple radical form in $a+bi$ form with $a$ and $b$ both positive	$\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i$
<b>3</b>	$1/i$ , expressing your answer without a fraction or an exponent	$-i$



**Question #1: Social Studies – Geography**

15 points

<p>This group of islands includes Adán Martín, an auditorium designed by Santiago Calatrava Valls, and a subsection of these islands is the Chinijo Archipelago. These contain a beach in Ajuy in the municipality of Betancuria on the island of Fuerteventura. Outside of Hawaii, this island chain contains the largest volcano in the world, Teide (TAY-day). Its largest city is Las Palmas, and its capital is located on the island of Tenerife. Name this group of islands located west of Morocco controlled by Spain.</p>	<p>Canary (Islands) (or Canaries or Canarias)</p>
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**Question #2: Fine Arts – Art History**

15 points

<p>One work by this artist shows the back of an officer wearing a large black hat, black sash, and red uniform seated inside below an open window and facing a laughing girl. Another work by this artist shows a woman wearing a dark blue apron using a pitcher. Another work, probably influenced by Michael Sweerts, shows a girl wearing a partially unwrapped blue and yellow turban with her face turned towards the viewer. Name this painter of <i>The Milkmaid</i> and <i>Girl With A Pearl Earring</i> who sometimes painted his hometown of Delft.</p>	<p>(Johannes or Jan) Vermeer</p>
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**Question #3: Mathematics – Conceptual Question**

*15 points*

<p>The intersection of this shape with a sphere is known as Viviani's Curve, and the name of this shape is given as an alternative name for Bessel functions. Mathematicians define this as the locus of points given by adding a fixed curve plus a parameter times a fixed point, sometimes bounding it with two parallel planes. The namesake of a coordinate system that combines two distance measures with an angle measure, the best known example of this shape is the right circular type, which has a volume of pi times r squared times h. Name this three-dimensional shape which commonly is the space between two circles.</p>	<p>Cylinder(s) (accept Cylindrical)</p>
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**Question #4: Science – Biology**

*15 points*

<p>This anatomical structure contains the Schaffer collateral fibers and dentate gyrus and is responsible for the stronger of the two theta rhythms in an EEG. It became the focus of a debate over evolution during the 1860s between Richard Owen and Thomas Henry Huxley. Experiments on mice have associated this structure with grid and place cells, and this region of the brain has been shown to be active during navigation. This region is also believed to be associated with short-term memory because it is the first brain region impacted by Alzheimer's disease. Name this structure whose shape resembles a seahorse.</p>	<p>Hippocampus (prompt Brain)</p>
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**Question #5: Literature & Language Arts – Speech**

15 points

<p>In one well-known speech by this person, he compares his views to those of Benjamin Franklin and determines that self-made men are men of work. This person spoke at the unveiling of the Emancipation Memorial, an event that was attended by the widow of Abraham Lincoln. Before the Emancipation Proclamation was issued, this person gave a speech called “What to a slave is the 4th of July?” Name this person whose first talk was given to the Massachusetts Anti-Slavery Society, an escaped slave who wrote a famous autobiography.</p>	<p>(Frederick) Douglass</p>
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**Question #6: Social Studies – Psychology**

15 points

<p>This psychologist was influenced by Hans Vaihinger, and some of his followers have been Rudolf Dreikurs and this psychologist’s children Kurt and Alexandra. He believed that people have a life plan that turns into a fictional final goal which shapes a person’s lifestyle. One of his later books was <i>What Life Should Mean to You</i>, though he became closely associated with a phrase he introduced in his earlier book <i>The Neurotic Constitution</i>. Name this psychologist who tried to free patients of their inferiority complexes by developing individual psychology.</p>	<p>(Alfred) Adler</p>
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**Question #7: Mathematics – Geometry**

*10 points per part*

Find the following for a convex dodecagon, otherwise known as a polygon with twelve sides:		
<b>1</b>	the total of all the interior angle measures in degrees	1800
<b>2</b>	the number of diagonals	54
<b>3</b>	the number of triangles that can be formed by connecting three of the vertices	220

**Question #8: Mathematics – Geometry**

*10 points per part*

Find the following values for a sphere with radius one:		
<b>1</b>	The circumference of a great circle	$2\pi$
<b>2</b>	Its volume	$\frac{4}{3}\pi \left( \text{or } \frac{4\pi}{3} \right)$
<b>3</b>	The volume of a cube inscribed in the sphere in simple radical form	$\frac{8}{9}\sqrt{3} \left( \text{or } \frac{8\sqrt{3}}{9} \right)$



**Question #9: Literature & Language Arts – Mythology**

*10 points per part*

Name these offspring of Typhon and Echidna.		
<b>1</b>	With a name that loosely translates as “strangler,” this monster terrorized Thebes before jumping off a cliff when Oedipus answered her riddle.	Sphinx
<b>2</b>	This fire-breathing terror of Lycia is usually depicted with three distinct heads: lion, goat, and dragon. It was eventually slain when a chunk of lead was shoved down its throat.	Chimera
<b>3</b>	Since this had a hide no weapon could penetrate, Queen Omphale donned its pelt while its original owner was her servant.	Nemean Lion (prompt Lion)

**Question #10: Literature & Language Arts – Mythology**

*10 points per part*

Given a description, name the Olympian god or goddess.		
<b>1</b>	She was called both the oldest and youngest of the Olympians. She was the first born, but she was the last to be regurgitated by Cronus.	Hestia (or Vesta)
<b>2</b>	This brother of Zeus fathered Polyphemus, Theseus, and Pegasus.	Poseidon (or Neptune)
<b>3</b>	Cadmus had to serve this war god for eight years after killing Dracon. Following this, he was allowed to marry Harmonia, whose father was also this war god.	Ares (or Mars)



**Question #11: Science – Astronomy**

*10 points per part*

Answer these questions about an outer region of our solar system:		
<b>1</b>	What is the torus-shaped region that extends 30 to 55 astronomical units from the sun and includes Pluto?	(Edgeworth-)Kuiper Belt
<b>2</b>	What is by far the largest moon of Pluto?	Charon
<b>3</b>	What is the region that extends beyond the torus-shaped region and includes the dwarf planet Eris?	Scattered Disc

**Question #12: Science – Astronomy**

*10 points per part*

Answer these questions about Johannes Kepler:		
<b>1</b>	Kepler worked for which Danish astronomer known for accurate measurement?	(Tycho) Brahe
<b>2</b>	Kepler wrote how many laws of planetary motion, the last of which is known as the harmonic law?	3
<b>3</b>	According to that harmonic law, what power of orbital period is proportional to semimajor axis length?	2/3



**Question #13: Social Studies – Religion**

*10 points per part*

Identify the following tenets of the Hindu religion.		
<b>1</b>	This refers to the mode of conduct that one should follow to advance spiritually, which encompasses duty and obligation.	dharma
<b>2</b>	This term is applied to the universal principle of cause and effect. It differs from fate in that it is driven by one's own actions.	karma
<b>3</b>	This tenet ends when one's soul attains moksha, or liberation from the cycle of samsara. It encompasses existence in unseen worlds that occurs between physical births.	reincarnation (accept punarjanma)

**Question #14: Social Studies – Religion**

*10 points per part*

Identify the following non-Western religious groups.		
<b>1</b>	This holds up its holy text, the Adi Granth, as the Living Guru.	Sikh(ism)
<b>2</b>	Its followers hold up Mahavira as the last tirthankara of this age. Its Digambara sect is renowned for eschewing clothes, in contrast to the Svetambara sect, which wears white.	Jain(ism)
<b>3</b>	This church has its basis in the teachings of St. Mark, who preached Christianity in Egypt. Its favored sons include Saint Athanasius, the author of the Nicene Creed.	Copt(ic Church)





**Question #15: Literature & Language Arts – Grammar/Usage**  
*15 points*

<p>This word is believed to be the Hebrew term for either stream or ear of grain. According to the Book of Judges, this was used by the Gileadites to identify Ephraimites, who could not pronounce its first consonant sound. In addition to the original meaning this term got from that story, it has also come to refer to platitudes that are often repeated without significant value. Give this term which usually refers to language differences used to determine whether or not people belong to a certain group.</p>	<p>Shibboleth</p>
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**Question #16: Science – Health**

*15 points*

<p>Efforts to control this disease in Russia in 1830 led to riots. Caused by the genus <i>Vibrio</i>, the seventh and current pandemic of this disease is named after a town on the Sinai Peninsula, El Tor, though it is now believed to have spread from Bangladesh. This disease, which recently spread to Haiti and the Dominican Republic, can usually be treated by rehydration but leads to one hundred thousand annual deaths worldwide. Name this disease which is rare in developed countries largely because of water purification.</p>	<p>Cholera</p>
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**Question #17: Miscellaneous – Industrial Arts**

15 points

<p>This type of wood comes from the <i>Ochroma pyramidale</i> plant. During World War II, it was combined with birch to make the de Havilland Mosquito, a British fighter aircraft nicknamed The Wooden Wonder. The softest hardwood, it was used by Thor Heyerdahl to build the raft <i>Kon-Tiki</i>, and it is often imported from Ecuador. Name this wood often used to make model bridges.</p>	<p>Balsa</p>
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**Question #18: Mathematics – Conceptual Question**

15 points

<p>To find a point that has this relationship to a point in a circle, you draw a ray from the center of the circle through the original point, a right angle using that ray based at the original point, and another right angle based where the ray from the first angle touches the circle. The formula for finding this type of matrix is to divide the adjoint of a given matrix by its determinant. To find this for a statement, change <math>p</math> implies <math>q</math> to not <math>p</math> implies not <math>q</math>. When this kind of matrix is multiplied by the original matrix, the product is an identity matrix. Give this term that applies to functions created by flipping an injective function over the line <math>y</math> equals <math>x</math>.</p>	<p>Inverse (accept other word forms)</p>
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**Question #19: Literature & Language Arts – U.S. Literature**

15 points

One work by this poet ends with the line, “I said petals from an appletree.” Another work by this poet reads in its entirety, “I have eaten the plums that were in the icebox and which you were probably saving for breakfast. Forgive me they were delicious so sweet and so cold.” In addition to the poems “Portrait of a Lady” and “This Is Just To Say”, this poet wrote a long work about Paterson, New Jersey. Name this poet who wrote that so much depends upon a red wheel barrow.

(William Carlos) Williams  
(prompt Carlos)

**Question #20: Social Studies – Religion**

15 points

According to canon law, there are three orders within this: the episcopal order, the Presbyterian order, and the te diaconal order. Members of this are said to be “in pectore” if their identity has not been revealed. People who are 80 years old or above are forbidden from joining this. The dean of this body is referred to as the Camerlingo and is responsible for preparations for the *novemdieles*, or nine days of mourning. Members of this body who come from within the Roman Curia enter in as Deacons; after ten years, they can petition to become priests. Its members are also referred to as “Princes of the Church”. Name this Catholic body whose primary role is to elect a new Pope.

College of Cardinals (prompt  
Carinal(s))



**Question #21: Science – Biology**

*10 points per part*

Answer these questions about the genus Homo:		
<b>1</b>	What is the species name for modern humans?	(Homo) Sapiens (or (Homo) Sapiens Sapiens)
<b>2</b>	Which species sometimes combined with Homo erectus includes the fossil Turkana Boy?	(Homo) Ergaster
<b>3</b>	What nickname is given to Homo erectus discoveries starting in 1891 by Eugene Dubois at Trinil?	Java (Man)

**Question #22: Science – Biology**

*10 points per part*

Answer these questions about the citric acid cycle. The word Acid should not be used in any of your answers:		
<b>1</b>	Which German-born scientist is often the namesake of the citric acid cycle?	(Hans Adolf) Krebs
<b>2</b>	Which carboxylate ion is decarboxylated and added to Coenzyme A to form Acetyl Coenzyme A, which is then used to form citrate?	Pyruvate (do not accept Pyruvic Acid)
<b>3</b>	Which ion is created by Succinate and Coenzyme Q on the inner membrane of a cell?	Fumarate (do not accept Fumaric Acid)



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

*10 points per part*

Answer these questions about taxes:		
<b>1</b>	In the United States, which agency is responsible for collecting taxes?	IRS (or Internal Revenue Service)
<b>2</b>	Which constitutional amendment outlawed poll taxes?	24 <sup>th</sup>
<b>3</b>	What type of tax is designed to reduce negative externalities? It is named after a 20th century English economist.	Pigovian (accept Pigou)

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

*10 points per part*

Answer these questions about public Old-Age, Survivors, and Disability Insurance in the United States:		
<b>1</b>	What name is commonly given to this program, which regularly sends checks to forty-four million retired Americans?	Social Security
<b>2</b>	What government program administered by the same agency from a different fund benefits eight million low income Americans who are old, blind, or disabled?	SSI (or Supplemental Security Income)
<b>3</b>	Who chaired a commission in the early 1980s that made the funds for these programs solvent for the long term?	(Alan) Greenspan



**Question #25: Literature & Language Arts – U.S. Literature**

*10 points per part*

The Prairie Trilogy consisted of <i>O Pioneers</i> , <i>The Song of the Lark</i> , and <i>My Antonia</i> .		
<b>1</b>	Name the author who wrote the trilogy.	(Willa) Cather
<b>2</b>	Name the narrator who falls in love with Antonia.	(Jim) Burden
<b>3</b>	Give the last name of the siblings Alexandra and Emil from <i>O Pioneers</i> .	Bergson

**Question #26: Literature & Language Arts – U.S. Literature**

*10 points per part*

Name these works by Henry James.		
<b>1</b>	This ghost story is about the siblings Miles and Flora.	( <i>The</i> ) <i>Turn of the Screw</i>
<b>2</b>	This work is about Isabel Archer, the wife of Gilbert Osmond, and her cousin Ralph Touchett.	( <i>The</i> ) <i>Portrait of a Lady</i>
<b>3</b>	This novel is about two young Londoners in love, Kate Croy and Merton Densher, and a wealthy but sick American, Milly Theale.	( <i>The</i> ) <i>Wings of the Dove</i>



**Question #27: Mathematics – Algebra**

*10 points per part*

Solve for y in each of the following situations:		
<b>1</b>	y varies directly with x, and y equals ten when x equals four. Find y when x equals one hundred.	250
<b>2</b>	y varies inversely with x, and y equals twenty when x equals twenty. Find y when x equals one.	400
<b>3</b>	y varies directly with the cube of x, and y equals eight when x equals ten. Find y when x equals twenty-five.	125

**Question #28: Mathematics – Algebra**

*10 points per part*

Find each of the following using a single simplified fraction:		
<b>1</b>	one over x plus one over the quantity 2x	$\frac{3}{2x}$
<b>2</b>	one over x divided by the quantity two over x squared, with the squaring only applying to the x at the end	$\frac{x}{2}$
<b>3</b>	one over the quantity x+3 plus two over the quantity $x^2+6x+9$	$\frac{x+5}{(x+3)^2}$ (or $\frac{x+5}{x^2+6x+9}$ )



**Question #29: Science – Chemistry**

15 points

An atomcule of this element has an antiproton instead of one of its electrons, and this element is created by the Carbon-Nitrogen-Oxygen cycle. The liquid form of this element is used to keep some superconducting magnetic resonance imaging scanners cold, and it is the most common superfluid. This element is commonly combined with neon in lasers, and it is the second most abundant element in the universe. This is the lightest noble gas, and its nucleus is an alpha particle. Name this element with atomic number two.

Helium (prompt He)

**Question #30: Literature & Language Arts – British Literature**

15 points

One leader in this work utilizes the words “mother” and “father” in a lecture on old-fashioned life, reminding them that everyone belongs to everyone else. In this novel, Bokanovsky groups are utilized for large tasks in society. The motto of Community, Identity, Stability is followed by society in this novel. In this work, a ceremonial dance at Malpais involving a boy being whipped shocks one main character. That character is whipped by a man who later hangs himself. One figure had too much alcohol in his blood surrogate during creation, yet is still an Alpha plus. Taking place in the year 632 After Ford, name this dystopian novel by Aldous Huxley.

*Brave New World*





**Question #31: Social Studies – U.S. History**

*15 points*

<p>While fighting for Red Cloud, this Native American leader played a major role in the Fetterman Massacre which led to control over Fort Phil Kearney. In 1877, this leader struggled with people bringing him to a guardhouse, and he was stabbed with a bayonet and died. This leader stopped George Crook at the Battle of the Rosebud, and he then joined forces with Chief Gall and Sitting Bull to win Little Bighorn. He was married to a Cheyenne Native American, but this man was Oglala Lakota Sioux. Name this person who may someday be the subject of an 87 foot tall sculpture in the Black Hills.</p>	<p>Crazy Horse</p>
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**Question #32: Science – Physics**

*15 points*

<p>This scientist developed a formula to describe capillary action which was further developed by Pierre-Simon Laplace, and he similarly developed an equation to describe the interactions between a liquid and a solid surface that was later improved upon by Lewis Dupré. By comparing the patterns caused by holding a narrow card lengthwise up to light and by water in a ripple tank, this scientist argued in favor of the wave nature of light. Name this scientist who studied the stiffness of elastic materials, which is now measured by this man's namesake modulus.</p>	<p>(Thomas) Young</p>
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**Replacement Question A: Social Studies – World History**

*15 points*

<p>Two contemporaries who wrote about this leader are Ibn Battuta and Ibn Khaldun. This leader employed Abu-Ishaq Ibrahim-es-Saheli, who designed his throne and the Djingareyber Mosque. The grandson of either Sundiata or one of Sundiata's sisters, he probably ruled for twenty-five years and became world famous in 1324. In that year, this leader traveled with tens of thousands of people and enormous amounts of gold to Mecca on his Hajj. Name this leader who built up Timbuktu while head of the Malian Empire.</p>	<p>(Mansa or King) Musa (the First)</p>
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**Replacement Question B: Science – Biology**

*15 points*

<p>Problems with these cells can cause mycosis fungoides, which is also known as Alibert-Bazin syndrome and is misleadingly named because it looks like a fungal disease. Some of these cells are classified as gamma-delta, which contrasts with the alpha-beta receptors most of these cells contain, while others are classified as CD8. These cells can be genetically modified to bind to the protein CD19 by giving them a chimeric antigen receptor in what may be a new cure for leukemia. Some of them are classified as natural killer, memory, or helper cells. Identify these cells that assist B cells with immunity and are created in the thymus.</p>	<p>T (Cells) (or T Lymphona, prompt White Blood Cells or Lymphocytes)</p>
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**Replacement Question C: Mathematics – Math Concepts**

*15 points*

<p>One of the results of performing this action on a dihedral angle is handled by Gergonne’s Theorem, which is analogous to the proportion formed by the adjacent sides and parts of the opposite side of a triangle formed when this action is done to an angle in a triangle. Three rays that perform this role in a triangle meet at the incenter, while the segments that perform this role on sides rather than angles meet at the centroid and are known as medians. Give this term which refers to dividing an object into equal halves.</p>	<p>(Angle) Bisect (accept other word forms)</p>
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**Replacement Question D: Literature – Mythology**

*15 points*

<p>A painting by Rubens depicts Ancaeus’ death during this event. According to Homer, the Curetes also took part in this action, which occurred shortly after first fruits. This event also resulted in the death of Eurytion at the hands of Peleus. A prize given out after this event was stolen by the sons of Thestius, Plexippus and Toxeus. King Oeneus’ failure to sacrifice to Artemis brought about this event, which ultimately led to the death of Meleager. Name this event involving many warriors trying to kill a boar.</p>	<p>Calydonian boar hunt (answer logical equivalents i.e. kill, accept Hus Kalydonios for Calydonian Boar)</p>
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**Replacement Question E: Literature – U.S. Literature**

*10 points per part*

In the past ten years, this writer has completed <i>Against the Day</i> and <i>Inherent Vice</i> .		
<b>1</b>	Name this author of <i>Gravity's Rainbow</i> .	(Thomas) Pynchon
<b>2</b>	<i>Gravity's Rainbow</i> is concerned with what type of German missile?	V-2 (or Vergeltungswaffe-2 or A4 or Aggregate-4)
<b>3</b>	Name the girlfriend of Pierce Inverarity who is the protagonist of the same author's <i>The Crying of Lot 49</i> .	Oedipa Maas (accept either half of answer)

**Replacement Question F: Literature – U.S. Literature**

*10 points per part*

Answer these questions based on works by O. Henry.		
<b>1</b>	This is the story of Della and Jim's attempts to buy Christmas presents for each other.	"(The) Gift of the Magi"
<b>2</b>	This is the last name of Ebenezer and Johnny, the latter of whom is kidnapped in "The Ransom of Red Chief".	Dorset
<b>3</b>	This is the name of the safecracker who falls in love with Annabel Adams in "A Retrieved Reformation".	(Jimmy) Valentine (prompt Jim or Jimmy)



**Replacement Question G: Science – Physics**

*10 points per part*

Answer these questions about special relativity:		
<b>1</b>	Who developed special relativity in an article titled “On the Electrodynamics of Moving Bodies”?	(Albert) Einstein
<b>2</b>	Which value is assumed to be constant in special relativity theory?	Speed of Light (in a Vacuum) (prompt c)
<b>3</b>	Which Dutch scientist developed the transformations for time and distance in special relativity theory?	(Hendrik Antoon) Lorentz

**Replacement Question H: Science – Physics**

*10 points per part*

Answer these questions about springs:		
<b>1</b>	Whose law states that the force on a spring varies directly with displacement?	(Robert) Hooke(‘s)
<b>2</b>	What name is given to the sinusoidal oscillations of an object hanging from a spring?	Simple Harmonic (Motion or Oscillation) (prompt Harmonic)
<b>3</b>	What is the formula for the period of a spring in terms of the spring constant and the hanging mass?	Two Pi times the square root of the quantity m over k (or Two Pi over k times the square root of the quantity m times k) (m is the same thing as “mass”, and k is the same thing as “spring constant”)



**Question #1: Miscellaneous – Agriculture**

*15 points*

<p>This person was repeatedly given an operating loan but not an ownership loan, and he was at one point told that he did not have requisite farming skills and should become a teacher instead. He was evicted from his house near Wilmington, North Carolina in 1994. He became the lead plaintiff in a class action suit against Dan Glickman, Clinton’s Secretary of Agriculture, and reached an agreement in 1999. One of the people who joined his suit was Shirley Sherrod, who was the victim of an Andrew Breitbart attack. Name this African American who accused the Department of Agriculture of discrimination.</p>	<p>(Timothy) Pigford</p>
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**Question #2: Science – Physics**

*15 points*

<p>Devices that take advantage of this phenomenon often contain indium arsenide and are used to measure magnetic flux density, which has applications for understanding the Earth’s magnetic field and in anti-lock braking systems. Spin-orbit interaction leads to the spin type of this phenomenon, while the more common type of this phenomenon can be used to differentiate between n- and p-type semiconductors and is equivalent to the magnetoresistance effect. Name this potential difference transverse to an electric conductor created in a magnetic field.</p>	<p>Hall (Effect or Voltage or Potential Difference)</p>
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**Question #3: Social Studies – U.S. Government**

*15 points*

<p>A 2010 law clarified the clawback provisions of this organization and also made it easier for this organization to carry out its Payout Method in addition to its Purchase and Assumption Method. In 2006, the BIF and SAIF, two funds overseen by this organization, were merged to form the DIF. This group's Board of Directors includes the Comptroller of the Currency and the Director of the Office of Thrift Supervision. This organization is associated with the phrase, "Deposits are backed by the full faith and credit of the United States Government." Name this organization that guarantees bank accounts.</p>	<p>FDIC (or Federal Deposit Insurance Corporation)</p>
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**Question #4: Mathematics – Conceptual Question**

*15 points*

<p>This point lies opposite the Nagel point on a Fuhrmann circle, and its distance from the Nagel point is half its distance from the circumcenter. Its distance from the sides of its triangle are proportional to the secants of the angles opposite those sides. Along with the nine-point circle center, centroid, and circumcenter, this point is on the Euler (OI-ler) line. For obtuse triangles, this point is located outside its triangle, and for right triangles, this point is located at the right angle. Name this intersection of the three altitudes of a triangle.</p>	<p>Orthocenter</p>
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**Question #5: Literature & Language Arts – Vocabulary**

*15 points*

<p>This term is derived from a Portuguese word meaning to command, and in the 16th century it started being applied to certain Chinese officials. This term later became associated with the color of the suits those officials wore, which is similar to orange, and it then became associated with a type of orange fruit. Give this term which names a language spoken by over one billion people, the most popular Chinese language.</p>	<p>Mandarin</p>
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**Question #6: Science – Environmental Science**

*15 points*

<p>The largest power plant of this type in the United States is Florida's New Hope Power Partnership, which uses bagasse. A Manomet Center for Conservation Sciences study raised the question as to whether or not this source of energy is carbon neutral, and some scientists now claim that it is carbon neutral only if you measure it over a long period of time or avoid using forests. One source of this type of fuel is miscanthus, a type of grass. Name this energy source which uses organic matter and can create biofuel.</p>	<p>Biomass</p>
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**Question #7: Mathematics – Pre-Calculus**

*10 points per part*

Simplify the following expressions. Do not use limits—just simplify:		
1	the quantity $x+h$ quantity squared minus $x$ squared, all divided by $h$	$2x+h$
2	the quantity $x+h$ quantity to the fourth power minus $x$ to the fourth power, all divided by $h$	$4x^3+6x^2h+4xh^2+h^3$
3	one divided by the sum $x+h$ , end quantity, minus one over $x$ , all divided by $h$	$\frac{-1}{x(x+h)} \left( \text{or } \frac{-1}{x^2+xh} \right)$

**Question #8: Mathematics – Pre-Calculus**

*10 points per part*

Find the following limits:		
1	the limit as $x$ approaches three of the quantity $x$ squared minus four $x$ plus three, end quantity, divided by the quantity $x$ minus three	2
2	the limit as $x$ approaches nine of the quantity of the square root of $x$ minus three, end quantity, divided by the quantity $x$ minus nine; in that expression, the three is outside the square root	$\frac{1}{6}$ (or .16 with the 6 repeating)
3	the sum of the infinite series one over zero factorial plus one over one factorial plus one over two factorial, etcetera	$e$



**Question #9: Literature & Language Arts – British Literature**

10 points per part

Identify the following concerning literary works of Alexander Pope.		
1	The title action of this work occurs when Lord Petri snips off a curl of Arabella Fermor's hair.	<i>(The) Rape of the Lock</i>
2	Pope wrote about the "chain of being" and how "hope springs eternal in the human breast" in <i>An Essay on this entity</i> .	<i>(An Essay on) Man</i>
3	Inspired by <i>MacFlecknoe</i> and the <i>Aeneid</i> , Pope took shots at contemporaries in this work, which concerns the goddess Dulness and the Shakespearean scholar Tibbald.	<i>(The) Dunciad</i>

**Question #10: Literature & Language Arts – British Literature**

10 points per part

Name the short story in which Sherlock Holmes performs the described actions.		
1	Holmes recognizes a ginger-haired pawnbroker's clerk as John Clay, and concludes that he and his associates dug a tunnel from the shop to a bank vault in order to rob it.	"(The) Red-Headed League"
2	Holmes put out an ad for a lost wedding ring, but the owner eludes him. When a cab driver bends down to help with a trunk, Holmes puts cuffs over Jefferson Hope's wrists.	"(A) Study in Scarlet"
3	Holmes stays the night in the room of Helen Stoner, and he beats back the poisonous snake which had killed Helen's sister.	"(The) Adventure of the Speckled Band"



**Question #11: Science – Biology**

*10 points per part*

Answer these questions about blood types:		
<b>1</b>	In the ABO system, what type is the universal recipient?	AB (Positive) (do not prompt or accept A or B)
<b>2</b>	Which scientist won the 1930 Nobel Prize for discovering blood groups?	(Karl) Landsteiner
<b>3</b>	Which letter names the antigen found in people who are classified as Rh+ (pronounced R H positive)?	D

**Question #12: Science – Biology**

*10 points per part*

Answer these questions about polysaccharides:		
<b>1</b>	Which three elements are in polysaccharides? Together with nitrogen, these are the most important elements in organic chemistry.	Carbon, Hydrogen, Oxygen (any order, accept, C, H, O)
<b>2</b>	Which polysaccharide, sometimes called animal starch, is often used to store energy in the liver?	Glycogen
<b>3</b>	Which disaccharide is the combination of two glucose molecules?	Maltose



**Question #13: Social Studies – Current Events**

*10 points per part*

Answer the following about Willard Mitt Romney:		
<b>1</b>	What state was he the Governor of from 2003 to 2007?	Massachusetts
<b>2</b>	Who is the namesake of the management companies headed by Romney during the 1980s and 90s?	(Bill) Bain
<b>3</b>	Romney was an early supporter of which U.S. Senator who won a special election in 2010 over Martha Coakley?	(Scott) Brown

**Question #14: Social Studies – Current Events**

*10 points per part*

Answer the following about the current US Speaker of the House:		
<b>1</b>	What is his name?	(John) Boehner
<b>2</b>	His district is in which state?	Ohio
<b>3</b>	What President of Americans for Tax Reform, who pushes the Taxpayer Protection Pledge, did he refer to last year as some random person?	(Grover) Norquist



**Question #15: Literature & Language Arts – Mythology**

15 points

<p>Epithets assigned to this deity include “Lady to the Limit” and “Lady of the West.” Compared to Aphrodite by the Greeks, upon being born seven incarnations of this deity would determine the fate of children. Items associated with this deity include a <i>sistra</i>, and she was depicted nude on a number of mirrors. Pregnant women were protected by this goddess, who turned into Sakhmet to punish mankind, only to turn back after getting drunk. Name this Egyptian goddess, often depicted as a cow with a sundisk on her head.</p>	<p>Hathor</p>
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**Question #16: Mathematics – Conceptual Question**

15 points

<p>This shape shows where a sonic boom can be heard on the ground at any given time, its three dimensional analog gives the shape of a nuclear reactor cooling tower, and it gives the path of an object that exceeds escape velocity if that path is not a ray. It can be graphed parametrically by setting one variable equal to a secant function and the other equal to a tangent function, and it can be used to create an alternative trigonometry which gives rise to a catenary curve. When every point on this curve is compared to two fixed points, the distances are a constant difference. Name this conic section with an eccentricity greater than one which contains two branches.</p>	<p>Hyperbola(s) (prompt Conic (Section))</p>
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**Question #17: Social Studies – Economics**

15 points

<p>Yochai Benkler wrote a paper stating that the development of Linux was this economist's penguin. The conjecture named after this economist gives situations in which somebody with a monopoly will have to sell goods at a low price. The theorem named after this economist, which applies in certain cases in which bargaining leads to efficient outcomes, is described in his article <i>The Problem of Social Cost</i>, which followed an article he wrote about the Federal Communications Commission. Name this economist who explained why people work together in <i>The Nature of the Firm</i>.</p>	<p>(Ronald) Coase</p>
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**Question #18: Fine Arts – Classical Music & Opera**

15 points

<p>One character in this opera sings “E lucevan le stele” while awaiting death. A deal that would have freed him is refused by the title character, who explains her position by singing “Vissi d’arte”. Earlier in this opera, a cannon sounds to announce that Cesare Angelotti has escaped from jail. The title character has a deep hatred for the Chief of Police, Scarpia, and loves the artist Cavaradossi. Name this Puccini opera set in Rome.</p>	<p><i>Tosca</i></p>
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**Question #19: Science – Chemistry**

15 points

The fifth decay stage starting with the most common isotope of this element is Lead 210, and this eventually decays to Lead 206. This element is created from the decay of thorium or uranium, and it is often found where the waste products of uranium mining have been buried. This rises from soil and water containing uranium, and this is the heaviest noble gas. Because it is colorless and odorless, people generally are not aware of their exposure level to it. Name this gas that emits ionizing radiation and according to some studies is the 2nd leading cause of lung cancer after smoking.

Radon (prompt Rn)

**Question #20: Literature & Language Arts – World Literature**

15 points

One novel by this author concerns a reporter who falls for a photographer and is shot following the discovery of a secret burial ground. Besides *Of Love and Shadows*, a character in a different work sleeps in a coffin; that character serves as a second mother to a woman who ends up becoming a scriptwriter. She wrote about a child known as Lai Ming, whose grandmother is Eliza Sommers, the title character in *Daughter of Fortune*. She set one novel at Tres Marias, the home of the Trueba family. After it was taken over by socialists, it is given back to Esteban following a military coup. Name this Chilean author of *House of the Spirits*.

(Isabel) Allende (Llona)  
(prompt Llona, which can be pronounced Yona)



**Question #21: Science – Physics**

*10 points per part*

Answer these questions about the scattering of electromagnetic radiation:		
<b>1</b>	What name is given to the range of colors seen when light disperses through a prism or to make a rainbow?	Spectrum
<b>2</b>	Similar to dispersion, what name is given to the type of scattering caused by very small particles? It can be used to explain why the sky is blue.	Rayleigh (Scattering)
<b>3</b>	Which scientist expressed the change in wavelength of scattered X-rays in terms of their scattering angle?	(Arthur) Compton

**Question #22: Science – Physics**

*10 points per part*

Answer the following about magnetism:		
<b>1</b>	What unit is equal to one weber per square meter and is commonly used to measure magnetic field strength?	Tesla
<b>2</b>	What name is given to the production of an electrical potential difference by a changing magnetic field?	(Electromagnetic) Induction
<b>3</b>	What eponymous name is given to the circular devices used to measure hysteresis curves of magnetic materials?	Rowland('s) Ring(s)





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

*10 points per part*

Identify these Civil War battles:		
<b>1</b>	This site, also known as Manassas, was the site of two Confederate victories, including the first major land battle during the Civil War.	Bull Run
<b>2</b>	This major battle in Georgia in 1863 allowed Confederate forces under Bragg and Longstreet to advance to Chattanooga.	Chickamauga
<b>3</b>	This was the site of three battles, the last of which ended a ten-month siege and allowed Union forces to advance to nearby Richmond.	Petersburg

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

*10 points per part*

Identify these towns that were important during the Civil Rights Movement:		
<b>1</b>	In 1955 and 1956, African Americans boycotted buses in this town, the home of Rosa Parks.	Montgomery(, Alabama)
<b>2</b>	In 1957, Orval Faubus tried to prevent nine African American students from attending a high school in this town.	Little Rock(, Arkansas)
<b>3</b>	In 1960, students from North Carolina Agricultural & Technical College started a sit-in at a Woolworth's in this town.	Greensboro(, North Carolina)



**Question #25: Literature & Language Arts – U.S. Literature**

10 points per part

This author wrote “The Bride Comes to Yellow Sky”.		
1	Name this man who also wrote the Civil War novel <i>The Red Badge of Courage</i> .	(Stephen) Crane
2	Name the youth who is the protagonist in <i>The Red Badge of Courage</i> .	(Henry) Fleming (prompt Henry)
3	Name the short story by the same writer about card games in Nebraska involving a Swede and Scully’s son Johnnie.	“(The) Blue Hotel”

**Question #26: Literature & Language Arts – U.S. Literature**

10 points per part

This author wrote <i>This Side of Paradise</i> and <i>Tender is the Night</i> .		
1	Name this author of <i>The Great Gatsby</i> .	(Francis Scott Key) Fitzgerald
2	Name the narrator of <i>The Great Gatsby</i> .	(Nick) Carraway (prompt Nick)
3	Name the yacht owner and copper mogul in <i>The Great Gatsby</i> who put Gatsby in his will.	(Dan) Cody (prompt Dan)



**Question #27: Mathematics – Geometry**

*10 points per part*

Find x for each of the following situations:		
<b>1</b>	A right triangle has legs of $x+1$ and $x-1$ and a hypotenuse of six	$\sqrt{17}$
<b>2</b>	A triangle has angles with degree measures $x$ , $x+1$ , and $x+2$	59
<b>3</b>	A rectangle has area $x^2$ , length $x-1$ , and width $x+2$	2

**Question #28: Mathematics – Geometry**

*10 points per part*

Find the following for a square-based pyramid with each edge of length two:		
<b>1</b>	the slant height	$\sqrt{3}$
<b>2</b>	the total surface area	$4 + 4\sqrt{3}$ (or equivalent)
<b>3</b>	the height	$\sqrt{2}$



**Question #29: Social Studies – Geography**

15 points

<p>Mine waste near this lake is contained in the Kennecott Tailings Pond. The southwest part of this lake has Stansbury Island, which is now connected to the mainland, while to the north it contains Spring Bay and Willard Bay. Its largest tributary is the Bear River, and its largest island is Antelope Island. It sometimes is approached through the towns of Magna or Layton, and it is the largest remnant of Lake Bonneville. The biggest cities near it are Ogden and a namesake city that serves as a state capital. Name this American lake located in Utah.</p>	<p>Great Salt (Lake) (prompt Salt (Lake))</p>
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**Question #30: Literature & Language Arts – U.S. Literature**

15 points

<p>This writer wrote one poem about handing his work to his servant and having him laugh at it, “The Height of the Ridiculous”. Another work by this poet contains the lines, “Thanks for the heavenly message brought by thee, child of the wandering sea,” and, “Build thee more stately mansions, O my soul.” One of his poems, which begins, “Ay, tear her tattered ensign down,” prevented the <i>USS Constitution</i> from being decommissioned. Those poems are “The Chambered Nautilus” and “Old Ironsides”. Name this poet whose son became a Supreme Court Justice.</p>	<p>(Oliver Wendell) Holmes (, Sr.)</p>
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**Question #31: Science – Astronomy**

*15 points*

After looking at data collected from Hipparcos on two hundred seventy-three of these objects, Feast and Catchpole wrote that minor adjustments should be made to previous luminosity measurements. The most accurately measured one of these objects is RS Puppis, and these objects are very similar to RR Lyraes. These objects have been used to study the structure of our galaxy and the universe, since their luminosity can be calculated, making it easy to calculate their distance from Earth. Name these objects that over the course of days or months go through a pulsation cycle of changing luminosity.

Cepheid(s) (Variable(s)  
Star(s)) (prompt Variable  
Star(s))

**Question #32: Social Studies – World History**

*15 points*

According to legend, this leader had a vision of five stars before his defeat of the Tanguts. Generals under his command won the Battle of the Kalka River but then lost the Battle of Samara Bend. This leader tried to establish trade with Inalchuq, but after this man's diplomats were slaughtered, he destroyed the city of Gurganj and much of the Khwarezmid Empire. This leader also ended the Western Xia and the Jin Dynasties, and his grandson made him the official founder of the Yuan Dynasty. Name this early 13th century ruler of China who was the father of Ögedei and grandfather of Kublai.

Genghis Khan (prompt either  
half of name, prompt  
Temujin)



**Replacement Question A: Science – Biology**

*15 points*

<p>Scientists disagree as to whether this phylum contains the Archaeocyatha, which probably is extinct. Usually classified as leuconoid, this type of animal has collar cells that use flagella and microvilli, and its excretory structure is an osculum. Their reproduction sometimes involves buds called gemmules, and they can be broken down into individual cells and survive. These contain an acellular gel layer known as mesohyl or mesenchyme, and some of them have skeletons made of spicules. These generally take in water at their bottom and release it at the top. Name these invertebrates that generally do not move about.</p>	<p>Porifera (accept Sponge(s))</p>
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**Replacement Question B: Social Studies – U.S. History**

*15 points*

<p>During this person's Presidency, a railroad strike that started in Martinsburg, West Virginia spread throughout the country. This President tried to appoint Teddy Roosevelt, Senior, to a position in the New York Customhouse in an attempt to institute civil service reform, which was part of a major rivalry between this person and Roscoe Conkling. Like James Polk, this President kept his pledge not to run for a second term. Name this President elected as part of the Wormley Agreement, which led to the Compromise of 1877 that ended Reconstruction and gave this person an electoral victory over Samuel Tilden.</p>	<p>(Rutherford) Hayes</p>
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**Replacement Question C: Mathematics – Math Concepts**

*15 points*

<p>This process is the subject of the Poncelet–Steiner and Mohr–Mascheroni theorems, and it can be applied to a polygon with <math>n</math> sides if and only if <math>n</math> can be expressed as the product of a power of two and a Fermat prime. Because it cannot generate numbers whose minimal polynomial is greater than two, it cannot be used to double a cube, and for other reasons it also cannot be used to trisect an angle or square a circle. This process uses two unmarked tools, one of which allows the production of segments, and the other of which allows the production of arcs and circles. Name this process which traditionally involves a compass and straightedge.</p>	<p>Construction(s) (accept different word forms and answers mentioning compasses and/or straightedges, but do not accept answers mentioning rulers)</p>
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**Replacement Question D: Language Arts – Grammar/Usage**

*15 points*

<p>This type of verb is very similar to a pronominal verb, and common examples are shaving, washing, and perjuring. With those verbs, there is an expectation within many sentences that the subject and object are identical. This term is more commonly used to identify pronouns and is used in the same situation. In those cases, the pronoun is used to refer to the object of an action that is equivalent to the noun that is the subject. Give this type of pronoun exemplified by the words themselves, yourself, and myself.</p>	<p>Reflexive</p>
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**Replacement Question E: Mathematics – Algebra**

*10 points per part*

Find the following for the graph of $y$ equals the natural log of $x$ :		
<b>1</b>	the equation of the asymptote--make sure you give your answer as an equation	$x=0$ (must be an equation, do not accept or prompt 0)
<b>2</b>	the $x$ -intercept	1 (accept (1,0))
<b>3</b>	the slope of the tangent line to the graph at $x=2$	$\frac{1}{2}$ (or .5)

**Replacement Question F: Mathematics – Algebra**

*10 points per part*

Find the sum of each infinite geometric series:		
<b>1</b>	$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8}$ , etcetera	2
<b>2</b>	$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8}$ , etcetera	$\frac{2}{3}$ (or .6 repeating)
<b>3</b>	$\frac{27}{8} + \frac{9}{4} + \frac{3}{2} + 1$ , etcetera	$\frac{81}{8}$ (or $10\frac{1}{8}$ or 10.125)





**Replacement Question G: Language Arts – Grammar/Usage**

*10 points per part*

Answer the following about a famous sentence in linguistics:		
1	What is the noun in the sentence “Colorless green ideas sleep furiously”?	ideas
2	What MIT linguist and outspoken socialist devised this sentence?	(Noam) Chomsky
3	In what 1957 book did he discuss the sentence?	<i>Syntactic Structures</i>

**Replacement Question H: Language Arts – Grammar/Usage**

*10 points per part*

Identify these people who wrote about the use of language:		
1	This ancient Chinese philosopher wrote that language should be taken as truth in his <i>Analects</i> .	Confucius
2	This linguist is best known for working with his mentor Edward Sapir on the way that language influences thought.	(Benjamin Lee) Whorf
3	This French writer equated language to symbols in works like <i>Mind-Energy</i> . One of his best known works is <i>Creative Evolution</i> .	(Henri) Bergson



**Question #1: Literature & Language Arts – British Literature**

15 points

The protagonist of this novel is able to exchange love letters with the help of a gamekeeper, Black George. The woman he loves bribes her maid in order to escape. A barber who treats the wounds of the title character is actually a man rumored to be his father. The protagonist lodges with Mrs. Miller, and many residents praise his goodness. In this novel, neighborhood gossip causes a schoolmaster to lose his job, as it is rumored that he fathered the title character with a servant. Blifil, his rival, tried to have him hanged for murder. He is actually the son of Bridget, the sister of Squire Allworthy. Name this novel about a foundling, written by Henry Fielding.

*(The History of) Tom Jones  
(, a Foundling)*

**Question #2: Social Studies – Economics**

15 points

The law named after this person is equivalent to saying that excess market demands add up to zero, and his name is associated with a type of perfect competition in which the demand level is made clear so that a price is set allowing for demand and supply to match. Working independently from William Stanley Jevons and Carl Menger, this man helped establish marginalist theory in France. He solved a problem from Antoine Augustin Cournot in his best known work *Elements of Pure Economics*. Name this economist whose name is attached to general equilibrium theory.

(Léon) Walras



**Question #3: Miscellaneous – Journalism**

15 points

This person wrote the poem “Freedom for the Mind” on the wall of his prison cell after being sued for libel by Francis Todd, and another poet described him as, “Champion of those who groan beneath oppression's iron hand.” This person publicly burned a copy of the Constitution in 1854, one of the actions that led to a major rift with his protégé Frederick Douglass. Name this leader of the American Anti-Slavery Society whose newspaper was *The Liberator*.

(William Lloyd) Garrison

**Question #4: Science – Earth Science**

15 points

This period is associated with an increase in the number of burrowing animals known as its substrate revolution. This includes the Montezuman and Furongian Subdivisions, and its study has been aided by findings at the Burgess Shale. One of the arguments against evolution is the rapid growth of fossils known as this period’s explosion. Name this Period between the Ediacaran and Ordovician, the first Period of the Paleozoic Era.

Cambrian (Period) (do not accept Pre-Cambrian Period)



**Question #5: Literature & Language Arts – Speech**

*15 points*

<p>This speech refers to an earlier speech by John Carlisle and states, “Burn down your cities and leave our farms, and your cities will spring up again as if by magic. But destroy our farms and the grass will grow in the streets of every city in the country.” This speech also refers to the ideas of Thomas Jefferson and states, “You shall not press down upon the brow of labor this crown of thorns.” The speaker was critical of the Coinage Act of 1873, and this speech helped propel him to the Democratic nomination for President. Name this 1896 speech in support of bimetallism delivered by William Jennings Bryan.</p>	<p>Cross of Gold</p>
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**Question #6: Social Studies – World History**

*15 points*

<p>This leader’s son died in a murder-suicide which became known as the Mayerling Incident, and his wife was assassinated by an anarchist named Luigi Lucheni. Despite his nation’s naval victory at the Battle of Lissa in what became known as the Third War of Italian Independence, this leader ended up ceding Venetia to France who then gave it to Italy. This leader was the older brother of Maximilian of Mexico and was supposed to be succeeded by Archduke Franz Ferdinand, whose assassination started World War One. Name this monarch who was made Emperor-King by the 1867 Austro-Hungarian Compromise.</p>	<p>(Francis) Joseph (the First) (or Franz Joseph (the First))</p>
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**Question #7: Mathematics – Analytical Geometry**

*10 points per part*

Find the finite volumes enclosed by the following equations in Cartesian coordinates:		
<b>1</b>	$x=1, x=2, y=3, y=4, z=5, \text{ and } z=6$	1
<b>2</b>	$x=y=z=0 \text{ and } x+y+z=1$	$\frac{1}{6}$ (or .16 with the 6 repeating)
<b>3</b>	$x=y=z=0, x+y=1, \text{ and } z=1$	$\frac{1}{2}$ (or .5)

**Question #8: Mathematics – Analytical Geometry**

*10 points per part*

Find the following areas:		
<b>1</b>	the area enclosed by the graph of $x^2+y^2=36$	$36\pi$
<b>2</b>	the area inside $x^2+y^2=36$ but outside the absolute value of x plus the absolute value of y equals six	$36\pi - 72$ (or equivalent)
<b>3</b>	the area inside $x^2+y^2=36$ and to the right of the line $x=3$	$12\pi - 9\sqrt{3}$ (or equivalent)



**Question #9: Literature & Language Arts – World Literature**

*10 points per part*

Answer the following about the travels of Lemuel Gulliver.		
1	These slow-witted humans serve the Houyhnhnms (WIN-ums). Gulliver is considered one of them until his horse master chucks him out.	Yahoo(s)
2	This circular-shaped land floats above the island of Balnibari. After Lemuel is attacked by Chinese pirates, people from this land rescue him.	Laputa
3	After a trip to Luggnagg, about three miles southeast of this country, Gulliver heads to this country before heading back to England.	Japan

**Question #10: Literature & Language Arts – World Literature**

*10 points per part*

Answer the following concerning the events of <i>Antigone</i> .		
1	This brother tried to attack Thebes after he was denied six months of rule by Eteocles. Creon issued a decree that anyone caught trying to bury him would be put to death.	Polyneices
2	This blind figure, led in by a boy, tells Creon that all men are liable to err, but the arrogant king refuses to listen.	Tiresias
3	This son of Creon tries to kill his father but misses and kills himself.	Haemon



**Question #11: Science – Astronomy**

*10 points per part*

Answer these questions about black holes:		
<b>1</b>	This is the boundary where escape from a black hole becomes impossible.	Event Horizon
<b>2</b>	The distance from the center to that boundary is the namesake radius of this physicist.	(Karl) Schwarzschild (Radius)
<b>3</b>	This is the surrounding region where it is impossible to be still.	Ergosphere

**Question #12: Science – Astronomy**

*10 points per part*

Answer these questions about asteroids:		
<b>1</b>	What dwarf planet is the largest asteroid?	Ceres
<b>2</b>	What name is given to asteroids that have the same orbital path as Jupiter?	Trojan(s)
<b>3</b>	Until 2011, which asteroid was hypothesized to be a possible cause of dinosaur extinction?	Baptistina (or 298)



**Question #13: Social Studies – U.S. History**

*10 points per part*

Answer these questions about the Jamestown Settlement started in 1607:		
<b>1</b>	Jamestown is in what current US state?	Virginia
<b>2</b>	The founders of Jamestown were looking for what colony started by Ralph Lane and Richard Grenville in the 1580s?	Roanoke
<b>3</b>	Name the first person elected Governor in the colony. After a few months, he was accused of atheism and replaced by John Ratcliffe.	(Edward Maria) Wingfield

**Question #14: Social Studies – U.S. History**

*10 points per part*

Name these Supreme Court plaintiffs in cases given by the Supreme Court while Earl Warren was Chief Justice:		
<b>1</b>	This man appealed his sentence against the state of Arizona because he was unaware of his rights when he signed his confession.	(Ernesto) Miranda
<b>2</b>	This Planned Parenthood director appealed her sentence against the state of Connecticut, which had made contraceptives illegal.	(Estelle) Griswold
<b>3</b>	This theatre manager sued the state of Ohio when it prevented him from showing <i>The Lovers</i> , a movie which had been deemed obscene.	(Nico) Jacobellis





**Question #15: Science – Biology**

15 points

<p>Type five of this protein is found in bird red blood cells and resembles the type one. Types three and four of these proteins are arginine-rich, while types one, two A, and two B are lysine-rich. Folds of this protein contain a triple helix structure. These proteins have an N-terminus which is altered in different ways to impact chromatin structure, and those alterations may impact transcription. Identify these proteins which spool DNA into nucleosomes.</p>	<p>Histone(s)</p>
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**Question #16: Fine Arts – Art History**

15 points

<p>One painting by this artist shows a boy with a bared shoulder and white flower above his ear recoiling as his middle finger is bitten by a small lizard. Another work, painted on an alchemist's ceiling, shows Jupiter at one end and Neptune and Pluto at the other. He completed two major works with the same title figure around 1600, one of which shows that person reaching up to an angel's palm leaf as a soldier prepares to kill him, and the other of which shows that same person being recruited away from tax collection. Name this Italian artist who painted <i>The Martyrdom of Saint Matthew</i> and <i>The Calling of Saint Matthew</i>.</p>	<p>(Michelangelo Merisi da) Caravaggio (do not accept or prompt Michelangelo)</p>
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**Question #17: Mathematics – Conceptual Question**

*15 points*

This mathematician is the namesake of a sphere formed by mapping points from the plane and adding a point at infinity, and he is also the namesake of objects which locally look like the complex plane but as a whole can be a curved surface. A function named after him is related to functions named after Dirichlet using simple proportions and has no zeroes of the form one plus  $i$  times  $t$ , which is used to prove the Prime Number Theorem. That function, which sums from one to infinity the number one over  $n$  raised to the input power, is his zeta function. Name this German, also the namesake of a sequence of rectangles used to approximate the value of an integral.

(Bernhard) Riemann

**Question #18: Social Studies – Geography**

*15 points*

The town that shares a name with this island is located near Lake Suwa, and the largest lake on this island is Biwa. It is north of the Inland Sea and northeast of the Kanmon Strait. This island includes the Hida, Kiso, and Akaishi Mountains, the last of which includes Mount Kita, and its northern tip is the Shimokita Peninsula. A stretch from the Ibaraki Prefecture to the Fukuoka Prefecture includes the Taiheiyō Belt, which includes the cities of Nagoya, Osaka, Kyoto, Kobe, and Hiroshima. Name this island that includes Tokyo, the main island of Japan.

Honshu (prompt Main Island (of Japan), do not accept Japan)



**Question #19: Literature & Language Arts – U.S. Literature**

15 points

In one play by this writer, Julian is given one hundred fifty thousand dollars, changing the lives of his older sisters Carrie and Anna Berniers. In another play by this writer, one of the characters asks, “What was a man in a wheelchair doing on a staircase?” In that work, Leo steals bonds from a safety deposit box to help Oscar and Benjamin build a cotton mill, though Regina Giddens later blackmails them. This writer’s story about a rumored lesbian affair closing a boarding school is *The Children’s Hour*. Name this playwright of *Toys in the Attic* and *The Little Foxes*.

(Lillian) Hellman

**Question #20: Science – Physics**

15 points

The quantity named after this person obeys the equation that its derivative with respect to time of its derivative with respect to velocity equals its derivative with respect to position. In Newtonian mechanics, that quantity equals kinetic energy minus potential energy. Like William Hamilton, this scientist developed a system of mechanics based on the Principle of Least Action. Identify this scientist whose attempt to solve the three-body problem led to his name being used to name the positions in orbital motion where a small object can be held still by the orbits of larger objects.

(Joseph Louis) Lagrange



**Question #21: Mathematics – Algebra**

*10 points per part*

Find the following for the graph of $y=x^2-1$ :		
<b>1</b>	the coordinates of the vertex	(0,-1)
<b>2</b>	the area between the graph and the x-axis for the part of the graph below the x-axis	$\frac{4}{3}$ (or $1\frac{1}{3}$ or $\frac{-4}{3}$ or $-1\frac{1}{3}$ ) (or 1.3 repeating or -1.3 repeating)
<b>3</b>	the coordinates of the focus	$(0, \frac{-3}{4})$ (or (0,-.75))

**Question #22: Mathematics – Algebra**

*10 points per part*

Answer the following about Pascal's Triangle:		
<b>1</b>	What is the sum of the row that starts out with the numbers 1 and 8?	256
<b>2</b>	What is the fourth number in the row whose first two numbers are 1 and 6?	20
<b>3</b>	A diagonal line on the triangle goes through the numbers 1, 3, 6, 10, and 15. What is the next number that diagonal line goes through?	21



**Question #23: Literature & Language Arts – Vocabulary**

*10 points per part*

Identify these English words with African origins:		
<b>1</b>	A dead body given the semblance of life; rumor has it that they like to eat brains	zombie
<b>2</b>	A fever and measles-like rash that, like malaria, yellow fever, and Chikungunya, is transmitted by mosquitoes	dengue
<b>3</b>	A term for kindness to humanity that is now used for a Linux distribution system that uses Gnome Graphical desktop	ubuntu

**Question #24: Literature & Language Arts – Vocabulary**

*10 points per part*

Identify these English words with Tamil origins:		
<b>1</b>	This mineral defines nine on the Mohs scale of hardness.	corundum
<b>2</b>	These boats, similar to outrigger canoes, have two hulls.	catamaran(s)
<b>3</b>	This word for outcast sometimes refers to drummers in India and Burma.	pariah



**Question #25: Science – Health**

*10 points per part*

Answer these questions about a disease whose name means “splitting of the mind”:		
<b>1</b>	What is this disease characterized by hallucinations, delusions, disorganized thinking, movement disorders, and flat affect?	Schizophrenia
<b>2</b>	Which treatable symptom suffered by some people with that disease includes periods of immobility and stupor which can be contrasted by periods of purposeless hyperactivity?	Catatonia (accept word variations)
<b>3</b>	What drug is often used to treat this disease even though it requires monitoring because in some patients it can cause a decrease in the number of white blood cells?	Clozapine (or Clozaril)

**Question #26: Science – Health**

*10 points per part*

Answer the following questions about diabetes:		
<b>1</b>	Diabetes is caused by a failure to produce or respond to which hormone?	Insulin
<b>2</b>	Some attempts to cure diabetes involve a transplant of which organ responsible for producing that hormone?	Pancreas
<b>3</b>	What complication of diabetes comes from breaking down fats instead of sugars in the body? Symptoms include vomiting, dehydration, and possibly coma.	(Diabetic) Ketoacidosis (or (D)KA)



**Question #27: Social Studies – World History**

*10 points per part*

Identify these people important in the history of the nation of Chile:		
<b>1</b>	The first European to see Chile was this man who tried to go around the world. The strait between mainland Chile and Tierra del Fuego is named after him.	(Ferdinand) Magellan
<b>2</b>	This leader became the first Supreme Director of an independent Chile after José Francisco de San Martín turned down the job.	(Bernardo) O’Higgins
<b>3</b>	This Marxist was removed in a 1973 coup that might have involved the CIA and which led to the rule of Augusto Pinochet.	(Salvador) Allende

**Question #28: Social Studies – World History**

*10 points per part*

Identify these Ancient Egyptians:		
<b>1</b>	This wife of Akhenaten is now most famous for a bust of her that is now located in Berlin.	(Queen) Nefertiti
<b>2</b>	This Pharaoh probably reigned in the 27 <sup>th</sup> century BCE before being succeeded by Sekhemkhet. He ordered Imhotep to build the first Step Pyramid.	Djoser (or Netjerikhet)
<b>3</b>	This Pharaoh from the 26 <sup>th</sup> century BCE may have been the son of Khafre and built the smallest of the three pyramids of Giza, which has three subsidiary pyramids in front of it.	Menkaure (or Men-Kau-Ra)



**Question #29: Mathematics – Conceptual Question**

*15 points*

<p>The convergence of these entities is determined by the Dini Test. One way to find this series is to integrate the product of a function with <math>e</math> raised to negative two <math>i</math> times <math>\pi</math> times <math>x</math>, though the coefficients can also be found by integrating the product of a function with sine and cosine functions of various wavelengths. The result allows any wave to be broken down into a sum of sinusoidal waves. Name this approximation of periodic functions using trig functions.</p>	<p>Fourier (Series or Transform)</p>
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**Question #30: Social Studies – U.S. History**

*15 points*

<p>This American spent all of 1946 in China trying to negotiate a deal between the Chinese Communists and the Kuomintang, and Joe McCarthy wrote a book blaming this man for the Communist takeover of China. This person had earlier been named the first Army Five Star General a few days before MacArthur and Eisenhower, and he served as Army Chief of Staff during World War Two. Name this man who served as Truman's Secretary of State and Defense and whose name is closely associated with the European Recovery Program that started in 1948.</p>	<p>(George) Marshall</p>
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**Question #31: Science – Chemistry**

15 points

This compound can be created by adding water to epichlorohydrin, which is also known as ECH, and it is also a byproduct of saponification. One of the benefits from a plan to create biodiesel from alligator fat is that it would also produce this chemical. Its chemical formula is  $C_3H_8O_3$ , and it provides the molecular structure for animal and vegetable fats. Name this compound whose nitrate can be used as a vasodilator in medicine and as an explosive.

Glycerol (accept Glycerin or Glycerine, prompt  $C_3H_8O_3$ , do not accept answers beginning with nitro-)

**Question #32: Literature & Language Arts – World Literature**

15 points

In this work, a card with a black cross indicates that one is about to shut himself up and die. One figure in this work spent three weeks making ornaments, as his family was still economizing. Among the Christmas presents bought in this play are a suit and sword for Ivar, and a horse and trumpet for Bob. In the opening scene of this play, one character cautiously eats some macaroons, and is then called both a squirrel and a lark. That figure once borrowed money from Krogstad, who attempts to blackmail her. In the end, he forgives the debt, but the protagonist ends up leaving her husband Torvald. Name this play featuring Nora Helmer by Henrik Ibsen.

(A) *Doll's House*



**Replacement Question A: Literature – U.S. Literature**

15 points

<p>This author wrote about milkman Gus McNeil and also about Ellen Thatcher, who marries the immigrant journalist Jimmy Herf. Another work by this writer includes sections devoted to characters such as Eleanor Stoddard and Charley Anderson as well as Camera Eye sections, the Newsreel, and short biographies of important people of his era, including Big Bill Haywood and Robert LaFollette. Name this author whose books <i>The Big Money</i>, <i>Nineteen Nineteen</i>, and <i>The 42nd Parallel</i> comprise his <i>USA Trilogy</i> and who also wrote <i>Manhattan Transfer</i>.</p>	<p>(John) Dos Passos (prompt Dos or Passos)</p>
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**Replacement Question B: Social Studies – Geography**

15 points

<p>One suburb of this city is Meudon, and its Meudon Telescope is in an observatory easily seen from this city's Luxembourg Gardens. In the 1980s, the Arab World Institute was built in this city, as was a square structure called the Grand Arch, and during the same decade a famous train station was converted into an art museum. This city also holds a large modern art museum, the Pompidou Centre, and its more famous art museum is decorated by pyramids designed by I.M. Pei. Name this city on the Seine River, the capital of France.</p>	<p>Paris(, France)</p>
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**Replacement Question C: Mathematics – Math Concepts**

*15 points*

This term can describe a differential equation transformation that does not change the solutions. Emmy Noether's first theorem states that every example of this phenomenon in a system corresponds to a conserved quantity, and this term can be used synonymously with invariance in mathematics. This type of relation maps  $y$  to  $x$  whenever it maps  $x$  to  $y$ , and functions of this type are classified as even or odd. This property of equality says that if  $a$  equals  $b$ , then  $b$  equals  $a$ . Give this term that can be classified as rotational, translational, or reflection.

Symmetry (accept word forms such as Symmetric, accept invariance before it is mentioned)

**Replacement Question D: Science – Astronomy**

*15 points*

This person's son John checked his work and then extended it by making observations from South Africa. This person separated the colors of sunlight and measured their temperatures, and his measurement of heat found outside the visible colors was the discovery that the Sun produces infrared radiation. The European Space Agency Space Observatory sensitive to infrared light is named after this person and his sister Caroline. This person's work significantly extended the Messier Catalogue, and he discovered Titania and Oberon. Name this builder of a telescope with one mirror who discovered Uranus.

(William) Herschel



**Replacement Question E: Science – Biology**

*10 points per part*

Answer the following about dinosaurs:		
<b>1</b>	Which class of animals did dinosaurs belong to?	Reptilia (or Reptile(s))
<b>2</b>	What name is given to the extinction event that killed off dinosaurs and many other species sixty-five million years ago?	K-T (or Cretaceous–Tertiary or K-Pg or Cretaceous–Paleogene) (extinction event)
<b>3</b>	Dinosaurs are usually divided into two orders. Which order includes the Sauropoda and Theropoda?	Saurischia (accept different word endings)

**Replacement Question F: Science – Biology**

*10 points per part*

Answer these questions about symbiosis:		
<b>1</b>	Unlike mutualism and parasitism, what type of symbiosis benefits one species without significantly impacting the other species?	Commensalism
<b>2</b>	What is the common name of cestoda, a class of Platyhelminthes, or flatworms, that live parasitically in vertebrate digestive systems?	Tapeworm(s)
<b>3</b>	Which dinoflagellate protozoans, also called Symbiodinium, lives mutually with coral?	Zooxanthella(e) (be lenient, should be pronounced zoo-zan-thelly)



**Replacement Question G: Social Studies – Geography**

*10 points per part*

Identify these Australian cities:		
<b>1</b>	Which most populous Australian city has a famous opera house?	Sydney
<b>2</b>	Which second most populous Australian city is the capital of the state of Victoria?	Melbourne
<b>3</b>	Located at the mouth of the Derwent River, what is the largest city on the island of Tasmania?	Hobart

**Replacement Question H: Social Studies – Geography**

*10 points per part*

Identify these lakes:		
<b>1</b>	The largest lake in Africa, this lake borders Uganda, Kenya, and Tanzania.	Victoria
<b>2</b>	This is the smallest and easternmost of the Great Lakes. Champlain is not a Great Lake.	Ontario
<b>3</b>	The largest lake in the Middle East, this lake is in northwestern Iran.	Urmia



**Question #1: Social Studies – Current Events**

*15 points*

<p>A controversy last year questioned whether or not this corporation had the goal of becoming the largest provider of health-care services in the United States. A lawsuit started against this corporation by Betty Dukes was denied class action standing by the Supreme Court last year, and in 2009 this company started its own Sustainability Index giving information to customers about the impact of its products. This company is often seen as the target of Big Box Laws that prevent large national chains from expanding into an area. Name this company recently headed by Mike Duke and headquartered in Bentonville, Arkansas that owns Sam's Club.</p>	<p>Walmart (Stores, Inc.)</p>
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**Question #2: Mathematics – Conceptual Question**

*15 points*

<p>The property named after this person applies to situations when present states of a system, but no past states, have no impact on future states. This property often applies to stochastic processes, which means that the future depends on random factors rather than being completely deterministic. When the property named after this person holds, then the process named after him can be used to predict future outcomes, and when time can be handled in discrete steps, that process can be calculated using his namesake chains. Name this Russian mathematicians whose chains typically involve matrix multiplication.</p>	<p>(Andrey) Markov</p>
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**Question #3: Fine Arts – Composers of Modern Era**

15 points

<p>One song composed by this man and Irving Mills, with lyrics by Irving Gordon, claims, “That was my heart serenading you.” Years after recording “Prelude to a Kiss”, this composer wrote “Cotton Tail” and “C Jam Blues”, and he worked with Mahalia Jackson when he reworked his <i>Black, Brown, and Beige suite</i>. Name this bandleader who composed <i>Do Nothing till You Hear From Me</i> whose signature song was Billy Strayhorn’s “Take the ‘A’ Train”.</p>	<p>(Edward Kennedy Duke) Ellington</p>
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**Question #4: Science – Chemistry**

15 points

<p>A ratio in this equation is sometimes equal to the molecules of salt form divided by the molecules of acid form, which is often equivalent to the amount of base divided by the amount of acid. This equation is usually expressed using addition, though it can use subtraction if the fraction is flipped depending on whether the dissociation constant or the hydrogen ion concentration is solved for. Commonly used for buffer solutions, name this equation that can be derived using the definitions of the dissociation constant and pH.</p>	<p>Henderson-Hasselbalch (equation)</p>
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**Question #5: Literature & Language Arts – World Literature**

*15 points*

Upon returning home, he rebuffs a monk's request for refuge. That monk is actually Duke John Parricida, who had just killed his uncle. During a tempest on Lake Lucerne, he helps ferry a man who split a seneschal's head with an axe. His father-in-law accuses Ulrich von Rudenz of being a turncoat, and proposes that an uprising be delayed until Christmas. He is arrested for not bowing to a cap, after which he takes out two arrows. He later admits that the second would have been aimed at Gessler, had the first not hit an apple on his son's head. Name this Swiss archer created by Friedrich Schiller.

(Wilhelm) Tell (accept William Tell)

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

*15 points*

This person was the subject of an epic poem by Blind Harry. There is debate over whether he married Marion Braidfute, but many historians believe that he avenged her death by killing a sheriff named William Heselrig. This person joined forces with Andrew Murray, and his influence grew after Murray died in battle. This person was betrayed at the Battle of Falkirk in 1298, leading to his defeat and his eventual quartering. Name this hero of the Battle of Stirling Bridge who was supported by Robert the Bruce while fighting for Scottish Independence.

(William) Wallace





**Question #7: Science – Biology**

*10 points per part*

Answer these questions about similarities between species:		
<b>1</b>	What name is given for a similarity which protects one or both species?	Mimic(ry)
<b>2</b>	What type of similarity occurs when both species have anti-predation characteristics?	Müller(ian mimicry)
<b>3</b>	That similarity occurs with bees and wasps, which belong to which order of insects?	Hymenoptera

**Question #8: Science – Biology**

*10 points per part*

Answer the following questions about biomes:		
<b>1</b>	Which biome has limited tree growth and is classified as arctic, antarctic, or alpine?	Tundra
<b>2</b>	Which biome that covers much of Canada and Russia is sometimes called a boreal forest?	Taiga
<b>3</b>	Which marine biome is found at the bottom of the sea? It is below the pelagic zone, and some systems place the abyssal zone below this one in deep parts of the ocean.	Benthic (zone)



**Question #9: Social Studies – Geography**

*10 points per part*

Identify these European cities:		
<b>1</b>	Which city is the capital of Portugal?	Lisbon
<b>2</b>	What is the most populous city on Sicily? It is located on the north coast.	Palermo
<b>3</b>	Which populous German city is located at the southern end of the Jutland Peninsula near Lübeck?	Hamburg

**Question #10: Social Studies – Geography**

*10 points per part*

Identify these small countries:		
<b>1</b>	This country between Switzerland and Austria has its capital at Vaduz.	Liechtenstein
<b>2</b>	Like Vatican City and possibly Seborga, this country is an enclave in Italy. It contains the city of Dogana.	San Marino
<b>3</b>	Like Marshall Islands, this country chose not to be a part of Micronesia. This includes Koror Island.	Palau



**Question #11: Literature & Language Arts – Speech**

*10 points per part*

Identify these ancient orators:		
<b>1</b>	This is the speaker in Plato's <i>Apology</i> .	Socrates
<b>2</b>	This politician who was killed around 43 BCE delivered the Verrine and Catiline Orations.	(Marcus Tullius) Cicero (prompt Tully)
<b>3</b>	Thucydides attempted to write down the famous funeral oration at the end of the first year of the Peloponnesian War by this politician.	Pericles

**Question #12: Literature & Language Arts – Speech**

*10 points per part*

Identify these early American orators:		
<b>1</b>	This man supposedly said, "Give me Liberty, or give me Death."	(Patrick) Henry
<b>2</b>	This preacher delivered the sermon "Sinners in the Hands of an Angry God".	(Jonathan) Edwards
<b>3</b>	This person is considered the Father of the Bill of Rights in part because of a speech he gave to Congress on June 8, 1789.	(James) Madison



**Question #13: Mathematics – Trigonometry**

*10 points per part*

Consider the graph of the function $y = P + Q \sin Rx$ , where $P$ , $Q$ , and $R$ cannot be negative. For each part of this question, you will be given a fact about the graph. You should state which of the three variable $P$ , $Q$ , or $R$ can be determined from that fact and give the value of that variable. For example, your answer could be $Q=8$ .		
<b>1</b>	The graph goes through the point $(0,3)$ .	$P=3$
<b>2</b>	The only intersections of the graph and $y = P$ are at integral multiples of $\pi$ and include all such multiples of $\pi$ .	$R=1$
<b>3</b>	The difference between the highest $y$ -coordinate and the lowest $y$ -coordinate is ten.	$Q=5$

**Question #14: Mathematics – Trigonometry**

*10 points per part*

Find the cosines of the following angles that can be made with a cube. Answers in simple radical form:		
<b>1</b>	the cosine of the angle between a face diagonal and an edge of that face	$\frac{\sqrt{2}}{2}$
<b>2</b>	the cosine of the angle between a face diagonal and an edge that has a common vertex with the diagonal, but where the edge is not part of that face	0
<b>3</b>	the cosine of the angle between a space diagonal and an edge with a common vertex	$\frac{\sqrt{3}}{3}$



**Question #15: Science – Astronomy**

*15 points*

<p>One long-range plan of NASA is to study this moon with the Deep Phreatic Thermal Explorer. One of its regions is Conamara Chaos, and it is the site of the Pwyll impact crater. It is the middle of the three planets that form a four to two to one resonance orbiting Jupiter, and it is the smallest of the four Galilean satellites. This moon has prominent lineae, and the smoothness of its surface has led many scientists to believe that it contains water. Name this Galilean moon smaller than Ganymede, Callisto, and Io.</p>	<p>Europa</p>
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**Question #16: Fine Arts – Classical Music & Opera**

*15 points*

<p>When this composer could not find a market for a one movement Phantasie for piano and orchestra in A Minor, he expanded it into what became his only piano concerto. In 1842, he completed what is widely regarded as the first significant Romantic Piano Quintet. This composer never completed his Zwickau Symphony, but he did complete four others, including Spring and Rhenish. Name this composer who had a famously stormy relationship with his eventual wife Clara.</p>	<p>(Robert) Schumann</p>
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**Question #17: Mathematics – Conceptual Question**

15 points

This mathematician wrote *Essay on the Application of Analysis to the Probability of Majority Decisions* in 1785, which included a formula determining the probability of a jury reaching a correct verdict assuming majority rule and based on the probability of an individual juror being correct and the number of jurors. He is best known for devising a method to handle intransitive ranking methods, thus making it impossible to meet his namesake criterion. Name this mathematician who believed that candidates should be ranked and each possible pair should be considered when voting.

(Marquis de) Condorcet

**Question #18: Social Studies – Psychology**

15 points

This topic is the subject of Spearman's Hypothesis and is the subject of the widely applied work by David Wechsler from when he worked at Bellevue Hospital. Lewis Terman of Stanford University developed the work on this subject performed by the Frenchman Alfred Binet. Those people tried to quantify this concept, whose general increase over time is called the Flynn Effect. This typically is measured on a scale with a standard deviation of fifteen and a mean of one hundred. Name this quantity valued by Mensa International that supposedly is the ability of abstract thought and problem solving.

IQ (or Intelligence or Intelligence Quotient or g or general intelligence (factor) or Intelligenz-Quotient)



**Question #19: Literature & Language Arts – Grammar/Usage**  
*15 points*

<p>Many of these words are also compound words, such as brainwashing, rhinestone, or flamethrower. Words are classified as this based on how they enter a language, and these words are not loanwords even though they come from another language. One example is due to the fact that regen is the German word for rain and wald is the German word for forest, so the German word regenwald became the English word rainforest. Give this term for a word that enters a language through word-for-word translation.</p>	<p>Calque(s) (prompt loan translation)</p>
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**Question #20: Science – Earth Science**

*15 points*

<p>The cubic lattice structure of this crystal is the namesake structure found in silicon and germanium, and many of this mineral's defects are nitrogen-vacancy centers. This is sometimes produced by either Chemical Vapor Deposition or High-Pressure High-Temperature synthesis. This substance is often extracted from kimberlite, which is named after a city in South Africa. This substance can be used for etching a variety of surfaces. Name this carbon allotrope that is a ten on the Mohs hardness scale.</p>	<p>Diamond</p>
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**Question #21: Literature & Language Arts – U.S. Literature**

10 points per part

In this poem, a sheet covers a dead woman, but her feet protrude.		
1	Name this work that begins, “Call the roller of big cigars”.	“(The) Emperor of Ice-Cream”
2	Name the poet who wrote it.	(Wallace) Stevens
3	Name this other work by the same poet which states that “People are not going to dream of baboons and periwinkles”.	“Disillusionment of Ten O’Clock”

**Question #22: Literature & Language Arts – U.S. Literature**

10 points per part

<i>Long Day’s Journey into Night</i> is a play about a dysfunctional family headed by James and Mary.		
1	Give the last name of the family.	Tyrone(s)
2	Name the playwright, who also wrote <i>The Iceman Cometh</i> .	(Eugene) O’Neill
3	Name this other play by the same playwright about Richard Miller, a teenager who likes to read the <i>Rubaiyat</i> of Omar Khayyam.	<i>Ah, Wilderness</i>





**Question #23: Mathematics – Algebra**

*10 points per part*

Answer the following questions regarding distance, rate, and time:		
<b>1</b>	Jack runs twice as fast as he walks. If it takes him one total hour to walk two kilometers and run four kilometers, then what is his walking speed in kilometers per hour?	4 (kilometers per hour)
<b>2</b>	Jill runs three kilometers per hour faster than she walks. If it takes her one total hour to walk four kilometers and run three kilometers, then what is her walking speed in kilometers per hour?	6 (kilometers per hour)
<b>3</b>	Ryan drives 30 kilometers in 40 minutes. What is his driving speed in kilometers per hour?	45 (kilometers per hour)

**Question #24: Mathematics – Algebra**

*10 points per part*

Answer the following questions about a population doubles every ten years. Make sure you round the last two answers appropriately:		
<b>1</b>	By what factor is the population multiplied by over fifty years?	32
<b>2</b>	Rounded to the nearest tenth, by what factor is the population multiplied by over five years?	1.4
<b>3</b>	Rounded to the nearest year, how long will it take for the population to be multiplied by ten?	33



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

*10 points per part*

Answer the following about the Watergate Scandal:		
<b>1</b>	The scandal led to the resignation of which President?	(Richard) Nixon
<b>2</b>	Which Attorney General helped plan the break-in and eventually served time in jail?	(John) Mitchell
<b>3</b>	Which special prosecutor was fired by Robert Bork during the Saturday Night Massacre? He was replaced with Leon Jaworski.	(Archibald) Cox

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

*10 points per part*

Answer the following about the Iran-Contra Affair:		
<b>1</b>	Which President was impacted by this 1986 scandal?	(Ronald) Reagan
<b>2</b>	One of the goals of the deal was to get which terrorist group to release six American prisoners? Its name means Hand of God.	Hezbollah
<b>3</b>	This Secretary of Defense was indicted, but the first President Bush pardoned him before trial.	(Caspar) Weinberger



**Question #27: Science – Environmental Science**

*10 points per part*

Answer these questions about car efficiency:		
<b>1</b>	Which type of cars get energy from more than one source, typically gasoline and an electric battery?	Hybrid
<b>2</b>	The Honda FCX Clarity, like most fuel cell vehicles, uses which element as an energy source?	Hydrogen
<b>3</b>	Which regulations require car companies to produce vehicles with certain overall mile per gallon standards?	CAFE (Standards) (or Corporate Average Fuel Economy)

**Question #28: Science – Environmental Science**

*10 points per part*

Answer these questions about asbestos:		
<b>1</b>	In addition to the EPA, which US agency in charge of workplace conditions regulates asbestos?	OSHA (or Occupational Safety and Health Administration)
<b>2</b>	What cancer of the protective layer of the body's internal organs became much more common with the use of asbestos?	(Malignant) Mesothelioma
<b>3</b>	In addition to oxygen, what is the primary element in asbestos?	Silicon (or Si)



**Question #29: Literature & Language Arts – World Literature**

15 points

<p>He wrote about a figure who goes away to study in England, indicating that “we’re not strong, we don’t even have a flag”. That figure’s friend decides to head inland, stating, “I could be master of my fate only if I stood alone”. That journey takes him to Nazruddin’s shop at the title locale. One of this writer’s works contains two stories in which first-person narrators recount their failures. Those stories, “One out of Many” and “Tell Me Who to Kill”, are found within <i>In a Free State</i>. In another novel, the central figure builds two structures on Tulsi land, but ends up in a structure of his own. Name this author of <i>A House for Mr. Biswas</i>, a Trinidadian Nobel Laureate.</p>	<p>(Sir Vidiadhar Surajprasad) Naipaul</p>
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**Question #30: Social Studies – U.S. Government**

15 points

<p>This agency was created by the Wiley Act, which is named after the person who became its first commissioner in 1907. Currently headed by Margaret Hamburg, its scope was increased in 2009 by the Family Smoking Prevention and Tobacco Control Act. Part of the Department of Health and Human Services, it includes the Center for Devices and Radiological Health and also regulates cosmetics. Name this agency whose primary role is to regulate pharmaceuticals and edible objects.</p>	<p>FDA (or Food and Drug Administration)</p>
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**Question #31: Science – Physics**

15 points

<p>Dayton Miller attempted to improve this experiment by eliminating magnetic fields and using a laboratory with thin walls, and this became the basis of the Kennedy–Thorndike experiment. This experiment originally was conducted on a block of sandstone floating in a pool of mercury. Worked on in 1887 in Cleveland, the rotating apparatus later became known as an interferometer and used a semi-silvered mirror to split a beam of light. Scientific historians debate whether or not this experiment played a role in the development of special relativity. Name this experiment that failed to find evidence of a luminiferous ether.</p>	<p>Michelson-Morley (Experiment)</p>
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**Question #32: Literature & Language Arts – U.S. Literature**

15 points

<p>At one point in this play, a gypsy explains that it is easy to tell the future by looking at a person's face, but it is difficult to tell the past. At another point, Miss Somerset, who is supposed to be playing Sabina, advises the audience not to take it seriously. The main character advises his wife to burn everything except Shakespeare to deal with an Ice Age that is about to reach Excelsior, New Jersey. Name this play with many similarities to James Joyce's <i>Finnegans Wake</i> that was written by Thornton Wilder.</p>	<p><i>(The) Skin of Our Teeth</i></p>
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**Replacement Question A: Literature – Mythology**

*15 points*

<p>Following the death of his son, a group of this god's daughters were turned into poplars, and the nymphs of Eridanus had their tears turned to amber. By the Oceanid Perseis, he fathered Pasiphae, Circe, and Calypso. A gift from this god helped Medea escape Corinth after the murder of Creon's daughter. While fetching the cattle of Geryon, Heracles utilized a vessel belonging to this deity, after the hero shot at this deity while crossing the desert. Name this personification of the Sun in Greek myth.</p>	<p>Helios (do not accept Apollo)</p>
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**Replacement Question B: Science – Biology**

*15 points*

<p>Unlike the one in the ulna, the coronoid process of this bone is at the top of one of its rami and attaches to the masseter and temporalis muscles. This bone contains holes that allow passage of the mental nerves, and its upper front section is the alveolar process. It articulates with the temporal bone, and it is sometimes called the submaxilla. It is U shaped and holds the lower teeth. Name this bone commonly called the jawbone.</p>	<p>Mandible (accept submaxilla before it is mentioned, prompt Skull or Jaw or Jawbone)</p>
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**Replacement Question C: Social Studies – U.S. History**

*15 points*

<p>A review board for this agency released a minority report by John Sinclair and a special report by William Thompson in addition to its main report. That main report was countered in detail by Donald Richberg, the chief counsel of this organization who would later lead it. This organization was originally led Hugh Johnson, and its review board was headed by Clarence Darrow. The legislation that created this organization was ruled unconstitutional by the Supreme Court in the Schechter Poultry decision. Name this New Deal organization symbolized by a blue eagle and created by the NIRA.</p>	<p>National Recovery Administration (or NRA, prompt NIRA or National Industrial Recovery Act)</p>
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**Replacement Question D: Mathematics – Math Concepts**

*15 points*

<p>Numbers that are checked for this property include numbers that are one more than a multiple of twelve or nine more than a multiple of thirty-six as well as numbers of the form <math>n</math> times the quantity <math>3n+1</math> divided by the quantity <math>1-n</math> quantity cubed, which are known as hexagonal numbers. The examples found so far have recursive digital sums of one and end with a six or eight. These numbers are contrasted with abundant or deficient numbers, and the lowest examples are six, twenty-eight, and four hundred ninety-six. Name these numbers which equal the sum of their proper factors.</p>	<p>Perfect (numbers)</p>
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**Replacement Question E: Social Studies – World History**

*10 points per part*

Name these British dynasties:		
<b>1</b>	This royal house ruled for much of the 18th and 19th centuries and included George the Third.	Hanover
<b>2</b>	This is the name of the current royal house, which started with George the Fifth.	Windsor
<b>3</b>	This is really the same house as Part B. This name was used only by Edward the Seventh.	Saxe-Coburg- (and) Gotha

**Replacement Question F: Social Studies – World History**

*10 points per part*

Answer these questions about the Third Crusade:		
<b>1</b>	Which English King together with Philip the Second of France organized the Third Crusade?	Richard the Lion-Heart(ed) (or Richard the First or Richard Cœur de Lion, prompt Richard)
<b>2</b>	Which city was the primary goal of the crusaders? They eventually signed a treaty keeping it in Muslim hands but allowing Christian pilgrims.	Jerusalem
<b>3</b>	At which 1187 battle did Saladin's forces conquer King Guy? It is considered a major cause of the Third Crusade.	(Battle of the Horns of) Hattin





### Replacement Question G: Mathematics – Geometry

*10 points per part*

Consider the arc of a circle with a measure of 60 degrees if the circle has a radius of 6:		
1	Find the area of the sector of the circle that corresponds to that arc.	$6\pi$
2	Find the area of the segment of the circle that corresponds to the arc.	$6\pi - 9\sqrt{3}$
3	Find the interior angle on the circle if the angle vertex is on the circle and the angle subtends the arc.	30 (degrees)

### Replacement Question H: Mathematics – Geometry

*10 points per part*

There is a convex quadrilateral ABCD, and angles ABC and ACD are both right angles. Additionally, sides AB, BC, and CD are all of length one. Note that this figure is not a rectangle, and the right angle at ACD is not one of its interior angles.		
1	What is the length of diagonal AC?	$\sqrt{2}$
2	What is the length of side AD?	$\sqrt{3}$
3	Rounded to the nearest tenth, what is the area of the quadrilateral? Give exact answers for Parts A and B, but round to the nearest tenth for Part C.	1.2