



### Question #1: Science – Chemistry

10 points

This element was the primary fuel in Space Shuttle solid rocket boosters. This metal exists in **cryolite** [KRY-oh-“light”], which is used to isolate it. This element is the most abundant metal in the Earth’s crust, where it coexists with silicon and oxygen in all feldspars. This element is isolated by a combination of the Bayer process and the Hall-**Heroult** [air-ohl] process. There is a scientific controversy as to whether this element increases the risk of Alzheimer’s disease. This element is found in **bauxite** [BAWK-“site”] and is the namesake of the company Alcoa. Name this lightweight metal that replaced tin as the most common one used to make foil.

aluminum [or aluminium]

### Question #2: Social Studies – Geography

10 points

This river’s namesake dolphins have the nickname “white ghosts,” as they grow lighter with age. **Samborombon** [sam-boe-roem-BONE] Bay is found at the mouth of this river, where the German warship *Admiral Graf Spee* [shpay] lost a World War Two battle. The **Paraná** [pah-rah-NAH] river joins with it at Santa Fe. **Montevideo** [mohn-tay-vee-DAY-oh] and **Buenos Aires** [BWAY-nohss “EYE-race”] lie on its shores. Name this river that separates Argentina and Uruguay, whose name is Spanish for “river of silver.”

Rio de la Plata [accept River Plate]



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

10 points

<p>This poet wrote about a “deluge of new woes” overwhelming “the glories of thy ever-famous realm” in “A Dialogue Between Old England and New.” In one poem by this author, the narrator prays that “the heavens reward manifold” the title dedicatee. This author wrote of love that “rivers cannot quench,” and that is prized “more than whole mines of gold” in “To My Dear and Loving Husband.” Name this colonial poet, colloquially referred to as the “Tenth Muse.”</p>	<p>Anne <u>Bradstreet</u></p>
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**Question #4: Math – Math Concepts**

10 points

<p><b>Sierpinski</b> [seer-PIN-skee] numbers of the second kind are used to generate an infinite number of these integers, and a subset of these integers is the <b>sphenic</b> [s'FEH-nik] numbers. <b>Fermat</b> [fair-mah] liars and Carmichael numbers are this type of number even though they satisfy <b>Fermat's</b> [fair-mah'z] little theorem. Numbers classified as “highly” this type of number have more divisors than any number less than themselves. The fundamental theorem of arithmetic states that these numbers can be factored using numbers not in this category. These numbers have proper factors besides one. Name these numbers that are not prime.</p>	<p><u>composite</u> numbers [or <u>composites</u>]</p>
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**Question #5: Social Studies – World History**

10 points

<p>This leader's wife sought financial support from Pope Pius the Ninth but suffered from paranoia when he refused to see her. This leader's wife was also the namesake of the largest part of New Virginia Colony, which housed former Confederate soldiers. This person was defeated at <b>Queretaro</b> [kay-ray-TAH-roe] by Benito Suarez. Name this brother of Franz Joseph the First who was supported by Napoleon the Third in his role as Emperor of Mexico but was eventually killed by a firing squad.</p>	<p><u>Maximilian</u> the First of Mexico</p>
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**Question #6: Fine Arts – Classical/Opera**

10 points

<p>This instrument's lowest notes are part of its "<b>chalumeau</b>" [shah-loo-moh] register, named for the instrument it was derived from. Mozart composed an A major <b>concerto</b> [kon-CHAIR-toe] for this instrument, to be performed by Anton Stadler. This instrument usually plays the basset horn parts found in classical-era music. This instrument plays a trill, then a glissando upwards to open Gershwin's <i>Rhapsody in Blue</i>. Name this single-reed woodwind.</p>	<p><u>clarinet</u></p>
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### Question #7: Science – Biology

10 points per part

This chromosome contains only 19 ancestral genes.		
1	Name this chromosome that only males have.	<u>Y</u> chromosome
2	Despite its small number of ancestral genes, the Y chromosome is very helpful when tracing male ancestors because most of it does not go through this process during <b>meiosis</b> [my-OH-siss] that includes crossing over.	genetic <b>recombination</b> [accept word forms]
3	This gene on the Y chromosome is coded to produce testis-determining factor.	<b>SRY</b> [or <b>sex-determining region</b> on Y]

### Question #8: Science – Biology

10 points per part

This term refers to a visual display of an organism's chromosomes.		
1	Name this arrangement of chromosomes, usually starting with the longest ones and ending with the sex chromosomes.	<b>karyotype</b> [KAIR-ee-oh-"type"] [or <b>karyotyping</b> ]
2	Karyotypes often have lines to show the placement of these structures that exist where sister chromatids join together and where <b>kinetochores</b> [kih-NEH-tuh-kors] are generated.	<b>centromeres</b> [SEN-troh-meerz]
3	The letter G is often used for karyotype stains, which are named for this German scientist.	Gustav <b>Giemsa</b> [GHEEM-sah]



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

10 points per part

The protagonist of this novel was inspired by <b>Jean-Baptiste Lamy</b> [john bap-teest lah-mee].		
<b>1</b>	Name this novel in which vicar Joseph Vaillant travel with the title figure from Sandusky, Ohio to a new <b>diocese</b> [DY-oh-seez].	<b><u>Death Comes for the Archbishop</u></b>
<b>2</b>	This author of <i>Death Comes for the Archbishop</i> wrote about the <b>Shimerda</b> [shih-MEHR-dah] family in <i>My Ántonia</i> [AN-toh-nee-ah].	Willa Sibert <b><u>Cather</u></b>
<b>3</b>	In <i>Death Comes for the Archbishop</i> , Vaillant and <b>Jean-Marie</b> [zhahn ma-ree] Latour travel to a new diocese established in this territory.	<b><u>New Mexico</u></b> Territory

**Question #10: Literature – U.S. Literature**

10 points per part

Joel Cairo offered one man five thousand dollars to procure this object, a gift to the King of Spain.		
<b>1</b>	Name this object whose value was hidden under a layer of black enamel. In the end, the one being pursued was a knock-off.	the <b><u>Maltese Falcon</u></b>
<b>2</b>	<i>The Maltese Falcon</i> appears in a novel by the same name, which was written by this man. He also wrote of amateur detectives Nick and Nora Charles in <i>The Thin Man</i> .	Samuel Dashiell <b><u>Hammett</u></b>
<b>3</b>	The authentic version of the Maltese Falcon was likely still in the hands of a general from this country.	<b><u>Russia</u></b> [accept <b><u>Soviet Union</u></b> ]



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

10 points per part

The eighth pope of this name excommunicated Formosus, while the ninth oversaw the proper burial of Formosus’ body, which was chucked into the Tiber following the Corpse Synod.		
1	The most recent pope of this name called the Second Vatican Council and issued the encyclical <i>Pacem [PAH-chem] in Terris</i> .	<u>John</u> [accept <u>John VIII</u> or <u>John XXIII</u> ]
2	The corpse of Formosus was later reburied within the confines of this Vatican City building, primarily designed by Donato <u>Bramante</u> [brah-MAHN-tay] and Michelangelo.	<u>St. Peter’s</u> Basilica
3	The sixth pope of this name conducted the Corpse Synod. The saint of this name gave a rousing speech to the <u>Sanhedrin</u> [saan-HEE-drin] before being stoned to death.	<u>Stephen</u>

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

10 points per part

Muslims who perform this action are called “kafir,” and in some interpretations of Sharia it is punishable by execution.		
1	Name this practice of renouncing one’s faith in a particular religion.	<u>apostasy</u> [accept variations like becoming an <u>apostate</u> ]
2	In Christianity and Judaism, the first recorded act of apostasy was performed by the people who created this object while Moses was receiving the Ten Commandments.	<u>golden calf</u> [prompt on <u>calf</u> ]
3	Chapter 6 of this New Testament book compares apostates to watered ground yielding thorns and thistles, indicating that apostates cannot be redeemed as Christians.	Letter to the <u>Hebrews</u>



**Question #13: Math – Statistics**

*10 points per part*

This is the value that has the highest frequency in a data set.	
<b>1</b>	Name this highest point on a histogram. <b><u>mode</u></b>
<b>2</b>	This adjective is used for distributions that have two values tied for the highest frequency. <b><u>bimodal</u></b> distributions [prompt on <b><u>multimodal</u></b> ]
<b>3</b>	Find the first skewness coefficient if a distribution has a mode of twenty-five, a mean of thirty-seven, and a standard deviation of four. <b><u>3</u></b>

**Question #14: Math – Statistics**

*10 points per part*

This quantity is calculated by taking the square root of the mean of the squares of the differences between values and the mean.	
<b>1</b>	Name this commonly used measure of the spread of data. population <b><u>standard deviation</u></b> [or <b><u>sample standard deviation</u></b> ]
<b>2</b>	This Greek letter is often used to represent standard deviation. <b><u>sigma</u></b>
<b>3</b>	Each trial of an experiment consists of tossing a fair coin 64 times. Find the standard deviation for the number of heads according to the de Moivre-LaPlace [mauv la-plahs] theorem. <b><u>4</u></b>



**Question #15: Literature – British Literature**

*10 points*

<p>This author wrote of a man who will “roast like a herrin” in Hell, and who was cited as an example of what alcohol could do to a man. This poet wrote of a love that will last “until the seas run dry” and “the rocks melt with the sun.” This author of “Tam O’Shanter” and “A Red Red Rose” wrote a poem in which “the best laid schemes of mice and men oft go awry.” Name this author of “To a Mouse,” a Scottish poet.</p>	<p>Robert <u>Burns</u></p>
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**Question #16: Science – Earth Science**

*10 points*

<p>This region of the atmosphere undergoes a quasi-biennial oscillation that includes its sudden warming. This region includes the <b>Junge</b> [YOON-guh] layer, which contains a significant amount of <b>sulfuric</b> [sul-FYOOR-ik] acid and is sometimes referred to as the aerosol layer. This region experiences very little convection, which is why chemicals that enter this region tend to stay there. This region exists just above the <b>tropopause</b> [TROH-poh-“pause”] and under the <b>mesosphere</b> [MEH-zoh-“sphere”], and it contains the ozone layer. Name this region of the atmosphere that includes the cruising altitude of airplanes.</p>	<p><u>stratosphere</u></p>
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**Question #17: Miscellaneous – Consumer Education**

10 points

<p>Following allegations that this company paid for information regarding the United Food and Commercial Workers' Union, CEO Tom <b>Coughlin</b> [KAWG-lin] was forced to resign. In 2012, the UFCW also organized strikes regarding this company's employees working on Thanksgiving Day. Its effect on local mom-and-pop stores was outlined in the documentary <i>The High Cost of Low Price</i>. It is headquartered in Bentonville, Arkansas. Name this retail chain founded by Sam Walton.</p>	<p><u>Walmart</u></p>
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**Question #18: Social Studies – U.S. History**

10 points

<p>One of this leader's major actions was an attack against the Pamunkey tribe, and his actions were sparked by an attack by the <b>Doeg</b> [DOH-ug] tribe. John Ingram replaced this person after his death from lice and <b>dysentery</b> [DISS-in-tair-ee], but his followers were quickly defeated and hanged. This resident of <b>Henrico</b> [hen-RY-koh] County became the rival of William <b>Berkeley</b> [BARK-lee], who was the governor of Virginia. Name this leader whose troops burned down Jamestown during his namesake 1676 rebellion.</p>	<p>Nathaniel <u>Bacon</u> [or <u>Bacon's Rebellion</u>]</p>
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**Question #19: Science – Biology**

10 points

The combination of this structure and an **endosome** [EN-doh-sohm] is called a hybrid organelle, and these structures are classified as either conventional or secretory. A deficiency of **lipase** [LY-“pace”] inside these structures causes **Wolman** [VOHL-mun] disease. The defect of another enzyme in this structure can lead to the enlargement of the spleen and liver in **Gaucher’s** [goh-shay’z] disease. **Mannose** [MAAN-ohss] 6-phosphate is attached to proteins that belong in these **vesicles** [VES-ik-ulz]. The insides of these structures are acidic. Name these organelles that break down macromolecules.

lysosomes

**Question #20: Literature – World Literature**

10 points

One character in this novel, the “terror of Klosterberg,” forced two bed-wetters to share a bed. The protagonist of this novel, the killer of Gerard Duval, was inspired by the words of his teacher, Kantorek. After having a leg amputated, Franz Kemmerich gave Muller his footwear. Name this novel chronicling the experiences of Paul **Bäumer** [BOY-mur] during World War I, by Erich Maria **Remarque** [“remark”].

All Quiet on the Western Front  
[accept Im Westen nichts Neues]



### Question #21: Math – Geometry

10 points per part

This segment in a regular polygon is often contrasted with the radius.		
1	Name the segment from the center of the polygon to the center of a side.	<u>apothem</u> [AA-puh-thum]
2	If a hexagon has a side of length of four, what is the length of its apothem?	<u>two root two</u> [or <u>two times the square root of two</u> or <u>two radical two</u> or equivalents]
3	A polygon with many sides has an apothem of length one unit and a perimeter of total length 6.4 units rounded to the nearest tenth. Find the area of the polygon rounded to the nearest tenth. Ignore units.	<u>3.2</u> square units

### Question #22: Math – Geometry

10 points per part

This type of solid consists of two parallel congruent polygons and the space between them.		
1	Name this type of solid that contains several faces that are parallelograms in addition to the two that may not be parallelograms. Those parallelograms are often rectangles.	<u>prisms</u>
2	How many total faces does a <u>decagonal</u> [deh-KAAG-uh-nul] prism have?	<u>12</u>
3	Face diagonals are along a face of the prism rather than inside the prism. How many total face diagonals does a triangular prism have?	<u>6</u>



**Question #23: Fine Arts – Art History**

10 points per part

Piero Cannata claimed that a model who worked with the painter <b>Veronese</b> [vair-oh-NAY-zay] came back from the dead and told him to attack this sculpture’s foot with a hammer.		
<b>1</b>	Name this sculpture made of Carrara marble that for a long time was located near the entrance of the <b>Palazzo Vecchio</b> [pah-LAH-zoh VAY-kee-oh].	<b>David</b>
<b>2</b>	This man sculpted <i>David</i> , as well as a sculpture of Moses with horns.	<b>Michelangelo Buonarotti</b> [accept either]
<b>3</b>	David was sculpted for this city, where it is currently on display in the Galleria dell’Accademia.	<b>Florence</b> [or <b>Firenze</b> ]

**Question #24: Fine Arts – Art History**

10 points per part

This painting shows a woman who is wearing a blue and yellow headwrap, and a yellow dress.		
<b>1</b>	Name this painting kept in the <b>Mauritshuis</b> [mor-IT-shoyss] gallery, which uses as its focal point the title jewel.	<i>The <b>Girl with the Pearl Earring</b></i> [or <i>Het <b>Meisje met de Parel</b></i> ]
<b>2</b>	<i>The Girl with the Pearl Earring</i> was painted by this artist, who also created <i>View of Delft</i> .	Jan <b>Vermeer</b>
<b>3</b>	<b>Jan</b> [yahn] Vermeer was an artist from this nation, which was also home to Jan Steen [yahn “stain”], Fritz Hals, and Rembrandt.	The <b>Netherlands</b> [or <b>Holland</b> ]



**Question #25: Science – Chemistry**

10 points per part

This thermodynamic concept is very similar to thermal energy and is generally represented by the letter $Q$ .		
1	Name this quantity that can be transferred from higher-temperature systems to lower-temperature systems.	<b>heat</b>
2	This adjective describes a process that occurs without any exchange of heat.	<b>adiabatic</b> [ay-dee-uh-BAA-tik] process
3	The theorem named for this person gives the ideal efficiency of a heat engine.	Sadi <b>Carnot</b> [sah-dee kar-noh]

**Question #26: Science – Chemistry**

10 points per part

Identify these elements and compounds that use triple bonds.		
1	This <b>diatomic</b> [dy-uh-TAH-mik] gas makes up most of the Earth's atmosphere.	<b>nitrogen</b>
2	The chemical formula of this compound is $C_2H_2$ ["C two H two"]; it has a triple bond between the two carbon atoms.	<b>acetylene</b> [uh-SEE-tuh-leen] [or <b>ethyne</b> [EH-"thine"]; do not accept "ethene" [EH-theen] or "ethane" [EH-thayn]]
3	Acetylene is the simplest example of these hydrocarbons that contain a carbon-carbon triple bond.	<b>alkyne</b> [AAL-"kine"] [do not accept "alkane" [AAL-kayn] or "alkene" [AAL-keen]]



**Question #27: Social Studies – U.S. History**

10 points per part

This spokesman for the Nation of Islam said that African Americans would gain the right to be treated as humans “by any means necessary.”		
<b>1</b>	Name this activist whose so-called “autobiography” was written by Alex Haley.	<b>Malcolm X</b> [or Malcolm <b>Little</b> or El-Hajj Malik El- <b>Shabazz</b> ; prompt on <b>Malcolm</b> ]
<b>2</b>	Malcolm X’s father, Earl Little, was a follower of this native of Jamaica who started the United Negro Improvement Association.	Marcus <b>Garvey</b>
<b>3</b>	Malcolm X was suspended by the Nation of Islam after he claimed that this person’s death was a case of “chickens coming home to roost.”	President John Fitzgerald <b>Kennedy</b> [or <b>JFK</b> ]

**Question #28: Social Studies – U.S. History**

10 points per part

This person’s autobiography was <i>All in the Day’s Work</i> .		
<b>1</b>	Name this muckraker whose articles in <i>McClure’s Magazine</i> were compiled into the book <i>The History of the Standard Oil Company</i> .	Ida <b>Tarbell</b>
<b>2</b>	Tarbell was particularly critical of this billionaire who started Standard Oil Company with his brother William and other investors.	John Davison <b>Rockefeller</b> , Sr.
<b>3</b>	This writer’s articles on political machines, which were mostly published in <i>McClure’s</i> , were turned into the book <i>The Shame of the Cities</i> .	Lincoln <b>Steffens</b>



**Question #29: Literature – U.S. Literature**

10 points

One of this author’s stories sees musicians promised noble titles for playing their best before the teenager who made the offer was shot by Diana Moon Glampers. This author created a “polymorph” that melted at 46°C, but acted as a seed crystal below it. That product, ice-nine, ends up destroying the world in *Cat’s Cradle*. Name this author who used the bombing of Dresden as a backdrop for *Slaughterhouse-Five*.

Kurt Vonnegut, Jr.

**Question #30: Math – Math Concepts**

10 points

The Picard–Lindelöf theorem addresses the Lipschitz version of this concept, which depends on the absolute value of slope being bounded. **Thomae’s [toh-MAY’z]** function only has this property at irrational numbers. The **Dirichlet [dir-ih-KLAY]** function notably does not have this property anywhere, while the **Weierstrass [VY-ur-shtrass]** function has this property over its entire domain even though it is not differentiable anywhere. This property does not exist at vertical asymptotes, holes, and jumps. Identify this property of functions that have values equal to their limits.

continuous [accept word forms such as continuity]



**Question #31: Social Studies – World History**

*10 points*

<p>This person was blamed for not supporting <b>Eucles</b> [YOO-klees] when <b>Brasidas</b> [brah-SEE-dahs] was victorious at <b>Amphipolis</b> [am-FI-poe-lis]. The works of <b>Cratippus</b> [KRAH-tih-pus] and <b>Theopompus</b> [thay-OE-pom-pus] started at the same point at which this person’s work suddenly ended in 411 B.C, in which he described the surrender of Plataea and the ensuing trials. This person’s use of speeches is controversial, and much attention has been given to this person’s version of a funeral oration delivered by <b>Pericles</b> [PEHR-ih-klees]. Name this historian who wrote History of the <b>Peloponnesian</b> [pel-uh-puh-NEE-shun] War.</p>	<p><u>Thucydides</u></p>
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**Question #32: Science – Physics**

*10 points*

<p>The <b>Verdet</b> [vair-day] constant measures the strength of the effect named for this person in a given material. That effect consists of the rotation of polarized light in a magnetic field. The waves on the surface of a vibrating fluid are also named for this person. The law named for this person states that the curl of an electric field equals the opposite of the time derivative of a magnetic field, and the negative sign in that equation represents Lenz’s law. That law summarizes this person’s discovery of induction. Identify this person whose name is shortened to give the SI unit of <b>capacitance</b> [kuh-PAA-sih-tuhnss].</p>	<p>Michael <u>Faraday</u> [do not accept “farad”]</p>
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**Extra Question #1: Social Studies – U.S. History**

*10 points*

<p>This person established the <b>Marseilles [mar-“sales”]</b> Training Center when he was an instructor in the Illinois National Guard during the 1930s. He earlier helped John Pershing plan the <b>Meuse [“moose”]-Argonne</b> Offensive. This person headed a mission to China to prevent civil war after World War II, but he was unsuccessful. That mission followed his work as Army Chief of Staff during World War II. This person gave a speech at Harvard after he became Secretary of State in 1947 outlining a plan of foreign aid. Identify this namesake of the European Recovery Program.</p>	<p>George <u>Marshall</u></p>
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**Extra Question #2: Science – Astronomy**

*10 points*

<p>Some of the stars in this constellation have Arabic names referring to the leaps of a gazelle. This constellation is the location of <b>Bode’s [BOH-duh’z]</b> Galaxy and the Pinwheel Galaxy. The animal represented by this constellation has a tail that is very slowly moving down because of the shifting relative position of Alkaid compared to Mizar. This constellation’s brightest star is <b>Alioth [AA-lee-oth]</b>, though its alpha star is <b>Dubhe [DOOB-huh]</b>. This constellation includes the Big Dipper. Identify this constellation commonly referred to as the Great Bear.</p>	<p><u>Ursa Major</u> [prompt on <u>Ursa</u> or <u>Bear</u> or <u>Great Bear</u>]</p>
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**Extra Question #3: Literature – British Literature**

10 points

<p>This person was called by Solomon Caw a “Betwixt and Between.” Maimie Mannering gave him an imaginary goat. Queen Mab granted him two wishes during his time in Kensington Gardens in the novel <i>The Little White Bird</i>. This character’s encounters with Jane and Margaret mirrored his interactions with their older relative Wendy Darling. He was the savior of Piccaninny princess Tiger Lily and the enemy of Captain Hook. Name this fictional boy, created by James Barrie, who never grew up.</p>	<p><u>Peter Pan</u> [accept either]</p>
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**Extra Question #4: Math – Math Concepts**

10 points

<p>The prime numbers named for this person are congruent to one mod four. The three classic means are collectively named for this person. The fractions named for this person are of the form <math>a</math> squared minus <math>b</math> squared, all over <math>2 a b</math>. Three trigonometric identities are named for this person, including the one stating that the sine squared of <math>x</math> plus the cosine squared of <math>x</math> equals 1 for every <math>x</math>. The theorem named for this ancient Greek mathematician is a special case of the law of cosines. Name this man whose theorem relates the squares of the lengths of sides in right triangles</p>	<p><u>Pythagoras</u> of Samos [prompt on <u>Pythagorean</u>]</p>
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**Extra Question #5: Fine Arts – Art History**

*10 points*

One of these institutions includes the **Santiago Calatrava** [sahn-tee-AH-goh kah-lah-TRAH-vah]-designed **Quadracci** [kwad-RAH-chee] Pavilion in Milwaukee. One of these institutions contains the Winter Palace in St. Petersburg. One of these buildings in Madrid contains an image of the Duchess of Alba nude, and is named the **Prado** [PRAH-doh]. One of these buildings in New York has a helical spiral ramp on its inside and was designed by Frank Lloyd Wright. The largest of these institutions in Florence is the **Uffizi** [ooh-FEET-see]. Name this kind of building, examples of which include the **Hermitage** [air-mee-TASH] and the **Guggenheim** [GOO-ghin-hyme], that contains artwork.

art museums



**Extra Question #6: Math – Algebra**

*10 points per part*

This property does not hold for matrix multiplication.		
<b>1</b>	Name this property which states that $x$ times $y$ equals $y$ times $x$ .	<b>commutative</b> [kuh-MYOO-tuh-tive] property of multiplication [accept <b>commutativity</b> ]
<b>2</b>	This adjective is used to describe a group that follows the commutative property.	<b>abelian</b> [uh-BEE-lee-in] group
<b>3</b>	There are two matrices that are each two-by-two. One matrix has fives in the top row and zeroes in the bottom row. The other matrix has fives in the left column and zeroes in the right column. If you multiply the matrices in the two orders possible, what is the difference between the result you get in the top row left column in the two answers?	<u><b>25</b></u>

**Extra Question #7: Math – Algebra**

*10 points per part*

In this notation, also known as postfix notation, both operands are given before the operator.		
<b>1</b>	Name this notation abbreviated RPN.	<b>reverse Polish</b> notation [do not prompt on “Polish”]
<b>2</b>	Reverse Polish notation uses this type of data structure that operates on a “last in, first out” principle.	<b>stack</b>
<b>3</b>	Using reverse Polish notation, evaluate one two three plus multiply.	<u><b>5</b></u>



### Extra Question #8: Literature – British Literature

10 points per part

As she pursued an affair, her husband grew closer to his caretaker, Ivy Bolton.		
1	Name this daughter of Sir Malcolm Reid, who turned down a proposal from the playwright <b>Michaelis</b> [mih-KAY-liss].	Lady <b>Chatterley</b> [accept <b>Constance</b> or <b>Connie</b> ]
2	This lover of Constance Chatterley was the gamekeeper at Wragby.	<b>Oliver Mellors</b> [accept either]
3	<i>Lady Chatterley's Lover</i> is by this British author, who wrote of a union man and talented flautist in <i>Aaron's Rod</i> .	David Herbert <b>Lawrence</b>

### Extra Question #9: Literature – British Literature

10 points per part

His namesake game, taught to him by Lurgan, involves remembering a group of objects after a single viewing.		
1	Name this orphaned son of Irish parents who befriended a lama seeking the “river of the arrow.”	<b>Kimball</b> O’Hara
2	Kimball O’Hara was created by this British author of “The White Man’s Burden.”	Joseph Rudyard <b>Kipling</b>
3	Kim confesses to the lama that he dreamed of a red one of these animals in a green field. These animals feature prominently in Ernest Hemingway’s <i>Death in the Afternoon</i> .	<b>bulls</b> [prompt on “cow”]



**Question #1: Literature – Mythology**

10 points

<p>Coroebus' [kuh-REE-buss'z] actions during the Trojan War were driven by his love for this woman. This twin of Helenus [HEH-luh-nuss] was raped by the Lesser Ajax. She was killed by Clytemnestra [kly-tim-NESS-truh] and Aegisthus [uh-JISS-thus] along with Agamemnon [aa-guh-MEM-nahn], who took her as a war prize. Name this prophetess who lacked the power to persuade, as evidenced by her warning about the Trojan Horse.</p>	<p><u>Cassandra</u></p>
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**Question #2: Science – Astronomy**

10 points

<p>A new example of this phenomenon was caused in 2014 by an object called 209P/LINEAR. That phenomenon occurred in the direction of a constellation known as the giraffe, or Camelopardalis [kaa-mih-loh-par-DAH-liss]. These events are named for the constellation they appear to be located in, and these events are generally caused by comet dust in the path of Earth's orbit. Name these events that include the Leonids [LEE-uh-nidz] and the Perseids [PUR-see-idz] during which it is easy to see large numbers of so-called shooting stars.</p>	<p><u>meteor showers</u> [accept <u>meteor outbursts</u> or <u>meteor storms</u>]</p>
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### Question #3: Social Studies – U.S. History

10 points

This person's observations of Europe were explained in his book *The Man Farthest Down*. He was recommended for his primary job by Samuel Armstrong, the principal of the Hampton Institute. This person's fame increased after he gave a speech at the Cotton States and International Exposition calling for a decreased emphasis on social inequality as part of what became known as the Atlanta compromise. Those policies would lead to a rivalry between this person and civil rights leaders such as W.E.B. DuBois [doo-BOYS]. Name this person who wrote *Up From Slavery* and headed the Tuskegee [tuhs-KEE-gee] Institute.

Booker Taliaferro Washington

### Question #4: Miscellaneous – Pop Culture

10 points

This person directed a film based on the story of Mehran Karimi Nasseri [MAY-rah-n kah-REE-mee nahs-SHE-ree], who stayed at an airport for seventeen years. In another of his films, the title character is lured into a home via Reese's Pieces. This producer of the cartoon show *Animaniacs* [aa-nih-"maniacs"] had a cameo as a tax clerk in *The Blues Brothers*. He also briefly appeared as a life-station worker in *Jaws*, which he directed, and he also directed *Raiders of the Lost Ark*. Name this director of *E.T.* and *Jurassic Park*.

Steven Spielberg



**Question #5: Literature – British Literature**

10 points

<p>In this novel, a minor character is described as “an ignoramus that doesn’t know poetry from a cabbage.” That man’s lover in this tale was a woman who described herself as a “flower of the mountain” when putting a rose in her hair “like the Andalusian girls.” In this novel, that lover later put her arms around a man saying “yes I said yes I will yes.” It chronicles June 16, 1904 in the life of Leopold Bloom, and it is celebrated each year in Dublin. Name this novel by James Joyce.</p>	<p><u>Ulysses</u></p>
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**Question #6: Science – Biology**

10 points

<p>The lowest part of this human bone is the origin of the <b>teres</b> [TAIR-eez] major muscle. Two extensions at the top of this bone are the <b>acromion</b> [uh-KROH-mee-ahn] and the <b>coracoid</b> [KOR-uh-koyd] process. This bone’s <b>infraspinatous fossa</b> [IN-fruh-spih-NAA-tuss FOH-suh] is a large triangular region located behind the <b>thoracic</b> [thor-AA-sik] cage, or rib cage, and it is connected to the ribs by the <b>pectoralis</b> [PEK-tor-AA-liss] minor. This bone is attached to both the <b>humerus</b> [“humorous”] and the <b>clavicle</b> [KLAAY-ih-kul]. Name this bone commonly referred to as the shoulder blade.</p>	<p><u>scapula</u> [SKAAP-yoo-luh] [prompt on <u>shoulder blade</u>]</p>
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**Question #7: Social Studies – Psychology**

10 points per part

Its various states are commonly referred to as “alters.”		
1	Shirley Mason, also known as Sybil Dorsett, was diagnosed with this disorder. Formerly known as a “hysterical neurosis,” name this disorder cited by Ian Hacking as an example of “making up people.”	<b><u>dissociative identity</u></b> disorder [accept <b><u>multiple personality</u></b> disorder]
2	This other dissociative disorder involves a sudden loss of memory, along with the assumption of a new identity in a different location.	dissociative <b><u>fugue</u></b> [fyooog]
3	Coming from the Greek for “split mind,” sufferers of this other disorder often create <b>neologisms</b> [nee-AH-luh-jizmz]. The <i>DSM V</i> removed explicit subtypes of this disorder, but kept specifiers, such as <b>catatonia</b> [kat-uh-TAHN-yuh] and delusion.	<b><u>schizophrenia</u></b>

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

10 points per part

Robert Sternberg’s <b>triarchic</b> [try-AR-kik] theory took into account three forms of it: analysis, creativity, and practicality.		
1	Name this ability to mentally process information, solve problems, and adapt to one’s environment.	<b><u>intelligence</u></b>
2	Intelligence can be contrasted with this ability to learn certain things or perform certain tasks. Tests for it often look at one’s potential.	<b><u>aptitude</u></b>
3	Developed by Lewis Terman, this intelligence scale is often used to measure someone’s IQ. Its tests measure abstract and visual reasoning.	<b><u>Stanford-Binet</u></b> Intelligence Scale [prompt on partial answer]



### Question #9: Science – Physics

10 points per part

The principle named for this person states that the more precisely one knows a particle's position, the less precisely it is possible to know the particle's momentum.	
<b>1</b>	Name this person who formulated his namesake uncertainty principle. Werner <u>Heisenberg</u> [VAIR-nur HY-sin-bairg]
<b>2</b>	Heisenberg was able to develop the uncertainty principle soon after this scientist hypothesized that all particles have wave properties. Louis <u>de Broglie</u> [duh broy] [prompt on <u>Broglie</u> ]
<b>3</b>	Position and momentum are not the only conjugate pairs described by the uncertainty principle; another pair is energy and this quantity. <u>time</u>

### Question #10: Science – Physics

10 points per part

A common example of these devices uses helium and neon to produce light with a wavelength of 632.8 nanometers.	
<b>1</b>	Name these devices used to read barcodes and compact discs. <u>lasers</u>
<b>2</b>	Laser light exhibits the spatial type of this property, which means it has a fixed phase relationship. <u>coherence</u> [or <u>coherent</u> ]
<b>3</b>	Lasers amplify light by putting more molecules in an excited state than in a ground state, which is known by this two-word name. <u>population inversion</u> [accept word forms]



**Question #11: Literature – World Literature**

10 points per part

Shortly after the death of <b>Jean Tarrou</b> [zhahn tah-roo], this man received word of this death of his wife.		
<b>1</b>	Name this man who, along with Dr. Castel, clashed with Dr. Richard, who wanted to wait it out rather than alarm the public.	Dr. <b>Bernard Rieux</b> [ree-yoo] [accept either]
<b>2</b>	During a quarantine in this city, Dr. Rieux chastised Father <b>Paneloux</b> [pah-nuh-loe] for a sermon following the death of the son of Monsieur Othon.	<b>Oran</b> , Algeria
<b>3</b>	Dr. Rieux is the narrator of this author’s novel <i>The Plague</i> .	Albert <b>Camus</b> [kah-moo]

**Question #12: Literature – World Literature**

10 points per part

This banker foolishly hired Huld as a lawyer on the advice of his uncle Karl.		
<b>1</b>	Name this man whose participation in the title event makes him attractive to Ludi. Titorelli convinces him to buy identical landscapes.	<b>Joseph K</b> [YOH-seff KAH] [prompt on <b>K</b> ]
<b>2</b>	Joseph K was killed in a quarry on his 31st birthday in this novel.	<i>The <b>Trial</b></i> [accept <i>Der <b>Prozess</b></i> ]
<b>3</b>	<i>The Trial</i> was penned by this author, who wrote about Gregor Samsa turning into an insect in <i>The Metamorphosis</i> .	Franz <b>Kafka</b>



### Question #13: Math – Probability

10 points per part

In mathematics, this adjective is often contrasted with “continuous”.		
1	Name this adjective that refers to a branch of mathematics that focuses on the integers rather than the real numbers.	<u>discrete</u>
2	Discrete probability distributions are often based on a function named for Paul Dirac and this Greek letter; that function can be thought of as being zero everywhere except when its input is zero, where it has an infinitely high “spike”.	Dirac <u>delta</u> function
3	The total area under any probability distribution function has to add up to what number?	<u>1</u>

### Question #14: Math – Probability

10 points per part

This shape consists of a circle missing an interior circle.		
1	Name this shape that looks like a ring.	<u>annulus</u> [AAN-yoo-luss]
2	If a point inside the larger circle is selected at random, the event of the point being inside the annulus and the event of the point not being inside the annulus are described by this term. This term refers to two events that have an empty intersection and whose union is the universal set.	<u>complementary</u> [or <u>complements</u> ]
3	If the outer circle of an annulus has a radius of six, and the inner circle has a radius of two, what is the probability that a random point inside the larger circle is also inside the annulus?	<u>8/9</u> [or <u>0.8 repeating</u> ]



**Question #15: Social Studies – World History**

10 points

<p>This country’s armed forces massacred a number of residents of the Dalnik ghetto in the Odessa massacre. The title of “Conducator” was used by Carol the Second of this country, as well as a dictator executed on the orders of the People’s Tribunal in 1946. Another Communist dictator of this nation was found guilty of genocide in <b>Timisoara</b> [tih-mih-SHOR-uh] before being executed with his wife Elenea. Its prime minister recently has been Victor Ponta. Name this Eastern European nation formerly ruled by <b>Ion Antonescu</b> [EE-on an-toe-NES-koo] and Nicolae Ceausescu [chou-SES-koo] with capital Bucharest.</p>	<p>People’s Republic of <b>Romania</b></p>
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**Question #16: Fine Arts – Art History**

10 points

<p>One of these places includes a Great Hall of Polychromes, decorated with a multi-colored bull. The oldest of these structures known to be decorated is named <b>Chauvet</b> [shoh-vay]. One of these structures contains a “Hall of the Bulls” and is threatened by the presence of black mold, forcing it to be closed. That location also is decorated by pictures of <b>Aurochs</b> [AW-ruks] and the <b>Megaloceros</b> [MEH-guh-loh-SAIR-ohss] deer. Name these underground structures, including Altamira and <b>Lascaux</b> [laas-koh], which early humans painted.</p>	<p><b>caves</b> [accept <b>caverns</b>]</p>
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**Question #17: Math – Math Concepts**

10 points

Lawson’s conjecture addresses a four-dimensional version of this solid, which is named for Clifford. The double and triple versions of this solid have genres of two and three, respectively. The spindle version of this shape is self-intersecting. Pappus’ theorem is commonly used to find the volume of these figures by tracing the path of a circle as it revolves around an axis in its own plane. The volume of this shape equals equal two pi squared times a large radius times a smaller radius squared. Identify this shape that looks like a doughnut.

ring torus [or toroid]

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

10 points

The First Fundamental Theorem of Welfare Economics is also referred as the theorem of this concept. Described by Milton Friedman as “the possibility of cooperation without coercion,” this phrase was used to describe how one who “intends only his own security” promotes and end that “was no part of his intention.” Name this metaphor used in *The Wealth of Nations* by Adam Smith, which describes how a market is designed to self-regulate.

invisible hand



**Question #19: Science – Chemistry**

10 points

<p>When this value depends on conditions, a <b>rheometer</b> [ree-AH-mih-tur] is used to measure it. One equation multiplies this quantity by six pi times radius times velocity to find frictional force. The <b>kinematic</b> [ky-nuh-MAA-tik] type of this quantity is found by dividing the dynamic type by density. This quantity equals shear stress divided by velocity gradient. The product of density, velocity, and diameter is divided by this quantity to calculate the Reynolds number, which is used to differentiate between laminar and turbulent flow. Name this quantity measured in <b>poise</b> [pwahz] that gives a fluid's resistance to flow.</p>	<p><u>viscosity</u></p>
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**Question #20: Literature – U.S. Literature**

10 points

<p>One character in this novel compares marriage to bees pollinating a pear tree. During a hurricane in this novel, the protagonist's husband is bitten by a rabid dog; the ensuing illness led him to attempt to shoot his wife, who was charged with his murder. This novel is told through flashbacks as described to <b>Phoeby</b> [FEE-bee] Watson following the protagonist's return from the Everglades to Eatonville. Name this novel featuring Tea Cake and Janie Crawford, by Zora Neale Hurston.</p>	<p><u><i>Their Eyes Were Watching God</i></u></p>
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**Question #21: Math – Algebra**

*10 points per part*

The natural version of this function uses base $e$ , while the common version uses base ten.		
<b>1</b>	Name this type of function, popularized by John Napier, used to invert exponential functions.	<u>logarithms</u> [or <u>logs</u> ]
<b>2</b>	Evaluate the log base eight of two.	<u>1/3</u> [or <u>0.3 repeating</u> ]
<b>3</b>	Find the product of the log base six of four times the log base six of nine. Give a fully simplified answer.	<u>2</u>

**Question #22: Math – Algebra**

*10 points per part*

This type of problem can be solved by the simplex method.		
<b>1</b>	Name this type of problem in which the goal is to maximize or minimize a first-degree expression based on first-degree constraints.	<u>linear programming</u> [prompt on <u>optimization</u> problem]
<b>2</b>	Find the area of the feasible region in a problem if the constraints are that $x$ is greater than or equal to zero, $y$ is greater than or equal to zero, and two $x$ plus $y$ is less than or equal to ten.	<u>25</u>
<b>3</b>	Given those constraints, find the maximum value of the objective function three $x$ plus $y$ . You do not need to give $x$ and $y$ —just give the maximum value of the function.	<u>15</u>



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

10 points per part

Its target was en route to an interview with Peter <b>Ustinov</b> [OO-stee-nawff].		
<b>1</b>	Name this action committed by <b>Beant</b> [beant] and <b>Satwant Singh</b> [sat-wahnt seeng], in retaliation for Operation Blue Star.	<b>assassination</b> of <b>Indira Gandhi</b> [accept equivalents, prompt if the first initial/name is omitted]
<b>2</b>	Operation Blue Star was a military assault on the <b>Harmandir Sahib</b> [har-MAHN-deer sah-HEEB], the “Golden Temple” in this city and a Sikh holy site.	<b>Amritsar</b>
<b>3</b>	Indira Gandhi’s son, Rajiv, was assassinated in a suicide bombing by <b>Thenmozhi Rajaratnam</b> [ten-MOH-zhee RAH-juh-RAHT-nahm] on behalf of this separatist group.	<b>Tamil Tigers</b> [accept <b>Liberation Tigers of Tamil Eelam</b> or <b>LTTE</b> ; prompt on partial answer]

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

10 points per part

President under the Malolos Congress, he was later captured by Frederick Funston.		
<b>1</b>	Name this revolutionary who lost a 1935 landslide to Manuel <b>Quezon</b> [KAY-zahn]. Earlier, he had become head of the Katipunan society following the execution of Andres Bonifacio.	Emilio <b>Aguinaldo</b> [ah-gwee-NAL-doh] [prompt on “Miong” or “Magdalo”]
<b>2</b>	Aguinaldo fought for the independence of this island archipelago, where Ferdinand Marcos declared martial law following the First Quarter Storm.	Republic of the <b>Philippines</b>
<b>3</b>	The Philippines achieved independence by signing the the Treaty of Manila with this occupying power.	<b>United States</b> of <b>America</b> [or <b>USA</b> ; accept any underlined portion]



**Question #25: Fine Arts – Classical/Opera**

10 points per part

<p>Charles Auguste de Beriot [sharl oh-goost day bair-ee-oh] wrote ten of these works for solo violin, and Max Bruch [brook] collaborated with Joseph Joachim [YOH-ah-keem] to refine his first one for violin.</p>		
1	<p>Identify these works that are written for a soloist to be accompanied by an orchestra.</p>	<b><u>concerto</u></b>
2	<p>This kind of passage is often found near the end of the first movement of a <b>concerto</b> [kon-CHAIR-toe]. In it, the soloist plays an unaccompanied virtuosic passage that is often improvised by the performer. Mendelssohn’s violin concerto is one of the first examples of a composer writing a standard one.</p>	<b><u>cadenza</u></b> [kuh-DEN-zuh]
3	<p>The first movement of a concerto is often written in this “form,” which is named for the kind of solo instrument composition it was first found in. Bach wrote a collection of three of these and three partitas for solo violin.</p>	<b><u>sonata</u></b> form [accept <b><u>sonata-allegro</u></b> form]

**Question #26: Fine Arts – Classical/Opera**

10 points per part

<p>This man opens one of his works with the piano playing 8 measures of slow, bell-like chords.</p>		
1	<p>Name this Russian composer of <i>Rhapsody on a Theme by Paganini</i>.</p>	Sergei Vasilievich <b><u>Rachmaninoff</u></b> [rok-MAH-nee-nof]
2	<p>Rachmaninoff composed four <b>concerti</b> [kun-CHAIR-tee] for this instrument, which is also the featured soloist in <i>Rhapsody on a Theme By Paganini</i>.</p>	<b><u>piano</u></b>
3	<p>Rachmaninoff briefly quit composing after his first symphony was disastrously premiered by this conductor, who was drunk at the time. This man composed the ballets <i>The Seasons</i> and <i>Raymonda</i>.</p>	Alexander Konstantinovich <b><u>Glazunov</u></b>



**Question #27: Literature – British Literature**

10 points per part

In this poem, the narrator claims that “any man’s death diminishes me, because I am involved in mankind.”		
1	Name this poem in which the speaker describes every man as “a piece of the continent.”	“ <b>No Man is an Island</b> ” [accept “ <b>Meditation XVII</b> ”; prompt on “Devotions Upon Emergent Occasions”]
2	“No Man is an Island” was penned by this author, whose collection of <i>Holy Sonnets</i> includes “Death be not proud.”	John <b>Donne</b>
3	Exact quote required. At the conclusion of “No Man is an Island,” the speaker indicates that one should never “send to know” this five-word phrase, which titled a novel by Ernest Hemingway.	“ <b>for whom the bell tolls</b> , it tolls for thee”

**Question #28: Literature – British Literature**

10 points per part

Grace Poole was hired by her husband to keep her under confinement.		
1	Name this insane woman responsible for burning down Thornfield Hall before jumping off the roof.	<b>Bertha Mason</b> [accept either; accept, but do not otherwise mention, <b>Bertha Rochester</b> ]
2	Bertha’s husband was this man, who was blinded in the fire. He was betrothed to Blanche Ingram before proposing to his second wife, whom he had hired as a governess for his ward, Adele.	<b>Edward Rochester</b> [accept either]
3	Edward Rochester fell in love with this woman, the title character of the Charlotte Brontë novel in which they appear.	<b>Jane Eyre</b> [accept either]



**Question #29: Science – Physics**

10 points

A parameter named for this phenomenon is used to calculate absolute **vorticity** [vor-TIH-sih-tee]. The standard derivation demonstrating this phenomenon uses the time derivatives of the tangential unit vector and the length of the radius. The size of this phenomenon is twice the surface rotation rate times the sine of latitude. Though this phenomenon has a negligible impact on water going down a drain, it does explain why major storms rotate differently in different hemispheres. Name this effect caused by rotating reference frames.

**Coriolis** [kor-ee-OH-liss] effect [or  
**Coriolis force**]

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

10 points

In one of this writer's stories, a performance of *The Geisha* leads to Gurov reuniting with Anna. In a letter to Aleksandr Lazarev, this writer stated that if a gun is placed in the setting of a story, at some point during the story the gun must be fired. He made frequent use of a metaphor of the title animal being killed "because there is nothing better to do" in a play featuring **Trigorin** [trih-GOR-in]. Another play centers around the fate of the **Ranevskaya** [rah-nev-SKY-ya] estate. Name this Russian dramatist who wrote *The Three Sisters* and *The Cherry Orchard*.

Anton Pavlovich **Chekhov**



**Question #31: Math – Math Concepts**

10 points

<p>When this Platonic solid is truncated, the resulting solid has faces that are hexagons and squares. The <b>dihedral</b> [dy-HEE-drul] angles of this figure have a cosine equal to negative one-third. This figure can be placed in coordinate space so that each vertex has one coordinate that is plus or minus a constant and two coordinates that are zero. There are only three diagonals that can be drawn through this figure, which has twelve edges and six vertices. Name this Platonic solid that can be thought of as two square pyramids joined at the base.</p>	<p><b>octahedrons</b> [or <b>octahedral</b>, prompt on square <b>bipyramid</b>]</p>
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**Question #32: Social Studies – U.S. History**

10 points

<p>This person wrote, “My country is the world, and my religion is to do good” in a book that was critical of Edmund Burke. This person also designed an inheritance tax that could be used to fund a national pension in his work <i>Agrarian Justice</i>. In addition to <i>Rights of Man</i>, he wrote a work that begins, “These are the times that try men’s souls.” That work, which was read to the Continental Army, was <i>The American Crisis</i>. Name this supporter of the American Revolution who wrote the pamphlet <i>Common Sense</i>.</p>	<p>Thomas <b>Paine</b></p>
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**Extra Question #1: Science – Biology**

10 points

This scientist extended Matthias **Schleiden's** [SHLY-dun'z] cell theory from plants to animals. He also was the first person to isolate a human enzyme, which he named **pepsin** [PEP-sin]. The anatomical objects named for this person are attacked in **tuberculoid** [too-BURK-yoo-loyd] leprosy and in the most common type of **Guillain-Barré** [ghee-yahn bar-ay] syndrome. Those objects named for this person surround Remak bundles and are known as **neurolemmocytes** [NUR-oh-LEM-oh-"sites"]. Name this scientist whose namesake cells are often surrounded by a myelin sheath.

Theodor **Schwann** [shvan]

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

10 points

The sixth of these works is in F major and unusually has a fifth movement, representing a Shepherd's song of Joy after a thunderstorm. Composer and work type required. The third of these works has a funeral march in its second movement, and on its autograph, a dedication to Napoleon Bonaparte is scratched out and its new dedication was "to the memory of a great man." The fifth of these works opens with a motif that is described as "fate knocking at the door" and consists of the notes "G-G-G-E flat." Name these 9 works, the last of which ends with a chorus singing Friedrich Schiller's "Ode To Joy."

**symphonies** by Ludwig van **Beethoven** [accept similar answers that include both underlined words]



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

10 points

Cayley's theorem states that every group is isomorphic to a subgroup of one of these groups. The parity of these groups depends on whether there is an even or odd number of inversions. This word also describes an operation that is equivalent to a factorial if its two inputs are equal. This operation is found by dividing the factorial of a number by the factorial of a difference. Name this operation which determines how many ordered sets of cardinality  $r$  can be made from a set of cardinality  $n$ .

**permutation** [accept **symmetric** or **symmetry** during the first sentence; prompt on **nPr**]

### Extra Question #4: Social Studies – World History

10 points

This event was followed by an interrogation by Sir William Wade. Planned at Ashby St. Ledgers, its instigators tried to hold out at Holbech House. During it, John Grant was to kidnap Princess Elizabeth. It is alleged that Francis Tresham penned the letter to Lord Monteagle that led to its discovery. Name this failed attempt to blow up James the First of England and Parliament, whose perpetrators included Guy Fawkes.

**Gunpowder** Plot



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

*10 points*

In describing its use of first-person narration, this work's author wrote "I should not talk so much about myself if there were anybody else whom I knew as well." Its narrator recounts being mistaken for a Fitchburg Railroad, and the narrator made a comparison to slavery when recounting his arrest for refusing to pay a poll tax. Name this recounting of Henry David Thoreau's time spent by a pond in the woods.

Walden, or *Life in the Woods*



### Extra Question #6: Science – Chemistry

10 points per part

Valence shell electron pair repulsion theory is used to explain the shapes of many molecules.		
1	Give the two-word name of the molecular shape that exists when there are three atoms around a central atom and no lone pairs.	<b>trigonal planar</b>
2	This is the name of the sum of the number of atoms bonded to the central atom plus the number of lone pairs. This number corresponds to the coordination number in a crystal.	<b>steric</b> [“STARE”-ik] number
3	Using the standard combination of orbital letters and numbers, give the orbital hybridization of an octahedral molecule.	<b><math>d^2 s^1 p^3</math></b> [“d two s (one) p three”] [all three parts must be given, but can be given in any order; note that the “1” after the <b>s</b> is optional]

### Extra Question #7: Science – Chemistry

10 points per part

The fractional type of this process was developed centuries ago and is still used.		
1	Name this process of separating parts of a solution by boiling and condensing them.	<b>distillation</b> [accept word forms]
2	This substance is distilled to get <b>naphtha</b> [NAF-thuh], kerosene, and gasoline.	<b>petroleum</b> [or <b>crude oil</b> ; prompt on <b>oil</b> ]
3	This type of distillation is often used for materials that have very high boiling points, making it more effective to change the pressure than the temperature.	<b>vacuum</b> distillation



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

*10 points per part*

When the Soviet Union invaded Afghanistan, this president organized an international protest of the 1980 Summer Olympics in Moscow.		
<b>1</b>	Name this president who was also in charge during the Iran hostage crisis.	James Earl “Jimmy” <b><u>Carter</u></b>
<b>2</b>	Carter negotiated the second round of this weapons reduction agreement with the Soviet Union that was never ratified by the Senate.	<b><u>SALT II</u></b> [or <b><u>Strategic Arms Limitation Talks</u></b> ]
<b>3</b>	Carter negotiated with the Soviets with the help of this National Security Advisor whose daughter <b>Mika</b> [MEE-kah] is now a television personality.	Zbigniew <b><u>Brzezinski</u></b> [z’BEEN-yev bruh-ZHIN-skee]

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

*10 points per part*

Give the following about Woodrow Wilson:		
<b>1</b>	He was first elected president in 1912 thanks to this party, started by Teddy Roosevelt, taking some of the Republican vote. It was nicknamed the Bull Moose party.	<b><u>Progressive</u></b> Party [or <b><u>Progressives</u></b> ]
<b>2</b>	In 1916, Wilson defeated this man who stepped down from the Supreme Court. He would later be Secretary of State and then Chief Justice.	Charles Evans <b><u>Hughes</u></b>
<b>3</b>	Before becoming president, Wilson was the governor of this state.	<b><u>New Jersey</u></b>



### Question #1: Science – Astronomy

10 points

<p>One example of this type of star is orbited by Zarmina, which was the first extrasolar planet located in a star's habitable zone. That star is <b>Gliese [GLEE-zuh] 581</b>. Many stars of this type are believed to have lifespans of trillions of years, which means that examples created soon after the Big Bang are still around, and it is believed that they will become white dwarfs. These stars are also believed to be the most common in the Milky Way, and one example is <b>Proxima Centauri [PRAK-sih-muh sen-TOR-ee]</b>. Name these stars that are smaller and cooler than our Sun.</p>	<p><b>red dwarfs</b> [prompt partial answer]</p>
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### Question #2: Social Studies – U.S. Government

10 points

<p>The English case <i>Empson v Smith</i> set the precedent that persons can be tried <i>ex post facto</i> with regards to this legal status. Its functional form only covers actions taken within its holder's work responsibilities. The Vienna Convention identifies whom this status applies to; such people may be recalled upon being considered <i>persona non grata</i>. Name this policy under which ambassadors do not have to abide by the local criminal code.</p>	<p><b>diplomatic immunity</b> [accept <b>personal inviolability</b>; prompt on <b>immunity</b> or variations thereon]</p>
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**Question #3: Literature – U.S. Literature**

*10 points*

<p>One character in this story only used the middle name “Dillingham” in times of prosperity. This tale of “two foolish children” sees one compare herself to a Coney Island schoolgirl before asking herself what she could have purchased for \$1.87. The husband in this story sold his watch to buy combs, while his wife sold her hair to buy a fob. Name this Christmastime short story featuring James and Della Young, by O. Henry.</p>	<p>“The <u>Gift of the Magi</u>”</p>
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**Question #4: Miscellaneous – Agriculture**

*10 points*

<p>This scale is based on a test in which the subject is diluted in sugar water and sampled at increasing concentrations until it is detectable by at least three of the five testers. Recent world record holders on this scale include the Red Savina, at around five hundred seventy seven thousand units, and the <b>Bhut Jolokia</b> [<b>BOOT joh-LOH-kee-uh</b>], at over one million units. It measures the concentration of <b>capsaicin</b> [<b>kap-SAY-sin</b>] in a pepper. Name this scale that quantifies the spiciness of hot sauces.</p>	<p><u>Scoville</u> Scale [accept <u>Scoville Organoleptic Test</u>]</p>
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### Question #5: Science – Chemistry

10 points

This compound is combined with iron sulfate and benzene to make **phenol** [FEE-nawl], which is an example of its use as Fenton's reagent. This compound is manufactured in the **anthraquinone** [aan-thruh-KWY-nohn] process, and it is often made safe in the lab by combining it with **urea** [yur-EE-uh]. Though this compound does not contain chlorine, it is often combined with sodium carbonate to make a bleach. This compound's use as a disinfectant is being decreased. Name this compound whose formula is  $H_2O_2$  ["H two O two"].

**hydrogen peroxide** [prompt on **peroxide**; accept **H<sub>2</sub>O<sub>2</sub>** before the end]

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

10 points

This event started with the assassination of **Agathe Uwilingiyimana** [ah-GAH-thay oo-wih-leeng-ee-MAH-nah] on the orders of **Theoneste** [THAY-oe-nest] Bagosora. The youth group **Interahamwe** [in-ter-ah-HAHM-way] was mobilized and teamed up with the **Impuzamugambi** [im-POO-zah-moo-gahm-bee] to take part in it. Sparked by the assassination of Presidents **Cyprien Ntaryamira** [sih-pree-en en-tar-yah-mee-rah] and Juvenal **Habyarimana** [hahb-yah-ree-mah-nah], Paul **Kagame** [kah-GAH-may] led the RPF forces that helped bring it to an end. Name this massacre of ethnic Tutsis by Hutus in an African country.

**Rwandan genocide** of 1994  
[accept equivalents]



**Question #7: Math – Geometry**

10 points per part

The theorem and the formula named for this mathematician both address quadrilaterals that can be inscribed in a circle.	
1	Identify this 7 <sup>th</sup> century Indian mathematician. <b>Brahmagupta</b> [brah-mah-GOOP-tah]
2	Other than “inscribed”, what adjective is used to describe quadrilaterals that can be inscribed in a circle? <b>cyclic</b> quadrilateral [accept <b>concylic</b> or <b>chordal</b> quadrilateral]
3	Cyclic quadrilateral ABCD has perpendicular diagonals. Side AB is length ten, and side CD is length twelve. If a segment that is perpendicular to side AB intersects that side 7 units from A and goes through the diagonal intersection point and hits side CD at point E, find the length of segment CE. <b>6</b>

**Question #8: Math – Geometry**

10 points per part

In hyperbolic geometry, the sum of the measures of the angles of a triangle is less than this number. In elliptic geometry, the sum is greater than this number.	
1	Give the number of degrees in a triangle in Euclidean geometry. <b>180</b> degrees
2	This Russian mathematician, who wrote <i>Geometrical Investigations on the Theory of Parallel Lines</i> , is considered the founder of hyperbolic geometry. This person worked at about the same time as <b>János Bolyai</b> [YAH-nosh BOL-yai]. Nikolai Ivanovich <b>Lobachevsky</b>
3	This French scientist designed a disc model and a half-plane model that help envision hyperbolic geometry. Jules Henri <b>Poincaré</b> [awn-ree pwan-kar-ay]



**Question #9: Fine Arts – Musical Theater**

10 points per part

Renee Zellweger, Richard Gere, and Catherine Zeta-Jones starred in the film adaptation of this musical, which includes the song “All That Jazz.”		
1	Name this musical, set in the title Midwestern city, centering on the trial of Roxy Hart after she murders her lover. Velma Kelly meets her in the women’s prison of Cook County Jail and they perform the “Cell Block Tango.”	<u>Chicago</u>
2	This other musical is set in Berlin during the Weimar [VY-mar] republic. Its film version starred Liza Minelli as Sally Bowles, who works at the Kit Kat Club with the Master of Ceremonies. At the end, Sally sings that “Life is” one of these, “old chum.”	<u>Cabaret</u>
3	Chicago’s Broadway premiere was directed by this choreographer, who also directed the film version of Cabaret as part of his collaborations with Kander and Ebb.	Robert Louis “Bob” <u>Fosse</u> [FAH-see]

**Question #10: Fine Arts – Musical Theater**

10 points per part

In this musical, a cockney flower-girl sings “Wouldn’t it be Lovely” when imagining what life is like in the upper class.		
1	Name this musical about Henry Higgins teaching Eliza Doolittle to speak with high-class English before realizing that he is becoming attached to her in his song “I’ve Grown Accustomed to Her Face.”	<u>My Fair Lady</u>
2	My Fair Lady is a musical created by this lyricist and songwriter duo, who also penned Gigi, Camelot, and Brigadoon.	Alan Jay <u>Lerner</u> and Frederick <u>Loewe</u> [either order]
3	In Brigadoon, American tourists discover a remote Scottish village that only appears for a single day, once every how many years?	<u>100</u> years [or a <u>century</u> ]



### Question #11: Science – Biology

10 points per part

Arteries carry blood away from the heart.		
1	Name the largest artery in the human body, which at first leads up from the heart.	<u>aorta</u>
2	These smaller blood vessels carry blood from arteries to capillaries.	<u>arterioles</u> [ar-TEER-ee-ohlz]
3	The “a” type of this substance is linked to arterial disease. Cholesterol is sometimes classified as good or bad depending on whether it contains the high or low density types of this substance.	<u>lipoprotein</u> [LY-poh-“protein”] [prompt on <u>L</u> ]

### Question #12: Science – Biology

10 points per part

These are classified as fibrous, <u>cartilaginous</u> [kar-tih-LAA-jih-nuss], or <u>synovial</u> [sih-NOH-vee-ul].		
1	Name these areas in the body where bones come together.	<u>joints</u>
2	This is the name of the fibrous joints that connect the bones in the skull. These come together at the <u>fontanelles</u> [FAHN-tuh-nellz] in infants.	<u>sutures</u>
3	These sacs of fluid are located near joints. They release synovial fluid and reduce friction.	<u>bursae</u> [BUR-say]



**Question #13: Literature – Mythology**

10 points per part

Some sources claim that she birthed the <b>Nemean</b> [NEE-mee-un] Lion following an affair with Zeus.		
<b>1</b>	Name this Greek moon goddess and sister of Helios who learned from her sister’s mistake when she fell for a mortal shepherd.	<b><u>Selene</u></b>
<b>2</b>	Selene fell for this shepherd, who was granted eternal sleep. Unlike <b>Tithonus</b> [tih-THOH-nuss], he remained human.	<b><u>Endymion</u></b> [en-DIH-mee-un]
<b>3</b>	Despite his eternal sleep, Endymion fathered this many daughters with Selene. <b>Danaus</b> [DAA-nay-uss] and <b>Aegyptus</b> [ih-JIP-tuss] each had this many children, and all but one of Danaus’ were sentenced to eternally use leaky buckets to fill a bathtub.	<b><u>fifty</u></b> daughters

**Question #14: Literature – Mythology**

10 points per part

This son of <b>Oeneus</b> [EE-nee-uss] accidentally killed <b>Iphicles</b> [IF-ih-kleez] during the <b>Calydonian</b> [kaal-ih-DOH-nee-un] boar hunt.		
<b>1</b>	Name this hero who, after landing the killer blow on the Calydonian boar, awarded the pelt to Atalanta.	<b><u>Meleager</u></b> [meh-lee-AY-gur]
<b>2</b>	Among the many warriors who participated in the Calydonian boar hunt was this husband of <b>Thetis</b> [THEE-tiss] and father of <b>Achilles</b> [uh-KILL-eez].	<b><u>Peleus</u></b> [PEE-lee-us]
<b>3</b>	After Meleager awarded the pelt to Atalanta, two maternal uncles protested. Meleager killed both, after which this woman, his mother, killed him by burning the sacred log.	<b><u>Althaea</u></b> [aal-THEE-uh]



**Question #15: Science – Physics**

10 points

<p>The type of this phenomenon caused by relativistic effects is named for Lense-Thirring and de Sitter, while the type of this phenomenon affecting magnetic moments due to quantum effects is named for Larmor. The <b>apsidal</b> [AP-she-dul] type of this phenomenon involves the motion of the <b>perihelion</b> [peer-uh-HEE-lee-on] and was explained by general relativity theory. In classical mechanics, this phenomenon is classified based on whether or not it is induced by <b>torque</b> [tork], and it is explained by the conservation of angular momentum. Name this motion of the axis of rotation of a rotating body exemplified by a gyroscope.</p>	<p><b>precession</b> [accept <b>precessing</b>]</p>
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**Question #16: Social Studies – U.S. History**

10 points

<p>Prior to this battle, a fake escape was staged for the prisoner John Honeyman. Many enemy fighters were able to escape across Assunpink Creek because American troops under James Ewing and John Cadwalader did not show. The head of those enemy fighters, who was killed by a musket ball while retreating, was Johann Rall. This battle took place just after Christmas 1776 and was targeted at Hessians. Name this victory led by Nathanael Greene and George Washington just after they crossed the Delaware River.</p>	<p>Battle of <b>Trenton</b></p>
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### Question #17: Literature – British Literature

10 points

This author wrote the line “If we’ve promised them aught, let us keep our promise” in “The Pied Piper of Hamelin.” He wrote of a man who noted how “God has not said a word” after using his victim’s blonde hair to strangle her in “**Porphyria’s [por-FEER-ee-uh’z]** Lover.” He wrote of a woman with a “half-flush that dies along her throat” that was the subject of a painting by Fra Pandolf. Name this author of “My Last Duchess.”

Robert Browning [prompt on Browning]

### Question #18: Math – Math Concepts

10 points

A compression system based on these constructs was developed by Michael Barnsley, who wrote a book about these constructs, including his namesake fern. The plane can be tessellated by Gosper Island, which is an example of this concept. The **Feigenbaum [FY-gun-baom]** constant gives the ratio of circle sizes on these constructs, which were developed while studying the lengths of coastlines. The dimension measure of these objects may not be an integer, and these objects exhibit self similarity. Name these concepts exemplified by Julia sets and Mandelbrot sets.

fractals



**Question #19: Fine Arts – Art History**

10 points

<p>This artist brought his dachshund Archie to interviews to answer questions this man didn't like. Half of the canvas is blank, while the other half is taken up with 15 panels showing the interior of a car, in his <i>Silver Car Crash Double Disaster</i>. This artist created four images of Marilyn Monroe shot in the head in <i>Shot Marylins</i>, and he created silkscreen portraits of Mao. His studio was called The Factory, which hosted his "Superstars." Name this artist who created images showing <i>Campbell's Soup Cans</i>.</p>	<p>Andy <u>Warhol</u></p>
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**Question #20: Literature – World Literature**

10 points

<p>This person was nearly killed after offering to pull <b>Mordaunt</b> [<b>mor-dawn</b>] into a lifeboat; after surviving he revealed himself as the father of <b>Raoul</b> [<b>rah-ool</b>], who rose to nobility as the <b>Vicomte</b> [<b>VY-kawmt</b>] of <b>Bragelonne</b> [<b>bra-ghel-“own”</b>]. The first husband of Charlotte, Milady de Winter, he hanged her upon discovering a branded <b>fleur-de-lis</b> [<b>floor-d'-lee</b>]. Name this nobleman who teamed with Porthos and Aramis to form the Three Musketeers.</p>	<p><u>Athos</u> [accept Oliver, <u>Comte de la Fere</u>]</p>
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### Question #21: Science – Chemistry

10 points per part

This type of decay can be classified as plus or minus.		
1	Name the type of decay, the most common type of which consists of the emission of an electron. Your answer should be a Greek letter.	<b>beta</b> minus decay
2	As opposed to beta-minus decay, which gives off an electron, this is the particle given off by beta-plus decay.	<b>positron</b> [PAH-zih-trahn] [do not accept “proton”]
3	In beta-minus decay, a neutron produces a proton, an electron, and this third particle.	electron <b>antineutrino</b> [do not prompt on “neutrino”]

### Question #22: Science – Chemistry

10 points per part

This concept is used to describe molecules when some of the electrons are delocalized.		
1	Name this concept used for aromatic molecules such as benzene.	<b>resonance</b>
2	There are two resonance structures for this <b>triatomic</b> [TRY-uh-TAH-mik] allotrope [AL-oh-troh-p] of oxygen.	<b>ozone</b>
3	This type of <b>isomerism</b> [“eye”-SAH-mur-izm] that can be confused with resonance exists when two molecules differ by the placement of a hydrogen atom and the positions of single and double bonds. A common type of this phenomenon is keto-enol.	<b>tautomerism</b> [TAW-toh-mur-izm] [or <b>tautomers</b> or <b>tautomerization</b> ]



**Question #23: Literature – British Literature**

10 points per part

In the creation of this fictional region, Oxford was renamed Christminster.		
1	Name this fictional region, the upper portion of which contains Southampton and Portsmouth. Some maps of it show the Isle of Slingers at the southern tip in lieu of Portland.	<u>Wessex</u>
2	This author elaborated on his creation of Wessex in the preface to <i>Far From the Madding Crowd</i> .	Thomas <u>Hardy</u>
3	Hardy’s hometown of Dorchester was given this moniker in Wessex. After selling his wife and child, Michael Henchard reformed and became the mayor of this city.	<u>Casterbridge</u>

**Question #24: Literature – British Literature**

10 points per part

The curfew tolls mentioned in its opening line were a reference to Dante’s “Purgatorio.”		
1	Name this poem that describes possible burying plots for “some inglorious Milton” or “some Cromwell guiltless of his country’s blood.”	<u>“Elegy Written in a Country Churchyard”</u>
2	This poet wrote that “paths of glory lead but to the grave” in “Elegy Written in a Country Churchyard.”	Thomas <u>Gray</u>
3	Thomas Gray penned an ode in which the one of these animals favored by the narrator drowns in a tub of goldfish. The actual animal, Selima, was owned by Horace Walpole.	tabby <u>cat</u>



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

10 points per part

This convention was named for its upstate New York location.		
1	Name this 1848 women’s rights convention.	<b><u>Seneca Falls</u></b> Convention
2	One hundred attendees at the Seneca Falls Convention signed this document whose lead author was Elizabeth Cady Stanton.	<b><u>Declaration of Sentiments</u></b> [or <b><u>Declaration of Rights and Sentiments</u></b> ]
3	The convention was supported by many followers of this religion, including the sisters Martha Coffin Wright and Lucretia Coffin Mott.	<b><u>Quakers</u></b> [or Religious Society of <b><u>Friends</u></b> ]

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

10 points per part

These dislocations started in eastern Tennessee and Alabama and ended in Arkansas and eastern Oklahoma.		
1	Give the nickname commonly applied to forced Native American displacements during the 1830s, starting with the <b>Choctaws</b> [“CHOCK”-tawz].	<b><u>Trail of Tears</u></b>
2	This tribe, whose syllabary was written by Sequoyah, moved after one of its factions signed the Treaty of New <b>Echota</b> [eh-KOH-tuh]. The sovereignty of this tribe had been supported by the Supreme Court in <i>Worcester v. Georgia</i> .	<b><u>Cherokees</u></b>
3	This 1830 law supported negotiations that would lead to the Trail of Tears.	<b><u>Indian Removal</u></b> Act



**Question #27: Math – Pre-Calculus**

*10 points per part*

This shape can be formed by taking a sphere and stretching it different amounts in different directions.		
<b>1</b>	Name this type of closed <b>quadric</b> [KWAD-rik] surface.	<b>ellipsoid</b> [ee-LIP-soyd] [do not accept “ellipse”]
<b>2</b>	If an ellipsoid has an $x$ -radius of one, a $y$ -radius of two, and a $z$ -radius of three, what is its volume? Ignore units.	<b>8 pi</b> cubic units
<b>3</b>	If that same ellipsoid is inscribed in a rectangular prism, what is the volume of the rectangular prism? Ignore units.	<b>48</b> cubic units

**Question #28: Math – Pre-Calculus**

*10 points per part*

These entities consist of vertices that can be connected by edges.		
<b>1</b>	Name this kind of mathematical object that can be described using adjacency matrices.	<b>graphs</b> [prompt on <b>trees</b> ]
<b>2</b>	This is the number of edges in a complete graph with six vertices. In a complete graph, each vertex is connected to every other vertex by an edge.	<b>15</b>
<b>3</b>	If a Hamiltonian path exists in a graph with six vertices, how many edges are traversed by that path? Keep in mind that this question is asking about Hamiltonian paths, not Hamiltonian cycles.	<b>5</b>



### Question #29: Social Studies – World History

10 points

This leader surrendered Armenia and Mesopotamia, re-establishing the **Euphrates** [yoo-FRAY-tes] as the limit of the Roman Empire. Nicknamed “Graeculus” as a youth, this person dedicated a number of Greek sites to Antinous, one of his lovers. He ordered public burnings of the Torah and outlawed Judaism following the Bar Kokba revolt. The successor to Trajan, name this Roman emperor who ordered the northern border of Roman Britain demarcated with a wall.

**Hadrian** [accept **Caesar Trajanus Hadrianus Augustus** or **Publius Aelius Hadrianus**]

### Question #30: Science – Biology

10 points

The membrane of this **organelle** [or-guh-NEL] contains **squalene synthase** [SKWAH-leen SIN-thayss], which is used in the creation of cholesterol. This organelle is affected by mutations in the XBP1 gene, which cause it to be stressed, possibly leading to beta cell death and diabetes. In this organelle, IP3 receptors cause calcium to be released to the **cytosol** [“SIGH”-toh-sawl]. **Vesicles** [VEH-sik-ulz] take proteins to the **Golgi** [“GOAL”-jee] apparatus after those proteins are folded in this organelle. Name these organelles that, depending on whether there are **ribosomes** [RY-boh-sohmz] on its surface, can be classified as smooth or rough.

**endoplasmic reticulum**



### Question #31: Literature – U.S. Literature

10 points

<p>This author wrote of a man who had “little formless fears” before firing his last bullet at an apparition of a crocodile. He also wrote a play featuring “The Captain” and “The General,” who had fought each other in the Boer War. This author of <i>The Emperor Jones</i> used Harry Hope’s saloon as a backdrop for <i>The Iceman Cometh</i>. Name this four-time Pulitzer winner and author of <i>Anna Christie</i> and <i>Long Day’s Journey into Night</i>.</p>	<p>Eugene Gladstone <u>O’Neill</u></p>
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### Question #32: Math – Math Concepts

10 points

<p>A test named for <b>Abel</b> [AH-bul] determines whether the uniform type of this property is met, while the <b>Weierstrass</b> [VY-ur-shtrass] M-Test can be used to determine whether the uniform and absolute types of this property are met. This property is met if the <math>n</math>th root of the <math>n</math>th number is less than one, according to the root test. The alternating test for this property only needs to show that terms have a limit of zero. Though this property is not demonstrated by the harmonic series, it is demonstrated when <math>r</math> is between negative one and one in geometric series. Name these series that have a finite limit.</p>	<p><u>convergent</u> [accept word forms such as <u>converging</u>; prompt on <u>limit</u>]</p>
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**Extra Question #1: Social Studies – U.S. History**

10 points

<p>This leader's decision to start the Siege of Port Hudson early did not work well for his ships or supporting troops led by Nathaniel Banks. This person and his brother by adoption David Porter were the first two four-star admirals in the U.S. Navy. During one attack, this leader captured the CSS <i>Tennessee</i>. This leader defeated Mansfield Lovell so that Benjamin Butler could take command of New Orleans. Name this person who, according to legend, said, "Damn the torpedoes, full speed ahead!" during the Battle of Mobile Bay in the Civil War.</p>	<p>David James Glasgow <u>Farragut</u></p>
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**Extra Question #2: Math – Math Concepts**

10 points

<p>The spiral named for this mathematician is generated by setting <math>r</math> equal to the square root of theta. The points named for this person or <b>Toricelli</b> [tor-uh-CHEL-lee] are a minimum total distance from the <b>vertices</b> [VER-tuh-sees] of a triangle. This person's son produced a version of Diophantus' <i>Arithmetica</i> with this person's comments included. In those comments, this mathematician claimed to have proven a theorem that was actually proved hundreds of years later by Andrew Wiles. Name this person who stated that, if <math>n</math> is greater than two, there are no integer solutions to the equation <math>a</math> to the <math>n</math> plus <math>b</math> to the <math>n</math> equals <math>c</math> to the <math>n</math>.</p>	<p>Pierre de <u>Fermat</u></p>
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### Extra Question #3: Literature – World Literature

10 points

This “five-thousand character text” opens with a line describing something not being constant if it can be spoken of. This text describes the process of *ziran*, or how the world unfolds itself on its own. Also expounding on action through inaction, called *wu wei*, it outlined how one could live virtuously by following the “way.” Name this central text of Daoism.

Dao de Ching [accept Book of Changes, *Taishang xuanyuan* Daodejing, or Tao te Ching]

### Extra Question #4: Fine Arts – Composers of Modern Era

10 points

Erich Korngold’s violin concerto includes themes taken from these kinds of works that he was employed to create. Sergei Prokofiev [proe-KOH-fee-yef] provided one of these works to accompany Sergei Eisenstein’s *Alexander Nevsky*. One of these works by Maurice Jarre included “Lara’s Theme,” which became the song “Somewhere My Love.” “The Imperial March” taken from one of these works first is heard when the Executor, commanded by Darth Vader, is shown, and was composed by John Williams. Name these works written to accompany visual spectacles including *Doctor Zhivago* and *Star Wars*.

film scores [accept anything indicating music for a film or movie]



**Extra Question #5: Science – Health**

*10 points*

This disorder can be picked up by finding high levels of **Inhibin [in-HIB-in]** A during a quadruple test, and this is the most common disorder picked up by a **nuchal [NOO-kul]** translucency screening test. About half of the people with this disorder have septal defects in their hearts, and about half have only one crease across each palm of their hand. This disorder occurs over one percent of the time when the mother is over the age of forty, and it usually results in slower growth and lower intellectual ability. Name this disorder caused by a **trisomy [TRY-soh-mee]** of chromosome 21.

**Down**'s syndrome [accept **trisomy 21** or equivalents before "trisomy"]



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

10 points per part

	Addressed to <b>Granadans</b> [gruh-NAY-duns], this document outlined why the First Republic fell, and was penned shortly before the Admirable Campaign.	
1	Name this text, which cited an 1812 earthquake and the machinations of the anti-republican Catholic Church as reasons for the temporary return of Spanish rule.	<b>Cartagena</b> [kar-tah-HAY-nah] <b>Manifesto</b>
2	The Cartagena Manifesto was penned by this military leader who fought for the independence of a number of South American countries, including Venezuela.	Simon <b>Bolívar</b> [prompt on “Liberator”]
3	Following the fall of the Second Republic, Bolivar penned a letter from this Caribbean nation addressed to Henry Cullen. Alexander Bustamante led this former British colony after independence.	<b>Jamaica</b>

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

10 points per part

	Established by the “Father of the Poor,” this period was instigated following the “Cohen Plan,” a fabricated plot used as a pretext to shut down the legislature.	
1	The <b>Queremistas</b> [kair-ay-MEES-tahz] campaigned to prolong this period, which saw its head double-cross the fascist Integralists.	<b>Estado Novo</b> [es-TAH-doh NOH-voh] [accept <b>New State</b> , do not accept “Vargas Era”]
2	The Estado Novo was established by <b>Getulio</b> [zhay-TOO-lee-oh] Vargas in this South American nation. Vargas’ rise to power ended the “coffee and milk” period, where power was concentrated in <b>Minas Gerias</b> [MEE-nahss ZHAIR-ee-ahss] and Sao Paolo.	Federative Republic of <b>Brazil</b>
3	This founder of Brazil’s Worker’s Party established the <b>Bolsa Familia</b> [BOL-sah fah-MEE-lee-ah] and <b>Fome Zero</b> [FOH-may ZAIR-oh] programs to fight hunger and poverty in the country. Current leader Dilma Rousseff took over the presidency from this man.	Luis Inacio Lula <b>da Silva</b> [prompt on <b>Lula</b> or <b>Silva</b> ]



### Extra Question #8: Math – Trigonometry

10 points per part

These two trigonometric functions never have outputs between negative one and one.		
1	Name <i>both</i> of the basic six trigonometric functions whose graphs have no $x$ -intercepts.	<b><u>secant</u></b> and <b><u>cosecant</u></b> [both answers in either order; cosecant can be called <b><u>csc</u></b> ]
2	Find the $y$ -coordinates of all local maxima for the graph of $y$ equals three plus five times the secant of four $x$ .	<b><u>-2</u></b>
3	Find the horizontal distance between successive local maxima on the same graph.	<b><u>pi over two</u></b> [or <b><u>one-half pi</u></b> ]

### Extra Question #9: Math – Trigonometry

10 points per part

Trigonometry can be used to find areas.		
1	One formula for the area of a triangle multiplies one-half times the product of two side lengths times this function acting on the angle between the two sides. Name the trigonometric function.	<b><u>sine</u></b>
2	Find the area of a parallelogram if its two sides are of length five and six, and its internal angles each have a sine of one-third.	<b><u>10</u></b>
3	Find the area of a kite if its side lengths are three and four, and the sine of the angle between those two sides is one-fourth.	<b><u>3</u></b>



**Question #1: Literature – British Literature**

10 points

<p>This novel states that its characters grew accustomed to mysteries and ignored them, “just as they ignored the miraculous throbbing stars.” After refusing to swim, one character in this novel is made fun of for his asthma. One group in this novel makes Castle Rock its headquarters. The title figure in this novel is allegedly heard during a vision triggered by the head of a sow. In this tale, a boulder rolled by Roger destroyed a conch shell and killed Piggy. Name this novel featuring schoolboys stranded on an island, by William Golding.</p>	<p><u>Lord of the Flies</u></p>
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**Question #2: Science – Earth Science**

10 points

<p>One location of this type is named for Victor Conrad, but attempts to locate it by drilling have been unsuccessful. Keith Bullen, who referred to one of these locations as “D double prime”, is sometimes the namesake for another one of these locations. D double prime is now named for Beno Gutenberg, and two of these locations are named for Inge [EEN-guh] Lehmann. These locations are found using the patterns of seismic waves, which can change speeds or reflect at these locations. These locations form the boundaries between different layers of the Earth. Name these locations that include the Moho [MOH-hoh].</p>	<p><u>discontinuity</u> [or <u>discontinuities</u>; prompt on <u>boundary</u> or <u>boundaries</u>]</p>
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**Question #3: Miscellaneous – Industrial Arts**

*10 points*

This product's smoothness can be improved via extra nips in the calendar section of a **Fourdrinier** [FOR-drih-nir] machine. Certain forms of this substance are created through raw materials that undergo the Kraft process. Clay and titanium dioxide, which improve opacity, are added to the pulp when manufacturing this product. Standard forms of this substance used in offices are A4 and letter size, which typically come in reams of 500 sheets. Name this material that one writes on.

paper [accept paperboard or cardboard]

**Question #4: Math – Math Concepts**

*10 points*

Lobachevsky's formula gives the angle named for this concept; that angle only makes sense in hyperbolic geometry, and is equal to twice the arctangent of  $e$  raised to the opposite of  $x$  power. Figures with this property are generated by the degenerate case of the equation  $x$  squared plus  $k$  times  $y$  squared equals one. Playfair's axiom and the equidistance postulate are equivalent to the axiom named for this property from Euclidean geometry, which asserts that given a line and a point not on it, there is exactly one line through the point that has this property with respect to the original line. In elliptic geometry, no lines have this property, but in Euclidean geometry, any two lines must be skew, intersect, or have this property. Name this property possessed by two lines with the same slope.

parallelism



### Question #5: Social Studies – World History

10 points

During this event, a firing squad killed Thomas Dickson, Patrick MacIntyre, and Francis Sheehy-Skeffington. Charges of treason stemming from a shipment of German arms for use in this event led to the execution of Roger Casement. Before fire destroyed it, the Post Office was a rebel stronghold. During a court martial, Patrick Pearse played up his role in it before being executed, and Eamon de Valera was sentenced to death, but would survive to become Prime Minister. Name this Irish rebellion against British rule begun on a religious holiday.

**Easter** Uprising [accept equivalents for “Uprising,” accept **Eiri Amach na Casca**]

### Question #6: Science – Biology

10 points

**Angiotensin** [an-jee-oe-TEN-sin] Two increases the amount of this element retained in the body. The blood concentration of this chemical element increases when the body has too little **vasopressin** [VAY-soh-“PRESS-in”]. Three ions of this atom often enter a cell in exchange for three calcium ions, and an enzyme in animal cell membranes removes its ions from cells while bringing in potassium ions. Too much of this element leads to increased water retention and high blood pressure. Name this element whose **cation** [“cat-ion”] is in table salt, along with **chloride** [KLOR-“eyed”].

**sodium**



**Question #7: Math – Trigonometry**

*10 points per part*

The derivative of this function of $x$ equals one over the quantity one plus $x$ squared.		
<b>1</b>	Name this function whose domain is all real numbers and whose range goes from negative one-half pi to positive one-half pi, exclusive.	<b>arctangent</b> [accept <b>inverse tangent</b> ; do not prompt on “tangent”]
<b>2</b>	Giving a single answer, solve the equation the arctangent of $x$ equals the arccotangent of $x$ .	<b><u>1</u></b>
<b>3</b>	Sticking to the principal values and using radians, for what value of $y$ does the arctangent of $x$ equal the arccotangent of $x$ ? The graphs of the two functions are mirror images over the horizontal line at this value of $y$ .	<b>pi over 4</b> [or <b>one-fourth pi</b> ]

**Question #8: Math – Trigonometry**

*10 points per part*

Give the following about using trigonometric identities:		
<b>1</b>	According to one identity, what quantity equals the cosine of angle $A$ , times the cosine of angle $B$ , minus the sine of angle $A$ , times the sine of angle $B$ ?	<b>cosine (A+B)</b> [accept equivalents; do not accept or prompt on “sine (A+B)”]
<b>2</b>	If the sine of angle $x$ is one-fourth, what is the cosine of the quantity angle $x$ plus ninety degrees?	<b><u>-1/4</u></b> [or <b><u>-0.25</u></b> , do not accept “1/4” or <b><u>0.25</u></b> ]
<b>3</b>	If the tangent of angle $P$ equals one, and the tangent of angle $Q$ equals two, what is the value of the tangent of the quantity $P$ plus $Q$ ?	<b><u>-3</u></b>



### Question #9: Social Studies – Current Events

10 points per part

Identify the following concerning governors' races from the 2014 November elections.		
1	Scott Walker won his third consecutive election for governor of this Midwestern state, after being the target of a recall in 2012.	<u>Wisconsin</u>
2	Busting onto the national stage following an eleven-hour filibuster against a bill that would restrict abortions was not enough to help Wendy Davis defeat Greg Abbott in this state.	<u>Texas</u>
3	This state saw former Republican governor Charlie Crist run as a Democrat for a second term against incumbent Rick Scott, with Scott winning by just over one percent.	<u>Florida</u>

### Question #10: Social Studies – Current Events

10 points per part

Identify the following concerning federal Senate races from the 2014 November elections.		
1	Joni Ernst's "Squeal" ad, in which she touted her experience castrating hogs, helped her win this state's Senate election. Doug Butzier also appeared on the ballot, despite being killed in a plane crash in October 2014.	<u>Iowa</u>
2	The Republican Senate nominee in New Hampshire, Scott Brown, had already served two years in Congress after winning a special election in this other state to replace the deceased Ted Kennedy.	<u>Massachusetts</u>
3	Due to the 2013 resignation of Jim DeMint, and Tom Coburn announcing his resignation following the 113th Congress, two states held elections for both Senators. Name either.	<u>South Carolina</u> (DeMint) or <u>Oklahoma</u> (Coburn)



### Question #11: Science – Physics

10 points per part

Answer these questions about sound.		
1	This logarithmic scale is used to measure the loudness, or power, of sound. You may give either the name of the scale's base unit or the name of the more commonly used subdivision of it.	decibel scale
2	Sound is made up of this type of pressure wave that contains compressions and rarefactions.	<b>longitudinal</b> [lawn-jih-TOO-dih-nul] waves [accept word forms]
3	This quantity for materials that sounds travel through equals the ratio of acoustic pressure to volume velocity. This quantity represents resistance to vibration.	acoustic <b>impedance</b>

### Question #12: Science – Physics

10 points per part

The experiment named for this scientist provided evidence for the wave theory of light.		
1	Identify this namesake of the double slit experiment.	Thomas <b>Young</b>
2	Young is also the namesake of Young's modulus, which appears in this law that says that the force needed to stretch a spring is directly proportional to the length by which the spring is stretched.	<b>Hooke's</b> law
3	While Young's modulus describes the reaction of an object to linear stress, this constant describes the reaction of an object to uniform stress from all directions.	<b>bulk modulus</b>



**Question #13: Literature – World Literature**

10 points per part

The protagonist of this novel recites the koan “if you meet the Buddha, kill him.”		
1	Name this novel in which <b>Mizoguchi</b> [mee-zoh-goo-chee] burns down the title structure after becoming obsessed with its beauty.	<u><i>Temple of the Golden Pavilion</i></u> [accept <u><i>Kinkakuji</i></u> ]
2	This author of <i>Temple of the Golden Pavilion</i> founded the <b>Tatenokai</b> [tah-the-noh-ky], and committed seppuku on live TV after an attempted coup.	<u><b>Mishima</b></u> Yukio [accept <u><b>Hiraoka</b></u> Kimitake]
3	In exchange for stepping on the stomach of a pregnant woman, an American soldier gave Mizoguchi these. In a different novel, Tsezar gave the leftovers of one to Ivan <b>Denisovich</b> [deh-NEE-soh-vich] instead of to <b>Fetyukov</b> [FET-yoo-kawff].	<u><b>cigarettes</b></u>

**Question #14: Literature – World Literature**

10 points per part

Later editions of this essay sometimes include the section “Post data,” which looked at the <b>Tlatelolco</b> [t’LAHT-lay-LOHL-koh] massacre, after which the writer resigned as ambassador to India.		
1	Name this analysis of Mexican identity which describes the title state as “the profoundest fact of the human condition.”	“The <u><b>Labyrinth of Solitude</b></u> ”
2	Within “The Labyrinth of Solitude,” this Mexican author analyzed foul language in Spanish in “La <b>Chingada</b> [cheen-GAH-dah],” part of “The Sons of La <b>Malinche</b> [mah-LEEN-chay].”	Octavio <u><b>Paz</b></u> Lozano
3	Octavio Paz’s poem “The Sun Stone” has 584 lines, one for each day on the calendar of these native peoples.	<u><b>Aztecs</b></u>



### Question #15: Science – Chemistry

10 points

<p>This quantity can be made negative by the yo-yo method on compounds such as <b>gallium arsenide</b> [GAL-ee-um AR-seh-nyde]. Photo-cathodes with negative values of this quantity can be used in night vision devices. This value tends to be high in elements with an incomplete two-<i>p</i> orbital, and the highest value of this quantity is for chlorine. This number measures the stability of an <b>anion</b> [AAN-“ion”], and this is the conceptual opposite of <b>ionization</b> [“ion”-iz-AY-shun] energy. Name this quantity that measures the change in energy when a neutral atom changes to a negatively charged ion.</p>	<p>first <b>electron affinity</b> [prompt on <b>affinity</b>]</p>
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### Question #16: Social Studies – Geography

10 points

<p>This waterway is spanned by El Ferdan, the world’s longest swing bridge, near <b>Ismailia</b> [eez-my-EE-lee-uh]. It crosses through the Bitter Lakes as well as lakes Manzala and Timsah. The October War was fought over control of this waterway, whose northern end is found in Port <b>Said</b> [sy-EED]. Name this waterway that connects the Mediterranean Sea to the Red Sea across a namesake isthmus in Egypt.</p>	<p><b>Suez</b> Canal [accept Qanāt al-<b>Suways</b>]</p>
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**Question #17: Literature – World Literature**

10 points

<p>In one work, he advised <b>Hirpinus</b> [hur-PIN-us] against taking stock in the opinion of the masses, and described how truly virtuous men cannot be guilty of an unworthy act. In a text written “to the Pisos,” he outlined how on occasion Homer nods off, and that stories should start in the middle, or “<b>in medias res</b> [een MAY-dee-ahss ‘RACE’].” Name this Roman poet and author of <i>Ars Poetica</i> as well as a number of odes.</p>	<p><b>Horace</b> [or Quintus <b>Horatius</b> Flaccus]</p>
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**Question #18: Fine Arts – Classical/Opera**

10 points

<p>This composer’s <i>La Valse</i> [vals] is a tone poem attempting to evoke Vienna. This composer used the saxophone to represent a troubadour in “The Old Castle,” part of his orchestration of <b>Mussorgsky’s</b> [muh-SORG-skee’s] <i>Pictures at an Exhibition</i>. While studying with Gabriel <b>Fauré</b> [faw-ray], this man wrote <i>Pavane</i> [pah-vahn] for a <i>Dead Princess</i>, and he also wrote the ballet <i>Daphnis et Chloe</i> [dahf-nees ay kloh-ay] and <i>Le Tombeau de Couperin</i> [lay tohm-boh day koo-pair-an]. One of his works features a snare drum repeating the same rhythm in an <b>ostinato</b> [ahss-tih-NAH-toh] while the orchestra trades off two melodies. Name this composer of <i>Boléro</i> [boh-LAY-roh].</p>	<p>Maurice <b>Ravel</b></p>
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**Question #19: Social Studies – U.S. History**

10 points

<p>This Supreme Court Justice established the discovery doctrine when he wrote the majority decision in <i>Johnson v. M'Intosh</i> [mih-IN-tosh]. That case clarified ownership of Native American land that this justice wrote about earlier in <i>Fletcher v. Peck</i>. This person also clarified the regulation of navigation in <i>Gibbons v. Ogden</i>, and he established judicial review in his decision on <i>Marbury v. Madison</i>. Name this longest-serving Supreme Court Chief Justice in American history, who died in 1835.</p>	<p>John <u>Marshall</u></p>
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**Question #20: Literature – Mythology**

10 points

<p>Damned souls in this myth system go eternally hungry at the center of the earth. In this mythos, a bridge of hair must be traversed to reach the sky. According to their creation myth, the elder son of the first woman was slain to grow fruits and vegetables, while the second, <b>Vichama</b> [vee-CHAH-mah], threw <b>Pachacamac</b> [PAH-chah-KAH-mahk] into the sea. Their pantheon was headed by the sun and storm god <b>Viracocha</b> [vee-rah-KOH-chah]. Name these natives of modern-day Peru.</p>	<p><u>Incas</u></p>
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**Question #21: Math – Algebra**

10 points per part

This mathematician wrote <i>An Investigation of the Laws of Thought on Which are Founded the Mathematical Theories of Logic and Probabilities</i> .		
1	Name this mathematician who is the namesake of a system of mathematics in which variables can only equal zero or one, which can represent true and false.	George <b>Boole</b> [BOO-ul] [prompt on <b>Boolean</b> ]
2	Two laws of Boolean algebra are named for this mathematician. One of those laws states that “not” the quantity <i>A</i> and <i>B</i> is equivalent to “not <i>A</i> ” or “not <i>B</i> ”.	Augustus <b>De Morgan</b> [accept <b>De Morgan</b> ’s <b>laws</b> ; prompt on <b>Morgan</b> ]
3	If an expression in Boolean algebra has five independent input values and is evaluated by a truth table, how many rows does the truth table need if each row represents a possible overall input into the expression? You do not need to count the header row.	<b>32</b>

**Question #22: Math – Algebra**

10 points per part

Some of these numbers are classified as transcendental.		
1	Identify these numbers whose decimal representations do not repeat or terminate.	<b>irrational</b> numbers [or <b>irrationals</b> ; do not prompt on “rational”]
2	Irrational numbers can be classified as either transcendental or of this type. These numbers are the solutions to polynomials whose coefficients are integers.	<b>algebraic</b> numbers
3	Give an expression of the form the quantity <i>A</i> plus the square root of <i>B</i> , end quantity, all divided by <i>C</i> , to express the golden mean. Make sure that your answer is of the form <i>A</i> plus the square root of <i>B</i> , end quantity, all divided by <i>C</i> .	$\frac{1+\sqrt{5}}{2}$ [do not worry about the wording being exact, but the answer does have to be in this form algebraically]



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

10 points per part

This Supreme Court justice was replaced by Samuel <b>Alito</b> [ah-LEE-toe] when she retired.		
<b>1</b>	Name this justice who became the first woman on the Supreme Court when she was appointed by President Reagan.	Sandra Day <b><u>O'Connor</u></b>
<b>2</b>	In the <i>Lockyer v. Andrade</i> [ahn-DRAH-day] decision, O'Connor wrote that California's "three strikes" law did not violate this constitutional amendment's ban on cruel and unusual punishments.	<b>8<sup>th</sup></b> Amendment
<b>3</b>	O'Connor wrote the majority decision in <i>Grutter v. Bollinger</i> , one of two simultaneous decisions addressing affirmative action at this university.	University of <b><u>Michigan</u></b> [prompt on <b><u>UM</u></b> ; do not accept "Michigan State"]

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

10 points per part

This person was supported by the Mugwumps.		
<b>1</b>	Name this president who lost his re-election campaign in 1888 to Benjamin Harrison, but was elected to a second term in 1892.	Grover <b><u>Cleveland</u></b>
<b>2</b>	During Cleveland's second term, this man led a march to Washington, DC to protest unemployment. He would lead a similar march twenty years later.	Jacob <b><u>Coxey</u></b>
<b>3</b>	This tariff, also known as the Revenue Act of 1894, passed during Cleveland's second term. It lowered the McKinley Tariff, but not as much as Cleveland wanted it to.	<b><u>Wilson-Gorman</u></b> Tariff Act



### Question #25: Fine Arts – Art History

10 points per part

This man painted a <b>Montagnard</b> [mohn-tawn-yard] who had a skin disease, wearing a headwrap while lying dead in his bathtub, after he was murdered by Charlotte Corday.		
1	Name this artist of <i>The Death of Marat</i> [mah-rah].	Jacques-Louis <b>David</b> [zhahk loo-ee dah-veed]
2	Jacques-Louis David painted this French emperor crowning himself in one scene set in Notre Dame Cathedral. David also portrayed this man “Crossing the Alps.”	<b>Napoleon Bonaparte</b> [accept either or <b>Napoleon I</b> ]
3	This other artist painted <i>Napoleon I on his Imperial Throne</i> , which shows Napoleon in robes wielding the scepter of Charlemagne and the hand of Justice.	Jean-Auguste-Dominique <b>Ingres</b> [zhahn oh-goost doh-mee-neek ahn(-gruh)]

### Question #26: Fine Arts – Art History

10 points per part

This painting shows five prostitutes, two of whom have faces like African masks, standing around a table with grapes and other fruit.		
1	Name this painting that presaged its artist’s creation of Cubism.	<i>Les <b>Demoiselles D’Avignon</b></i> [lay dem-wah-zel daw-veen-yohn]
2	This man painted <i>Les Demoiselles D’Avignon</i> , and he pioneered cubism along with colleague <b>Georges Braque</b> [zhorzh brahk].	Pablo Ruiz y <b>Picasso</b>
3	This Picasso painting was put on display at the Spanish Pavilion in the Paris World’s Fair of 1937. It shows a screaming horse underneath a lightbulb, and it protests a bombing campaign.	<b>Guernica</b> [gair-NEE-kah]



**Question #27: Literature – British Literature**

10 points per part

This procedure was undertaken at <b>Staja</b> [STAH-yah] 84F by Dr. Brodsky.		
<b>1</b>	Name this technique of forcing a subject to view violent imagery while under the influence of a nausea-inducing drug.	<b>Ludovico</b> [loo-doh-VEE-koh] technique
<b>2</b>	This Nadsat-speaking “humble narrator” undergoes the Ludovico Technique after killing a cat lady at age 15, and leading a rape of two girls set to Beethoven’s “Ode to Joy.”	<b>Alex DeLarge</b> [accept either]
<b>3</b>	Alex DeLarge is the protagonist of this novel by Anthony Burgess.	A <b><u>Clockwork Orange</u></b>

**Question #28: Literature – British Literature**

10 points per part

This character has “the power of having rather too much her own way, and a disposition to think a little too well of herself.”		
<b>1</b>	Name this character who tries to sophisticate Harriet Smith and make her a protege, but Harriet ends up marrying Robert Martin.	<b>Emma Woodhouse</b> [accept either]
<b>2</b>	This author claimed that Emma Woodhouse was “a character whom no one but me will much like.”	Jane <b>Austen</b>
<b>3</b>	Name Emma’s father, who laments his daughter Isabella’s marriage to John Knightley, and in general is concerned about his health and that of others.	<b>Henry</b> Woodhouse [prompt on <b>Woodhouse</b> ]



**Question #29: Social Studies – World History**

*10 points*

An attempted assassination of **Khaled Meshal** [KAH-leed meh-SHAL] in this country threatened to annul the Wadi Araba treaty. During Black September in 1970, the PLO was expelled from this nation. The United Kingdom was given control of what is now this country and part of Iraq in the **Sykes-Picot** [sikes pee-koe] Agreement. Following the Arab-Israeli War, this nation occupied the West Bank until Israel recaptured it in the Six-Day War. Ruled for almost fifty years by King Hussein, the father of Abdullah the Second, name this Middle Eastern kingdom with capital Amman.

Hashemite Kingdom of **Jordan**  
[accept Al Mamlakah al  
**Urduniyah** al Hashimiyah]

**Question #30: Math – Math Concepts**

*10 points*

A square matrix has this property if and only if it can be expressed as a product of elementary **matrices** [MAY-trih-sees]. This property means that a square matrix has a rank equal to the number of columns it has, which means that its columns are independent vectors. If Gauss-Jordan reduction is applied to matrices with this property, then they are changed into an identity matrix. These matrices have nonzero determinants, meaning that these matrices can be multiplied by another matrix to give an identity matrix. Name these nonsingular matrices.

**invertible** matrices [accept  
**nonzero determinant** or  
**nonsingular** before those clues are  
mentioned]



**Question #31: Literature – U.S. Literature**

*10 points*

One character in this story uttered a “Parthian volley of expletives” following the disappearance of an armed escort, which was meant to intimidate a man John Wheeler wanted to see hanged. That man had earlier given \$40 back to a man who “can’t gamble worth a cent,” Tom Stimson. A snowstorm eventually claims the lives of most of the title group, including Mother Shipton and Piney. Name this story concerning the ill fate of a group expelled from a town, penned by Bret Harte.

“The Outcasts of Poker Flat”

**Question #32: Science – Physics**

*10 points*

The equation associated with these devices has an exponent in which voltage is divided by thermal voltage. That equation is named for transistor founder William Shockley. Like transistors, these devices have depletion regions that can stop current. These devices can be used as rectifiers to convert AC current to DC current. These devices often are constructed by creating a p-n [pee en] junction from two types of semiconductors. In a DC circuit, these devices are forward-biased or reverse-biased. Name these devices that conduct current better in one direction than the other.

diodes [DY-ohdz]



**Extra Question #1: Fine Arts – Art History**

10 points

<p>In this country, a hypostyle hall is found in the world's largest religious ruin. A funerary complex at <b>Deir el-Bahri</b> ["DARE" el-BAH-ree] commemorates one female ruler of this nation. The statues of <b>Abu Simbel</b> [AH-boo "symbol"] were relocated due to the construction of the Aswan High Dam. This nation includes a temple at Karnak, and one eye is unpainted in a bust made during the Amarna period showing Queen <b>Nefertiti</b> [neh-fer-TEE-tee]. One sculpture here is missing its nose. Name this nation where the city of Giza contains a Great Sphinx.</p>	<p><u>Egypt</u></p>
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**Extra Question #2: Literature – U.S. Literature**

10 points

<p>This character was originally named "Pansy". Alexandra Ripley wrote a novel based on her. She bought a sawmill right before becoming pregnant with Ella Lorena. She named her first child Wade Hampton, in honor of the general of her first husband, Charles Hamilton, and never married Ashley Wilkes. Name this protagonist of <i>Gone with the Wind</i>.</p>	<p>Katie <u>Scarlett</u> O'Hara/Hamilton/Kennedy/Butler [prompt on any of those last names]</p>
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**Extra Question #3: Science – Physics**

*10 points*

<p>This phenomenon names a type of <b>fluorescence</b> [flor-ESS-inss] that occurs quickly and has an emission frequency equal to absorption frequency. This phenomenon also is used in several types of <b>spectroscopy</b> [spek-TRAH-skuh-pee], including one type in which protons are absorbed and re-emitted in a magnetic field. An AC circuit with a frequency of one over the square root of the quantity <b>inductance</b> [in-DUK-tunss] times <b>capacitance</b> [kuh-PASS-ih-tunss] achieves this phenomenon. This condition exists when the driving frequency matches an object’s natural vibrating frequency. Name this phenomenon that causes very large amplitudes.</p>	<p><b>resonance</b> [accept word forms of <b>resonate</b>]</p>
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**Extra Question #4: Social Studies – U.S. History**

*10 points*

<p>This person’s second term as governor of Virginia lasted less than three months because he resigned to become Secretary of State, and for a time he served as both Secretary of State and Secretary of War. During this person’s entire presidency, his cabinet included William Crawford, John Calhoun, and John Quincy Adams. His term included passage of the Missouri Compromise. Despite the Panic of 1819, his presidency was known as the Era of Good Feelings. Name this president who succeeded James Madison.</p>	<p>James <b>Monroe</b></p>
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**Extra Question #5: Math – Math Concepts**

*10 points*

The theorem named for this number of circles guarantees three concurrent lines. This is the least number of sides for a regular polygon that *cannot* be constructed with compass and straightedge. Three dimensions and this number of dimensions are the spaces in which the cross product can be well-defined. This number is the most common sum when two standard dice are rolled. The reciprocal [reh-SIP-roh-kul] of this integer is approximately 0.143. Identify this greatest one-digit prime number.

seven



**Extra Question #6: Science – Biology**

*10 points per part*

This process begins with <b>diploid</b> [DIP-loyd] cells and creates <b>haploid</b> [HAP-loyd] cells.		
<b>1</b>	Name this type of cell division that produces spores or gametes.	<b>meiosis</b> [my-OH-siss] [do not accept “mitosis”]
<b>2</b>	This failure of a chromosome pair to go to separate daughter cells during meiosis is responsible for several birth defects.	<b>nondisjunction</b>
<b>3</b>	When an egg cell is created during meiosis, three of these smaller objects are also produced.	<b>polar body</b> [or <b>polar</b> cell]

**Extra Question #7: Science – Biology**

*10 points per part*

The down types of these are short and help animals stay warm.		
<b>1</b>	Name these objects that grow on the outsides of birds.	<b>feathers</b>
<b>2</b>	Feathers contain the beta type of this protein, whose alpha type is found in the hair and nails of mammals.	<b>keratin</b> [KAIR-uh-tin]
<b>3</b>	This is the central shaft of the feather that the barbs grow out from. The same name is used for the central vein of a leaf or frond.	<b>rachis</b> [RAA-kuss]



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

*10 points per part*

This poem describes the “Mother of Exiles” that lifts a lamp “beside the golden door.”		
<b>1</b>	The title figure of this poem is “not like the brazen giant of Greek fame,” but nonetheless stands at “sea-washed, sunset gates.”	“The <u>New Colossus</u> ”
<b>2</b>	This author of “The New Colossus” described the year 1492 as a “two-faced year” in another poem.	Emma <u>Lazarus</u>
<b>3</b>	“The New Colossus” is inscribed on the pedestal supporting this statue designed by Frederic <b>Bartholdi</b> [bar-tol-dee].	<u>Statue of Liberty</u> [or <u>Liberty Enlightening the World</u> ]

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

*10 points per part*

This poem ends with the lines “Datta. <b>Dayadhvam</b> [dy-YAD-vahm]. <b>Damyata</b> [dahm-YAH-tah]. Shantih Shantih Shantih”		
<b>1</b>	Name this poem in which April is described as the “cruellest month”.	“The <u>Waste Land</u> ”
<b>2</b>	“The Waste Land” was written by this author, who compared an evening sky to “a patient etherized upon a table” in “The Love Song of J. Alfred Prufrock.”	Thomas Stearns <u>Eliot</u>
<b>3</b>	In “The Waste Land,” the line “ <b>Hieronimo</b> [heer-AH-nih-moh] is mad again” is a reference to this play by Thomas Kyd.	<i>The <u>Spanish Tragedy</u></i>



**Question #1: Fine Arts – Composers of Modern Era**

10 points

<p>In one of this composer’s operas, the chorus chants the numbers “1-2-3-4, 1-2-3-4-5-6, 1-2-3-4-5-6-7-8” in its “Knee Play #5.” This composer worked with Godfrey Reggio on a film that shows moving images of the world changing with no dialogue, <i>Koyaanisqatsi</i> [koy-AH-niss-KAHT-see]. He composed a symphony based on the David Bowie album <i>Low</i>. This composer’s Portrait trilogy includes an opera about the Egyptian pharaoh who worshipped the sun, and that trilogy’s operas <i>Akhenaten</i> [ak-ih-NAH-tun] and <i>Satyagraha</i> [saht-yah-GRAH-hah] precede another one about a scientist. Name this minimalist composer of the opera <i>Einstein on the Beach</i>.</p>	<p>Philip <u>Glass</u></p>
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**Question #2: Literature – World Literature**

10 points

<p>The protagonist of this novel has a dream in which the “stranger-god” is worshipped in a primitive ritual by torchbearers. The protagonist of this tale uses his misplaced luggage as an excuse to return to the <i>Hotel des Bains</i> [oh-tel dez-ben]. The central character of this novel sees a wrestling match between <i>Jasiu</i> [YAHSS-yoo] and another Polish boy shortly before the title event. <i>Cholera</i> [KAH-leh-rah] strikes down German author Gustav von <i>Aschenbach</i> [AH-shun-bahk] in what novel by Thomas Mann set in an Italian city?</p>	<p><u><i>Death in Venice</i></u> [accept <i>Der <u>Tod</u> in Venedig</i>]</p>
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**Question #3: Science – Health**

10 points

A high amount of this chemical in the body is associated with a high amount of **cortisol** [KOR-tih-sawl], the primary symptom of Cushing syndrome. A test to measure tolerance to this chemical involves drinking a fluid and having repeated blood draws; that test is given to pregnant women. This chemical can be created in the liver and kidneys, and molecules of this substance combine to make a substance that is stored in muscles. This chemical activates beta cells in the pancreas and becomes useful when combined with insulin. Name this sugar that is found in high amounts in diabetic patients.

glucose [prompt on sugar or glycogen]

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

10 points

This person was the subject of the documentary *An Unreasonable Man*, and he justified his political actions in the book *Crashing the Party*. He is the founder of the Public Citizen organization, and his book *Action for a Change* led to the creation of the Public Interest Research Group. His running mate was Winona LaDuke when he ran for president as the Green Party candidate; that campaign by this man was blamed by some Democrats for influencing the 2000 Election. Name this activist who promoted safety features in cars in his book *Unsafe at Any Speed*.

Ralph Nader



**Question #5: Literature – Mythology**

10 points

This creature was placated with honey cake by the Sibyl of Cumae in order to help Aeneas. In the *Theogony* [thee-AH-guh-nee], this figure was said to have fifty heads, while Horace claimed it had one hundred. This serpent-tailed creature was the target of Hercules' twelfth labor. Orpheus [OR-fee-uss] lulled it to sleep in his bid to rescue Eurydice [yur-IH-dih-see]. Name this three-headed dog that guarded the entrance to Hades [HAY-deez].

**Cerberus** [accept **Kerberos**]

**Question #6: Science – Physics**

10 points

Because of its description of what happens to peak wavelengths, Wien's [VEEN'z] Law is given this word in its name. A field named for this concept is calculated by multiplying permittivity [per-mih-TIV-ih-tee] times electric field plus polarization density. The rate of change of that field was accounted for by Maxwell's adjustment to Ampère's law, which is named for this type of current. Force is multiplied by this quantity to find work. This vector quantity is divided by time to find average velocity. Name this quantity equal to an object's change in position.

**displacement** [accept **displacement current** after "permittivity"]



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

*10 points per part*

This event was perpetrated in response to the rise in power of Admiral <b>Gaspard de Coligny</b> [gas-par day koh-leen-ye].		
<b>1</b>	Name this 1572 event in which a number of <b>Huguenots</b> [HYOO-guh-nawts] were slaughtered on the orders of the French queen.	<b><u>St. Bartholomew's</u></b> Day Massacre
<b>2</b>	Name that queen who ordered the St. Bartholomew's Day Massacre. She was the wife of Henry II of France.	Catherine de <b><u>Medici</u></b> [prompt on <b><u>Catherine</u></b> , <b><u>Medici</u></b> , or <b><u>de Medici</u></b> ]
<b>3</b>	The massacre was part of the French Wars of Religion, which came to an end when this king converted to Catholicism.	<b><u>Henry IV</u></b> of Navarre

**Question #8: Social Studies – World History**

*10 points per part*

The closure of Bohemian chapels, a violation of the Letter of Majesty of Rudolf II, culminated in this event.		
<b>1</b>	Name this incident in which William Slavata, <b>Jaroslav Martinic</b> [YAR-oh-slahv mar-TEE-nich], and Philip <b>Fabricsius</b> [fuhb-REE-see-uss] landed in a soft pile of manure.	Second <b><u>Defenestration of Prague</u></b> [prompt on <b><u>Defenestration</u></b> ]
<b>2</b>	The Second Defenestration of Prague, and the subsequent Bohemian revolt, helped kickstart this conflict, that ended with the 1648 Peace of <b>Westphalia</b> ["west"-FAY-lee-uh].	<b><u>Thirty Years'</u></b> War
<b>3</b>	This Catholic who wanted to wipe out Protestantism was the King of Bohemia during the Defenestration of Prague. He would soon become Holy Roman Emperor.	<b><u>Ferdinand II</u></b> [or <b><u>Ferdinand of Styria</u></b> , prompt on <b><u>Ferdinand</u></b> ]



**Question #9: Science – Biology**

*10 points per part*

This collection of bones includes the hip bones.		
<b>1</b>	Name this structure between the spine and the legs.	<b>pelvis</b> [or <b>pelvic girdle</b> ]
<b>2</b>	This triangular bone at the base of the spine is part of the pelvis. This bone is not the tailbone.	<b>sacrum</b>
<b>3</b>	This part of the hip bone is under the <b>ilium</b> [ILL-ee-um] and behind the <b>pubis</b> [PYOO-biss].	<b>ischium</b> [ISS-kee-um]

**Question #10: Science – Biology**

*10 points per part*

These cells make antibodies.		
<b>1</b>	Name these <b>lymphocytes</b> [LIM-foh-“sites”] that are not T cells or natural killer cells.	<b>B</b> cells [or <b>B lymphocytes</b> ]
<b>2</b>	B cells receive signals from these T cells that have the <b>glycoprotein</b> [GLY-koh-“protein”] CD4.	<b>helper</b> cells [accept <b>T helper</b> cells or <b>helper T</b> cells]
<b>3</b>	B cells can be infected by this virus responsible for <b>mononucleosis</b> [MAH-noh-NOO-klee-OH-siss].	<b>Epstein-Barr</b> virus [or <b>EBV</b> , prompt on <b>herpes</b> virus]



### Question #11: Fine Arts – Art History

10 points per part

There are four versions of this painting that shows two men in the background on a bridge.		
1	Name this Expressionist painting depicting a man gripping his face in agony, underneath a bright orange sky.	<i>The <u>Scream</u></i> [or <u>Skrik</u> , or <i>Der Schrei der Natur</i> ]
2	This Norwegian painted <i>The Scream</i> , as well as <i>Vampire</i> and <i>The Frieze of Life</i> .	Edvard <u>Munch</u>
3	Munch painted a nude woman in a work given this title. More traditional works bearing this title show the Virgin Mary, one of which by Raphael is titled “of the fields.”	<u>Madonna</u>

### Question #12: Fine Arts – Art History

10 points per part

This man painted Cecilia Gallerani holding a weasel in his work <i>Lady with an Ermine</i> .		
1	Name this artist who painted Mary, Jesus, John the Baptist, and an angel in <i>Madonna of the Rocks</i> .	<u>Leonardo</u> di ser Piero <u>da Vinci</u> [accept either underlined portion]
2	Leonardo created this sketch showing a nude man with his arms and legs held at different positions, inscribed within a circle and a square.	<u>Vitruvian Man</u>
3	This Leonardo painting shows Mrs. Gherardini, a cloth merchant’s wife. She is barely smiling, and sits in front of a blurred rocky landscape.	<u>Mona Lisa</u> [or <i>La <u>Gioconda</u></i> ; or <i>La <u>Joconde</u></i> ]



**Question #13: Literature – U.S. Literature**

10 points per part

He fell in love with the niece of Medora Manson while trying to dissuade her from divorcing a Polish count.		
<b>1</b>	Name this lawyer from New York who, after his wife’s death, sent his son up to meet his old flame during a trip to Paris.	<b><u>Newland Archer</u></b> [accept either]
<b>2</b>	Newland Archer falls in love with Ellen Olenska in this novel.	<i>The <b><u>Age of Innocence</u></b></i>
<b>3</b>	This author of <i>The Age of Innocence</i> wrote about a bobsledding suicide attempt in <i>Ethan Frome</i> .	Edith Newbold <b><u>Wharton Jones</u></b> [accept either underlined name]

**Question #14: Literature – U.S. Literature**

10 points per part

The protagonist of this novel thought the word “ <b>mañana</b> ” [mahn-YAH-nah] “probably meant heaven.”		
<b>1</b>	Name this “roman à <b>clef</b> [klay]” in which Carlo Marx and the morphine addict Old Bull Lee represent contemporaries of the author, while Sal Paradise represents the author himself.	<b><u>On the Road</u></b>
<b>2</b>	This Beat author wrote <i>On the Road</i> .	“Jack” Jean-Louis Lebris de <b><u>Kerouac</u></b>
<b>3</b>	At the conclusion of <i>On the Road</i> , Sal reflects on the life of this character, who had abandoned him during a bout of dysentery that left Sal in Mexico City until he recovered. This character was based on Neal Cassady.	<b><u>Dean Moriarty</u></b> [accept either]



**Question #15: Miscellaneous – Journalism**

10 points

Former reporter Bernard Goldberg argued in *Bias* that this network had a liberal bias. This network drew controversy regarding its handling of an interview with Jeffrey Wigand regarding the major tobacco companies. Walter Cronkite once anchored its evening news program, with Dan Rather later assuming that role. Since 1968, this network has broadcast the newsmagazine *60 Minutes*. Name this major television network whose logo is an eye.

CBS Broadcasting, Inc. [accept  
Columbia Broadcasting System]

**Question #16: Social Studies – Religion**

10 points

One school of thought believes that only people with this status can see Kwan-Yin and Amito-fo. Another school holds that only those who achieve the ideal of “arhat” are able to reach this status. The end of the cycle of samsara, reincarnation, ceases once this status is attained. Following the Eightfold Path leads to this status. Give this Buddhist term for the end of suffering.

nirvana [accept nibbana, prompt  
on enlightenment]



**Question #17: Math – Math Concepts**

*10 points*

This shape is its own evolute without changing size. An object sliding along this shape will take the same amount of time to reach the bottom of the curve no matter how high it begins, which makes this shape the solution to the **tautochrone** [TAW-toh-“crone”] problem. This curve is also the path that an object should follow to get as quickly as possible from one point to a lower point, so it solves the **brachistochrone** [bruh-KISS-toh-“crone”] problem. The area under one arch of this shape is three times the area of its generating circle. Name this shape generated by tracing a point on the rim of a rolling circle.

**cycloid**

**Question #18: Language Arts – Grammar/Usage**

*10 points*

In Romance languages, this grammatical tense is divided, according to the degree of completion, into imperfect and preterite forms. In French, the compound form of it utilizes an auxiliary verb. Its hesternal form is used for specific reference to yesterday. Name this tense which is commonly formed in English by adding -d or -ed to the end of a verb.

**past** tense



**Question #19: Social Studies – U.S. History**

10 points

<p>A threat made by this person was heard by Alexander Dallas, who told Pennsylvania Governor Thomas Mifflin. The result was a brief letter written by Senator Rufus King and Supreme Court Chief Justice John Jay that lowered public opinion of this person. This person spent much of his time in Charleston, South Carolina, and his actions were viewed as a threat to American neutrality because he raised money to capture British ships. Name this person who was eventually given asylum by the United State after President Washington made a request to France to recall him as ambassador.</p>	<p>Citizen Edmond-Charles <b>Genet</b> [zhuh-nay]</p>
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**Question #20: Science – Chemistry**

10 points

<p>This compound reacts with proteins to form <b>xanthoproteic</b> [zaan-thoh-PROH-tee-ik] acid, and this compound combines with water and phosphorite in the Odde process. Alchemists referred to this compound as aqua fortis, and this compound makes up twenty-five percent of <b>aqua regia</b> [REE-jee-uh]. The white fuming version of this compound is combined with sulfuric acid to make a heart medicine that can also be used to make dynamite. The output of the <b>Haber</b> [HAH-bur] process is used to make this compound in the Ostwald process. Name this strong acid with chemical formula <b>HNO<sub>3</sub></b> [H N O “three”].</p>	<p><b>nitric</b> [NY-trik] acid [accept <b>HNO<sub>3</sub></b> before the end]</p>
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**Question #21: Math – Algebra**

*10 points per part*

Consider the graph of the equation $y$ equals the quantity $x$ minus four, end quantity, divided by the quantity $x$ squared minus sixteen.		
<b>1</b>	There are two lines that this function approaches close to at infinity. What is the name given to such lines?	<b>asymptotes</b> [“ASS-imp-totes”]
<b>2</b>	Give an equation for the horizontal asymptote.	<b><math>Y = 0</math></b> [prompt on <b><u>x-axis</u></b> ]
<b>3</b>	Find the y-coordinate of the hole of this graph.	<b><math>\frac{1}{8}</math></b> [or <b>0.125</b> , accept additional information saying that $x=4$ or <b>(4,1/8)</b> or <b>(4,0.125)</b> ]

**Question #22: Math – Algebra**

*10 points per part*

The theorem used for these expressions uses combinations to calculate the coefficients when one of these expressions is raised to a positive integer power.		
<b>1</b>	Give this term for a polynomial with two terms.	<b>binomial</b> [by-NOH-mee-ul] expression
<b>2</b>	Find the coefficient of the term with $x$ cubed times $y$ for the expansion of the quantity $x$ plus two $y$ , end quantity, raised to the fourth power.	<b>8</b>
<b>3</b>	Find the sum of all the coefficients for the expansion of quantity, $x$ plus two $y$ , end quantity, raised to the fourth power.	<b>81</b>



**Question #23: Literature – Mythology**

*10 points per part*

His son <b>Okuni-Nushi</b> [oh-koo-nee noo-shee] disarmed him of the “grass-cutting sword,” <b>Kusanagi</b> [koo-sah-nah-gee].		
<b>1</b>	Name this Shinto god of storms and snakes, who once was stripped of his beard and fingernails.	<b>Susanoo</b> [soo-sah-noh-oh]-no-Mikoto [accept <b>Susanowa</b> ]
<b>2</b>	Susanoo drove his sister <b>Amaterasu</b> [ah-mah-tair-ah-soo] into a cave by flaying one of these animals and throwing it into one of her houses.	<b>horse</b>
<b>3</b>	Susanowa procured Kusanagi following his battle against Koshi, a dragon with this many heads.	<b>eight</b> heads

**Question #24: Literature – Mythology**

*10 points per part*

He was conceived from a piece of cake given to <b>Dasaratha</b> [dah-sah-rah-thah].		
<b>1</b>	Name this god who, after being captured, had his tail set on fire. This god then shapeshifted, and used that tail to alight <b>Lankapuri</b> [lahn-kah-poo-ree].	<b>Hanuman</b> [HAH-noo-mahn]
<b>2</b>	Despite his ability to shapeshift at will, Hanuman is depicted by worshippers in the form of this animal. Sun Wu-kong was given the title of “King of” these animals.	<b>Monkey</b>
<b>3</b>	Hanuman’s trip to Lankapuri was a reconnaissance mission on behalf of this husband of Sita, who later fought the demon king Ravana.	<b>Rama</b>



### Question #25: Science – Physics

10 points per part

Some vibrations have points called nodes and points of maximum vibration called anti-nodes.		
1	String vibrations are sometimes these types of waves, in which the antinode does not travel along the length of the string.	<b>standing</b> wave [or <b>stationary</b> wave]
2	The speed of the wave in the string varies directly with the square root of this force, which is a measure of how much the ends of the string are being pulled.	<b>tension</b>
3	This scientist is the namesake of plates that have node patterns that can be located by sprinkling sand over their surface.	Ernst <b>Chladni</b> [KLAHD-nee]

### Question #26: Science – Physics

10 points per part

This phenomenon is caused by relative motion, and calculated with a Lorentz transformation in special relativity, and it is caused by gravitational fields in general relativity.		
1	Name this effect that is often paired with length contraction.	<b>time dilation</b> [accept word forms]
2	One of the consequences of time dilation is that two observers may not agree on this concept, the observation that two events occurred at the same time.	<b>simultaneity</b> [accept word forms]
3	The Rossi-Hall experiment provided supporting evidence for time dilation by measuring the amounts of these particles approaching Earth at different altitudes.	<b>muons</b> [MYOO-ahnz] [accept <b>mu leptons</b> ; prompt on <b>leptons</b> ]



**Question #27: Social Studies – U.S. Government**

10 points per part

This publication was a study done by the Department of Defense into how the United States was involved in Vietnam politically and militarily.		
1	Give the two-word term for the collection of documents that Daniel Ellsberg leaked to the <i>New York Times</i> . Alaska Senator Mike Gravel [grah-VEL] read a large section of it into the Congressional Record.	<b><u>Pentagon Papers</u></b>
2	In <i>New York Times v. United States</i> , the Supreme Court ruled that the government did not make a compelling case for this form of censorship, in which speech is forbidden before it is actually expressed.	<b><u>prior restraint</u></b>
3	Senator Gravel read the Papers into the record after this Senator reneged on his promise to do so because he was planning to run for President of the United States.	George Stanley <b><u>McGovern</u></b>

**Question #28: Social Studies – U.S. Government**

10 points per part

This agency relies on “safe harbor” provisions regarding youth exposure to certain content.		
1	This bureau within the federal government mandates the widespread installation of V-chips in certain products, which can block certain programs from being shown.	<b><u>Federal Communications Commission</u></b> [accept <b><u>FCC</u></b> ]
2	In <i>Red Lion v. FCC</i> , the Supreme Court upheld this FCC policy that required broadcasters to provide balanced coverage of issues of public importance. The “Equal Time” doctrine applied this policy to political candidates.	<b><u>Fairness</u></b> Doctrine
3	The FCC also came out on top in a lawsuit filed by the Pacifica foundation after the broadcaster was fined for airing a bit about foul language by this late comedian.	George <b><u>Carlin</u></b>



**Question #29: Science – Biology**

10 points

Adding one oxygen atom to this molecule in the right place creates **norepinephrine** [NOR-ep-in-EF-rin], and both this molecule and norepinephrine are created from **tyrosine** [TEER-oh-seen]. Its effects were studied by Nobel Prize winner Arvid Carlsson. Cells that produce this chemical are high in **neuromelanin** [nur-oh-MEL-uh-nin], and many are located in the **substantia nigra** [sub-STAN-shee-uh NY-gruh]. Drugs that are antagonists of this chemical include Risperdal, which is an anti-psychotic, while its level is increased by Ritalin. A decrease in the levels of this chemical causes Parkinson’s disease. Name this chemical that, like **serotonin** [sair-oh-TOH-nin], is a neurotransmitter.

dopamine [“DOPE”-uh-meen]

**Question #30: Social Studies – World History**

10 points

This founder of the *Defenseur de la Constitution* was attacked by opposing press as a “monkey of **Mirabeau** [meer-ah-boe].” The group he led sat in the high back benches at the **Tuileries** [TIL-uh-rees] Palace during the National Convention. This head of the Cult of the Supreme Being earned the nickname “the incorruptible” as a member of the Committee of Public Safety. He shattered his jaw in a suicide attempt the day before he was guillotined. Name this leader during the Reign of Terror in France.

Maximilien Francois Marie Isidore de Robespierre



**Question #31: Literature – U.S. Literature**

10 points

Alice B. Toklas offered to dramatize this author's story of Nanda Brookenham, *The Awkward Age*. He inverted the plot of "The Necklace" for his story "Paste." One of his characters came down with malaria after a late-night rendezvous at the Colosseum with Giovanelli. Gilbert Osmond is reunited with Isabel Archer at the end of his novel *The Portrait of a Lady*. Name this author of *The Ambassadors* and *Daisy Miller*.

Henry James

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

10 points

One system in this field is called Rijndael [REEN-del] because it was developed by Joan Daemen and Vincent Rijmen [RAY-min]. That system combines linear mix transforms, non-linear transforms, and key addition Transforms. A link between this field and number theory was demonstrated by the RSA factoring challenge, which involved factoring large numbers with two prime factors to demonstrate the strength of public-key systems. Name this field which uses ciphers to encode messages so that they cannot be understood by unintended audiences.

cryptography [or encryption or cryptanalysis or codebreaking]



### Extra Question #1: Science – Chemistry

10 points

<p>This scientist's simplistic theory of metal-electrolyte interfaces explains his namesake double layer. His study of fluid dynamics produced his namesake three theorems, and an explanation of the instability between two fluids is named for Kelvin and this person. One quantity named for this person is also called the <i>Massieu</i> [mass-yoo] potential. A quantity named for this person that is useful at constant temperature equals internal energy minus the product of temperature and entropy. Name this person who, like Gibbs, names a type of free energy.</p>	<p>Hermann von <u>Helmholtz</u></p>
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### Extra Question #2: Literature – British Literature

10 points

<p>This veteran of the Battle of Maiwand had a wife who received the contents of a chaplet from the Agra treasure following the capture of Jonathan Small. Tricked into seeing a nonexistent patient at the <i>Englischer Hof</i> ["English"-ur hawff], he later found a letter at <i>Reichenbach</i> [RY-kin-bak] Falls penned by his companion, who had fought with Professor James Moriarty. Name this prominent narrator and companion to Sherlock Holmes.</p>	<p>Dr. <u>John</u> H. <u>Watson</u> [accept either underlined name]</p>
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**Extra Question #3: Social Studies – World History**

*10 points*

<p>The site of this battle was chosen by a retreating army looking to link up with <b>Mithridates</b> [mith-rih-DA-tees] of Pergamum. The losing army at this battle had enlisted officers under the command of Aulus Gabinius, and had abandoned the Macedonian phalanx formation. After losing here, Ptolemy XIII fled, but drowned when his boat capsized. Name this 47 BCE battle that saw Cleopatra secure the Egyptian throne, named for a prominent river.</p>	<p>Battle of the <u>Nile</u></p>
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**Extra Question #4: Math – Math Concepts**

*10 points*

<p>This value equals the ratio of the lengths of the side of an equilateral triangle to the diameter of an inscribed circle. This value gives the ratio of the distance between parallel sides of a regular hexagon to the length of a side. A line with a slope equal to this positive value makes a sixty degree angle with the <math>x</math>-axis. This value also gives the ratio between the length of a space diagonal across a cube and the length of a side. This value also equals the tangent of pi over three radians, or the tangent of sixty degrees. Name this irrational value equal to about 1.73.</p>	<p><u>square root of 3</u> [or <u>3 to the <math>\frac{1}{2}</math></u> power or <u>3 to the .5</u> power or <u>radical 3</u>, do not accept “3”]</p>
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**Extra Question #5: Fine Arts – Classical/Opera**

*10 points*

<p>This composer was inspired by the poet Lamartine to compose his <i>Les Preludes</i> [lay pray-lood]. This composer of <i>Mazeppa</i> invented the symphonic poem. His <i>Totentanz</i> [TOH-tin-tahnts] is based on the “Dies Irae” chant. This composer’s teacher Carl Czerny [CHAIR-nee] is the dedicatee of the <i>Transcendental Études</i> [AY-toodz], and he also composed the <i>Mephisto Waltzes</i>. This composer names a “mania” that swept concert halls during the height of his popularity as a pianist. The “<i>Rakoczi</i> [rah-KOH-chee] March” is a subtitle for one of his 19 works for piano based on gypsy and folk music. Name this composer of the <i>Hungarian Rhapsodies</i>.</p>	<p>Franz <u>Lizst</u> [or <u>Liszt</u> Ferenc]</p>
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**Extra Question #6: Literature – World Literature**

10 points per part

In this tale, <b>Urshanabi</b> [oor-shah-NAH-bee] lost his role as a ferryman after assisting the title character.		
<b>1</b>	Name this epic, in which the son of <b>Lugalbanda</b> [LOO-gul-BAN-dah] and Ninsun sought out a plant that will make him youthful, but it was stolen by a serpent.	<i>The <u>Epic of Gilgamesh</u></i>
<b>2</b>	In <i>The Epic of Gilgamesh</i> , this character was raised by animals. Lured to civilization by Shamhat, he became the longtime companion of Gilgamesh.	<b><u>Enkidu</u></b>
<b>3</b>	In seeking out the plant, Gilgamesh sought the advice of this man and his wife, who had survived the Deluge with the help of <b>Ea</b> [AY-uh].	<b><u>Utnapishtim</u></b> [OOT-nah-PISH-teem]

**Extra Question #7: Literature – World Literature**

10 points per part

The title group in this story is also referred to as the “Stars of Destiny.”		
<b>1</b>	Upon their release from beneath a tortoise, the group is divided into “Heavenly Spirits” and “Earthly Fiends” and eventually accepts amnesty from the emperor.	<b><u>Outlaws of the Marsh</u></b> [accept <b><u>Water Margin</u></b> , <b><u>All Men Are Brothers</u></b> , <b><u>Shui Hu Zhuan</u></b> or <b><u>Suikoden</u></b> ]
<b>2</b>	<i>Outlaws of the Marsh</i> is primarily set in this modern-day country, where it is considered one of the Four Great Classical Novels, alongside <i>Romance of the Three Kingdoms</i> , <i>Journey to the West</i> , and <i>Dream of the Red Chamber</i> .	People’s Republic of <b><u>China</u></b>
<b>3</b>	Gao <b>Qiu</b> [choo], the main antagonist of <i>Outlaws of the Marsh</i> , was renowned for his skill at this sport. In <i>The Dumb Waiter</i> , Ben and Gus argue over whether a certain match in this sport took place in either Birmingham or Tottenham.	<b><u>soccer</u></b> [accept <b><u>association football</u></b> ]



### Extra Question #8: Science – Chemistry

10 points per part

Orbital subshells are determined by the <b>azimuthal</b> [aaz-ih-MOO-thul] quantum number.		
1	The simplest orbital is this one, with spherical symmetry, corresponding to an azimuthal quantum number of zero.	<u>s</u> orbital
2	The last two quantum numbers are represented by this letter. One of them is represented by this letter sub l, while the other one is represented by this letter sub s.	<u>m</u>
3	This rule named for a German scientist is used to determine which orbitals are filled first. It often involves adding the first two quantum numbers and drawing diagonal lines.	<b>Madelung</b> energy ordering rule

### Extra Question #9: Science – Chemistry

10 points per part

This quantity equals internal energy plus the quantity pressure times volume.		
1	Name this thermodynamic quantity often represented by an <i>H</i> .	<b>enthalpy</b>
2	This law states that the enthalpy change of a reaction does not depend on which steps are taken.	<b>Hess</b> ' law of constant heat summation
3	These two scientists name a cycle that applies Hess' law to calculate the lattice enthalpy of ionic solids.	Max <b>Born</b> and Fritz <b>Haber</b> [either order]



**Question #1: Literature – U.S. Literature**

*10 points*

<p>This character was owed twelve dollars by the narrator of the story in which he appears, but he did not touch the thirty-two dollars left for him. After being found dead, he was described as sleeping “with kings and councillors.” A change in administration forced him out of the Dead Letter Office, after which he matriculated to a copying establishment where he worked with Turkey and Nippers. Name this scrivener and title character of a Herman Melville short story who “would prefer not to.”</p>	<p><b><u>Bartleby</u></b>, the Scrivener</p>
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**Question #2: Science – Biology**

*10 points*

<p>The lack of this substance in one setting is known as the <b>chlamydial [kluh-MID-ee-ul]</b> anomaly. This substance contains beta one four <b>glycosidic [gly-koh-SID-ik]</b> bonds that connect two types of sugars. The synthesis of this polymer is disrupted by <b>cephalosporins [SEF-uh-loh-SPOR-inz]</b> or by penicillins. This substance is found in <b>firmicutes [FIR-mih-“cute”s]</b> and <b>actinobacteria [ak-TIN-oh-“bacteria”]</b>. Name this polymer found in some cell walls that is detected using crystal violet dye, a procedure called the Gram stain.</p>	<p><b><u>peptidoglycan</u></b></p>
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**Question #3: Social Studies – World History**

*10 points*

<p>This battle, where fog delayed the start of Operation Judgment, saw the capture and re-capture of forts at Fleury and Douaument [doo-au-mon]. Planning to bleed his opponent white, instead Erich von Falkenhayn [FAHL-ken-hine] was replaced by Paul von Hindenburg during this encounter. Occurring simultaneously with the Battle of the Somme, during this battle Robert Nivelle inspired his troops with the daily order “they shall not pass.” Name this single longest battle of World War One.</p>	<p>Battle of <u>Verdun</u></p>
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**Question #4: Miscellaneous – Sports**

*10 points*

<p>During the season in which Stan Van Gundy was relieved of coaching this team, they beat Dallas 4-2 to win the 2006 NBA Finals. The 2013 season saw this team win a record 27 consecutive games. It has recently been coached by Pat Riley and Erik Spoelstra [SPOHL-struh]. Name this NBA team that won two recent titles in four consecutive Finals appearances with stars Chris Bosh, Dwyane [duh-WAYN] Wade, and the now departed LeBron James.</p>	<p><u>Miami Heat</u> [accept either]</p>
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**Question #5: Literature – British Literature**

10 points

<p>One victim in this play is gagged with gingerbread and thrown into a water closet during a ceremony preparing him to meet the “Queen of Fairy.” In this play, one character disguises himself as a Spanish nobleman, but reveals his true identity to Dame Pliant. Upon Lovewit’s return, the scheming of Doll, Subtle, and Captain Face is exposed. Name this play by Ben Jonson in which Subtle pretends to be able to turn objects to gold.</p>	<p><i>The <u>Alchemist</u></i></p>
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**Question #6: Math – Math Concepts**

10 points

<p>One of these constructs is based on the formula <math>A^2 = N - S</math> and is named for Anderson and Darling. That example is based on the <b>Kolmogorov-Smirnov</b> [kole-moh-GOE-rof SMEER-nof] example, which in turn is the rank type of this construct and measures goodness-of-fit. Another example of this construct compares measurements to a <b>chi</b> [KY]-squared distribution, while another compares to a Student’s <math>t</math>-distribution. Name this measurement of the accuracy of a null hypothesis, used to determine whether or not a result is statistically significant.</p>	<p>statistical null hypothesis rank <b>testing</b> [prompt on <b><u>null hypothesis</u></b> or <b><u>statistic</u></b>]</p>
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**Question #7: Social Studies – Geography**

*10 points per part*

Likoma Island is found within this Rift Valley lake.		
<b>1</b>	Major ports on this lake include Monkey Bay and <b>Mangochi</b> [man-GOH-chee]. Its western border is defined by the <b>Nyika</b> [ny-EE-kah] Plateau and the <b>Viphya</b> [VEEP-yah] Mountains.	Lake <b>Nyasa</b> [nee-YAH-say] [accept Lake <b>Malawi</b> [mah-LAU-wee]]
<b>2</b>	The <b>Shire</b> [shi-ray] River, which flows out of Lake Nyasa, which is also known as Lake Malawi, is a tributary of this “great river.” It flows from the Central African Plateau to the Indian Ocean.	<b>Zambezi</b> River
<b>3</b>	The northern end of Lake Nyasa defines part of the southwest border of this country, which is bordered on the south by Mozambique.	<b>Tanzania</b>

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

*10 points per part*

It is surrounded by its namesake canton, as well as <b>Obwalden</b> [ohb-VAL-den], Niderwalden [NEE-dair-val-den], Uri, and <b>Schwyz</b> [shveez].		
<b>1</b>	Name this body of water in Switzerland. The Rutli Meadow lies along its shore.	Lake <b>Lucerne</b> [accept, but do not otherwise reveal, Lake of the <b>Four Forested Cantons</b> ]
<b>2</b>	The cantons surrounding Lake Lucerne are collectively known as these cantons, also called the <b>Waldstaaten</b> [VALD-shtah-tin].	<b>forest</b> cantons
<b>3</b>	Popular sights around Lake Lucerne include Mounts Pilatus and Rigi, part of this mountain chain.	Swiss <b>Alps</b>



**Question #9: Science – Physics**

*10 points per part*

Lenses are used to create images by bending light.		
<b>1</b>	One type of lens is classified as convex based on its shape. What alternative name is used for a convex lens based on the impact it has on light rays?	<b>converging</b> lens [accept word forms; prompt on <b>positive</b> ]
<b>2</b>	This common type of problem with lenses is caused by light rays near the center of the lens converging to a different point than light rays away from the center.	<b>spherical aberration</b> [prompt on <b>aberration</b> ]
<b>3</b>	This unit equal to an inverse meter is used to measure the strength of a lens.	<b>diopeters</b> [DY-ahp-tur(s)]

**Question #10: Science – Physics**

*10 points per part*

Calculations are sometimes simplified by assuming that an object exists entirely at this point.		
<b>1</b>	Name this point which, for objects of uniform density, is the same as the centroid.	<b>center of mass</b> [accept <b>center of gravity</b> ; prompt on <b>CM</b> or <b>CG</b> ]
<b>2</b>	This value is divided by mass to find the center of mass. This value equals mass times position added up for every point of an object.	first <b>moment</b>
<b>3</b>	If the moment of inertia about an axis through the center of mass of an object is known, this formula can be used to find the moment of inertia around a different rotation axis with a namesake property relative to the original axis.	<b>parallel axis</b> theorem [or <b>Huygens-Steiner</b> theorem]



**Question #11: Literature – World Literature**

10 points per part

This playwright won a contest in <b>Aristophanes'</b> [air-iss-TAH-fuh-neeZ'] <i>The Frogs</i> .		
<b>1</b>	Name this Greek tragedian credited with introducing a second actor to the stage to better depict conflict.	<b><u>Aeschylus</u></b> [ESS-kuh-luss]
<b>2</b>	Aeschylus authored this trilogy, in which the children of <b>Agamemnon</b> [aa-guh-MEM-nahn] avenge his death at the hands of <b>Clytemnestra</b> [kly-tim-NESS-truh] and <b>Aegisthus</b> [uh-JISS-thus], and are then pursued by the Furies.	<b><u>Oresteia</u></b> [as a combined answer, accept <b><u>Agamemnon</u></b> , <i>The <u>Libation Bearers</u></i> (or <b><u>Choephoroi</u></b> ), and <i>The <u>Eumenides</u></i> ]
<b>3</b>	In <i>Seven Against Thebes</i> , this character was struck by Zeus with a bolt of lightning for comparing it to the midday sun.	<b><u>Capaneus</u></b> [kuh-PAA-nee-uss]

**Question #12: Literature – World Literature**

10 points per part

Before departing Ossenburger Hall, Holden Caulfield read this novel.		
<b>1</b>	Name this autobiographical novel set on a coffee plantation that took its title from a Latin quote describing “always something new.”	<b><u>Out of Africa</u></b>
<b>2</b>	This author of “Seven Gothic Tales” resumed her writing career after returning to Denmark following the experiences she wrote about in <i>Out of Africa</i> .	Isak <b><u>Dinesen</u></b> [or Karen von <b><u>Blixen</u></b> -Finecke]
<b>3</b>	Most of the plot of <i>Out of Africa</i> is set in this former British colony. In the novel, Dinesen described her interactions with the <b>Kikuyu</b> [kih-KOO-yoo] and <b>Masai</b> [MAH-sy] locals.	Republic of <b><u>Kenya</u></b>



### Question #13: Math – Probability

10 points per part

Some classic probability problems are based on a scenario in which balls are pulled out of this type of container.		
1	Name this type of container sometimes used for holding ashes.	<u>urns</u>
2	If there are five white balls and five black balls in an urn, and two of them are selected randomly without replacement, what is the probability of selecting a white ball and then a black ball?	<u>5/18</u> [or <u>0.27 repeating</u> ]
3	If there are five white balls and five black balls in an urn, and two of them are selected randomly with replacement, what is the probability of selecting a white ball and then a black ball?	<u>1/4</u> [or <u>0.25</u> ]

### Question #14: Math – Probability

10 points per part

This concept is very similar to arithmetic mean, though it is typically based on theoretical probabilities rather than experimental results.		
1	Name this concept calculated by adding the product of each result with its predicted probability.	<u>expected value</u> [or <u>expectation</u> or <u>first moment</u> ; accept <u>EV</u> ]
2	A person places a bet that costs one dollar. There is a ten percent chance that the person will get the dollar back and an additional fifty dollars, and there is a ninety percent chance that the person will lose the dollar. What is the expected value of one such bet?	<u>\$4.10</u>
3	If you roll several dice, what is the expected value of the arithmetic mean of the dice?	<u>3.5</u> [or <u>3½</u> or <u>7/2</u> ]



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

10 points

<p>This person was the mother of the girl who became Susanna Cole after this woman and many of her children were killed during Kieft's War by Siwanoy Native Americans. This person supported her brother-in-law John Wheelwright in a controversy over whether God's covenant was due to works or grace. Though she was supported by Governor Henry Vane, this woman was banned from Massachusetts during the Antinomian ["anti"-NOH-mee-un] Controversy. Name this woman who, following the encouragement of Roger Williams, moved to Rhode Island.</p>	<p>Anne <u>Hutchinson</u> [or Anne <u>Marbury</u>]</p>
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**Question #16: Science – Astronomy**

10 points

<p>The sphere named for this person, also known as the Hill sphere, is the volume in which a given object has the most gravitational pull. In the case of a binary system, the shape over which a given object has the most pull is not spherical, so the region is known as this person's lobe. A value named for this person is calculated by multiplying the cube root of two times the radius of a moon times the mass ratio of a planet to its moon. That value is used to determine whether the moon will remain solid or break up into rings. Identify this scientist who is the namesake of a limit.</p>	<p>Édouard <u>Roche</u> [ayd-war rohsh]</p>
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**Question #17: Fine Arts – Classical/Opera**

10 points

This composer's first opera included material that was reused in his *Vespers of the Sacred Virgin*. His second opera is lost other than the lament of the title character, *L'Arianna* [lar-ee-AH-nah]. One of his operas features a plea to Caronte [kar-OHN-tay] to let the title character enter Hades [HAY-deez], the aria "Possente spirito" [poh-SEN-tay SPEE-ree-toh]. Another of his operas focuses on Penelope's husband returning to fight off her suitors. This composer of *The Return of Ulysses* wrote a historical drama in which Nerone [nair-OH-nay] is convinced to make his lover Empress. Name this composer of the operas *The Coronation of Poppaea* [poh-PAY-uh] and *Orfeo* [or-FAY-oh].

Claudio Monteverdi

**Question #18: Literature – World Literature**

10 points

This work's opening section described the fruitless worship of Apollin [ah-poh-lan] and Mahnoud by King Marsil. During a trial in this story, Pinabel's demand of trial by combat led to the accused being torn limb from limb, and a number of his relatives hung. That trial in this "chanson de geste" [shahn-saw day zhest] stemmed from the betrayal by Ganelon which led to the battle of Roncevaux [rohn-seh-voh] pass, where the title character blew his horn until his head exploded. Name this epic poem about a soldier of Charlemagne.

"The Song of Roland" [or "La Chanson de Roland"]



### Question #19: Social Studies – Economics

10 points

<p>This document's anti-dumping provision calls for a ten-citizen panel to hear appeals of decisions reached by the Court of International Trade. Ethyl Corporation cited Chapter 11 of this agreement in a lawsuit regarding a ban on MMT. Ross Perot derided the "giant sucking sound" he alleged that it would create. Name this treaty that eliminated trade restrictions between Canada, the United States, and Mexico.</p>	<p><u>NAFTA</u> [accept <u>North American Free Trade Agreement</u>]</p>
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### Question #20: Science – Chemistry

10 points

<p>This class of compounds includes common solvents in Grignard [GREEN-yard] reactions. The best known example of a compound in this class is made by distilling sulfuric [sul-FYOOR-ik] acid and ethyl alcohol. Cyclic examples of these compounds are epoxides [ep-AHK-"sides"]. These compounds generally have two functional groups attached to an oxygen atom, and the best known example has two ethyl groups. Name this chemical used in 1846 in Boston before a tumor was removed from a patient's neck, which led to it temporarily becoming a common anesthetic.</p>	<p><u>ethers</u> [or <u>diethyl ether</u>]</p>
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**Question #21: Fine Arts – Art History**

10 points per part

This structure is located in the Jefferson National Expansion Memorial, and is the tallest building in Missouri.		
1	Name this large steel-encased catenary ["CAT"-ih-nair-ee] shaped building overlooking the Mississippi River in St. Louis.	The <b>Gateway Arch</b> [prompt on <b>Arch</b> ]
2	This architect designed the Gateway Arch, as well as the Tulip Chair for the Knoll furniture company.	Eero <b>Saarinen</b> [AIR-oh SAH-rih-nen]
3	Saarinen designed the flight center at John F. Kennedy International Airport for this airline, which was owned by Howard Hughes.	<b>TWA</b> [or <b>Trans-World Airlines</b> ]

**Question #22: Fine Arts – Art History**

10 points per part

This movement's manifesto was written by Tristan Tzara, who frequented the Cabaret Voltaire in Zurich.		
1	Name this art movement that often exhibited common objects given artistic names as "readymades." This movement may take its name from a word for "Hobbyhorse."	<b>Dadaism</b> [or <b>Dadaist</b> ]
2	This dada artist created the readymade <i>Fountain</i> , which is simply a urinal turned on its side. He also painted two works called <i>Nude Descending a Staircase</i> .	Marcel <b>Duchamp</b> [doo-sham]
3	This photographer and painter was in the same social circle as many Dadaists. He photographed a woman's back and placed f-holes on it to resemble a violin in <i>Le violon d'Ingres</i> [lay vee-oh-lohn dahng-ruh].	<b>Man Ray</b> [or Emmanuel <b>Radnitzky</b> ]



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

*10 points per part*

Legend has it that President James Polk set four goals for his presidency and achieved them all in a single term.		
<b>1</b>	Name the cabinet-level department that had an independent system re-established under Polk so that government funds would not have to go through private or state banks.	<u>treasury</u>
<b>2</b>	This Polk Treasury Secretary became the namesake of a new lower tariff in 1846.	Robert <u>Walker</u>
<b>3</b>	Despite the call by some Americans to settle the Oregon boundary dispute at 54 degrees 40 minutes latitude, Polk settled the boundary at this line of latitude. This line is now the southern boundary of four Canadian provinces.	<u>49<sup>th</sup></u> degrees north latitude [or <u>49<sup>th</sup></u> parallel]

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

*10 points per part*

The first African-American to hold this cabinet position, Ron Brown, died in a plane crash in Croatia.		
<b>1</b>	Name this position concerned with American business, currently held by Penny Pritzker.	Secretary of <u>Commerce</u>
<b>2</b>	This person served as Secretary of Commerce under Harding and Coolidge shortly before becoming president.	Herbert <u>Hoover</u>
<b>3</b>	This close aide to Franklin Roosevelt who headed the Works Progress Administration served as Secretary of Commerce from 1938 to 1940.	Harry <u>Hopkins</u>



### Question #25: Science – Chemistry

10 points per part

Beginning in the first decade of the 20 <sup>th</sup> century, it became very common to use this element in light bulb filaments.		
1	Name this element extracted from <b>wolframite</b> [WUL-frum-ite].	<b><u>tungsten</u></b>
2	Tungsten is also extracted from a mineral named for this Swedish scientist who discovered oxygen before Joseph Priestley, though Priestley is often given credit.	Carl Wilhelm <b><u>Scheele</u></b> [SHAY-luh]
3	Tungsten is often combined with this element to make drills and other pieces that require stiffness and hardness.	<b><u>carbon</u></b>

### Question #26: Science – Chemistry

10 points per part

Rosalind Franklin's work in this field led to the discovery of the structure of DNA.		
1	Name this field that often employs X-rays to find the structures of solids that are not amorphous.	X-ray <b><u>crystallography</u></b> [“crystal”-AH-gruh-fee] [accept <b><u>crystallographer</u></b> ]
2	Crystals can be classified as having the primitive, body-centered, or face-centered structures named for this shape.	<b><u>cube</u></b> [accept <b><u>cubic</u></b> ]
3	This law used to find the distance between crystal lattices states that an integer times wavelength equals twice the space between crystal planes times the sine of the incident angle.	<b><u>Bragg's law</u></b>



**Question #27: Literature – U.S. Literature**

10 points per part

An eye operation serves as a turning point in this story, in which the patient ends up dying.		
<b>1</b>	This tale sees Laurel Hand read Dickens to her father, Judge McKelva, when not feuding with her stepmother, Fay.	<i>The <u>Optimist's Daughter</u></i>
<b>2</b>	This Mississippian and author of <i>The Optimist's Daughter</i> wrote of a narrator who refused to listen to the stories Stella-Rondo told of Mr. Whitaker in "Why I Live at the P.O."	Eudora Alice <u>Welty</u>
<b>3</b>	This Eudora Welty short story sees Phoenix Jackson travel during the winter to procure medicine for her grandson, who had swallowed lye.	"A <u>Worn Path</u> "

**Question #28: Literature – U.S. Literature**

10 points per part

The protagonist of this novel steals the electricity he uses to simultaneously burn 1,369 light bulbs.		
<b>1</b>	Name this novel in which the protagonist is forced to fight blindfolded to win a scholarship. After being expelled, he joins the Brotherhood and meets Ras the Exhorter.	<i><u>Invisible Man</u></i> [do not accept "The Invisible Man"]
<b>2</b>	This author of <i>Invisible Man</i> described African-American life as "a discipline teaching its own insights into the human condition" in "The World and the Jug."	Ralph Waldo <u>Ellison</u>
<b>3</b>	This Ellison novel concerns the life a man, raised by a black Baptist minister, who grew up to become a race-baiting politician. It was posthumously published, and later re-edited and re-published as <i>Three Days Before the Shooting</i> .	<i><u>Juneteenth</u></i>



**Question #29: Math – Math Concepts**

*10 points*

The field of statistics named for this person can be justified by Cox's postulates, which begin by defining certain truth and certain falsehood. That area of statistics uses prior probability distributions and is contrasted with frequentism ["frequent"-izm]. In his system, posterior probabilities are found by using this person's namesake formula, which is based on his attempt to solve an inverse probability problem. Name this mathematician who used the ratio of two probabilities to find the probability of one event given that another occurs, called the conditional probability.

Thomas **Bayes** [prompt on **Bayesian**]

**Question #30: Social Studies – World History**

*10 points*

Wounded during his father's capture of Ceuta [SOO-tah], this leader had the ultimate goal of finding the kingdom of Prester John. Slavery was introduced to this man's country by one of his captains, Antam Goncalves [gon-KAHL-vays]. Gil Eanes [ay-AH-nays] was the first of his captains to sail past Cape Bojador [boe-HAH-dor]. This founder of the School of Sagres [SAH-grays] sponsored ships that explored much of the West African coast, reaching what is now Liberia before his death in 1460. Name this Portuguese prince and explorer.

Prince **Henry the Navigator** [accept Infante Dom **Henrique de Avis**, Duke of Viseu]



**Question #31: Science – Physics**

10 points

An effect named for this type of material involves the creation of electric current during phase transitions. The relative **permittivity** [per-mih-TIV-ih-tee] of a material is sometimes named for this type of substance, the strength of which is measured in units of potential difference per length. The type of breakdown named for these materials can be viewed as an electric arc and leads to a sudden decrease in resistance. Name these insulating materials that weaken electric fields in order to increase **capacitance** [kuh-PASS-ih-tinss].

dielectrics [“die”-“electric(s)”]

**Question #32: Literature – British Literature**

10 points

The villain in this drama outlines how he would rather be a canker in a hedge than a rose in the grace of his brother. In this play, **Borachio** [bor-AH-kee-oh] offers to woo Mary on behalf of Don John, who sought to undermine the efforts of Don Pedro. Much of this work takes place in and around the house of the Governor of Messina, Leonato. Name this Shakespeare play that concludes with the marriages of Claudio and Hero, and Beatrice and Benedick.

*Much Ado About Nothing*



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

*10 points*

<p>This person was the last Confederate Secretary of War, escaping to Cuba after Jefferson Davis was captured. He was expelled by the U.S. Senate and labelled a traitor by unanimous vote after he joined the Confederate Army. He served as vice president under James Buchanan. Joe Lane ran on a ticket with this politician after the Fire-Eaters staged a walkout of the Democratic Convention. Name this candidate who carried eleven states in the Election of 1860 for the Southern Democrats.</p>	<p>John Cabell <u>Breckinridge</u></p>
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**Extra Question #2: Math – Math Concepts**

*10 points*

<p>A concept named for this person integrates the product of a function with e raised to the power of the quantity i times two pi multiplied by frequency multiplied by time. That operation transforms a function from the time domain to the frequency domain, and is used to find a type of function based on the orthonormal relationships between sine and cosine functions with integer horizontal compressions. Name this French scientist whose namesake series of sine and cosine functions are used to approximate periodic functions.</p>	<p>Joseph <u>Fourier</u> [fur-yay]</p>
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**Extra Question #3: Fine Arts – Art History**

10 points

<p>This man took as an assistant a freed, partially black slave named Juan <b>de Pareja</b> [day par-AY-hah], whom he painted a portrait of. This artist showed the head of the Catholic Church in a red hat and vest, wearing a white gown, in his <i>Portrait of Pope Innocent X</i>. This man showed a dog lying down next to a dwarf in one work, where he includes himself behind the canvas, painting the Infanta Margarita. Name this Spanish court artist to Philip IV, who painted <i>Las Meninas</i>.</p>	<p>Diego Rodriguez de Silva y <b>Velásquez</b> [dee-AY-goh veh-LAHSS-kez]</p>
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**Extra Question #4: Science – Physics**

10 points

<p>This scientist is the namesake of two-body problems involving only gravity. The six orbital elements, or parameters, are also named for this person. This person's namesake equation finds the mean anomaly, which is proportional to the area swept out by a line connecting a source of gravity to the object it is impacting. This person's law of periods states that the square of orbital period varies directly with the cube of the orbit's semi-major axis length. Name this scientist who also stated that planets move in elliptical orbits as part of his three laws of planetary motion.</p>	<p>Johannes <b>Kepler</b></p>
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**Extra Question #5: Literature – U.S. Literature**

*10 points*

In this novel, love is said to connect “the land of the living and the land of the dead” and is described as “the only survival, the only meaning.” That observation is made by the Abbess of the Convent of Santa Maria Rosa de las Rosas. The protagonist of this book sought to prove God’s plan for a group of victims, which included the **Marquesa de Montemayor** [mar-KAY-sah day mohn-tay-my-OR]. Name this novel about Brother Juniper’s quest following the collapse of the title structure, by Thornton Wilder.

*The Bridge of San Luis Rey*



**Extra Question #6: Math – Geometry**

*10 points per part*

According to Napoleon’s theorem, building these types of triangles on top of an original triangle creates another one of these triangles when you connect the centers.	
<b>1</b>	Name this type of triangle that has three congruent sides and three congruent angles. <b><u>equilateral</u></b> triangle [accept <b><u>equiangular</u></b> triangle or <b><u>regular</u></b> triangle]
<b>2</b>	This is the ratio of the length of a median of an equilateral triangle divided by the length of a side of an equilateral triangle. <b><u>Root 3 over 2</u></b> [or <b><u>one-half root 3</u></b> or equivalents]
<b>3</b>	This is the ratio of the distance from a vertex of an equilateral triangle to the centroid of an equilateral triangle divided by the length of the median. <b><u>2/3</u></b> [or <b><u>0.6 repeating</u></b> ]

**Extra Question #7: Math – Geometry**

*10 points per part*

In two dimensions, a circle has a radius of length six units, and another point, Point P, is located ten units from the center of the circle.	
<b>1</b>	Find the distance from the nearest point on the circle to Point P. Ignore units. <b><u>4</u></b> units
<b>2</b>	Give the name of a line that intersects a circle at two points. This type of line can be contrasted with a tangent line, since this line intersects a circle twice while a tangent line intersects it only once. <b><u>secant</u></b> [SEE-kant] line
<b>3</b>	If a tangent line is drawn from Point P, find the length of the segment from Point P to the point where the tangent line touches the circle. Remember that the circle has a radius of four, and Point P is ten units from the center of the circle. Give your answer in simple radical form. <b><u>2 root 10</u></b> [or <b><u>2</u></b> times <b><u>the square root of 10</u></b> or <b><u>2 radical 10</u></b> or equivalents]



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

10 points per part

This former resident of the House of Hwang refused medical care at her death, citing the land that could be bought with the money.		
1	Name this woman who was eventually supplanted by Lotus, but continued to provide for her children and household.	<u>O-Lan</u>
2	O-Lan and her husband Wang Lung are the central couple of this novel set in China.	<i>The <u>Good Earth</u></i>
3	<i>The Good Earth</i> was penned by this author, who wrote about her missionary parents in <i>The Exile and Fighting Angel</i> .	Pearl Sydenstricker <u>Buck</u> Sedges [or <u>Sai</u> Zhenzhu]

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

10 points per part

Identify these John Steinbeck novels.		
1	In this novel that takes its title from a Robert Burns poem, George Milton is the primary guardian of Lennie Small.	<u><i>Of Mice and Men</i></u>
2	In this novel, Samuel Hamilton and Adam Trask discuss the story of Cain and Abel.	<u><i>East of Eden</i></u>
3	This novel is named for a gift from Carl Tiflin to his son Jody.	<i>The <u>Red Pony</u></i>



### Question #1: Social Studies – Religion

10 points

In Temple times, twelve of these items were displayed on a special table. On Shabbat, a cloth cover is laid over these items to avoid “embarrassing” them because the candles and wine are blessed before the *motsi* [MOHT-see] is recited over two of these objects. On Passover, the normal form of this kind of food is replaced by matzah. Name this kind of food exemplified by *challah* [HAH-lah].

loaves of **bread** [accept **loaf**/ves; accept **showbread** before “embarrassing”; accept **challah** before the end]

### Question #2: Science – Chemistry

10 points

The natural log of the ratio of two values of this quantity is found using the Kelvin equation, which is used to determine the fates of water droplets. This quantity varies exponentially with temperature for all substances. The equation that finds the total amount of this quantity has the same form as Dalton’s partial pressure law, but it is used on an ideal mixture of liquids. This subject of *Raoult’s* [rah-ool’z] law is one of the four *colligative* [kuh-LIG-uh-tiv] properties. Name this quantity related to the rate at which liquids turn into gases, equal to the atmospheric pressure at the boiling point.

**vapor pressure**



**Question #3: Language Arts – Grammar/Usage**

10 points

In Italian, this mood is often preceded by the word **che** [kay] and expressed with the suffix **-ino** [ee-noe]. The **jussive** [JUSS-iv] form of this mood in English uses the word “let.” In Spanish, third-person verb conjugations in this mood are the same as in the imperative. It is used to indicate the speaker’s emotion or opinion regarding the topic. In English, it mainly occurs in dependent clauses. Name this mood used for hypotheticals, contrasted with the indicative mood.

subjunctive mood [accept  
conjunctive]

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

10 points

When Wallace White was Senate Majority Leader, he often told reporters to ask this other senator for information, and this man briefly became Majority Leader before he died in 1953. This senator was praised in John Kennedy’s *Profiles in Courage* for criticizing the Nuremberg Trials. As chair of the Senate Labor Committee, he was able to override a presidential veto to weaken the Wagner Act and the labor movement in a bill named for him and Fred Hartley. Name this politician nicknamed “Mr. Republican”, who opposed U.S. entry into World War II, and who was the son of a president and Supreme Court Chief Justice.

Robert Taft [prompt on Taft]



**Question #5: Miscellaneous – Technology**

*10 points*

WaveLAN was an immediate precursor to this technology. The WEP protocol was developed to encrypt it, but was superseded by WPA. Utilizing the IEEE 802.11 standards, many devices connect to it through network access points, or hotspots. Name this technology utilized in connecting to the internet without physical cables.

**Wi-Fi** [prompt on **wireless** networking or **WLAN** or similar answers containing **wireless**; do not prompt on answers that contain “networking” without an indication of wirelessness]

**Question #6: Science – Health**

*10 points*

This disease can be prevented by the 17-D vaccine, which was developed by Max **Theiler** [“**Taylor**”]. The virus that causes this disease was the first **arbovirus** [AR-boh-“virus”] discovered, and this disease is spread by the same mosquito that spreads both **chikungunya** [“chicken”-GUN-yuh] and **dengue** [DAYN-ghee] fever. While 85% of patients recover after its acute phase, the others enter a toxic phase that can cause severe liver damage. Travelers to Asia are vaccinated against this disease though it does not occur there, and there are many cases in Africa and Latin America. Name this disease whose name comes from the **jaundice** [JAWN-diss] it causes.

**yellow fever** [or **yellow jack** or **yellow plague**]



### Question #7: Math – Algebra

10 points per part

Examples of these systems include binary, in which this number is two, and hexadecimal, in which this number is sixteen.		
<b>1</b>	Identify these systems which are named for how many digits are used. Powers of that number are used to determine place values.	<b>bases</b> [or <b>radix</b> /ces]
<b>2</b>	In the decimal system, the third number from the right has a place value of one hundred. What is the place value of the third number from the right in hexadecimal?	<b>256</b>
<b>3</b>	Convert the number one two three in hexadecimal to an equivalent decimal number.	<b>291</b>

### Question #8: Math – Algebra

10 points per part

Consider the graph of $y$ equals $x$ raised to the third power.		
<b>1</b>	Which function is the inverse of that function?	$y$ equals <b><math>x</math> to the one-third power</b> [or $y$ equals the <b>cube root of <math>x</math></b> ; ]
<b>2</b>	How many points of intersection are there between the two graphs $y$ equals $x$ cubed and $y$ equals the cube root of $x$ ?	<b>3</b> points
<b>3</b>	Find the area between the graph of $y$ equals $x$ cubed and the $x$ -axis between $x$ equals zero and $x$ equals one.	<b><math>\frac{1}{4}</math></b> [or <b>0.25</b> ]



**Question #9: Fine Arts – Jazz**

10 points per part

This man’s ensemble gained prominence due to their bookings at the Cotton Club, and his songs include “Mood Indigo” and “Sophisticated Lady.”	
<b>1</b>	Name this bandleader who wrote the song “It Don’t Mean a Thing (If It Ain’t Got That Swing)”. Edward Kennedy “Duke” <b><u>Ellington</u></b>
<b>2</b>	Duke Ellington’s orchestra signature song was this piece by Billy Strayhorn, which is titled after the directions to get to Harlem. “ <b><u>Take the ‘A’ Train</u></b> ”
<b>3</b>	One version of “Take the ‘A’ Train” was recorded by Ellington with this singer, a frequent collaborator who had earlier success with her song “A-Tisket, A-Tasket.” Ella Jane <b><u>Fitzgerald</u></b>

**Question #10: Fine Arts – Jazz**

10 points per part

This man made a shift from “cool jazz” to “jazz fusion” that can be seen on his album <i>In A Silent Way</i> .	
<b>1</b>	Name this jazz trumpeter who had two “Great Quintets” that included John Coltrane in the first and Chick Corea in the second. He released <i>The Birth of the Cool</i> and the song “So What?” Miles <b><u>Davis</u></b>
<b>2</b>	Chick Corea replaced this pianist in Davis’s second Great Quintet. This man’s later efforts included the album <i>Head Hunters</i> , which includes the track “Chameleon,” and he also performed “Cantaloupe Island.” Herbie <b><u>Hancock</u></b>
<b>3</b>	Jimmy Cobb played this instrument in Davis’s first quintet. His “kit” often had other kinds of instruments like woodblocks and cowbells attached. <b><u>drums</u></b> [or <b><u>drum</u></b> set or <b><u>drum</u></b> kit or <b><u>traps</u></b> or <b><u>trap</u></b> set or <b><u>trap</u></b> kit; accept <b><u>percussion</u></b> ]



### Question #11: Science – Chemistry

10 points per part

Water is sometimes called a “universal” example of this substance.		
1	Name this substance that dissolves a <b>solute</b> [SAHL-yoot].	<b><u>solvent</u></b>
2	This chemical, the simplest <b>ketone</b> [“key-tone”], is often used as a solvent, such as when it is used as a paint thinner or nail polish remover.	<b><u>acetone</u></b> [“ASS”-ih-“tone”] [or <b><u>propanone</u></b> [PROH-puh-nohn]]
3	This chemical is able to dissolve paint thinners. One name for this compound is <b>methylbenzene</b> [METH-ill-BEN-zeen], since it consists of a benzene molecule with one hydrogen atom replaced by a methyl group.	<b><u>toluene</u></b> [TAHL-yoo-eeen] [or <b><u>toluol</u></b> ]

### Question #12: Science – Chemistry

10 points per part

The <b>Geiger</b> [“GUY”-gur]-Marsden experiment is also known as this person’s gold foil experiment.		
1	Name this scientist who studied the scattering of alpha particles to determine that atoms have a nucleus.	Ernest <b><u>Rutherford</u></b> , 1 <sup>st</sup> Baron Rutherford of Nelson
2	Rutherford’s atomic model replaced the plum pudding model put forward by this person who discovered the electron.	Sir Joseph John “JJ” <b><u>Thomson</u></b>
3	These two German scientists later studied collisions between electrons and mercury vapor, finding that electrons that lost energy always lost a multiple of 4.9 electron volts.	James <b><u>Franck</u></b> and Gustav <b><u>Hertz</u></b> [either order]



**Question #13: Social Studies – World History**

10 points per part

The colloquial name for this rebellion came from the nickname for the state corps.		
1	Name this uprising in which George Johnston and John MacArthur overthrew the governor of a colony, only for Lachlan Macquarie [LAAK-lun muh-KWAR-ee] to have the two men arrested.	<b><u>Rum Rebellion</u></b>
2	The Rum Rebellion led to turmoil in this country’s state of New South Wales.	Commonwealth of <b><u>Australia</u></b>
3	This deposed governor hid under his bed before being arrested. Earlier, he had been the target of a mutiny led by Fletcher Christian as captain of the <i>HMS Bounty</i> .	William <b><u>Bligh</u></b> [bly]

**Question #14: Social Studies – World History**

10 points per part

This incident was a response to protests against laws mandating that minorities carry around documentation, and its victims had been shouting the slogans “Our Land,” and “Forward to Independence.”		
1	Name this slaughter of unarmed civilians by police. It resulted in two opposition political parties forming military arms, Poqo [POH-koh] and Umkhonto we Sizwe [oom-KOHN-toh way SEEZ-way].	<b><u>Sharpeville</u></b> Massacre
2	The Sharpeville Massacre took place in the Transvaal province of this country.	Republic of <b><u>South Africa</u></b>
3	These laws, a key component of apartheid [“apart-hate”], mandated that minorities carry documentation when not in their homeland or designated area.	<b><u>pass</u></b> laws



**Question #15: Math – Math Concepts**

10 points

Games notable for not following the game theory version of this property include Efron's dice, Penney's game, and rock-paper-scissors. This property is also lacking from cyclic voting situations, and Arrow's impossibility theorem states that systems cannot have both completeness and this property. The reflexive property, symmetric property, and this property define equivalence relations, and this property also applies to inequalities. Name this property stating that if  $x$  is less than  $y$ , and  $y$  is less than  $z$ , then  $x$  is less than  $z$ .

transitive property [or transitivity]

**Question #16: Literature – U.S. Literature**

10 points

A turning point in this novel is a performance of "Under the Gaslight" at a local Elks club. Subsequent events in this work lead to a patron embezzling money from Fitzgerald and Moy's before fleeing to Montreal. The protagonist of this novel is convinced to move in with a traveling salesman after being slipped two ten-dollar bills, but Charles **Drouet** [droo-ay] ends up cuckolded. Gas in a hotel room ended up taking the life of the fallen George Hurstwood in this novel. Name this novel by Theodore **Dreiser** [DRY-zur] about Caroline Meeber.

Sister Carrie



**Question #17: Fine Arts – Art History**

10 points

He painted **Athena** [uh-THEE-nuh] standing next to an axe, seizing the hair of a half-horse, half-man in his *Pallas and the Centaur*. This painter showed three angels on the roof of the stable where Jesus is born in *The Mystical Nativity*, painted after he became a follower of **Savonarola** [suh-vah-nuh-ROH-luh]. This artist showed Venus standing underneath a **putto** [POOT-toh], standing next to a woman crowned in flowers, wearing a flower-patterned dress. One of his paintings shows Zephyr blowing to shore a goddess standing on a shell. Name this painter of *Primavera* and *The Birth of Venus*.

Sandro **Botticelli** [or Allesandro di Mariano di Vanni **Filipepi**]

**Question #18: Science – Physics**

10 points

Inside this type of material, **Coulomb** [koo-lohm] collisions resulting in temporarily hyperbolic paths are common. As with electrolytes, the **Debye** [duh-BYE] length is used to determine the volumes affected by charges in this substance. Two methods used to control the temperature of this substance are inertial confinement and magnetic confinement. This substance makes up the solar wind, and a channel of this substance is created by lightning. This substance is created by the electrical breakdown of liquids and gases, separating the electrons from the molecules. Name this “fourth state of matter”.

**plasma**



**Question #19: Literature – Mythology**

*10 points*

Once this event's outcome was sealed, its perpetrator fled to Franag's Falls, but was caught in the form of a salmon by Thor. Following this event, Hermod rode for eight days and nights to reach **Helheim** [HELL-hyme] in order to reverse it. Immediately prior to it, an oath was sworn by all living things save mistletoe. It was unwittingly perpetrated by **Hodur** [HOH-dur]. Name this tragedy of Norse myth, the fall of the god of light.

**death** of **Baldur** ["balder"]  
[accept logical equivalents]

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

*10 points*

Joseph Stack flew a plane into one of this organization's field offices in Austin, Texas in 2010. A reform of this organization in 1998 shifted the burden of proof onto it. John Koskinen became the head of this organization in 2013, and recent leaders have been criticized for the inability to find emails sent by its recent Director of Exempt Organizations Lois Lerner. Name this arm of the Treasury Department responsible for collecting taxes.

**Internal Revenue Service** [accept **IRS**; prompt on **Treasury** Department before it is mentioned]



**Question #21: Science – Biology**

10 points per part

Ribosomes are created inside this structure.		
1	Name this prominent feature inside a cell nucleus.	<u>nucleolus</u> [nook-lee-OH-luss]
2	A <b>karyosome</b> [“carry”-oh-sohm], which is made of this substance, is sometimes called a false nucleolus. This substance includes <b>nucleic</b> [noo-KLAY-ik] acids and the proteins called <b>histones</b> [HISS-tohnz] that package them.	<u>chromatin</u> [KROH-muh-tin]
3	These sub-organelles named for a Spanish scientist are attached to the nucleolus by coilin.	<u>Cajal</u> [kah-HAHL] bodies

**Question #22: Science – Biology**

10 points per part

This technique was developed by Kary Mullis.		
1	Name this process that makes many copies of a piece of DNA.	<u>PCR</u> [or <u>polymerase chain reaction</u> ]
2	This DNA <b>polymerase</b> [puh-LIM-ur-“ace”] taken from a bacteria that lives at warm temperatures is commonly used in PCR.	<u>Taq</u> polymerase
3	This step, also called DNA melting, takes place when the DNA is heated. It separates the DNA into single strands.	<u>denaturation</u> [dee-“nature”-AY-shun] [accept word forms]



**Question #23: Literature – U.S. Literature**

10 points per part

Being breastfed during childhood led to the nickname “Milkman” for Macon Dead III in this novel.		
1	Name this novel whose Biblical references include the names of Macon’s sisters, First Corinthians and “Magdalena called Lena.”	<u>Song of Solomon</u>
2	<i>Song of Solomon</i> was written by this author, who wrote about <b>Sethe</b> [SETH-uh] saving one of her children from slavery in <i>Beloved</i> .	Toni <b>Morrison</b> [accept Chloe Ardelia <b>Wofford</b> ]
3	This other Toni Morrison novel sees Violet Trace knife the corpse of Dorcas, who was killed by Joe, her lover and Violet’s husband.	<u>Jazz</u>

**Question #24: Literature – U.S. Literature**

10 points per part

The “Restored” version of this novel features Willie Talos as the Boss.		
1	Name this novel in which political reporter Jack Burden becomes the right-hand man of a politician nicknamed “the Boss.”	<u>All the King’s Men</u>
2	<i>All the King’s Men</i> is by this founder of the <i>Southern Review</i> .	Robert Penn <b>Warren</b>
3	In <i>All the King’s Men</i> , this two-word phrase, inspired by an old man Jack picked up, is used to refer to his impromptu journey to California following his discovery that Willie had been sleeping with Anne Stanton.	the <u>great twitch</u>



**Question #25: Social Studies – Economics**

*10 points per part*

A study by Edward Prescott provided support to the idea that pursuing this economic policy would impact long-term labor supply.		
1	Name this economic theory that posits that lowering the marginal tax rate increases economic activity, as eventually the extra income spreads throughout the economy. During the 1980 Presidential campaign, George H.W. Bush called it “voodoo economics.”	<u>supply-side</u> economics [prompt on <u>Reaganomics</u> ]
2	A key component of supply-side economics is this curve, which plots the overall tax rate against tax revenue.	<u>Laffer</u> curve
3	In 1996, Steve Forbes’ presidential platform included this kind of tax on income. Herman Cain’s presidential platform during the 2012 campaign also featured one, but at 9% instead of 17%.	<u>flat</u> tax

**Question #26: Social Studies – Economics**

*10 points per part*

Refundable deposits and emissions standards are common ways to correct for these actions.		
1	Name these actions that are not directly accounted for in market prices, but nonetheless impact consumers and producers.	<u>externality</u> /ies
2	This British economist developed the concept of taxes and subsidies on market players in order to induce positive externalities and correct for negative ones.	Arthur Cecil <u>Pigou</u> [pih-GOH] [accept <u>Pigouvian</u> taxes/subsidies]
3	Pigouvian taxes are commonly used to regulate the consumption of these non-rival, non-exclusive goods, such as water and paved roads.	<u>public</u> goods



**Question #27: Math – Analytical Geometry**

*10 points per part*

This coordinate system uses the two coordinates from the polar system and also a $z$ -coordinate.		
<b>1</b>	Name this three-dimensional system.	<u><b>cylindrical</b></u> coordinate system
<b>2</b>	In cylindrical coordinates, the graph of $z$ equals $r$ squared has this shape.	circular <u><b>paraboloid</b></u> [do not accept “parabola”]
<b>3</b>	Find the area of the two-dimensional shape inside the intersection of the equations $z$ equals $r$ squared and $z$ equals nine.	<u><b>9 pi</b></u> [do not accept partial answer]

**Question #28: Math – Analytical Geometry**

*10 points per part*

These quantities for vectors can also be called coordinates.		
<b>1</b>	Name these quantities used to specify vectors that are equal to the vector’s projections onto the axes.	<u><b>components</b></u>
<b>2</b>	This two-word trigonometric phrase is used to represent the orientation of a vector and is calculated by dividing a vector component by the vector magnitude.	<u><b>direction cosines</b></u>
<b>3</b>	For any vector, what is the sum of the squares of the direction cosines?	<u><b>1</b></u>



**Question #29: Literature – British Literature**

10 points

<p>A landlord in this novel dies of spontaneous human combustion. A former Army officer, who died of an opium overdose, assumed the pseudonym “Nemo” while working as a copier. Nemo’s illegitimate daughter with Lady Dedlock later married Dr. Allan Woodcourt in this novel. It lampoons the legal system via the court case <i>Jarndyce v Jarndyce</i>. Name this Charles Dickens novel in which Esther Summerwood comes to live in the title residence.</p>	<p><u><i>Bleak House</i></u></p>
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**Question #30: Math – Math Concepts**

10 points

<p>The <b>Banach-Schauder</b> [BAH-nahk-“shouter”] theorem guarantees that certain maps have this property. Sets with this property form the basis of a topological space, in which any union of sets with this property also has this property, but only intersections of finitely many of these sets are required to have this property. These sets include a neighborhood around every point in them. This adjective can also be applied to intervals that are symbolized with parentheses. Name this adjective used for intervals that do not include their endpoints.</p>	<p><u>openness</u> [or <u>open</u> sets]</p>
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**Question #31: Social Studies – World History**

*10 points*

This person thwarted his rival Francois **Dupleix** [doo-play] and was a major reason that the English defeated the French in the Carnatic Wars. This person also got revenge against Siraj ud-**Daulah** [dah-oo-lah] after British prisoners were kept in deadly conditions. That victory at the Battle of Plassey added to the power of the British East India Company. Name this Englishman who gained control over Bengal after the Black Hole of Calcutta incident.

Robert Clive

**Question #32: Science – Biology**

*10 points*

The enzyme that plays a major role in the creation of this molecule increases activity when exposed to **cholera** [KAH-lur-uh] toxin. This molecule and a similar one containing **guanosine** [GWAH-noh-seen] are degraded by the enzyme PDE, which is inhibited by caffeine. This molecule binds to protein **kinase** [KY-nayss] A, and it is formed when G-proteins act on **adenylate cyclase** [uh-DEE-nul-ayt SYKE-“lace”]. Because this molecule acts after a neurotransmitter or hormone binds to a receptor, this is classified as a second messenger. Name this molecule containing **ribose** [RY-bohss] and **adenine** [AAD-uh-neen] that often is formed from ATP.

cyclic AMP [or cAMP or cyclic adenosine monophosphate]



**Extra Question #1: Literature – British Literature**

10 points

This novel features a peasant who leads her village in an attempt to cross the Arabian Sea. In this novel, **Mahound** [mah-hoond] is opposed by the priestess Hind and the poet Baal, who later flees to a brothel. This novel's opening features an exploding plane, which Gibreel **Farishta** [fah-REESH-tah] and Saladin Chamcha survive. Name this novel that led to Ayatollah Khomeini calling for the death of its author, Salman Rushdie.

*The Satanic Verses*

**Extra Question #2: Math – Math Concepts**

10 points

This distribution forbids simultaneous events and uses time intervals that are independent and non-overlapping. As a result, there is an exponential distribution for waiting times between events modeled by this distribution. Its mass function is the parameter raised to the  $k$  power divided by  $k$  factorial times  $e$  to the power of the opposite of the parameter; that parameter, equal to both the expected value and the variance, is traditionally symbolized lambda. Identify this distribution named for a French mathematician.

Poisson [pwah-saw(n)] distribution



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

*10 points*

<p>One left-wing party in this nation was named for the religious leader murdered following La <b>Matanza</b> [mah-TAHN-zah], <b>Farabundo Marti</b> [fah-rah-BOON-doe mahr-TEE]. The Chapultepec Peace Accords ended the civil war in this country, during which Major Roberto <b>D’Aubuisson</b> [daw-bwees-son] allegedly ordered the assassination of Oscar Romero. Following a qualifying match for the 1970 World Cup, this nation invaded its eastern neighbor, kicking off the Soccer War. Name this Central American country with capital San Salvador.</p>	<p>Republic of <b><u>El Salvador</u></b></p>
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**Extra Question #4: Science – Earth Science**

*10 points*

<p>The Kessler syndrome that could be caused by a large number of collisions in space is sometimes named for a cascade of this process. This process is sometimes used to name the heat shield around a spacecraft if it loses mass. A place named for this process is on the east coast of Alexander Island. This process names a till formed on top of a glacier. For glaciers, this process outpaces its opposite below the equilibrium line altitude, and a sudden form of this process is calving. Name this process that for a glacier is the opposite of accumulation.</p>	<p><b><u>ablation</u></b> [ab-LAY-shun] [accept word forms]</p>
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**Extra Question #5: Fine Arts – Classical/Opera**

*10 points*

In one aria, the title character of this opera begs for death because she is in love with a man who is fighting her father. A military commander in this opera meets with Ramfis to find out that their enemy has reached Thebes. This opera's arias include "Ritorna vincitor" [ree-TOR-nah VEEN-chee-tor] and "O Patria Mia" [oh PAH-tree-ah MEE-ah], sung by the heroine as she plots to escape slavery. Her master, Amneris [ahm-NAIR-ees], is betrothed to the commander, who captures Amonasro [ah-moh-NAHSS-roh]. At the end of this opera, Radamès [rah-dah-MAYSS] is sentenced to death and imprisoned with his lover in a tomb. Name this opera by Giuseppe Verdi [joo-SEP-pay VAIR-dee] about an Ethiopian princess.

Aida ["eye"-EE-dah]



**Extra Question #6: Math – Probability**

*10 points per part*

His first axiom states that any probability must be nonnegative, and he is also the namesake of the zero one law.		
<b>1</b>	Name this 20 <sup>th</sup> -century Russian mathematician who wrote <i>Foundations of Probability Theory</i> .	Andrey <b>Kolmogorov</b> [kohl-MAW-gaw-rawff]
<b>2</b>	Kolmogorov and Borel name a problem with two reasonable answers about probability on a sphere. The problem is called one of these types of statements that seems to lead to a contradiction.	<b>paradoxes</b>
<b>3</b>	According to Kolmogorov’s axioms, if there are three possible, mutually exclusive events, and two of them have probabilities of one-half and one-third, then what is the probability of the other event?	<b>1/6</b> [or <b>0.16 repeating</b> ]

**Extra Question #7: Math – Probability**

*10 points per part*

Take an initial triangle, and form a new triangle by connecting the midpoints of the sides of the original triangle.		
<b>1</b>	If a point inside the original triangle is selected at random, what is the probability that the point is also in the smaller triangle?	<b>1/4</b> [or <b>0.25</b> ]
<b>2</b>	This figure is created by starting with a triangle and repeatedly removing middle triangles from whatever triangles remain.	<b>Sierpinski</b> [seer-PIN-skee] triangle [or <b>Sierpinski gasket</b> or <b>Sierpinski sieve</b> ]
<b>3</b>	One way to generate a Sierpinski triangle is to randomly choose a point in the original triangle and then repeatedly move halfway towards a randomly chosen triangle vertex. That game is named for this study of phenomena in which minor changes in initial conditions have a major impact, as exemplified by the butterfly effect.	<b>chaos</b> game [or <b>chaos theory</b> ]



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

*10 points per part*

Identify these prominent families from the early United States.		
<b>1</b>	This family included Declaration of Independence signers Francis Lightfoot and Richard Henry. It also included Light-Horse Harry, whose son headed Confederate forces in the Civil War.	<u>Lee</u> family [or <u>Lees</u> ]
<b>2</b>	This family included South Carolina Governor Charles and Federalist President Candidate Charles Cotesworth. Thomas negotiated a treaty with Spain in 1795.	<u>Pinckney</u> family [or <u>Pinckneys</u> ]
<b>3</b>	Two cousins with this name signed the Continental Association. Philip from New York signed the Declaration of Independence, and William from New Jersey signed the Constitution.	<u>Livingston</u> family [or <u>Livingstons</u> ]

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

*10 points per part*

Give the following about gun control:		
<b>1</b>	This amendment mentions a “well-regulated militia” before stating, “The right of the people to keep and bear arms shall not be infringed.”	<u>2<sup>nd</sup></u> Amendment to the United States Constitution
<b>2</b>	This bureau enforces gun laws and other regulations. After 9/11, it was moved from the Treasury Department to the Justice Department and gained the power to regulate explosives.	<u>ATFE</u> [or Bureau of <u>Alcohol, Tobacco, and Firearms</u> or Bureau of <u>Alcohol, Tobacco, Firearms, and Explosives</u> ]
<b>3</b>	This bill instituted background checks for gun purchases. Passed during the Clinton Administration, it was named for President Reagan’s press secretary.	<u>Brady</u> Act [or <u>Brady Law</u> or <u>Brady Bill</u> or <u>Brady Handgun Violence Prevention</u> Act]



### Question #1: Science – Physics

10 points

The law named for this person states that magnetization varies inversely with absolute temperature for **paramagnetic** [PAIR-uh-“magnetic”] objects at high temperatures. A law named for this person and Pierre **Weiss** [“vice”] finds the susceptibility of a **ferromagnet** [FAIR-oh-“magnet”]. This person is also the namesake of the boundary between paramagnetism and ferromagnetism, which is his namesake temperature. His name is also used for a unit equal to thirty-seven billion decays per second. Name this scientist who helped isolate **radium** [RAY-dee-um] and **polonium** [puh-LOH-nee-um] while working with his wife Marie.

Pierre **Curie** [kyur-ee]

### Question #2: Literature – World Literature

10 points

One character living in this city exiled his wife once her collarbone had healed following a car accident. That man’s infidelity was revealed once his son saw him playing a tambourine. It is home to **Midaq** [mee-DAHK] Alley, as well as the al-Jawad family headed by al-**Sayyed** [sy-ED] Ahmad. Name this city in which *Sugar Street* and *Palace Walk* were set in a namesake trilogy by **Naguib Mahfouz** [nah-GHEEB mah-FOOZ], an Egyptian author.

**Cairo** [accept **al-Qahira**]



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

10 points

<p>One artist from this country painted a “Trinity” icon showing the three parts of God sitting at a table. One artist from this country painted <i>The Rich Jew</i> and <i>The Poor Jew</i>, and he planned the design of a gate for Kiev. This home country of Victor Hartmann produced an artist who painted <i>A Religious Procession in Kursk</i>, as well as a picture of a monarch murdering his son. Name this home country of <b>Andrei Rublev [AHN-dray ROOB-lev]</b> and <b>Ilya Repin [EEL-yah REP-in]</b>, who painted its tsar Ivan the Terrible.</p>	<p><u>Russia</u></p>
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**Question #4: Math – Math Concepts**

10 points

<p>If a <b>limaçon [lee-muh-saw]</b> has a dimple, then it has two of these points, and a normal distribution has these points at plus and minus one standard deviation from the mean. The logistic curve has symmetry about this point, which exists at each <math>x</math>-intercept of the sine and cosine graphs. For graphs of polynomial functions, the number of these points cannot be more than the degree minus two. Name these points where the second derivative of a graph changes sign because the graph’s curvature changes between concave up and concave down.</p>	<p><u>inflection</u> point [or <u>point of inflection</u> or <u>flex</u>]</p>
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**Question #5: Social Studies – U.S. History**

*10 points*

Early in this battle, Edwin Sumner ordered brigades under John Sedgwick into the East Woods, where those brigades were quickly turned back. Fought shortly after the Battle of South Mountain, both sides in this battle fought for the high ground around Dunker Church. Much of the fighting took place in Miller’s cornfield next to the Hagerstown Pike. Shortly after this battle, General McClellan was removed from his command, and Abraham Lincoln issued the Emancipation Proclamation. Name this Maryland battle that was the bloodiest day in American history.

Antietam [aan-TEE-tum] [or  
Sharpsburg]

**Question #6: Literature – British Literature**

*10 points*

Unlike the central figures in this poem, both “Cossack and Russian reel’d from the saber stroke.” None in the title group knew “someone had blundered,” as “theirs not to make reply, theirs not to reason why, theirs but to do and die.” It is set during the Battle of Balaclava. Name this poem about the title group riding “into the valley of death,” written by Alfred, Lord Tennyson.

“The Charge of the Light  
Brigade”



### Question #7: Science – Biology

10 points per part

This sense is also known as <u>gustation</u> [gus-TAY-shun].		
1	Name this sense that involves interactions with buds on the tongue.	<u>taste</u> [accept word forms]
2	This Japanese word meaning “delicious” or “savory” is referred to as the “fifth taste” after sweet, sour, bitter, and salty.	<u>umami</u> [ooh-mah-mee]
3	Taste buds are located on these bumps on the tongue.	<u>papillae</u> [puh-PEE-lee]

### Question #8: Science – Biology

10 points per part

Some of the terms used for plant seeds have more than one meaning.		
1	This is the name for the developing plant inside a seed. The same term is used for a human from fertilization until it is developed enough to be a fetus.	<u>embryo</u> [EM-bree-oh] [accept word forms]
2	This is the name of a tuft of hairs on a seed that aid in wind dispersal. The same term is used for the atmosphere around the main part of a comet.	<u>coma</u>
3	This is the flap of the seed that opens during germination. The same term describes the flaps that cover fish gills.	<u>operculum</u> [oh-PUR-kyoo-lum]



**Question #9: Fine Arts – Classical/Opera**

10 points per part

Name these groundbreaking 20 <sup>th</sup> -century composers.		
1	This composer of <i>The Rite of Spring</i> moved into a neo-classical phase that led to his <i>Dumbarton Oaks</i> concerto.	Igor <b>Stravinsky</b> [EE-gor strah-VIN-skee]
2	Stravinsky's late works, such as <i>Agon</i> , were influenced by this creator of serialism, who taught Anton von Weber [VAY-bur] and Alban Berg [AL-bahn BAIRG]. His <i>Moses und Aron</i> is an unfinished serialist opera.	Arnold <b>Schoenberg</b> [SHURN-bairg]
3	This late student of Arnold Schoenberg broke from most schools of musical thought by introducing chance into his music. Examples of that style include <i>Imaginary Landscape #4</i> , which has 12 radios tuned to different frequencies playing at once.	John Milton <b>Cage</b> , Jr.

**Question #10: Fine Arts – Classical/Opera**

10 points per part

This opera includes the aria “ <i>Der Hölle Rache</i> ” [dair HUR-luh RAH-kuh], in which the Queen of the Night orders her daughter Pamina to kill the priest Sarastro.		
1	Name this opera, where the birdcatcher Papageno [pah-pah-GAY-noh] helps Tamino to rescue princess Pamina.	<i>The <b>Magic Flute</b></i> [or <i>Die <b>Zauberflöte</b></i> ]
2	Name the composer of <i>The Magic Flute</i> .	Wolfgang Amadeus <b>Mozart</b>
3	This section of <i>The Magic Flute</i> opens with loud E-flat major chords. This section in the opera <i>William Tell</i> includes an evocation of a storm, and precedes the introduction of the singers.	<b><u>overture</u></b>



**Question #11: Math – Geometry**

*10 points per part*

This circle is tangent to each of the sides of a triangle.		
<b>1</b>	Name this circle, whose center is the intersection of the angle bisectors of a triangle.	<b>incircle</b> [prompt on <b>inscribed</b> circle]
<b>2</b>	Give the measure of the angle in degrees between a radius of the incircle that goes to its point of tangency, and the side of the triangle.	<b>90</b> degrees
<b>3</b>	Name the theorem which states that the nine-point circle is tangent to both the incircle and the three excircles.	<b>Feuerbach's</b> [FOY-ur-bak's] theorem

**Question #12: Math – Geometry**

*10 points per part*

This shape is the most efficient way to enclose a given area with a given length of wire.		
<b>1</b>	Name this figure that is the limiting shape of a regular polygon as its number of sides approaches infinity.	<b>circle</b>
<b>2</b>	This number is the ratio of the circumference squared of a circle divided by its area.	<b>four</b> times <b>pi</b> [or equivalents]
<b>3</b>	This inequality states that four pi times the enclosed area is less than or equal to the length squared of any closed curve.	<b>isoperimetric</b> [“EYE”-soh-pair-ih-MET-rik] inequality



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

10 points per part

The narrator of this poem meets a traveler who describes a “shattered <b>visage</b> [vih-SAZH]” with “a wrinkled lip, and sneer of cold command.”		
<b>1</b>	Name this poem, in which the traveler recalls that the pedestal has engraved on it the line “look on my Works, ye Mighty, and despair!”	“ <b>Ozymandias</b> ” [ah-zih-MAAN-dee-uss]
<b>2</b>	This Romantic poet of “Ozymandias” also wrote the work <i>Music, When Soft Voices Die</i> .	<b>Percy Bysshe Shelley</b>
<b>3</b>	According to the traveller, the writing on the pedestal also features this three-word phrase to describe Ozymandias. In the Bible, Revelation 17:14 and 19:16 use this phrase to describe Jesus Christ.	<b>King of Kings</b> [do not accept “Lord of Lords”]

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

10 points per part

St. George is personified as the Red Crosse Knight in this poem.		
<b>1</b>	This epic poem sees the title character, <b>Tanaquill</b> [TAN-uh-“quill”], take the title of Gloriana.	“The <b>Faerie Queene</b> ”
<b>2</b>	“The Faerie Queene” was written by this author, who repeated the line “sweet <b>Thames</b> [temz], run softly, til I end my song” in “ <b>Prothalamion</b> ” [proh-thuh-LAM-ee-ahn].	Edmund <b>Spenser</b>
<b>3</b>	The Red Crosse Knight encounters <b>Fradubio</b> [fruh-DOO-bee-oh] and <b>Fraelissa</b> [fray-LISS-uh], who had been turned into these things. The opening line of Longfellow’s “The Village Blacksmith” describes the title man standing under one of these.	<b>trees</b> [accept <b>chestnut trees</b> ; prompt on <b>plants</b> ]



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

10 points

<p>In the end credits to one game, this character awakens to see the Wind Fish flying above the water. In another appearance, his mother left him with the <b>Kokiri</b> [koh-KEER-ee] as a child. This holder of the Triforce of Courage obtains assistance from the Zora and Gorons in saving the land of <b>Hyrule</b> [“high-rule”]. He is routinely called on to defeat <b>Ganondorf</b> [GAN-un-dorf]. Name this protagonist of the <i>Legend of Zelda</i> series.</p>	<p><b>Link</b> [do not accept “Zelda”]</p>
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**Question #16: Social Studies – U.S. History**

10 points

<p>An attempt to allow this practice was struck down by the Supreme Court in <i>Wallace v. Jaffree</i>, and that case was strengthened by the decision in <i>Lee v. Weisman</i>. A constitutional amendment supporting this activity was sponsored by Ernest Istook and received a majority, but not a two-thirds, vote in the House in 1998. Hugo Black stated that these actions could violate the Establishment Clause in his 1962 decision, <i>Engel v. Vitale</i>. Name this activity that is banned in public education because it violates the separation of church and state.</p>	<p><b>school prayer</b> [accept similar answers containing both underlined words or synonyms thereof; accept <b>moment of silence</b> or <b>minute of silence</b>; prompt on <b>prayer</b> or equivalents thereof]</p>
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**Question #17: Science – Biology**

10 points

<p>Spiderhunters and sunbirds belong to a family named after this substance because it is a major part of their diet. For some organisms, this substance improves fitness by attracting ants, which deter herbivores [HUR-bih-vorz]. Other organisms are not required to produce as much pollen as they would otherwise because this substance attracts insects. Name this sugary substance produced by plants that is used to make honey.</p>	<p><u>nectar</u></p>
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**Question #18: Literature – U.S. Literature**

10 points

<p>This author heaped praise on orange trees in a memoir recounting her time in Florida, <i>Palmetto Leaves</i>. She wrote of a man whose Quaker conversion came after being shoved off a cliff by a Kentucky farmer. Nina Gordon's plantation served as the setting for her novel <i>Dred</i>, and in another novel she created a protagonist who had visions of Jesus and Eva before his death is ordered by Simon Legree. Name this author of <i>Uncle Tom's Cabin</i>.</p>	<p>Harriet Beecher <u>Stowe</u></p>
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**Question #19: Social Studies – World History**

10 points

<p>A massacre of nobles in this country's capital by Danish king Christian II led to its' secession from the Kalmar Union, and the rise of the Vasa dynasty. The Treaty of Kiel granted this nation control of Norway. During the reign of King Charles XII, this country won the Battle of Narva, but lost the Great Northern War to Russia. Name this Scandinavian country ruled by Gustavus Adolphus.</p>	<p>Kingdom of <u>Sweden</u> [accept <u>Konungariket Sverige</u>]</p>
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**Question #20: Science – Astronomy**

10 points

<p>One design for a vehicle that would travel regularly between Earth and Mars is named for this person, who wrote the book <i>Mission to Mars: My Vision for Space Exploration</i>. This person made headlines in 2002 when he punched conspiracy theorist Bart Sibrel. This person's autobiographies include <i>Return to Earth</i> and <i>Magnificent Desolation</i>, the latter of which is named for his statement when he did the activity he is most famous for. Name this person who was second to walk on the Moon, after Neil Armstrong.</p>	<p>Edwin Eugene "Buzz" <u>Aldrin</u></p>
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**Question #21: Social Studies – World History**

*10 points per part*

Marlborough House in London is the home of this organization's Secretariat.		
<b>1</b>	Name this organization currently led by Secretary-General Kamalesh Sharma, but whose ceremonial head is Queen Elizabeth II.	the <u>Commonwealth</u> of Nations
<b>2</b>	When the Commonwealth of Nations recognized the nation of Bangladesh, this nation left in response. It returned, but its participation was subsequently suspended following a 1999 coup led by <b>Pervez Musharraf</b> [per-VEZ moo-SHAH-rahf].	Islamic Republic of <u>Pakistan</u>
<b>3</b>	Robert <b>Mugabe</b> [moo-GAH-bay] announced the withdrawal of this nation from the Commonwealth following the re-election of Don McKinnon as secretary-general and its suspension not being lifted.	Republic of <u>Zimbabwe</u>

**Question #22: Social Studies – World History**

*10 points per part*

This Special Administrative Region was the site of the 1-2-3 incident, which followed the Cultural Revolution.		
<b>1</b>	Name this former European colony that was transferred to China in December 1999.	<u>Macau</u> [muh-"COW"]
<b>2</b>	Macau was a former colony of this European power, which also controlled Mozambique.	<u>Portugal</u>
<b>3</b>	The "one country, two systems" policy utilized for Chinese Special Administrative Regions was developed by this premier, who bested the Gang of Four following the death of Mao Zedong.	Deng <u>Xiaoping</u>



**Question #23: Math – Trigonometry**

*10 points per part*

Answer the following questions about small angle approximations. Assume all angles are in radians.		
<b>1</b>	Of the six basic trigonometry functions, for which two of them does the value of the function approximately equal the measure of the angle for very small angles?	<b>sine</b> and <b>tangent</b> [both answers in either order]
<b>2</b>	Which two of the six basic trigonometry functions have very high output values for very small positive input values? The graphs of these functions have asymptotes along the y-axis.	<b>cotangent</b> and <b>cosecant</b> [either order; cosecant can be called <b>csc</b> ]
<b>3</b>	If you want to use a two-term small-angle approximation for the cosine function in radians on $x$ , the best approximation is to start with one and subtract this number times $x$ squared. Give the positive coefficient that gets multiplied by minus $x$ squared.	$\frac{1}{2}$ [or <b>0.5</b> ]

**Question #24: Math – Trigonometry**

*10 points per part*

This function of $x$ equals half of the sum of $e$ to the $x$ power plus $e$ to the minus $x$ power.		
<b>1</b>	Name this function that increases towards positive infinity without bound as $x$ approaches positive or negative infinity. Give the name of the function rather than the name of the shape of the curve.	<b>hyperbolic cosine</b> $x$ [or <b>cosh</b> ; do not prompt on partial answers]
<b>2</b>	What is the name of the shape of the hyperbolic cosine graph?	<b>catenary</b> [“CAT”-uh-nair-ee]
<b>3</b>	Find the hyperbolic cosine of the natural log of two.	<b>5/4</b> [or <b>1 ¼</b> or <b>1.25</b> ]



**Question #25: Science – Physics**

*10 points per part*

Physics can be used to explain why white light can be separated into different colors.		
<b>1</b>	Name the bending of light due to a change of speed when light moves from one medium to another. This phenomenon is described quantitatively by Snell’s law.	<b>refraction</b> [accept word forms; do not accept “diffraction”]
<b>2</b>	This term is used for the separation of colors into a spectrum due to different refractive indices for different colors.	<b>dispersion</b> [accept word forms]
<b>3</b>	The sky is blue due to this type of elastic scattering named for a Nobel laureate.	<b>Rayleigh</b> [RAY-lee] scattering

**Question #26: Science – Physics**

*10 points per part*

This principle states that <b>buoyant</b> [BOY-unt] force equals the weight of displaced fluid.		
<b>1</b>	Identify this principle named for an ancient scientist.	<b>Archimedes’</b> [ar-kih-MEE-deez’] principle
<b>2</b>	Archimedes’ principle can be explained by this principle, named for a different scientist, which states that a change of pressure in a fluid is transmitted evenly throughout the fluid.	<b>Pascal’s</b> principle [or <b>Pascal’s law</b> ]
<b>3</b>	Archimedes is also the namesake of a type of this simple machine that is spun in order to lift objects.	Archimedes’ <b>screw</b> pump [prompt on <b>spiral</b> or <b>pump</b> ]



**Question #27: Literature – U.S. Literature**

10 points per part

He wrote of a man who imagined outswimming Union bullets while awaiting being hanged.		
<b>1</b>	This author wrote of the execution of <b>Peyton Farquhar</b> [PAY-tun FAR-kwar] in “An Occurrence at Owl Creek Bridge.”	Ambrose Gwinnett <b><u>Bierce</u></b>
<b>2</b>	In this work, originally titled <i>The Cynic’s Word Book</i> , Bierce called the title mythical figure “the author of all our woes.”	<i>The <u>Devil’s Dictionary</u></i>
<b>3</b>	In <i>The Devil’s Dictionary</i> , Bierce described this event as “a ceremony where...nothing undertakes to become supportable.” The opening chapter of Upton Sinclair’s <i>The Jungle</i> centers on one of these events in Lithuania.	<b><u>wedding</u></b> [accept equivalents]

**Question #28: Literature – U.S. Literature**

10 points per part

He later claimed that a dream was the inspiration for a novel concerning a talking mouse.		
<b>1</b>	Name this author of <i>Stuart Little</i> . He wrote about Fern Arable, her pig, and the spider who befriended that pig in <i>Charlotte’s Web</i> .	Elwyn Brooks “E.B.” <b><u>White</u></b>
<b>2</b>	E.B. White collaborated on a revision of <i>The Elements of Style</i> with this writer.	William <b><u>Strunk</u></b> , Jr.
<b>3</b>	White collaborated with this author on a satire of romance and marriage entitled <i>Is Sex Necessary?</i> This author also penned a story about a man who dreamt of being an expert with the Webley-Vickers 50.80.	James <b><u>Thurber</u></b>



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

10 points

<p>This person was president when Amos Durfee was killed, and he tried to lessen tensions with Canada during William Mackenzie’s Upper Canada Rebellion. This president tried to support Spain after a slave rebellion on a ship during the <i>Amistad</i> trial. This person’s power increased after the Petticoat affair, because his positive treatment of Peggy Eaton pleased Andrew Jackson. This person’s presidency was marred by the Panic of 1837. Name this president from New York whose re-election bid was defeated by William Henry Harrison.</p>	<p>Martin <u>Van Buren</u></p>
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**Question #30: Literature – World Literature**

10 points

<p>This text features a “Phoenician thing” that is explained using metals, with the prevailing goal being total segregation; that concept is the “noble lie.” One tale in this work described a shepherd who could become invisible thanks to the ring of Gyges [“GUY”-jeez]. In it, philosophers are held up as those most fit to rule as kings and the least likely to be tempted by greed. Name this political tract by Plato that includes the allegory of the cave.</p>	<p><i>The <u>Republic</u></i> [accept <u>Politeia</u>]</p>
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### Question #31: Science – Chemistry

10 points

This scientist tried to apply his namesake equation to reactions between toxins and antitoxins, writing the book *Immunochemistry*. Multiplying the **steric** [STAIR-ik] factor by collision frequency gives the value of the pre-exponential factor, which is the y-intercept in a plot named for this person. In that plot, the reciprocal of temperature is on the x-axis, and the x-intercept equals the opposite of activation energy divided by the ideal gas constant. Name this scientist who defined acids and bases based on the ions they create in aqueous solution.

Svante Arrhenius

### Question #32: Math – Math Concepts

10 points

In computer science, this concept is a more general form of aggregation, differentiated by the fact that it usually implies ownership. Combining two linear transformations by this operation is equivalent to matrix multiplication. This operation is generally identical to nesting functions. If this operation is used to create a function, then that function can be differentiated using the chain rule. If this operation combines two functions to give the identity function, then the two functions are inverses of each other. Name this operation that treats the output from one function as the input to another.

composition [accept word forms; prompt on nesting before it is mentioned]



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

*10 points*

<p>Following the assassination of this country's leader Guillaume Sam, the US military intervened in its affairs until 1934. The Tontons Macoutes were a key tool of suppression during one dictator's rule of this nation. Its independence movement was led by Jean-Jacques Dessalines and Toussaint L'Overture. Formerly led by Papa and Baby Doc Duvalier, name this Francophone Caribbean country, ravaged by an earthquake in 2010.</p>	<p>Republic of <u>Haiti</u></p>
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**Extra Question #2: Math – Math Concepts**

*10 points*

<p>A variation on this situation developed by Robert Rosenthal is named for centipedes because of a diagram used to explain it. Maynard Smith added a level of complication to this situation by imagining mice in haystacks. In the long run, that version of this situation is equivalent to a stag hunt. Like the coordination problem, this situation has an optimal strategy called a Nash equilibrium. Name this game in which two people who cannot communicate with each other must choose to remain silent or betray the other person to their jailers.</p>	<p><u>prisoner's dilemma</u></p>
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**Extra Question #3: Science – Biology**

10 points

This scientist is credited for coining the term “invertebrate” and for improving their classification. Some of his ideas have been revisited following studies by Lars Olov Bygren [OH-lawff “BUY”-gren] in Sweden that might be explained by DNA methylation [METH-ul-AY-shun] and histone [HISS-tohn] modification, and a different attempt to revive this man’s ideas was made by Lysenko [ly-“SANK”-oh]. This scientist believed that increasing complexity and that movement towards perfection were natural, and he attempted to explain why giraffes have long necks. Name this French scientist who believed that environmental factors affect genetics.

Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck

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

10 points

He penned a poem comparing a locust shell to the outer robe of a woman he was pursuing. Following the discovery of his affair with Oborozukiyo [oh-bor-oh-zoo-kee-yoh], this half-brother of Emperor Sukazu was exiled to Suma. This owner of the Rokujo Mansion was the father of Emperor Reizei through Lady Fujitsubo [foo-jeet-soo-boh]. Name this husband of Princess Aoi [“ow”-ee] and title character of an 11<sup>th</sup>-century novel by Lady Murasaki.

Hikaru Genji [accept Shining Genji; accept Genji monogatari or The Tale of Genji]



**Extra Question #5: Fine Arts – Art History**

*10 points*

This state's city of Mitchell is home to the world's only Corn Palace. Henry Standing Bear commissioned what is planned to be the world's largest sculpture, currently being constructed on land in this state. **Korczak Zielkowski [KOR-chahk zeel-KAWV-skee]** designed this state's Crazy Horse Memorial. This state is also home to a granite carving near the city Keystone, designed by Gutzon Borglum, that shows four presidents. Name this state that contains Mount Rushmore.

**South Dakota**



**Extra Question #6: Science – Physics**

*10 points per part*

The first type of this device was the field effect type.		
<b>1</b>	Name these semiconductor devices that replaced vacuum tubes and are used in integrated circuits.	<u>transistors</u>
<b>2</b>	Transistors are used as a switch and for this purpose. This name is given to any device that increases an electrical signal, especially if that signal is used to produce sounds.	<u>amplifier</u> [accept word forms]
<b>3</b>	Before silicon became popular, this other semiconducting element was used in most transistors.	<u>germanium</u> [jur-MAY-nee-um]

**Extra Question #7: Science – Physics**

*10 points per part*

Identify these units of energy.		
<b>1</b>	One of this unit of energy will raise the temperature of one gram of water by one degree Celsius.	small <u>calorie</u> [or <u>gram calorie</u> ]
<b>2</b>	This CGS unit is equivalent to a force of one dyne acting over one centimeter.	<u>erg</u>
<b>3</b>	This unit of energy is approximately 1.6 times ten to the negative nineteenth joules.	<u>electron volt</u> [or <u>EV</u> ; do not prompt on partial answers]



**Extra Question #8: Social Studies – World History**

*10 points per part*

One consequence of this policy was the recognition of the <b>Oder-Neisse</b> [“odor-niece”] line as a Polish border.		
<b>1</b>	Name this policy that sought to improve relations with countries east of the Iron Curtain.	<b>Ostpolitik</b> [ohst-poh-lee-teek] [prompt on “Eastern Policy”]
<b>2</b>	<b>Willy</b> [VIL-ee] Brandt promulgated Ostpolitik while leading this nation. He resigned following the revelation that <b>Gunter Guillaume</b> [GOON-tur ghee-YOHM] was a spy for a communist neighbor.	<b>West Germany</b> [do not accept or prompt on “Germany”]
<b>3</b>	The term “Ostpolitik” has also been used to describe the foreign policy of this pope, who closed the Second Vatican council.	Pope <b>Paul VI</b> [accept Giovanni Battista Enrico Antonio Maria <b>Montini</b> ]

**Extra Question #9: Social Studies – World History**

*10 points per part*

Early results from this policy included the establishment of a tourist region on Mt. Kumgang.		
<b>1</b>	Name this policy that also resulted in collaboration on the Kaesong Industrial Park, and sought to bring about peaceful coexistence through cooperation and exchange.	<b>Sunshine</b> Policy
<b>2</b>	The Sunshine Policy’s ultimate goal was to open up this secretive nation, whose former leaders include Kim Il Sung and Kim Jong Il.	<b>North Korea</b> [accept <b>Democratic People’s Republic of Korea</b> or <b>DPRK</b> ]
<b>3</b>	The Sunshine Policy won this South Korean president the 2000 Nobel Peace Prize. Korean-Japanese relations were strained following his kidnapping by Korean spies in Tokyo; at the time he was an outspoken critic of Park Chung-hee. Give his family <i>and</i> given names.	<b>Kim dae-Jung</b> [prompt partial answer]