## Question #1: Literature – Mythology

*10 points*

| | |
|---|---|
| This goddess helped her husband gain control of the world by throwing Eurynome [yur-IH-nuh-mee] into Tartarus. This character caught her husband with Philyra [FIL-ur-uh], but not before Chiron [KYE-rahn] was conceived. Following the kidnapping of Persephone [pur-SEH-fuh-nee], this character convinced Demeter to return to Olympus. She hid her youngest child on Mount Dicti on Crete after fooling her husband by giving him a stone wrapped in baby clothes because he had swallowed their first five children. Name this mother of Zeus and wife of Cronos [KROH-nohss]. | **Rhea** |

## Question #2: Miscellaneous – Popular Culture

*10 points*

| | |
|---|---|
| Walter Penney invented a game based around doing this three times. In *Final Fantasy Six*, Edgar gained control of his father's castle by rigging this act. Anton Chigurh [chi-GUR] performed this action to decide the fate of his victims in *No Country for Old Men*. In the movie *Friday Night Lights*, this act was used to eliminate one team from the playoffs. This action is performed by Batman villain Two-Face to determine whether he should be good or evil. In a Tom Stoppard play, Rosencrantz repeatedly wins bets based on this action. Name this act used to determine which team can elect to receive the ball at the beginning of a football game. | **flip**ping a **coin** [or **toss**ing a **coin**; accept variations like **coin toss** or **coin flip**; prompt on answers mentioning **head**s or **tail**s] |

## Question #3: Science – Biology

*10 points*

| | |
|---|---|
| These cells are combined with cancer cells to form hybridomas ["hybrid"-OH-muz]. These cells undergo clonal selection without positive selection. The marker CD20 [C-D-"twenty"] is found on the surface of these cells. Memory cells and plasma cells are derived from these cells. In birds, these cells mature in the bursa of Fabricius [fuh-BRISH-ee-us], while in humans they mature in the bone marrow. These cells secrete *y*-shaped proteins that bind to antigens. Name these immune cells which secrete antibodies, and are helped by T cells. | **B** cells or **B** lymphocytes [prompt on **white** blood cells or **lymphocyte**s] |

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

*10 points*

| | |
|---|---|
| This person recited oyster recipes in a 15-hour filibuster of the Glass-Steagall Act. This person was accused of arranging the murder of J. Y. Sanders by the Dynamite Squad, which tried to impeach him as governor. This politician won a Supreme Court case against the Cumberland Telephone company over rate hikes. Shortly after announcing he would run for president, this man was shot in the State Capitol building by Carl Weiss. This politician's "Share Our Wealth" program promised "Every Man a King." Identify this Louisiana politician nicknamed The Kingfish. | Huey (Pierce) **Long** (Jr.) |

## Question #5: Literature – British Literature

*10 points*

| | |
|---|---|
| This author wrote about a colonel [KER-nul] who was mentored by Joseph Addison and Richard Steele. Jonathan Swift is portrayed as a bully in this author's novel *The History of Henry Esmond*. In another novel, this author of *The Book of Snobs* wrote of Sir Pitt's desire to marry his children's governess, who is already secretly married. That novel by this author, set initially at Miss Pinkerton's Academy for Young Ladies, describes the marriages of George Osborne to Amelia Sedley and Rawdon Crawley to Becky Sharp. Name this author of *Vanity Fair*. | William Makepeace **Thackeray** |

## Question #6: Science – Astronomy

*10 points*

| | |
|---|---|
| These objects are found in the Clowes-Campusano Group and the Huge Group. Comparing the luminosity of one of these objects to its mass gives the Eddington ratio. The spectra of these objects features the Gunn-Peterson trough [trawff]. These objects are more luminous than Seyfert [SEE-fert] galaxies, which are, like these objects, active galactic nuclei. Some astronomers believe that these objects are blazars [BLAY-zahrs] observed from a different angle. These objects are believed to surround supermassive black holes at the centers of galaxies, and they are very distant and bright. Identify these objects whose name is based on the fact that they are sources of radio waves. | **quasar**s [prompt on **blazar**s before they are mentioned] |

## Question #7: Mathematics – Probability

*10 points per part*

| | This experiment is named for an 18th-century Frenchman. | |
|---|---|---|
| **1** | Name this experiment that involves dropping an object onto a floor that is divided into strips, and counting the number of objects that land in such a way that they touch more than one strip. | **Buffon**'s **needle** experiment [accept other words in place of "experiment"; prompt on partial answers] |
| **2** | The Buffon's needle experiment can be used to approximate this irrational number between 3 and 4. | **pi** |
| **3** | If the length of the needle equals the space between lines on the floor, what is the probability that the needle will cross a line? | **2/pi** |

## Question #8: Mathematics – Probability

*10 points per part*

| | Many methods used by computers to ostensibly generate these numbers are given the prefix "pseudo-" [SOO-doh] because there generally is some degree of predictability. | |
|---|---|---|
| **1** | Name these types of numbers that are supposed to be chosen by pure chance and are not supposed to contain patterns. | **random** numbers [accept **pseudorandom** numbers] |
| **2** | This pseudorandom number generator works by squaring the previous result and dividing by the product of two prime numbers. | **Blum Blum Shub** |
| **3** | If two digits are chosen at random, and zeroes and repeats are possible, what is the probability that neither of the digits is a seven? | **81/100** [or 0.**81** or **81%**] |

## Question #9: Social Studies – Psychology

*10 points per part*

| | Muzafer Sherif [MOO-zah-fur shuh-REEF] tested this behavior in an experiment involving a white light that appeared to move. | |
|---|---|---|
| **1** | Name this phenomenon in which people adjust their behavior to comply with group norms. | **conform**ity [accept word forms] |
| **2** | This psychologist tested conformity during the 1950s in an experiment involving lines of different lengths in which actors would occasionally give incorrect answers, causing subjects to also give incorrect answers. | Solomon **Asch** ["ash"] |
| **3** | Sherif also led this experiment, in which the "Rattlers" and "Eagles" competed against each other in various tasks. | **Robbers Cave** Experiment |

## Question #10: Social Studies – Psychology

*10 points per part*

| | David Wechsler [WEK-slur] created tests for calculating this quantity based on four distinct clusters. | |
|---|---|---|
| **1** | Name this quantity which can be measured by the Stanford-Binet [buh-NAY], which features different tasks based on the test-taker's age, including solving reasoning problems and reversing six-digit numbers. | **intelligence quotient** or **IQ** [prompt on answers mentioning **intelligence**] |
| **2** | The normal distribution for IQ scores uses 100 as the mean, and this value for the standard deviation. | **15** |
| **3** | The Flynn effect describes how the average IQ rises with respect to this value. | **time** [accept **year**s, **generation**s, or similar answers; do not accept "age"] |

## Question #11: Science – Physics

*10 points per part*

| | Upon observation, one of these functions can "collapse". | |
|---|---|---|
| 1 | Name these functions, symbolized with the Greek letter psi ["sigh"], that describe the quantum state of a system. | **wave** functions |
| 2 | The wave function is the eigenfunction ["EYE-gun-function"] of the time-independent form of this equation. This equation and a cat in a thought experiment are named for the same person. | **Schrödinger**'s [SHRAY-ding-ur'z] equation |
| 3 | The Aharonov-Bohm [ah-hah-ROH-nawf BOHM] effect, in which a charged particle in areas with zero vector potential is affected by the potential, is explained using this quantity, which shifts the graph of a sine wave horizontally. | **phase** shift [or Berry **phase**; or geometric **phase**; or Pancharatnam-Berry phase] |

## Question #12: Science – Physics

*10 points per part*

| | The loss of atmospheric gas via Jeans escape can be modeled using this function. | |
|---|---|---|
| 1 | Name this distribution, a model for particle speeds in an ideal gas. | **Maxwell-Boltzmann** distribution [prompt on partial answers] |
| 2 | Adding a one to the denominator of the Maxwell-Boltzmann distribution gives a distribution that models these particles. The function allows between zero and one particles in any state. | **fermion**s [prompt on **electron**s, **lepton**s, or **quark**s] |
| 3 | Two fermions cannot occupy the same quantum state according to this principle. | **Pauli** **exclusion** principle [accept either underlined term] |

## Question #13: Literature – World Literature

*10 points per part*

| | This member of the 104th claimed that God made stars from the Moon's broken pieces. | |
|---|---|---|
| 1 | Name this title character and friend of the Baptist Alyoshka [al-YOSH-kuh], who despised the scrounging Fetyukov [FET-yoo-kawf]. | **Ivan Denisovich** [accept either; accept **Ivana**, **Denisovicha**, **Shukov**, or ***One Day in the Life of Ivan Denisovich***] |
| 2 | This author of *One Day in the Life of Ivan Denisovich [EE-vahn deh-NEE-soh-vich]* also wrote *The Gulag Archipelago [GOO-lahg ar-kih-PEL-uh-goh]*. | Aleksandr (Isayevich) **Solzhenitsyn** |
| 3 | This other Solzhenitsyn novel focuses on a group of intellectuals tasked with identifying the voice on a taped phone call made by Volodin [vuh-LOH-din]. | ***The First Circle*** [or ***V kruge pervom*** or ***In the First Circle***] |

## Question #14: Literature – World Literature

*10 points per part*

| | The central group in this story journeyed from Rouen [roo-en] to Le Havre [hahv-ruh]. | |
|---|---|---|
| 1 | Name this story in which the protagonist shares her emergency rations with those who deemed themselves above her, only to be shunned once the trip resumes from Tôtes ["tote"]. | "**Boule de Suif**" [or "**Ball of Fat**" or "**Ball of Lard**" or "**Dumpling**" or "**Butterball**"] |
| 2 | "Boule de Suif" was written by this Frenchman, who also wrote "The Necklace." | Guy de **Maupassant** [maw-pah-sahn] |
| 3 | This is the name of the title dog left to die in a Maupassant story. This same name is used for a stock character who loves Columbine, who in turn loves Harlequin. | **Pierrot** [pyair-oh] |

## Question #15: Fine Arts – Art History

*10 points*

| | |
|---|---|
| This painter showed a chandelier with candles whose flames are being blown strongly to the side at the top of his painting *Witching Hour*. He painted a white dog sleeping comfortably on a bed covered with a white blanket in *Master Bedroom*. Without telling his wife or his subject's husband, he made over 200 pictures of one of his neighbors in Pennsylvania during the 1970s and '80s. Name this painter of Helga Testorf, who showed a different neighbor who suffered from polio trying to make it across a farm in *Christina's World*. | Andrew (Newell) **Wyeth** ["WHY"-eth] |

## Question #16: Mathematics – Math Concepts

*10 points*

| | |
|---|---|
| The Weierstrass [VYE-ur-shtrass] substitution uses both division by two and this function to simplify integration problems. The law of this function gives an expression for the ratio of the difference of two lengths divided by the sum of two lengths. Its Taylor series begins $x$ plus $x$ cubed over 3 plus 2 $x$ to the fifth over 15. When the line $x$ equals 1 intersects the terminal side of an angle in standard position, this function gives the $y$-coordinate of the point of intersection. This function is undefined precisely when the secant function is undefined, that is, when cosine is zero, since it equals sine divided by cosine. Name this function that, for an acute angle in a right triangle, is the ratio of the opposite side to the adjacent side. | **tan**gent function [accept answers that additionally mention a variable; do not accept "cotangent"] |

## Question #17: Social Studies – World History

*10 points*

| | |
|---|---|
| This ruler bet that the Château de Bagatelle could *not* be constructed in three months. Nicole Lequay pretended to be this monarch in a scam involving a valuable piece of jewelry, which led to severe sentences for the Cardinal de Rohan and Jeanne de la Motte. This queen was the sister of Leopold II [2], Holy Roman Emperor, which divided her loyalties. People who disliked this ruler referred to her as "the Austrian woman". Name this woman who was sent to the guillotine a few months after her husband Louis XVI [16]. | **Marie Antoinette** [or **Maria Antonia** Josepha Johanna or **Maria Antonia** Josephina Johanna; prompt on partial answer] |

## Question #18: Science – Chemistry

*10 points*

| | |
|---|---|
| A form of this functional group bound to a carbon-carbon double bond can be protected by a silyl ether [SIL-il EE-thur], and is central to the mechanisms of the Michael addition and the aldol condensation. That form of this functional group is the tautomer ["TAUT"-oh-mur] of a ketone ["KEY-tone"]. A molecule with two of this functional group is used to protect carbonyls [KAR-buh-NEELZ] by forming a 1,3 dioxolane ["die-OX-uh-lane"]. The Jones oxidation forms a secondary one of these compounds from a ketone, while Grignard [GREEN-yard] reagents will form these compounds when attacking a carbonyl. A compound with two of these functional groups is called a diol ["DIE-awl"]. Name this functional group found in ethanol. | **alcohol** group [or **hydroxyl** group] |

## Question #19: Literature – U.S. Literature

*10 points*

| | |
|---|---|
| This was the 22nd poem in the collection *Spring and All*. Its four stanzas together form one sentence, though its first word is not capitalized. The last stanza of this poem places the title object near farm animals, and the third stanza describes the title object's wet texture. The name of that object is broken up between the third and fourth lines. The title object probably has one wheel, and it is "glazed with rain water". Name this poem about an object that "so much depends upon", written by William Carlos Williams. | "The **Red Wheelbarrow**" |

## Question #20: Social Studies – Economics

*10 points*

| | |
|---|---|
| In *General Theory*, Keynes ["canes"] argued that the "marginal efficiency of capital" determined this economic value. The Keynes effect states that this value falls when prices fall. The Hicks-Hansen model compares this quantity to real output, and the Fisher equation compares two versions of this calculation to the rate of inflation. This value is divided into 72 to approximate the doubling period. The federal funds rate and the prime rate are both specific examples of this kind of value. Name this value used to calculate the extra amount paid when borrowing money. | **interest** rate [or **lending** rate] |

## Question #21: Fine Arts – Classical Music & Opera

*10 points per part*

| | This work in E-flat major was composed in 1850. | |
|---|---|---|
| **1** | Give this symphony's nickname, which is based on a river going through Düsseldorf [DOOS-sel-dorf]. | **Rhenish** [REN-ish] Symphony [prompt on **Rhine** River] |
| **2** | The "Rhenish" is the third symphony by this composer, who married Clara Wieck [veek] against her father's wishes. | Robert **Schumann** |
| **3** | Schumann also wrote this eight-movement piano piece named for an E. T. A. Hoffmann character. | **Kreisleriana** ["Chrysler"-ee-ah-nah] |

## Question #22: Fine Arts – Classical Music & Opera

*10 points per part*

| | This symphony, Burghauser number 178, is in E minor. | |
|---|---|---|
| **1** | Give the nickname of this Antonín Dvořák [d'VOR-zhahk] piece that is believed to have been influenced by his study of African-American and Native American music. | From the **New World** Symphony [prompt on Symphony No. **9** or **Ninth** Symphony] |
| **2** | Dvorak also wrote these 16 nationalist pieces in two groups of eight. These pieces are influenced by Bohemian and Moravian music. | **Slavonic Dance**s [or **Slovanske tance**s; prompt on **Slavonic**] |
| **3** | In the first set of *Slavonic Dances*, the first and last pieces are classified as this type of lively dance that often follows a dumka [DOOM-kah]. | **furiant**s |

## Question #23: Mathematics – Algebra

*10 points per part*

| | | |
|---|---|---|
| *x* squared minus 36 is an example of this kind of expression. | | |
| **1** | Name these binomials that can be factored into the form quantity $a + b$, end quantity, times the quantity $a - b$. | **difference of** (two) **squares** |
| **2** | Factor *x* to the sixth power minus twenty-five according to the difference-of-squares formula. | $(x^3 + 5)(x^3 - 5)$ [or $(x^3 - 5)(x^3 + 5)$ |
| **3** | The difference of squares can simplify certain multiplication problems. Find the product of 29 times 31. | **899** |

## Question #24: Mathematics – Algebra

*10 points per part*

| | | |
|---|---|---|
| This arrangement of numbers includes all the possible outcomes of the "binomial choose" operation, which is sometimes written "n C R". | | |
| **1** | Name this arrangement used to find the coefficients when you expand a binomial raised to a positive integer power. | **Pascal**'s **triangle** |
| **2** | Find the coefficient of the *x* squared *y* squared term in the expansion of the quantity *x* plus *y*, quantity closed, raised to the fourth power. | **6** [accept $6x^2y^2$] |
| **3** | Find the coefficient of the *x* squared *y* squared term in the expansion of the quantity 2*x* plus 5*y*, quantity closed, raised to the fourth power. | **600** [accept $600x^2y^2$] |

## Question #25: Social Studies – World History

*10 points per part*

| | The leader of this movement claimed that it "enticed the snakes out of their lairs". | |
|---|---|---|
| 1 | Name this movement followed by the Anti-Rightist Campaign. It was introduced in a speech entitled "On the Correct Handling of Contradictions Among the People". | **Hundred Flowers** Campaign [or **Hundred Flowers** Movement or **Baihua yundong**] |
| 2 | The Hundred Flowers Movement occurred in 1956 under this Chinese premier. | **Mao** Zedong [or **Mao** Tse-tung; prompt on **Zedong** or **Tse-tung**] |
| 3 | Shortly after the crackdown on open speech, Mao instituted this set of economic reforms. The second of the Five-Year Plans, it tried to force through rapid industrialization but resulted in a famine. | **Great Leap Forward** [or **Dà yuè jìn**] |

## Question #26: Social Studies – World History

*10 points per part*

| | After defeating a group of Sherden pirates in the Nile Delta, he incorporated them into his forces. | |
|---|---|---|
| 1 | Name this pharaoh sometimes called Ozymandias [ah-zee-MAN-dee-us]. This husband of Nefertari [neh-fur-TAHR-ee] commissioned the temples at Abu Simbel [AH-boo "symbol"]. | **Ramses II** [accept **Ramses the Great**; prompt on **Ramses**] |
| 2 | Ramses signed the oldest known international treaty with the leader Muwatallis II [moo-wah-TAH-lis "the second"] following this massive chariot battle. | Battle of **Kadesh** [KAY-desh] |
| 3 | After defeating a group of *these* people known as Sherden, Ramses II incorporated them into his forces at Kadesh. These mysterious people mostly raided towns on the Mediterranean coast. | **Sea People**s [accept **People of the Sea**] |

## Question #27: Literature – British Literature

*10 points per part*

| | In a 20th-century novel, this character was re-imagined as Antoinettte Cosway. | |
|---|---|---|
| 1 | Name this Creole woman who occasionally escaped when her caretaker Grace Poole consumed whiskey. | **Bertha Mason** [accept either; accept, but do not otherwise reveal, Bertha **Rochester**; prompt on the **Madwoman in the attic**] |
| 2 | This man, Bertha's husband, kept Bertha locked up in an attic. He broke off an affair with Celine Varens, only to take in her abandoned daughter Adele. | **Edward Rochester** [accept either] |
| 3 | Edward Rochester's initial attempt to marry this Charlotte Brontë protagonist was interrupted by Bertha's brother, Richard. | **Jane Eyre** [accept either] |

## Question #28: Literature – British Literature

*10 points per part*

| | These twins are part of the "bigguns", and were tasked with maintaining the signal fire. | |
|---|---|---|
| 1 | Name these twins who thought that a dead parachutist was a deformed ape. Initially loyal to Ralph, they end up joining Jack Merridew's tribe. | **Samneric** [or **Sam** and **Eric**] |
| 2 | Samneric appear in this William Golding novel, in which a boulder crushes both Piggy and a conch [kahnk] shell. | ***Lord of the Flies*** |
| 3 | The title figure in *Lord of the Flies* is symbolized by the impaled head of one of these animals. | **pig** [or **hog** or **swine**] |

## Question #29: Mathematics – Math Concepts

*10 points*

| | |
|---|---|
| A perfect set has this property without having any isolated points. A space is regular if all sets with this property are separated from points not in those sets. An operator has this property if that operator acting on a converging sequence in the domain always maps to a converging sequence in the range, and the limit is in the range. Intervals with this property include their limit points and are expressed in interval notation with square brackets. Name this property which exists in sets under an operation if that operation on elements of the set always results in another element from the set, and which is therefore possessed for the integers under addition, subtraction, and multiplication, but not under division. | **closure** or **closed** |

## Question #30: Social Studies – U.S. History

*10 points*

| | |
|---|---|
| The buildup to this action began with an argument over whether John Goldfinch had paid for his wig. An exchange of words was followed by Hugh White striking Edward Garrick. Patrick Carr's dying declaration was given by Samuel Hemmingway at the trial stemming from this act on King Street. An engraving of this action showed a superior appearing to give an order to soldiers lined up. Governor Thomas Hutchinson restored order after this event, which was used to stir up anger against the British by Samuel Adams. Name this incident in which Crispus Attucks was among the colonists killed by British soldiers. | **Boston Massacre** |

## Question #31: Literature – World Literature

*10 points*

| | |
|---|---|
| In a novel by this author, Vaska says he is afraid of frogs after a doctor explains why to experiment on them. One of this author's collections opens with a tale of a pair of peasants, one thrifty and the other an idealist. In another tale by this writer, the loss of the horse Malek Adel sends a nobleman off the deep end. This author of *Diary of a Superfluous Man* and *A Sportsman's Sketches* wrote a novel focusing on a physician who denies all laws except those of the natural sciences, the nihilist [NYE-hil-ist] physician Bazarov. Name this author of *Fathers and Sons*. | Ivan (Sergeyevich) **Turgenev** [tur-"GAIN"-yeff] |

## Question #32: Science – Physics

*10 points*

| | |
|---|---|
| One type of these materials contains edge states with carriers whose spin is locked at a right angle to their momentum. A type of these materials that do not act as calculated by conventional calculations are named for Nevill Mott. Nickel oxide acts as one of these compounds, which must have a large band gap. These materials lose their namesake property at their breakdown voltage. Examples of these materials capable of undergoing dielectric polarization are used between the two plate of a capacitor. Name these materials that do not conduct electricity. | **insulator**s [prompt on **dielectric**s] |

## Extra Question #1: Fine Arts – Classical Music & Opera

*10 points*

| | |
|---|---|
| This composer's use of Mademoiselle de Lafontaine in *Le triomphe de l'amour* [lay tree-awmf day lah-mor] was unusual since almost all ballet dancers before then were men. Using a Thomas Corneille [toh-mah kor-nay] libretto based on a Molière [mole-yair] play, this composer wrote the opera *Psyche [SY-kee]*. This composer started the Paris Opera Ballet in 1669, and it is now the oldest national ballet company in the world. This composer's career took off after he danced with Louis XIV [14] in Benserade's [bens-rahd'z] *Ballet de la nuit [nwee]*. Name this French composer who died after stabbing himself in the foot during a concert. | Jean-Baptiste **Lully** |

## Extra Question #2: Social Studies – World History

*10 points*

| | |
|---|---|
| Adventurer Jørgen Jorgensen [YOR-gin YOR-gin-sen] briefly seized power in this nation, but he was not backed by locals. The last hunt of the great auk occurred in this country, which formed the Old Covenant with Norway. It came out ahead following a series of Cod Wars with Great Britain. A volcano eruption in this country in 2010 disrupted northern European air traffic. Though Erik the Red was born in what is now Norway, his son Leif Erikson was born in what is now this country. Its parliament is the Althing ["ALL-thing"]. Name this nation on an island between Great Britain and Greenland. | (Republic of) **Iceland** [or Lydveldid **Ísland**] |

## Extra Question #3: Mathematics – Math Concepts

*10 points*

| | |
|---|---|
| Hypergeometric functions are used in the continued fractions named for this person. This person's Theorema Egregium [tay-oh-RAY-mah eh-GRAY-jee-um] states that the embedding of a surface in space does not affect its curvature. The so-called "integers" [IN-teh-jers] named for this mathematician are actually complex numbers whose real and imaginary parts are each integers. This person is the namesake of a method of reducing matrices into row-echelon [ESH-uh-lahn] form, and Wilhelm Jordan's [YOR-dahn'z] name is added to this person's name when that process leads to reduced row-echelon form. Name this German mathematician and physicist. | Carl Friedrich **Gauss** [prompt on **Gaussian**] |

## Extra Question #4: Literature – U.S. Literature

*10 points*

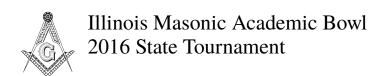| | |
|---|---|
| This author wrote about a man who would have awed Thor, and a woman that was "blindingly beautiful"; they kissed the ceiling before Diana Moon Glampers shot them both. This author also wrote about a substance devised to deal with mud but used by Papa Monzano to commit suicide, ice-nine. This author created a character who became part of a zoo exhibit on Tralfamadore after surviving the fire-bombing of Dresden. Name this author of "Harrison Bergeron", *Cat's Cradle*, and *Slaughterhouse-Five*. | Kurt **Vonnegut** (Jr.) |

## Extra Question #5: Science – Biology

*10 points*

| | |
|---|---|
| VEGF [vej-"F"] is a growth factor that contributes to the formation of these structures. A factor said to be derived from this tissue turned out to be nitric oxide, which increases the permeability of these structures. Malignant tumors can cause the formation of these structures to increase their growth. These structures are formed through vasculogenesis [VASS-kyoo-loh-"genesis"] and angiogenesis [AN-jee-oh-"genesis"]. Some of these structures contain valves to prevent backflow, while the formation of cholesterol plaques in some of these structures causes atherosclerosis [uh-THAIR-oh-skluh-ROH-siss]. Name these structures that can be classified as arteries and veins. | **blood vessel**s [prompt on **endothelium**; ask for a less specific answer upon a response of **artery**/ies or **arteriole**s or **venule**s or **vein**s or **capillary**/ies] |

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

*10 points per part*

| | This tragedy was planned to take place on Patriots' Day, and its main perpetrator was later caught driving without a license plate. | |
|---|---|---|
| **1** | Name this event that destroyed the Alfred P. Murrah building, and resulted in the arrests of Michael Fortier and Terry Nichols. | **Oklahoma City** bombing [accept other words in place of bombing] |
| **2** | This man was sentenced to death by lethal injection for masterminding the Oklahoma City bombing. | Timothy (James) **McVeigh** |
| **3** | McVeigh launched the attack to avenge the civilian deaths that occurred during the standoff between federal agents and the Branch Davidians [duh-VID-ee-uns] in this city. | **Waco**, Texas |

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

*10 points per part*

| | The Webster-Ashburton Treaty settled the eastern location of this line. | |
|---|---|---|
| **1** | Name this concept whose then-nebulous western end inspired the slogan "fifty-four forty or fight" before being set at the 49th parallel. | the **U.S.-Canadian border** [accept equivalents; prompt on **border**] |
| **2** | Before he could cross the border, this Nez Perce leader was captured at Bear Paw Mountain. In surrendering, he declared "I will fight no more forever." | **Chief Joseph** [accept **Young Joseph** or **Hin-mah-too-yah-lat-kekt**; prompt on **Joseph**] |
| **3** | The International Boundary Commission responsible for the border was created by this 1794 treaty, negotiated by a Supreme Court Justice. | **Jay**'s Treaty [accept **London Treaty of 1794** or Treaty of **Amity, Commerce, and Navigation**] |

## Extra Question #8: Science – Chemistry

*10 points per part*

| | Mothballs tend to undergo this phase transition, whose opposite is deposition. | |
|---|---|---|
| 1 | Name this phase transition in which a solid becomes a gas. | **sublimation** [or **subliming**] |
| 2 | This solid commonly sublimates to its gaseous form, carbon dioxide. | **dry ice** |
| 3 | A common lab technique for purification involves sublimating a sample onto one of these apparatuses. One of these pieces of glassware is sometimes found on a rotary evaporator in place of a condenser. | **cold finger**s |

## Extra Question #9: Science – Chemistry

*10 points per part*

| | In this technique, a sample is ionized through a method like E.S.I. or MALDI [MAHL-dee]. | |
|---|---|---|
| 1 | Name this technique whose peaks are separated by how heavy they are. | **mass spec**trometry [accept **mass spec**troscopy; prompt on **spectrometry** or **spectroscopy**] |
| 2 | In mass spectrometry, peaks are given by their ratio of mass to this quantity, which is typically one for analytes after ionization. | **charge** |
| 3 | Time-of-flight mass spectrometry determines mass by setting this quantity for particles equal, and then viewing their time-of-flight through a chamber. | **kinetic energy** [accept **K**E; prompt on **energy**] |