



### Question #1: Literature

10 points

In one novel by this author, the protagonist drinks wine with Sarah's mother instead of going on a date with Sylvia. In that novel by this author, Sarah dies from a lung infection after the protagonist discovers that Sarah had promised to God not to see him again if he survived an explosion. In another novel by this writer, a dentist hides a book about a Christian martyr in an oven, and a priest misses his boat to Vera Cruz. This English author set that novel in Tabasco, Mexico. Name this author of *The End of the Affair* and *The Power and the Glory*.

(Henry) Graham Greene

### Question #2: Mathematics

10 points

When a complete graph's number of **vertices** [VUR-tuh-sees] is this type of number, the chromatic index equals the number of vertices, where the chromatic index is based on edge coloring. A connected graph has an **Eulerian** [oy-LAIR-ee-un] cycle if none of the vertices has a degree that is this type of number. **Nicomachus's** [nik-OH-muh-kuss'z] theorem states that adding these numbers produces perfect cubes. Adding the first  $n$  positive numbers of this type gives  $n$  squared. There is only one prime number that is *not* this type of number. Give this term for a number not divisible by 2.

odd numbers [accept odds]



### Question #3: Miscellaneous

10 points

A museum for this type of organization is located where the first American one started in Manchester, New Hampshire. The largest organizations of this type in the United States are PenFed, State Employees, and Navy Federal. Some of these organizations require customers to be in a Select Employee Group. These not-for-profit organizations provide share accounts for their customers. These organizations are not insured by the FDIC, but there is a similar organization that insures them. Name these organizations that are similar to banks but are cooperatives that typically help people who have something in common.

credit unions

### Question #4: Science

10 points

This compound is the neutral compound with the strongest bond, and it has a triple bond in which one of the three parts is a coordinate covalent bond. The production of **tropospheric** ["trophe-oh-sphere"-ik] ozone often begins with the oxidation of this compound by a **hydroxyl** ["hide-ROCK-sill"] radical, which creates a **hydrocarboxyl** ["hide-row-car-BOX-ill"] radical. In the water-gas shift reaction, this compound combines with water vapor to form carbon dioxide and hydrogen. People exposed to this compound should breathe 100% oxygen to recover. Name this compound formed by incomplete combustion, which is very toxic because it has a greater affinity for hemoglobin than oxygen does.

carbon monoxide or CO



**Question #5: Social Studies**

10 points

The Praetorian prefect Macro helped this emperor come to power, but this leader criticized Macro until Macro committed suicide. An attempt to kill this emperor was called the Plot of the Three Daggers. After that plot, this emperor had two of his in-laws and his cousin Tiberius **Gemellus** [geh-MEL-loos] killed and had his sisters **Livilla** [liv-ILL-uh] and **Agrippina** [ag-rip-EE-nuh] the Younger exiled. This emperor succeeded Tiberius and was replaced by Claudius after being assassinated in 41 CE. Historians were very critical of this emperor, especially for the three years after his illness. Name this emperor who, according to legend, tried to make his horse **Incitatus** [in-kih-TAH-tuss] a consul.

Caligula [or Gaius Julius Caesar Augustus Germanicus or Gaius Caesar Germanicus;  
prompt on Gaius Caesar  
but do not accept or  
prompt on other parts of  
the name]

**Question #6: Literature**

10 points

This creature was depicted on the triple-crested helmet of Turnus. Also in the *Aeneid*, **Gyas's** [gee-AHS'z] ship was named for this creature. This creature was raised by King **Amisodarus** [ah-MEE-soh-dah-rus]. *The Iliad* says of this creature, "Her gaping throat emits infernal fire." The killing of this creature was demanded by King **Iobates of Lycia** ["eye"-AH-buh-teez "of lie-SEE-uh"] and was done with a lead-tipped spear to its throat. This creature had a serpent for a tail, a lion's body, and the head of a goat growing out of its back. Name this offspring of **Typhon** ["TIE"-fahn] and **Echidna** [uh-KID-nuh] that was killed by **Bellerophon** [buh-"LAIR"-oh-fahn].

Chimera



**Question #7: Science**

*10 points per part*

|   |  |  |
|---|--|--|
| This experiment was conducted on top of a stone floating in mercury at Case Western Reserve University. |  |  |
| <b>1</b>  | Name this attempt to measure motion through the luminiferous ether.  | <u>Michelson-Morley</u> experiment                       |
| <b>2</b>  | This 1932 follow-up to the Michelson-Morley experiment used <b>interferometer</b> [IN-tur-fuh-RAH-mih-tur] arms of differing lengths over several months to support Einstein's theories of relativity. | <u>Kennedy-Thorndike</u> experiment                      |
| <b>3</b>  | The Kennedy-Thorndike experiment disproved this person's ether theory. The transformations named after this person are still used in special relativity.   | Hendrik <u>Lorentz</u> or <u>Lorentz</u> transformations |

**Question #8: Science**

*10 points per part*

|  |   |  |
|--|---|--|
| Two of these laws can be written using the vector calculus operation called divergence, and two of them can be written using the curl operation. |   |  |
| <b>1</b>   | Name these four laws that summarize classical electromagnetism.   | <u>Maxwell's</u> equations [or <u>Maxwell-Heaviside</u> equations] |
| <b>2</b>   | One of Maxwell's equations is Gauss's law for magnetism, which essentially states that these constructs do not exist. These constructs would have a net magnetic charge.    | magnetic <u>monopoles</u>  |
| <b>3</b>   | This scientist determined that if magnetic monopoles exist, then electric charge is quantized. This scientist's equation combined quantum mechanics and special relativity. | Paul <u>Dirac</u>  |



**Question #9: Social Studies**

*10 points per part*

|   |   |  |
|---|---|--|
| Israel held elections in April 2019, and when that did not work out, they tried again in September. |   |  |
| <b>1</b>  | Name the leader of <b>Likud</b> [lee-KOOD] in the elections who became prime minister for the second time in 2009.  | Benjamin “Bibi”<br><b><u>Netanyahu</u></b>       |
| <b>2</b>  | Following those elections, Netanyahu and Gantz could not get the support of this leader of the <b>Yisrael Beiteinu</b> [yeess-rah-EL bay-TAY-noo] party who was recently the Minister of Defense. | Avigdor <b><u>Lieberman</u></b>                  |
| <b>3</b>  | Netanyahu’s main opponent, Benny Gantz, has said he would restart negotiations with the Palestinian Authority, which is headquartered in this city north of Jerusalem.                            | <b><u>Ramallah</u></b> , West Bank,<br>Palestine |

**Question #10: Social Studies**

*10 points per part*

|   |  |  |
|---|--|--|
| Deforestation policies in this country have led its president to be nicknamed “Captain Chainsaw”. |  |  |
| <b>1</b>  | Name this country where indigenous people have used the adjective “ <b>ethnocidal</b> ” [ETH-noh-“SIDE”-ul] to describe President <b>Bolsonaro’s</b> [bowl-so-NAH-roe’z] policies. | (Federative Republic of)<br><b><u>Brazil</u></b> or (República Federativa do) <b><u>Brasil</u></b> |
| <b>2</b>  | Bolsonaro has a feud with this American journalist who moved to Brazil. This editor of <i>The Intercept</i> worked closely with Edward Snowden to expose American surveillance.    | Glenn <b><u>Greenwald</u></b>  |
| <b>3</b>  | This U.N. High Commissioner for Human Rights and former two-time President of Chile has criticized Bolsonaro. He responded by making fun of her father.                            | Michelle <b><u>Bachelet</u></b><br>[bah-cheh-leh]  |



**Question #11: Fine Arts**

*10 points per part*

|   |   |  |
|---|---|--|
| This school of art was started by Walter <b>Gropius</b> ["GROPE"-ee-uss]. |   |  |
| <b>1</b>  | Name this school of art that moved from <b>Weimar</b> ["VIE-mar"] to Dessau to Berlin, existing from 1919 to 1933.  | (Staatliches) <b>Bauhaus</b> [rhymes with "cow house"]                   |
| <b>2</b>  | This final director of the Bauhaus closed it under pressure from the Nazis. This architect of the Farnsworth House is known for aphorisms such as "Less is more." | Ludwig <b>Mies</b> [meess] van der Rohe [prompt on <b>van der Rohe</b> ] |
| <b>3</b>  | Mies van der Rohe often worked with this Bauhaus teacher on furniture, such as their collaboration on the Barcelona chair.  | Lily <b>Reich</b>  |

**Question #12: Fine Arts**

*10 points per part*

|  |   |  |
|--|---|--|
| Funerary art is art made to hold the dead or to be placed with the dead: |   |  |
| <b>1</b>   | This name is given to the thousands of sculptures buried with <b>Qin</b> [chyin] Shi Huang, the first emperor of China.   | <b>Terracotta Army</b> [or <b>Terracotta Warriors</b> or <b>Bingmayong</b> ] |
| <b>2</b>   | This type of building for the dead is named for a Persian leader buried in <b>Halicarnassus</b> [HAL-ih-kar-NASS-uss].  | <b>mausoleum</b> [maw-zoh-LEE-um]  |
| <b>3</b>   | When ancient Egyptians decided it was a bad idea to bury servants with their masters, they buried people with these small human figurines that were supposed to perform tasks in the afterlife. | <b>Shabtiu</b> [or <b>Shawabti</b> or <b>Ushabti</b> ]                       |



**Question #13: Literature**

*10 points per part*

|   |   |   |
|---|---|---|
| The beginning of Book Nine of this novel describes “those who lawfully may, and those who may not, write such histories as this”. |   |   |
| <b>1</b>  | Name this novel in which a baby is found in Squire Allworthy’s bed.   | <i>The History of <b>Tom Jones</b>, a Foundling</i> |
| <b>2</b>  | This author wrote <i>Tom Jones</i> . He also wrote the play <i>The Modern Husband</i> and the novel <i>Amelia</i> .   | Henry <b>Fielding</b>                               |
| <b>3</b>  | In <i>Tom Jones</i> , this word is both the type of animal that Tom kills on the estate of Allworthy’s neighbor and the name of the schoolmaster accused of being Tom’s father. | <b>Partridge</b>                                    |

**Question #14: Literature**

*10 points per part*

|  |   |   |
|--|---|---|
| This poet wrote “I will enjoy thee now, my Celia,” at the beginning of his poem “A Rapture”. |   |   |
| <b>1</b>   | Name this 17th century English poet who also wrote the country-house poems “To Saxham” and “To my friend G. N. from Wrest”.                                     | Thomas <b>Carew</b> [“carry”]   |
| <b>2</b>   | Like Robert Herrick and Richard Lovelace, Thomas Carew is considered a member of this group of poets who supported King Charles I during the English Civil War. | <b>Cavalier</b> poets [or the <b>Cavaliers</b> ; prompt on the <b>Caroline</b> poets] |
| <b>3</b>   | Carew wrote “An Elegy upon the Death of the Dean of Paul’s” about this poet whose “Sonnet <b>X</b> [10]” is known by its first line, “Death Be Not Proud”.      | John <b>Donne</b> [dun]   |



### Question #15: Science

10 points

One of these geographic features is named for Mikhail **Lomonosov** [loh-MOH-noh-sawff] and goes from the East Siberian Shelf to the Lincoln Shelf in the Arctic Ocean. The Carlsberg example of this type of feature is the north part of the Central Indian one. The **stratigraphic** [strat-uh-“graphic”] type of this feature exists in some mountain ranges. Counter-intuitively, these objects—which can look like lines on maps—form at divergent plate boundaries. An enormous example of these features runs almost the entire length, north to south, of the Atlantic Ocean. Give this term for a continuous crest that slopes downward on both sides.

(ocean or mountain)  
**ridges** [prompt on mountain **range** before it is said]

### Question #16: Social Studies

10 points

This person wrote “The educated person differs from the uneducated in almost everything he does” at the beginning of the book *The Technology of Teaching*. This person developed a device called a “Glider” with a spinning disk that was used to teach children. “A Technology of Behavior” was the first chapter in this person’s book, which states “We have not yet seen what man can make of man.” This person had the character T. E. Frazier expound his views in his novel *Walden Two*. Name this writer of *Beyond Freedom and Dignity* who promoted behaviorism and developed an operant conditioning chamber known as his “box”.

B(urrhus) F(rederic)  
**Skinner**





**Question #17: Literature**

10 points

In a short novel written in this country, a woman focuses on cooking after her grandmother dies and she moves in with a friend and his mother. That mother, named **Eriko [eh-ree-koh]**, is a transgender woman in this country. In another novel from this country, one of the characters decides to sell his family's land to a person from Korea nicknamed "the Emperor". That character, who is dealing with the suicide of a friend and the institutionalization of his son, moves to a forest in this country. Those two works of fiction from this country are *Kitchen* and *The Silent Cry*. Name this country that is the home of Banana Yoshimoto and Kenzaburo **Oe [oh-eh]**.

**Japan** [or **Nippon** or **Nihon**]

**Question #18: Science**

10 points

These organs contain cells that wrap around capillaries, called **podocytes ["POD-oh-sites"]**. Fanconi syndrome decreases re-absorption in these organs, causing the body to lose protein. Other problems in these organs lead to a loss of **albumin [al-BYOO-min]** or a build-up of **creatinine [kree-AT-uh-noon]**. These organs are not thought of primarily as glands, but they excrete **erythropoietin [uh-RITH-roh-POY-uh-tin]**. The adrenal glands are on top of these organs. The functional units of these organs contain a Bowman's capsule and loop of Henle [pause] and are called **nephrons [NEF-rahnz]**. These bean-shaped organs are fed by the **renal [REE-nul]** arteries. Name these organs that filter blood and send urine to the bladder.

**kidneys**



**Question #19: Social Studies**

10 points

This person, who never became president, told Charles **Guiteau** [gee-toh] “Never speak to me again of the Paris consulship as long as you live.” This person was very nearby when Guiteau assassinated President Garfield. A few months later, this person resigned his position as Secretary of State, though he returned to the job under President Benjamin Harrison. This person did not get along well with Chester Arthur and other Stalwarts; this person’s supporters were called Half-Breeds. One of the Republicans who opposed this politician was Roscoe Conkling. Name this person who lost the election of 1884 to Grover Cleveland and who was from Maine.

James G. **Blaine**

**Question #20: Fine Arts**

10 points

This jazz musician often performed with his sons Dan, Chris, and Darius and with the drummer Joe Morello. This person worked with his wife Iola and Louis Armstrong on the musical *The Real Ambassadors*. Many of the songs associated with this pianist were actually written by his saxophonist, Paul Desmond. This composer’s 1962 album *Countdown—Time in Outer Space* was dedicated to John Glenn. Like many of his albums, that one has a wide variety of time signatures. Name this musician whose *Time Out* album features “Blue Rondo à la Turk” and “Take Five”.

(David Warren) “Dave”  
**Brubeck**



**Question #21: Mathematics**

10 points per part

|  |   |   |
|--|---|---|
| The so-called “integers” named for this person are actually complex numbers in which the real and imaginary parts are both integers. |   |   |
| <b>1</b>   | Identify this mathematician. A process named for him is used to put a matrix into row-echelon [ESH-uh-lahn] form.   | (Johann) Carl (Friedrich) <b>Gauss</b> [rhymse with “house”] [prompt on <b>Gaussian</b> ] |
| <b>2</b>   | In simplified form, what Gaussian integer results when the quantity “3 plus $i$ ” is divided by the quantity “1 plus $i$ ”?   | <b><math>2 - i</math></b> [or <b><math>2 + -i</math></b> or <b><math>-i + 2</math></b> ]  |
| <b>3</b>   | Consider the matrix whose top row is “1, 1, 5” and whose bottom row is “0, 1, 8”. If the matrix is put in <i>reduced</i> row-echelon form, what number is in the top row, right column? | <b><math>-3</math></b> [do not prompt on “3”]   |

**Question #22: Mathematics**

10 points per part

|  |  |   |
|--|--|---|
| For any angle, this function squared equals 1 plus the tangent function squared. |  |   |
| <b>1</b>   | Name this function that, for an acute angle in a right triangle, can be defined as “hypotenuse over adjacent”. | <b>secant</b> function [accept answers that additionally mention a variable; do not accept or prompt on “cosecant”] |
| <b>2</b>   | Find the secant of the quantity “7 pi over 4”.   | square <b>root</b> of <b>2</b> [accept <b>radical 2</b> ]   |
| <b>3</b>   | If the secant of an acute angle is 4, then what is the tangent of the angle?                                   | square <b>root</b> of <b>15</b> [accept <b>radical 15</b> ]   |



**Question #23: Literature**

10 points per part

|   |   |  |
|---|---|--|
| In this novel, Severo Del Valle ["VIE"-ay] is a Liberal Party politician and a Mason. |   |  |
| 1   | Name this novel in which somebody tries to poison Severo, but kills his daughter Rosa the Beautiful instead.      | <i>The <b>House of the Spirits</b></i> [or <i>La casa de los espíritus</i> ] |
| 2   | In <i>The House of the Spirits</i> , what does Clara do on her 19th birthday that she had not done in nine years? | <b>talk</b> or <b>speak</b> or <b>say</b> something                          |
| 3   | This author wrote <i>The House of the Spirits</i> . She was born in Peru but is Chilean.                          | Isabel <b>Allende</b> (Llona)<br>[EE-sah-bel<br>"eye"-YEN-day]               |

**Question #24: Literature**

10 points per part

|  |  |   |
|--|--|---|
| Early in this play, the Mother curses the person who invented knives, shotguns, pistols, little razors, and even hoes and winnowing hooks. |  |   |
| 1  | Name this play in which the characters do not have names except for Leonardo Felix, who runs off with the Bride. It premiered in Madrid in 1933.         | <i><b>Blood Wedding</b></i> [or <i>Bodas de sangre</i> ]  |
| 2  | This object has speaking lines in <i>Blood Wedding</i> after it is addressed by the Woodcutters. This object vanishes after talking to the Beggar Woman. | <b>Moon</b>   |
| 3  | <i>Blood Wedding</i> is by this Spanish playwright. He also wrote <i>The House of Bernarda Alba</i> .  | Federico <b>García</b> Lorca<br>[prompt on <b>Lorca</b> ] |



**Question #25: Social Studies**

*10 points per part*

|  |  |   |
|--|--|---|
| Eli Whitney invented this device in the 1790s. |  |   |
| <b>1</b>                                       | Name this device that made it easy to process a crop that was often picked by slaves.  | <b><u>cotton gin</u></b> [prompt on <b><u>gin</u></b> ] |
| <b>2</b>                                       | A few decades before Whitney invented the cotton gin, James Hargreaves invented this device that uses more than one spindle to change cotton fibers into yarn. | <b><u>spinning jenny</u></b>                            |
| <b>3</b>                                       | Eli Whitney made more money producing this type of gun than cotton gins. This predecessor of the rifle was loaded through the muzzle.                          | <b><u>muskets</u></b>                                   |

**Question #26: Social Studies**

*10 points per part*

|   |   |  |
|---|---|--|
| Warren Burger was the Chief Justice of the United States from 1969 to 1986. |   |  |
| <b>1</b>  | In 1973, the Supreme Court ended many restrictions on this general type of medical procedure in its <i>Roe v. Wade</i> decision.                      | <b><u>abortion</u></b> [or <b><u>aborting</u></b> fetuses; do not accept or prompt on putative synonyms or descriptions] |
| <b>2</b>  | Burger wrote the decision taking away the tax-exempt status from this evangelical university in South Carolina that did not allow interracial dating. | <b><u>Bob Jones</u></b> University   |
| <b>3</b>  | The Burger court required the University of California at Davis to allow this person into its medical school due to an affirmative action lawsuit.    | Allan <b><u>Bakke</u></b> [BAK-ee]   |



### Question #27: Science

*10 points per part*

|  |   |                                       |
|--|---|---------------------------------------|
| These organic compounds are characterized by a hydroxyl ["hide-ROCK-sill"] group attached to carbon from an alkyl [AL-kill] group. |   |                                       |
| 1  | Name this class of compounds whose two-carbon example is ethanol.   | <u>alcohols</u>                       |
| 2  | This is the common name for isopropyl ["ice"-oh-PROH-pill] alcohol based on its use as a cleaning fluid and disinfectant.   | <u>rubbing</u> alcohol                |
| 3  | Rubbing alcohol is oxidized to form this compound that has three carbon atoms, one of which is double-bonded to oxygen and single-bonded to the two other carbon atoms. | <u>acetone</u> [or <u>propanone</u> ] |

### Question #28: Science

*10 points per part*

|  |  |  |
|--|--|--|
| These molecules are often attracted to electrodes. |  |  |
| 1  | Name these molecules that have a net positive or negative electric charge.   | <u>ions</u>  |
| 2  | This consequence of Le Chatelier's [luh "shot"-lee-ay'z] principle states that, for example, there will be more lead chloride in a solution if sodium chloride is added to it. | <u>common-ion</u> effect   |
| 3  | This ion comprises one chlorine atom and four oxygen atoms, with a net charge of $-1$ .  | <u>perchlorate</u> [do not accept or prompt on partial or other answers] |



**Question #29: Mathematics**

10 points

Each **Fermat** [fair-mah] number is 1 more than one of these numbers. If the first  $n$  of these numbers are added, the sum is 1 less than the  $n$ -plus-first of these numbers. Subtracting 1 from one of these numbers gives a Mersenne number, which is used to find a perfect number if the Mersenne number is prime. In each row of Pascal's triangle, the number of odds is one of these numbers, and each row adds up to one of these numbers. Computer storage units are usually one of these numbers of bytes. Name these numbers such as 1, 2, 4, 8, 16, and 32.

powers of 2 [accept 2 to the  $n$ th power or 2 to the power of  $n$ ]

**Question #30: Literature**

10 points

A novella by this writer is about a woman who had been married to Marvin Macy for 10 days. In that novella, this writer featured a hunchbacked man named Cousin Lymon, who becomes the new love interest of Miss Amelia Evans. A novel by this author is set in a Southern town whose main eatery is the New York Café, which is run by Biff Brannon and often frequented by a heavy drinker named Jake Blount. In that novel, this author wrote about the deaf-mutes Spiros **Antonapoulos** [an-tun-uh-POO-lohss] and John Singer. Name this author of *The Ballad of the Sad Café* and *The Heart Is a Lonely Hunter*.

Carson **McCullers** [or  
Lula Carson **Smith**]



**Question #31: Science**

*10 points*

The thermal voltage used in the Shockley diode equation equals this constant times temperature divided by charge. In Planck's law, this constant is multiplied by temperature in the denominator of an exponent. This number is multiplied by the natural log of the number of microstates to determine the entropy of a system. This number equals the ideal gas constant divided by the Avogadro constant, so it can be used in the ideal gas law when  $n$  represents the number of molecules. Identify this constant usually given in Joules ["jewels"] per Kelvin and written as a lowercase  $k$ .

Boltzmann's constant

**Question #32: Social Studies**

*10 points*

The aftermath of this leader ceding territory is described by the phrases "diplomatic revolution" and "reversal of alliances", which is when this leader formed an alliance with France rather than England. That shift was overseen by this leader's chancellor, Wenzel Anton von Kaunitz. That occurred after this person's hold on the throne was strengthened by the War of the Austrian Succession, and this person was allowed to rule according to the Pragmatic Sanction of 1713. Name this Habsburg who was married to Holy Roman Emperor Francis I and who was the archduchess of Austria and queen of Hungary.

Maria Theresa (Walburga Amalia Christina) [or Maria Theresia]





**Extra Question #1: Fine Arts**

10 points

|  |                                     |
|--|-------------------------------------|
| <p>This composer referenced the songs “The Campbell’s are Comin’” and “Hello! Ma Baby” in a work that was combined with <i>Hallowe’en</i> and <i>The Pond</i> to make “Three Outdoor Scenes”. That work, <i>Central Park in the Dark</i>, was combined with another of this composer’s pieces to make “Two Contemplations”. That other work by this composer, in which a woodwind quartet tries to reply to a solo trumpet, is <i>The Unanswered Question</i>. Name this early-20th-century American composer who evinced Boston Common, Putnam’s Camp, and the <b>Housatonic</b> [hoo-suh-TAH-nik] in his piece <i>Three Places in New England</i>.</p> | <p>Charles (Edward) <u>Ives</u></p> |
|--|-------------------------------------|

**Extra Question #2: Social Studies**

10 points

|   |  |
|---|--|
| <p>This person was asked “What newspapers and magazines did you regularly read?” and responded, “I’ve read most of them” and “All of them, any of them that have been in front of me over all these years.” This person hosted the television show <i>Amazing America</i> and wrote the book <i>Going Rogue</i>. After being a state governor for a little over two years, this person resigned in 2009, complaining about the amount of opposition research. Name this person from <b>Wasilla</b> [wuh-SIL-luh], Alaska who became the second woman to run on a major party presidential ticket when she was John McCain’s running mate.</p> | <p>Sarah (<u>Heath</u>) <u>Palin</u><br/>[accept either underlined name]</p> |
|---|--|



### Extra Question #3: Science

10 points

|   |   |
|---|---|
| <p>One of the earliest demonstrations of this phenomenon was a work by Naomi Mitchison and J. B. S. Haldane studying albinism and pink eyes in mice. R. C. Lewontin and Ken-Ichi Kojima proposed a coefficient of the dis-equilibrium of this concept, which is the probability of two <b>alleles</b> [uh-LEELZ] minus the product of the probability of each allele. This phenomenon is a violation of Gregor Mendel's law of independent assortment. This phenomenon is measured in map units or centi-morgans, which relate the distance between chromosome positions and chromosomal crossovers. Name this phenomenon in which traits are inherited together.</p> | <p>genetic <b>linkage</b> (groups)<br/>or genetic <b>linkages</b></p> |
|---|---|

### Extra Question #4: Literature

10 points

|   |                                   |
|---|-----------------------------------|
| <p>In one play by this writer, the protagonist says "Today's game will be delayed because of my Aunt Blanche's headache." In another play by this writer, the same character gets drafted and goes to basic training in Biloxi, Mississippi, continuing the Eugene Jerome trilogy. In another play by this writer, one of the characters tries to set up a double date with the Pigeon sisters, but his friend refuses to go along. In that play, this writer portrayed an unusual and temporary friendship between a news-writer who is a neat freak and a slovenly sportswriter. Name this playwright of <i>Brighton Beach Memoirs</i> and <i>The Odd Couple</i>.</p> | <p>(Marvin) Neil <b>Simon</b></p> |
|---|-----------------------------------|



**Extra Question #5: Mathematics**

*10 points*

This concept is necessary because the derivative operator has a kernel and therefore is not injective. When solving differential equations, this concept's value is often found by considering initial conditions. This concept is used to explain why the antiderivative of “2 sine  $x$  cosine  $x$ ” [pause] can be written as either “sine  $x$ , quantity squared” or as “negative  $\frac{1}{2}$  cosine  $2x$ ”, which do not equal each other. This concept is necessary when evaluating indefinite integrals but is not needed for definite integrals because it would cancel out if used. This concept is used because antiderivatives are not unique. Name this concept often written as “plus  $C$ ”.

**constant of integration**  
[prompt on **constant** or  
plus **C**]



**Extra Question #6: Mathematics**

*10 points per part*

|  |   |                                |
|--|---|--------------------------------|
| These lines are used to test whether a relation is a function. |   |                                |
| <b>1</b>   | Name these lines that are perpendicular to the $x$ -axis and which can be generated by setting $x$ equal to a constant.   | <b>vertical</b> lines          |
| <b>2</b>   | Give the equation of the vertical line that is an asymptote to the graph of “ $y$ equals the quantity $2x$ squared minus $3x$ minus 9, end quantity, divided by the quantity $x$ squared minus $7x$ plus 12”. | $x = -4$ [accept $x - 4 = 0$ ] |
| <b>3</b>   | Give the equation of the vertical line that is an asymptote to the graph of “ $xy$ minus $3x$ plus $2y$ minus 6 equals 0”.  | $x = -2$ [accept $x + 2 = 0$ ] |

**Extra Question #7: Mathematics**

*10 points per part*

|   |  |   |
|---|--|---|
| The length of this segment equals the circumradius of a polygon times the cosine of the quantity “pi over the number of sides”. |  |   |
| <b>1</b>  | Name this segment from the center of a regular polygon to the midpoint of one of the sides.                                      | <b>apothem</b> [AP-uh-thum]   |
| <b>2</b>  | Find the length of the apothem of a regular hexagon whose sides are each 6 units long.   | <b>3</b> times the square <b>root</b> of <b>3</b> (units) [accept <b>3 radical 3</b> (units)] |
| <b>3</b>  | To the nearest thousandth, find the area of a 22-sided polygon with a perimeter of 1. Its apothem length is approximately 0.158. | <b>0.079</b> (units squared or square units)  |



**Extra Question #8: Social Studies**

*10 points per part*

|   |   |  |
|---|---|--|
| Identify these historic volcanic eruptions: |   |  |
| 1   | This volcano erupted in 79 CE, causing Pompeii to be buried.  | Mount <b>Vesuvius</b><br>[veh-SOO-vee-uss] |
| 2   | Much of this mountain was destroyed when it erupted in 1883. This island is in what is now Indonesia, though the eruption had a worldwide impact. | <b>Krakatoa</b><br>[“crack-uh-TOE-uh”]     |
| 3   | This volcano in <b>Martinique</b> [mar-tan-eek] destroyed the city of Saint-Pierre when it erupted in 1902.                                       | Mount <b>Pelée</b>                         |

**Extra Question #9: Social Studies**

*10 points per part*

|  |  |   |
|--|--|---|
| The first Jacobite rising was in reaction to this event. |  |   |
| 1  | Name this event that replaced King James II of England with William III and Mary II.   | <b>Glorious Revolution</b> [or the <b>Revolution of 1688</b> or the <b>Bloodless Revolution</b> ] |
| 2  | Parliament passed several important acts in 1689, including this one stating that James “did endeavour to subvert and extirpate the Protestant religion and the laws and liberties of this kingdom”.                             | English <b>Bill of Rights</b> of 1689   |
| 3  | A key point in the Glorious Revolution came when this general ended his support of James. This general was married to Sarah Jennings and later won the Battle of <b>Blenheim</b> [BLEN-em] in the War of the Spanish Succession. | John <b>Churchill</b> , Duke of <b>Marlborough</b> [accept either underlined name]                |