



Question #1: Literature

10 points

When a boy on horseback asks this novel's protagonist for a drink of milk, the protagonist says there is no milk in town, so some children are dying. Soon after that, shining cans of milk are delivered. This novel then describes a letter from Mr. Carmichael saying that a young man will be hanged for murder. An earlier letter in this novel is from **Theophilus** [thee-AH-fuh-luss] at the Mission House, stating that Gertrude is very sick. This novel is about a reverend who travels from **Natal** [nuh-TAHL] Province to Johannesburg. Name this novel about Stephen **Kumalo** [koo-MAH-loh] written by Alan **Paton** [PAY-tun].

Cry, the Beloved Country

Question #2: Science

10 points

This geologic period began shortly after the breakup of **Pannotia** [pan-OH-shuh], which is also called Greater Gondwana. The *Marrella*, which was an early arthropod, is found in fossils from this period. This period included the End-**Botomian** [bah-TOH-mee-un] and **Dresbachian** [drez-BAHK-ee-un] extinction events, and another extinction event ended this period and began the **Ordovician** [or-doh-VISH-un] Period. A major source of information about this period are fossils from the Sirius Passet, **Maotianshan** [MOW-shin-shan] Shales, and Burgess Shale. Name this first period of the Paleozoic Era which had a great diversification in animals in its namesake "explosion".

Cambrian Period



Question #3: Fine Arts

10 points

This composer made references to his earlier song “Leave Me Alone” in his *Cello Concerto* because it was the favorite song of his deceased sister-in-law. This composer’s *Cello Concerto in B minor* was written in 1894 and remains popular. This composer also wrote two related sets of eight pieces, with the first set beginning and ending with a Furiant, inspired by Bohemian songs. A symphony by this composer was written while he headed the National Conservatory of Music of America and was heavily influenced by spirituals. Name this composer of *Slavonic Dances* and the “From the New World” Symphony.

Antonín (Leopold)
Dvořák [DVOR-zhak]

Question #4: Social Studies

10 points

This person organized protesters in front of the White House from 1917 to 1919 called the Silent Sentinels. That effort was part of this person’s leadership of the National Woman’s Party. This person and Lucy Burns organized a large march that was held the day before Woodrow Wilson’s inauguration. This person and Crystal Eastman proposed a law stating “No political, civil, or legal disabilities or inequalities on account of sex or on account of marriage, unless applying equally to both sexes, shall exist within the United States”, but that proposal has not been ratified. Name this person who wrote the Equal Rights Amendment.

Alice (Stokes) **Paul**



Question #5: Literature

10 points

<p>One of this poet's works consists of the lines "Here we are all by day; by night we're hurled by dreams, each one into a several world." Another poem by this writer states "Come, let us go, while we are in our prime." That poem, which begins "Get up, get up for shame, the Blooming Morn", is "Corinna's [kuh-RIN-uh'z] going a-Maying". Another poem by this writer states "That Age is best, which is the first." That poem ends "For having lost but once your prime, you may forever tarry." This writer began that poem with the line "Gather ye Rose-buds while ye may." Name this English poet who wrote "To the Virgins, to Make Much of Time".</p>	<p>Robert <u>Herrick</u></p>
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Question #6: Science

10 points

<p>Hybridomas ["hi"-brih-DOH-muhz] are used to produce a large number of these proteins that are identical to each other. The onset of Kawasaki disease is treated with aspirin and intravenous injections of these proteins. The fragment crystallizable regions of these proteins are at their tail end and form the base of their 'Y' shape. The <i>fab</i> regions of these proteins bind to epitopes [EP-i-tohps]. In mammals, these proteins are classified as A, D, E, G, or M. The D type of these proteins activate basophils [BAZ-oh-filz] and mast cells. These substances are secreted by B lymphocyte [LIM-foh-"site"] cells. Name these proteins that attach to antigens and remove them.</p>	<p><u>immunoglobulins</u> or <u>antibody</u>/ies [prompt on Ig or Ab or <u>antitoxins</u>]</p>
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Question #7: Mathematics

10 points per part

This mathematician developed a chi [ky] -squared test to measure statistical significance.		
1	Identify this mathematician who is also the namesake of the most commonly used correlation coefficient.	Karl <u>Pearson</u>
2	What is the largest possible value of Pearson's correlation coefficient?	<u>1</u>
3	Find the coefficient of determination if the correlation coefficient equals 0.4.	<u>0.16</u> or <u>4/25</u>

Question #8: Mathematics

10 points per part

The formula named for this mathematician is often extended to find roots of complex numbers.		
1	Identify this mathematician whose namesake formula gives an easy way to raise complex numbers to powers if the numbers are written in polar or "cis" form.	Abraham <u>De Moivre</u> <u>[duh mwahv-ruh]</u>
2	Find the value of i raised to the eighth power.	<u>1</u> (plus $0i$)
3	The cube root of -8 has three values. Give the one whose real and imaginary parts are both positive.	<u>1 plus root 3 i</u> or <u>1 plus i root 3</u> [accept square root of <u>3</u> or radical <u>3</u> in place of <u>root 3</u>]



Question #9: Social Studies

10 points per part

This is the most widely practiced denomination of Islam.		
1	Name this denomination that broke with Shi'a Islam over who should succeed Muhammad.	<u>Sunni</u> Islam [or <u>Sunnism</u>]
2	This movement within Sunni Islam is named after an 18th-century religious leader and has close ties to the Saudi royal family.	<u>Wahhabism</u>
3	Muhammad ibn Abdal Wahab wrote a book named for this Arabic term, which means the oneness of God.	<u>tawhid</u>

Question #10: Social Studies

10 points per part

Catholic Mass involves a profession of faith.		
1	The Catholic Church has in recent decades become more permissive with the use of a creed named for these 12 followers of Jesus.	<u>apostles</u> [accept <u>Apostolic</u> Creed]
2	Most Catholic churches use this creed that begins "I believe in one God." This creed was adopted in 325 CE.	<u>Nicene</u> Creed [or <u>Niceno-Constantinopolitan</u> Creed]
3	Give the last three words to the first stanza of the Nicene Creed in English. The stanza begins "I believe in one God, the Father almighty, maker of heaven and earth, of all things..."	<u>"visible and invisible"</u> [order must be correct]



Question #11: Science

10 points per part

This is the simplest group of alkyls [AL-killz].		
1	Name this group characterized by the radical CH_3 ["C H three"].	<u>methyl</u> group
2	These acids that are a part of amino acids have an alkyl group that is commonly methyl and a group characterized by the radical COOH [spell out].	<u>carboxylic</u> ["car-box-ILL"-ik] acid
3	The combination of just a methyl group with a carboxyl group forms this compound that has a sour taste and pungent smell. Give its full name, not a formula.	<u>acetic acid</u> [accept <u>ethanoic acid</u> ; prompt on <u>vinegar</u>]

Question #12: Science

10 points per part

This rule states that the lowest-energy term is the one with the greatest value of spin multiplicity.		
1	Name this rule stating that electrons fill orbitals in a way that prevents them from pairing up until they have to.	<u>Hund's</u> rule (of maximum multiplicity)
2	Molecular orbital theory is often named after Friedrich Hund and this other person, whose electro-negativity scale combines ionization energy and electron affinity and who is not Linus Pauling.	Robert <u>Mulliken</u> [do not accept "Millikan"]
3	This simplest and strongest bond in molecular orbital theory is formed by the overlap of orbitals in an end-to-end fashion.	<u>sigma</u> bond



Question #13: Literature

10 points per part

In this novel, several dogs are shot during an attack on Lucy's farm.		
1	Name this novel about Lucy's father David Lurie, who used to be a professor of Romantic poetry.	<i><u>Disgrace</u></i>
2	When Cape Technical University shut down its Classics and Modern Languages Department, Lurie often taught classes in this subject.	<u>communications</u> or <u>communication</u> skills
3	This South African author wrote <i>Disgrace</i> as well as <i>Life & Times of Michael K.</i>	J(ohn) M(axwell) Coetzee [kuut-SEE-uh]

Question #14: Literature

10 points per part

The setting of this play is a rehearsal of the play <i>Mixing It Up</i> , which was supposedly written by the same playwright.		
1	Name this play whose characters include the Father, the Mother, the Stepdaughter, the Boy, the Child, and the Son.	<i><u>Six Characters in Search of an Author</u></i> [or <i><u>Sei personaggi in cerca d'autore</u></i>]
2	This Italian playwright wrote <i>Six Characters in Search of an Author</i> .	Luigi Pirandello
3	During the rehearsal, the Leading Man wears a cook's cap and works with what food?	eggs



Question #15: Social Studies

10 points

This country's Silvio **Pettirossi** [pet-tee-ROH-see] International Airport is located in its former capital city, **Luque** [LOO-kay]. This country contains most of the **Pilcomayo** [peel-koh-"MY"-oh] River, which is a tributary of the river that shares its name with this country. This country's eastern border is the site of the second-most powerful dam in the world, the **Itaipu** [ee-"TIE"-poo] Dam, which is very close to this country's second-most populous city, **Ciudad del Este** [see-yoo-DAHD del ESS-tay]. The western half of this country is part of the Gran Chaco. Name this country between Argentina, Bolivia, and Brazil whose capital is **Asunción** [ah-soon-see-OHN].

(Republic of) **Paraguay** or
(República del) **Paraguay**

Question #16: Literature

10 points

In a novel by this author, a man's Madrid, Texas relatives uncomfortably get together with his Mount **Salus** [SAL-us], Mississippi relatives after he dies. This author portrayed that man, Judge McKelva, dying when his second wife, Fay, tries to move him after he has had eye surgery. In a short story by this writer, a family rift worsens when Stella-Rondo claims that Sister does not like Papa-Daddy's beard. In that short story, this writer has the narrator, who is Sister, explain why she moved away from her family. Name this author from Mississippi who wrote *The Optimist's Daughter* and "Why I Live at the P.O."

Eudora (Alice) **Welty**



Question #17: Mathematics

10 points

Chen's theorem is a less restrictive but proven variation on this statement. The ternary version of this statement, which is also known as the "weak" version, might have been proved by Harald Helfgott in 2013. This statement can be restricted to odd addends when it is applied to numbers greater than 4, but that restriction cannot be made when it is applied to numbers greater than 2. This statement is named after the person who wrote about it in letters to Leonhard Euler [OY-lur]. Name this statement that every even integer greater than 2 can be expressed as the sum of two primes.

Goldbach's conjecture

Question #18: Social Studies

10 points

During this battle, the ship *Capitana*, led by Marcantonio Colonna [mark-an-TOH-nee-oh kuh-LOH-nuh] was used to rescue the winning side's flagship, the *Real* [ray-AHL]. This battle reversed the result of the siege of Famagusta [fah-muh-GOOS-tah] on the island of Cyprus. During particularly close fighting during this battle, Agostino Barbarigo [bar-bah-REE-goh] was killed. His side, which won, was led on the other side of this battle by Giovanni Andrea Doria [joh-VAHN-nee ahn-DRAY-ah DOR-ee-ah]. Mahomet Sirocco and Ali Pasha were both killed during this battle while fighting for the Ottoman Empire. Name this 1571 victory for the Holy League under Don Juan de Austria which was fought in a branch of the Ionian Sea.

Battle of Lepanto



Question #19: Science

10 points

The Grashof number is divided by the square of this number to calculate the Richardson number, which compares natural convection to forced convection. When a **Mach** [“mock”] number gets very large, this quantity predicts the behavior of the surrounding medium better than the Mach number. The **Euler** [OY-lur] equations are accurate only when this quantity is large. This quantity is defined as flow speed times diameter divided by **kinematic** [ky-nuh-MAT-ik] viscosity, which makes it unit-less. More generally, this quantity is thought of as the ratio of inertia force to viscous force. When this quantity is large, eddies are likely. Name this quantity that is low for laminar flow and high for turbulent flow.

Reynolds number

Question #20: Miscellaneous

10 points

Early examples of this technology, such as Audrey by Bell Laboratories and Shoebox by IBM, were developed in the mid-20th century. According to recent rumors, Facebook’s attempts at this technology are codenamed Aloha. One of the products whose primary feature is this technology is the Nuance Ten, which also uses artificial intelligence, neural networks, and deep learning. This technology is often paired with natural-language understanding. Amazon’s Alexa and Apple’s Siri rely on this technology. Name this key aspect of hands-free computing that allows users to talk to devices.

(automatic) speech recognition or (computer) speech recognition or speech to text or voice transcription or STT or ASR [prompt on voice recognition]



Question #21: Literature

10 points per part

This novel begins with the line “This is the saddest story I have ever heard.”		
1	Name this novel narrated by John Dowell. Both he and his friend Edward Ashburnham are in troubled marriages.	<i>The <u>Good Soldier</u></i>
2	This author wrote <i>The Good Soldier</i> as well as the <i>Parade’s End</i> tetralogy [teh-TRAH-luh-jee].	Ford Madox <u>Ford</u> [or Ford Hermann <u>Hueffer</u>]
3	This person wrote the script for a television adaptation of <i>Parade’s End</i> that starred Benedict Cumberbatch. This writer’s original works include <i>Arcadia</i> and <i>Rosencrantz and Guildenstern Are Dead</i> .	Tom <u>Stoppard</u> [or Tomáš <u>Stráussler</u>]

Question #22: Literature

10 points per part

This poem contains the lines “The Mariners heard the warning Bell; and then they knew the perilous Rock.”		
1	Name this English poem published in 1802 that begins “No stir in the air, no stir in the sea, the Ship was still as she could be.”	“The <u>Inchcape Rock</u> ”
2	This poet wrote “The Inchcape Rock” and “After Blenheim”.	Robert <u>Southey</u>
3	Robert Southey was a leader of the Lake Poets along with this writer of <i>The Rime of the Ancient Mariner</i> .	Samuel Taylor <u>Coleridge</u>



Question #23: Science

10 points per part

These bonds are often labeled with the letters ‘O’, ‘N’, ‘S’, or ‘C’.		
1	Name these covalent bonds that link a saccharide [“SACK-uh-ride”] to something else or to another saccharide.	glycosidic [gly-koh-SID-ik] bonds
2	Glycosidic bonds form when one of these carbons combines with a hydroxyl [“hide-ROCKS-ill”] group. These carbons were part of a carbonyl [KAR-buh-nil] group before the saccharide became cyclic.	anomeric [an-oh-MAIR-ik] carbons
3	Only one anomeric carbon is used in this type of sugar that can react with an oxidizing agent.	reducing sugar [or reductant or reducer ; do not accept “reduction (sugar)”]

Question #24: Science

10 points per part

Lipids are a principal component of cell membranes.		
1	These lipids, which are the main constituents of body fat, contain fatty acids.	triglycerides [“try-GLISS-uh-rides”]
2	Triglycerides are also these types of organic compounds formed by replacing an acid’s hydrogen with a hydrocarbon group. The hydrocarbon group used is often an alkyl [AL-kil].	ester
3	Some lipids are this type of molecule that has one end attracted to water and one end repelled by water.	amphiphile(s) [AM-fih-“file”] or amphiphilic molecule(s) [or amphipathic molecules or amphipaths]



Question #25: Social Studies

10 points per part

This Chinese dynasty lasted from 221 to 206 BCE.		
1	Name this dynasty started by the first emperor of a unified China, whose name is sometimes given as Shi Huangdi.	Qin ["chin"] dynasty [accept Kin or Ch'in ; do not accept Qing]
2	Shi Huangdi suppressed intellectuals, ending this scholarly Chinese period that existed during the Spring and Autumn Period and the Warring States Period.	Hundred Schools of Thought [or zhuzi baijia]
3	Shi Huangdi ended this school of thought that emphasized love without distinctions.	Mohism or Mohist school [or Mozi]

Question #26: Social Studies

10 points per part

This person was the chancellor from 1949 to 1963.		
1	Name this first leader of West Germany.	Konrad (Hermann Joseph) Adenauer [KOHN-raht AH-duh-"now"-ur]
2	Adenauer headed the Prussian State Council for most of the time between 1918 and 1933, when Germany was organized as a republic named for this city where its constitution was signed.	Weimar ["VIE-mar"], Thuringia [accept Weimar Republic]
3	Adenauer was succeeded by this person who had disagreed with him while being his minister of economic affairs and vice-chancellor.	Ludwig (Wilhelm) Erhard



Question #27: Fine Arts

10 points per part

This series of paintings inspired an Igor Stravinsky opera.		
1	Name this 18th-century series of paintings about a man named Tom who inherits money but wastes it.	A <u><i>Rake's Progress</i></u> or <u><i>The Rake's Progress</i></u>
2	This English artist painted <i>A Rake's Progress</i> as well as <i>A Harlot's Progress</i> .	William <u>Hogarth</u>
3	Years later, Hogarth made this series about a man and a woman. The man is killed, and the woman commits suicide.	<u><i>Marriage-A-la-Mode</i></u>

Question #28: Fine Arts

10 points per part

Name these paintings by Pierre-Auguste Renoir [pyair oh-goost ren-war]:		
1	This painting shows Jeanne Darlot [zhahn dar-loh] and a younger girl. An owner of this painting called it <i>On the Terrace</i> .	<u><i>Two Sisters</i></u> [or <i>Les Deux Soeurs</i>]
2	<i>Two Sisters</i> is set near this painting in which a woman holds a dog on a table and a man sits backward on a chair.	<u><i>Luncheon of the Boating Party</i></u> [or <i>Le déjeuner des canotiers</i>]
3	Unlike <i>Two Sisters</i> , this painting actually shows two sisters. It is also called <i>Alice and Elisabeth Cahen d'Anvers</i> [dahn-veer], but you should give the common title based on the girls' colorful dresses	<u><i>Pink and Blue</i></u> [or <u><i>Rose et bleu</i></u> ; order must be correct]



Question #29: Mathematics

10 points

The architect Christopher Wren determined that the length of this curve is eight times one of its generating parameters. If a pendulum is suspended from part of this curve, then the pendulum's period does not depend on amplitude. This shape can be generated by the parametric equations " x equals t minus sine t " and " y equals 1 minus cosine t ". The time it takes for an object to slide down this shape without friction is not dependent on the starting point of the object, which leads to this shape being called the **tautochrone** ["TAUT-oh-crone"] curve. Name this shape traced out by a point on the rim of a rolling wheel.

cycloid(s)

Question #30: Literature

10 points

This goddess has an older sister who was one of the wives of **Kali** [KAH-lee] and whose name literally states that she is not this goddess. **Sita** [see-tah] is believed to be an incarnation of this goddess, so the worship of this goddess is often based on stories from the *Ramayana*. This goddess left the world when Indra threw sacred flowers on the ground, and she did not return until she could be seen on a lotus flower after the gods churned the oceans for 1,000 years. This wife of Vishnu is celebrated by cleaning the home and having a festival of lights. Name this Hindu goddess of wealth who is celebrated on Diwali.

Lakshmi



Question #31: Science

10 points

<p>An equation named for this person and William Thomson is used to approximate freezing-point depression. The entropy named for this person is based on state probabilities, and it gives similar but not identical results to the Boltzmann and Clausius entropies. The form of entropy named for this scientist equals the temperature derivative of Helmholtz free energy. This person is also the namesake of a quantity equal to enthalpy minus temperature times entropy; that quantity is useful when there is constant temperature and pressure. Name this American scientist who is the namesake of a kind of free energy.</p>	<p>J(osiah) Willard <u>Gibbs</u></p>
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Question #32: Social Studies

10 points

<p>In response to this conflict, one person sent his wife Frances to England for help. Charles the Second sent 1,000 troops, but their side won before the troops arrived. One leader of this conflict was replaced by John Ingram after dying from dysentery. That side consisted largely of indentured servants and Black slaves who wanted to kill all Native Americans. At the beginning of this conflict, a colonial governor bared his chest and dared a person to kill him; that governor was William Berkeley [BARK-lee]. Name this conflict that took place in 1676 around Jamestown, Virginia.</p>	<p><u>Bacon's rebellion</u></p>
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Extra Question #1: Science

10 points

This law and the Lorentz force law can be combined to prove Ampère's force law. Additionally, Ampère's law can be derived from this law, but this law is more useful in situations that lack symmetry. In the most common way to write this law, the permeability of free space is divided by 4 pi, and that quantity is multiplied by an integral that includes an inverse-square relation. If this law is applied to a straight wire, it can be simplified to the formula "permeability of free space times current divided by the quantity 2 pi times distance". Identify this law that says the magnetic field is equal to an integral of current crossed with position, and which is named for two French scientists .

Biot-Savart [bee-oh sah-var] law [prompt on **Laplace**'s law]

Extra Question #2: Social Studies

10 points

This city was the location of the Honno-ji Incident, where an attack by **Akechi Mitsuhide** [ah-keh-chee mit-soo-hee-day] led to Oda Nobunaga's suicide. This city is next to the site of the Battle of Uji, which started the Genpei War. Four years later in this city, Minamoto no Yoshinaka destroyed the Hojuji Palace and seized Emperor Go-Shirakawa. The **Muromachi** [moo-roh-MAH-chee] period ended when **Ashikaga Yoshiaki** [ah-shee-kah-gah yoh-shee-AH-kee] was driven out of this city by Oda Nobunaga. In 1997, an international agreement on global warming was adopted in this city and named this city's "Protocol". Name this city that during the **Heian** [HAY-un] period became the capital of Japan and which kept that role until 1869.

Kyoto, Japan [or Heian-**kyo**]



Extra Question #3: Literature

10 points

In a novel by this author, several characters state, “These are strange times to be a Jew” after the body of Mendel Shpilman is found at the Hotel Zamenhof. This author set that novel in Sitka, Alaska, which has become the primary home for Jews in an alternative history in which the Arabs defeated Israel. In another novel by this writer, a character moves to New York City in 1939 after escaping from Prague by hiding in a coffin. The two protagonists of that novel are cousins who create a comic book character called “the Escapist”. Name this author of *The Yiddish Policemen’s Union* and *The Amazing Adventures of Kavalier & Clay*.

Michael Chabon

Extra Question #4: Mathematics

10 points

The center of a nine-point circle is halfway between this point and the circumcenter. The nine-point circle goes through the midpoints of segments between each vertex and this point. The existence of this point can be proven by using the existence of the circumcenter of a larger triangle to demonstrate that three segments are concurrent. The distance between the centroid and circumcenter is half of the distance between the centroid and this point. This point is at the right angle of a right triangle, and it is outside of obtuse triangles. Name this point at the intersection of triangle altitudes.

orthocenter



Extra Question #5: Fine Arts

10 points

A depiction of Jesus by this painter is 200 centimeters wide but only 30 centimeters tall and shows the eyes of Jesus rolled up [pause] and the back of his hand as bluish. That painting from the 1520s is *The Body of the Dead Christ in the Tomb*. Another painting by this artist depicts **Jean de Dinteville** [zhahn duh deent-veel] and **Georges de Selve** [zhorzh duh selv] standing on opposite sides of shelves with several objects, including two globes and a lute with a broken string. This artist painted a skull in **anamorphic** [an-uh-MOR-fik] perspective at the bottom of that painting. Name this German painter of *The Ambassadors*.

Hans **Holbein** the Younger



Extra Question #6: Literature

10 points per part

Near the beginning of this novel, the main character learns that his sister Savannah has attempted suicide and his wife Sallie is having an affair.		
1	Name this novel about Tom Wingo, who grew up in South Carolina.	<i>The <u>Prince of Tides</u></i>
2	This author wrote <i>The Prince of Tides</i> and <i>The Great Santini</i> .	(Donald) Pat(rick) <u>Conroy</u>
3	Pat Conroy was encouraged to become a writer by a high school English teacher who gave him a copy of this author's <i>Look Homeward, Angel</i> and drove him to this author's home in Asheville, North Carolina.	Thomas (Clayton) <u>Wolfe</u> [do not accept or prompt on "Tom Wolf"]

Extra Question #7: Literature

10 points per part

The second chapter of this novel begins "With the breakdown of the Medieval system, the gods of Chaos, Lunacy, and Bad Taste gained ascendancy."		
1	Name this novel in which Ignatius J. Reilly lives in New Orleans with his mother and corresponds with Myrna Minkoff, who lives in New York City.	<i>A <u>Confederacy of Dunces</u></i>
2	This author wrote <i>A Confederacy of Dunces</i> , but it was published after he died by suicide.	John Kennedy <u>Toole</u>
3	Ignatius Reilly is a big fan of this philosopher, especially his <i>Consolations of Philosophy</i> .	<u>Boethius</u> [boh-EE-thee-uss]



Extra Question #8: Mathematics

10 points per part

This type of interval is expressed using square brackets instead of parentheses.		
1	Name this type of interval that includes its endpoints.	closed interval
2	Give both endpoints of the closed interval that solves the inequality “5 is less than or equal to $4x$ minus 3, which is less than or equal to 21”.	2 and 6 [either order; accept 2 is less than or equal to x is less than or equal to 6]
3	Find the radius of the closed disk “ x squared plus y squared minus $6x$ plus 5 is less than or equal to 0”.	2

Extra Question #9: Mathematics

10 points per part

A graph of this type of polynomial can have at most two stationary points.		
1	Give the name for a polynomial with degree 3.	cubic polynomial
2	Find the x -coordinates of both stationary points for the polynomial “ x cubed minus $12x$ ”.	2 and -2 [either order; or plus or minus 2 or positive and/or negative 2]
3	Find the constant term for the cubic polynomial in which the coefficient of x cubed is 1 and whose zeroes are 1, 2, and 3.	-6 [do not prompt on “6”]