1. In *Crime and Punishment,* Svidrigailov (svih-drih-GUY-lahf) claims to be going to this country just before shooting himself. After impregnating household servant Johanna Brummer, the youth Karl Rossman is sent to this country in a Franz Kafka novel. In 1974, Alexander Solzhenitsyn went to this country after being exiled from the Soviet Union. People from this country visiting Spain are the subject of *The Sun Also Rises.* For 10 points, name this country whose *emigre* authors included Gertrude Stein and Ernest Hemingway.
ANSWER: the **United States** of America [or the United States of **America** or other obvious equivalents]

080-12-56-04101

2. A molecule that does not do this action in a solution has a van 't Hoff factor of 1. An ICE table is often used to determine the amount of a compound that undergoes this action. For an acid, the log of the constant for this process is related to pH by the Henderson-Hasselbach equation. When this process occurs with salts, it can create an electrolytic solution. For 10 points, name this process by which molecules are split into their smaller component ions.
ANSWER: **dissociation** [or **ionization**; or acid **dissociation**]

023-12-56-04102

3. In one battle, this officer disobeyed the orders of Admiral Hyde Parker, which led to his destruction of much of the Danish fleet. He was victorious at another battle fought in Aboukir Bay. After he was stationed at Cadiz aboard the HMS *Victory*, this man defeated a Franco-Spanish force led by Admiral Villeneuve in an engagement that saw him hit by sniper fire. For 10 points, name this British naval officer who was shot and killed during his victory at the 1805 Battle of Trafalgar.
ANSWER: Horatio **Nelson**

064-12-56-04103

4. The long half-life of about 4.5 billion years of this element makes it useful for radiometric dating in techniques that see it decay to thorium (THOR-ee-uhm) and lead. Martin Klaproth discovered this element's presence in pitchblende. It also occurs in a type of powder called yellowcake. The 235 isotope of it is the only naturally occurring fissile (FIH-sie-ull) isotope, which is enriched in centrifuges from its more common 238 isotope. For 10 points, name this member of the actinide (ACK-tih-nide) series that is used in nuclear reactors.
ANSWER: **uranium**

147-12-56-04104

5. This ruler conquered the kingdom of his father-in-law Desiderius and was victorious at Pamplona but lost at Saragossa. This student of Alcuin built his palace at Aachen, and his biography was written by Einhard. This predecessor of Louis the Pious lost his rear guard to a surprise attack at Roncesvalles (RON-seh-valz) Pass. This son of Pepin the Short was crowned by Pope Leo III on Christmas Day in 800. For 10 points, name this Holy Roman Emperor who united the Frankish lands.
ANSWER: **Charlemagne** [or **Charles I**; or **Charles the Great**; or **Charles le Grand**; or **Carolus Magnus**; or **Karl der Grosse**; prompt on **Charles**]

124-12-56-04105

6. In one story by this writer, a man in black offers a serpent-shaped staff to the title character as they walk. After witnessing a witches' sabbath in the forest, that title character created by this author distrusts his wife Faith. In a novel by him, the protagonist's husband is first seen standing beside an Indian after returning under the name Roger Chillingworth. That novel involves Hester Prynne being forced to wear a patch of fabric in the shape of an "A." For 10 points, name this American writer who wrote "Young Goodman Brown" and *The Scarlet Letter.*
ANSWER: Nathaniel **Hawthorne**

7. In one country, this body of water is named for the province of Mazandaran (mah-ZAHN-durr-ahn) that borders it. Old records show that both the Syr Darya (sir DAH-ree-uh) and Amu Darya (ah-moo DAH-ree-uh) rivers once flowed into this body of water, although neither one currently does. The Alborz Mountains lie along the southern shore of this body. The Ural and Volga rivers both end in this body of water, whose major cities include Baku in Azerbaijan. For 10 points, name this large sea in central Asia, found north of Iran and to the east of the Black Sea.
ANSWER: **Caspian** Sea

8. The Five-Power Naval Limitation Treaty and the Four-Power Pact were signed during this man's presidency. This President defeated James Cox using a "front porch" campaign. In one speech, this man advocated a "return to normalcy" in the aftermath of World War I. During his administration, Albert Fall profited from the leasing of oil reserves such as Teapot Dome. For 10 points, name this President who, upon his death in office in 1923, was succeeded by Calvin Coolidge.
ANSWER: Warren Gamaliel **Harding**

9. One character in this book is taken out of school after her teacher hits her for trading limes with her friends and giving none to Miss Snow. The epigraph to this novel is taken from John Bunyan's *Pilgrim's Progress,* which also provides many of its chapter titles. The protagonist of this novel marries Professor Bhaer, who helps her develop as a writer. By its end, Beth has died of scarlet fever, and Amy has married her former neighbor Laurie. For 10 points, name this novel about Josephine March and her three sisters by Louisa May Alcott.
ANSWER: ***Little Women***

10. The further propagation of this structure is threatened by deletion of its AZF region. Swyer syndrome can be caused by a deficiency in this structure's SRY region. A degeneration of this structure in Muridae and Cricetidae (crick-ET-id-eye) has led many scientists to hypothesize its eventual disappearance within the next ten million years in primates and humans. The most recent common ancestor of this structure, named Adam, is often paired with Mitochrondrial Eve. For 10 points, name this sex-determining chromosome that starts the development of testes and the production of sperm.
ANSWER: **Y** chromosome

11. This deity was served by the god of the wine-press, Shezmu, in his realm of Duat. In one story, this god held a banquet at which his brother tricked him into entering a casket that fit this god's dimensions. Only thirteen pieces of this god are found after he is cut into fourteen by his brother Set; he is mostly recovered and reconstructed by his wife. For 10 points, name this Egyptian god of the underworld who was the father of Horus and husband of Isis.
ANSWER: **Osiris** [or **Usir**]

12. This city contains a Sanitary and Ship Canal that is connected by the Cal-Sag Channel to the Little Calumet River. Sections of highway in this city are named the Edens, Calumet, and Dan Ryan. This city has a 150 foot high Ferris wheel located on its Navy Pier. Each Saint Patrick's Day, this city's main river is dyed green. For 10 points, name this city located on Lake Michigan that is the third largest in the U.S. and the largest in Illinois.
ANSWER: **Chicago**

13. A dynamic example of these algorithms developed by Ziv and Lempel optimizes based on the sample being examined. These algorithms can be performed if the Shannon entropy is less than the average encoding length. The discrete cosine transform and run-length encoding are "lossy" examples of these algorithms. Those are often performed with images or sound, where missing information may go unnoticed. A lossless example for images is the GIF format, and JPEG employs both lossy and lossless types of this. For 10 points, name these algorithms that reduce the memory necessary to store information.
ANSWER: data **compression** algorithms [or word forms]

14. This composer's Septet in E-flat major was dedicated to Maria Theresa, and was premiered along with his first symphony. He wrote a set of 33 pieces based on the work of an earlier Italian composer, the Diabelli (dee-a-BEHL-ee) Variations. His piano sonatas include *Les Adieux*, *Waldstein* (VAHLD-shtein), and *Apassionata*; the nickname of another was inspired by a critic's comparison to Lake Lucerne. For 10 points, name this composer of the *Moonlight Sonata,* who included a setting of Schiller's "Ode to Joy" in his ninth symphony.
ANSWER: Ludwig van **Beethoven**

15. One method for determining this property uses a Durometer. Another method for calculating this property uses the coefficient 1.854 and a material in the shape of a square pyramid. That method was devised by engineers at Vickers, Ltd. This property can be measured using a sclerometer (SCLER-ah-muh-ter). One scale for this property lists quartz at seven. For 10 points, name this property measured by the Mohs scale to be the resistance of a smooth surface to abrasion or scratching.
ANSWER: **hardness**

1A. Who wrote *The Conditions of the Working Class in England* while in Manchester, three years before co-authoring *The Communist Manifesto* with Karl Marx?
ANSWER: Friedrich **Engels**

1B. What Mexican poet wrote the essay collection *The Labyrinth of Solitude*?
ANSWER: Octavio **Paz**

2A. This is a 10-second calculation question. What is the smallest prime divisor of 329?
ANSWER: **7**

2B. This is a 10-second calculation question. What is the power of a test that incorrectly identifies 5% of negative results as positive and 1% of positive results as negative?
ANSWER: **0.99** [or **99%**]

3A. What poetry collection by Charles Baudelaire (BOE-duh-lair) begins with a poem "To the Reader" and contains the section "Spleen and Ideal"?
ANSWER: *Les **Fleurs du Mal*** [or *The **Flowers of Evil***]

3B. What NBA team plays in the FedEx Forum and is led by Rudy Gay and Zach Randolph?
ANSWER: Memphis **Grizzlies** [or **Memphis** Grizzlies]

4A. Which chemical bonds are formed when atoms share pairs of electrons?
ANSWER: **covalent** bonds

4B. What artificial language was created by Ludwig Zamenhof in 1887?
ANSWER: **Esperanto**

5A. Which former President was accused during the Whitewater Scandal of providing funding illegally to a corporation while he was acting as Governor of Arkansas?
ANSWER: Bill **Clinton** [or William Jefferson **Clinton**; or William Jefferson **Blythe** III]

5B. This is a 20-second calculation question. Construct regular hexagon ABCDEF of side length 2 units. What is the area of rectangle ACDF? Express your answer in simplest radical form.
ANSWER: **4** times the square **root** of **3** square units [or **4 sqrt(3)** square units]

6A. This is a 20-second calculation question. Solve on the interval x between 0 and 2 pi, inclusive. $2 \cos^2 x - 3 \cos x - 2 = 0$.
ANSWER: **{2pi/3, 4pi/3}**

6B. Palamedes (pal-uh-MEED-eez) placed what son of Odysseus in front of a plow prior to the Trojan War?
ANSWER: **Telemachus**

7A. In response to a question at a January 17 debate about US-Pakistani relations, Newt Gingrich claimed that Andrew Jackson's policy towards "America's enemies" was what two-word phrase?
ANSWER: "**kill them**"

7B. What is the term for the Jain doctrine of universal nonviolence that manifests in practitioners taking great care not to harm insects and other animals?
ANSWER: **ahimsa**

8A. Which Roman emperor was served by the generals Belisarius and Narses?
ANSWER: **Justinian** the Great [or **Justinian** I]

8B. What author of *Nine Stories* wrote about Holden Caulfield in *The Catcher in the Rye*?
ANSWER: Jerome David **Salinger**

9A. This is a 30-second calculation question. Kevin is twice as old as John will be in four years. In two years, Matt will be three times as old as John is now. Four years ago, Kevin was twice as old as Matt. How old is John?
ANSWER: **4** years old

9B. This is a 30-second calculation question. There are 8 good apples and 2 rotten apples in a box of apples. If you randomly pick 4 apples from the box without replacement, what is the probability that exactly 3 of them are good apples? Express your answer as a fraction in lowest terms.
ANSWER: **8/15**

10A. What actress voiced Lady Bluebury in *Gnomeo and Juliet* and played Professor McGonagall in the Harry Potter series?
ANSWER: Maggie **Smith**

10B. What is the number of extra troops provided by Europe and North America in Risk, the number of resources in *The Settlers of Catan,* or the point value of a rook in chess?
ANSWER: **five**

1. In James Joyce's *A Portrait of the Artist as a Young Man,* Stephen Dedalus writes a poem in this form. In this form of poem, the first and third lines form a rhyming couplet at the end of the poem, and the first line is repeated at the end of the second stanza. One poem written in this form exhorts the addressee to "rage, rage against the dying of the light." For 10 points, Dylan Thomas's "Do Not Go Gentle into That Good Night" is an example of what nineteen-line poetic form with a French name?
ANSWER: **villanelle**

003-12-56-04117

2. This cell is surrounded by the corona radiata, which supplies proteins to it. It is also protected by the zona pellucida, which allows for the acrosome reaction to take place. Polar bodies exist inside of these cells. Around a day after a surge of Luteinizing Hormone, this cell is released from its site of production. That event ends the follicular phase of a cycle involving the discharge of this cell. For 10 points, name this female gamete, a reproductive cell that is fertilized by sperm.
ANSWER: **ovum** [or **egg** cell]

127-12-56-04118

3. This state's "Archive War" was fought over an attempt to move this state's capital by a man who replaced Mirebeau Lamar as the leader of this state. English designs on this state were revealed in the Pakenham letter by John Calhoun. The Compromise of 1850 reimbursed this state for lost territory. John Tyler failed to annex this state, a feat that was accomplished by James K. Polk. For 10 points, name this state that was led for ten years as a Republic by men such as Sam Houston.
ANSWER: **Texas** [or Republic of **Texas**]

149-12-56-04119

4. The presence of this property causes Joule heating. For a model in which this property is absent, Bardeen, Cooper, and Schriffer won a Nobel Prize. The absence of this quality leads to the expulsion of magnetic fields in the Meissner effect. For a conductor, this quantity is equal to length divided by cross-sectional area times conductivity. For 10 points, name this quantity, equal to voltage divided by current according to Ohm's law, and absent in superconductors.
ANSWER: electrical **resistance**

002-12-56-04120

5. In Frederic Church's *The Heart of the Andes*, two miniscule natives are in front of one of these objects next to a cliff. Piero della Francesca (fran-CHESS-kuh) painted a series detailing the "Legend" of one of these objects. In Renaissance art, these objects are frequently mounted with a sign reading "INRI" ("I-N-R-I"), and a man is taken down from one in Deposition scenes. Mary Magdalene and the Virgin Mary are often at their bases. For 10 points, name these objects upon which Jesus is mounted in Passion scenes.
ANSWER: **cross**es [or **crucifix**es; or the true **cross**]

080-12-56-04121

6. The Lorentz factor is defined as 1 over the square root of 1 minus v squared over this quantity squared, so this quantity affects the extent of length contraction or time dilation. Tachyons are so named because of their hypothetical ability to exceed it. According to Einstein's mass-energy equivalence, energy is equal to mass times the square of this quantity. For 10 points, give this quantity symbolized c and equal to three times ten to the eighth meters per second in a vacuum.
ANSWER: the **speed of light** [accept **c** early]

7. This country was home to the Moro Islamic Liberation Front, Andres Bonifacio's Katipunan (KAH-tee-poo-NAHN), and Jose Rizal's Propaganda Movement. The Tydings-McDuffie Act gave independence to this country, and the People Power Revolution ousted one of its presidents. Corazon Aquino and Ferdinand Marcos led this country, where the Battles of Corregidor and Bataan were fought. For 10 points, in what country did John Dewey and Emilio Aguinaldo win the Battle of Manila Bay?
ANSWER: Republic of the **Philippines** [or Republika ng **Pilipinas**]

8. Hypotheses for the origin of this phylum include the woody magnoliid and paleoherb hypotheses. Members of this phylum are monoecious (MON-oh-EESH-uss) if they contain both sexes and are divided into monocots or dicots based on the number of cotyledons. Seeds are contained inside sporophylls in members of this phylum, whose corolla surround the stamen and pistil. Sepals protect petals on members of this fruit-producing phylum. For 10 points, name this phylum of flowering plants, contrasted with gymnosperms.
ANSWER: **angiosperm**ae [or **angiosperm**s or **Anthophyta**]

9. Hamid Karzai endorsed a plan for peace in Afghanistan that would start with the Taliban opening an office in this country. In November 2011, Pakistani officials caused a minor diplomatic tiff with this country by releasing fifty falcons belonging to its royal family. The headquarters for Al Jazeera are located in this country, which also housed the US forward operating base for the invasion of Iraq. Recently, this country has been embroiled in corruption allegations and announced plans to air-condition its outdoor stadiums. For 10 points, name this country which was surprisingly awarded the 2022 FIFA World Cup.
ANSWER: **Qatar**

10. The equipment used by this scientist in his namesake experiment was actually designed and built by John Mitchell. That apparatus consisted of two pairs of lead spheres of 350 and 1.6 pounds set on a torsion balance. That experiment was intended to measure the Earth's density, but ultimately yielded both the Earth's mass and a universal constant. For 10 points, name this British scientist who completed Newton's Law of Universal Gravitation by measuring the gravitational constant.
ANSWER: Henry **Cavendish**

11. One building found in a suburb of this city features eight steel columns and glass walls built of giant panes; that is Ludwig Mies van der Rohe's Farnsworth House. Steel is again used in one sculpture in this city, nicknamed The Bean, which is the massive stainless steel *Cloud Gate* designed by Anish Kapoor; that sculpture is found in this city's Millennium Park. Cantilevered roofing and the use of Roman Brick characterize another building in this city, designed in the Prairie Style by Frank Lloyd Wright. For 10 points, name this city where the Robie House is found in Hyde Park.
ANSWER: **Chicago**

12. This character is vindicated after being accused by Mr. Brocklehurst. At the Lowood School, she looks up to one of her teachers, Miss Temple, and befriends Helen Burns, who dies of tuberculosis in her presence. This character rejects a proposal from a minister who travels to India. This character is employed as a governess for Adele at Thornfield Manor, which is burnt down by Bertha Mason, whom this character discovers is the first wife of her employer, Mr. Rochester. For 10 points, name this title character of a Charlotte Bronte novel.
ANSWER: **Jane** Eyre [or Jane **Eyre**]

13. In one opera by this composer, Adriano is in love with Irene, but both of them die along with the title tribune when rebels set the Capitol on fire. Another opera by this composer sees a knight leave Venusberg and compete with Wolfram for the love of Elisabeth. In addition to *Rienzi* (ri-EHN-zee) and *Tannhauser* (TAHN-hoy-zer), this composer wrote an opera in which Senta's love saves a man from eternally sailing the seven seas. He is best known, however, for a tetralogy that includes *Das Rheingold* and *Siegfried*. For 10 points, name the German composer of *The Flying Dutchman* and the *Ring* cycle.
ANSWER: Richard **Wagner**

14. 831 "koban" in this city are the substations of its police department, which is headquartered in an iconic triangular building with a spiraling tower on top. In this city, a large fireworks display is held on the last Saturday of July over the Sumida River. Its subway system, the world's busiest, was the target of a sarin gas attack in 1995. This city is home to the fashion district Harajuku. For 10 points, name this city, the home of the Japanese Imperial Palace.
ANSWER: **Tokyo**

15. This poet wrote "let age speak the truth and give us peace at last" in a poem beginning, "Grow old along with me! The best is yet to be." This poet of "Rabbi Ben Ezra" also wrote a poem which ends by describing a statue of Neptune taming the seahorse made by Claus of Innsbruck. That poem describes a woman who had a heart "too soon made glad" who is "painted on the wall, looking as if she were alive." For 10 points, name this Victorian poet of "My Last Duchess."
ANSWER: **R**obert **Browning**

1. One of this man's speech's claimed those who "trade our freedom for security" were bringing the country "down to the ant heap of totalitarianism." That "A Time for Choosing" speech was used for Barry Goldwater's presidential campaign. In another speech, this President told a fellow leader that if he sought peace, prosperity, and liberalization, he should come to a city's gate. That speech also saw this man ask "Mr. Gorbachev" to "tear down this wall." For 10 points, name this "Great Communicator" President.
ANSWER: Ronald Wilson **Reagan**

121-12-56-04132

2. In this work, it is revealed that Felix hatched a plot to release a Turk from prison, thereby winning Safie's love and getting himself, Agatha, and De Lacey exiled to a cottage where chopped wood mysteriously appears. One character in this work frames Justine Moritz for murder and later murders Henry Clerval and blames it on the protagonist. This novel begins with a series of letters from Robert Walton. For 10 points, name this work about Victor and his monstrous creation, written by Mary Shelley.
ANSWER: ***Frankenstein***

124-12-56-04133

3. Statements involving this concept are formally proven using delta-epsilon proofs. The squeeze theorem is used to find unknown ones based on ones already known. In statistics, a theorem named for the central one of these states how variables approach the normal distribution. L'Hopital's (LOW-pea-tal's) rule is used to find it for indeterminate forms. Functions that have a value for it are called convergent. For 10 points, name this concept from calculus that is defined as a fixed value that a function gets infinitely close to.
ANSWER: **limit**

066-12-56-04134

4. In one novel by this writer, a possible loss of inheritance causes Lester Kane to leave the title character, who becomes pregnant with the child of George Brander. This author of *Jennie Gerhardt* also created a title character who moves in with fellow chorus girl Lola while rising to stardom on Broadway after leaving George Hurstwood. Roberta Alden is drowned by Clyde Griffiths in another of his novels. For 10 points, name this American writer who wrote *Sister Carrie* and *An American Tragedy.*
ANSWER: Theodore **Dreiser**

130-12-56-04135

5. This letter names a test in statistics to compare two different standard deviations. Six atoms of the element denoted by this letter are found in enriched uranium. A quantity denoted by this symbol is equal to k times the product of two charges divided by the radius squared according to Coulomb's (KOO-loms) law or to big G times mass squared over radius squared. This letter symbolizes the element with the highest electronegativity. For 10 points, name this letter that specifies a quantity equal to mass times acceleration.
ANSWER: **F** [accept **F** test before "this element"is read]

020-12-56-04136

What term, coined by the pioneer of this field, Norbert Wiener, refers to the study of feedback-modulated control systems, including computers, biological systems, and the intersection of the two?
ANSWER: **cybernetic**s

020-12-56-04137

This is a calculation question. What is the height of a square pyramid whose base has area 16 square units and whose surface area is 48 square units?

ANSWER: **2** times the square **root** of **3** units [or **2 sqrt(3)** units]