



1. The first of these devices was created with a synthetic ruby crystal by Theodore H. Maiman. The first one of these based on gases used helium and neon. These devices are created by placing a pair of mirrors on either side of a gain medium, then pumping the gain medium so that the atoms within achieve population inversion and release photons of a defined energy. For 10 points, name these devices that produce a beam of monochromatic, coherent light.

ANSWER: laser [or light amplification by stimulated emission of radiation]

048-13-74-08101

2. During this President's administration, rates were significantly cut by the new Underwood Tariff. During his administration, Carter Glass and Robert Owen created the Federal Reserve. This President clashed with Henry Cabot Lodge over the ratification of a treaty. He supported freedom of the seas in his speech on the Fourteen Points. For 10 points, identify this President, who failed to get the Senate to ratify the Treaty of Versailles, and led the United States during World War I.

ANSWER: Thomas Woodrow Wilson

189-13-74-08102

3. This city's Old Quarter is located around Hoam Kiem Lake. An old university is found in this city's Temple of Literature. The Thang Long is a prominent water puppet theater located in this city. A museum for the Hoa Lo Prison is located in this city, which is home to the Temple of the Trung Sisters. Haiphong serves as this city's chief port. This city is located about eighty-five miles inland from the South China Sea on the Red River. For 10 points, name this city that is the capital of Vietnam.

ANSWER: Hanoi

030-13-74-08103

4. This man wrote a poem in which the speaker implores the title creature to "teach me half the gladness that thy brain must know." He also described "a sneer of cold command." This author was inspired by a walk to write a poem that begins, "Hail to thee, blithe spirit!" In one of his poems, he asks, "If Winter comes, can Spring be far behind?" For 10 points, name this British poet who wrote "Ozymandias," "To a Skylark," and "Ode to the West Wind."

ANSWER: Percy Bysshe Shelley

052-13-74-08104

5. Constituents of this structure are cleaved in order to form arachidonic acid, which in turn can be used to form leukotrienes or prostaglandins. G-protein coupled receptors traverse it seven times. This structure's constituents can move laterally, but not intrafacially, in accordance with the fluid mosaic model. This structure consists of a double layer of phospholipids. For 10 points, name this structure just inside the cell wall, the barrier between the inside and outside of a cell.

ANSWER: cell membrane [or plasma membrane]

048-13-74-08105

6. "Code-breaking" refers to the phenomenon of usurping the purpose of these behaviors. One example of these behaviors was used to coin the term "supernormal stimuli" by Tinbergen. Examples of these behaviors are the stickleback fish attacking anything with a red underbelly and graylag geese rolling eggs into their nests. These behaviors are triggered by a sign stimulus. For 10 points, name these animal behaviors which are hard-wired and run to completion once initiated.

ANSWER: **fixed action patterns** [or **FAP**]

048-13-74-08106

7. This composer set John Donne and Emily Dickinson poems in his cantata *Harmonium*. He depicted the 1994 Los Angeles earthquake in *I Was Looking at the Ceiling and Then I Saw the Sky*. In his most notable opera, characters view a performance of "The Red Detachment of Women," before Mao Zedong descends from a portrait, in a section that became "The Chairman Dances." For 10 points, name this American composer of *Nixon in China*.

ANSWER: John Coolidge **Adams**

019-13-74-08107

8. "Lagerstätten" is a term used to denote locations where many of these can be found. Stromatolites and coprolites are examples of these objects. Othniel Marsh and Edward Cope fought a war over them. Mazon Creek and the Burgess Shale contain extensive caches of these objects. Geologic periods are defined by the presence of their index type. A strong piece of evidence for evolution is the existence of their so-called record. For 10 points, identify these remains of ancient organisms.

ANSWER: **fossils** [prompt on **bones**]

140-13-74-08108

9. Joe Subic was the only member of the military involved in this event who was denied a medal. An aborted plan to address this event was Operation Credible Sport, which was rendered unnecessary by the Algiers Accords. A previous attempt to end this event was the unsuccessful Operation Eagle Claw. This event lasted 444 days and ended just after the inauguration of Ronald Reagan. For 10 points, name this 1979 to 1981 incident in which fifty-two Americans were imprisoned by a new Islamic government.

ANSWER: **Iran hostage** crisis [or equivalent descriptive answers]

019-13-74-08109

10. Historian Martin Bernal wrote a work with a title that referred to this goddess as "Black." Cecrops mediated a dispute between Poseidon and her for the possession of Attica. In response to the rape of Cassandra by Ajax, she sent a storm that sank the Greek fleet returning from Troy. This goddess ripped apart a tapestry depicting the faults of the gods after losing a weaving contest to Arachne. For 10 points, name this Greek goddess of handicraft and war, who was born out of the head of Zeus.

ANSWER: Pallas **Athena** [or **Athene**]

030-13-74-08110

11. A bond between aluminum and three of these ions creates gibbsite, which is a primary component of bauxite. Combining one atom of beryllium with two of this ion creates an amphoteric substance. Slaked lime consists of calcium combined with two of these ions. The ionic compound of this substance with sodium is a commonly used base in titrations and detergent manufacture. For 10 points, name this highly basic ion, which combines with a hydrogen ion in order to form water.

ANSWER: **hydroxide** [or **OH** minus]

048-13-74-08111

12. This book includes the real person Bernard O'Hare as a character, at whose house the author promises Mary that this book will not exalt war. The protagonist of this book is saved by Roland Weary, but is killed years later by Paul Lazarro. Edgar Derby is shot for looting a teapot in this book, which also includes the protagonist being imprisoned with Montana Wildhack in a Tralfamadorian zoo. For 10 points, name this book in which Billy Pilgrim becomes "unstuck in time," a World War II novel by Kurt Vonnegut.

ANSWER: **Slaughterhouse-Five**

019-13-74-08112

13. It's not a computer, but Joseph Jacquard built one of these machines that received punched cards for its operation. Edmund Cartwright designed the first mechanical type in 1785. John Kay's flying shuttle allowed one person to efficiently use one of these machines. The Frame Breaking Act was intended to protect this type of machine against workers who feared it put them out of work, called Luddites. For 10 points, name this machine used for weaving.

ANSWER: **loom**

121-13-74-08113

14. The Gezira is a strip of land located between two branches of this river. The Dumyat and Rashid are two of this river's distributaries. A portion of this river is named for Lake Albert. Another portion of this river is known as Al-Jabal and drains the Al-Sudd. Part of this river's autumn flood is stored at Lake Nasser by the Aswan High Dam, and this river includes Blue and White branches. For 10 points, name this river that annually floods Egypt and is the longest river in the world.

ANSWER: **Nile**

030-13-74-08114

15. A group of people with this job was the militant Nation of Domination led by Faarooq. Another man in this line of work was the victim of an incident in Montreal that helped Shawn Michaels. Ted Turner featured people of this occupation on the now-defunct television shows *Thunder* and *Nitro*. A current man with this job has such enemies as Dolph Ziggler and A.J. Lee and is feuding with C.M. Punk. For 10 points, name this occupation of John Cena, The Undertaker, and Hulk Hogan.

ANSWER: **wrestler** [or word forms or obvious synonyms; do not accept "boxer"]

052-13-74-08115



1A. What Irish champion of the 2011 U.S. Open and 2012 PGA tournament is currently the number one-ranked golfer in the world?

ANSWER: Rory McIlroy

1B. The IPA is a writing system for linguistics that represents what units of sound, the smallest distinguishable unit of meaning in language?

ANSWER: phonemes

2A. What people used quick, *assegai*-wielding warriors in the "horns of the bull" formation created by Shaka, their first king?

ANSWER: amaZulu

2B. Name the ancient Greek sculptor who depicted winners of the 456 and 448 BCE Olympic Games, as well as a sportsman known as "the discus-thrower."

ANSWER: Myron of Elutherae

3A. What category of numbers cannot be expressed as roots of polynomial equations with rational coefficients?

ANSWER: transcendental numbers

3B. If an object is "galazio" in Greek, "laahm" in Cantonese, and "azul" (ah-ZOOL) in Spanish, what is it in English?

ANSWER: blue

4A. This is a 20-second calculation question. An external angle of a regular polygon measures 12 degrees. How many sides does the polygon have?

ANSWER: 15

4B. This is a 20-second calculation question. Define the operation "a star b" to be equal to a squared minus b. Find 10 star 17.

ANSWER: 83

5A. What ruler created the League of Corinth and was the father of Alexander the Great?

ANSWER: Philip II [or Philip of Macedonia; prompt on Philip]

5B. Name the country which is fighting a war with Blefuscu over how to crack an egg in *Gulliver's Travels*.

ANSWER: Lilliput

6A. Two yellow books and the herb foxglove sit on a table, which the title subject leans on, in what van Gogh painting that depicts his psychiatrist?

ANSWER: Portrait of Dr. Gachet

6B. Name the Dutch Jewish philosopher who advocated freedom of religion in the *Tractatus Theologico-Politicus* but is more known for his pantheistic, geometrically constructed work of metaphysical and moral philosophy, *Ethics*.

ANSWER: Baruch Spinoza [or Benedict de Spinoza; or Benedictus de Spinoza]

7A. This is a 30-second calculation question. The test scores in a certain statistics class were normally distributed, with 95% falling between 49 and 85. What was the standard deviation of the scores?

ANSWER: **9**

7B. This is a 30-second calculation question. A circle has diameter 40 centimeters. What is the length of the arc subtended by a central angle of 45 degrees? Express your answer in terms of pi.

ANSWER: **5 pi** centimeters

8A. Who directed the comedies *Bananas*, *Annie Hall*, and *Manhattan*?

ANSWER: Woody **Allen** [or Allan Stewart **Konigsberg**]

8B. *The Castle of Otranto* is generally considered to be the first novel in what genre, popular at the turn of the eighteenth century, which was characterized by horror and supernatural themes?

ANSWER: **Gothic** fiction

9A. MD5, a mostly-collision-free example, is what type of algorithm that maps a variable size input to a fixed-length string?

ANSWER: **hash** function

9B. In December 2012, what bank agreed to pay just under two billion dollars to the U.S. government to settle accusations of laundering drug money?

ANSWER: **HSBC**

10A. What Nigerian playwright wrote *The Lion and the Jewel* and *Death and the King's Horseman*?

ANSWER: Wole **Soyinka** [or Akinwande Oluwole **Soyinka**]

10B. What substances, which include mayonnaise, are colloids in which a liquid is dispersed in another liquid?

ANSWER: **emulsions**



1. A procedure that makes use of these particles uses fludeoxyglucose (FLOO-de-ox-ee-GLOO-cos) as a tracer to measure the metabolic activity of tissues; that procedure is its namesake "emission tomography." The existence of this particle was predicted by Dirac in relation to his namesake equation. This particle was discovered by Carl Anderson, as the first example of antimatter. For 10 points, identify this positively charged antiparticle of the electron.

ANSWER: positron

066-13-74-08117

2. One religious leader in this country was executed by order of Amir Kabir after prophesying "the one who God shall make manifest." That man founded a religion in this country that venerates *The Book of Certitude*. This country was ruled for a millennium by followers of a religion that believes in the evil Angra Mainyu and the good god Ahura Mazda. For 10 points, name this homeland of Bahai and Zoroastrianism, which is now the world's largest Shia Muslim country and is ruled by Shia ayatollahs.

ANSWER: Islamic Republic of Iran [or Jomhuri-ye Eslami-ye Iran; or Persian Empire]

019-13-74-08118

3. An oft-studied reflex in *Aplysia californica* occurs when the siphon and these organs are withdrawn in response to a stimulus. They are similar in appearance to the pseudobranch, which is homologous to the ear opening in vertebrates. Bony processes called rakers are responsible for retaining food particles in them. They are covered by a membrane called the operculum, and in cartilaginous animals, they consist of a series of slits. For 10 points, name these organs, used by fish to exchange gases with the environment.

ANSWER: gills

048-13-74-08119

4. The Zuavi Pontifici were formed to oppose this process, which was supported by the Expedition of the Thousand. This process was finalized in 1870, creating a "prisoner" status for Pius IX; nine years earlier, it triggered the re-crowning of Victor Emmanuel II. This series of events was orchestrated by Count Cavour and militarily aided by the Redshirts of Giuseppe Garibaldi. For 10 points, identify this process that unified disparate states such as Piedmont and the Two Sicilies into the new Kingdom of Italy.

ANSWER: the Risorgimento [or descriptive answers such as the unification of Italy until "Italy" is read]

019-13-74-08120

5. One value found in this equation can be used to find the deceleration parameter and is squared on one side of the Friedmann equations. The constant found in this equation is equal to one over the age of the universe, or 74 kilometers per second per megaparsec. This law states that the Doppler shift of distant objects in space is proportional to their distance away from the observer. For 10 points, name this astronomical law, whose discoverer is also honored by a space telescope.

ANSWER: Hubble's law

048-13-74-08121

6. The title character of this play used to pull a classmate's hair in school and threaten to burn it off. At the end of this play, the title character shoots herself to avoid entrapment in an adulterous relationship with Judge Brack. The protagonist of this play burns a crucial manuscript and advises Eilert Lovborg to kill himself for the sake of her husband's advancement. For 10 points, name this Henrik Ibsen play about the manipulative wife of George Tesman.

ANSWER: Hedda Gabler

080-13-74-08122

7. Opposition to this event led Lord Fisher to resign, and its initial failure caused Charles Monro to replace Ian Hamilton. French participants in this operation landed at Kum Kale, while the British attacked Cape Helles and troops from Australia and New Zealand targeted what became known as the ANZAC beaches. Lasting from February 1915 to January 1916, it was repelled by troops under Mustafa Kemal. For 10 points, name this bloody attempt at an amphibious invasion of Turkey during World War I.

ANSWER: Gallipoli landing [or Dardanelles campaign]

019-13-74-08123

8. This author wrote an homage to Samuel Richardson in his *Another Pamela: Or Virtue Still Rewarded*. He included *Wide Is the Gate* and *World's End* in his massive series about mid-century international politics, which follows Lanny Budd. This author ran for governor on the End Poverty in California ticket, and he described James Ross in *Oil!* For 10 points, name this socialist novelist who described Jurgis Rudkis's misadventures in the meatpacking industry in *The Jungle*.

ANSWER: Upton Sinclair [or Upton Beall Sinclair]

019-13-74-08124

9. Roughly thirty people were arrested in this country in December 2012 following the burning of a copy of the Qur'an. An institution in this country, the Government Girls Decree College, nearly renamed itself after a person who was attacked in this country by an organization represented by Ehsanullah Ehsan. That advocate for education and women's rights reform here is Malala Yousafzai. For 10 points, identify this Asian country, currently led by Asif Ali Zardari.

ANSWER: Islamic Republic of Pakistan [or Jamhuryat Islami Pakistan]

189-13-74-08125

10. This poet depicted a woman who refuses to pay for a long-distance collect call in "Madam and the Phone Bill." He declared "America never was America to me" in one poem, and, in another, he begins, "The instructor said, go home and write a page tonight." This poet of "Theme for English B" and "The Weary Blues" also wrote, "My soul has grown deep like the rivers," in another poem. For 10 points, name this author of "The Negro Speaks of Rivers," a poet of the Harlem Renaissance.

ANSWER: Langston Hughes [or James Mercer Langston Hughes]

019-13-74-08126

11. In 1914, this company introduced an unheard-of five-dollar payment for an eight-hour workday. The first president of this company from outside its namesake family was Robert McNamara. In 1937, guards working for this company attacked Walter Reuther at the "Battle of the Overpass." This was the only Big Three company to reject TARP bailout money in 2008. For 10 points, name this company whose Dearborn plant perfected the assembly line, and which brought cars to the masses with the Model T.

ANSWER: Ford Motor Company

019-13-74-08127

12. Section markings in this piece include the "l'Allegretto" and the "Rigaudon." The most familiar portion of this musical piece is the conclusion of its first suite, the "Alla Hornpipe." It is divided into three component suites, which are in F, D, and G major. At its debut, it was played three times in a row because it delighted its target audience, King George I. For 10 points, name this composition by George Handel, which is named because of its debut performance from barges on the Thames River.

ANSWER: the Water Music

019-13-74-08128

13. One character in this poem predicts the defeat of the White Guelfs. Antaeus is a giant who transports the main characters of this poem between two areas. The earthly bodies of Fra Alberigo and Branca d'Oria have been possessed in this epic, but their souls are in the title place. Count Ugolino gnaws on the head of Archbishop Ruggieri in a frozen section of its title realm. For 10 points, name this poem in which Vergil guides Dante through the nine circles of Hell.

ANSWER: the Inferno [prompt on *The Divine Comedy*; prompt on *La Divina Commedia*]

030-13-74-08129

14. This city is named after a man who worked for surveyors of the Connecticut Land Company, as it once belonged to Connecticut's Western Reserve. This American city has a museum with a glass pyramid designed by I.M. Pei. This city is located at the mouth of a river which notoriously caught fire in June of 1969. It is home to the Rock and Roll Hall of Fame. For 10 points, name this second-largest Ohio city, located on the mouth of the Cuyahoga River and on the shores of Lake Erie.

ANSWER: Cleveland

052-13-74-08130

15. One catalyst used to form this substance contains two iodine and two carbonyl ligands attached to an iridium atom in a square planar arrangement. That is the Cativa catalyst, which forms this substance via the carbonylation of methanol. At 16.6 degrees Celsius, crystals of the anhydrous form of this substance can be isolated in the "glacial" form of it. For 10 points, name this substance with formula CH₃COOH, which is the primary component of vinegar.

ANSWER: acetic acid [or acetate]

048-13-74-08131



2013 VHSL Regionals
Round 8
Tiebreaker Questions

1. This quantity is the conjugate variable of entropy. The energy radiated by a blackbody is proportional to the fourth power of this quantity. Subtracting the product of this value with the change in entropy from the change in enthalpy gives the Gibbs free energy. This measure roughly quantifies the average kinetic energy of a gas. One mole of a gas occupies 22.4 liters at the standard value for this quantity and pressure. For 10 points, name this quantity whose "absolute" type is kelvins.

ANSWER: temperature [or T]

048-13-74-08132

2. This poet observed "black phones on hooks, glittering, glittering and digesting" in "the morgue between Paris and Rome" in a poem that opens, "Perfection is terrible, it cannot have children." This poet of "The Munich Mannequins" concluded, "Out of the ash I rise with my red hair, and I eat men like air," in "Lady Lazarus." In another poem, she compares her father and her husband Ted Hughes to Nazis. For 10 points, name this suicidal poet of the collection *Ariel*, which includes her poem "Daddy."

ANSWER: Sylvia Plath

019-13-74-08133

3. One form of this quantity can be calculated using a Mohr circle. Applying too much of it can cause an object to exceed its yield point. It is found in the numerator of Young's modulus. The definition of Le Chatelier's principle states that a system counteracts the effects of an applied one of these. Like pressure, this quantity is measured in pascals and equals the applied force over an area, resulting in a strain. For 10 points, name this term describing a physical or emotional tension.

ANSWER: stress

064-13-74-08134

4. Gordon Baum founded a group with this acronym as its name that publishes the racist *Citizens Informer*; the Republican Party ordered members to resign from that group in 1998 in protest. Members of another group with this acronym received living supplies and thirty dollars a month, effectively lowering unemployment by half a million, and engaged in building floodwalls. For 10 points, give this acronym for a New Deal organization that also planted trees and maintained forests.

ANSWER: CCC [or Council of Conservative Citizens; or Civilian Conservation Corps]

019-13-74-08135

5. The speaker of this poem asks, "On what wings dare he aspire? What the hand dare seize the fire?" Two stanzas later, the speaker wonders about the furnace in which the subject's brain was forged. The speaker of this poem asks the title creature, "What immortal hand or eye dare frame thy fearful symmetry?" For 10 points, name this poem about an animal "burning bright in the forests of the night," written by William Blake.

ANSWER: "The Tyger"

014-13-74-08136

This is a calculation question. What is the surface area of a tetrahedron in which each edge is 4 inches long? Express your answer in simple radical form.

ANSWER: 16 times the square root of 3 square inches [or 16 times radical 3 square inches]

Which American chemist defined acids as electron pair acceptors, and developed a namesake dot structure method?

ANSWER: Gilbert Newton Lewis