**VHSL States 2016-2017 - Round 03 - First Period, Fifteen Tossups**

1. A 6/8 time second movement unusually marked "Introduzione" segues into a difficult "Rondo" in a piece of this type by Beethoven that is nicknamed for Count von Waldstein. Beethoven's eighth of these was published under the title *Pathétique*. Mozart's output in this genre include one commonly labelled "for beginners," and one that ends with a "Rondo alla turca." The opening of one by Beethoven was compared a shimmering scene over a nighttime lake. For 10 points, what genre of solo keyboard music includes Beethoven's *Moonlight*?
ANSWER: **piano sonata** [prompt on sonata]

2. A constant found in this law is multiplied by four times mass and set equal to a constant squared to find conditions for critical damping. Integrating this law gives an expression for the elastic potential energy. This law applies to materials below the yield point, and the constant of proportionality for this law is the Young's modulus. For 10 points, name this law that describes the restoring force on springs, usually summarized as F equals minus k times x.
ANSWER: **Hooke**'s law

3. Lavoisier isolated this element by reacting water with a very hot iron tube. Unsaturated fats are converted to saturated ones through the addition of this element. The ground state of an electron for this atom is minus 13.6 electron-volts. Iron catalyses this element's reaction with nitrogen in the Haber process. The Bohr model of the atom accurately explained the Rydberg formula for the spectral lines of this element. For 10 points, name this element that has chemical formula H.
ANSWER: **hydrogen** [or **H** until it is read]

4. This actor played a character who shouts "hey Aqualung!" after performing the jazz flute. That character played by this man is rivals with Wes Mantooth and loves Veronica Corningstone. Another of his characters shouts "You sit on a throne of lies!" to a department store Santa Claus he considers an impostor. This performer's characters included the self-absorbed journalist Ron Burgundy and Buddy, a human who grew up at the North Pole. For 10 points, name this comic actor who starred in the movies *Anchorman* and *Elf*.
ANSWER: John William "Will" **Ferrell**

5. In a novel by this author, Cathy Ames shoots the protagonist in the shoulder after giving birth to their twin sons. In addition to writing about Adam Trask, this author wrote a novella in which Juana is attacked by her husband Kino for attempting to throw the title object into the ocean. This author of *East of Eden* and *The Pearl* wrote a novel in which a mentally handicapped man accidentally kills a puppy and Curley's wife. For 10 points, name this author who wrote about Lennie and George in *Of Mice and Men*.
ANSWER: John **Steinbeck**

6. A man serving in this position controversially declared "I am in control here" after Ronald Reagan was shot in 1981. That man serving in this position was former Nixon Chief of Staff Alexander Haig. The head of the CIA, Allen, was the brother of a man who held this position during much of the 1950's. John Foster Dulles (DULL-ess) served in this Cabinet position during almost the entire Eisenhower presidency, while Madeleine Albright was the first female to hold it. For 10 points, what Cabinet position primarily handles foreign policy?
ANSWER: United States Secretary of **State**

7. In the *Shahnameh*, Rustam undergoes this many labors, called the Haft Kahn. Isis was accompanied by a group of this many scorpions when travelling without Horus. This is the number of "lucky gods" in Shintoism, and Islamic tradition suggests that there are this many heavens. Another group containing this many members were placed in the sky after grieving at the death of their brothers, the Hyades (HY-uh-DEEZ). For 10 points, give this number, the number of "sisters" that make up the Pleiades (PLY-uh-DEEZ).
ANSWER: **seven**

8. In a poem by this man, the speaker recalls "the drunk delight of battle with my peers" and declares, "I am a part of all that I have met." That poem by this man ends with an exhortation to the speaker's fellow "mariners" to remain "strong in will to strive, to seek, to find, and not to yield." Another of his poems praises the "noble six hundred" who rode "into the valley of Death" during the Crimean War. For 10 points, name this Victorian poet of "Ulysses" and "The Charge of the Light Brigade."
ANSWER: Alfred, Lord **Tennyson**

9. This country's seat of government is home to the world's largest roundabout. Rice cooked in coconut milk is the main component of this country's national dish, *nasi lemak*. This country, whose majority population is known as the *bumiputera*, moved its government to Putrajaya in 1999. This country's eastern province of Sarawak completely surrounds the country of Brunei. The Petronas Twin Towers are found in, for 10 points, what southeast Asian country's capital of Kuala (KWALL-uh) Lumpur?
ANSWER: **Malaysia**

10. The largest pyramid in the world is dedicated to the worship of this deity. An aspect of this deity began the motion of the sun and the moon by blowing on them. A story relates how this god was conceived after his mother swallowed an emerald. While in the underworld, he retrieved bones that he poured his blood onto in order to create mankind. This enemy of Tezcatlipoca (TETZ-cal-lee-POKE-uh) had a temple dedicated to him at Teotihuacan (TAY-oh-tee-WAH-kon). For 10 points, name this feathered serpent and chief god of the Aztecs.
ANSWER: **Quetzalcoatl** (KETZ-uh-COAT-ill) [or **Ehecatl**]

11. This composer wrote the essays "Art and Revolution" and "The Artwork of the Future," in which he outlined his ideal of opera as a *Gesamtkunstwerk* (GEH-zahmt-KUNST-vairk), or "total artwork." In one of his operas, the mysterious title knight arrives in a boat drawn by a swan to defend Elsa of Brabant. This composer's most recognizable operatic excerpts include the "Bridal Chorus" from *Lohengrin* and the "Ride of the Valkyries." For 10 points, name this revolutionary German composer of *Tristan and Isolde* and *The Ring of the Nibelung.*
ANSWER: Richard **Wagner**

12. This person is not Sarah Palin but denounced the "gotcha political system" after her comments about the harmful effects of WiFi in schools were ridiculed. An arrest warrant was issued against this woman for spray-painting "decolonization" on a bulldozer in North Dakota as part of a protest alongside Ajamu Baraka. Donald Trump said this woman's attempt to file for voting recounts in states such as Michigan and Wisconsin was a "scam." For 10 points, name this physician who was the 2016 Green Party presidential nominee.
ANSWER: Jill **Stein**

13. With iron, this element is found in cementite. Its not found in water, but this element is commonly used as a moderator in nuclear reactors. Andre Geim discovered that this element forms two-dimensional hexagonal sheets, and sixty atoms of this element form a structure called a buckminsterfullerene. Although not oxygen, an isotope of this element is the basis for the atomic mass unit. This element is triple bonded to nitrogen in the cyanide anion and bound to four hydrogens in methane. For 10 points, name this element with numerous allotropes, including diamond and graphite.
ANSWER: **carbon** [or **C**]

14. In a ten-day stand-off, a man in this position was impeached after trying to dissolve the legislature was and almost replaced by his deputy, Alexander Rutskoy. In 2012, the current owner of the Brooklyn Nets ran for this position. The first person to hold this position ordered a 1994 invasion of Chechnya (CHETCH-nee-yah). In 2008, a man left this position after being appointed Prime Minister by his successor, Dmitry Medvedev (MED-vuh-DEV). For 10 points, what position was first held by Boris Yeltsin and is currently held by Vladimir Putin?
ANSWER: **President** of **Russia** [or **President** of the **Russian** Federation; or **President** of the **Russian** Soviet Federative Socialist Republic; do not accept "Prime Minister of Russia"]

15. Numerous natives from this modern-day country were killed during the Musket Wars. In 1893, while still technically a colony, it became the first to grant all women the right to vote. This modern-day country was first governed by William Hobson after the Treaty of Waitangi (WHY-tong-EE) placed it under the control of Great Britain. This is the smaller country that made up the ANZAC force during World War One. For 10 points, the Maori (MOWW-uh-ree) people reside on what island country in the Pacific?
ANSWER: **New Zealand** [or **Aotearoa**]

 **VHSL States 2016-2017 - Round 03 - Directed Period**

1A. What type of speciation, exemplified by polyploidy (POLLY-ployd-ee) in plants, occurs *without* a geographic boundary separating the new species from the parent population?
ANSWER: **sympatric** speciation

1B. In what West African country surrounded by Senegal did longtime president Yahya Jammeh at first accept and later refuse to recognize his loss to Adama Barrow in a 2016 election?
ANSWER: The **Gambia**

2A. Exemplified by methane and the ammonium cation, what geometry will be predicted by VSEPR theory for a compound containing a central atom with four single bonds and no lone pairs?
ANSWER: **tetrahedral** [or **Td**]

2B. What German Romantic poet collected his poems in the *Book of Songs* and wrote the lyric "Die Lorelei" (dee LOR-uh-lie)?
ANSWER: Heinrich **Heine** (HIE-nuh)

3A. This is a 20-second calculation question. If the graph of y=2^x ("y equals 2 to the x") is shifted 3 units to the right, what is the y-coordinate of the new y-intercept?
ANSWER: **1/8** or **0.125** [The new graph is of y=2^(x-3). Substitute in x=0 to get y=2^-3=1/2^3 at the y-intercept.]

3B. This is a 20-second calculation question. Let T be a second-quadrant angle whose sine is equal to 3/5. What is sin(2T) ("sine of 2 T")?
ANSWER: **-24/25** or **-0.96** [By an identity, sin(2T)=2sin(T)cos(T). The Pythagorean Identity says that cos(T)^2=16/25, and we take the negative square root in the second quadrant to get cos(T)=-4/5.]

4A. Which Norse god once hung himself from the world tree for nine nights to obtain the runes?
ANSWER: **Odin**

4B. The Bulgarian woman Raina Petkoff appears in what George Bernard Shaw play that takes its title from the first line of the *Aeneid*?
ANSWER: ***Arms and the Man***

5A. Which French President and former war hero almost resigned amid major strikes and protests in May 1968?
ANSWER: Charles **de Gaulle**

5B. What country's cuisine includes the rice dish paella (pah-AY-yah) and appetizers called tapas?
ANSWER: **Spain** [or Kingdom of **Spain**; or Reino de **España**]

6A. What company's recent advertisements have featured rapper Ice-T at a lemonade stand and a sumo wrestler figure skating?
ANSWER: **GEICO** [or **Government Employees Insurance** Company]

6B. What German past tense contrasted with the perfect tense is used primarily in writing and rarely in spoken German outside of "sein" (ZYNE), "haben" (HAH-ben), and modals?
ANSWER: **preterite** [or **Präteritum**]

7A. The *Zong* and the "fighting" *Temeraire* are examples of what kind of objects painted by J.M.W. Turner?
ANSWER: **ship**s [or **boat**s; or obvious equivalents]

7B. Light penetrates all the way to the lake floor, allowing aquatic plants to grow, in what "zone" that is often contrasted with the limnetic (lihm-NET-ik) and profundal (proe-FUHN-dull) zones?
ANSWER: **littoral** (LIT-ehr-uhl) zone

8A. This is a 30-second calculation question. What is the height of a circular cone with surface area 450 pi and a base radius of 9?
ANSWER: **40** [The surface area is pi\*r\*(r+s) where s is the slant height, so s=41. By the Pythagorean Theorem, the height is sqrt(41^2-9^2)=40.]

8B. This is a 30-second calculation question. A and B are events such that at least one of A and B always happens. If the probability of A is 0.4 and the probability of A and B is 0.2, what is the conditional probability of A given B?
ANSWER: **1/4** or **0.25** or **25 percent** [P(B)=1-P(A)+P(A and B)=0.8, so the conditional probability is P(A and B)/0.8=0.2/0/8=1/4.]

9A. Gorm the Old and Harald Bluetooth were the first two kings of what modern-day country, where they carved runes into the Jelling Stones?
ANSWER: Kingdom of **Denmark**

9B. What financier is currently serving a 150-year prison term after masterminding a Ponzi scheme exposed in 2008 as the largest financial fraud in U.S. history?
ANSWER: Bernard "Bernie" **Madoff**

10A. What English metaphysical poet wrote "A Valediction: Forbidding Mourning" and described bloods mixing in "The Flea"?
ANSWER: John **Donne**

10B. What type of poem contains nineteen lines consisting of five tercets and a quatrain and is exemplified by Dylan Thomas's "Do not go gentle into that good night"?
ANSWER: **villanelle** [or **villanesque**]

 **VHSL States 2016-2017 - Round 03 - Third Period, Fifteen Tossups**

1. Multiplying this quantity times conductivity gives the current density in a variation of Ohm's Law. The curl of this quantity is equal to the negative time derivative of the magnetic field according to Faraday's law. Because charges are free to move to the surface, this quantity is necessarily zero in a conductor. The dot product of charge and this quantity gives the force acting on a charge. For 10 points, name this field whose strength falls off as the square of the distance from a stationary charged particle according to Coulomb's (COO-lahm's) law.
ANSWER: **electric** field [or **E**-field]

2. A rodent found in this biome unusually stacks grasses on rocks to dry; that is the singing vole. The blackfish *Dallia pectoralis*, which can breathe air through its esophagus, is found in this biome. Patchy growths of cushion plants in this biome are called feldmarks and include low-lying species like moss campion. In the summer, mosses and lichens in this biome grow due to melting of the surface above permafrost, and the tree line is the boundary between it and taiga. For 10 points, name this biome characterized by cold temperatures and a lack of trees.
ANSWER: **tundra** [or alpine **tundra**; or arctic **tundra**; or subarctic **tundra**; or polar **tundra**; prompt on alpine, arctic and subarctic]

3. A form of this process that generates Stokes and anti-Stokes lines is inelastic and named for Raman. The existence of the nucleus was determined when a beam of alpha particles underwent this process when it struck a gold foil in the Geiger-Marsden experiment. A form of this process named for Rayleigh explains why the sky is blue. In the atmosphere, light can undergo this process when it encounters clouds. For 10 points, name this process in which radiation or particles bounce off of objects.
ANSWER: **scattering** [or word forms]

4. This composer called for a massive orchestra including four brass groups placed at the four corners of the stage in his Op. 5 requiem, the *Grande Messe des Morts.* Niccolo Paganini commissioned his second symphony featuring a solo viola, which was based on a Lord Byron poem. This composer of *Harold in Italy* wrote a programmatic symphony including such movements as "A Ball" and "March to the Scaffold." For 10 points, name this French Romantic composer of *Symphonie Fantastique.*
ANSWER: Hector **Berlioz**

5. An English king with this name personally led his troops to victory at the Battle of Falkirk. That king with this name expelled the Jews from England, a decision reversed much later by Cromwell. While not finished until 1090, a king with this name ordered the construction of Westminster Abbey. This was the name of the only king of England to be canonized and by the king known as the "Hammer of the Scots" who executed William Wallace. For 10 points, what name was held by English kings known as "Longshanks" and "the Confessor"?
ANSWER: **Edward** [or **Edward** the Confessor; or **Edward** I; prompt on Longshanks until it is read]

6. An economist from this country names the paradox that improvements in fuel efficiency cause consumption of fuel to rise and questioned his country's reliance on fossil fuels in the book *The Coal Question*. A school of economics based in this country was founded by members of the Fabian Society. It is the home country of an economist who predicted that exponential population growth would lead to catastrophe. For 10 points, name this country of origin of William Jevons and Thomas Malthus.
ANSWER: Great **Britain** [or **England**; or the **United Kingdom**; or the **U.K.**]

7. In this novel, the protagonist meets with his former student adviser at the Wicker Bar and learns that he is dating a Chinese sculptress. Its protagonist purchases the record "Little Shirley Beans" for his sister. In this novel, the narrator gets into a fight with his roommate Stradlater after he goes on a date with Jane Gallagher. After leaving Pencey Prep, this novel's narrator enjoys watching his sister Phoebe ride the carousel at the Central Park Zoo. For 10 points, name this novel narrated by Holden Caulfield and written by J. D. Salinger.
ANSWER: *The* ***Catcher in the Rye***

8. In the last chapter of this book, a man asks his follower three times if he loves him, while also commanding him to "feed my lambs." Earlier in this book, a man meets with Nicodemus and tells him that one must be "born again" in order to "see the kingdom of God." This book contains a verse that explains that "God so loved the world that he gave his one and only Son." That is the sixteenth verse of this book's third chapter. For 10 points, name this New Testament book, the only non-synoptic Gospel that typically follows those of Matthew, Mark, and Luke.
ANSWER: Gospel According to **John**

9. One of these places was affected by a spill at the Church Rock uranium mine that released more radiation than the Three Mile Island accident. Marlon Brando refused his Oscar for *The Godfather* to support a protest at another one of these places led by the AIM. The largest of these areas surrounds another of them owned by the Hopi, and is home to the Four Corners Monument. To generate revenues for these places, their residents often operate casinos. For 10 points, identify these areas set aside for tribes like the Navajo.
ANSWER: Indian **reservation**s [or Native American **reservation**s]

10. A poem by this author describes a monster with an eye "watery as though with tears" who smokes a hookah pipe and would swallow the world with a yawn. Another of his poems addresses "you who, like the stab of a knife, entered my plaintive heart." This author's essay "The Painter of Modern Life" coined the term "modernity." This author's poem "The Vampire" appears in the section "Spleen and Ideal." For 10 points, what 19th-century French poet wrote the collection *Les Fleurs du Mal* (lay FLOOR doo MAHL), or *The Flowers of Evil*?
ANSWER: Charles **Baudelaire** (BO-duh-lair)

11. A "club" named for this city produced the book *The Limits to Growth*, which simulated worldwide population growth. It's not Paris, but a 1957 treaty signed in this city created the European Economic Community. In this city, the Red Brigades kidnapped and later killed the Christian Democratic leader Aldo Moro. A 1922 march on this city resulted in King Victor Emmanuel III giving power to the leader of the Blackshirts. For 10 points, Benito Mussolini took control of Italy after his forces marched on what major city?
ANSWER: **Rome**

12. This country's first dictator was a man known as "El Supremo," Dr. Jose Francia. Nicaragua's Anastasio Somoza was killed in this country while under the protection of dictator Alfredo Stroessner. It lost 70% of its male population in a war begun in 1864 under the leadership of Francisco Solano Lopez. This country was defeated by Brazil, Argentina, and Uruguay during the War of the Triple Alliance. For 10 points, what South American country fought the Chaco (CHOCKO) War with its fellow landlocked neighbor, Bolivia?
ANSWER: Republic of **Paraguay**

13. This operation on *n* can be approximated as *n* times natural log of *n* minus *n* according to Stirling's approximation. This function is the *n*th derivative of *x* to the *n* power, which causes it to appear in the denominator in many Taylor series. This function of *n* counts the number of ordered paths visiting each of *n* cities once, and generally counts the number of permutations of *n* objects. For 10 points, name this function that for an integer *n* returns the product of all integers from one to *n* and is symbolized with an exclamation point.
ANSWER: **factorial**

14. This person is the subject of the chronologically first novel in the *Narratives of Empire* series by Gore Vidal. A man with peanut butter in his mouth fails to clearly say the name of this person in the first "Got Milk?" commercial. This man sings "Love doesn't discriminate between the sinners and the saints" in the song "Wait For It," and gives the advice "Talk less, smile more" to a person whom he later kills in the song "The World Was Wide Enough." For 10 points, name this man who shot Alexander Hamilton in a duel.
ANSWER: Aaron **Burr**, Jr.

15. In a novel by this author, the protagonist is led to the "Valley of K" and then later to the title location by Butt the Hoopoe. This author of *Haroun and the Sea of Stories* also wrote a novel in which Allie Cone is murdered by an actor who survived a plane crash over the English Channel along with Saladin Chamcha. In another novel by this author, Saleem Sinai has telepathic powers because he was born at the exact moment of Indian independence. For 10 points, name this Indian-British author of *The Satanic Verses* and *Midnight's Children*.
ANSWER: Salman **Rushdie** [or Ahmad Salman **Rushdie**]

 **VHSL States 2016-2017 - Round 03 - Tiebreaker Questions**

1. This musician included arrangements of Manuel de Falla's *El amor brujo* and Joaquin Rodrigo's *Concierto de Aranjuez* in a collaboration with Gil Evans titled *Sketches of Spain*. He experimented with modal jazz in an album for which pianist Bill Evans, a member of this musician's sextet, helped to compose "Flamenco Sketches" and "Blue in Green." "So What" is the first track on this an album by this musician considered to be the best-selling jazz record of all time. For 10 points, name this jazz trumpeter who wrote *Kind of Blue*.
ANSWER: Miles **Davis** [or Miles Dewey **Davis** III]

2. When these structures become unstable, they can undergo breakage-fusion-bridge cycles. Cohesin (ko-HEEZ-in) holds these structures together until it is degraded by separase (SEP-uh-raze). Giemsa (gi-EM-zuh) staining is used to G-band these structures. They contain p and q, or long and short, arms and are visualized in a karyotype. These structures line up during metaphase and are separated in anaphase. For 10 points, name these condensed complexes of protein and DNA, of which humans have 46.
ANSWER: **chromosome**s

3. Makers of this product have campaigned for a separate time zone in the state of Assam. It's not a vehicle, but the Tata Group owns a popular brand of this product called Tetley. A unique black type of this product is grown in Darjeeling, India. A mixture of cardamom and ginger is found in this product's masala chai variety. This product, made from the leaves of *Camellia sinensis*, can come in green and oolong varieties. For 10 points, name this beverage popular in Asia, which can be prepared by dipping a bag into hot water.
ANSWER: **tea**

4. This man's tenure as Governor ended when boss Thomas Platt insisted he receive a higher position to remove him from New York politics. He went on a dangerous expedition to South America's so-called "River of Doubt" with his son, Kermit. Despite heavy opposition from Mark Hanna, he was nominated as Vice-President. This President promised the "Square Deal" and supported Progressive laws such as the Pure Food and Drug Act. For 10 points, what former leader of the Rough Riders succeeded the assassinated William McKinley as President?
ANSWER: **T**heodore "Teddy" **Roosevelt** Jr. [or **Teddy Roosevelt**; or **TR**; prompt on Roosevelt]

5. A man in this play claims that he would rather have been born as a fish at the end of a monologue in which he relates how all of his favorite memories originated when he was at sea. At the end of this play, a delirious woman descends a staircase in her old wedding dress. This play's central family includes the father James, an alcoholic former actor, and the morphine-addicted mother Mary. For 10 points, name this semi-autobiographical play about the Tyrone family written by Eugene O'Neill.
ANSWER: ***Long Day's Journey into Night***

For what value of x is the determinant of the matrix with first row 3, 1, 2 ("three, one, two"), second row 1, 4, -1 ("one, four, negative one"), and third row 2, x, -2 ("two, x, negative two") equal to 0?
ANSWER: **8** [The determinant is 3(-8+x)-1(-2+2)+2(x-8)=-40+5x, but the shortcut is to make the third row a multiple of the second.]

What musical instrument was played by jazz musicians Duke Ellington and Herbie Hancock?
ANSWER: **piano** [prompt on keyboard]