Bulldog High School Academic Tournament XXI (2012): Oh God, Not the Spider Cows!
Written by Yale Student Academic Competitions
Edited by Matt Jackson, with John Lawrence, Ashvin Srivatsa, and Sam Spaulding

Round 7 Tossups

1. This man used the example of light striking the mineral porphyry to claim that the ideas of redness and whiteness are not actually in that rock. This secretary to the Earl of Shaftesbury argued that mixing one's labor with natural substances entitles a man to property, and distinguished between primary and secondary qualities. He claimed that estate, with life and liberty, is a right any valid government must protect, in whose absence people may form a new social contract. For 10 points, name this British empiricist author of *Two Treatises of Government,* whose *Essay Concerning Human Understanding* proposed a mental blank slate, or "tabula rasa".
ANSWER: John **Locke** <MJ>

2. This character's answering machine features him singing to the tune of the Theme from Greatest American Hero. This character misses a phone call because the *maitre d'* at a restaurant said "Cartwright" instead of his name. This character has to move a Frogger machine across the street through Frogger-like traffic. This character often uses the pseudonym Art Vandelay, and his fiancee died from the glue on their cheap wedding invitations. This character's father invented a holiday called Festivus. This character is hired by the Yankees after insulting George Steinbrenner. For 10 points, name this character played by Jason Alexander, a friend of Elaine and Kramer on *Seinfeld*.
ANSWER: **George Costanza** [accept either] <JL>

3. Quakes in the crusts of these stars may be the source of gamma-ray bursts from soft gamma repeaters, a subclass of these stars which may have tremendous magnetic fields, making them magnetars. Above approximately two solar masses, these stars may turn into strange stars. The core of the Crab Nebula, which formed from SN 1054, is one of these stars. The decay in the orbit of a binary of these stars provides indirect evidence for gravitational radiation; one of those two stars emits highly periodic radiation, making it a pulsar. For 10 points, name these very dense stars which are named for the uncharged subatomic particles which compose their cores.
ANSWER: **neutron** stars [accept **pulsar**s until it is read; accept **magnetar**s until it is read; accept **soft gamma repeater**s until it is read] <AD/AS>

4. This politician proposed a 49.5 percent duty on imports while in the Senate, which passed before being lowered by the replacement Wilson-Gorman tariff. Marcus Hanna encouraged this man to stay at home while raising money for this man's "front-porch" campaign. He appointed Secretary of State John Hay, who praised a "splendid little war" in which this man sent Commodore George Dewey to Manila Bay. The first campaign of William Jennings Bryan lost to, for 10 points, what Ohioan who managed the Spanish-American War during a presidency cut short by his 1901 assassination?
ANSWER: William **McKinley** <MJ>

5. One ruler of this period gouged out the eyes of a lute player who tried to assassinate him, and a powerful figure in its government tested servants' loyalty with a deer by making them call it a horse. At Li Si's suggestion, under the influence of Han Fei's Legalist doctrine, it carried out the policy of "Burn the books, bury the scholars". This dynasty's most powerful leader died when immortality medicine gave him mercury poisoning. It began building the Great Wall after the Warring States era. For 10 points, name this dynasty of the 3rd century BC whose only powerful leader, Shi Huangdi, was buried with a terra cotta army and ruled before the Han.
ANSWER: **Qin** Dynasty [or **Ch'in**; be careful and do NOT accept "Qing" or "Ch'ing"] <RB>

6. One of this author's poems conjures "in the moist hour" the image of a woman who "housed infinite tenderness" "like a jar". Another one of this author's poems demands "give me silence, give me water, hope / Give me the struggle, the iron, the volcanoes", after declaring "I come to speak for your dead mouths". One of his poems repeats the refrain "in you everything sank!", while another opens its twelfth canto with the line "Arise to birth with me, my brother!". For 10 points, name this author of *Twenty Love Poems and a Song of Despair* who included "The Heights of Macchu Picchu" in his *Canto General*, a Chilean poet.
ANSWER: Pablo **Neruda** [or Neftalí Ricardo Reyes **Basoalto**] <JL>

7. Molecules which have this property in one domain and lack it in another are called amphiphilic, and often act as surfactants. Symmetric molecules necessarily lack this property. For solvents, the strength of the dielectric constant is a good measure of this property, which is the origin of the notion that "like dissolves like". Conventionally, bonds are taken to have this property if the electronegativity difference between their atoms is between 0.4 and 1.7, providing the bond with partial ionic character. For 10 points, name this property of some covalent bonds in which the atoms possess separated partial charges.
ANSWER: **polarity** [accept word forms; accept **nonpolar** or word forms until "lack this property" is read, but do not accept afterwards; prompt on "dipole moment" or "dipole"; prompt on "hydrophilicity" or "hydrophobicity"; do not accept "hydropathicity"; do not accept "polarizability" or word forms of that, because that's a different word]
<AS>

8. The presence of one character in this work is always announced by her obnoxious laugh, and that character ends up marrying a Persian peddler. After purchasing a "potion" from Ali Hakim, the female protagonist falls asleep and enters a dream ballet sequence in which her beloved is killed by Jud. The male lead sings the unaccompanied first lines of this musical's opening number from offstage while Aunt Eller churns butter. That song is "Oh, What a Beautiful Mornin,'" after which the farm girl Laurey is invited to a box social by Curly. For 10 points, name this musical written by Rodgers and Hammerstein and set in the title American territory.
ANSWER: *Oklahoma!* <KK>

9. One author claimed that this ruler's head could disappear and reappear, which proved he was actually a demon. This man's subordinate John the Cappadocian secured the Perpetual Peace with Khosrau I of Persia, and his deeds as ruler were attacked in the *Secret History* of Prococpius. With help from his eunuch Narses, this ruler suppressed the Green and Blue factions of chariot fans, ending the Nika Riots. This emperor's army defeated Vandals and Ostrogoths when he sent Belisarius to re-conquer North Africa and Italy. For 10 points, name this namesake of a legal *Codex,* a husband of Theodora who ruled the Byzantines in the 6th century AD.
ANSWER: **Justinian** I [or **Justinian** the Great or Flavius Petrus Sabbatius **Iustinian**us Augustus] <SJW>

10. A large metronome in this city towers above Letna Hill. The Lennon Wall in this city became a famous hotspot for dissident graffiti. The two twisted cylinders of Frank Gehry's modernist Dancing House are in this city. Hitler intended to build a Jewish museum in this city at the conclusion of the Holocaust, and its Jewish cemetery in the Josefov is the oldest in Europe. This city, located south of the Charles Bridge, contains Saint Vitus Cathedral as well as Wenceslas Square, and lies along the Vltava River. For 10 points, name this historical center of Bohemia, which is now the largest city in the Czech Republic.
ANSWER: **Prague** [or **Praha**] <SL>

11. One character in this novel is repeatedly mocked for describing another as having "fine eyes". The plot of this novel is set into motion by a new tenant moving into Netherfield Park, which leads to the assertion that "It is a truth universally acknowledged, that a single man in possession of a good fortune, must be in want of a wife". In this novel, Charlotte Lucas marries Mr. Collins, who had been earlier rejected by the protagonist, whose sister Lydia elopes with the rakish Wickham, and whose other sister, Jane, married Bingley. For 10 points, name this novel in which Elizabeth Bennett and Fitzwilliam Darcy need to overcome their ego and distrust by Jane Austen.
ANSWER: *Pride and Prejudice* <JL>

12. This composer used a wordless female choir in the "Sirens" movement of an orchestral work inspired by the paintings of Whistler. In the printed score for another set of his works, the titles appear at the end of each piece rather than at the beginning. Those are his preludes for piano, which include pieces like "What the West Wind Saw," "The Sunken Cathedral," and "The Girl With the Flaxen Hair," and he wrote three *Nocturnes* for orchestra. His best-known piano piece takes its title from a poem by Paul Verlaine and is the third movement of his *Suite bergamasque*. For 10 points, name this French impressionist composer who wrote *La mer*, *Prelude to the Afternoon of a Faun*, and *Clair de lune*.
ANSWER: Claude **Debussy** <KK>

13. In the bottom right corner of one of his paintings sits a woman in a blue shirt, white jacket, and red skirt. At the right of that painting by him stands a harlequin and a clown in a red cap. In one of his paintings, a canvas depicting a woman cradling a man stands between a nude couple and a woman cradling a baby. His *Family of Saltimbanques* and *La Vie* were painted during this artist's Rose and Blue Periods, respectively. A horse with a skull overlaid on its nose stands underneath a light bulb in the center of his painting commemorating the bombing of a Basque town. For 10 points, name this Spanish cubist painter of *Guernica*.
ANSWER: Pablo Ruiz y **Picasso** <JL>

14. This god's diet consisted entirely of lettuce. He was worshipped at Avaris after becoming patron deity to the Hyksos. This god defended against serpent attacks in the underworld while helping with the nightly voyage taken by Ra's barge, and his consort was Nephthys. This god stole his nephew's eye while in his battle with Horus, sometime after he dismembered and scattered the fourteen pieces of his brother. This god had flat-topped ears on a long-snouted black head, and ruled over the deserts. For 10 points, name this nemesis of Osiris, an evil Egyptian god.
ANSWER: **Set** [or **Seth**; or **Seteh**; or **Bebo**] <SSp>

15. When the Knudsen number in one of these substances is much less than 1, the continuum hypothesis is a valid assumption. MHD is the study of electrically-charged ones. Kolmogorov scales are functions of the rate at which kinetic energy associated with eddies in them is dissipated. Transverse waves cannot propagate through these substances. The Reynolds number describes the ratio of inertial and viscous forces in them, and they are modeled by the Navier-Stokes equations. Inviscid ones move faster when their pressure drops, according to Bernoulli's principle. For 10 points, name these substances which flow, including plasmas, liquids, and gases.
ANSWER: **fluid**s [prompt on "liquids" or "gases" or "plasmas"] <BH/AS>

16. This man's so-called "toy army" was a group of adolescents with which he staged mock battles, and he promoted Franz Lefort to be a general. This man hanged rebelling bodyguards when his daughter triggered an uprising of the *streltsy*. This promulgator of the Julian Calendar went with the Grand Embassy to study shipbuilding in Holland and city-building in Manchester on an extensive tour of Europe. He declared war on Sweden in 1700, and built a city on the banks of the Neva River. For 10 points, name this tsar who sought to modernize Russia and named a new cosmopolitan capital after his namesake saint.
ANSWER: **Peter I** [accept **Peter the Great**, prompt on "Peter Romanov" or equivalents] <CSM>

17. This character's husband is recognizable because his left shoulder is higher than his right. This character constantly fears that her daughter, who throws flowers at her, is insufficiently human and too elf-like. After delivering an Election Day sermon, this character's lover leaps with her onto a scaffold. Her child is named Pearl and her husband renames himself Roger Chillingworth when he moves to Puritan Boston. For 10 points, name this woman punished for her affair with Arthur Dimmesdale by having the title symbol sown into her dress in Nathaniel Hawthorne's *The Scarlet Letter*.
ANSWER: **Hester** **Prynne** [accept either] <JL>

18. In this process, the reversible lysis of a biphosphate pentose yields dihydroxyacetone phosphate and the glyceraldehyde derivative PGAL, with which it rapidly interconverts. Its second step is an isomerization yielding F6P, which then undergoes rate-limiting phosphate addition by phosphofructokinase. The product of the first step of this process is a precursor to glycogen, and its final three-carbon product can be fermented into lactate or decarboxylated to form acetyl-CoA. The products of this process are consumed by the Krebs cycle. For 10 points, name this metabolic pathway which converts glucose into pyruvate, yielding a net gain of two ATP molecules.
ANSWER: **glycolysis** [accept **Embden-Meyerhof**-Parnas pathway; prompt on "respiration" or "cellular respiration" or "aerobic respiration"; prompt on "metabolism" or "catabolism"] <MJ/AS>

19. One character in this work, doesn't know who her parents are, and performs magic tricks and ventriloquism at a party. Another character in this play is called the "perpetual student", because he completed his university studies. Those characters are Charlotta Ivanovna and Trofimov. Anya and her mother return to Paris at the end of this play, while her adopted sister Varya takes a job as a housekeeper. At the end of this play, Lopakhin buys the family property of Gayev and Lyubov at an auction, and plans to turn it into dachas. For 10 points, name this play, which ends with an axe being used in the title location, written by Anton Chekhov.
ANSWER: The ***Cherry Orchard*** [or ***Vishnyovy sad**]* <SJW>

20. This faith classifies the souls of unliberated beings by the number of senses those beings have. Two of its sects disagree on whether Mallinath was a woman; those who believe that have white-clad monks while disbelievers' monks are "sky-clad" and thereby naked. This religion believes people get smaller and live shorter lives as the cycle of time goes on. Its believers make five great vows, venerate their *tirthankar* founder Mahavira, and respect the souls of animals and plants. For 10 points, name this Indian religion whose adherents filter water to avoid drinking insects in keeping with *ahimsa,* or total non-violence.
ANSWER: **Jain**ism [or **Jain**s or **Jain dharma**] <MPG/MJ>

[STOP HERE]
[You have reached the end of the round. Do not continue reading unless the game is tied or a tossup was thrown out earlier in the round.]

21. The NAIRU measure of this quantity is non-accelerating, and a one percent rise in this phenomenon roughly correlates to a two percent drop in a country's GDP according to Okun's Law. One temporary type of this phenomenon is called "frictional," and the moniker "Keynesian" is sometimes given to the more persistent "cyclical" kind of it. It is plotted along the X-axis of a Phillips curve against a quantity with which it is combined in the "misery index;" that other quantity is inflation. For 10 points, name this phenomenon that occurs when those in the workforce cannot find salaried opportunities.
ANSWER: **unemployment** rate <MHH>

Round 7 Bonuses

1. If Franklin D. Roosevelt had had Twitter, he might often use the hashtag #newdealproblems. Answer some questions about such problems he ran into, for 10 points each.
[10] This autocratic Louisiana Senator, nicknamed "Kingfish," threatened a more radical "Share Our Wealth" program. He was organizing a Presidential run at the time of his 1935 assassination.
ANSWER: Huey **Long**
[10] In 1937, Franklin Roosevelt tried and failed to weaken the anti-New Deal "Four Horsemen" by reform of this body. Opponents saw his plan as an attempt to quickly "pack" it with six new members.
ANSWER: **Supreme Court** of the United States [or **SCOTUS**]
[10] This Catholic priest made increasingly anti-New Deal, pro-fascist, and anti-Semitic radio broadcasts to millions of listeners from Royal Oak, Michigan.
ANSWER: Father Charles Edward **Coughlin** [*KOG-lin*; accept pronunciations such as "KOFF-lin"] <MJ>

2. The phrase "so it goes" recurs 154 times in this work. For 10 points each,
[10] Name this novel about Billy Pilgrim, who becomes "unstuck" in time. This novel describes the firebombing of Dresden, during which American prisoners-of-war are housed in the title structure.
ANSWER: *Slaughterhouse-Five, or The Children's Crusade: A Duty-Dance with Death*
[10] *Slaughterhouse-Five* is a work by this American author of *The Sirens of Titan* and *Jailbird*.
ANSWER: Kurt **Vonnegut**, Jr.
[10] In *Slaughterhouse-Five*, "So it goes" is the response of this alien civilization to death. These creatures resemble a toilet plunger surmounted by a hand, with a single eye.
ANSWER: **Tralfamadorian**s <SJW>

3. This series of conflicts lasted almost eight hundred years, and famous warriors during it included El Cid, who changed sides multiple times. For 10 points each:
[10] Name this struggle in which the Christians of Spain slowly took back the peninsula from the Muslim states which ruled almost all of it following their invasion in 711.
ANSWER: the **Reconquista**
[10] Boadbil surrendered this last Muslim city in Spain to Ferdinand and Isabella in 1492. After that, the *reyes Catolicos* turned on the Jews with a decree from this city's Alhambra palace.
ANSWER: **Granada**
[10] Pelayo of Asturias, a Christian king who declared the Reconquista in the 710s, was a member of this ethnicity which had earlier lost the Battle of Vouillé to the Merovingian Clovis.
ANSWER: **Visigoth**s [prompt "Goths"] <MJ>

4. The cruel Corporal Himmelstoss becomes a cook in this novel after revealing his cowardice in the trenches. For 10 points each:
[10] Name this novel in which students of Kantorek, such as Paul Baumer, Albert Kropp, and Stanislaus Katczinsky fight in World War I.
ANSWER: *All Quiet on the Western Front* [or **Im Western nichts Neues**]
[10] *All Quiet on the Western Front* is by this German author.
ANSWER: Erich Maria **Remarque**
[10] Frederich Muller inherits these items from Franz Kemmerich. As he dies, Muller passes these items onto Paul.
ANSWER: **boot**s [prompt on "shoes"] <JL>

5. This function's fixed point is at zero. For 10 points each:
[10] Name this function which, for an angle in a right triangle, gives the ratio of the opposite side to the hypotenuse.
ANSWER: **sine**
[10] The sine function has this property, meaning that it has rotational symmetry about the origin. The integral of one of these functions over an integral that is symmetric about the origin is zero.
ANSWER: **odd**
[10] Fourier series express periodic functions as this type of expression of sines and cosines, in which the terms are multiplied by scalar constants and summed. The span of a set is the set of these expressions on the set's elements.
ANSWER: **linear combination** <BH/AS>

6. [*Note to Moderator: Do not reveal the promptable answers to the first part if they are not given.*]
This organ houses the sebaceous glands, as well as Meissner's corpuscules, which are tactile mechanoreceptors. For 10 points each:
[10] Name this organ which some amphibians use for respiration, and which is important for preventing water loss.
ANSWER: **skin** [prompt on "epidermis"; prompt on "dermis"]
[10] This outermost layer of the skin, whose lowest layer is the stratum basale, is keratinized. It is composed of melanized stratified squamous epithelium.
ANSWER: **epidermis** [do not accept "dermis"]
[10] These small, essentially vestigial muscles are responsible for hair standing on end when it is cold. In porcupines, these muscles control the quills.
ANSWER: **arrector pili** muscles [or **arrectores pilorum**] <RB/AS>

7. Erichthonius was born after Hephaestus tried to rape this goddess. For 10 points each:
[10] Name this gray-eyed Greek goddess of wisdom and tactics who favored Odysseus. She is often depicted wearing a helmet more often than her Roman counterpart Minerva.
ANSWER: Pallas **Athena** [prompt "Pallas"]
[10] Athena helped Odysseus's son Telemachus travel to Pylos and Sparta in search of news about his missing father. Give the name of *either* king visited by Telemachus on that trip.
ANSWER: **Nestor** OR **Menelaus**
[10] Athena sprang fully-grown from the head of Zeus after he had cunningly swallowed this Titan famed for her wisdom. This Titan was thereby regarded as Athena's mother.
ANSWER: **Metis** <SSp>

8. This artist outlined his aesthetic theory in *Ten O'Clock Lecture*. For 10 points each:
[10] Name this British painter who depicted a fireworks display in *Nocturne in Black and Gold: The Falling Rocket*.
ANSWER: James McNeill **Whistler**
[10] Whistler's most famous painting, *Arrangement in Grey and Black No. 1*, is of this relation of his.
ANSWER: the artist's **mother**
[10] Whistler's *Nocturne: Blue and Gold* depicts a small boat in the Thames under this wooden structure.
ANSWER: Old **Battersea Bridge** <JL>

9. William James was a professor of philosophy and psychology at this university at the turn of the twentieth century. For 10 points each:
[10] Name this Ivy League university whose so-called "mascot" is the color crimson. It is located in Cambridge, Massachusetts, and its founding in 1636 makes it the oldest college in America.
ANSWER: **Harvard** University [or **Harvard** College]*[Editor's note: BOOOOO HARVARD]*
[10] While at Harvard, William James advocated for this school of American philosophy, which holds that a person's claims and concepts are judged by their usefulness to, and effect on, that person.
ANSWER: **pragmatism** [do not accept "pragmatic" or "pragmaticism"]
[10] James championed this other American, who founded and later broke with pragmatism. He worked in logic and semiotics, which inspired his work *How to Make Our Ideas Clear.*
ANSWER: Charles Sanders **Peirce** *[PURSE]* <MJ>

10. With the words having been translated, answer these questions about a language in order that you may receive points, for 10 points each:
[10] This dead Indo-European language has five declensions of nouns and four conjugations for verbs. It is the basis for modern Romance languages such as Spanish, and its "vulgar" form became Italian.
ANSWER: **Latin**
[10] In Latin, examples of this grammatical property for nouns include the nominative, which indicates a subject, the dative, which indicates indirect objects, and the ablative. Declension changes this property.
ANSWER: **case**
[10] This Latin grammar construction is introduced by words such as "dixit." In it, the subject is changed from nominative to accusative, relative-clause verbs become subjunctive, and the main verb becomes an infinitive.
ANSWER: **indirect** discourse [or **indirect** speech, or **indirect** quotation] <MJ>

11. The *Exxon Valdez* spill occurred in Prince William Sound off the coast of this state, the site of a sled dog race ending in Nome called the Iditarod. For 10 points each:
[10] Name this northernmost and largest US state, which began as a territory purchased from Russia.
ANSWER: **Alaska**
[10] This town in North Slope borough is the northernmost town in Alaska and the town in the United States with the coldest average temperature. Many residents work in nearby oil fields.
ANSWER: **Barrow**
[10] This city on Baranof Island southwest of Juneau is named in the language of the native Tlingit. It preceded Juneau as capital and lends its name to a giant spruce tree found across the Pacific Northwest.
ANSWER: **Sitka** <MJ>

12. For 10 points each, answer these questions about a Protestant denomination.
[10] *Institutes of the Christian Religion* is the magnum opus of this theologian who led a theocraticy at Geneva.
ANSWER: John **Calvin** [or Jean **Chauvin**]
[10] Calvin refused to accept that good works can earn salvation since he believed in this phenomenon, whereby an elect set of people is known by God to be the only future entrants into heaven.
ANSWER: **predestination**
[10] Calvin's Five Points also included this tenet, that each possible faculty of man is horrible and wicked, rendering his efforts to try and save himself utterly worthless..
ANSWER: **total depravity** [or **total inability**; or **total corruption**; prompt "depravity," "inability," or "corruption" by itself] <SSp>

13. This work takes the form of a conversation between its author and the traveller Raphael Hythloday, who begins by critiquing the current state of governments, nations, and civilization. For 10 points,
[10] Name this work, which describes the title island, in which chamber-pots are made of gold, there is no private property and all citizens must contribute labor.
ANSWER: *Utopia*
[10] *Utopia* was written by this Englishman, who served as Chancellor to Henry VIII. Desiderius Erasmus wrote *In Praise of Folly* while staying with this man, his friend and correspondent.
ANSWER: St. Thomas **More**
[10] More's career and downfall are depicted in this Robert Bolt play, narrated by The Common Man.
ANSWER: A *Man For All Seasons* <SJW>

14. For 10 points each, answer these questions about final bosses who take up like half the screen in Game Boy Advance role playing games.
[10] Cackletta turns into a big purple thing at the end of the "Superstar Saga" of these two brothers. These ostensible plumbers and Nintendo mascots wear overalls and often work together to save Princess Peach when not kart racing.
ANSWER: **Mario** Mario AND **Luigi** Mario [or Super **Mario brothers**]
[10] Menardi and Saturos become the Fusion Dragon at the end of this game, in which Isaac changes classes with the help of *djinn*. It continues from Felix's point of view in *The Lost Age* and has a DS sequel subtitled *Dark Dawn*.
ANSWER: *Golden Sun* [or **Ougun no Taiyou**]
[10] Final bosses in this series, such as NebulaGray, Gospel, and the proto-Internet-beast-thing Alpha, take up all nine enemy squares. Its protagonist is a computer program which Lan Hikari pilots in CyberWorld.
ANSWER: **Megaman Battle Network** [or **Rockman EXE**; prompt "Megaman" or "Rockman" alone; do NOT accept "Megaman NT Warrior"] <MJ>

15. Answer these questions about Jews in England, for 10 points each.
[10] Benjamin Disraeli, the first Prime Minister of Jewish ancestry, served this nineteenth-century queen, as did his rival William Gladstone. She ruled for sixty-three years.
ANSWER: Queen **Victoria** [or Queen Alexandrina **Victoria**]
[10] Victoria elevated this Jewish banking family to the British nobility. The Balfour declaration was made in a letter to a member of this family, the subject of many anti-Zionist conspiracy theories.
ANSWER: **Rothschild** family
[10] This earlier ruler of Britain reversed Edward Longshanks' expulsion of the Jews from England. He was briefly succeeded by his boy son Richard.
ANSWER: Oliver **Cromwell** <MJ>

16. *[MODERATOR NOTE: Read the first two lines of the bonus slowly.]*
Suppose that you are massless and are sitting in a car with mass M, traveling *counterclockwise* on a circular track of radius R, moving at constant speed V. For 10 points each:
[10] What would be the magnitude of the centripetal force on your car? Express your answer in terms of the quantities given.
ANSWER: **M times V squared divided by R** [accept mathematically identical expressions such as **MV-squared over R**]
[10] Measured from the center of track, what is the magnitude and direction of your car's angular momentum?
ANSWER: **M times V times R**, pointing **up** [accept mathematically identical expressions; accept directions like **out of the ground** or the **positive z** direction or obvious equivalents of any of those]
[10] Assuming the track is not angled, this force prevents your car from skidding off the track, and also allows your car to move forward. The coefficients that describe this dissipative force are often denoted mu.
ANSWER: **friction** [accept **static friction**; accept **dynamic friction**; accept **kinetic friction**; generously prompt on "centripetal force"] <AS>

17. Identify the following composers of musical works based on the seasons, for 10 points each.
[10] The E-major "Spring" is probably the most popular of *The Four Seasons*, a set of four violin concertos by this Italian Baroque composer.
ANSWER: Antonio **Vivaldi**
[10] *The Seasons* and *The Creation* are the two oratorios that this Austrian wrote late in life with libretto by Baron van Swieten.
ANSWER: Franz Joseph **Haydn**
[10] This avant-garde composer wrote the music for Merce Cunningham's ballet *The Seasons*, but he is better known for pioneering the prepared piano and writing the completely silent piece *4'33"*.
ANSWER: John **Cage** <JL>

18.This poet described "pale kings and princes too, / Pale warriors" enthrall to the title figure of "La Belle Dame Sans Merci." For 10 points each,
[10] Name this British Romantic poet of "Ode to a Nightingale", who declared "'Beauty is truth, truth beauty,' - that is all / Ye know on earth, and all ye need to know" in "Ode on a Grecian Urn."
ANSWER: John **Keats**
[10] This Keats sonnet describes the title experience as akin to when "stout Cortez… star'd at the Pacific… Silent, upon a peak in Darien."
ANSWER: "**On First Looking Into Chapman's Homer**"
[10] This longer Keats work begins, "A thing of beauty is a joy for ever," and describes the love between the title shepherd and the Moon, personified as Cynthia.
ANSWER: "**Endymion**"<SJW>

19. This work was one of its artist's "readymades". For 10 points each:
[10] Name this sculpture, a urinal that was signed R. Mutt by its artist.
ANSWER: ***Fountain***
[10] *Fountain* is by this French Dada artist of *Nude Descending a Staircase, No 2*.
ANSWER: Marcel **Duchamp**
[10] Marcel Duchamp adopted this female alter ego for a series of photographs by Man Ray, for which he dressed and posed in drag.
ANSWER: **Rrose Sélavy** [prompt on partial answer] <JL>

20. To escape British control and border warfare, this group of settlers left Cape Colony for the Great Trek in the 1830s. For 10 points each:
[10] Name this group of Dutch settlers which nonetheless fought two namesake wars against the English in modern-day South Africa.
ANSWER: **Boer**s [prompt "Afrikaners"]
[10] This diamond conglomerate, founded by Cecil Rhodes in 1888, was named for the Boer settlers in present-day Kimberley whose farm was bought out.
ANSWER: **De Beers**
[10] This last white President of South Africa released Nelson Mandela from prison and worked with him to end apartheid before Mandela won the election to succeed him.
ANSWER: Frederik Willem **de Klerk** <SL>

21. *[Note to moderator: Do NOT read the alternate answer to the first part unless the team gives it.]*
The law of mass action assumes that only one of these exists. For 10 points each:
[10] Name this configuration that a group of reactants must assume before forming products. In endothermic reactions, these configurations resemble the products more than the reactants.
ANSWER: **transition state**s [also accept **activated complex**es, because they aren't well-distinguished from one another]
[10] This quantity is the difference in energy between the reactants and the transition state. This energy barrier must be overcome for the reaction to proceed. Catalysts lower this quantity.
ANSWER: **activation** energy
[10] This term describes catalysts that are in a different phase or state of matter than the reactants. This term also describes mixtures that are non-uniform, such as suspensions.
ANSWER: **heterogeneous** [accept **heterogeneous catalyst**s; accept **heterogeneous mixture**s or obvious equivalents] <IP/AS>