Tossups

1. **It's not the Byzantine Empire, but *The Tale of the Bygone Years* recounts a siege of this state's capital by the Pechenegs. To forestall blood feuds, murderers here were made to pay 80 vira to the families of their victims. One of its rulers gave his daughter in marriage to Casimir the Restorer. One ruler of this state married Anna, the sister of Basil II. Another of its rulers was called "the Accursed Prince" for murdering his younger brothers, and he was defeated at the Alta River by its eventual greatest ruler,** (*) Yaroslav the Wise. It was established when its capital was relieved from Khazar tribute by the Varangian Guard; it later converted to Orthodox Christianity. For 10 points, name this 9th to 13th century state ruled by the Rurik Dynasty, with a capital in modern-day Ukraine.
ANSWER: Kievan **Rus** [prompt on **Rurik** Dynasty]

2. **One of these objects ignored the command "shutdown dammit until," leading to speculation that it was stuck in a reboot loop. Every one of these objects could instantly deploy an alpha proton x-ray spectrometer. One of these objects discovered a feature named Home Plate and became stuck in loose granular material near it. All of these objects were named for winners of** (*) student essay competitions, including one that bears instruments like the CheMin and MARDI. *Sojourner* was the first successful one, preceding twin ones named *Spirit* and *Opportunity*. A site named for Ray Bradbury was the landing zone of the most recent one, which arrived in August 2012. For 10 points, name these vehicles, such as *Curiosity*, which were built to explore a red planet.
ANSWER: **Mars rover**s [prompt on **rover**s]

3. **One man with this surname names a fort where the Shawnee chief Cornstalk was murdered. Another man with this surname resigned as Secretary of State over a scandal involving a letter from Joseph Fauchet and adopted the pseudonym Germanicus to pen many letters defending George Washington. Along with the first President of the Continental Congress, this surname was shared by a man who forced the Pullman Company to give** (*) black workers higher wages as leader of the Brotherhood of Sleeping Car Porters. This was the surname of the man who presented the Virginia Plan at the Constitutional Convention. For 10 points, give this surname shared by the head of the March on Washington and the first Attorney General of the United States.
ANSWER: **Randolph** [accept Peyton **Randolph**, Edmund **Randolph**, or Asa Philip **Randolph**]

4. **The background of this painting consists of a large wall onto which many faint images of outside scenery can be seen, and into which a man, who is bent as if being crucified, has his right hand stuck. The left side of this painting includes a white dog and a stringed instrument near figures such as an Irish beggar and a traveling salesman. The right of this painting depicts several of the painter's** (*) friends, including Champfleury on a stool and Baudelaire reading a book. A nude woman, a boy, and a white cat all stand next to the central figure, whose foot seems to fall into the landscape he is working on. For 10 points, name this large painting by Gustave Courbet, which depicts himself at work.
ANSWER: The **Artist's Studio**: *A real allegory summing up seven years of my artistic and moral life* [or The **Painter's Studio**]

5. **One character in this novel tells two newspaper editors about his short story "A Pisgah Prophecy." Over a cup of hot chocolate, two characters in this novel discuss teaching a woman correct Italian pronunciation. This novel's protagonist reads a letter from his daughter at photography school and carries on a flirtatious relationship with Martha by mail under the name** (*) Henry Flower. At its end, a woman recalls her days in Gibraltar and remembers the rose she wore in her hair the day her husband proposed to her. Blazes Boylan cuckolds the protagonist of this novel, who masturbates on the beach in its section "Nausicaa." For 10 points, name this stream of consciousness novel in which Leopold Bloom wanders in Dublin, written by James Joyce.
ANSWER: *Ulysses*

6. **In one appearance, this god curses frogs, elephants, and parrots for disclosing his hiding spots. Because he could not tell lies, this god was cursed by Brgu after he revealed the location of a Rakshasa's wife-to-be. This**

god dealt with his fear of death by hiding in plants upon seeing three brothers in the form of sticks die during a sacrifice. Consequently, this god was given the task of hotr and received (*) immortality through drinking soma. This consort of Svaha, often depicted with two heads and a pot belly, rides a ram and was nearly relieved of his duties after becoming too fat. He receives tribute to the rest of the gods by gluttonously devouring ghee through his seven tongues during sacrifices. For 10 points, name this Hindu god of fire.
ANSWER: **Agni**

7. **This band covered Chris Knox's song "Brave" for in a collaborative album following Knox's stroke. In one of this band's own songs, the singer declares "I write down good reasons to freeze to death/in my spiral notebook." This band behind "Broom People" wrote a song about Golden Boy peanuts, which only exist in heaven. This band wrote a concept album about the dysfunctional (*)** Alpha couple, which includes a song beginning "I hope that our few remaining friends/give up on trying to save us," titled "No Children." They introduced a horn section for songs on their latest album, *Transcendental Youth*. For 10 points, name this band headed by the brilliant John Darnielle, who sang "I'm gonna make it...if it kills me" in the song "This Year."
ANSWER: The **Mountain Goats** [prompt on John **Darnielle**]

8. **Sherman E. Lee labeled this empire's influential sculptural design the "International Style." A "warrior king" of this empire reaped tribute from twelve southern states and ousted the rulers of nine northern ones besides issuing bullion commemorating his revival of the horse sacrifice. One ruler of this empire issued** *savarna* **coinage and is praised in inscriptions engraved on this empire's famed (*)** iron pillars. Its first ruler gained power by marrying a Licchavi princess and consolidating the local iron trade from his home state of Magadha. An incursion by the White Huns forced the disintegration of this empire, which patronized Kalidasa and oversaw a flourishing of Sanskrit. For 10 points, Samudra ruled which 4th to 6th century Indian empire?
ANSWER: **Gupta** Empire [or **Gupta** Dynasty; or **Gupta** Samrajya; prompt on **Magadha** if players buzz before the words "home state of" are read]

9. **This idea can be divided into apophatic and kataphatic varieties depending on whether it can be explained concretely. William James'** *The Varieties of Religious Experience* **asks if saintly life originates from this idea and states that "ineffability" is a prerequisite for a tradition to adhere to it. This idea underlies a tradition whose practitioners attempt to merge the (*)** Godhead with the *Einsof*. It underlies a different tradition that uses various practices to achieve the Six Subtleties as well as *fana*. That group also emulates the motion of planets through the practice of whirling, fostering this experience by proxy. For 10 points, name this human experience of the transcendent divine that characterizes sects like Kabbalah and Sufism.
ANSWER: **mystic**ism [or word forms; or **mystic** theology; or **mystic** experiences; use discretion to accept religious terms that include "mystic"]

10. **The cities of Tiberias and Diospolis were nearly destroyed by the forces of Ursicinus during one of these conflicts. According to Eusebius of Caesarea, a man named Andreas declared himself "king" during one of these conflicts in which his forces burned Alexandria. During another of them, Lydda was sacked by Lucius Quietus, whose corrupted name was given to that conflict. Sextus Julius Severus was recalled from (*)** Britannia to put down the last major one. The largest of these conflicts was triggered by sacrilegious bird sacrifices. Josephus chronicled how that one was quelled by Titus after the fall of the Masada. For 10 points, name these uprisings in which the Zealots and Bar Kohkba failed to reclaim the Holy Land from the Romans
ANSWER: **Jewish Revolts** [accept any number of synonyms for **revolt**; just **Jewish** is fine after "these uprisings" is read; accept **Jewish-Roman** Wars]

11. **In one story by this author, a soothsayer wins a client's trust by predicting that the client had previously been the target of a murder attempt, which in fact was carried out by the soothsayer himself. This author of "An Astrologer's Day" wrote a novel in which a calligrapher who cares for his aunt falls in love with the family planning advocate Daisy. This author wrote about Rosie, who leaves her husband for a man more supportive of her dancing career in a novel ending with the death the sage (*)** Raju. This author set *The Painter of Signs* and *The Guide* in the same place by the banks of the Sarayu River. For 10 points, name this Indian author of *Swami and Friends*, who created the village of Malgudi.
ANSWER: R.K. **Narayan** [or Rasipuram Krishnaswami Iyer **Narayanaswami**]

12. **In one story by this author, a man describes the amount of work units needed to repair a church in order for Res Grier to return to the parish. Another of this author's stories is about the unseen lynching of Will Mayes after he was accused of assaulting Minnie Copper. This author of "Shingles for the Lord" penned a 1,600 word sentence called "The Land" that is sometimes added as the fourth section of a short story in which (*)** Ike McCaslin kills the title creature. In the most famous story by this author of "Dry September," the horrible smell coming from title character's home is discovered to be the corpse of Homer Barron, a Northerner whom she had killed and slept with until her death. For 10 points, name this author of "The Bear" and "A Rose for Emily."
ANSWER: William **Faulkner**

13. **The Hilbert form of this quantity can be used to derive Einstein's field equations. The contribution of a path has phase proportional to this quantity in Feynman's path-integral formulation. This quantity appears as Hamilton's principal function in the Hamilton-Jacobi equation. By defining this quantity as the integral of momentum with respect to the generalized position, the path of motion can be found, though not as a function of time. Its variation is zero only if the (*)** Lagrangian satisfies the Euler-Lagrange equations. It is given by the integral of the Lagrangian with respect to time in Hamilton's principle. For 10 points, name this quantity that, like time in Fermat's principle, is stationary for any trajectory taken by a system according to its namesake principle.
ANSWER: **action**

14. **In this work's second section, the author lays out the three classes of "volitions" that guide actions as "technical," "pragmatic," and "moral." Its third section describes an "antinomy" between the ideas of freedom and natural necessity. This work equates "autonomy of will" with free will in order to draw a distinction between (*)** intelligible and sensible experiences. According to this work, the title system is a product of *a priori* conceptions of reason as they apply to duty. This work asserts in its first section that consequentialism is misguided since it is a misapplication of the duty borne out of good will, the only unqualified good. For 10 points, name this first work of Immanuel Kant's moral philosophy that established a basis for the categorical imperative.
ANSWER: ***Groundwork on the Metaphysics of Morals*** [or ***Foundations of the Metaphysics of Morals***; or ***Grundlegung zur Metaphysik der Sitten***; accept minor variations in the English title, as there are several different published titles]

15. **The fourth movement of this piece ends with an andante giusto section whose melody is played by muted strings. In his letters, the composer had originally planned to name this composition a program symphony, although it gained its more popular name from the piece's publisher, Jurgenson. The opening movement of this symphony begins with an Adagio whose melody is played by the bassoon. A fortissimo half diminished chord in A immediately follows a dynamic marking of (*)** *pppppp* in the bassoon in its first movement. Its second movement is described as a "limping waltz" and is written in 5/4 time. A week after this piece's premiere, its composer died, likely from cholera. For 10 points, name the final symphony written by Tchaikovsky.
ANSWER: ***Pathetique*** *Symphony* [or **Tchaikovsky's *Symphony No. 6*** in B minor, Op.74; just **6ᵗʰ Symphony** needed after Tchaikovsky is mentioned, but prompt on it before]

16. **The failure of a proposed rapid transit system in this country, despite its novel "non-material coupling system," was investigated by an actor-network theorist from here. Several women from this country who had had abortions signed the "Manifesto of the 343 Bitches." A native of this country names a syndrome in which tourists faint upon seeing beautiful art. One thinker from this country focused on geography in his work *The Mediterranean World in the Age of Philip II*, in which he used the (*)** "long term" approach. A politician from this home of the Annales school used his experiences touring prisons to write a book warning of the "tyranny of the majority" in a new republic. For 10 points, name this country, home to the author of *Democracy in America*.
ANSWER: **France** [or **French Republic**; or **Republic francaise**; accept either underlined part of "***Aramis**, or the Love of Technology* by Bruno **Latour** before "country" is said]

17. **Fort Campbell straddles this state's northern neighbor and its own city of Clarksville. The Hunter Museum of American Art is located in one of this state's major cities. The busiest cargo airport in the United States is found in this state, in a city located at the confluence of the Wolf and Mississippi Rivers. A landmark in this state includes several tombstones in its Meditation (*)** Garden, and a "Jungle Room" that was used as a recording studio. Centennial Park, located in this state's capital, is home to a replica of the Parthenon, as well as the Grand Ole Opry House. For 10 points, name this home state of Elvis Presley whose largest cities are Memphis and

Nashville.
ANSWER: **Tennessee**

18. **Background information in this play is provided through dialogues with otherwise inactive nobles named Arias and Alonzo. An attempt by a soldier in this play to assuage his leader's distrust of a war hero is halted by the sight of ten enemy ships. In this play, a princess admits to her lady-in-waiting Leonora that she has been helping to kindle the central romance because she cannot love the title character. The plot of this play is set off after a tutoring job is offered to (*)** Don Diego, who is slapped by a jealous Count of Gormas. After killing Don Gomes, the title character of this play tries to marry his daughter Chimène, but is asked by King Fernand to kill some Moors first. For 10 points, name this tragedy about a soldier named Rodrigo, written by Pierre Corneille.
ANSWER: *Le **Cid*** [or *The **Cid***]

19. **One method for measuring this quantity involves plotting the apparent magnitude against temperature of a cluster's main sequence stars and comparing to a standard H-R diagram. Another method uses a power law between the rotational speed of a (*)** spiral galaxy and its luminosity, known as the Tully-Fisher relation. The difference between apparent and absolute magnitude is this quantity's namesake modulus. It can be found by measuring the difference in position of stars due to the motion of the Earth, known as parallax. It is measured with the help of RR Lyrae variables, type Ia supernovae, Cepheid variables, and other standard candles. For 10 points, parsecs are unit of measurement for what quantity, whose value for the Earth-Sun system is 1 astronomical unit?
ANSWER: **distance** [or **absolute magnitude**; do not accept or prompt on "magnitude" alone]

20. **A replica of this structure is made by evaporating a thin layer of carbon together with a metal in freeze-fracture electron microscopy. According to a recent theory, the inhomogeneity of this structure's composition suggests that it is made up of many micro-domains. Some components of it are translocated with the aid of scramblases, flippases, and floppases, resulting in a preponderance of phosphatidyl serine on its (*)** inner leaflet. Integral proteins, such as G-protein coupled receptors, span the width of this structure, which becomes more packed as cholesterol is added. This structure is visualized as a fluid mosaic and it consists of a phospholipid bilayer. For 10 points, name this outer covering of most eukaryotic cells which is further reinforced by a "wall" in plants.
ANSWER: **plasma membrane** [or **cell membrane**; accept a buzz of **membrane** in the first sentence, but prompt on it afterwards]

Tiebreakers

21. **William Abbenseth took many photographs of this city during the Great Depression. One structure in this city was designed by Bernard Maybeck for a fair celebrating the completion of the Panama Canal. A skyscraper in this city, that houses the Palace of Fine Arts, was designed by William Pereira and contains aluminum panels on its spire. That tallest building in this city is located on (*)** 600 Montgomery Street, has two wings on its sides, and was built in a particular shape due to a law restricting the surface to height ratio. A bridge built from this city was originally designed by Joseph Strauss and was painted International Orange. For 10 points, name this city in California, home to the Transamerica Pyramid and the Golden Gate Bridge.
ANSWER: **San Francisco**, California

Bonuses

1. This heresy emerged following the Council of Chalcedon. For 10 points each:
[10] Name this heresy which maintains that following the union of the divine and human into the form of Jesus Christ, God has only one nature, as opposed to the belief that God in the form of Jesus was both divine and human.
ANSWER: **Monophysitism**
[10] St. Gregory the Illuminator founded the Monophysite church in this region, the first nation to adopt Christianity.
ANSWER: **Armenian** Apostolic Church
[10] Another Monophysite church is this one, to which most of Egypt's Christians belong to. Its current pope is Tawadros II, who succeeded Shenouda III in 2012.
ANSWER: **Coptic** Orthodox Church of ALexandria

2. He critiqued the fear of death with his "symmetry argument," arguing that the state of death is identical to the state preceding birth. For 10 points each:
[10] Name this Epicurean philosopher who proffered a *fortuna*-guided universe and the theory that atomic "swerve" fosters free will in *De Rerum Natura*.
ANSWER: Titus **Lucretius** Carus
[10] Another investigator of Nature was Pliny the Elder, who contended that luxury was physically and morally harmful in the medicine section of his *Naturalis Historia* before dying during the 79 AD eruption of this volcano.
ANSWER: Mount **Vesuvius** [or Mons **Vesuvius**]
[10] This Stoic drew a distinction between things which are valuable and inherently good in *Moral Letters to Lucilius*. He also tutored Nero, who ungratefully ordered him to commit suicide.
ANSWER: **Seneca** the Younger [or Lucius Annaeus **Seneca**; do not accept "Seneca the Elder"]

3. Many science fiction tales had to do with regression to the past. Name some, for 10 points each.
[10] In this Stephen Vincent Benet story, a future priest of the Hill People rediscovers a burned-out Dead Place, which is implied to be the city of New York.
ANSWER: "**By the Waters of Babylon**"
[10] The protagonist encounters the Morlocks, who raise the Eloi like livestock, in the year 802,701 in this H.G. Wells novella.
ANSWER: The *Time Machine*
[10] This Walter Miller novel, divided into sections like "Fiat Homo" and "Fiat Lux," features the aftermath of a nuclear war where the title weapons technician is canonized after mobs turn on scientists.
ANSWER: A *Canticle for Leibowitz*

4. During this event, the central figures were defended by Emmanual Bloch and the prosecution's primary witness was one of the defendant's brother, David Greenglass. For 10 points each:
[10] Name this event in which two communists were convicted and sentenced to death for passing information on nuclear weapons to the Soviet Union.
ANSWER: The **Trial** of Julius and Ethel **Rosenberg** [accept clear-knowledge equivalents]
[10] The Supreme Court declined to hear the appeal of the Rosenbergs in a decision read by this man, a former Secretary of the Treasury under Truman who became Chief Justice in 1946 before being replaced by Earl Warren.
ANSWER: Fred **Vinson** [or Frederick Moore **Vinson**]
[10]Whereas the Rosenbergs were actual Soviet spies, this Wisconsin Senator gave a Lincoln Day speech in Wheeling in which he produced a list of 205 supposed Communists in the State Department
ANSWER: Joseph Raymond "Joe" **McCarthy**

5. It was once believed that performing this action would manipulate the animal magnetic forces that the body responds to, thus achieving harmony and balance. For 10 points each:
[10] Name this form of therapy pioneered by Franz Anton Mesmer, in which a patient's mental state is altered by concentrating intensely on one specific thought or object.
ANSWER: **hypnotism** [or **hypnotherapy**; or word forms of hypnotism, like **hypnotic** induction; prompt on **mesmerism**]

[10] Under hypnosis, this patient of Josef Breuer muttered nonsense words and phrases that popped into her mind and, illustrating the phenomenon of transference, imagined herself pregnant with the doctor's baby.
ANSWER: **Anna O.** [or Bertha **Pappenheim**; prompt on partial answer]
[10] This student of Jean-Martin Charcot published, and then retracted, several articles about his mentor's work with hypnotism. Along with Victor Henri and Theodore Simon, he published a precursor to the IQ test.
ANSWER: Alfred **Binet**

6. One leader of this kingdom embraced the Roman Catholic date of Easter at the Synod of Whitby. For 10 points each:
[10] Name this kingdom whose leader Oswiu defeated Penda at Winwaed to gain control of Mercia. This kingdom was the birthplace of the Venerable Bede and had its capital at York.
ANSWER: **Northumbria**
[10] This leader's failure to subjugate rebels in Northumbria led to its exclusion from his Domesday book. He is better known as the victor at the Battle of Hastings.
ANSWER: **William the Conqueror** [or **William I**; or **William the Bastard**; or **William II of Normandy**; prompt on **William**; do not accept just "William II"]
[10] In retaliation for the actions of Northumbrian resistors, William the Conqueror ordered this action, in which thousands of troops used a scorched-earth policy to attempt to subjugate rebellion.
ANSWER: **Harrying of the North** [or **Harrowing of the North**]

7. Name some deities in the mythology of McDonaldland, for 10 points each.
[10] Probably the most recognizable member of the McDonalds Pantheon is this red-afroed clown, who officially holds the title of "Chief Happiness Officer" within the McDonalds Corporation.
ANSWER: **Ronald McDonald**
[10] Ads often feature Ronald McDonald beside this purple amorphous blob, who originally had two pairs of hands with which to steal milkshakes. His uncle appears every March to bring Shamrock Shakes to mankind.
ANSWER: **Grimace** T. Jackson
[10] This clumsy avian was first introduced to give the world the McDonalds breakfast menu. She wears a pink jumpsuit complete with flight cap and scarf and was hatched from an egg after it was given love by Ronald.
ANSWER: **Birdie** the Early-Bird [prompt on **Early-Bird**]

8. Name some composers of difficult piano music, for 10 points each:
[10] "Mazeppa" and "Feux Follets" are among the pieces in this composer's *Transcendental Etudes*. He also wrote *Three Concert Etudes* and many *Hungarian Rhapsodies*.
ANSWER: Franz **Liszt**
[10] This Russian composer's *Etude in D sharp minor* is also known for its technical difficulty. His other piano works include *Vers la Flamme*, and the unfinished *Mysterium*, a work that he wrote to precede the end of the world.
ANSWER: Alexander **Scriabin**
[10] This French composer wrote many difficult works, such as *Etudes in All the Major* and *Minor Keys*, the latter of which contains *Aesop's Feast*. His other piano works include *Grand Sonata: The Four Ages*.
ANSWER: Charles-Valentin **Alkan**

9. This property, along with time-invariance, greatly simplifies the analysis of systems. For 10 points each:
[10] Name this property that allows the principle of superposition. For a system H, it means H of quantity ax+by equals aH of x + bH of y. Functions of this type are often written in y = mx + b form.
ANSWER: **linear**ity
[10] Any linear time-invariant system is completely characterized by this property, the output of the system when the input is the Dirac delta function.
ANSWER: **impulse response** [do not accept or prompt on "impulse"]
[10] The output of an LTI system for any input can be obtained by performing this operation, represented by a star, on the input and the impulse response. It flips and shifts one of its inputs, and integrates as it slides past the other.
ANSWER: **convolution** [accept word forms]

10. Carl Peters helped establish one of this empire's colonies, and it sent troops to suppress the Abushiri Revolt. For 10 points each:

[10] Name this colonial power that gained namesake "Southwest Africa" and "East Africa" departments as part of the Scramble for Africa.
ANSWER: **German Empire** [or Imperial **Germany**; or ***Deutsches Reich***]
[10] In early 20th century German Southwest Africa, these people were forced into the Omaheke desert along with the Nama and starved by the forces of General Lothar von Trotha following the Battle of Waterberg.
ANSWER: the **Herero**
[10] The Herero genocide took place mainly in this modern-day country that gained independence in 1990 and was ceded Walvis Bay after the end of apartheid in South Africa. It disputes the Caprivi Strip with Botswana.
ANSWER: Republic of **Namibia**

11. A feud over ownership of a castle named Soplicowo sets the plot of this work into action, which is resolved when the title character marries Zosia. For 10 points each:
[10] Name this twelve-book epic poem whose most awesome character, Jacek, returns as a Benedictine monk named Robak, kills a bear with a single shot, and dies protecting both feuding families from gunfire.
ANSWER: ***Pan Tadeusz***, *czyli ostatni zajazd na Litwie. Historia szlachecka z roku 1811 i 1812 we dwunastu księgach wierszem* [or ***Sir Thaddeus***, *or the Last Lithuanian Foray: A Nobleman's Tale from the Years of 1811 and 1812 in Twelve Books of Verse*]
[10] Adam Mickiewicz's *Pan Tadeusz* is considered the national epic of this country, and takes place during its union with Lithuania. This nation's was home to 20th century poets Czesław Miłosz and Wisława Szymborska.
ANSWER: Republic of **Poland** [or Rzeczpospolita **Polska**; or **Polsko** Republika]
[10] This author fictionalized the Khmelnytsky Uprising in *With Fire and Sword*. Petronius tries to help foster a romance between Marcus Vinicius and Ligia in his novel *Quo Vadis?*
ANSWER: Henryk **Sienkiewicz**

12. Several publications produced noteworthy moments during the 2012 election cycle. For 10 points each:
[10] A pivotal verbal gaffe of Herman Cain's campaign occurred when he flubbed a question about Libya while seeking the endorsement of this city's *Journal-Sentinel*.
ANSWER: **Milwaukee**
[10] David Corn, a journalist who works for this investigative magazine, leaked the video of Mitt Romney discussing the dependence of 47% of Americans on the rest.
ANSWER: ***Mother Jones***
[10] Statistician Nate Silver's FiveThirtyEight blog racked up millions of online hits for this newspaper, which agreed to host the blog for three years starting in 2010.
ANSWER: ***New York Times*** [or ***NYT***; or ***NY Times***]

13. Based on criteria like optical absorbance and ease of preparation, Norman Good came up with what he thought were the twelve most suitable substances of this kind in 1956. For 10 points each:
[10] Name these solutions specifically prepared to be resistant to pH changes.
ANSWER: **buffer**s
[10] The pH of a buffer is often calculated using this equation, which yields it as the sum of pKa and the log of the quotient of the concentration of a conjugate base over that of the weak acid.
ANSWER: **Henderson-Hasselbalch** equation
[10] Three terms are summed and then multiplied by 2.303 in order to yield this quantity, written as beta, a quantitative measure of a buffer's resistance to pH change.
ANSWER: buffering **capacity**

14. An interesting article by Rachmilevich et. al suggests that this process is necessary for nitrate assimilation in shoots. For 10 points each:
[10] Name this generally unfavorable process that occurs when there is way more oxygen available than carbon dioxide, reducing a plant's photosynthetic output by up to 25%.
ANSWER: **photorespiration** [do not accept or prompt on "respiration"]
[10] Photorespiration happens when this enzyme adds oxygen to RuBP. A major component of the "carbon fixation" phase of the Calvin Cycle, it is the most abundant enzyme on earth.
ANSWER: **RuBisCO** [or **Ribulose-1,5-bisphosphate carboxylase oxygenase**]
[10] Both the normal Calvin Cycle and photorespiration produce this three-carbon compound, a precursor to serine.

Two of them are produced in the Calvin Cycle for one carbon dioxide before being further reduced to PGAL.
ANSWER: **3-phosphoglycerate** [or **3PG**; or **glycerate 3-phosphate**; or **PGA**; prompt on **phosphoglycerate**]

15. Habinnas acts upon orders to reveal this man's gigantic funerary monument, which shows him wearing golden rings and giving money to the poor. For 10 points each:
[10] Name this wealthy former slave who serves delicacies such as a lamb affixed with wings and a boar stuffed with a flock of birds to Giton, his wife Fortunata, and other guests.
ANSWER:Gaius Pompeius **Trimalchio** Maecenatanus
[10] "The Dinner of Trimalchio" is one of the best-preserved sections of this lengthy novel by Gaius Petronius.
ANSWER: *Satyricon* [or *Satyrica*]
[10] In *Satyricon*, Encolpius's impotence prevents the success of this woman's advances. In *The Odyssey*, a character with this name keeps Odysseus on her island for a year after turning his men into animals.
ANSWER: **Circe**

16. Answer some questions related to the life and career of William Ernest Henley, for 10 points each:
[10] Henley is most famous for this poem of his, which states "I thank whatever gods may be/For my unconquerable soul" and ends "I am the master of my fate/I am the captain of my soul."
ANSWER: "*Invictus*"
[10] As editor of the *National Observer*, Henley introduced the English public to this author by publishing his *Barrack-Room Ballads*, including the poems "Fuzzy-Wuzzy" and "Gunga Din." He also wrote *The Jungle Book*.
ANSWER: Rudyard **Kipling**
[10] In this Kipling novel, the spoiled brat Harvey "Don't Call Me Mike" Cheyne becomes more considerate after falling off of a boat and being rescued by the fishing captain Dan Troop, who puts him to work on the *We're Here*.
ANSWER: *Captains Courageous*

17. X-rays of this painting show that the figure of a woman was painted under this work's subject, whose head is bent to the left. For 10 points each:
[10] Name this painting, in which a white-haired figure plays the title instrument while sitting cross-legged.
ANSWER: *The **Old Guitarist***
[10] *The Old Guitarist* is a painting from the Blue Period of this artist, who helped found cubism with Georges Braque.
ANSWER: Pablo Ruiz y **Picasso**
[10] One painting from Picasso's Rose Period depicts a man of this profession wearing pink attire and blue boots. Popular portrait subjects of this profession include David Garrick and Sarah Siddons.
ANSWER: **actor**s

18. This god punished the Telchines for their malevolent use of magic, and also punished Salmoneus for mimicking him. For 10 points each:
[10] Name this chief Olympian deity, who freed the Hecatonchires to help him fight against the Titans.
ANSWER: **Zeus**
[10] In his early life, Zeus was fed by Amalthea, a female animal of this kind. A god with the hindquarters, legs, and horns of this animal was the son of Hermes and Dryope.
ANSWER: domestic **goat** [or *Capra* aegagrus hircus]
[10] During Zeus' infancy, Rhea enlisted the help of this group of dancers to make noise from their armor and weapons in order to drown out Zeus' cries.
ANSWER: **Korybantes** [or **Kurbantes**; or **Curetes**]

19. This city was once saved by torrential rains that prevented the attacking force from bringing up their heavy cannons. For 10 points each:
[10] Name this city, which was besieged once in 1529 during the reign of Suleiman the Magnificent, and again in 1683, when the flags of the defeated Turkish army allegedly inspired the invention of the croissant.
ANSWER: **Vienna** [or **Wien**; or **Wean**]
[10] The Second Siege of Vienna was only defeated by the forces of Christian Europe thanks to this Polish king, whose famed "Winged Hussars" were key to his victory
ANSWER: **Jan III** Sobieski [or **John III** Sobieski; accept **Jan Sobieski**; prompt on **Jan**, **John**, and **Sobieski**]

[10] Sobieski came to the throne at the end of this chaotic period in Polish history. It began roughly with the Khmelnytsky Uprising and included an invasion of the Polish-Lithuanian Commonwealth by Sweden.
ANSWER: The (Swedish) **Deluge** [or **Potop**; or **Tvanas**]

20. New York's Astor Place Riots began during a performance of this man's opera *Macbeth*. For 10 points each:
[10] Name this Italian composer who created a vengeful jester in *Rigoletto*.
ANSWER: Giuseppe **Verdi**
[10] In 1919, civilians and servicemen rioted in Times Square to protest the Lexington Theater's staging of this Richard Wagner opera that ends with Walther joining the namesake guild after Veit Pogner deems his voice worthy.
ANSWER: *The **Mastersingers of Nuremberg*** [or *Die **Meistersinger von Nürnberg***]
[10] Another opera that sparked rioting was *The Mute Girl of Portici*, in which Masaniello leads a revolution in this city. This city's musical tradition includes the popular songs "O Sole Mio" and "Funiculì, Funiculà".
ANSWER: **Naples** [or **Napoli**]

21 This theorem states that energy is shared equally amongst all accessible degrees of freedom of a state. For 10 points each:
[10] Name this thermodynamic result, which can be used to derive Dulong–Petit law and is not to be confused with the virial theorem.
ANSWER: **equipartition** theorem
[10] The equipartition theorem predicts that the average kinetic energy for a particle in a monatomic ideal gas is 3/2 times this quantity, which is often used as a scaling factor for energy in molecular systems.
ANSWER: **kT** [the product of **Boltzmann constant** and **temperature**]
[10] Applying the equipartition theorem to these objects resulted in the ultraviolet catastrophe. These objects are so named because they absorb all incident light.
ANSWER: **black bodies** [or **blackbody**]