

2021 ACF Nationals

Packet 12 by the Editors, Finals 1

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Tossups

1. *Two answers required.*

Pseudo-stilbenes consist of azobenzenes with these two entities diametrically opposite. The pEDA and sEDA parameters characterize the strengths of these two kinds of entities. The presence of these two entities, which serve as a captor and a dative substituent, stabilize radicals in the captodative effect. The presence of each of these entities on opposite sides of a compound yields a “push-pull” compound. The presence of these two entities together will lower a compound’s HOMO-LUMO gap. These groups contribute +I and -I (“plus I and minus I”) effects. With the exception of halogens, in EAS, these two types of groups are typically equivalent to activating and deactivating groups, and they contribute inductive, mesomeric, and field effects to stabilize carbocations and carbanions. For 10 points, give these two classes of compounds which affect the electron densities of nearby conjugated pi systems.

ANSWER: **electron withdrawing groups** AND **electron donating groups** [or **EWGs** AND **EDGs**; or **electron withdrawing groups** AND **electron releasing groups**; or **EWGs** AND **ERGs**]

2. An Arthur Wilson biography claims that viewers “became favorable to change” when they looked at the images in this work. A critic proclaimed that “nothing shows wood’s humanizing power better than” the “world of machines” depicted in images accompanying this work. The ninth and tenth volumes of illustrations to this work are still of interest since they depict the secrets of the Gobelins Manufactory. The 5,000 images that accompany this work were hailed as the beginning of a “philosophy of the object” by Roland Barthes, who called their depictions of subjects such as coin-making and iron-forging a “French *Golden Legend*.” Robert Benard spent over 20 years overseeing the engravings that accompany this work, which accompanied texts by the scientist D’Alembert, among others. For 10 points, name this illustrated, multi-volume French text supervised by Denis Diderot.

ANSWER: the **Encyclopedia** [or the illustrations of the **Encyclopedia**; or the **Encyclopedie**]

3. Two women carry water drawn from a fountain at the center of one of a set of three paintings that Hubert Damisch called this city’s “perspectives,” which depict nearly empty, “ideal” cities to illustrate the principles of urban planning. A duke of this city commissioned a room lined in wood *intarsia*, featuring *trompe l’oeil* renderings of open cabinets and projecting benches, called his *studiolo*. A duchess of this city was depicted on a unicorn-drawn chariot facing her husband, who also appears kneeling in the *Brera Madonna*. The half-missing nose of that duke from this city is accentuated in Piero della Francesca’s portrait of him with his wife Battista Sforza. Federico de Montefeltro ruled this city, which titles a painting whose background features two maids rummaging through a *cassone* near a window. For 10 points, name this Italian city whose “Venus” is the subject of a Titian painting.

ANSWER: **Urbino**

4. In Ingeborg Bachmann's *Malina*, the unnamed protagonist writes a story about a character of this type from Vienna's Kagran neighborhood. During an outing with a character of this type, Honorio provokes and shoots a domesticated tiger in a novella by Goethe. In another story, a man charged with investigating some of these characters produces three twigs respectively made of gold, silver, and diamonds, which prove his explanation of the condition of their shoes. A mouse who is also one of these characters, Pirlipat, eats the nut Krakatuk to undo a curse in "The Nutcracker and the Mouse King." A woman who schemes to murder one of these characters is ordered to dance to death in red-hot boots in a story by the Brothers Grimm, who also wrote about "twelve dancing" ones. For 10 points, name this character type exemplified by many protagonists of Grimm's Fairy Tales, such as Snow White. ANSWER: **princesses** [or **prinzessinnen**; or **fürstin**; prompt on women, or girls, or royalty]

5. In his *Stratagems*, Frontinus credits this figure with being the first to divert a river so that the river could cleave a city into two parts. Ammianus Marcellinus claims this ruler was the first person ever to castrate males, thus creating the first eunuchs. In some stories syncretizing her with Egyptian mythology, she is said to have been reincarnated as an egg-laying rabbit after death, making her the progenitor of the Easter Bunny. The Christian bishop Alexander Heslop claimed that polytheism was invented by this woman. In the Middle Ages, she was often depicted as being half-human and half-fish. She waged war after hearing of king Ara the Beautiful's rejections in an Armenian folktale. This woman, who is sometimes said to be the wife of Nimrod, is more traditionally held to have murdered her husband Ninus, the founder of Nineveh. For 10 points, name this treacherous Babylonian queen from antiquity. ANSWER: **Semiramis** [or **Sammu-Rammât**]

6. One man by this name had a partial biography written by author Thomas Thistlewood, and agreed to cease hostility by signing the treaty of Petty River Bottom, which granted equal hunting rights. Another man given this first name, which literally means "man born on Monday," became a church sexton and founded the settlement of African Town, now called Africatown. That man arrived in Mobile Bay in 1860 after he was shipped from the port of Whydah on the *Clotilda*, the last slave ship ever to make a Transatlantic journey to America. Zora Neale Hurston filmed that man with this name, whose surname was Lewis. Accompong is home to a monument to another man of this name, who became the namesake of Trelawny Town in the Cockpit Country after he led the "Leeward" contingent of some anti-British rebels. For 10 points, name that man who led a slave revolt called the First Maroon War in Jamaica. ANSWER: **Cudjoe** [or **Cudjo**; or **Codjoe**; or Captain **Cudjoe**; or **Kojo**; or **Kwadwo**; or **Cudjoe** Lewis; accept **Oluale** before "Lewis"]

7. The article introducing this theorem discussed how uncertainty creates "subjective probability distributions" that later researchers Michael Jensen and William Meckling argued were strongly affected by agency costs. Alan Kraus and Robert Litzenger's research on tax advantages led to the development of one of the two main models that attempts to adapt this theorem's ideal assumptions to real-world conditions; that model is "trade-off theory," which rivals the "pecking order model." Under assumptions of perfect market efficiency, no information asymmetry, and zero taxes or costs of transactions or bankruptcy, this theorem implies indifference between debt and equity. "Capital structure irrelevance" is an informal name of, for 10 points, what theorem stating that a firm's value is unaffected by its method of financing, which is named for an American and an Italian-American economist? ANSWER: **Modigliani-Miller** theorem [accept answers mentioning **Modigliani** and **Miller** in either order, such as **Modigliani-Miller** independence; prompt on "capital structure irrelevance principle," or "capital structure independence," or answers indicating that "capital structure is irrelevant," or "firm value is independent of capital structure," before "structure"]

8. An edition of one of these pieces contained Heinrich Schenker's first published attempt at graphic analysis. An original manuscript of the last of these pieces unusually notates a phrase with upward stems despite it ending on a high A-flat 6. The fourth movement of one of these pieces opens with stark unharmonized F's that ascend by an octave every two notes; a leap of a tenth from F to A characterizes the three-voice fugue theme used for the rest of that movement. In the last of these pieces, the right hand plays bouncy descending long-short figures in groups of four while the left hand plays syncopated G major seventh chords; that passage appears in the Arietta movement and has been described as a "boogie-woogie." One of these pieces with a German nickname was considered unplayably difficult until first publicly performed by Franz Liszt. For 10 points, name these piano pieces that include the *Hammerklavier*.

ANSWER: **piano sonatas** by Ludwig van **Beethoven** [prompt on partial answer]

9. An army charged with laying siege to this city, commanded by Viscount Wimbledon after the resignation of John Ogle, got slaughtered after they found an abandoned house full of booze and drank themselves into a stupor. A group of conservative deputies based in this city wrote the "Manifesto of the Persians" encouraging the king to abolish a document drafted here called "La Pepa." Patrick Masterson captured the French imperial eagle during an attempt to liberate this city at the Battle of Barrosa. The Trienio Liberal reinstated a constitution named for this city. Much earlier, this city was attacked in an event dubbed "the singeing of the King's beard" by its perpetrator Francis Drake. In 1810, an interim assembly began ruling in this city after the ouster of King Ferdinand VII. For 10 points, name this port city of southern Spain home to the Cortes during the Peninsular Wars.

ANSWER: **Cadiz**

10. In a 1931 novel sometimes considered the first in this style, Max Dishar changes his name to Matthew Fisher to win the hand of Helen Givens; that novel in this style is by George Schuyler. The essay that coined this style's name analyzes a bric-a-brac costume called "Gasholeer" created by The Rammellzee and the Milestone comics superheroes of Dwayne McDuffie. Mark Dery's 1993 essay on this style also features an interview with an author who wrote the sexually graphic novel *Hogg* and a novel about the ruined city of Bellona. Authors commonly associated with this style include Samuel R. Delany and Octavia Butler. In music, this term describes an aesthetic associated with Parliament-Funkadelic and Sun Ra, who exemplified this style with his 1974 film *Space is the Place*. For 10 points, identify this literary and artistic style that uses science fiction tropes to explore black culture.

ANSWER: **Afrofuturism** [prompt on black science fiction, or science fiction, or speculative fiction]

11. One algorithm for approximately solving this problem begins by using randomized quadtrees to recursively partition the input set, and probabilistically computes a number of crossings in a runtime on the order of "big O of  $n \log n$  [pause] to the big O of the square root of  $d$  times  $c$  [pause] to the big O of  $C$  power." That PTAS algorithm by Arora and Mitchell was a significant improvement to another algorithm that approximately solves this problem by constructing an Eulerian multigraph from a minimum spanning tree, and removing repeated edges. The Christofides algorithm was the first efficient approximation algorithm for the Euclidean variant of this problem. The general form of this problem has a runtime on the order of  $n$  factorial if one brute forces it by trying all combinations of vertices. Finding the shortest possible route for a tour of cities is at the heart of, for 10 points, what computer science problem?

ANSWER: (Euclidean) **travelling salesman** problem [or **travelling salesperson** problem; or **TSP**; prompt on route finding]

12. A character in this play uses the phrase “Donkeys with stripes” instead of “zebras.” Characters in this play reminisce about a woman with crooked toes, a grey dress, and “soapsuds on [her] brown hands.” In this play, a character whose motto is “too many cooks spoil the broth” reads the Bible passage on the curse of Cain out loud after another character falls asleep. A character in this play imagines presenting his mother with a butterfly he caught and later pretends to drive her away with stones. While pretending that he is walking through a gate, a character in this play calls the character playing the gate guard a “swartgat.” The characters in this play spend money intended for a farm on a suit to impress their white pen-pal Ethel. For 10 points, name this two-man play about Zachariah and his light-skinned brother Morris, who was originally played by author Athol Fugard.

ANSWER: **Blood Knot**

13. Before this campaign, the losing force camped at the farm of Henry Blocher and forded the Little Crossings at Castleman’s River, but lost several supply wagons at Big Savage Mountain after cutting an artillery road through two areas called the Shades of Death. This campaign is *not* named for a fort, but was directly caused by the capture of Trent’s Fort one year earlier, and a subsequent expedition in which a man called the “Half-King” allegedly exclaimed “Thou art not yet dead, my father!” before he ate the brain of a namesake slain general in the Jumonville Affair. Daniel de Beaujeu formulated the winning battle plan but died early in this battle, which is sometimes named for the body of water that was crossed in a failed attempt to reach Fort Duquesne (“doo-CANE”). For 10 points, name this 1755 campaign often named for the British general who was disastrously defeated during the French and Indian War.

ANSWER: Battle of the **Monongahela** [or **Braddock**’s Campaign; or **Braddock**’s Defeat; or **Braddock**’s Field; or other answers mentioning **Braddock**; accept Battle of the **Wilderness**; accept the **Jumonville** Affair or the Battle of **Jumonville** Glen before “Jumonville” is read; prompt on the **French and Indian War** or the **Seven Years’ War**]

14. *Description acceptable.*

In one tradition, the names of members of this group were written on the last five of the 129,000 nails given to Noah; relatedly, Hadith al-Safinah compares this group to Noah’s ark. In another story, God tells Adam he would not have created heaven or hell except for this group, which existed before Adam. After their opponent showed up alongside this group, Christians from Najran backed out of a curse contest during the Event of Mubahala. During the “event of the cloak,” God revealed the section of the “purification verse” that attributes the quality of *ismah* to them. The “hadith of the two weighty things” claims that Muslims will “never go astray” following the Qur’an and this group. People with the title “sayyid” belong to this group, which includes Fatimah and the twelve Imams. For 10 points, name this group revered in Shi’a Islam, consisting of the “Seal of the Prophets” and his descendants.

ANSWER: the **family of Muhammad** [or the **Ahl-al-Bayt**; or the **People of the Household**; or **descendants of Muhammad**; accept the **Fourteen Infallibles**; accept **People of the Cloak** until “cloak” is read; accept **Fatimah, Ali, Muhammad, Hasan, and Husayn** until “ismah” is read, prompt after “ismah” is read; prompt on the **Twelve Imams** until it is read; prompt on the **Quraysh** or **Hashemites** or **Banu Hashim**; do not accept “Companions,” do not accept “wives of Muhammad”]

15. Pumping a high-Q medium with a continuous wave laser and inducing four-wave mixing via this effect allows for the generation of this effect’s namesake frequency comb. Self-focusing as a consequence of this effect gives rise to a phenomenon in which a light pulse travels without diffraction through a medium, known as filament propagation. A modulator based on this effect sandwiches nitrobenzene between two polarizers and can be used to achieve Q-switching in lasers. This effect arises from the third-order term of the expansion of the electric susceptibility, and in the simplest form of this effect, the magnitude of the shift is proportional to the wavelength of the incident light times the square of the electric field, unlike the linear Pockels effect. For 10 points, identify this electro-optical effect in which the refraction index of a material changes with the application of an electric field.

ANSWER: **Kerr** effect [accept **quadratic electro-optical** effect before “square”]

16. Early in this opera, the violinists are given the nearly-impossible instruction to retune their instruments within six quarter-notes to hit a low “F.” This opera begins with the orchestra, which is often cited as the largest of any repertory opera, playing a fortissimo broken D-minor chord, in which two sixteenth notes are followed by a chord sustained over two measures. The title character of this opera decides to try to dig up a sacred axe after being inaccurately told that another character has been trampled by horses. A polychord made from E and C-sharp Major chords represents the title character of this opera. After a frenzied dance, the title character of this opera falls dead as her sister Chrysothemis calls for her to come inside the palace of Mycenae. For 10 points, name this Richard Strauss opera whose title character encourages her brother Orestes to murder their mother Klytemnestra.

ANSWER: **Elektra**

17. A philosopher from this school was elected *strategos* of Tarentum seven times and formulated a thought experiment asking if you could thrust your staff through the edge of a limited universe. According to Nicomachus of Gerasa, this school’s second leader proposed the Antichthon, or Counter-Earth, to justify the first non-geocentric model of the universe. This school also invented monads. After early members like Archytas, Philolaus, and the female thinker Theano, this school split between ethically-orthodox *akousmatikoi* (“AH-coos-MAH-tee-coy”) and a branch that merged with the Platonists. This school’s founder conducted studies of string tuning, leading him to propose a “music of the spheres.” Hippasus was legendarily drowned by members of this school centred in Croton after he discovered irrational numbers. For 10 points, name this school possibly founded by a mathematician from Samos.

ANSWER: the **Pythagorean** school [accept equivalents like followers of **Pythagoras**]

18. One of these archaeological sites contains a building called the Pompeion, where the Panathenaic procession began each year, and was the original site of the Stele of Hegeso sculpted by Kallimachos. Italian archaeologists recently discovered one of these sites at the village of Udegram in the Swat Valley, containing Dardic artifacts dated prior to the “Gandhara culture.” At one of these places in Japan, visitors try to lift the Miroku Stone with one hand to test their virtue after they cross the Ichinohashi Bridge. A large one of these sites circles a “potter’s quarter” at the Kerameikos in ancient Athens. The oldest one of *these* in Europe may be Gross Fredenwalde, and the sacred Okunoin on Mount Koya is the largest in Japan. The city of Worms is home to one of *these* known as Heiliger Sand, while a more modern one features Jacob Epstein’s Art Deco sphinx sculpture for Oscar Wilde. For 10 points, name these kinds of places that include Pere Lachaise in Paris.

ANSWER: **cemetery** [or **gravesites**; or **burial grounds**, or equivalent terms; accept “**Potter**’s Quarter/Potter’s Workshop” before “potter’s” is read; accept **Kerameikos** before “Kerameikos” is read]

19. Several populations of these cells are distinguished by their expression of BDCA-2 through 4. When circulating, these cells’ membranes ruffle to give a veiled appearance. These cells are attracted by stromal CCL21, and they in turn secrete CCL19. A triad of diabetes insipidus, lytic bone lesions, and exophthalmos (“ex-off-THAL-mos”) occurs in one disease of these cells. Hashimoto-Pritzker, Letterer-Siwe, and Hand-Schuller-Christian disease are caused by a CD207/CD1a positive type of these cells that have tennis-racket inclusions called Birbeck granules; those are skin-resident Langerhans cells. Their follicular type assists B-cell maturation, and their plasmacytoid type secrete interferon. These cells are unusually effective at cross-presentation. Like macrophages, they are professional APCs that activate T cells via antigen presentation. For 10 points, name these immune cells named for their hairlike projections.

ANSWER: **dendritic** cells [accept **Langerhans** cells before mention, prompt on white blood cells, leukocytes, histiocytes; do not accept or prompt on “macrophages”]

20. In an essay on this play, William Hazlitt remarked that in poetry, “the insolence of power is stronger than the plea of necessity.” A warrior in this play greets his rival by exclaiming that his “rapt heart” “dances” and recounting nightly dreams where they “fist[ed] each other’s throats.” A woman in this play rejects an invitation to dinner with the line, “Anger’s my meat: I sup upon myself.” After a character in this play refuses to expose his scars, his downfall is engineered by Brutus and Sicinius. In the first act of this play, Menenius quells public unrest by telling a fable in which the limbs rebel against the belly. The title character of this play joins his former rival Aufidius to march against his native city, but is diverted from his purpose by his mother Volumnia. For 10 points, name this Shakespeare tragedy about a general who seeks revenge against Rome.

ANSWER: *Coriolanus*

## Bonuses

1. This character tries to consummate his relationship with the suffragette Valentine Wannop on Armistice Day; he fails when his manipulative wife Sylvia appears, says she has cancer, and throws herself down the stairs. For 10 points each:

[10] Name this devout Anglican, called “the most brilliant man in England,” who works in the Imperial Department of Statistics. This man is the protagonist of the *Parade’s End* tetralogy.

ANSWER: Christopher **Tietjens** (“TEE-jens”) [or **Christopher** Tietjens]

[10] Christopher Tietjens is the protagonist of *Parade’s End*, a tetralogy by this author of the modernist novel *The Good Soldier*.

ANSWER: Ford Madox **Ford**

[10] Tietjens’ relationship with Valentine Wannop is partly based on Ford’s relationship with this woman, who in turn fictionalized her relationship with Ford in her novel *Quartet*.

ANSWER: Jean **Rhys**

2. In an article about this place’s “Enlightenment,” Dag Herbjornrud (“her-BYORNS-rood”) praises Anton Amo, whose Latin treatise *The Art of Philosophising Soberly and Accurately*, prefigures Kant’s idea of a “thing-in-itself.” For 10 points each:

[10] Name this continent, which Hegel claimed had “no history” in his *Lectures on the Philosophy of History*.

ANSWER: **Africa**

[10] Anton Amo was from what is now this country. Another author who was born in England but raised here identified Hegel as part of a world-wide “cosmopolitan” tradition in his volume *Cosmopolitanism*.

ANSWER: **Ghana** (That author is Kwame Anthony Appiah.)

[10] Another philosopher from Ghana, Kwasi Wiredu, has spent much of his career arguing against this approach to African philosophy, in which the namesake individuals are seen as the bearers of the African philosophical tradition. An anthology by Henry Orika popularized this term.

ANSWER: **sage** philosophy [or philosophy of **sagacity**]

3. A famous *krater* painted in this style, which was stolen from an Etruscan tomb in 1971, depicts the corpse of Sarpedon being carried away by Hypnos and Thanatos. For 10 points each:

[10] Name this style of Greek vase painting that emerged in late Archaic Athens. The Andokides Painter is credited with inventing this style, whose early practitioners included the rivals Euthymides and Euphronios.

ANSWER: **red-figure** vase painting

[10] A notable red-figure cup adorned with a painting of the dead Memnon is often nicknamed for this Michelangelo sculpture in St. Peter’s Basilica, a marble depiction of Mary cradling Jesus’ body on her lap.

ANSWER: **Pieta**

[10] Euphronios and Euthymides belonged to this early set of red-figure painters, which took advantage of the new red-figure style to paint human figures in unusual poses and in unprecedented anatomical detail.

ANSWER: **Pioneer** Group [or the **Pioneers**]

4. Answer the following about religious movements that became popular in the 1960s and 1970s, for 10 points each.  
[10] The Maharishi Mahesh Yogi founded this international movement, whose practitioners receive mantras tailored for them from generously-paid instructors.

ANSWER: **Transcendental Meditation** [or **TM**; prompt on **meditation**]

[10] Abraham Maslow praised this LA-based cult founded as a drug rehabilitation program by Charles Dederich. Members of this cult verbally abused each other in regular “therapy” sessions called “The Game.”

ANSWER: **Synanon**

[10] Another outgrowth of the Human Potential Movement was Werner Erhard’s est (“E-S-T”) organization, which L. Ron Hubbard claimed was a rip-off of this religion based on Hubbard’s self-help book *Dianetics*.

ANSWER: Church of **Scientology**

5. The most notable artifact from this medieval kingdom is a “Golden Rhinoceros” made of foil with a wooden center. For 10 points each:

[10] Identify this civilization, whose name means “Place of the Jackals,” which was the first class-based society in Africa. Its elite lived on top of a namesake hill, the middle class on a plateau, and the lowest class below in a valley.

ANSWER: **Mapungubwe** [accept **MK** kingdom]

[10] The Mapungubwe dominated trade in southern Africa until the emergence of this “Great” kingdom in the 11<sup>th</sup> century. It was home to soapstone bird sculptures and stone ruins said to replicate the Queen of Sheba’s palace.

ANSWER: Great **Zimbabwe**

[10] The Mapungubwe traded gold with this Swahili Coast empire, founded in 960 CE by one of seven sons of the Persian king of Shiraz. Its founder promised to acquire enough cloth to cover the island, only to renege on the deal.

ANSWER: **Kilwa** Sultanate [or **Kilwa** Kisiwani]

6. This molecule’s *trans* conformation is stereochemically rigid and is visible in steroid skeletons where the A ring meets the B ring and the B ring meets the C ring. For 10 points each:

[10] Name this molecule, whose *cis* isomer can undergo a chair-flip. This fully saturated molecule is the second most common molecule used as an H-donor solvent.

ANSWER: **decalin** [or **decaline**; accept, but DO NOT REVEAL, **decahydronaphthalene**]

[10] Decalin can be synthesized by complete hydrogenation of this aromatic hydrocarbon, which has two joined aromatic rings. It is commonly found in mothballs.

ANSWER: **naphthalene**

[10] Derivatives of naphthalene modified in this manner are often used as surfactants. This chemical transformation blocks the para position in electrophilic aromatic substitution to direct reactivity to the ortho position.

ANSWER: **sulfonation** [or **sulfonated**; do not accept “sulfated”]

7. For 10 points each, answer the following about the mythical island of WakWak, which frequently appeared on maps in the Middle Ages:

[10] Geographers who wrote in this language often situated WakWak east of China, inspiring many explorers to try to voyage there. The man who created the *Tabula Rogeriana* worked primarily in this language.

ANSWER: **Arabic**

[10] WakWak was a faraway island whose inhabitants all had this trait. Penthesilea and Hippolyta were rulers of a group of warriors who had this trait.

ANSWER: **women** [or **female**]

[10] Perhaps the most distinctive feature of WakWak was this object in its center, from which fully-formed humans sprung. It may help to know that many writers describe the terrible screams that came from it.

ANSWER: **tree of** screaming human **heads** [prompt on **tree** with “what is the fruit of that tree?”]



8. Thomas Jefferson referred to this man as a “meteor of the hemisphere.” For 10 points each:

[10] Name this early American mathematician who wrote the *New American Practical Navigator* in 1802, still published today as a practical encyclopedia of ocean navigation.

ANSWER: Nathaniel **Bowditch**

[10] Nathaniel married a woman from this great American family, whose most famous member gave the “Plumed Knight” speech to nominate James G. Blaine, and was known as the “Great Agnostic” for his free thought lectures.

ANSWER: **Ingersoll** [accept Robert **Ingersoll**; accept Mary **Ingersoll**]

[10] As related by Josiah Quincy, Bowditch scandalized polite society when he took over running the business affairs of this university. Its earlier presidents included Increase Mather during the time of the Salem Witch Trials.

ANSWER: **Harvard** University

9. In this film, the twins Oliver and Oswald make time-lapse videos of the decay of organic matter. For 10 points each:

[10] Name this 1985 Peter Greenaway film in which those twins, who work at the zoo, lose their wives in a car accident in which Alba loses her leg.

ANSWER: *A **Zed & Two Noughts***

[10] Manohla Dargis compared the time-lapse footage of a pig decaying in Shane Carruth’s *Upstream Color* to a time-lapse sequence of a seed sprouting in this Terrence Malick film in which Bill and Abby work on a Texas farm.

ANSWER: ***Days of Heaven***

[10] Sam Taylor-Johnson, a member of this movement that also includes Tracey Emin and Damien Hirst, has made several time-lapse videos of still lifes decaying.

ANSWER: **Young British Artists** [or **YBAs** or **Brit artists**]

10. This author met his teenage muse Juliana in 1820 while her father was painting his portrait. For 10 points each:

[10] Name this notably handsome American poet. Juliana Bordereau kept this poet’s love letters to her, which an unscrupulous critic later tried to steal from her Venetian palazzo.

ANSWER: Jeffrey **Aspern**

[10] This author wrote a preface to “The Aspern Papers” discussing the pros and cons of writing about “celebrities who...couldn’t possibly have” existed as though they were real. His other novellas include “The Beast in the Jungle” and “Daisy Miller.”

ANSWER: Henry **James**

[10] James’ preface to “The Aspern Papers” compares Jeffrey Aspern to his other artist characters, such as Hugh Vereker in this short story about an unnamed literary obsessive who seeks Vereker’s secret from Drayton Deane.

ANSWER: “The **Figure in the Carpet**”

11. This phenomenon can be realized in a system of nuclear spins where the relaxation time for the interaction between spins is small compared to the relaxation time for the interaction between the spins and the lattice. For 10 points each:

[10] Identify this phenomenon, which in systems of magnetic dipoles, results in dipoles pointing opposite the direction of applied field. This phenomenon can only occur if the energy of a system is bounded from above.

ANSWER: **negative temperature** [accept **temperature** being **less than zero** or obvious equivalents; accept **negative beta** or **beta less than zero**]

[10] The temperature can formally become negative because the derivative of this quantity with respect to the energy can become negative under the circumstances described above. This temperature is proportional to the log of the number of microstates according to Boltzmann's formula.

ANSWER: **entropy**

[10] Paramagnetic systems at low temperatures exhibit the Schottky anomaly, a peak in the graph of this quantity vs. temperature. This quantity peaks at the lambda point of a superfluid.

ANSWER: specific **heat capacity** [accept **specific heat**]

12. Answer the following about the Muratorian Fragment, the oldest extant listing of books of the New Testament, for 10 points each.

[10] The Muratorian Fragment does not mention this epistle, which does not name its author but has traditionally been attributed to Paul. This epistle calls faith "the substance of things hoped for, the evidence of things not seen."

ANSWER: Epistle to the **Hebrews** [or Letter to the **Hebrews**; or **Pros Hebraious**]

[10] The first scholar to compile a list of 27 New Testament books was this 4th-century bishop from Alexandria, who is better known for arguing for the concept of the Trinity against Arius.

ANSWER: **Athanasius** of Alexandria [or **Athanasios** of Alexandria]

[10] The Muratorian Fragment lists this work as part of the New Testament, but it does not appear on Athanasius's list. This text in the *nekylia* tradition describes how "men and women" will "burn and roast" for leaving God.

ANSWER: **Apocalypse of Peter** [or **Revelation of Peter**; prompt on **Peter**]

13. Answer some questions about the work of gay Abbasid poet Abu Nuwas, for 10 points each.

[10] Although Abu Nuwas was repeatedly locked up by the government of Harun al-Rashid, the two appear as pals in this collection that also includes "The Tale of the Fisherman and the Jinni" and several stories about Sindbad.

ANSWER: **1001 Nights** [or **Arabian Nights**; or **1001 Arabian Nights**]

[10] Abu Nuwas was probably imprisoned for adopting a hedonistic lifestyle in his qasidas. The qasida form, which was also used in the Hanging Poems and the "Al-Burda," is usually translated into English as this type of poetry.

ANSWER: **ode**

[10] Abu Nuwas may also have invented a kind of riddle called mu'amma, which has also been attributed to this contemporary of his. This founder of Arabic prosody introduced vowel markings to Arabic through his *Kitab al'Ayn*.

ANSWER: **Al-Khalil** ibn Ahmad **al-Farahidi** [accept either underlined part]

14. In an iconic sculpture, this king is depicted pouring a goblet of water on the ground, showing that he no longer considered himself subject to the Burmese lords of the Toungoo Dynasty. For 10 points each:

[10] Name this great ruler of the Ayutthaya Kingdom, known as the “Black Prince,” who was taken hostage as a child by the Burmese king Bayinnaung, only to return and reclaim his homeland.

ANSWER: **Naresuan** (“na-RE-soo-an”)

[10] The battle between Naresuan and Crown Prince Mingyi Swa in 1593 is widely known as the battle of this animal. Much earlier, the Indian king Porus rode one of these war animals against Alexander the Great at the Battle of the Hydaspes.

ANSWER: **elephants** [or the **Elephant** Battle]

[10] This Thai state was a tributary to Burma during Naresuan’s childhood. The possibly-forged Ram Khamhaeng inscription, dated to 1292, is a description of this kingdom, considered the first independent Thai state.

ANSWER: **Sukhothai** kingdom

15. Regarding this piece commissioned by actor Lucien Guitry, the composer complained “[it] is coming along. But it is such an unpleasant work!” For 10 points each:

[10] Name this work of incidental music, written several years after its composer’s overture-fantasia based on the same play. This incidental music used that overture and also borrowed from the composer’s *Elegy for Ivan Samarin*.

ANSWER: incidental music to ***Hamlet*** by Tchaikovsky

[10] Shakespeare also inspired this orchestral work by Tchaikovsky. After seeing the first version of this Overture-Fantasy, Mily Balakirev wrote to him, “I play it often, and I want very much to hug you for” this piece’s love theme.

ANSWER: ***Romeo and Juliet***

[10] *Romeo and Juliet* opens with a somber F-sharp minor theme in the woodwinds representing this character. In the development, an agitated version of this character’s theme mixes with music that represents the families’ feud.

ANSWER: Friar **Laurence**

16. Though this result can be proven with Galois Theory, its two namesakes did not do so. For 10 points each:

[10] Name this theorem which states that there is no general solution expressible with radicals to equations consisting of fifth degree polynomials or higher.

ANSWER: **Abel-Ruffini** Theorem

[10] Charles Hermite provided a general solution to such equations using these functions, which are doubly periodic. The solutions to the Korteweg-DeVries equation can be expressed using the Weierstrass ones of these functions.

ANSWER: **elliptic** functions [or **elliptic** transcendents]

[10] This mathematician later showed that all algebraic equations could be solved using modular functions. Another result named for him states that the complement of an image of a continuous map of a circle in “ $\mathbb{R}^2$ ” consists of exactly two connected components.

ANSWER: Camille **Jordan**

17. This woman compared academia’s “publish or perish” attitude to Charlie Chaplin’s *Modern Times* in a 2019 paper arguing for a “slow science” in which people are restricted to publishing one paper per year. For 10 points each:

[10] What psychologist advanced the “weak central coherence” theory in her book *Autism: Explaining the Enigma?*

ANSWER: Uta **Frith** [or Uta **Aurnhammer**]

[10] Frith taught this British psychologist who developed the “extreme male brain” theory of autism.

ANSWER: Simon Philip **Baron-Cohen**

[10] Baron-Cohen’s theories of autism relate to his concept of the “S-E spectrum,” with ‘S’ referring to “systemizing” and ‘E’ to this cognitive faculty that involves the capacity to understand another person’s feelings or perspectives.

ANSWER: **empathy** [or **empathizing**; or **empathic**]

18. In 1929, a “second” manifesto for his literary movement excommunicated insufficiently Marxist authors like Raymond Queneau and Jacques Prevert. For 10 points each:

[10] Name this movement whose first manifesto was written by the author *The Magnetic Fields* and *Nadja*, Andre Breton. Breton’s manifesto for this movement champions the method of “pure psychic automatism.”

ANSWER: **surrealism**

[10] Surrealists denounced by Andre Breton instead published in the journal *Documents*, edited by this founder of the secret society *Acephale*. His transgressive writing includes the pornographic novel *The Story of the Eye*.

ANSWER: George **Bataille**

[10] The *Documents* group launched a counterattack against Breton in a 1930 pamphlet named for one of these objects. A Surrealist technique took its name from a sentence about one of these objects that “drinks the new wine.”

ANSWER: a **corpse** [or exquisite **corpse**; or **cadavre** exquis]

19. This emperor called the Quinisext Council, sometimes called the "Council in Trullo," after which he tried and failed to arrest Pope Sergius I. For 10 points each:

[10] Name this Byzantine emperor who had his nose sliced off after his throne was usurped by Leontios, so he replaced it with a solid gold prosthetic and retook the throne under the nickname Rhinotmetos, or the "slit-nosed."

ANSWER: **Justinian II** [prompt on Justinian; do not accept “Justin”]

[10] This historian relates that Justinian II sent an envoy to the Bulgar khan Tervel to forge an alliance to reclaim the throne. This man wrote his *Chronographia* at the invitation of George Syncellus, after serving in the court of Leo IV the Khazar.

ANSWER: Saint **Theophanes** the Confessor

[10] Khan Tervel became known as the "Savior of Europe" after his forces defeated an Arab army in 718 CE, assisted by the Byzantines, who used this liquid substance to burn their boats on the water.

ANSWER: **Greek fire**

20. Polyglutamate derivatives of methotrexate inhibit AICAR (“A-I-C-A-R”) transformylase, which catalyzes a key step in their synthesis, and they are degraded by xanthine oxidase into uric acid. For 10 points each:

[10] Name these nucleotides, like adenine and guanine, whose nucleobase portion has two rings.

ANSWER: **purine**

[10] The purine de novo synthesis pathway forks after forming this purine, whose monophosphate is synthesized from FAICAR (“F-A-I-C-A-R”) by its namesake cyclohydrolase. Because of its ability to act as a wobble base pair, it is often found in the 5’ position of the tRNA anticodon.

ANSWER: **inosine**

[10] Both APRT and HGPRT are critical to this other metabolic pathway, which uses PRPP to transform free purines into purine monophosphates.

ANSWER: purine **salvage** pathway