

2021 ACF Nationals

Packet by Illinois

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Tossups

1. This protein's 22 glycosylation sites include N165 and N234, which create a glycan shield. This protein is stabilized by replacing a cleavage site with GSAS and further stabilized with a series of proline substitutions in its HexaPro variant. A two aa deletion at position 69 of this protein is found in a clade called "Cluster 5" isolated from Danish mink farms. Its D614G mutant preferentially adopts an "open" configuration. This protein's two heptad repeats flank a connecting domain and a central helix. This protein has an RRAR furin cleavage site in its RBD. Camostat inhibits TMPRSS22, which processes this protein. This protein trimerizes into a peplomer, which binds to ACE2 to trigger fusion. The RECOVERY trial tests a mix of two monoclonal antibodies that bind to this protein and that were developed by Regeneron. For 10 points, name this protein on the envelope of SARS-CoV-2.

ANSWER: **spike** protein [or **S**-protein from SARS-CoV-2]

2. One of this country's communist parties is suspected of orchestrating a 1982 attack in which sixteen monks and a nun were dragged out of taxis taking them to an educational conference and then beaten and burned alive. The Historic Eight Documents outlined the ideology of a revolutionary from this country who led a 1967 peasant rebellion that began with sharecroppers planting red flags on plots of land from which they'd been evicted by powerful *jotedar* landlords. In 1964, a pro-Chinese faction walked out of a congress of this country's Communist Party and formed a party with a nearly identical name that features the word "Marxist" in parentheses. Maoist insurgents known as Naxalites control large territories in this country's state of Orissa. For 10 points, name this country whose largest communist party formed to protest the Soviet Union's relationship with the government of Jawaharlal Nehru.

ANSWER: **India** [or Republic of **India**; or **Bhārat** Gaṇarājya]

3. A set of rules that dictates when terms in this quantity can be replaced by delta functions to compute contributions arising from singularities was developed by Cutkosky. The elements of the S-matrix can be computed by volume integrals of the product of the incident and outgoing free waves with this quantity. This quantity is given as the integral over the four-momentum of i over the quantity momentum squared minus mass squared, times an exponential of minus i times momentum dotted with position for the Klein-Gordon field. More generally, this quantity can be obtained in the Feynman formalism by integrating the exponential of the integral of the Lagrangian between two times, over all physical trajectories, giving the probability amplitude for a particle transition between two states over some time. For 10 points, name this unitary operator sometimes referred to as "causal Green's functions," which one can convolve with the initial wavefunction of a system to find the state at any future time.

ANSWER: **propagator** [accept **causal Green's functions** before "causal Green's functions" is read; prompt on **causal function** before "causal" is read; prompt on **Green's functions** before "Green" is read]

4. Among a social grouping in this country, the silver-based inhalant Auroloc became a popular drug. This country established a network of institutions including the *leagen*, the *gradinita*, and the *camin spital*. A cohort from this country was the subject of the BEIP, a twelve-year psychological study conducted by Fox, Zeanah, and Nelson based on attachment theory. The documentary *Shame of a Nation* publicized the effects of a certain policy in this country. The "decretei" generation in this country suffered from a policy enacted in Decree 770. A 1990 report by *20/20* revealed the death-camp-like conditions of orphanages set up in this country, which accompanied a policy depicted in the film *4 Months, 3 Weeks, and 2 Days* and enforced by the Securitate. For 10 points, name this communist country where a disastrous abortion ban was enacted by Nicolae Ceausescu.

ANSWER: **Romania**

5. Dupré and Nicholson's manifesto for this concept in the philosophy of biology promises to not use eccentric ideas like the "27 Categories of Explanation" or the "nine Categoreal Obligations" from a book partly titled for it. The author of the environmental ethics book *Is It Too Late?* co-founded a center for "studies" of this concept in Claremont. This is the first title concept of a book that describes a "conrescence" of "prehensions," which generates an "actual entity." In a 1996 book, Nicholas Rescher laid out a "metaphysics" described by this word, which opposes "substance metaphysics." The dipolar nature of God is emphasized in John Cobb and Charles Hartshorne's "theology" of this type. A so-called "philosophy of organism" was proposed in a set of Gifford Lectures by Alfred North Whitehead pairing "reality" with, for 10 points, what word that emphasizes that reality is always changing?
ANSWER: **process** [or **process** studies; or **process** metaphysics; or **Process and Reality**; or **process** theology; accept **processual** philosophy]

6. This composer set the poem "A Tragic Story" as part of a song collection that was originally titled *Twelve Songs for Schools* and was renamed *Friday Afternoons*. Toward the end of the penultimate movement of another work, this composer used a *stretto* effect as the choir sings "Deo Gracias" in quick and overlapping succession; that piece by this composer opens with the procession "Hodie Christus natus est" and was originally scored for SSA children's choir and harp. This composer wrote a piece that makes heavy use of the C–F-sharp tritone and features chorus, boys' choir, organ, and two orchestras; that piece was written for the consecration of the rebuilt Coventry Cathedral and includes settings of poems by Wilfred Owen. For 10 points, name this English composer of *A Ceremony of Carols* and the *War Requiem* as well as the opera *Peter Grimes*.
ANSWER: Benjamin **Britten** [accept Edward Benjamin **Britten**, Baron Britten]

7. A side in this conflict was betrayed by the prince Navaras after the opposing commander agreed to wed his daughter to Navaras. The aggressors, supported by the Gallic chieftain Autaritus, rallied at the town of Sica around an escaped Campanian slave, whose army later starved to death in this conflict while trapped against a mountain range called the "Saw." The great-grandfather of the Gracchus brothers, the oldest Tiberius Gracchus, used this conflict to seize Sardinia. It broke out immediately *after* the Treaty of Lutatius ended a previous war following the Battle of the Aegates Islands. A group led by Mathos and Spendius took hundreds of prisoners, including Gisco, and threw them into a giant ditch to start this war when they did not receive their military pay. For 10 points, name this conflict sometimes called the Truceless War, which occurred after the First Punic War when a group of Libyans and other foreign troops rebelled against Carthage.
ANSWER: **Mercenary** War [or **Mercenary** Rebellion; accept **Truceless** War before "Truceless War" is read; accept **Libyan** War before "Libyans" is read; do not accept or prompt on "Punic War"]

8. An author with this primary occupation wrote a play in which a girl discovers that the dead wife she was sent to replace did not actually die in a fire, leading her to feign amnesia and become that woman's servant; that author with this occupation wrote a play whose protagonist offers his body in sacrifice so that a certain god will stop killing snakes. After glimpsing his love interest at a competition between two dancing masters, a character with this occupation schemes to meet Malavika. This was the occupation of the author of *Nagananda* as well as of the author of *The Little Clay Cart*, Shudraka. A man with this occupation from Hastinapur forms a gandharva marriage with a girl from the woods before Durvasa curses him to forget her in *The Recognition of Shakuntala*. For 10 points, name this occupation of the playwright Harsha and *Mahabharata* characters like Dushyanta, Pandu, and his son Yudhishtira.
ANSWER: **king** [or **emperor**; or **monarch**; or **raja**]

9. This novel's narrator successively quotes passages from Pope, Addison, and Swift because those passages reveal their character better than biographical details. This novel's narrator relies on a diary entry from John Fenner Brigge that breaks off abruptly when Brigge falls out of a tree. This novel's narrator uses a vulture and a harpy as comparison points for the protagonist's sudden love for Archduchess Harriet, who turns out to be Archduke Harry in disguise. The protagonist of this novel engages in a doomed romance with the Russian princess Sasha at a carnival on the frozen Thames. After a period in which she searches for "life and a lover," this novel's protagonist reencounters a poet and critic named Nicholas Greene, who helps her get her poem *The Oak Tree* published. For 10 points, name this Virginia Woolf novel whose protagonist changes from a man to a woman and lives for centuries.

ANSWER: ***Orlando: A Biography***

10. In his capacity in this profession, William Wickham enlarged and reorganized the Alien Office. A man in this profession employed as his secretary the inventor of the first multiplying machine and megaphone, Samuel Moreland. Before he was made postmaster general and arrested for treason, a member of this profession named James Thurloe broke the Sealed Knot. A man best known for serving in this role created the Bonds of Association alongside his ally William Cecil and may have recruited Christopher Marlowe. A man with this profession tortured Francis Throckmorton and foiled the Babington Plot while serving as principal secretary to Queen Elizabeth. For 10 points, Francis Walsingham was best known for serving in what role, in which he covertly intercepted threats?

ANSWER: **spymaster** [or **secret agent**; or **intelligence** officer; or **espionage** master; accept principal **secretary** to Queen Elizabeth I]

11. This scholar analyzed three regional case studies in a paper that contrasted issue linkage, logrolling, and issue-based alliance formation as political models of "reform-mongering." He critiqued "monoeconomics," the neoclassical idea that economic principles could be applied universally, in an essay titled for the "rise and decline" of his primary subfield of economics. He countered the "big push" doctrine by arguing that countries should invest in "leading" sectors to pull along other sectors through "linkages" in his theory of "unbalanced growth." This development economist is the alphabetically second namesake of an index whose maximum value is 10,000 and whose value is calculated by summing the squares of each firm's market share. For 10 points, the Department of Justice calculates merger impact using an index co-named for Orris Herfindahl and what economist, who wrote *Exit, Voice, and Loyalty*?

ANSWER: Albert Otto **Hirschman**

12. A passage from the *Parasara Samhita* sometimes mentioned as a scriptural basis for this practice alludes to the thirty-five million hairs on the human body. Thirteen days after this observance, a region holds a festival centered on placing a red *chunari* over a trident. Participants carry a lemon and a mirror in many historical depictions of this practice, such as its namesake commemorative "stones," which often feature imprints of participants' hands. Like the similar *jauhar* ritual, this observance was historically most prominent in Rajasthan. This practice's name is shared by a goddess whose actions provoked Shiva to destroy the sacrifice of her father, Daksha. Ram Mohun Roy authored a dialogue between an "Advocate" and an "Opponent" of this practice, which, in 1829, Governor William Bentinck outlawed. For 10 points, name this controversial practice of widow-burning from historical India.

ANSWER: **sati** [or **suttee**; prompt on **widow-burning**; prompt on **immolation**]

13. In one film, a character with this profession is seen smiling for the first time in a shot that shows him on the back of a motorcycle being driven to a train station. In another film, a close-up of a woman recounting a severe rash on her hands is used to narrate a letter being read by a character with this profession who speaks to a man who is fearful of China's nuclear arsenal. Claude Laydu debuted as a character with this profession who suffers from stomach cancer in a 1951 film that features multiple dissolves of his journal. A character with this profession discovers that Max Von Sydow's Jonas has shot himself near a snowy creek. A recent film ends with a revolving shot of a widow being kissed by a character with this profession who'd planned to kill a factory owner with a suicide vest. For 10 points, name this profession of Tomas in Bergman's *Winter Light* and Ethan Hawke's Ernst Toller in *First Reformed*.
ANSWER: **priest** [or **pastors**; or **clergymen**; accept **country priest**]

14. A visit to the site of an old house in this city prompted a writer in her memoir to reflect on forgetting an old address, concluding that one's identity is "not a thing that exists but something you do or do not remember." In a novel, a character who often tags the streets of this city with the word "Lens" successfully applies for a grant to film a documentary. The city of Gossols where the Hersland family lives in *The Making of Americans* is often read as a stand-in for this city, which an author visits in *Everybody's Autobiography*. Tony Loneman joins a group that plans to use 3D-printed guns to rob an upcoming "Powwow" held in this city's auditorium in the 2018 debut novel by Cheyenne and Arapaho author Tommy Orange; that novel is titled for an author's famous declaration about this city. For 10 points, name this California city, of which onetime resident Gertrude Stein said, "There is no there there."
ANSWER: **Oakland**, California

15. *Description acceptable.* The Maulide lab developed a nucleophilic method of performing this modification at the alpha position of amides using TBAT. Because it evolves sulfur dioxide, a compound that performs this modification has been superseded by the reagent DAST. The antimony-containing Swarts reagent is used to affect this transformation. An N-alkylated derivative of DABCO sold by Sigma-Aldrich with the prefix "select-" is used to perform this modification electrophilically. A version of ethylene that has this transformation done at both carbons is the prototypical compound in which the gauche conformer is more stable than the anti. A form of this substitution using a radioisotope is performed on glucose to generate a tracer molecule for PET. The K_a ["K-a"] increases 34,000-fold when this substitution is performed thrice on acetic acid, due to the increased inductive effect. For 10 points, name this modification that bonds a target with the lightest halogen.
ANSWER: **fluorination** [or adding **fluorine**; prompt on **halogenation**]

16. A crowded bridge occupies the foreground of a painting of this event by Pierre-Jacques Volaire, whose dozens of nocturnal depictions of this event earned him the nickname "Chevalier Noir." After being damaged in a flood, John Martin's painting of this event was found rolled up inside Paul Delaroche's *The Execution of Lady Jane Grey* in 1973. Walter Scott is said to have spent an hour staring at an 1830 painting of this event that made Karl Bryullov the first internationally successful Russian artist. A green sky dominates a painting of this event "from Posilippo," part of a series of thirty pieces by Joseph Wright of Derby. Eighteenth-century visitors like Goethe marveled over art at the site of this event, such as a mosaic in which the fleeing king Darius looks back from his chariot at Alexander. For 10 points, name this disaster depicted in Angelica Kauffman's *Pliny the Younger and His Mother at Misenum*.
ANSWER: **eruption** of **Vesuvius** [or the **destruction** of **Pompeii**; or the **destruction** of **Herculaneum**; accept *The Last Day of Pompeii*; accept synonyms for "destruction"]

17. This organization received early donations in the form of several three-thousand dollar checks given by an anonymous figure called “Pennsylvania.” One of its members, with the pen name Lisa Ben, released a music album for this group with songs like “Cruising down the Boulevard” after earlier creating the magazine *Vice Versa*. Its first national conference at the Whitcomb Hotel had an opening statement by Reverend Fordyce Eastburn. This group dissolved after Rita LaPorte stole the list of subscribers to its main publication, *The Ladder*, from its headquarters. It was named after a fictional Greek poet created by Pierre Louÿs, chosen by its founders Del Martin and Phyllis Lyon just because it was obscure. This group initially followed the lead of the Mattachine Group in advocating for assimilation, though it focused more on family rights. For 10 points, name this first lesbian rights organization in the United States, whose name deliberately mocks the Daughters of the American Revolution.

ANSWER: **Daughters of Bilitis** [or **DOB**; prompt on The Daughters]

18. In the final chapter of this novel, a correspondent for the *Fanal de Rouen* wages a six-month-long campaign in the editorial section to get a blind beggar imprisoned. An upstart character in this novel repeatedly boasts of his seventy-two page thesis, “Cider: Its Manifestations and Effects.” In this novel, a deist who names his children after Napoleon, Athalie, and Benjamin Franklin starts several cliché-ridden arguments with the priest Father Bournisien. A pharmacist in this novel cuts a star into his front lawn to manifest receiving the Legion of Honor, which he is awarded in its last sentence. In this novel, the ridiculous Monsieur Homais pressures his friend into an ultimately botched operation on Hippolite’s clubfoot. Homais befriends Charles, the hapless country doctor husband of the title adulteress, in, for 10 points, what novel written by Gustave Flaubert?

ANSWER: **Madame Bovary**

19. A text named for this figure refers to three of his brides or daughters named Pidray, Tallay, and Arsay, who are given the epithets “girl of light,” “girl of rain,” and “girl of Yaabdar.” One of his servants has a double name that may refer to two separate brothers called Skilled and Clever; that servant gives gifts to the “mother of the Seventy Gods,” bringing her a bowl from Kamares and adorning her with clothing “in the two rivers.” To protect the members of his house, this figure orders no windows built in his palace but changes his mind after he conquers many cities. With his sister, he searches for a secret on the hill at Mount Saphon after he uses two magic clubs handed to him and named by his craftsman Kothar. The sun goddess Shapash convinces the god of death Mot to submit to this god, who was resurrected after earlier defeating the god of waves, Yam. For 10 points, name this Ugaritic god of thunder who names a mythological cycle.

ANSWER: **Baal** [or the **Baal** Cycle; or Epic of **Baal**; or the Myth of **Ba’al** Aliyan]

20. A landmark 1997 paper by Roberts, Gelman, and Gilks establishes the conditions for optimal scaling in this algorithm using the principle of weak convergence. Some implementations of global illumination make use of a version of this algorithm where “mutations” are used to find the steady state of “light transport.” The first mathematical derivation of this algorithm starts with the principle of detailed balance and then iterates over a candidate solution using this algorithm’s namesake acceptance ratio. This algorithm reduces to Gibbs sampling when the acceptance probability is set to one. A multivariate Gaussian is often used as a proposal distribution in this algorithm, which was first used on the MANIAC computer by a physicist working in statistical mechanics who coined the term “Monte Carlo algorithm.” For 10 points, what commonly used Markov chain procedure is sometimes co-named for W. K. Hastings?

ANSWER: **Metropolis**-Hastings Algorithm [prompt on **MCMC**; prompt on **Markov Chain Monte Carlo** before “Monte Carlo” is read; prompt on **Monte Carlo** before “Monte Carlo” is read]

Bonuses

1. Answer the following about the relationship between jazz musicians and religion, for 10 points each.

[10] A devoted scientist, this musician made an appearance on L. Ron Hubbard's album *Space Jazz: The Soundtrack to Battlefield Earth*. This founder of Return to Forever played piano on Miles Davis' *Bitches Brew*.

ANSWER: Armando "Chick" **Corea**

[10] This musician joined Soka Gakkai after hearing a solo by Buster Williams, a fellow member of his band Mwandishi. This founder of Head Hunters also composed the standard "Watermelon Man."

ANSWER: Herbie **Hancock**

[10] This jazz musician included a poem by his guru, Sri Chinmoy, in the liner notes to his album *My Goal's Beyond*. A group led by this man took inspiration from *tala* rhythms on albums like *The Inner Mounting Flame*.

ANSWER: John **McLaughlin**

2. John Taliaferro likely wrote one of these documents that claimed that its subject once killed a thousand Native Americans, slept in a field of their corpses, and then ate a dozen of them for breakfast. For 10 points each:

[10] Name these documents released by Philadelphia news editor John Binns during the election of 1828.

ANSWER: **Coffin Handbills** [accept **Coffin Bills**; prompt on partial answer]

[10] The first Coffin Handbill focused on Andrew Jackson's cruelty at the Battle of Horseshoe Bend, where he defeated the Red Sticks and ended the war named for this tribe.

ANSWER: **Creek** [accept **Muscogee** Creek or **Mvskoke**; accept **Creek** War]

[10] The Jackson campaign responded by charging that John Quincy Adams had, while serving in this political position from 1809 to 1814, pimped out young girls to provide sexual services. The "Lion of White Hall," Cassius Clay, was named to this post by Abraham Lincoln.

ANSWER: U.S. **ambassador to Russia** [accept equivalents, such as **Russian ambassador**, **minister** to **Russia**, or American foreign **emissary** to **Russia**; prompt on **ambassador** or equivalent]

3. In a novel by this author, a woman is given an inheritance on the condition she can find a husband to take her name. For 10 points each:

[10] Name this author whose diary, which she kept for over seventy years, contains a detailed account of the mastectomy that "seven men in black" gave her in 1811.

ANSWER: Fanny **Burney** [or Fanny **Burney**; or Madame **d'Arblay**]

[10] Because she served as her father's amanuensis, Burney had to disguise her handwriting to pen this debut novel about a young society woman raised by Reverend Arthur Villars.

ANSWER: **Evelina**

[10] This novel based its depiction of the Battle of Waterloo, where George Osborne is killed and Amelia Sedley is left a pregnant widow, on the firsthand account in Burney's diaries.

ANSWER: **Vanity Fair**

4. The Faithful Sisterhood were unmarried women devoted to this figure, who had a close bond with Sarah Richards and was invited to the Iroquois peace talks at Canandaigua by Timothy Pickering. For 10 points each:

[10] Name this preacher who, after a near-fatal illness, proclaimed to receive a revelation from God. After that, this figure refused to answer to their former name, Jemima Wilkinson, eschewed all gender pronouns, and was known by an androgynous phrase.

ANSWER: the **Public Universal Friend** [accept **P.U.F.**; prompt on the **Universal Friend**; prompt on the **Friend**]

[10] The Public Universal Friend was born to a family of this Christian denomination. Members of this denomination were also dubbed Friends and thrived in the colonies of William Penn.

ANSWER: **Quakers** [prompt on **Religious Society of Friends**; prompt on **Friends Church**]

[10] A later schism in the Quaker church is named for this minister, who believed that obedience to the Inner Light was the foundational principle of Christianity and who rejected original sin. In 1827, his faction split from the “Orthodox Friends” and set up rival Yearly Meetings in Philadelphia.

ANSWER: Elias **Hicks**

5. This prefix partly names a technique in which the drag from an atmosphere is used to supply the force to achieve an orbital insertion. For 10 points each:

[10] Give this prefix that comes before “braking” and “capture” in the names of orbital maneuvers made by NASA.

ANSWER: **aero-** [accept **aerobraking** or **aerocapture**]

[10] Aerobraking has been proposed as one of several methods to save on fuel costs for spacecraft traveling to this large moon of Saturn, the only one with an atmosphere.

ANSWER: **Titan**

[10] Aerobraking and aerocapture are used to alter this quantity, which is formally defined as the impulse per unit mass of a spacecraft. It’s often plotted on the amusingly named porkchop plots in spaceflight planning.

ANSWER: **delta-V**

6. The engineer who developed the first lunar orbit rendezvous for spaceflight, Yuri Kondratyuk, was arrested in 1930 by the NKVD as a spy after he built a wooden one of these devices without using a single nail, due to a shortage of metal. For 10 points each:

[10] That facility, called the Mastodon, was what kind of device built in the Russian town of Kamen?

ANSWER: **grain elevator** [accept reasonable alternatives that reference the storage of **grain**]

[10] The first steam-powered grain elevator was built in Buffalo, New York, and named for a man with this last name, shared by the anthropologist who excavated the Taung Child in South Africa.

ANSWER: **Dart** [accept Joseph **Dart**; accept Raymond **Dart**; accept **Dart**’s Elevator]

[10] When this man visited Russia, he took a handful of soil from outside Yuri Kondratyuk’s home in Novosibirsk. He famously declared, “That’s one small step for man, one giant leap for mankind.”

ANSWER: Neil **Armstrong**

7. A medieval predecessor to this instrument included a *pirouette*, an extra attachment that physically supported the lips and embouchure. For 10 points each:

[10] Name this woodwind instrument, a descendant of the shawm. Most modern orchestras tune to this double-reed instrument’s concert A.

ANSWER: **oboe**

[10] This Baroque composer wrote a D minor oboe concerto that has become a cornerstone of the instrument’s repertoire. This Venetian composer also wrote a set of six concerti titled *La Cetra*.

ANSWER: Alessandro Ignazio **Marcello**

[10] This contemporary of Marcello also wrote many oboe concerti, including one in D minor featured in his *12 Concerti a Cinque*. This composer is often credited for an adagio in G minor that was actually written by Remo Giazotto.

ANSWER: Tomaso Giovanni **Albinoni**

8. The immunogenicity of this molecule can be modulated by acylation, and humans are uniquely sensitive to it. For 10 points each:

[10] Name this molecule that consists of lipid A, a core oligosaccharide, and the O antigen found in the outer membrane of some bacteria.

ANSWER: **lipopolysaccharide** [or **LPS**]

[10] LPS is found in bacteria that stain negative under this procedure. Bacteria that stain negative in this procedure have a thin layer of peptidoglycan sandwiched between an inner and outer membrane.

ANSWER: **Gram** stain

[10] In humans, LPS is sensed by a complex of MD2, CD14, and this pattern-recognition receptor. This receptor signals through both Myd88-dependent and independent pathways.

ANSWER: **TLR4** [or **toll-like receptor 4**; or **CD284**; prompt on toll-like receptor; prompt on TLR]

9. Answer some questions about science-related literary essays, for 10 points each.

[10] This author's essay "Total Eclipse" was republished by the Atlantic during the eclipse of 2017. An excerpt from her most famous book that begins with her trying to spot insects is frequently anthologized as the essay "Seeing."

ANSWER: Annie **Dillard**

[10] Although John McPhee is best known for ecological writings like *Encounters with the Archdruid*, his most famous essay is probably "The Search for Marvin Gardens," an urban history of this city on which Monopoly is based.

ANSWER: **Atlantic City**

[10] This extremely sad New Yorker essay by Jo Ann Beard describes her friendship with physicists Cristoph Goertz and Bob Smith at the University of Iowa before their deaths in a 1991 campus shooting.

ANSWER: "The **Fourth State of Matter**"

10. The United Nations-backed attempt to destroy this state resulted in the capture of a company of Irish troops under Pat Quinlan during the Siege of Jadotville. For 10 points each:

[10] Name this breakaway state that seceded in 1960 and used namesake "crosses" both on its flag and as its currency in copper form.

ANSWER: State/Republic of **Katanga**

[10] Katanga had broken away from the central government of this country, then known as Zaire and ruled by Joseph Mobutu.

ANSWER: Democratic Republic of the **Congo** [or the **DRC**]

[10] This mercenary of Irish blood was hired by Moise Tshombe to put down the Simba rebellion in the Congo. In 1981, he and his drinking buddies in Ye Ancient Order of Froth Blowers created a fake rugby team that tried to overthrow the president of the Seychelles; that plan failed.

ANSWER: Mike **Hoare** [or Thomas Michael **Hoare**; or Mad Mike **Hoare**]

11. In 1949, Knight reported a shift in this quantity in various metals that Townes attributed to paramagnetism. For 10 points each:

[10] Name this quantity that is normalized in terms of chemical shift. The Larmor formula is used to calculate the “operating” version of this quantity for a magnet.

ANSWER: nuclear magnetic resonant **frequency**

[10] Resonant frequency’s dependence on chemical environment means that nuclei with this property will have the same shift unless placed in a chiral solvent. Geminal hydrogens on a tetrahedral center with two other unique groups are the classical example of this property.

ANSWER: **enantiotopic** [prompt on topicity; do not accept or prompt on “enantiomeric,” “enantiomers,” “chiral,” or “diastereotopic”]

[10] Use of PFGs as part of programs of these phenomena can improve resolution in techniques like WATERGATE and excitation sculpting. Sequences of these phenomena are used in amusingly named techniques like INEPT and INADEQUATE.

ANSWER: selective **pulses** [accept **pulse** sequences; accept **pulse** programs]

12. The needles suspended from a dip circle by Sir James Clark Ross pointed down at 90 degrees on Boothia Peninsula in 1831, indicating he had discovered the magnetic location of this place. For 10 points each:

[10] Name this destination first reached geographically by American explorer Robert Peary in 1909.

ANSWER: the **North Pole**

[10] In 2014 and 2016, Canadian expeditions discovered the *Erebus* and the *Terror*, the two ships from the “Lost Expedition” of this explorer in 1845, in almost the exact spot where Inuits had reported in 1859 to Francis McClintock that the ships were stranded.

ANSWER: John **Franklin**

[10] This Swedish engineer died trying to reach the geographic North Pole in a hydrogen balloon named *Ornen*, or *The Eagle*, setting off in 1897 with the well-publicized financial backing of Alfred Nobel.

ANSWER: Salomon August **André** [or S. A. **André**]

13. This essay claims that Lautréamont’s *Chants de Maldoror* represents the cruelty of the Western bourgeoisie and also criticizes the theorizing of *Bantu Philosophy* by the missionary Placide Tempels. For 10 points each:

[10] Name this Aimé Césaire essay, which begins with the proclamation that “Europe is indefensible” and equates its title phenomenon to “thingification.”

ANSWER: “**Discourse on Colonialism**”

[10] In the essay, Césaire likens the rise of Nazism in Europe to the effect of one of these objects. One of these objects is often named for Michel Foucault due to a similar effect described in the lecture *Society Must Be Defended*.

ANSWER: **boomerang**

[10] Césaire’s dramatic works on colonialism include *A Tempest* as well as *The Tragedy of King Cristophe*, a work set in this nation that is also the setting of Alejo Carpentier’s *The Kingdom of This World*.

ANSWER: **Haiti**

14. The Volunteer Force named for this province, led by Frederick Crawford, purchased arms from the Germans to defend itself during the Howth gunrunning scandal. For 10 points each:

[10] Name this province that signed a namesake covenant in 1912 to oppose Home Rule, which its Unionist Party led by Edward Carson referred to as “Rome Rule.”

ANSWER: **Ulster**

[10] At the dawn of World War I, the largest city in Ireland was this one, which later became a capital city when Northern Ireland was formed from six counties of Ulster.

ANSWER: **Belfast**

[10] In this 1914 mutiny, several unionist British officers resigned from the army rather than join in an attack on Ulster to attempt to enforce Home Rule.

ANSWER: **Curragh** mutiny [or **Curragh** incident]

15. Legislator Rachel Burgin revealed information about this organization’s workings when she accidentally left its mission statement in the text of a bill she introduced to reduce Florida corporate tax rates. For 10 points each:

[10] Name this organization that, often in conjunction with the State Policy Network, drafts and shares model legislation with conservative members of state governments.

ANSWER: **ALEC** [or **American Legislative Exchange Council**]

[10] ALEC’s “board of scholars” includes this economist who, at a 1974 meeting with Dick Cheney and Donald Rumsfeld, allegedly grabbed a napkin and sketched a “curve” showing a relationship between tax rate and revenue.

ANSWER: Arthur (Betz) **Laffer** [accept **Laffer** curve]

[10] The 2016 book *Caught*, by this University of Pennsylvania political scientist, traces the links between ALEC model legislation and the increase in private prisons in the U.S. Her 2006 book, *The Prison and the Gallows*, is an examination of the legal and political emergence of mass incarceration.

ANSWER: Marie **Gottschalk**

16. While this woman is pregnant, Cú Chulainn gives her a gold ring for their son and instructs her to tell their son to search Ireland for Cú Chulainn when their son turns seven. For 10 points each:

[10] Name this woman, the mother of Connla, whose war with her sister is described in the “wooing of Emer” saga in the Ulster Cycle.

ANSWER: **Aífe** [accept **Aoife**]

[10] Aífe’s war with this sister ended after Cú Chulainn bested Aífe in battle. This warrior woman and mother of Uathach lives at the Fortress of Shadows in the Isle of Skye and taught combat to Cú Chulainn.

ANSWER: **Scáthach** [accept **Sgathaich**; accept **Sgáthach** an Eilean Sgitheanach; prompt on **The Shadow**; prompt on **Warrior Maid**]

[10] Scáthach gave Cú Chulainn this spear during her lessons. Cú Chulainn used this deadly, multi-barbed spear to inadvertently kill his son Connla and his foster-brother Ferdiad.

ANSWER: **Gáe Bulg** [accept **Gáe Bulga**; accept **Gáe Bolg** or **Gáe Bolga**]

17. A term for artists specializing in this subject matter originated as a derisive label for the work of Antoine-Louis Barye, who first gained notice for an unusual medallion of Milo of Croton. For 10 points each:

[10] Identify these subjects, the speciality of an artistic family that included Auguste and Isidore Jules. Their better known sibling, whose major paintings all feature these subjects, set a diagonally oriented painting in the Nivernais.

ANSWER: **animals** [or **fauna**; or **beasts**; or **creatures**; prompt to be less specific on specific animals like lions or cattle] (The term for the artists is *animalier*, and the family is the Bonheurs.)

[10] Barye was often accompanied on his animal sketching trips to the Jardin des Plantes by this painter, who partly based his series *The Lion Hunt* on recollections of a trip to North Africa that led to his *Women of Algiers*.

ANSWER: Eugène **Delacroix** [or Ferdinand Victor Eugène **Delacroix**]

[10] An American *animalier*, Anna Hyatt Huntington, also created Manhattan's sculpture of this person. A gilded statue of this person is the most famous work by the sculptor of *Gorilla Carrying Off a Woman*, Emmanuel Frémiet.

ANSWER: **Joan** of **Arc** [or **Jeanne d'Arc**; prompt on **Joan** or **Jeanne**]

18. This process becomes energetically favorable at room temperature when the electrons in a hydrogen gas are replaced with a heavier lepton, resulting in a greater reduced mass and shorter bond length. For 10 points each:

[10] Identify this process in which the above replacement drives a process that otherwise typically occurs at much higher temperatures, such as those found in stellar interiors.

ANSWER: **muon**-catalyzed **fusion** [accept descriptions as long as they mention both required parts; prompt on fusion]

[10] The precession of muons in a magnetic field is the subject of a recent Fermilab experiment that is searching for deviations from the Standard Model by measuring this quantity for the muon, usually denoted as "g - 2" ("gee minus two").

ANSWER: **anomalous magnetic dipole moment** [prompt on dipole moment or magnetic dipole moment]

[10] A common experiment in undergraduate physics labs is measuring the muon lifetime, which provides a direct test of this phenomenon predicted by the theory of relativity, whereby a clock ticks slower in the reference frame of a muon traveling near the speed of light.

ANSWER: **time dilation**

19. This declaration opens a poem that narrates a whitewashed variant of the Tantalus myth in which the king never fed his son to the gods, who instead punished him for stealing ambrosia. For 10 points each:

[10] Give this gnomic assertion that opens the first *Olympian Ode*, which is dedicated to Hieron of Syracuse. This verdict is followed by an encomium to gold, which "stands out supreme of all lordly wealth."

ANSWER: "**water is best**" [or "**ariston men hudor**"; accept close translations, like **water is the best**, or **water is best** of all, or **water is best** of elements]

[10] This Greek poet, the author of many *epinikia* in honor of victorious athletes, enigmatically asserted that "water is best" at the opening of his first *Olympian Ode*.

ANSWER: **Pindar** [or **Pindaros**]

[10] Many of Pindar's odes consist of three parts, of which the last is given this name. Iambic "blame" poetry is the model for seventeen poems by Horace collected under this name, which are distinct from his satires.

ANSWER: **epodes** [or **epodoi**]

20. Richard Taylor's two versions of this example were defused with the Montague grammar-derived "System J" in David Foster Wallace's senior thesis. For 10 points each:

[10] Jan Łukasiewicz's three-valued logic was inspired by what example that introduced the problem of future contingents? Aristotle created a paradox by supposing that one of these events "will not [occur] tomorrow."

ANSWER: **sea battle** [or **sea fight**; or **naval battle**; prompt on **battle**]

[10] Diodorus Cronus addressed the problem of future contingents with an argument of this name, which draws a fatalist conclusion from statements like "Something impossible does not follow from something possible."

ANSWER: **master** argument [or **ruling** argument; or **kurieuôn** logos]

[10] The sea battle example is often used to illustrate how the fallacy of this name can make it appear that statements about the future are necessary. This sort of logic is used for statements about possible worlds.

ANSWER: **modal** [accept **modal** fallacy; accept **modal** logic]