

## 2021 ACF Fall

### Packet M by Editors

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Tossups

1. Jo Ann Robinson and the Women's Political Council helped coordinate one campaign in this state's capital city. Viola Liuzzo was killed by members of the Ku Klux Klan while returning from a protest in this state. Five women from this state, including Claudette Colvin, were plaintiffs in the Supreme Court case *Browder v. Gayle*. Demonstrators in this state were attacked on the Edmund Pettus Bridge. Four Black girls in this state were killed in the 16th Street Baptist Church bombing. Amelia Boynton helped organize a march for voting rights to this state's capital from Selma. For 10 points, name this state where the arrest of Rosa Parks triggered the Montgomery bus boycott.

ANSWER: **Alabama**

<US History>

2. It is reported in this novel that after a prisoner tried to climb over the gates of the Enfield Prison Farm, the guards shot him seventeen times. In this novel, Mrs. Merriweather composes a work entitled *Ad Astra Per Aspera* for a Halloween pageant. In this novel, Miss Caroline tries to give a quarter to the poor boy Walter Cunningham when he doesn't bring any lunch to school. While dressed as a ham, the protagonist of this novel and her brother are attacked by Bob Ewell and saved by their reclusive neighbor Boo Radley. For 10 points, name this novel set in Maycomb that revolves around Atticus and his daughter Scout Finch, written by Harper Lee.

ANSWER: **To Kill a Mockingbird**

<US Literature>

3. This deity was rescued by two androgynous beings known as the gala-tura and the kur-jara. This deity gave two objects called a pukku and a mikku to a hero who defended this deity's sacred tree from the bird monster Anzû. For failing to mourn this deity's death, Dumuzid was forced to spend half of each year in the Underworld. This deity was cursed with 60 diseases after being forced to remove an article of clothing at each of the seven gates to the Underworld. This deity sent the Bull of Heaven to attack Gilgamesh after he rejected her romantic advances. For 10 points, name this Mesopotamian goddess of fertility, love, and war.

ANSWER: **Ishtar** [or **Inanna**]

<Mythology>

4. This sculptor's failure to complete an addition of two towers to one building partially inspired a sculpture of his showing a cloth being removed from a woman by an incomplete figure. This sculptor's early works include a sculpture of a man carrying his father and leading his son from the ruins of Troy. Patrons sit in theater boxes on either side of a sculpture by this artist at the rear of the Cornaro Chapel. Sculptures by this artist including *Aeneas*, *Anchises and Ascanius* and *Truth Unveiled by Time* are on display at the Villa Borghese. This sculptor designed a baldacchino for St. Peter's Basilica. For 10 points, name this Baroque sculptor of *The Ecstasy of Saint Teresa*.

ANSWER: Gian Lorenzo **Bernini** [or Giovanni Lorenzo **Bernini**]

<Painting/Sculpture>

5. Linear pulse-code modulation is commonly used to encode this kind of data. The Red Book defines a standard format for this kind of data that uses a 705600 baud ("bod") sample rate and 16-bit samples. Data of this type that has been compressed with the FLAC algorithm can be decompressed to retrieve the original file. The Opus format is able to encode this kind of data with multiple bitrates and is commonly used to transmit this kind of data "over IP." Data of this type that has been compressed by the lossy Vorbis codec can be stored in .ogg files, but this kind of data is more commonly stored in .mp3 files. For 10 points, Spotify streams what kind of data?

ANSWER: **audio** data [or **sound** data or **music** data or **voice** data]

<Other Science>

6. When messengers came to assassinate this man, they found in his bed only an idol wearing a quilt made of goat's hair. This man won a civil war after Ish-bosheth was killed by his own courtiers. A prophet turned down Eliab and Abinadab before anointing this man with a horn full of olive oil. Nathan scolded this man for sending Uriah to his death so that he could cover up his affair with Uriah's wife Bathsheba. This man's first wife Michal ("mee-HALL") was the daughter of the king Saul, who recruited this man as an armor bearer in a war against the Philistines. For 10 points, name this Old Testament king often credited with writing most of the *Psalms* who used a sling to kill Goliath.

ANSWER: **David**

<Religion>

7. One ruler transferred the rights to this resource in his country to a British businessman in the D'Arcy concession. Alfred Nobel's brother Ludwig helped develop the production of this resource in the Russian Empire. Edwin Drake first produced this resource in the United States near Titusville, Pennsylvania. Albert Fall was jailed after accepting bribes to lease this resource in the Teapot Dome scandal. John D. Rockefeller's fortune came from a company that held a virtual monopoly on this resource. For 10 points, name this resource, deposits of which were found in Iran and Saudi Arabia, and can be turned into gasoline.

ANSWER: crude **oil** [accept **petroleum**]

<Other History>

8. A negative value for this quantity is found in the state of population inversion. According to the Stokes–Einstein equation, the diffusion coefficient is proportional to this quantity divided by viscosity times particle radius. Thermodynamic beta is the reciprocal of the product of Boltzmann's constant and this quantity; that product has units of energy. The axes of a phase diagram of a pure substance are usually pressure and this quantity. At a constant value for this quantity, pressure and volume are inversely proportional according to Boyle's law. This quantity is proportional to average kinetic energy. For 10 points, name this quantity that can be measured in degrees Celsius.

ANSWER: **temperature** [prompt on **T**]

<Physics>

9. This author included a five part "Letter to Lord Byron" in a collection he co-wrote with Louis MacNeice titled *Letters from Iceland*. This author repeated the line "She looked over his shoulder" in a poem describing an object that belonged to an "iron-hearted" figure who "would not live long." The speaker of a poem by this author reminds readers of "what all schoolchildren learn, / those to whom evil is done / do evil in return." This author wishes to "show an affirming flame" after asserting that "We must love one another or die" in a poem set at the outbreak of World War II. For 10 points, name this poet of "The Shield of Achilles" and "September 1, 1939."

ANSWER: W.H. **Auden** [or Wystan Hugh **Auden**]

<British Literature>

10. The all-time record for blocks in a single season was set with this team by Mark Eaton. The center for this team became the first player in the NBA to test positive for COVID-19 two days after a press conference in which he jokingly rubbed his hands on the microphones. The NBA's all-time leader in assists and steals spent his entire career with this team. After winning the 2021 Defensive Player of the Year award, this team's center became an Olympic Basketball silver medalist with France. Throughout the 1990s, this team was led by All-Star co-MVPs Karl Malone and John Stockton. Donovan Mitchell and Rudy Gobert ["go-BEAR"] lead, for 10 points, what team based in Salt Lake City?

ANSWER: the **Utah Jazz** [accept either underlined portion]

<Pop Culture>

11. The B and C glycoproteins of one of these agents often bind to heparan sulfate. The *pol* gene of these agents is always located upstream from their *gag* and *env* genes. The gp120 glycoprotein of one of these agents binds to CD4 receptors. One group of these agents is classified into serotypes based on the different hemagglutinin and neuraminidase proteins they contain. The nine classes of another group of these agents include "zoster" and "simplex." A lipid envelope may surround the capsids of these pathogens, which reproduce through either the lysogenic or lytic cycle. For 10 points, name these small pathogens, whose "corona" type includes SARS-CoV-2.

ANSWER: **viruses** [accept herpes simplex **virus** or **HSV** or **HSV-1** or **HSV-2** or retro**virus** or human immunodeficiency **virus** or **HIV** or influenz**avirus** or varicella zoster **virus** or **herpesviridae** or **viral** envelope or **viral** capsid or **coronavirus**]

<Biology>

12. Empiricist understandings of this thinker's work are rebutted in a Louis Althusser collection titled "For [this thinker.]" Economic relations, or the substructure, determine the course of history, or superstructure, according to this non-English thinker's *The German Ideology*. This thinker used the labor theory of value to argue that bosses make money by taking surplus value from workers. According to this thinker's historical materialism, society passes from feudalism towards a phase in which the proletariat takes power from the bourgeoisie. For 10 points, name this economist who, along with Friedrich Engels, criticized capitalism in *Das Kapital* and the *Communist Manifesto*.

ANSWER: Karl **Marx**

<Social Science>

13. This architect used lily-pad shaped columns to bear weight in the Great Workroom at the Johnson Wax Headquarters. In another design, this architect envisioned an inverted ziggurat with a descending ramp inside. This architect's Imperial Hotel gained fame for withstanding a destructive 1923 earthquake in Tokyo. This architect designed New York City's Solomon R. Guggenheim Museum. This artist used the Usonian style to build the Robie House, and was the head of the Prairie School. A cantilevered house this architect built in Pennsylvania is perched above a creek. For 10 points, name this architect of Fallingwater.

ANSWER: Frank Lloyd **Wright**

<Other Fine Arts>

14. A speaker created by this author tells the addressee, "I remembered you with my soul clenched" in a poem that begins, "We have lost even this twilight." The speaker of a poem by this author notes that "only the tremulous shadow twists in my hands" after stating that he feels "deserted like the wharves at dawn." That poem by this author opens with the line, "The memory of you emerges from the night around me" and repeats the line "in you everything sank!" The penultimate poem in a collection by this author opens with the speaker saying, "Tonight I can write the saddest lines." For 10 points, *Twenty Love Poems and a Song of Despair* was written by what Chilean poet?

ANSWER: Pablo **Neruda** [or Ricardo Eliécer Neftalí **Reyes** Basoalto]

<World/Other Literature>

15. Gilberto Freyre studied these people's participation in the *casa grande*. Muslims led by Ahuna among these people rose up in the Malê Revolt. Ganga Zumba and Zumbi were monarchs of a prominent settlement established by these people. These people established settlements like Quilombo dos Palmares. These people were the beneficiaries of the Law of the Free Womb, and Princess Isabel permanently changed the legal status of these people with the 1888 Golden Law. For 10 points, name these people, many of whom were transported from Africa to Brazil to labor on plantations.

ANSWER: slaves in Brazil [accept maroons in Brazil; accept quilombolas before "quilombos"; prompt on Brazilians and Afro-Brazilians and Black Brazilians and Africans and Black people with "of what legal status?"]

<World History>

16. In June 2021, this country ordered the grounding of a Ryanair flight carrying a journalist critical of this country's government. A sprinter representing this country during the Olympics was told to return home, leading to her defecting to Poland instead. This country's president suggested visiting saunas and drinking vodka to combat the coronavirus. Election fraud marred this country's 2020 elections, which opposition candidate Sviatlana Tsikhanouskaya claimed that she had won, leading to widespread protests. For 10 points, name this country currently led by "Europe's last dictator," Alexander Lukashenko.

ANSWER: Republic of Belarus

<Current Events>

17. One character created by this author believes that Spain and China are the same country and calls himself King Ferdinand VIII. A near-sighted police officer created by this author accosts a character for throwing the title object off of the St. Isaac's bridge and later finds that object dressed in a state councillor's uniform attempting to escape to Riga. This author's collection *Arabesques* contains his stories "Diary of a Madman" and "Nevsky Prospekt." Ivan Yakovlevich finds the title body part in a loaf of bread at the beginning of a short story by this author set in St. Petersburg. For 10 points, name this Ukrainian-born author of "The Nose."

ANSWER: Nikolai Gogol [or Nikolai Vasilievich Gogol-Yanovsky]

<European Literature>

18. A contentious parliamentary debate named for this country resulted in the resignation of Neville Chamberlain as British Prime Minister. British commandos in this country successfully carried out Operation Gunnerside to destroy a plant being used for the production of heavy water. The Nazi official Josef Terboven worked with a collaborationist government in this country after a German invasion forced this country's king Haakon VII to flee to Britain. That collaborationist government in this country was led by Vidkun Quisling. For 10 points, name this Scandinavian country occupied by Nazi Germany in 1940, governed from Oslo.

ANSWER: Kingdom of Norway

<European History>

19. A loud double-reed instrument from this country with a wide bell is used in some Cuban conga ensembles, where it is known as this country's *corneta*. The instruments of this country are typically organized into eight groups based on the materials they are made from. A composer from this country who created the *Orchestral Theater* series of pieces also wrote the score to the movie *Hero*. A style of opera named for this country's capital includes works like *The Peony Pavilion*. This country is home to an instrument played by drawing a bow between two close strings, the erhu. For 10 points, name this Asian country home to composers like Tan Dun, as well as Peking Opera.

ANSWER: People's Republic of China [or PRC or Zhongguo; do not accept or prompt on "Republic of China"]

<Classical Music>

20. A quadrupole analyzer may be used in a technique named for this quantity, during which the McLafferty rearrangement may occur. ESI or MALDI are often used as the first step of that analytical procedure named for this quantity. Compounds containing chlorine or bromine exhibit large M+2 peaks in an analytical procedure named for this quantity which involves ionizing the sample and then measuring its ratio of this quantity to charge.

Stoichiometric calculations often involve the "molar" form of this quantity, which is approximately 18 amu for water. For 10 points, name this quantity, which is often measured in grams.

ANSWER: **mass** [accept **mass** spectrometry or **mass** spectroscopy or **time of flight** mass spectrometry or **time of flight** mass spectroscopy or **TOF** mass spectrometry or **TOF** mass spectroscopy or molar **mass**; do not accept or prompt on "weight"]

<Chemistry>

## Bonuses

1. Gottlob Frege's ("FRAY-guh") development of the formal type of this discipline led him to distinguish between forms of the word "is" that denote existence, identity, predication, and subsumption. For 10 points each:

[E] Name this philosophical discipline that studies types of reasoning including induction and deduction. Aristotle's syllogisms are simple examples of arguments in this discipline.

ANSWER: **logic**

[M] This thinker stated "a logical picture of facts is a thought" in the third proposition of his *Tractatus Logico-Philosophicus*. In his early work, he defined a logical truth as a statement that is true in all possible worlds.

ANSWER: Ludwig **Wittgenstein**

[H] This field concerns the relationships between sentences and the structures in which they are true in a logical system. Godel ("girdle") classified this field under set theory, unlike a closely related field classified under number theory.

ANSWER: logical **semantics** [accept **model theory**]

<Philosophy>

2. The protagonist of this story watches a woman lay her "moonbeam fingers" on the cheeks of the protagonist's husband and make secret arrangements to meet each other the next day. For 10 points each:

[H] Name this story in which Bertha Young feels the title emotion while looking at her pear tree with Pearl Fulton, one of her dinner guests who turns out to be her husband's mistress.

ANSWER: "**Bliss**"

[M] "Bliss" was written by this New Zealand-born author of the story "The Garden Party."

ANSWER: Katherine **Mansfield** [or Kathleen Mansfield **Beauchamp**; or Kathleen Mansfield **Murry**]

[E] This author based the character Gudrun Brangwen from his novel *Women in Love* on Katherine Mansfield. This author also wrote the novels *Sons and Lovers* and *Lady Chatterley's Lover*.

ANSWER: D.H. **Lawrence** [or David Herbert **Lawrence**]

<World/Other Literature>

3. Answer the following questions about  $S_N1$  ("S-N-one") reactions, for 10 points each:

[M] The N in  $S_N1$  stands for these compounds, which donate electrons in a reaction and are attracted to atoms with low electron density.

ANSWER: **nucleophiles** [accept **nucleophilic** substitution reaction]

[E] The nucleophile in  $S_N1$  reactions "attacks" a cation named for containing a positively-charged atom of this element. Compounds containing this element are the subject of organic chemistry.

ANSWER: **carbon** [prompt on **C**]

[H]  $S_N1$  reactions occur faster in a polar solvent that has this property, such as water or alcohol. THF and acetone do **not** have this property.

ANSWER: **protic** [accept descriptive answers that indicate that **they donate  $H^+$  ions in solution**; do not accept or prompt on "aprotic"]

<Chemistry>

4. This state's indigenous *nene* goose has been under threat from invasive species. For 10 points each:

[E] Name this U.S. state in the Pacific where the *nene* and other endemic species live in national parks like Haleakala. Haleakala National Park is located on this state's island of Maui, a popular tourist destination.

ANSWER: **Hawai'i**

[H] Invasive species like the brown tree snake have threatened native birds in Hawai'i and this U.S. island territory. This island's highest point is Mt. Lamlam, which means "lightning" in this island's native Chamorro language.

ANSWER: **Guam**

[M] Another invasive species in Hawai'i is a rhinoceros beetle named for this crop. A crab named for this crop endemic to the Indian and Pacific Oceans is the largest land-dwelling arthropod.

ANSWER: **coconuts**

<Geography>

5. This politician campaigned for governor with the slogan "Every man a king, but no one wears a crown." For 10 points each:

[M] Name this Louisiana politician, nicknamed "The Kingfish," who proposed the "Share Our Wealth" program as a senator. This politician was assassinated by Carl Weiss just prior to a likely run in the 1936 presidential election.

ANSWER: Huey Pierce **Long**, Jr.

[E] Long was a major opponent of this president, who regarded him and Douglas MacArthur as "the two most dangerous men in America." This president co-opted many of Long's proposals into the New Deal during the Great Depression.

ANSWER: **Franklin** Delano **Roosevelt** [or **FDR**; prompt on **Roosevelt**]

[H] In the Senate, Long filibustered this 1933 bill for over 15 hours, believing it was unfairly benefiting the wealthy. This bill was eventually struck down in the Supreme Court case *Schechter Poultry Corp. v. U.S.*

ANSWER: **National Industrial Recovery Act** [accept **NIRA**; do not accept "National Recovery Administration" or "NRA"]

<US History>

6. The "F" form of this protein forms thin filaments with troponin and tropomyosin. For 10 points each:

[M] Name this protein, which binds to and then slides along thick filaments composed of myosin during muscle contraction.

ANSWER: F-**actin**

[E] The myosin head is moved when this molecule is hydrolyzed, triggering a power stroke. This highly energetic compound is the final product of the electron transport chain and consists of a nucleoside bound to three ions.

ANSWER: **ATP** [or **adenosine triphosphate**]

[H] Muscle is able to contract when troponin is bound by a messenger ion released from this organelle. SERCA pumps increase the concentration of that ion within this organelle.

ANSWER: **sarcoplasmic reticulum** [or **SR**; prompt on **endoplasmic reticulum** or **ER**]

<Biology>

7. In *Man, the State, and War*, Kenneth Waltz theorized that fear of these weapons could cause states to use them pre-emptively in moments of uncertainty. For 10 points each:

[E] Name these weapons. Scholars like John Mearsheimer have argued that the power of these weapons, as demonstrated by the destruction of Hiroshima and Nagasaki, could dampen conflict if widely dispersed.

ANSWER: **nuclear** weapons [or **nuclear** bombs; accept **atomic** bombs; prompt on weapons of mass destruction]

[H] States are considered power-hungry actors in international politics in this IR school of thought. Waltz first expounded the theories of this school's "Neo" branch.

ANSWER: **realism** [or **neorealism**; accept classical **realism**; accept classical **neorealism**]

[M] States were defined as polities with a "monopoly on the legitimate use of violence" by this early German political theorist. This theorist compared rationality to an "iron cage" trapping humans into conformity and work.

ANSWER: Max **Weber** ("VAY-ber")

<Social Science>

8. In order to prepare to write a novel, one author spent a few days as a street sweeper in this city. For 10 points each:

[M] Name this setting of the novel *Love and Garbage*. In a different novel, the surgeon Tomas becomes a window washer and his wife Tereza becomes a bartender while living in this city.

ANSWER: **Prague** [or **Praha**] (*Love and Garbage* is by Ivan Klíma)

[E] That aforementioned novel, *The Unbearable Lightness of Being*, was written by this Czech author.

ANSWER: Milan **Kundera**

[H] The Czech author Jaroslav Hašek created this character who is assigned to Lieutenant Lukáš and does many foolish things such as trying on a Russian uniform that leads to him being arrested and assigned to a gang of Russian POWs.

ANSWER: **Josef Švejk** [or *The Good Soldier Švejk*; accept any underlined portion]

<European Literature>

9. For 10 points each, answer the following about miniature painting.

[E] Much of the art created in miniature form after the 16th century was in this broad genre of painting, which were used to capture likenesses of people like Nicholas Hilliard's one showing Elizabeth I ("the first").

ANSWER: **portraits**

[H] Portrait miniatures developed out of the elaborate artwork in these medieval objects. One of these objects, the Limbourg Brothers' *Tres Riches Heures* ("tray reesh oo-zuh"), marked the high point of the International Gothic style of medieval art.

ANSWER: **manuscripts** [or illuminated **manuscripts** or illustrated **manuscripts**; accept **book of hours**; prompt on books]

[M] Miniature art in this non-European region was created by artists like Behzad and collected in *muraqqa* albums. The Ardabil and Chelsea carpets come from this region, which has created carpets for over two thousand years.

ANSWER: **Persia** [or **Iran**]

<Painting/Sculpture>

10. Workers in this industry dissatisfied with licence fees revolted in the Eureka Stockade. For 10 points each:  
[M] Name this industry that led to significant population growth in the Australian state of Victoria as immigrants came to sites like Ballarat and Bendigo. Australian immigrants also went to California to work in this industry in the 1850s.

ANSWER: **gold mining** [prompt on mining]

[H] One of the most famous people from Victoria was this leader of the Greta Mob. This man killed three policemen at Stringybark Creek and also dictated the Jerilderie Letter.

ANSWER: Ned **Kelly** [accept Edward **Kelly**]

[E] Ned Kelly was born to immigrants from this country, many of whom worked in Victoria's goldfields. Many immigrants from this country came to Australia during this country's Potato Famine during the 1840s.

ANSWER: Republic of **Ireland**

<Other History>

11. Congratulations! You are a resident of ancient Egypt who has just died. For 10 points each, answer the following about your journey through the underworld, or Duat:

[H] Your first stop is the Hall of Two Truths, where your heart is weighed against the feather of Ma'at. If your heart is heavier, it will be devoured by this monster with the features of a hippopotamus, crocodile, and lion.

ANSWER: **Ammit** [or **Ammut** or **Ahemait**]

[E] Because you led a virtuous life and your heart is lighter than the feather, you are allowed into the Field of Reeds, a heavenly paradise ruled by this green-skinned god of death and the afterlife.

ANSWER: **Osiris**

[M] Your new home is blissful, but your sleep is disrupted when the god Ra and his entourage fight off this gigantic flint-headed snake and embodiment of chaos who attacks Ra's solar barge every night as it travels through the Duat.

ANSWER: **Apep** [or **Apophis**]

<Mythology>

12. During one of these events, the speaker of a poem describes a "Plank in Reason" breaking before they "dropped down, and down - And hit a World, at every plunge, And Finished knowing." For 10 points each:

[H] Name this event during which the speaker of a certain poem describes "Sense breaking through" after a group of people "kept treading" "to and fro."

ANSWER: a **funeral** [accept "I felt a **Funeral**, in my Brain"]

[E] That poem, "I felt a Funeral, in my Brain," was written by this Belle of Amherst who also wrote "Because I could not stop for Death."

ANSWER: Emily **Dickinson** [or Emily Elizabeth **Dickinson**]

[M] In "Because I could not stop for Death," the speaker notes how Death "kindly stopped for me" and that the carriage he was in "held but just Ourselves – and" this figure.

ANSWER: **Immortality**

<US Literature>

13. These events were endorsed by Heinrich Kramer in a treatise called the *Malleus Maleficarum*. For 10 points each:

[M] Name these events, large-scale kinds of which took place in Bamberg and Würzburg, resulting in the deaths of 900 people respectively. The "swimming test" was often employed during these events.

ANSWER: **witch trials** [accept **witch hunts**]

[E] The Bamberg and Würzburg witch hunts took place during this war. This war resulted in massive depopulation throughout Germany until it came to an end in 1648 with the Peace of Westphalia.

ANSWER: **Thirty Years' War**

[H] The Würzburg witch trials led Friedrich Spee, a member of this organization, to write the *Cautio Criminalis* criticizing the conduct of witch hunts. This organization was suppressed by the 1737 papal bull *Dominus ac Redemptor*.

ANSWER: **Jesuit Order** [accept **Society of Jesus**]

<European History>

14. Several of this composer's operas were premiered by the castrato Senesino, though their stormy relationship eventually led Senesino to leave this composer's opera company for a rival. For 10 points each:

[M] Name this composer of operas like *Giulio Cesare* and *Alcina*. This composer's other vocal works include an oratorio that includes the section "Ev'ry valley shall be exalted."

ANSWER: Georg Friedrich **Handel**

[E] Handel set several operas including *Agrippina* in this city. Claudio Monteverdi's opera *The Coronation of Poppea* centers on the title character's marriage to Nero in this city.

ANSWER: **Rome**

[H] The castrato Caffarelli premiered the title role of this Handel opera, whose opening aria "Ombra mai fu" is also known as this opera's *Largo*.

ANSWER: **Serse** [or **Xerxes**]

<Other Fine Arts>

15. This system's Hamiltonian is the radial kinetic energy operator plus the electric potential energy. For 10 points each:

[H] Name this system, which can be solved exactly by the Schrodinger equation. The Bohr radius is the most probable distance between two components of this system.

ANSWER: **hydrogen** atom [or **protium** atom]

[M] This state of the hydrogen atom has zero angular momentum. In general, this state of a quantum system is the one with the lowest energy.

ANSWER: **ground** state [accept **zero-point** energy]

[E] Each state of the hydrogen atom corresponds to a different probability distribution for the location of this negatively-charged subatomic particle in a namesake "cloud" around the nucleus.

ANSWER: **electrons** [accept **electron** cloud]

<Physics>

16. Ships known as *dhow*s were used for trade in this body of water. For 10 points each:

[E] Name this ocean where goods like African ivory and Chinese silk were traded, often by Muslim merchants. Ships used the *monsoon* winds to travel across this ocean, on which the Swahili coast is located.

ANSWER: **Indian Ocean**

[H] Artifacts from the Indian Ocean trade network were found at this inland African site, famous for its many soapstone bird carvings. This site is home to a building known as the Great Enclosure.

ANSWER: **Great Zimbabwe**

[M] The cities on the Swahili coast were visited by this Chinese Muslim explorer, who brought back giraffes, ostriches and other African animals with him. This man commanded the Ming Dynasty's seven treasure voyages.

ANSWER: **Zheng He**

<World History>

17. Wendy Carlos replaced the slow movement of one piece in this set with an original composition in a 1980 album titled for a *Switched On* version of this composition. For 10 points each:

[M] Name this set of six pieces composed for Margrave Christian Ludwig. Its second piece includes a part for solo trumpet, and its fourth includes solos for two recorders.

ANSWER: **Brandenburg Concertos**

[E] This prolific Baroque composer wrote the *Brandenburg Concertos*.

ANSWER: **Johann Sebastian Bach** [or **J.S. Bach**; prompt on **Bach** alone]

[H] Carlos' original composition replaced Brandenburg Concerto No. 3's slow movement, which only consisted of a minor half cadence described by this adjective. A mode with this name starts on degree 3 of a major scale.

ANSWER: **Phrygian** [accept **Phrygian** half cadence; accept **Phrygian** mode]

<Classical Music>

18. How do you solve a first-order ordinary differential equation? For 10 points each:

[M] The easiest way is probably this method, which involves rearranging the equation such that the differentials for each variable are on opposite sides of the equation.

ANSWER: **separation of variables** [or **Fourier** method, accept word forms like **separating variables**]

[H] If separation of variables isn't applicable, you can guess a solution of the form  $A$  times this function of  $x$  plus  $B$  times this function of negative  $x$ . This function equals the sum of hyperbolic sine and hyperbolic cosine.

ANSWER: **exponential** function [or  **$e$  to the  $x$** ]

[E] Differential equations for which a closed-form solution cannot be found can be solved by a numerical method named for this mathematician. This Swiss mathematician named the base of the exponential function  $e$ .

ANSWER: Leonhard **Euler** [accept **Euler's** method or **Euler's** constant]

<Other Science>

19. Participants in this action must wear *ihram* ("ih-hrahm"), or plain white garments whose male version cannot have seams. For 10 points each:

[E] Name this Islamic pilgrimage that any physically and financially fit Muslim must undertake in their lifetime. Around 2 million people travel to Mecca each year for this pilgrimage.

ANSWER: **hajj**

[M] In one ritual included in *hajj*, the *tawaf*, worshippers walk around this shrine in Mecca, kissing or touching the black stone at its center if possible.

ANSWER: **Kaaba**

[H] Another ritual included in *hajj*, the *rajm*, consists of performing this action in the valley of Mina in remembrance of a punishment Abraham gave to Satan.

ANSWER: **throwing stones** at walls [accept equivalents like **stoning** the devil; accept anything including **jamarat** or **jamrah**]

<Religion>

20. The narrator of this work says that if some "plump young girls" who didn't have "one single groat to their fortunes" were killed, "the kingdom would not be the worse." For 10 points each:

[M] Name this work whose narrator suggests eating Irish babies so that markets would be "glutted more than usual" nine months after Lent and, as luck would have it, lessen "the number of Papists among us."

ANSWER: "A **Modest Proposal**" [or "A **Modest Proposal** For preventing the Children of Poor People From being a Burthen to Their Parents or Country, and For making them Beneficial to the Publick"]

[E] "A Modest Proposal" was a satire written by this author of *Gulliver's Travels*.

ANSWER: Jonathan **Swift**

[H] In this other satire by Swift, the brothers Peter, Martin, and Jack are given coats in the will left by their father, who represents God, and are told to not alter them whatsoever, which of course, they do.

ANSWER: A **Tale of a Tub** [or A **Tale of a Tub**. *Written for the Universal Improvement of Mankind.*]

<British Literature>