

2021 ARCADIA 🐉

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Packet 6: Just gotta stop spending 3 hours trying to find a darn science clue and find something good for once.

Tossups

1. **A member of this group surmised Strasbourg to be the “New Jerusalem” and fled Denmark following the Flensburg disputation. After four of its members were drowned in the Limmat River, this group outlined its positions in the Schleithem Confession. Three members of this group had their bodies torn apart by giant red-hot pincers before being suspended in iron cages from the tower of Saint Lambert’s Church. Franz (*) von Waldeck oversaw the sadistic execution of Dutch baker Jan Matthys, a member of this group, in 1535 during the failed Münster Rebellion. Jakob Hutter led members of a namesake branch of this group to Moravia. For 10 points, the Mennonites is a branch of which religious sect, whose adherents believed only adults should receive a water-based sacrament?**

ANSWER: **Anabaptists** [accept word forms; prompt on **Protestants**] (The itinerant preacher in the first sentence is Melchior Hoffmann.)

<GP, European History>

2. **This figure is “walking anarchy” with “a homemade bomb in the pocket” in the poem “Junkman’s Obligato.” This “lonely old courage-teacher” stands next to the “black waters of Lethe” in one poem. This figure is followed by the “store detective” and asked, “are you my angel?” after being seen “poking among the meats.” This figure is (*) “eyeing the grocery boys” before being asked, “Which way does your beard point tonight?” This real-life figure “is large” and “contains multitudes” in one poem. This poet sees “men and women... in the usual costumes” in a poem that opens, “Flood-tide below me!” For 10 points, name this addressee of Allen Ginsberg’s *A Supermarket in California* whose poems, such as “Crossing Brooklyn Ferry” and “Song of Myself,” are collected in *Leaves of Grass*.**

ANSWER: Walt **Whitman** [or Walter **Whitman**; prompt on **myself** or **I** or “Song of **Myself**” or “the **speaker**” by asking “What specific real-life person does that refer to?”]

<RW, American Literature>

3. **Lil Buck performs in a style inspired by Memphis street dance set to this movement in a viral video recorded by Spike Jonze. A ballet set to this movement was notably performed by Maya Plisetskaya in her sixties. A dancer performs nearly continuous bourrées before sinking on their left knee in the final seconds in that ballet set to this movement. The fluttering arm movements in a Michel (*) Fokine ballet set to this movement inspired many interpretations of a different ballet that features Odette’s variation. This movement, which opens with the descending notes “G, F-sharp, and B,” is the setting of Anna Pavlova’s signature role. This penultimate movement of a suite also depicting pianists and elephants is scored for two pianos and cello. For 10 points, name this movement from *The Carnival of the Animals* that depicts a graceful white bird.**

ANSWER: “The **Swan**” [or “Le **Cygne**”; accept “The **Dying Swan**”; do not accept or prompt on “Swan Lake”]

<VD, Other Arts: Dance>

4. **A 2009 paper by Kolda and Bader summarizes the CP and Tucker models of these mathematical objects. Google developed a type of integrated circuit named for these mathematical objects that is designed for training machine learning models and intended to provide performance improvements over GPUs. These objects have the same structure as numpy (“NUM-pie”) (*) ndarrays (“N-D-arrays”). Google developed a machine learning framework named for these objects that competes with Facebook’s PyTorch. Cauchy names a**

symmetric one of these objects that defines the forces on an object under deformation. A matrix can be thought of as a rank-2 type of one of these objects. For 10 points, name these objects that can represent relations between a vector and a scalar, such as that between stress and energy.

ANSWER: **tensors** [or **tensor processing units** or **TensorFlow**; prompt on **TPUs**]

<RR, Other Science: Math and Computer Science>

5. **This concept is distinguished by being “bound” in the example of two travelers going to Larissa. A definition of this concept drawing from Protagoras and Heraclitus is the first of three presented in a dialogue in which Socrates compares himself to a midwife. That dialogue represents this concept with the birds in an aviary. This concept derives from the intelligible realm in the Two-Worlds theory, by contrast with (*) *doxa*. Aristotle’s *Posterior Analytics* argues that if this concept derived *solely* from demonstration, either an infinite regress or circular argument would result. Plato’s *Theaetetus* seeks to define this concept, which is argued in the *Meno* to be obtained through recollection of the Forms. For 10 points, name this concept classically defined as justified true belief, the subject of epistemology.**

ANSWER: **knowledge** [or scientific **knowledge**; accept **episteme** until “epistemology” is read]

<MB, Philosophy>

6. **During one of these events, light-skinned university students were first recruited as *edecanes*, sexualized hostesses intended to refute a country’s machismo image. Javier Barros Sierra resigned as rector of the UNAM in response to a crackdown on protests opposing that one of these events. The bombing of Korean Air flight 858 was intended to discourage participation in one of these events, before which the (*) June Democracy Movement’s demands for free elections were met by Roh Tae-woo. Ten days before one of these events, Gustavo Díaz Ordaz ordered police into the Plaza de las Tres Culturas, inciting the Tlatelolco Massacre. For 10 points, a pair of African-American athletes raised their fists while on the podium during the 1968 edition of which international sporting event?**

ANSWER: **Olympic** Games [or **Olympics**; accept Summer **Olympics** or Winter **Olympics**; accept 1968 Mexico City **Olympics**; accept 1988 Seoul **Olympics**]

<GP, World History>

7. **In Seki’s retelling, Urashima Tarō finds a crane feather, smoke, and one of these objects at the bottom of a three-tiered box. Triangular examples of these objects adorned with deities and beasts from the Yamato region have been identified with an account in the *Book of Wei* of one hundred bronze ones that were sent to the shaman queen Himiko. Some *magatama* and an octagonal example of these objects are (*) viewed by one deity lured by a dance on an overturned tub performed by Ame-no-Uzume. One of these objects known as Yata-no-Kagami is housed at Ise. That example of these objects, a sword, and a jewel form the Three Imperial Treasures of Japan. For 10 points, Amaterasu was lured from a cave after seeing her reflection in an example of what objects?**

ANSWER: **mirror**s [accept **kagami** until “Yata” is read]

<MB, Beliefs>

8. **A paper observing the absence of spin diffusion in random examples of *these* structures introduced Anderson localization. Boltzmann names a method in computational fluid dynamics that treats fluids as collections of mesoscopic particles on these structures. Nearly all exactly solvable models in statistical physics are defined on 2D examples of these structures. The low-energy behavior of QCD is non-perturbatively modeled by defining fields on one of these (*) discrete structures. Brillouin (“breeel-WAN”) zones are units of these structures in reciprocal space. Three primitive vectors generate examples of these structures named for Bravais, which may have face-centered cubic or hexagonal close-packed unit cells. For 10 points, name these periodic mathematical structures used to model crystal structure.**

ANSWER: **lattices** [or **lattice** graphs; prompt on **crystals** by asking, “What mathematical structures are used to model crystals?”]

<VD, Physics>

9. **Karen Strassler describes how this activity shaped modernity in Indonesia in her Bateson Prize-winning book *Refracted Visions*. Ariella Azoulay writes that this activity “deterritorializes” the concept of citizenship, and links its participants and subjects in a “civil contract.” A description of this activity as an “act of non-intervention” that sets up a “chronic voyeuristic relation” is built upon in *Regarding the Pain of Others* by Susan (*) Sontag. A Cuban child screaming in a closet while a SWAT team member points a gun at him and a three-year-old lying face down on a Turkish beach define a modern “decisive moment” of this medium. For 10 points, give this medium used by Henri Cartier-Bresson and journalists in *Death of Alan Kurdi* and *Afghan Girl*.**

ANSWER: **photography** [accept **photojournalism**]

<VD, Other Academic>

10. **In this novel, a character feels her breast “shoot with joy” while silently watching a mare give birth on a hillside, before vowing to marry a boy who had avoided her developing body the previous day. A doctor transforms into a “dark, fat vampire” while performing a kitchen autopsy in this novel, during which his assistant violates a corpse. After a car crash kills a woman in this novel, her pregnant daughter recovers her (*) decapitated head and then gives birth to twins. The body of Uncle Marcos arrives in the courtyard along with a dog who “came to us by sea” named Barrabas, according to a character in this novel who refuses to speak for nine years after the death of her green-haired sister, Rosa del Valle. For 10 points, name this novel centered around the Tres Marias hacienda of Esteban Trueba, by Isabel Allende.**

ANSWER: *The **House of the Spirits*** [or *La **casa de los espíritus***]

<GP, World Literature>

11. **Land rights of indigenous groups in this country were first recognized in the Calder case, which prompted the Berger Inquiry. Glen Coulthard pinpointed this country’s assimilationist shift to the release of a 1969 “White Paper” that induced the “Citizens Plus” response from Harold Cardinal. Awareness of the “Highway of Tears” in this country was raised by the (*) MMIW movement. Elijah Harper, while symbolically holding up an eagle feather, blocked the ratification of the Meech Lake Accord in this country. Brian Mulroney proposed those legislations to satisfy a nationalist movement led by Lucien Bouchard in a French-speaking province. For 10 points, name this country, the home of First Nations, Inuit, and Métis populations.**

ANSWER: **Canada** [or Dominion of **Canada** or Dominion du **Canada**] (Glen Coulthard wrote *Red Skin, White Masks*.)

<KT/GP, British History>

12. **To exemplify the “art” of this general process, Deborah Stone used “market” and “polis” models in a book titled for this process’s “Paradox.” C. E. Lindblom suggested a two-step “root and branch” method for this general process in the paper “The Science of ‘Muddling Through.’” Harold Lasswell created a seven-stage “cycle” for this process, including “legitimation” and (*) “agenda setting.” Cost-benefit and cost-effectiveness analyses are performed to evaluate “alternatives” in this process, which begins with “defining the problem.” Data for this process might come from the Cato Institute, the Brookings Institution, or other political think tanks, and this process’s stated goal is to increase social welfare. For 10 points, identify this process, the construction of a proposal to solve a public problem.**

ANSWER: **policy**making [accept answers like **policy** crafting or **policy** formulation; accept specific types of **policy**making; accept “**Policy** Paradox: The Art of Political Decision;” prompt on **decision** making]

<HG, Social Science: Political Science>

13. For the MoMA's Modern Restaurant, Mickalene Thomas reimaged one of these events with collaged images of three afroed black women. It's not an execution, but an artist cut into three pieces a painting of one of these events featuring Frédéric Bazille. A painting of one of these events elicited the assertion that "no one goes to the Louvre to be scandalized" from Émile Zola. A brittle-boned artist repeatedly copies a painting of one of these events in the film (*) *Amélie*. A painting of one of these events drew poses from Marcantonio Raimondi's *Judgement of Paris*. Aline Charigot plays with a dog while guests in straw hats converse under a striped awning in a Renoir painting of one of these events. For 10 points, a nude woman sits with two fully-dressed men in a Manet painting of a gathering for what meal "on the grass?"

ANSWER: **luncheons** [or **déjeuners** or **lunches**; accept **Luncheon** on the Grass or **Luncheon** of the Boating Party; prompt on **picnic** or boating **party** by asking "For what meal?"] (The second clue refers to Monet's *Luncheon on the Grass*.)

<DC, Visual Arts>

14. One virus that infects these cells expresses the TNF-alpha homolog LMP1. Mutations in *MYD88* are associated with a poor prognosis in a "diffuse large" cancer of these cells. One mature subset of these cells is identified on flow cytometry by expression of CD138 since they downregulate a marker that is targeted by the drug rituximab and normally used to identify them, (*) CD20. The action of error-prone polymerases after that of AID facilitates somatic hypermutation in these cells. Vaccination increases the production of these cells' antibody-secreting "memory" type, which differentiate into their "plasma" type. For 10 points, what immune cells that mature in the bone marrow are contrasted with NK and T cells?

ANSWER: **B** cells [or **B** lymphocytes; or plasma **B** cells; or memory **B** cells; prompt on **lymphocytes**; prompt on **white blood cells** or **WBCs**; prompt on **memory cells** or **plasma cells**]

<EG, Biology>

15. At the end of this novel, a woman in a wheelchair continually checks to see if the men ringing the doorbell are coming to move her prized bedside cabinet. During one of her many long drives through the marshlands, this novel's narrator recalls boys who joked that their elbows could "unzip." A woman in this novel frequently flips through porn magazines in order to find women who look like her, which she calls her (*) "possibles." During a trip to Norfolk, this novel's central trio encounters a cassette tape of a Judy Bridgewater song that gives this novel its title. This novel's central characters are created to be "carers," then die after a sustained period of organ donation. For 10 points, the Hailsham school is used to raise Kathy, Tommy, and other clones in what novel by Kazuo Ishiguro?

ANSWER: ***Never Let Me Go***

<JS, British Literature>

16. "The Little House in Kolomna" begins by praising one version of this literary technique. In French, the identical form of this literary technique is "riche" or "richissime," and is contrasted with the "sufficiente" form. The complex use of this technique was unusually preserved in Robert Pinsky's translation of *The Inferno*. The speaker of a songbook alternatively named for this technique hopes "to find pity and (*) forgiveness / for all the modes in which [he talks] and [weeps]." "Scattered" instances of this technique provide another name for *Il Canzoniere*. The *Divine Comedy* uses a poetic structure that translates to the "third" of this technique, which has an ABA BCB form. For 10 points, which poetic technique may be "inner" or "slant," and is defined as when words have phonetically similar endings?

ANSWER: **rhymes** [or **rima** or **rime**; accept **rhyme** scheme; accept very rich **rhyme** or sufficient **rhyme**; accept **rime** riche or **rime** richissime or **rime** sufficiente; accept ottava **rima**; accept terza **rima**; accept scattered **rhymes** or **Rime Sparse**; accept inner **rhyme** or slant **rhyme**; prompt on **stanzas**]

<RR, European Literature>

17. In a Russian fairy tale, Emelya the Fool rides one of these objects to see the king after receiving magical boons from a pike. One hero's pet, Benny, dies after accidentally swallowing an acre-large example of these objects. Before his miraculous healing, Ilya Muromets lies atop one of these objects. One of these objects serves as a bed for Baba Yaga. Before the Lunar New Year, families go to one of these objects to (*) burn honey-smearing paper images of a god who reports to the Jade Emperor. Men use bacon as skates while greasing up one of these objects belonging to Paul Bunyan. After her brother offers a witch a bone instead of his finger, one heroine pretends not to know how to use one of these objects. For 10 points, Gretel shoves the witch into what object in which she had intended to cook Hansel?

ANSWER: ovens [accept stoves or fireplaces or hearths or pancake griddles; do not accept or prompt on "fires" or "furnaces"]

<KT, Beliefs>

18. Therapeutic siRNAs are usually conjugated to a derivative of one of these compounds for targeted delivery. Carolyn Bertozzi's group uses azido-functionalized examples of these compounds as bioorthogonal precursors for metabolic labeling. Sialic acids are a class of these compounds cleaved by neuraminidase. Depending on whether they attack asparagine or serine and threonine residues, post-translational addition of these compounds is (*) N-linked or O-linked. Acrylamide is formed as a byproduct of an amino acid reacting with one of these compounds in the Maillard reaction. These compounds are visualized using Haworth and Fischer projections. "Reducing" examples of these compounds have an aldehyde and include aldoses. For 10 points, identify these compounds whose simple examples include fructose and glucose.

ANSWER: sugars [accept amino sugars or azido-sugars or reducing sugars; accept monosaccharides, oligosaccharides, or polysaccharides; accept carbohydrates; accept glycans; accept glycosides; accept N-linked or O-linked glycosylation] (The first clue refers to siRNA-GalNAc conjugates.)

<JZ, Chemistry>

19. A composer from this country wrote the wildly popular salon piece "A Maiden's Prayer." The three-hand piano piece "Le Murmure," by a composer from this country, inspired the rapid A-flat major broken chords in another piece from here. A volume of *Twenty Exercises* by a *stile brillante* composer from this country likely inspired the fourth of her compatriot's variations on "La ci darem la mano." In response to that piece, Robert (*) Schumann wrote, "Hats off, gentlemen, a genius!" about that composer from this country. Arthur Rubinstein, a pianist from this country, is famous as an interpreter of a composer from this country who wrote "Military" and "Heroic" pieces in a national dance form. That composer drew inspiration for his many etudes and nocturnes from his contemporary Maria Szymanowska. For 10 points, name this home country of Frédéric Chopin.

ANSWER: Poland [or Polska] (The unnamed piece in the second sentence is Chopin's "Aeolian Harp" etude.)

<VD, Auditory Arts>

20. In 1998, a statue in this state had its right foot cut off to protest a massacre of native people in this state where each man's right foot was cut off. Native people in this modern-day state killed the first Berber man to explore much of North America, the enslaved person Estevanico. The Acoma massacre was perpetrated in this modern-day state under the command of Juan de Oñate. Francisco de (*) Coronado conquered Hawikuh in this modern-day state while searching for the Seven Cities of Cibola, which were legendarily located in this state. Native tribes destroyed Christian imagery as part of Popé's Rebellion in this modern-day state. That rebellion, also known as the Pueblo Revolt, started in Taos. For 10 points, name this modern-day state that retains its colonial capital of Santa Fe.

ANSWER: New Mexico

<RR, American History>

Bonuses

1. In this archipelago, mothers withheld food until their children had shot a loaf of bread using a sling. For 10 points each:

[10h] Name this archipelago called the *Gymnesiae* by the Greeks. A woman's ransom was equivalent to that of four men in this archipelago, whose renowned slingers served as mercenaries in Roman and Carthaginian armies.

ANSWER: **Balearic** Islands [or Illes **Balears** or Islas **Baleares**; accept Hispanica **Balearica** or **Baliares**]

[10e] During an assault on Burnswark Hill, Roman soldiers terrified enemies with "whistling" sling bullets made of this metal. Frontius noted the use of this toxic metal in aqueduct pipes.

ANSWER: **lead** [accept **Pb**]

[10m] This Greek soldier organized a core of two hundred Rhodian slingers to repel the forces of Artaxerxes II. This soldier detailed the March of the Ten Thousand in his *Anabasis*.

ANSWER: **Xenophon**

<KT, Ancient History / Archaeology>

2. Scholars have drawn parallels between Dante's Beatrice to Nizham, the woman who initiated this philosopher into God's love, as described in his *Meccan Illuminations*. For 10 points each:

[10h] Name this Andalusian scholar and mystic, the author of *The Ringstones of Wisdom*. His heavily Qur'an-focused work devotes much attention to the implications of God's "engendering command," or *amr*, to "Be!"

ANSWER: **Ibn 'Arabi** [or **al-Oushayri**; or Abū 'Abdallāh Muḥammad ibn 'Alī **ibn al-'Arabi** al-Tā'ī al-Ḥātimī; do NOT accept "Arabi" alone]

[10e] While Ibn 'Arabi did not consider himself part of this broad Islamic mystical tradition, his work was so foundational to its various branches that he is called *ash-Shaykh al-Abkar*, or its greatest *shaykh*.

ANSWER: **Sufism** [or **Tasawwuf**]

[10m] It's not existence, but Ibn 'Arabi took this property of God, known as *tawhīd* in Arabic, to be the truth upon which all other truths in his philosophy are based.

ANSWER: **oneness** of God [or **singleness** of God; accept "**There is no God but God**" or equivalent translations; accept **lā 'ilāha 'illā Llāh**; accept **monotheism**]

<MB, Beliefs>

3. Indo-Aryan, Dravidian, Austroasiatic, and Sino-Tibetan languages are studied in an example of this type of linguistic region in the Subcontinent. For 10 points each:

[10h] Name this type of linguistic region where unrelated languages share similar characteristics, such as retroflex consonants, SOV word order, and echo words in the Indian example of these regions.

ANSWER: **sprachbund** [or **sprachbünde**]

[10e] In 1939, this linguist proposed a European sprachbund, controversially noting contrasts between European languages and Hopi. This linguist worked with his teacher Edward Sapir on a doubly-eponymous linguistic relativity hypothesis.

ANSWER: Benjamin Lee **Whorf** [or Benjamin **Whorf**; accept Sapir-**Whorf** Hypothesis]

[10m] Contemporary scholars brand the controversial Altaic language family as a sprachbund of Mongolian, Tungusic, and this language family, whose languages include Uzbek, Kazakh, and Azeri.

ANSWER: **Turkic** language family [do not accept or prompt on answers that contain "Turkish"]

<AS, Social Science: Linguistics>

4. In a novel by this author set in 2092, Raymond dies from a mysterious illness after conquering Constantinople from the Ottomans. For 10 points each:

[10h] Name this author. Lionel Verney thinks that he is the sole survivor of a devastating plague in this author's novel *The Last Man*.

ANSWER: Mary **Shelley** [accept Mary Wollstonecraft **Shelley** or Mary **Godwin**]

[10m] Partygoing nobles are shocked to discover this plague's masked, intangible form after their host confronts it with a dagger.

ANSWER: the **Red Death** [accept "The Masque of the **Red Death**"]

[10e] Similar to the Red Death, Scarlet Death ravages humanity and their knowledge of science, art, and culture in this author's novel *The Scarlet Plague*. This author also wrote *The Call of the Wild*.

ANSWER: Jack **London** [or John Griffith **Chaney**]

<PS, American Literature>

5. One form of lineage tracing applied in regions like the epidermis utilizes the incorporation and dilution of tritiated thymidine or BrdU to track developmental fates across this process. For 10 points each:

[10m] *Description acceptable*. Identify this process that is halted by contact inhibition in normal cells and studied through staining for markers like Ki67 and PCNA.

ANSWER: cell **proliferation** [or cell **division**; or **mitosis**; or cell **growth**; accept any answer implying that the **number of cells increases**; prompt on **DNA replication**; do NOT accept or prompt on "meiosis"]

[10e] Sulston, Horvitz, and Brenner shared a Nobel for tracing the developmental fate of every cell in this model organism via DIC microscopy. Fire and Mello discovered RNAi by injecting DNA into this model nematode.

ANSWER: **C. elegans** [or **Caenorhabditis elegans**]

[10h] In another lineage-tracing technique similar to the FLP-FRT ("Flip-F-R-T") system, a pulse of tamoxifen activates a version of this enzyme fused with the estrogen receptor's ligand-binding domain. This enzyme acts at loxP sites to switch fluorescent reporters "on" in cells of interest.

ANSWER: **Cre** recombinase [accept **CreER**]

<AY, Biology>

6. A director from this country used long takes and minimal camera movement in films like *A City of Sadness*, which focused on previously taboo historical tragedies. For 10 points each:

[10h] Name this country. The film *A Brighter Summer Day* also delves into its political history, while *Vive l'Amour* focuses on the disconnect of this country's urban citizenry.

ANSWER: **Táiwān** [or **Republic of China** or **ROC** or **Zhōnghuá Mínguó**; do not accept or prompt on "China", "People's Republic of China", or "PRC"]

[10m] This director examined Taiwanese modernity in his "Father Knows Best" trilogy. This director also revived the *wúxiá* genre with a film scored by Tân Dùn and starring Michelle Yeoh as Yu Shu Lien.

ANSWER: Ang **Lee** [or **Lǐ Ān**]

[10e] Ang Lee is the second generation of a Taiwanese movement with this name. A pioneering French movement of the 1960s with this name included directors like Jean-Luc Godard, François Truffaut, and Agnès Varda.

ANSWER: **New Wave** [accept **Nouvelle Vague**]

<DC, Other Arts: Film>

7. At the end of a monologue expressing his fear of eternal damnation, this character desperately exclaims, "I'll burn my books!" right before demons drag him to Hell. For 10 points each:

[10e] Name this dramatic character, who makes a pact with Mephistopheles to gain magical powers in exchange for his soul in a Christopher Marlowe play named for him.

ANSWER: Doctor **Faustus** [do not accept or prompt on "Faust"]

[10m] After gaining his powers, Faustus makes an antagonistic knight with this name sprout horns. In *Romeo and Juliet*, a character with this name announces the death of his friend Mercutio.

ANSWER: **Benvolio**

[10h] Before he is dragged to Hell, Faustus uses his magic for the final time to conjure up Helen of Troy, then asks her to "make me [this word] with a kiss."

ANSWER: **immortal** [accept "make me **immortal** with a kiss"]

<HG, British Literature>

8. This book's central objects are viewed as folds in time and space in a Gilles Deleuze book tracing its author's influence on Baroque art and philosophy. For 10 points each:

[10m] Name this book that lays out a metaphysical system named for soul-like simple substances with "perception and appetite," which all exist in a pre-established harmony.

ANSWER: The **Monadology** [or **La Monadologie**]

[10e] *The Monadology* was written by this German philosopher, who co-discovered calculus with Isaac Newton.

ANSWER: Gottfried Wilhelm von **Leibniz**

[10h] Leibniz's monads drew inspiration from the "spirit particles" of *this* philosopher, whose metaphysics describes all matter as imbued with life and existing on a continuum between spirit and body. This female Cambridge Platonist was heavily influenced by *kabbalah*.

ANSWER: Anne **Conway**

<MB, Philosophy>

9. E.M. Purcell describes how bacterial flagellar motions must break time-symmetry in order to achieve a net displacement in a lecture about life in *this* regime. For 10 points each:

[10m] Give this regime, in the extreme limit of which the Navier-Stokes equations become linear and time-reversible. Laminar flow dominates in this quantitative regime, in which viscous forces dominate over inertial forces.

ANSWER: **low Reynolds** number [accept answers indicating that the **Reynolds** number is **low** or **small**; prompt on **creeping** or **laminar** flow with "Give the fluid quantity and property it must have."]

[10h] Taking the curl of the Navier-Stokes equations, and then taking the low-Reynolds limit where advection vanishes, yields a diffusion equation for *this* quantity. This fluid quantity is necessarily zero for potential flows.

ANSWER: **vorticity**

[10e] With Berg, Purcell treated bacteria in low-Reynolds environments to derive a limit to how sensitively they can detect differences in *this* quantity. Diffusion transports particles from regions where this quantity is high to regions where it is low.

ANSWER: **concentration**

<VD, Physics>

10. Muhammad al-Kanemi debated rulers of this polity, including Muhammad Bello, over the nature of their invasion of Borno. For 10 points each:

[10h] Name this Islamic state, established by the Fulani mystic Usman dan Fodio upon conquering the Hausa Kingdoms.

ANSWER: **Sokoto** Caliphate [or Khilāfa **Ṣukutū** or Daular **Sokoto**]

[10e] Al-Kanemi disagreed with Usman over the nature of these events. The Sokoto Caliphate and the later Toucouleur Empire were formed from these holy wars, which take their name from an Islamic concept often translated as a "struggle."

ANSWER: **jihads**

[10m] Usman viewed himself as this Messianic figure. A Sufi leader self-styled as this figure trapped a British expeditionary force led by Chinese Gordon in the Siege of Khartoum.

ANSWER: the **Mahdi** [prompt on **Muhammad Ahmad** ibn 'Abdallāh]

<KT/GP, World History>

11. In the absence of this variable, the Solow model converges to a steady state and fails to explain long-run economic growth. For 10 points each:

[10m] Name this variable. Unlike endogenous theories of growth, the Solow model incorporates this variable exogenously, often by assuming that an economy's efficiency of labor increases at a constant rate.

ANSWER: **technology** [accept **technological** progress or **technological** growth; accept **innovation**]

[10e] Early endogenous models of growth treated technological progress by fixing the returns on this factor of production. This factor's "human" form measures the skills and knowledge of workers.

ANSWER: **capital**

[10h] In his paper *Endogenous Technological Change*, this economist noted that innovations are non-rival, and introduced a model where private R&D firms profit by selling in monopolistically competitive markets.

ANSWER: Paul **Romer** [or Paul Michael **Romer**]

<VD, Social Science: Economics>

12. William Moerner uses the whimsical prefix "guaca-" to refer to this amount of analyte, as in a "guacamole." For 10 points each:

[10m] Give this fundamental detection limit of any chemical technique. Super-resolution microscopy techniques like STED ("sted") and STORM ("storm") can resolve this smallest possible amount of analyte, which is equal to about 1.66 times 10 to the negative 24th moles.

ANSWER: a **single molecule** [accept equivalents]

[10e] Most single-molecule microscopy techniques rely on observing this process for the molecule. Because this process is spin-allowed, it occurs on shorter timescales than phosphorescence.

ANSWER: **fluorescence** [accept word forms]

[10h] Single molecule detection is also possible using this spectroscopic technique, which adsorbs analyte molecules onto metallic nanoparticles in order to enhance an inelastic scattering effect by ten orders of magnitude.

ANSWER: **surface-enhanced Raman** spectroscopy [accept **SERS**; prompt on **Raman** spectroscopy; prompt on localized **surface plasmon resonance** by asking, "What is the experimental technique?"]

<VD, Chemistry>

13. *Description acceptable.* This event was documented in a letter to Edwin Sandys, who later helped form the House of Burgesses. For 10 points each:

[10h] Describe this event, which occurred in Point Comfort near Jamestown. This event was precipitated by the capture of the *São João Bautista* by English pirates.

ANSWER: the arrival of the **first slaves in America** [accept the **first sale of slaves in America**; accept answers that specify **African slaves**; accept **English colonies** or **Virginia** in place of "America;" do not accept answers that don't mention slaves]

[10m] This man described the arrival of a "Dutch man of warr" carrying the first slaves to Virginia in his letter to Edwin Sandys. This planter was the first to grow Orinoco tobacco in Virginia.

ANSWER: John **Rolfe**

[10e] The first arrival of slaves to Virginia occurred in this year. A *New York Times* project named for this year frames American history around the legacies of slavery and enslaved people.

ANSWER: **1619** [accept the **1619** Project]

<RR, American History>

14. In a Guilherme Figueiredo play named for this short story, this story's author wins his freedom after extricating his master from a drunken oath to drink the entire ocean. For 10 points each:

[10m] Name this short story. In this short story, the title animal concludes that the fruit on the branch must be "sour" after he tries and fails to reach it.

ANSWER: "The **Fox and the Grapes**" [accept *A raposa e as uvas*]

[10e] "The Fox and the Grapes" is one of many stories by this Ancient Greek fabulist, who also wrote "The Tortoise and the Hare."

ANSWER: **Aesop**

[10h] This author of the *Aesopica* created a namesake "index" that categorized Aesop's fables by language, chronology, and source, before listing them alphabetically, which is still used by scholars today.

ANSWER: Ben Edwin **Perry** [accept **Perry** Index]

<PS, European Literature>

15. Anish Kapoor referenced the self-manifestation of Hindu deities in his *Svayambh*, featuring a red block of this substance. For 10 points each:

[10h] Name this substance, which Kapoor applied to engraved boxes in an interpretation of *One Thousand and One Nights* in collaboration with Salman Rushdie. Yinka Shonibare frequently uses fabrics printed in a process that uses this substance.

ANSWER: **wax** [accept Dutch **wax** fabric] (The second Kapoor work is *Blood Relations*.)

[10e] In another contemporary reimagining, Mrinalini Mukherjee knotted purple fibers to depict a *Deity of Terror* tied to this figure. Chola sculptures depict this Destroyer surrounded by a ring of fire with one leg raised as Nataraja.

ANSWER: **Shiva** [accept **Rudra**]

[10m] Shahzia Sikander placed a female devata on this figure's shoulders, inspired in part by a statue of this figure "Anadyomene." This figure wonders, "How came [the sculptor] to see me bare," in a poem inspired by a different work.

ANSWER: **Venus** [or **Aphrodite**] (The Sikander sculpture is *Promiscuous Intimacies* and was inspired by the Met's Lebanese statuette of *Aphrodite Anadyomene*; the poem clue refers to *Aphrodite of Knidos*.)

<AY, Visual Arts>

16. Virtual aspects of classical music performance predate COVID-19. For 10 points each:

[10h] In 2009, musicians around the world posted videos of this Tán Dùn piece that were assembled into an online premiere by the YouTube Symphony Orchestra. This piece is partly based on a theme from Beethoven's third symphony and uniquely features a solo for hubcaps.

ANSWER: **Internet Symphony** No. 1, "Eroica" (The YouTube Symphony's musicians also performed the piece's live premiere at Carnegie Hall.)

[10e] In Eric Whitacre's "Deep Field," the audience activates an 8,000-voice virtual one of *these* ensembles using a mobile app. Whitacre recently assembled an even larger one of these ensembles for his online piece "Sing Gently."

ANSWER: **choirs** [or **choruses**; accept Virtual **Choir** 5 or Virtual **Choir** 6]

[10m] In conjunction with a different app, ForScore, musicians use Bluetooth pedals to do this action hands-free. As a result, collaborative pianists no longer need assistance with this action.

ANSWER: **turning page** of music [accept synonyms in place of "turning;" accept word forms like **page-turning**; prompt on **turning** or synonyms by asking, "Turning what?"]

<JE, Auditory Arts>

17. Roland Robertson popularized this term from the Japanese slogan *dochaku-ka* that promoted the tailoring of products to regional markets as an alternative to homogenous marketing. For 10 points each:

[10h] Give this portmanteau used to describe how international products are indigenized by national and subnational cultures.

ANSWER: **glocalization** [accept word forms] ("Glocalization" is a portmanteau of "globalization" and "localization.")

[10m] An example of glocalization is the *tishoumaren* style of this musical genre, which the band Tinariwen blends with Tuareg and Songhai music. Paul Oliver traced this genre from its origins in Sahelian call-and-response songs to an early style named for the Mississippi Delta.

ANSWER: **blues** [accept desert **blues**; accept Mississippi Delta **blues**]

[10e] More examples of glocalization are region-specific menu offerings, such as the Maharaja Mac, of this international company, whose global brand requires the display of the Golden Arches outside local chains.

ANSWER: **McDonald's**

<AS, Geography>

18. One author from this country analogized its colonized people to its depletion of natural resources in a poem that repeatedly exclaims, “I am coal!” For 10 points each:

[10h] Name this home country of the poet of “Black Outcry.” In a novel set during this country’s civil war, two refugees shelter in the scorched remnants of a bus and read the notebooks of Kindzu.

ANSWER: **Mozambique** [or Republic of **Mozambique** or República de **Mocambique**] (The unnamed novel is *Sleepwalking Land* by Mia Couto.)

[10e] The author of “Black Outcry,” José Craveirinha, wrote in this language. Mário de Andrade and other modernist Brazilian authors also wrote their poetry in this language.

ANSWER: **Portuguese** [or **Português**]

[10m] Craveirinha’s poem “The Tanjarines of Inhambane” jokes that Mozambican companies blame their deficits on a “traffic cop [who] didn’t fine” *this* historical figure, the protagonist of Portugal’s national epic, *The Lusitads*.

ANSWER: Vasco **da Gama**

<AS, World Literature>

19. Madame de Maintenon, the secret second wife of this ruler, founded the Maison Royale de Saint-Louis to offer educational opportunities to noble girls. For 10 points each:

[10e] Name this “Sun King,” who ordered the transformation of the Palace of Versailles into a royal residence.

ANSWER: **Louis XIV** [prompt on **Louis**]

[10m] Supported by Charles Emmanuel III, Rosa Govone organized a *convitti* consisting of a series of shelters and textile shops to provide work to young women throughout this duchy. Monarchs of Italy following the 19th-century reunification came from a family named for this duchy’s namesake county, who ruled Piedmont-Sardinia.

ANSWER: Duchy of **Savoy** [or Duché de **Savoie** or Ducato di **Savoia**; accept County of **Savoy**; accept House of **Savoy** or **Savoyards**]

[10h] Maria I of Portugal established this educational institution to raise children displaced by the Lisbon Earthquake.

ANSWER: **Casa Pia**

<GP, European History>

20. In 2009, a “perfect” example of this shape was found whose edge lengths, face diagonal lengths, and body diagonal lengths are all integers. For 10 points each:

[10m] Name this shape. In 3D, its volume is given by the triple product of the three vectors that define its edges, and more generally the determinant of an n -by- n matrix gives the signed volume of one of these shapes.

ANSWER: **parallelepiped** [or **parallelotope**; do not accept or prompt on “parallelogram”]

[10h] This operation on a manifold can be defined as the net flux through the boundary of an infinitesimal $k + 1$ parallelotope at each point. This operation maps k -forms to $(k+1)$ -forms, and applying it twice always gives zero.

ANSWER: **exterior derivative**

[10e] The congruence of opposite sides and angles of a parallelogram is a direct consequence of the parallel postulate, which this ancient mathematician defined in his *Elements*.

ANSWER: **Euclid** of Alexandria

<JF, Other Science: Math and Computer Science>