

## Cal's Mid-Spring Tournament 2018

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Tossups

1. The narrator feels as if the gaze of one of these people wishes to take him away at the end of an eleven-paragraph story, each of which describes a different one of these people. In a letter to the publisher Kurt Wolff, a writer cited both “obvious” and “secret” connections among three stories to request that they be published together in a collection named for these people. A character throws off his bedsheets, telling a person with this relationship to him, “I know that you wanted to cover me up!” A 45-page long piece written from the (\*) perspective of this kind of person opens with the line “You asked me recently why I maintain that I am afraid of you.” A character learns that a person with this relation to him has become engaged to Frieda Brandenfeld, and later sentences that person with this relation to him to death by drowning, in the story “The Judgment.” A man injures a person with this relation to him by throwing apples at him after that person transforms into a giant insect in *The Metamorphosis*. For 10 points, name these people who often have troubled relationships with their fathers in Franz Kafka’s works.

ANSWER: sons [accept sohn or Söhne; prompt on children or equivalents]

<JN, Short Fiction>

2. A variant of this reaction developed at Syntex makes use of an activator prepared by protonation of dicyclohexyl carbodiimide. The Swedish chemist K. B. G. Torrsell demonstrated that the alkoxy-sulfonium ylide intermediate in this reaction undergoes an intramolecular proton abstraction, as opposed to the E2 mechanism suggested by Nathan Kornblum. Replacing one reagent in this reaction with either cyanuric chloride or trifluoroacetic anhydride allows this reaction to be performed at (\*) higher temperatures.

Triethylammonium chloride is among the byproducts produced in this reaction when triethylamine is used as the organic base. DMSO acts as a resonance contributor to oxalyl chloride in this reaction, whose use as a dehydrating agent requires that this reaction occur at negative-sixty degrees Celsius. For 10 points, name this reaction that converts primary and secondary alcohols into aldehydes.

ANSWER: Swern oxidation [prompt on DMSO oxidation]

<RH, Chemistry>

3. A piano piece by this composer includes a central *Andante espressivo* episode in between outer sections marked *Allegro marcatissimo*. This composer’s violin concerto calls for tambourine and a piccolo snare drum, opens its slow second movement with a mournful bassoon solo that is repeated an octave higher by a clarinet solo, and has a first movement marked *Allegro con fermezza*. This composer’s Toccata in E-flat minor vastly overshadows the remainder of the original suite for which it was written. For a suite, this composer extracted a waltz, nocturne, mazurka, romance, and galop from his incidental music to the play (\*) *Masquerade*. A ballet by this composer includes a second-act *Adagio* that depicts the escape of the title character and his lover Phrygia. Another of his ballets is set on a collective farm in the Soviet Union. For 10 points, name this composer of the ballets *Spartacus* and *Gayane* (“gah-yah-NAY”), the latter of which features the “Sabre Dance.”

ANSWER: Aram Khachaturian [or Aram Il'yich Khachaturian]

<PS, Classical Music>

4. A garbled statement by a politician in this decade popularized the slogan “we wanted the best, but it turned out like always.” USAID received over 26 million dollars from Harvard as a result of a lawsuit claiming it had been defrauded in actions taken during this decade. A film often studied as an exemplar of this decade’s

**culture centers on a former soldier who listens to Nautilus Pompilius and travels to another city to find his brother. In that film’s country of origin, the life expectancy for men during this decade dropped to as low as fifty-seven years. A liberal party whose name translates as (\*) “Apple” reached its peak electoral success in this decade. A largely unsuccessful reform that took place during this decade operated by issuing vouchers to the population, who often promptly traded or sold them. Policies implemented in this decade created powerful “oligarchs.” Anatoly Chubais (“choob-ICE”) and Yegor Gaidar held office in this decade and tried to introduce a market economy to their newly-independent country. For 10 points, identify this decade in which Boris Yeltsin served as president.**

ANSWER: 1990s

<MC, European History>

**5. *Midnight Blue* and other Blue Note albums were recorded by a player of this instrument, Kenny Burrell. Norman Granz produced a solo album for this instrument that features only one original track, “Blues for Alican” and is titled *Virtuoso*. A John Lewis track paying tribute to a player of this instrument titles an album by the Modern Jazz Quartet. A player of this instrument founded a group that recorded an album opening with “Meeting of the Spirits”; that album by a player of this instrument includes the ballad “A Lotus on Irish Streams” and is titled *The Inner Mounting Flame*. “West Coast Blues” and (\*) “Four on Six” are both standards for this instrument popularized by recordings the artist did with the Wynton Kelly Trio for the album *Smokin’ at the Half Note*. Miles Davis’s *In a Silent Way* and *Bitches’ Brew* both featured John McLaughlin (“muh-CLOCK-lin”) on this instrument. Another player of this instrument performed works like “Minor Swing” and “Nuages” (“noo-AHZH”) at the Quintette du Hot Club. For 10 points, Wes Montgomery and Django Reinhardt played what string instrument?**

ANSWER: guitar [accept electric guitar]

<RK, Other Art (Jazz)>

**6. The second edition of this book responds to Margaret Masterman’s contention that the first edition of this book used an important term in no fewer than twenty-two different ways. In the last chapter of this book, the author notes that the only time that it uses the word “truth” before the last few pages is in a quotation from Francis Bacon. This book argues that a psychological experiment performed by Bruner and Postman in which subjects were presented with anomalous (\*) playing cards provides a useful analogy for this book’s subject. The postscript to the 1969 edition of this book introduced the notion of “exemplar” to clarify one of its main ideas. One of this book’s last chapters argues that fixed pedagogical forms are responsible for the “invisibility” of the title events, which this book likens to the gestalt (“gush-TAHLT”) switches induced by the duck-rabbit illusion, and which disrupt the continuity of “normal science.” For 10 points, name this book on the history of science by Thomas Kuhn.**

ANSWER: *The Structure of Scientific Revolutions*

<WN, Philosophy>

**7. An article by Bonny Ibhawoh about “Deconstructing” a concept developed by this man suggests that that concept was unique because it completely rejected the concept of class struggle. This man translated both *Julius Caesar* and *The Merchant of Venice* into his native language, which were later used as part of a nationwide program to force colleges to adopt that language by the year 2000. A document stating this leader’s policies declared that “a poor man does not use money as a weapon.” This leader’s policies of agricultural collectivization, known as (\*) “villagization,” turned his country from Africa’s largest food exporter to its largest food importer. Clean water supplies and an increased literacy rate were goals of this man’s program of building rural “development villages.” In 1967, this leader outlined his policy of “familyhood” in the Arusha Declaration. For 10 points, name this promoter of *ujamaa*, the first president of Tanzania.**

ANSWER: Julius Nyerere (“nyeh-REH-reh”) [or Julius Kambarage Nyerere]

<IJ, World History>

8. A theologian from this country advocated the use of “kitchen theology” over “living-room theology” in a book that suggests seasoning theology with “Buddhist salt” and “Aristotelian pepper.” That book, which reflects on its author’s experiences as a missionary in Thailand, is *Water Buffalo Theology*. A community of Christians in this country approached the French priest Bernard Petitjean (“puh-tee-ZHAWN”) and asked him, “Where is the statue of the Virgin Mary?” after he built a church dedicated to the (\*) Twenty-Six Martyrs of this country. That “hidden” community of Christians in this country made use of a holy text called the Beginning of Heaven and Earth and venerated images of the Virgin Mary disguised as Kannon. For 10 points, an encounter with a man named Anjiro prompted Francis Xavier to become the first Christian missionary to visit what East Asian country?

ANSWER: Japan [or Nihon-koku or Nippon-koku]

<WC, Religion>

9. A poem by this author ends with the line “It touched, it struck it, clattered and went out,” which describes a lantern striking the ground after a couple discovers a man and child walking in the darkness. This author wrote an eight-line poem whose speaker twice assures “I sha’n’t be gone long” and tells the addressee “You come too.” The title event of a poem by this author takes place in a location “so small the window frames the whole of it.” This author of “The Fear” and “The (\*) Pasture” wrote a poem whose speaker “cannot rub the strangeness from [his] sight” and wonders if his slumber is “just some human sleep,” from being “overtired of the great harvest I myself desired.” In a poem by this author, a farmer only utters the word “Dead” after learning of the title event. He wrote a poem whose speaker regrets a “frozen-ground-swell” that “spills the upper boulders in the sun,” and is told that “good fences make good neighbours.” For 10 points, name this author whose collection *North of Boston* contains the poems “Home Burial,” “After Apple-Picking,” “The Death of the Hired Man,” and “Mending Wall.”

ANSWER: Robert Frost [or Robert Lee Frost]

<JN, Poetry>

10. Jan Matzeliger’s (“MAH-tsoh-lee-gur’s”) invention of the “lasting machine” revolutionized this state’s shoemaking industry, which is examined in Alan Dawley’s *Class and Community*. Sam Bass Warner’s *Streetcar Suburbs* discusses the increasing segregation of this state’s capital in the late 1800s. This state was home to ex-slave Lewis Temple, who popularized a certain industry with his “Toggle.” Harriet Farley edited a publication in this state that promoted changes in industry titled *The Offering*. This was the larger of the two states that benefited from the industry boom in the Blackstone Valley. The phrase (\*) “Bread and Roses” became associated with an IWW-organized strike in this state. A system popularized in this state centralized manufacturing through the use British power looms, and is named for its city of Waltham. For 10 points, girls were primarily employed by Francis Cabot Lowell for textile mills in what New England state?

ANSWER: Commonwealth of Massachusetts

<RK, American History>

11. This material was used for an expressionist sculptural group in which the headdresses of two screaming women are being blown back; that sculpture in this material located in Bologna’s (“buh-LONE-yuh’s”) Santa Maria della Vita shows six figures around a dead Christ. Artists working with this material would often finish pieces by creating a *coperta*, a step not done when creating simple *bozzetti* (“boh-TSEH-tee”). Niccolò (“nee-koh-LOH”) dell’Arca’s *Lamentation* uses this material, as does another artist’s set of medallions depicting infants in the spandrels of the Ospedale degli Innocenti (“oh-spay-DAH-lay day-lyee ee-noh-CHEN-tee”). Small Rococo sculptures depicting drunken nymphs and satyrs were done in this material by (\*) Claude Michel (“mee-SHELL”), also known as Clodion. It’s not wax, but Bernini, like earlier Renaissance sculptors, created models using this material to show to patrons. The della Robbia family worked in this material, developing a

tin-based *bianco* glaze for their sculptures in it. For 10 points, name this clay-based material whose name means “baked earth,” also used for a series of warriors from the tomb of Qin (“chin”) Shi Huangdi.

ANSWER: terracotta [accept clay or earthenware]

<AK, Painting/Sculpture>

12. Disturbances in this quantity, which do *not* have permanent effects on output, are one of the two types of shocks responsible for fluctuations in GNP and unemployment according to Blanchard (“blahn-SHAR”) and Quah. It’s not labor supply, but in a model developed by Eggertsson and Krugman, a backward-sloping curve of this quantity explains the paradox of toil and the paradox of flexibility. Chapter 12 of Mankiw’s (“MAN-kyoo’s”) textbook *Macroeconomics*, named after this quantity “in the open economy,” derives the Mundell–Fleming model. This quantity’s curve is downward sloping when plotted against (\*) price level due to effects like the Pigou (“PEE-goo”) effect. The standard formula for this quantity is  $C$  plus  $I$  plus  $G$  plus bracket  $X$  minus  $M$  close bracket, or the sum of consumption, investment, government spending, and net exports. The Keynesian (“KANE-zee-in”) cross plots this quantity on the  $y$ -axis versus real GDP on the  $x$ -axis. For 10 points, the “AD” in the AD–AS model stands for what quantity, which is the total demand for goods and services in an economy?

ANSWER: aggregate demand [accept effective demand or domestic final demand; accept aggregate expenditure; prompt on AD; prompt on demand]

<WN, Social Science>

13. A character in this play notes that a water spaniel that was afraid of water would deserve hanging, and claims that “as a spaniel is to water, so is a man to his own self.” In a scene in this play, a letter descends from above and foretells the fates of several characters. This play’s first act ends with a character exclaiming “You enjoyed that! You enjoyed it!” after another character pulls his hand into a candle flame. This play’s central character gifts a man a (\*) silver cup that he had received as a bribe, and argues that he would “give the Devil benefit of law” to Roper. Late in this play, the protagonist engages in a debate on the meaning of silence and chastises Richard Rich for selling his soul. This play opens with an introduction by the Common Man, and includes a trial that ends with a man denying that he opposes the Act of Supremacy. For 10 points, name this Robert Bolt play about Thomas More.

ANSWER: A *Man for All Seasons*

<JN, Drama>

14. One quantitative assay testing for the *in vitro* activation of these cells uses flow cytometry to detect the presence of *both* CD63 and CD203c on the surface of their membranes. An excess presence of these cells in a certain disease is indicative of a translocation between chromosomes 6 and 9 resulting in the formation of the chimeric fusion gene DEK/CAN (“deck-can”). These cells have been shown to be inhibited by both human CD200 and the CD200 homolog present in human herpesviruses 6, 7, and 8. These cells are the (\*) less abundant of two cell types present in abnormally high concentrations at the site of parasitic infections. Unlike a similar cell type, these myeloblast-descendants circulate in the bloodstream and stain purplish-red in H&E staining. They’re not mast cells, but when activated by the binding of IgE, these cells degranulate to secrete proteoglycans like heparin and chondroitin, as well as a compound targeted by allergy-relief drugs. For 10 points, name these least common granulocytes in the human body named for their affinity for basic stains.

ANSWER: basophils (The second clue refers to the basophilia phenotype in t(6;9)(p23;q34) AML.)

<RH, Biology>

15. Don Crabtree wrote an influential *Introduction to working with this material*. In the Napoleonic era, the town of Brandon in Suffolk produced a form of this material that was used in a technology invented by Marin le Bourgeois (“mah-RAN luh boorzH-WAH”). Elaborate irregularly shaped Mayan artifacts are known as “eccentric [this term],” although they were not always made from this material. The use of ashlar and this

**material characterizes a technique prevalent in English Gothic (\*) architecture known as flushwork. A technology partly named for this material was rendered obsolete by the percussion cap and uses this material to strike a flint. The blade of the Gebel el-Arak knife is made of this material, which was shaped into a “tortoise core” in the Levallois (“luh-vahl-WAH”) technique used in the Paleolithic era. For 10 points, name this type of chert that was often knapped to make hand axes, a stone also used in a namesake “lock” mechanism found in 18th-century firearms.**

ANSWER: flint [or gunflints; prompt on chert, quartz, stone]  
<EC, Other History>

**16. The Schönhage–Strassen (“SHURN-hah-guh STRASS-en”) algorithm for integer multiplication uses the negacyclic kind of an operation with this name at each step. Under certain conditions, the support of the result of this operation is equal to the sum of the support of each input by a theorem named for Edward Titchmarsh. Performing this operation on the input and the impulse response gives the output of a dynamical system. The product of the Fourier transforms of this operation’s two inputs equals the Fourier transform of this operation applied to the two inputs, according to a theorem named for it. The probability density function of the (\*) sum of two random variables  $X$  and  $Y$  is this operation applied to the probability density functions of  $X$  and  $Y$ . This operation is defined for functions  $f$  and  $g$  as the integral from negative to positive infinity of “ $f$ -of- $t$ , times  $g$  of  $t$ -minus- $\tau$ ,  $d\tau$ .” A sliding square filter layer of this name is used to detect features in a machine learning technique. For 10 points, name this operation that for two functions  $f$  and  $g$  is written as  $f$  star  $g$ , which also names a type of neural network often used in image recognition.**

ANSWER: convolution [or convolutional neural networks; or convolution theorem; prompt on CNNs]  
<AK, Math>

**17. In a rhythmic instance of *araith* (“AH-ryth”) introducing this man, his horse is described as having hooves that cast up four clods of dirt like four sparrows following him, mirroring an aspect of his beloved. During the last of three days, this man catches and throws back the third and final poisonous spear thrown at his men, piercing the eye of its original thrower. This man completes one of his several *anoethau* (“ah-NOY-thy”) after the oldest animal, a salmon, leads the men helping him to a watery Gloucester (“GLOS-ter”) prison to find (\*) Mabon ap Modron. While trying to enter a castle, this man threatens to yell loudly three times to induce miscarriages in every woman inside. King Arthur assists this man in one task by killing and taking the blood of the Black Witch. In search of tools to cut hair, he and his men earlier pursued the giant swine Twrch Trwyth (“toork TROO-ith”), one of the many tasks required for him to win the hand of Ysbaddaden’s (“ISS-bah-thah-den’s”) daughter. For 10 points, name this Welsh hero who marries Olwen.**

ANSWER: Culhwch (“kill-HOOK”) [or Kilhwch]  
<JX, Legends>

**18. A 2006 study controversially concluded that a legendary racehorse that won thirty-six races in this country and died in 1932 was poisoned with arsenic. The Barassi Line divides a sport popular in the south of this country from two sports popular in the east. A 1990s power struggle within one sport in this country pitted a league backed by the firm Optus against the breakaway Super League. This country’s poor performance at the 1976 Olympics led it to establish a new “Institute of Sport” for training. That performance may have led this country to not select its intended victory song as its “national song” in a 1977 referendum. The use of (\*) tackling from a sport in this country is combined with the round ball and soccer-style goal used in Gaelic football in the hybrid sport of international rules football. After a team representing this country won in 1882 at The Oval, *The Sporting Times* wrote an obituary stating that English cricket “will be cremated and the ashes taken to” this country. This country is home to the first tennis Grand Slam of the calendar year. For 10 points, name this host of the 2000 Summer Olympics, which closed with a rendition of “Waltzing Matilda.”**

ANSWER: Commonwealth of Australia  
<EC, Other Academic>

19. In supersymmetry theories, the superpartner of these particles has a field described by the four-vector  $\mu$  equals 0, 1, 2, 3 and the spinor  $\alpha$  equals 1, 2. A “dual” form of them was first predicted in SO(8) (“S-O-eight”) theories under electric–magnetic duality. In 2010, Claudia de Rham, Gregory Gabadadze, and Michael Tolley revived a theory describing these particles by eliminating the Boulware–Deser ghost. They cannot be composed of more than one elementary particle, according to the Weinberg–Witten theorem. Because two-loop (\*) Feynman diagrams of these particles’ interactions result in ultraviolet divergence, perturbation methods cannot be used to study them. In brane theories, these particles are hypothesized to “leak” across branes into higher-dimensional space. Like photons, these spin-2 particles are usually predicted to be massless and travel at the speed of light. For 10 points, name these currently undiscovered particles which mediate the weakest of the four fundamental forces.

ANSWER: gravitons

<PS, Physics>

20. A resident of this city moves his hands as if playing an imaginary cello during times of great stress. A character is carried around a house in this city on a couch because of her disability, which does not prevent her from flirting with every man she encounters. A character is called back to this city from Italy, where he had been staying for twelve years on the pretense of recovering from a sore throat, despite spending most of his time collecting butterflies. A lawyer in this city named Abraham Haphazard drafts a (\*) “Convent Custody Bill” at the end of the chapter “The Jupiter,” which is named for this city’s newspaper. After Grantly’s death, Bishop Proudie and the slimy Obadiah Slope gain control of this city’s cathedral. Septimus Harding’s maintenance of Hiram’s Hospital in this city is the subject of the novel *The Warden*. For 10 points, what fictional English city’s “Towers” title Anthony Trollope’s (“TRAW-lup’s”) most famous novel?

ANSWER: Barchester [prompt on Barsetshire]

<RK, Long Fiction>

## Bonuses

1. A general serving this dynasty, Zafar Khan, fell into an ambush during the Battle of Kili against the Chagatai Khanate, but managed to inflict heavy casualties on the enemy before his death. For 10 points each:

[10] Name this dynasty, which fended off Mongol incursions into India. Its most powerful ruler, Alauddin, acquired the Koh-i-Noor diamond in raids on neighboring Hindu kingdoms and ordered the massacre of some twenty thousand Mongol converts to Islam in 1311.

ANSWER: **Khalji** Dynasty [accept Alauddin **Khalji**; accept **Khilji** Dynasty]

[10] The Khalji Dynasty ruled over this sultanate, which was also ruled by the Tughlaq and Lodi dynasties. For much of its existence, the Vijayanagara Empire resisted its control in south India.

ANSWER: **Delhi** Sultanate

[10] The Mughal Empire replaced the Delhi Sultanate after Ibrahim Lodi lost to Babur in a 1526 battle at this site. Akbar the Great defeated Hemu in a 1556 battle on the outskirts of this city.

ANSWER: **Panipat** [accept First Battle of **Panipat**; accept Second Battle of **Panipat**]

<CP, World History>

2. A William Empson poem with this title describes him and his Japanese lover Haru being woken up by an earthquake, and repeats “The heart of standing is you cannot fly.” For 10 points each:

[10] Name this title of a poem that calls religion “that vast moth-eaten musical brocade created to pretend we never die.” That Philip Larkin poem with this title is told by a man who “works all day, and gets half-drunk at night.”

ANSWER: “**Aubade**” (“oh-BAHD”)

[10] William Empson repopularized this poetic form with works like “Missing Dates.” This form, consisting of five tercets (“TUR-sits”) and a quatrain, was used for a poem that commands “Rage, rage against the dying of the light.”

ANSWER: **villanelle** (“vil-uh-NEL”)

[10] In an “Homage to” this place, William Empson described a “supreme God” who “needs his belly to include the Pantheon.” Adam Appleby avoids working on his thesis in a comic novel taking place here over the course of a single day.

ANSWER: the **British Museum** [accept *The **British Museum** Is Falling Down*]

<RK, Poetry>

3. Answer the following about a form of creaky voice known as stød (“stood”), for 10 points each:

[10] Stød is a suprasegmental feature of this North Germanic language, whose orthography was adapted into the Bokmål (“BOOK-mole”) system used for a neighboring language.

ANSWER: **Danish** [or **dansk**]

[10] The Southern Jutlandic dialect of Danish has this type of system, also found in Norwegian and Swedish, instead of stød. These systems lie between stress systems and tonal systems in that they allow contrastive tone only on stressed syllables.

ANSWER: **pitch accent** [or **tone accent**]

[10] In emphatic speech, stød is often realized as a glottal stop, a sound produced by closing this pair of membranes stretched across the larynx. These structures vibrate to produce voiced sounds like [z] (“zzz”).

ANSWER: **vocal folds** [or **vocal cords**]

<EC, Social Science>

4. This method of analysis is described as the search for “intrinsic meaning or content” beyond mere “knowledge of literary sources” in a 1939 book that studies humanist themes throughout the Renaissance. For 10 points each:

[10] Name this concept that is the third level of Erwin Panofsky’s art historical method. It analyzes why an artist chose to represent textual references like Christian imagery the way they did, building on the lower level of iconography.

ANSWER: **iconology**

[10] After writing *Studies in Iconology*, Panofsky wrote a book on this German Renaissance printmaker. Panofsky drew on Erasmus's *Handbook of a Christian Knight* to analyze this artist's woodcut *Knight, Death, and the Devil*.

ANSWER: Albrecht **Dürer**

[10] While iconology was popularized by Panofsky, this art historian was the first to use the term. He established a private library in Hamburg that moved to London, and tried tracing the development of symbols through the Renaissance with his *Mnemosyne* ("nih-MOSS-in-ee") *Atlas*, a series of wooden panels displaying over nine hundred photographs.

ANSWER: Aby **Warburg** ("VAR-boork")

<AK, Other Art (Criticism)>

5. During this event, a mob attacked Ethel Kennedy and decathlete Rafer Johnson as they tried to visit César Chávez in jail. For 10 points each:

[10] Name this series of labor actions undertaken by the United Farm Workers after growers gave "sweetheart contracts" to the Teamsters. This conflict included the largest farmworker strike in U.S. history against Salinas Valley lettuce growers and contributed to the passing of the California Agricultural Labor Relations Act of 1975.

ANSWER: **Salad Bowl** Strike

[10] The Salad Bowl Strike occurred after nationwide boycotts helped the UFW reach a collective bargaining agreement with growers of this crop in Delano ("duh-LAY-noh"). Napa Valley is known for its production of this fruit.

ANSWER: **grapes** [or *uvas*]

[10] This activist co-founded the National Farm Workers Association with Chávez and coined the phrase "Sí, se puede," which was adopted by Barack Obama for his 2008 campaign slogan.

ANSWER: Dolores **Huerta** ("WAIR-tuh") [or Dolores Clara Fernández **Huerta**]

<EC, American History>

6. German historian Arno Peters aroused controversy when he introduced a self-declared ideal one of these constructs that had actually been first developed more than century earlier by James Gall. For 10 points each:

[10] Name these constructs that seek to represent the features of the globe on a two-dimensional surface. The Mercator type of these constructs was developed to preserve the linearity of rhumb lines.

ANSWER: map **projections**

[10] Map projections are produced from datums that specify latitude and longitude on a reference ellipsoid as part of this field which, more broadly, studies the measurement and representation of the Earth.

ANSWER: **geodesy** ("jee-AH-duh-see") [or **geodetics**]

[10] This construct named for a French mathematician measures distortion in a given map projection by projecting circles at different locations on the map.

ANSWER: **Tissot's indicatrix** [or **Tissot's indicatrices**; or **Tissot's ellipses**]

<JN, Geography>

7. A cellulose acetate membrane named for Loeb and Sourirajan is commonly used for this process due to its high flux. For 10 points each:

[10] Name this process that is divided into pretreatment, pressurization, separation, and stabilization stages. The pore diameter for this process is typically lower than for nanofiltration.

ANSWER: **reverse osmosis** [or **RO**; prompt on partial answer; prompt on but do NOT reveal **desalination**]

[10] Reverse osmosis is a "membrane" method of performing this process, which reduces the mineral content of seawater. Around one percent of the world's population are dependent on water obtained from this process.

ANSWER: **desalination** [or **desalinization**; DO NOT accept "destalinization"]

[10] Around half of the world's desalinated water is produced through this other desalination technique, in which feed brine water is boiled rapidly at successively lower pressures. It utilizes countercurrent heat exchangers, unlike a similar multi-effect technique.

ANSWER: **multi-stage flash** distillation [or **MSF** distillation; prompt on thermal desalination]  
<RD, Chemistry>

8. In Islamic eschatology (“ess-kuh-TAH-luh-jee”), a figure identified as a descendant of this man will begin an uprising in the Levant before going on to attack Medina and Kufa. For 10 points each:

[10] Name this man, who was a leader of the Quraysh tribe and early opponent of Muhammad in Mecca. He led the Meccan forces to victory over the Muslims at the Battle of Uhud.

ANSWER: **Abu Sufyan** ibn Harb

[10] The apocalyptic figure called the Sufyani will be opposed by this other figure who will justly rule the world prior to the Day of Resurrection. Twelver Shias believe that the last imam will reappear as this figure.

ANSWER: **Mahdi**

[10] The arrival of the Mahdi will be heralded by flags of this color flown at Khorasan. In another context, pilgrims gesture towards or kiss an object of this color during *tawaf*.

ANSWER: **black** [accept **Black** Standard or **Black** Stone]

<WC, Religion>

9. In 2017, a team led by Michaël Rao performed a computer-assisted proof that there were only fifteen families of irregular pentagons that can be used to perform this task. For 10 points each:

[10] Name this task that can be done aperiodically with patterns named for Penrose. For regular polygons, the pentagon is the simplest shape for which this task is impossible.

ANSWER: **tessellation** [or **tiling** the **plane**]

[10] Fortune’s algorithm uses parabolas to approximate the “beach line” of these tessellations, which are the dual of a Delaunay triangulation. They consist of Thiessen polygons, regions closest to one point within a set of points.

ANSWER: **Voronoi** diagrams [or **Voronoi** tessellations; or **Dirichlet** (“dee-reesh-LAY”) tessellations]

[10] The first aperiodic tiling is made of 20,426 of these four-colored tiles. Because these tiles can be used to simulate Turing machines, the undecidability of their tiling was linked to the halting problem by Robert Berger, the student of their namesake.

ANSWER: **Wang** tiles (They are named for mathematician Hao Wang.)

<RK, Math>

10. A Tony Harrison play follows Grenfell and Hunt’s discovery of objects of these material, which are destroyed by satyrs who clog-dance out of a box of them. For 10 points each:

[10] Name this material found in a villa named for them in Herculaneum, where they were preserved by the eruption of Mount Vesuvius. Several Greek plays are preserved in a collection of this material named for Oxyrhynchus (“ock-see-RINK-us”).

ANSWER: **papyrus** [or **papyri**]

[10] The best preserved play on the Oxyrhynchus papyri is this comedy in which Pan orchestrates Sostratos’s love for a nameless girl, the daughter of Knemon (“kuh-NEE-mon”).

ANSWER: **Dyskolos** [or *The Grouch*; or *Old Cantankerous*; or *The Misanthrope*; or *The Curmudgeon*; or *The Bad-Tempered Man*]

[10] *Dyskolos* is also preserved in a set of papyri named for this Swiss book collector, whose namesake library near Geneva includes Papyrus 66, a nearly complete copy of the Gospel of John.

ANSWER: Martin **Bodmer**

<JN, Drama>

11. In a classic study of these cellular components, J. Z. Young demonstrated that application of a sodium citrate solution to one end of them would generate a rhythmic discharge at the other end. For 10 points each:

[10] Name these specific cellular components that are linked to the water-propulsion defense response in a certain type of animal. These structures can grow up to one millimeter in diameter and several centimeters in length.

ANSWER: **squid giant axons** [prompt on partial answers; accept **giant squid axons**, but do not accept synonyms for “giant”; accept answers mentioning any specific species of squid, such as the Humboldt squid]

[10] One of the most useful properties of squid giant axons is that a roller can be applied along their length to extract several microliters of a relatively pure sample of this substance. More generally, nuclear cargo bound to exportin will diffuse through the nuclear pore and [emphasize] *into* this substance.

ANSWER: **cytoplasm** [or **cytosol**; or **axoplasm**]

[10] Voltage clamp electrodes were placed inside the lumen of the squid giant axon in the experiment that led to the discovery of this set of nonlinear, differential equations, which model the propagation of an action potential by treating each component of an excitatory cell as a different electrical element.

ANSWER: **Hodgkin–Huxley** model [accept **conductance-based** model]

<RH, Biology>

12. The leaders of this rebellion, Charles Neville and Thomas Percy, captured the city of Durham and held a Catholic mass after their initial victory. For 10 points each:

[10] Name this attempt to replace the ruling monarch with Mary, Queen of Scots, due to questions surrounding the legitimacy of the marriage of Anne Boleyn (“buh-LIN”). Pius V supported this rebellion by issuing the papal bull *Regnans in Excelsis*.

ANSWER: **Rising of the North** [or the **Revolt of the Northern Earls** or the **Northern Rebellion**]

[10] The Rising of the North was a rebellion against this English queen, the last Tudor monarch.

ANSWER: **Elizabeth I** [prompt on **Elizabeth**]

[10] Another conspirator in the Rising of the North, the Duke of Norfolk, was later implicated in the plot of this Italian banker, who allegedly tried to assassinate Elizabeth I. Always scheming to return England to Catholicism, Pius V made this man his papal agent in England.

ANSWER: Roberto **Ridolfi**

<IJ, European History>

13. Prior to an event, this man’s cowardice is compared to a man being startled upon coming across a snake in the mountains. For 10 points each:

[10] Name this man. During a duel, another man drags him by his helmet, but a goddess intervenes by breaking the chinstrap and shrouding him in mist before transporting him to the safety of his bedchamber.

ANSWER: **Paris** [or **Alexander**; or **Alexandros**]

[10] This goddess, a supporter of the Trojans, saves Paris in his duel with Menelaus (“men-ih-LAY-us”). Earlier, this goddess promised Paris the love of Helen, so Paris chose this goddess of love as the fairest, sparking the Trojan War.

ANSWER: **Aphrodite**

[10] During Diomedes’s *aristeia* (“air-ih-STEE-uh”) in Book V, this figure tells him to target the weak Aphrodite, causing Diomedes to spear Aphrodite in the wrist. Earlier, this figure took the form of Laodokos (“lay-ODD-uh-kuss”) and manipulated the Trojan Pandarus.

ANSWER: **Athena**

<AK, Legends>

14. This artist stated “Pictor classicus sum” in an article that he published in *Valori plastici* (“vah-LOR-ee PLAH-stee-chee”) titled “The Return of Craftsmanship.” For 10 points each:

[10] Name this artist, whose post-1919 neoclassicism sharply broke from the *pittura metafisica* (“pee-TOO-rah may-tah-FEE-zee-kuh”) movement he founded with Carlo Carrà (“kah-RAH”).

ANSWER: Giorgio **de Chirico** (“JOR-joh day KEE-ree-koh”)

[10] Much of de Chirico’s work either alludes to or features these vehicles in the background, such as *The Melancholy of Departure*, which is alternately titled for the Gare Montparnasse (“gar mon-par-NOSS”) station.

ANSWER: **trains** [or **locomotives**; or **railroads**]

[10] During his late career, de Chirico produced Rubens-inspired neo-Baroque pieces and these artworks, to the dismay of collectors. Robert Hughes said one of these artworks titled *Metaphysical Interior* “has crept into the show [at the Cleveland Museum of Art] and should creep out.” *Description acceptable.*

ANSWER: **self-forgeries** [or **copies of previous paintings** or equivalents; or **incorrectly dated** works]  
<AK, Painting/Sculpture>

15. One equation named for this scientist relates the time derivative of the fluid velocity with the divergence of the outer product of velocity and the velocity with the various forces acting on the fluid. For 10 points each:

[10] Name this scientist who names that momentum equation. A quantity named for this scientist is equal to the product of the stiffness tensor and compliance matrix.

ANSWER: Augustin-Louis **Cauchy** (“koh-SHEE”)

[10] Constitutive relations used in the Cauchy momentum equation relate the stress tensor with this quantity for the fluid, which characterizes its resistance to flow.

ANSWER: **viscosity** [accept bulk **viscosity** or dynamic **viscosity** or kinematic **viscosity**]

[10] This simple model of viscosity, which is accurate at intermediate values of shear rate, states that the viscosity is equal to the flow consistency index times the shear rate to the  $n$ -minus-one power. For Newtonian fluids,  $n$  is equal to one, since the viscosity is constant.

ANSWER: **power law** fluid model [or **Ostwald–de Waele** power law fluid model]

<RD, Physics>

16. An author compares Melville’s writing to plum pudding while engaging in this pastime with the Austrian Kandinsky, who is only familiar with the author through some “rather obscene poems.” For 10 points each:

[10] Name this pastime whose description is interrupted by various literary musings in the book *Green Hills of Africa*, based on a 1933 trip taken with its author’s wife Pauline Pfeiffer (“FY-fur”).

ANSWER: big-game **hunting** [prompt on **safari**]

[10] In probably the book’s most famous passage, Ernest Hemingway declares that “all modern American literature comes from” this book, whose real ending he claims is when the slave Jim is stolen, as “the rest is just cheating.”

ANSWER: *Adventures of **Huckleberry Finn***

[10] Hemingway’s frustration with this person is conveyed in two different vignettes from *A Moveable Feast*, one pairing him with “the Devil’s Disciple,” and the other describing his “Acrid Smell of Lies,” despite this man’s help in popularizing Hemingway through his editorship of *The Transatlantic Review*.

ANSWER: Ford Madox **Ford**

<RK, Misc Literature>

17. The overture to *Der Freischütz* (“FRY-shoots”) first introduces Agathe’s (“ah-GAH-tuh’s”) Act II aria “Leise, leise (“LY-zuh LY-zuh”), fromme Weise (“FROH-muh VY-zuh”)” using this instrument. For 10 points each:

[10] Name this instrument. The composer of *Der Freischütz* also wrote two concertos for this instrument, one in F minor and another in E-flat major, with both featuring Rondos for soloist Heinrich Baermann.

ANSWER: **clarinet**

[10] Both *Der Freischütz* and those two clarinet concertos were written by this German Romantic composer, who also wrote a “rondeau brillante (“bree-YONT”)” for piano titled *Invitation to the Dance*.

ANSWER: Carl Maria von **Weber**

[10] The overture to von Weber’s *Oberon* opens with a three note ascending theme for this instrument, with the first note double dotted. The *Der Freischütz* overture opens with an *Adagio* passage for a quartet of these instruments.

ANSWER: French **horn**

<AK, Opera>

18. In a novel by this man, Kalinovich marries the crippled but rich Polina instead of Nastenka in pursuit of the title “one thousand souls.” For 10 points each:

[10] Name this realist writer of *Boyarshchina* (“boy-ar-SHEE-nuh”) and the play *A Bitter Fate*. The hapless and lazy title character Pavel Beshmetev marries the unfaithful Yuliya in his novel *The Simpleton*.

ANSWER: Aleksey **Pisemsky** [or Aleksey Feofilaktovich **Pisemsky**]

[10] Another weak-willed character in Russian fiction is this title character who rarely rises from his bed. His friend Andrey Stoltz fails to rouse him from inactivity, and he dies from a self-declared “-itis” of himself.

ANSWER: Ilya Ilyich **Oblomov** (“uh-BLOH-muff”)

[10] Ivan Goncharov, the writer of *Oblomov*, accused this man of plagiarizing his novel *The Precipice* for the novel *A Nest of Gentlefolk*. In another of his novels, the nihilist Bazarov dies from blood poisoning after a duel with Pavel.

ANSWER: Ivan **Turgenev** (“tur-GAIN-yif”) [or Ivan Sergeyevich **Turgenev**]

<JN, Long Fiction>

19. Anthony Snodgrass’s “gradualist” theory of these warriors claims that it took around a hundred years for each individual technological advancement to occur that allowed them to become armored. For 10 points each:

[10] Name these Greek warriors who fought in the phalanx formation. They were often given a pike or sword, and take their name from the small shield with which they were equipped.

ANSWER: **hoplites**

[10] Hoplites were freemen since they had to be able to afford a full set of bronze armor, which is known by this name. The *hoplon* shield is considered to be part of this set.

ANSWER: **panoply**

[10] Hoplites were first used effectively in phalanx formation in the first of these conflicts, whose first phase ended with the fall of Ithome (“ith-OH-mee”) and the suicide of Aristodemus. As a result of these wars, thousands of conquered people of the namesake region became helots (“HELL-uts”).

ANSWER: **Messenian** (“muh-SEE-nec-in”) Wars

<IJ, European History>

20. In a paper classifying “I” as an “essential indexical,” this philosopher recalled following a trail of sugar on the supermarket floor to try to catch the shopper with the torn bag, only to realize he himself was that shopper. For 10 points each:

[10] Name this philosopher known for his work with Jon Barwise on situation semantics. He won an Ig Nobel prize for his theory of structured procrastination.

ANSWER: John **Perry**

[10] Barwise and Perry also discussed the “slingshot argument,” which states that all sentences with this property stand for the same thing. Theories of this property include the correspondence and coherence theories.

ANSWER: **true** [or **truth**]

[10] This philosopher presented a version of the slingshot argument which states that all true sentences refer to the same Great Fact. His other papers include “A Nice Derangement of Epitaphs,” “Truth and Meaning” and “Actions, Reasons, and Causes.”

ANSWER: Donald **Davidson** [or Donald Herbert **Davidson**]

<WN, Philosophy>