

Written by Ankit Aggarwal, Hidehiro Anto, P.C. Chauhan, Jason Cheng, Boyang Jiao, Aseem Keyal, Eddie Kim, Bruce Lou, Charlie Mann, Kevin Wang, Corry Wang, Kion You

TOSSUPS

1. Low levels of this element differentiate mafic rocks from felsic ones. One mineral with this element and aluminum can be divided into orthoclase and plagioclase varieties based on their levels of sodium, potassium, and calcium. This element is responsible for the explosive nature of andesitic and rhyolitic volcanoes, which possess high viscosity magma. One mineral containing it can be found in gem quality bearing a (*) purple color. This element is second most abundant in the crust, mostly in the form of feldspars, and is used commercially to make glass. For 10 points, name this element whose dioxide is found in quartz, with atomic symbol Si.

ANSWER: silicon [accept Si before read; prompt on "element 14"]

2. This author fictionalized the post-World War II Group 47 with a novel in which Simon Dach hosts a gathering of intellectuals after the Thirty Years' War. Another novel by this author, who wrote *The Meeting at Telgte* (TELG-tuh), is narrated by a man who was born on a lifeboat while the *Wilhelm Gustloff* sank. Paul Pokriefke (poh-KREEF-kuh) narrates a novel by this man, who also wrote a (*) trilogy titled after his home city. This author of *Crabwalk* wrote about an unnaturally perceptive boy born in the Free City of Danzig whose shriek can shatter glass and who obsessively beats the title object. For 10 points, name this creator of Oskar Matzerath and author of *The Tin Drum*.

ANSWER: Günter Grass

3. These structures are coated in the non-coding RNA Xist ("exist") in a process that was used by Stanley Gartler to show that tumor cells are clones. That process is important in ensuring dosage compensation of these structures and is responsible for the mottled pattern of calico cats. The formation of Barr bodies from these structures is termed lyonization, or their namesake (*) inactivation. Diseases linked to these structures include hemophilia and red-green colorblindness, resulting in an increased prevalence in males, who only have one of these structures. For 10 points each, name these sex chromosomes which are found in both males and females, unlike Y.

ANSWER: X chromosomes [accept Barr bodies until mentioned; prompt on "chromosomes"]

4. One of this author's characters quips "society is full of women of the very highest birth who have remained ... thirty-five for years" while interrogating her nephew's fiancée. Another of this man's epigrams calls a cynic "a man who knows the price of everything and the value of nothing." A man claims that "the truth is rarely pure and never simple" after admitting to having an (*) invalid ("INN-vah-lid") alter ego named Bunbury in one of this author's Victorian satires. In that play by this author, Jack Worthing eventually discovers that his real name is Ernest. For 10 points, name this Irish author of *Lady Windemere's Fan* and *The Importance of Being Earnest*.

ANSWER: Oscar Wilde [accept Oscar Fingal O'Flahertie Wills Wilde]

5. Prior to this battle, d'Erlon's I Corps ("dare LONG's one core") spent an entire day marching in circles due to conflicting orders. On the day before this battle, Marshal Ney's army failed to capture the crossroads at Quatre Bras (kat-truh BRAH), while another French army temporarily defeated an enemy force at Ligny. This battle came to an end when Prussian reinforcements under (*) Gebhard von Blücher (BLOO-kur) surrounded the French. It ended the so-called Hundred Days, a period that began with Napoleon's escape from Elba. For 10 points, name this 1815 battle where Napoleon was finally defeated by the Duke of Wellington.

ANSWER: Battle of Waterloo

6. In this country, the largest of the Open Hand sculptures sits in a planned state capital that was designed with the help of Le Corbusier. This country is home to a Bahá'í House of Worship built with large white marble petals, resembling a lotus flower. The Koh-i-Noor diamond was once housed in this country's Red Fort, which was also the site of the legendary (*) Peacock Throne. Four minarets and an onion dome characterize a large white marble mausoleum built by Shah Jahan in the city of Agra. For 10 points, name this country home to the Taj Mahal.

ANSWER: India [or Republic of India; or Bharatiya Ganarajya]

7. This composer was inspired by James Whistler paintings to write a piece with movements "Clouds," "Festivals," and "Sirens." He parodied *Tristan und Isolde* in "Golliwogg's Cakewalk," the last movement of his *Children's Corner*. This composer wrote the preludes "The Submerged Cathedral" and "The (*) Girl with the Flaxen Hair," and depicted the ocean in a symphonic poem titled *La mer*. A poem by Stéphane Mallarmé inspired this composer's *Prelude to the Afternoon of a Faun*. His *Suite bergamasque* includes a piano piece whose title is French for "moonlight." For 10 points, name this French Impressionist composer of "Clair de Lune."

ANSWER: Claude Debussy [or Achille-Claude Debussy]

8. This leader was supplied by the British and Americans via the Burma Road. He led the Northern Expedition to defeat the warlord "cliques" of the Beiyang government. He moved his capital inland to Wuhan and then to Chongqing (chong-ching) after his original capital was captured in 1937. A year earlier, this leader had reluctantly formed a Second United Front with the Communists to fight the Japanese. Following his defeat by the (*) Communists in 1949, this leader was forced to relocate his Kuomintang (KWOH-min-TAHNG) government to Taiwan. For 10 points, name this Nationalist leader of China, a student of Sun Yat-sen.

ANSWER: Chiang Kai-shek [or Jiang Jieshi; or Jiang Zhongzheng]

9. A book subtitled for "The Birth of" this kind of place opens with a chapter about the chaotic public torture and execution of Robert Francois Damiens, who had attempted to assassinate Louis XV ("the 15th"). Before he got sidetracked and wrote *Democracy in America*, Alexis de Tocqueville ("TOKE"-vill) originally visited the U.S. to study these places. Jeremy Bentham attempted to (*) design a perfect one of these places known as the Panopticon, which Michel Foucault analyzed in his book *Discipline and Punish*. The psychologist Philip Zimbardo set up a fake one of these places in a 1971 Stanford experiment. For 10 points, name these places that hold criminals.

ANSWER: prisons [or jail; or penal system; or obvious equivalents]

10. After Sweden captured this nation's Fort Casimir on the Delaware River, this nation conquered the entire colony of New Sweden as revenge. In 1609, this non-British nation's East India Company hired Henry Hudson to find the Northwest Passage. This nation built Fort Nassau (NAA-saw) and Fort Orange in what is now Albany. In 1664, Peter (*) Stuyvesant (STY-veh-sunt) surrendered this nation's primary North American colony to England. Its colonists bought the island of Manhattan for 60 guilders. For 10 points, name this nation that founded the colony of New Amsterdam.

ANSWER: Netherlands [or Dutch Republic; or Republic of the Seven United Netherlands; accept Holland]

HALFTIME

11. During the *Iliou persis*, this man's sons Demophon and Acamas saved his mother, who was stolen by the Dioscuri and accompanied Helen to Troy. In addition to slaying the Crommyonian Sow, this son of Aethra killed a bandit who stretched his victims' bodies or severed their limbs to fit them into a bed; that bandit was (*) Procrustes (proh-KRUSS-teez). This demigod's mortal father jumped into the sea when he saw black sails upon his son's return from Crete. This man entered a maze with a ball of string provided by Ariadne ("air"-ee-AHD-nay). For 10 points, name this Athenian hero who went into the Labyrinth and slew the Minotaur.

ANSWER: Theseus

12. The land for this national park was originally set aside by Congress on the suggestion of Central Park architect Frederick Law Olmsted, who now names a popular viewpoint along this park's northern Tioga Road. This park's Mariposa ("MARE"-ee-poh-sah) Grove once featured the 220-foot-tall Wawona (wah-WOH-nuh) Tunnel Tree, which had a car tunnel cut through its trunk. In 1903 Theodore Roosevelt and John (*) Muir were famously photographed above this park's main valley and namesake falls, the tallest in North America. For 10 points, name this California national park home to the granite monoliths of El Capitan and Half Dome.

ANSWER: Yosemite National Park

13. Early additions to this construct were given the prefix "eka," to denote that they shared properties with their root words. The last major addition to this construct was made by Glenn Seaborg, who developed a concept whose namesake region would join another at this construct's bottom. One of this construct's namesake trends is an increase in (*) covalent radius from right to left. The development of the actinides was the largest development in this construct since the choice to order by atomic number instead of atomic mass. For 10 points, name this construct that was developed by Dmitri Mendeleev to display the chemical elements.

ANSWER: periodic table of elements

14. This author wrote a novel in which environmental activist Paul Bannerman is diagnosed with thyroid cancer and becomes quarantined at his parents' house. In another novel by this author, the farm owner Mehring becomes haunted by an unidentified dead body found by his foreman Jacobus. In addition to *Get a Life* and *The (*) Conservationist*, this author wrote a novel in which the title character takes command of a "bakkie," and Maureen chases after a helicopter. In that novel, the Smales family flees civil war to the village of their title servant. For 10 points, name this South African author of *July's People*.

ANSWER: Nadine Gordimer

15. One of these people dressed in all white with his arms tied up was painted by Francisco Zurbaran, who painted many of them using strong chiaroscuro (kee-AR-oh-SKOO-roh). Another painting shows one of these people with his arms out, nearly being trampled by a horse. A boy recoils in horror during the death of one of these people in a painting within Rome's Contarelli chapel. In that same chapel, a sharply defined ray of light bridges a hand on the right in another (*) Caravaggio painting showing Jesus "Calling" one of these figures to follow him. For 10 points, name these holy people in Christianity, including Serapion, Paul, and Matthew.

ANSWER: saints [accept apostles, priests, or other equivalents, prompt on more general answers like "religious people"]

16. A former state attorney general from this family was a frontrunner to succeed Governor Jack Markell until he died from brain cancer in May 2015. A former Senator from this family drafted the 1994 Violence Against Women Act as the Chairman of the Senate Judiciary Committee. That man from this family, who chose not to seek the 2016 (*) Democratic presidential nomination following the death of his son Beau, represented Delaware in the Senate from 1973 to 2009. For 10 points, name this family whose patriarch is Joe, the current Vice President.

ANSWER: Biden family [accept Robert Hunter Biden; accept Joseph Robinette "Beau" Biden III; accept Joseph Robinette "Joe" Biden Jr.]

17. In Catholic tradition, this holiday is celebrated with the reading of the Exsultet, a liturgy known as this holiday's namesake "Proclamation." Believers often kindle a bonfire and light the large, white Paschal candle during the namesake "Vigil" that begins on the night before this holiday. This holiday is interpreted as the fulfillment of Passover, and is set fifty days before (*) Pentecost. This endpoint of Lent comes two days after Good Friday and celebrates the resurrection of Jesus. For 10 points, name this Christian holiday often celebrated with a hunt for decorated eggs delivered by a namesake "Bunny."

ANSWER: Easter [or Pasch before "Paschal candle"; or Pascha before "Paschal candle"; or Resurrection Sunday before "resurrection"; accept Easter Vigil]

18. An invasion by this ruler succeeded partly because emperor Theodosius II was too busy invading Africa to fight back properly. In the last years of his life, this ruler was persuaded to end another of his invasions by Pope Leo I.

After he interpreted a gift from the sister of Valentinian III (VAH-lun-"TIN"-ian "the third") as a wedding proposal, he tried to claim half of the Western (*) Roman Empire as a dowry, but he was defeated by a united Visigoth-Roman army at the Battle of Chalons (shah-"LAWN"). He died of a nosebleed in 453, causing his empire to collapse a year later. For 10 points, name this "Scourge of God," a warlord of the Huns.

ANSWER: Attila the Hun

19. A model of this phenomenon used a new particle postulated by Hideki Yukawa as its force carrier, and explains this phenomenon's residual form through the exchange of pions. Particles governed by this phenomenon form a unique phase of matter at very high energies as a consequence of asymptotic freedom, and cannot be isolated because of a property of quantum (*) chromodynamics termed confinement. This phenomenon is mediated by gluons, which bind together quarks to form mesons and hadrons. For 10 points, name this fundamental force that holds the nucleus together and is more powerful than gravity, electromagnetism, and the weak force.

ANSWER: strong nuclear force [or strong interaction; accept residual strong force; prompt on "nuclear force"; prompt on "color force"]

20. One of these animals is bullied by Lip-Lip but later kills him during a winter famine. That example of these animals had earlier encountered his mother Kiche (kee-chay), who fails to recognize him despite having earlier survived a winter where she had killed a lynx and her young to feed him. Another of these animals becomes a local legend after killing a tribe of (*) Yeehats to avenge John Thornton, after having earlier won a bet for Thornton by breaking a half-ton sled out of the ice and dragging it by himself. Buck is an example of, for 10 points, what animals central to *The Call of the Wild* and *White Fang*, both written by Jack London?

ANSWER: dogs [accept wolves or St. Bernard-Scotch Collies, be generous and prompt on other breeds such as huskies, although that's not what either of them are]

END OF REGULATION, PROCEED ONLY IF TIED

21. After this war, John de la Pole unsuccessfully attempted to claim the throne; his brothers Edmund and Richard would later become prominent pretenders themselves. In this war's last major battle, the Stanley family refused to help the losing side. In this war's Battle of Tewkesbury (TOOKS-berry), the powerful Margaret of Anjou and her son were captured by the new king (*) Edward IV ("the fourth"). It came to an end when Edward's successor, Richard III ("the third"), was defeated at the Battle of Bosworth Field. For 10 points, name this 15th-century English war between the rival houses of Lancaster and York, both of which were symbolized by flowers.

ANSWER: War(s) of the Roses [accept Rose War(s)]

22. In a homogeneous system, this quantity equals the sum of chemical potential times number of moles over all particles. In transition state theory, the activation type of this quantity appears in the exponent of the Eyring ("EYE"-ring) equation. This quantity equals negative RT times the natural logarithm of K for a system at equilibrium. An endothermic reaction with positive enthalpy is only (*) spontaneous when high temperatures allow this quantity, calculated $\Delta H - T \Delta S$, to be negative. For 10 points, name this thermodynamic quantity that describes the amount of useful energy available in a system, symbolized ΔG .

ANSWER: Gibbs free energy [or Gibbs energy; or Gibbs function; or free enthalpy; accept specific types such as Gibbs energy of activation or standard state Gibbs energy; accept ΔG before mentioned; prompt on " ΔP "; do not accept "Helmholtz free energy"]

BONUSES

1. In one of this man's plays, Josie steals six dollars from her dad to give to her brother Mike as he runs away from her family's farm. For 10 points each:

[10] Name this author of *A Moon for the Misbegotten* who also wrote *Long Day's Journey into Night*.

ANSWER: Eugene **O'Neill**

[10] *Long Day's Journey into Night* features this family, which includes the morphine-addicted Mary, her husband James, and their sons Jamie and the tuberculosis-stricken Edmund.

ANSWER: **Tyrone**

[10] The male members of the Tyrone family all seem to struggle from this affliction. In *A Moon for the Misbegotten*, Hogan makes Josie exploit this trait of James Tyrone in order to blackmail and seduce him.

ANSWER: **alcoholism** [accept **drunk**enness]

2. This substance was historically traded for salt mined at Taghaza. For 10 points each:

[10] Name this substance that became devalued throughout the Middle East after Mansa Musa freely distributed large amounts of it during his 1324 journey to Mecca.

ANSWER: **gold**

[10] Mansa Musa was the tenth emperor of this medieval empire in Saharan Africa. An epic relates how it was founded by Sundiata Keita.

ANSWER: **Mali** Empire

[10] After returning from his pilgrimage to Mecca, Mansa Musa built this early Islamic university in Timbuktu. This university is often grouped together with the nearby Djinguereber (**jin-gah-ray-bair**) Mosque.

ANSWER: University of **Sankore** [or **Sankore** Madrasah or **Sankore** Masjid]

3. This poet studied the "pachuco" subculture of his homeland in the first section of a long essay. For 10 points each:

[10] Name this Mexican author who collected other parts like "The Sons of La Malinche" and "The Conquest and Colonialism" in his *The Labyrinth of Solitude*.

ANSWER: Octavio **Paz** [or Octavio **Paz** Lozano]

[10] Octavio Paz also wrote "Sunstone", a poem based on the 584-day calendar of these ancient natives who built Tenochtitlan.

ANSWER: **Aztecs** [prompt on "Mexica"]

[10] Octavio Paz wrote in 1985 that hatred of this man was "hatred of ourselves." Keats somewhat inaccurately describes this "stout" conquistador standing on a peak gazing at the Pacific in "On First Looking into Chapman's Homer."

ANSWER: Hernán **Cortés** de Monroy y Pizarro

4. This case held that the Judiciary Act of 1789 fell beyond the powers granted to the Supreme Court by the Constitution. For 10 points each:

[10] Name this court case that established the practice of judicial review.

ANSWER: **Marbury v. Madison** [accept either underlined part]

[10] *Marbury* arose over the controversial appointments of "midnight judges" by this second president of the U.S.

ANSWER: **John Adams** [prompt on "Adams"; do not accept "John Quincy Adams"]

[10] The opinion for *Marbury* was written by Chief Justice John Marshall; Marshall later affirmed his power to overturn state laws in this 1810 case, which ruled that Georgia could not void contracts made during the Yazoo Land Fraud.

ANSWER: **Fletcher v. Peck** [accept either underlined part]

5. This religion is chiefly divided into the Theravada school, popular in Southeast Asia, and the Mahayana school, popular in East Asia. For 10 points each:

[10] Identify this religion founded by Siddhartha Gautama, which stresses the achievement of an enlightened state of being called nirvana.

ANSWER: **Buddhism**

[10] This set of Buddhist teachings describes the nature of suffering, or dukkha, and the Eightfold Path necessary to liberate oneself from it.

ANSWER: the **Four Noble Truths** [or **catvāri āryasatyāni**; or **cattāri ariyasaccāni**]

[10] These enlightened leaders in Mahayana Buddhism choose to delay their departure from the world in order to help other beings attain nirvana.

ANSWER: **bodhisattva** [or **bodhisatta**]

6. For 10 points each, name these islands formerly ruled by the Danish Empire:

[10] In 1948 Denmark granted home rule to the residents of this Atlantic archipelago, which is situated about halfway between Scotland and Iceland.

ANSWER: **Faroe** Islands [or **Færøerne** or **Føroyar**]

[10] In 1979 Denmark also granted home rule to the residents of this North Atlantic island, a former colonial possession that is often considered the largest island in the world.

ANSWER: **Greenland** [or **Kalaallit Nunaat**]

[10] In 1916 Denmark sold these Caribbean islands to the United States for \$25 million in gold. This modern-day U.S. territory's capital of Charlotte Amalie is on its island of Saint Thomas.

ANSWER: **Virgin** Islands [or United States **Virgin** Islands; prompt on "Danish West Indies"]

7. This quantity is typically measured using a sphygmomanometer (**sfig-no-mah-"gnaw"-"meter"**), which consists of an armband and a rubber bulb. For 10 points each:

[10] Name this quantity, which is the amount of force exerted by a certain bodily fluid.

ANSWER: **blood pressure**

[10] This condition is defined as an abnormally high blood pressure, and it is a risk factor for heart disease and stroke. It can be caused by a high sodium intake.

ANSWER: **hypertension**

[10] These two quantities refer to blood pressure during a heartbeat and in between; blood pressure is typically expressed as one over the other. Name either.

ANSWER: **systolic** or **diastolic** [accept **systole** or **diastole**]

8. For 10 points each, answer the following about market failures.

[10] Pollution is a canonical cause of these deficits between social and private costs. They are so named because a third party other than the producer or the consumer is affected.

ANSWER: **externalities** [accept negative **externality** or positive **externality**]

[10] Governments can correct negative externalities by imposing the Pigouvian type of these financial fees, which are collected in the U.S. by the Internal Revenue Service.

ANSWER: **taxes**

[10] Positive externalities can be created by these types of goods, which are both non-excludable and non-rivalrous. They are often subject to the free rider problem, in which everybody benefits from them but nobody pays for them.

ANSWER: **public** goods

9. From the 1950s until the end of the Cold War, this agency was led by Erich Mielke ("**eric**" "**MEAL**"-kuh), who was nicknamed the "Master of Fear." For 10 points each:

[10] The motto "Shield and Sword of the Party" was adopted by what secret police force of East Germany?

ANSWER: **Stasi** [or **Ministry for State Security**; or Ministerium für **Staatssicherheit**; or **MFS**; or **Staatssicherheitsdienst**; or **SSD**]

[10] British historian Christopher Andrew's 1992 book *The Sword and the Shield* documented the history of this Soviet intelligence agency founded in 1954. This agency competed with the CIA throughout the Cold War.

ANSWER: **KGB** [or **Komitet gosudarstvennoy bezopasnosti**; or **Committee for State Security**]

[10] During the 1960s and 1970s, the KGB suppressed dissent throughout Eastern Europe under the directions of this chairman, who later briefly succeeded Leonid Brezhnev ("**LEY**-uh-nid **BREZH**-neff) as General Secretary.

ANSWER: Yuri **Andropov** [or Yuri Vladimirovich **Andropov**]

10. Name some things associated with world-renowned translator Walter W. Arndt, for 10 points each.

[10] Arndt won the Bollingen Poetry Translation Prize for translating this novel in verse, in which the main character rejects Tatyana and kills Lensky in a duel.

ANSWER: **Eugene Onegin** [or **Yevgeny Onegin**]

[10] *Eugene Onegin* was originally written by this author, who also wrote *Boris Godunov*.

ANSWER: Alexander Sergeyevich **Pushkin**

[10] This author heavily criticized Arndt's translation of *Eugene Onegin*. He also wrote a novel in which the editor Charles Kinbote critiques a poem written by John Shade.

ANSWER: Vladimir Vladimirovich **Nabokov**

11. These next door neighbors speak through a hole in the wall and agree to meet at the tomb of Ninus, but a lion shows up for some reason and screws up their plan. For 10 points each:

[10] Name these star-crossed lovers from Babylon who subsequently kill themselves. Their blood stains the fruits of the mulberry tree, and they appear in *A Midsummer Night's Dream*.

ANSWER: **Pyramus** and **Thisbe** (thiz-"**BEE**") [accept in either order]

[10] This kind old couple welcomes the disguised Jupiter and Mercury into their home. They are spared from the resulting flood and eventually turn into intertwining oak and linden trees.

ANSWER: **Baucis** and **Philemon** [accept in either order]

[10] Both Pyramus and Thisbe and Baucis and Philemon appear in the *Metamorphoses*, the magnum opus of this Roman Golden Age poet of the *Fasti* and the *Heroides*.

ANSWER: **Ovid** [or Publius **Ovidius** Naso]

12. This process is performed in eukaryotes at a namesake fork formed from the action of helicases. For 10 points each:

[10] Name this process that creates a copy of the genetic information of an organism. It occurs during the S phase of the cell cycle.

ANSWER: **DNA replication** [prompt on partial answer]

[10] This class of enzymes are responsible for reducing strain in DNA before it enters the replication fork. They break one or both of the DNA strands before rotating and reattaching them.

ANSWER: **topoisomerases** [accept **gyrases**]

[10] This lab technique makes use of a polymerase enzyme to replicate a single sequence of DNA several thousand times. The introduction of the thermostable Pfu ("**p f u**") has allowed it to use a wider temperature range during cycling.

ANSWER: **polymerase chain reaction** [accept **PCR**]

13. Just a year before his death, this composer wrote a set of *Four Last Songs*, the last of which, "At Sunset," quotes his own *Death and Transfiguration*. For 10 points each:

[10] Name this composer who used two themes, one played by horn and one by clarinet, to depict the title trickster in *Till Eulenspiegel's Merry Pranks*.

ANSWER: Richard Strauss [or Richard Georg Strauss; prompt on Strauss; do not accept "Johann Strauss"]

[10] A philosophical novel by Friedrich Nietzsche titles this Strauss piece whose first section, "Sunrise," begins with a rising trumpet fanfare over pounding timpani.

ANSWER: Also Sprach Zarathustra [or Thus Spake Zarathustra; or Thus Spoke Zarathustra]

[10] A timpani rhythm played against strings begins the third movement of this composer's D minor violin concerto. In another of his pieces, an English horn solo depicts a swan swimming in the river of death.

ANSWER: Jean Sibelius

14. After German forces demanded that the surrender of this army division, its commander Anthony McAuliffe sent back the single-word response, "Nuts!" For 10 points each:

[10] Name this best-known paratrooper division of the U.S. army. The World War II exploits of this division's so-called "Easy Company" were depicted in the HBO miniseries *Band of Brothers*.

ANSWER: 101st Airborne Division

[10] The 101st was surrounded at Bastogne (bah-"STONE") during this last-ditch 1944 offensive by the Germans through the Ardennes, which was named for the indentation it temporarily created in the Allied lines.

ANSWER: Battle of the Bulge [prompt on anything that mentions "Ardennes"]

[10] The 101st were finally relieved at Bastogne by the tanks of this American general's Third Army.

ANSWER: George Smith Patton Jr.

15. Conditional values in this field can be addressed by using Bayes' theorem. For 10 points each:

[10] Name this field of mathematics which governs card games, coin flips, and other games of chance. It can calculate the likelihood of any given event happening.

ANSWER: probability theory

[10] When there are two possible outcomes for a process, repeated iteration of that process can be described using this statistical distribution, which shares its name with a polynomial with two terms.

ANSWER: binomial distribution

[10] This law states that, in the long run, probability will always tend towards the mean. Monte Carlo algorithms take advantage of this law to create results that are usually pretty close to right.

ANSWER: law of large numbers

16. This country's citizens are often described as "cheese eating surrender monkeys" by conservative American commentators. For 10 points each:

[10] In 2003 many American restaurants switched to the name "Freedom Fries" in response to what European country's refusal to support the Iraq War?

ANSWER: France [or French Republic; or République française]

[10] At the time of the Iraq War, France was led by this center-right president, who served until 2007.

ANSWER: Jacques Chirac ("sheer"-ACK) [or Jacques René Chirac]

[10] In June 2015 Wikileaks revealed that the NSA had spied on multiple French presidents, including this successor to Chirac. This man lost the 2012 French presidential election to Francois Hollande.

ANSWER: Nicolas Sarkozy [or Nicolas Paul Stephane Sarkozy de Nagy-Bosca]

17. This novel ends with the arrival of a British officer, who states that he expected a "better show" from the main group of children. For 10 points each:

[10] Name this novel in which a group of children stranded on an island split into factions led by Jack and Ralph.

ANSWER: Lord of the Flies

[10] *Lord of the Flies* was written by this author of *The Inheritors* and *Pincher Martin*.

ANSWER: William Golding [or Sir William Gerald Golding]

[10] In Chapter 6 of *Lord of the Flies*, Samneric wake up to see a massive, shadowy figure silhouette of *this thing*, which they mistake for the Beast. Description acceptable.

ANSWER: dead parachutist [accept descriptive answers such as body of an airman or corpse of a pilot; be generous with accepted answers]

18. The change in the internal energy of a system is equal to the heat added minus this quantity. For 10 points each:

[10] This quantity can be given by the area under the curve on a PV diagram. This non-energy quantity is measured in joules.

ANSWER: work

[10] This quantity is maximized at 40% for a perfect engine, such as a Carnot engine. It is given by the work done by the system W over the heat put into the system Q.

ANSWER: efficiency of the engine

[10] Two answers required. One minus the ratio of two temperatures named for these two properties is used in an alternate expression for efficiency. The two reservoirs in a Carnot engine gain their names from these two properties.

ANSWER: hot and cold [accept equivalents]

19. The title character in this painting wears a Phrygian (frih-jee-en) cap and holds a musket with a bayonet in her left hand. For 10 points each:

[10] Name this Eugene Delacroix (deh-luh-KWAH) painting, whose bare-breasted title figure wears a yellow dress and is standing on top of a pile of dead bodies.

ANSWER: Liberty Leading the People [or *La Liberté guidant le peuple*]

[10] In her right hand, Liberty holds one of these objects. The American painter Jasper Johns was famous for painting these objects.

ANSWER: flags [accept more specific answers like tricolor flag or American flag]

[10] This lover of Jasper Johns often put together trash, paint, and found objects to create art that he called "combines." One of this man's combines, called *Monogram*, depicts a goat with a tire around its body.

ANSWER: Robert Rauschenberg

20. These shoes were worn by royalty in the 16th century in order to make figures like Catherine de Medici appear more regal and towering. For 10 points each:

[10] Name these shoes, whose varieties include "kitten" and "stiletto".

ANSWER: high heels

[10] This shoe brand's "Pigalle" high heels are named after one of its namesake's favorite Parisian neighborhoods. That creator legendarily added this brand's iconic "red bottoms" after applying nail polish to a sketch.

ANSWER: Christian Louboutin

[10] This type of shoe, which is common in the disco and glam rock scenes, is similar to high heels. Unlike high heels, however, these shoes lift the entire foot off the ground.

ANSWER: platform shoes [accept disco boots or triangle heels; prompt on sandals]

21. The first line of this poem is "Hwæt! Wē Gār-Dena in geār-dagum." For 10 points each:

[10] Name this Old English epic about a Geatish hero who comes to Hrothgar's hall of Heorot and slays Grendel, Grendel's mother, and a dragon.

ANSWER: Beowulf

[10] This Irish poet of the collection *Death of a Naturalist* and winner of the 1995 Nobel Prize in Literature published his translation of *Beowulf* in 2000.

ANSWER: Seamus Heaney [or Seamus Justin Heaney]

[10] In 2014, HarperCollins posthumously published this author's translation of *Beowulf*, which was edited by his son Christopher. This author also wrote *The Hobbit* and *The Lord of the Rings*.

ANSWER: J.R.R. Tolkien [or John Ronald Reuel Tolkien]