

Semifinals

Tossups

(Tossup 1) Gluons split apart into a “sea” of these particles and their anti-particles, which can then annihilate each other to form a gluon. George Zweig and Murray Gell-Mann each devised the model for these particles, with Gell-Mann coining their name. Half of these particles have a positive charge of two-thirds, and the other half have a negative charge of one-third. Protons consist of three of these particles: two up and one down. For the point, name this type of elementary particle that come in six flavors.

ANSWER: quarks (accept antiquarks)

(Tossup 2) This novel’s narrator is wounded at the Battle of Maiwand and meets Stamford at the Criterion Bar. In this novel, the murders of the Mormons Stangerson and Drebbler are investigated by Gregson and Lestrade, two Scotland Yard detectives. This novel’s protagonist declares that there is a “thread of murder running through the colorless skein of life,” which is what inspires him to become a consulting detective helped by Dr Watson. For the point, name this Sir Arthur Conan Doyle novel that introduced Sherlock Holmes.

ANSWER: A Study in Scarlet

(Tossup 3) This country’s King Khalid ordered the execution of Juhayman al-Otaybi after the 1979 seizure of its holiest site. This country’s Operation Decisive Storm has received widespread international criticism for its efforts to influence the Yemeni Civil War. It is currently led by King Salman, who succeeded his brother King Abdullah in 2015. For the point, name this Middle Eastern country whose namesake royal family rules from Riyadh.

ANSWER: Kingdom of Saudi Arabia

(Tossup 4) After receiving information from these goddesses, Althaea rescued a burning piece of firewood to save her son Meleager. These figures are known as the Parcae in Roman mythology. Upon a person’s birth, two members of this group, Clotho and Lachesis, would spin and measure a certain thread. Atropos was the final member of, for the point, which group of Greek goddesses, who signaled a person’s death by snipping their thread of life?

ANSWER: The Fates (accept the Moirai)

(Tossup 5) This country’s government responded to the #ThisFlag movement by briefly shutting down WhatsApp in July 2016, a few months after Pastor Evan Mawarire began agitating for reform. A longtime leader of this country married Grace Marufu after she had risen through the ranks of its ZANU Party; after that man was put under house arrest and deposed in late 2017, Emmerson Mnangagwa became its president. For the point, name this country that was led for over three decades by Robert Mugabe from its capital, Harare.

ANSWER: Zimbabwe

(Tossup 6) This symphony's 1893 premiere was conducted by Anton Seidl at Carnegie Hall. This symphony may have been inspired by a trip that its composer took to Iowa. The third movement of this symphony was inspired by themes from the *Song of Hiawatha*. Williams Arms Fisher used a tune from this symphony's second movement to write the song "Goin' Home," which was mistaken as an African-American spiritual. A trip to Iowa and exposure to Native American music inspired, for the point, what symphony by Antonin Dvorak [d'vor-zhak]?

ANSWER: From the **New World** Symphony (accept Symphony No. **9** by Antonin **Dvorak**; prompt on "9" or "9th" alone)

(Tossup 7) The area of any regular polygon is equal to the length of this segment times the perimeter divided by 2. For an equilateral triangle, this segment is one-third of the altitude. Irregular polygons do not have these line segments. The radius of an inscribed circle is equivalent to, for the point, what line segment that is drawn between the center of a regular polygon and the midpoint of one of its sides, often represented by the variable a ?

ANSWER: **apothem**

(Tossup 8) A section of this region can produce the high pressure phase of magnesium silicate known as post-perovskite. Under Keith Bullen's nomenclature, this region is separated into D prime and D double prime regions. This region lies between the Gutenberg and Mohorovicic [mo-ho-ro-vitch-itch] discontinuities. Hot spots are formed from the uprising "plumes" of this layer, which makes up 84% of the earth's total volume. For the point, name this largest layer of the Earth, found between the core and the crust.

ANSWER: **mantle**

(Tossup 9) Soren Kierkegaard examined this literary device in "The Concept of" this concept. One type of this literary device occurs when the audience is aware of facts that characters are unaware of, such as when Oedipus does not know that he has married his mother, and is the "dramatic" type of this device. For the point, name this literary device in which things are not what they appear to be.

ANSWER: **irony** (accept The Concept of **Irony**; accept dramatic **irony**)

(Tossup 10) During this battle, William Rowley hunted down Lew Wallace who, instead of supporting William Sherman, defended Stoney Lonesome. Daniel Ruggles seized a field in this battle which, due to chaotic fighting, had been labeled the Hornet's Nest. Albert Sidney Johnston's death during this battle led to P.G.T Beauregard taking control of the Army of Mississippi. For the point, name this 1862 Union victory along the Tennessee River.

ANSWER: Battle of **Shiloh** (accept Battle of **Pittsburg Landing**)

(Tossup 11) The second part of this novel's epilogue discusses concepts such as power, free will and determinism. In this novel, Hélène Kuragina dies after an attempted abortion, and her brother Anatole tries to elope with Natasha Rostova despite being already married. Anatole loses a leg during the Battle of Borodino in, for the point, what long novel about characters such as Andrei Bolkonsky and Pierre Bezukhov, written by Leo Tolstoy?

ANSWER: War and Peace (accept Voyná i Mir)

(Tossup 12) During this war, Robert Capa possibly staged a photograph showing the death of a FIJL member, *The Falling Soldier*. This war included a bombing campaign carried out by the German Condor Legion. José Sanjurjo died in a plane crash in this war, which was preceded by the outlawing of the Falange. The Nationalists won, for the point, what war in which Francisco Franco seized control of Madrid?

ANSWER: Spanish Civil War

(Tossup 13) One form of this molecule can be used in knockdown experiments by performing its namesake interference. Another form of this molecule is drawn as a cloverleaf with three loops and an acceptor stem. That form of these molecules brings amino acids to ribosomes during translation. One form of this molecule is made in transcription. For the point, name this molecule, whose messenger variety functions in the central dogma to allow proteins to be made from DNA.

ANSWER: RNA or ribonucleic acid (accept siRNA, miRNA, tRNA, mRNA)

(Tossup 14) This son of Manoah ripped apart a lion on the way to Timnah, and when he later found its corpse full of bees, he created a riddle for his wife's family. At a festival dedicated to Dagon, this man caused a temple to collapse, and he killed a thousand Philistines with a donkey's jawbone. This biblical man tricked his lover into tying him with new ropes and weaving his hair into a loom. For the point, name this Judge of Israel who lost his immense strength when his hair was cut by Delilah.

ANSWER: Samson (accept Shimshon)

(Tossup 15) This work describes how Dr. M was called in to deal with a woman who was suffering from whitish grey scabs in a section titled "Irma's Injection." The author described the central concept of this work as a form of wish fulfillment. This work introduces concepts that were later described as the Oedipus Complex. For the point, name this book in which Sigmund Freud first outlined the theory of the unconscious with respect to the title sleeping activity.

ANSWER: The Interpretation of Dreams (accept Die Traumdeutung)

(Tossup 16) Random sequences are generated to perform this process in Pollard's rho algorithm. Shor's algorithm uses a quantum computer to perform this task, which may endanger the security of RSA encryption. Every positive integer has a unique result for this process, according to the fundamental theorem of arithmetic; for 65, that result is "five times 13." For the point, name this mathematical process that breaks an integer down into a product of prime numbers.

ANSWER: integer factorization (accept descriptions related to "finding the prime factors of an integer")

(Tossup 17) A 1994 documentary by Christopher Hitchens called this woman “Hell’s Angel.” This woman, who once described her faith as “nothing but emptiness and darkness,” founded the Missionaries of Charity. She became a saint in what was then the shortest time ever when she was canonized by Pope Francis in 2016. This woman established a leper colony called Shanti Nagar through her work with the diocese in Calcutta, India. For the point, name this Albanian-born nun and missionary.

ANSWER: Mother Teresa (accept Anjeze Gonxhe Bojaxhiu; accept Saint Teresa of Calcutta)

(Tossup 18) This project included three Wide Field systems and suffered from flaws caused by Perkin-Elmer’s poor testing procedures, which failed to remedy a case of spherical aberration. This project has undergone five repair missions, including one that installed the COSTAR corrective optics package in 1993. The *Challenger* disaster delayed the operations of, for the point, what satellite that was launched in 1990, one of the largest space telescopes in Earth orbit?

ANSWER: Hubble Space Telescope (accept HST)

(Tossup 19) This man designed the Museum of Islamic Art in Qatar and the Miho Museum in Japan. A plan named for this man was used to redevelop downtown Oklahoma City, and he also designed the John F Kennedy library. In 1978, he was invited by his home country to design the Fragrant Hills hotel near Beijing. For the point, name this Chinese-American architect who designed the glass and steel pyramid at the Louvre.

ANSWER: Ieoh Ming “I.M.” Pei

(Tossup 20) An annual event in this city is centered in Theresa’s Meadows and has been held since 1810. The Gallery of Beauties can be found in this city’s Nymphenburg Palace. The Isar is a river that flows through this city, whose main square is the Marienplatz. Many streets in this country were shut down to car traffic during the 1972 Olympics, where Israeli athletes were killed. For the point, name this German city that hosts the world’s largest Oktoberfest in Bavaria.

ANSWER: Munich

(Tossup 21) This author wrote about the Hamilton and Trask families in a novel that parallels the Cain and Abel story, titled *East of Eden*. In another novel by this author, Curley’s wife has her neck broken by a man who dreams about tending rabbits, and George shoots Lennie to save him from an angry mob. For the point, name this author of *Of Mice and Men*, who described the Joad family’s journey to California in *The Grapes of Wrath*.

ANSWER: John Steinbeck

(Tossup 22) A training facility to prevent future events like this one was established at 558 West Dekoven Street, the same location where this event began. This event took place simultaneously with a similar event in Peshtigo, Wisconsin. A meteor shower may have triggered this event, which legendarily started in a haypile in the O’Leary barn after a cow tipped over a lantern. For the point, name this 1871 disaster which ignited thousands of buildings along the coast of Lake Michigan.

ANSWER: Great Chicago Fire (accept Chicago Fire of 1871)

(Tossup 23) This compound's supercritical fluid form is used as a solvent to extract caffeine from coffee beans. The concentration of this molecule in the atmosphere is measured at the Mauna Loa Observatory and plotted on the Keeling Curve. This molecule's uptake from the atmosphere is a major cause of ocean acidification. The solid form of this molecule is dry ice, and it is released with water during a combustion reaction. For the point, name this molecule with chemical formula CO₂.

ANSWER: carbon dioxide (accept CO₂ until it is read)

(Tossup 24) In this play, Lodovico is a relative of Brabantio, and is surprised to see the protagonist strike his wife. Bianca steals a strawberry-embroidered handkerchief for her husband, who is an ensign working under this play's title character. Roderigo is wounded in a failed attempt to kill Cassio in this play, after which he is stabbed by the traitorous Iago. For the point, name this play by William Shakespeare in which the title "Moor of Venice" jealously strangles his wife, Desdemona.

ANSWER: The Tragedy of Othello, the Moor of Venice

(Tossup 25) This city's Symphony Center is named after Morton Myerson, a former president of Electronic Data Systems, and Margaret Hunt Hill names a Santiago Calatrava-designed bridge in this city across the Trinity River. AT&T is headquartered in this city, whose suburbs include Irving and Plano. This city forms a metropolitan area with Fort Worth. For the point, name this city, the third-most populous in Texas, behind San Antonio and Houston.

ANSWER: Dallas

(Tossup 26) In a work by this artist, Cosimo, Piero and Giovanni de Medici kneel before Jesus as representatives of the title figures. This creator of *Adoration of the Magi* painted the Graces dancing in an orange grove near Flora in one painting, and depicted Zephr blowing at a newborn goddess standing on a seashell in another. For the point, name this Italian painter of *The Allegory of Spring* and *The Birth of Venus*.

ANSWER: Alessandro "Sandro" Botticelli (accept Alessandro di Mariano di Vanni Filipepi)

(Tossup 27) This god of foreigners protected Ra's solar barge from the serpent Apophis while Ra passed through the Underworld. This god lost a boat race to a rival because his boat was made of stone, while his rival's was wood painted as stone. This god married his sister, Nephthys, with whom this god may have fathered Anubis. For the point, name this Egyptian god of the desert, who killed Osiris and feuded with Horus.

ANSWER: Seth

(Tossup 28) During this election year, Secretary of State Katherine Harris controversially refused votes that were not submitted by a deadline. Critics of Winona LaDuke and Ralph Nader attacked them for "spoiling" this election for a man who ran alongside Joe Lieberman. Hanging chads and butterfly ballots in this election year led to a recount in the state of Florida, which was ended by a Supreme Court case. For the point, name this election year in which Al Gore narrowly lost to George W. Bush.

ANSWER: U.S. presidential election of 2000

(Tossup 29) A character in this novel drops and breaks a “Little Shirley Beans” record and is beat up by Maurice after he sends Sunny away with five dollars instead of ten. This novel’s protagonist is intimidated by Mr Antolini, his former English teacher, and is persuaded not to hitchhike west by his sister, Phoebe, who accompanies the protagonist to Central Park. For the point, name this novel about Holden Caulfield, written by J.D. Salinger.

ANSWER: The Catcher in the Rye

(Tossup 30) An organism in this kingdom was used by Beedle and Tatum to come up with their “one gene, one enzyme” hypothesis. This kingdom of organisms include the species *Candida*, which can cause an infection called thrush. *Saccharomyces cerevisiae* is a species in this kingdom used for brewing and baking. Members of this kingdom use chitin in their cell walls. For the point, name this kingdom of molds, yeasts, and mushrooms.

ANSWER: fungi or fungus

Replacements

(Tossup 31) This dynasty defeated the short-lived Shun Dynasty to take power after the defection of General Wu Sangui. Emperor Qianlong [chee-ahn-long] of this dynasty launched the Ten Great Campaigns, and it regulated its trade with foreign powers through the Canton System. This dynasty lost the Sino-French War and faced the Taiping and Boxer Rebellions. The Opium Wars were fought by, for the point, what last imperial dynasty of China?

ANSWER: Qing Dynasty