

## Round 10

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### Tossups

(1) **Davis’s cyclical theory of this process ends with the peneplain. The namesake features of Arches National Park resulted from one form of this process, while a different type (\*) carves gullies into hillsides.** The weathering of rocks begins, for ten points, what process by which wind and water remove surface material, leaving features like the Grand Canyon behind?

ANSWER: erosion (accept any additional information)

(2) **Schopenhauer argued that this philosophical concept was an illusion, in part because the body’s reactions to stimuli are automatic. An opposite of this concept, (\*) determinism, says that there is a single, unavoidable course of events.** For ten points, name this philosophical concept that holds people can make choices about their future actions.

ANSWER: free will (accept freedom; accept word forms, such as freedom of the will; accept choice before “choices” is read)

(3) **This man wrote about the Bokononist Papa Monzano in *Cat’s Cradle*, and created a narrator who comments “so it goes” when those around him die. A man is kidnapped by plunger-shaped aliens, the Tralfamadorians, in a novel by this author that depicts the (\*) firebombing of Dresden.** For ten points, name this American author who wrote about Billy Pilgrim in *Slaughterhouse-Five*.

ANSWER: Kurt Vonnegut Jr.

(4) **During this battle, Vasily Zaytsev killed over 200 people, and the high amount of suburban fighting led one side to call this battle a “Rat War.” For two months of this battle, soldiers defended Pavlov’s House against (\*) Friedrich Paulus’s Sixth Army, who eventually surrendered to Georgy Zhukov.** For ten points, name this lengthy World War II siege of a Russian city named for the Soviet premier.

ANSWER: Battle of Stalingrad (accept Siege of Stalingrad)

(5) **The Tsiolkovsky equation for these devices relates change in velocity to initial and final mass. Robert Goddard realized the third law of motion would allow these devices to operate in a (\*) vacuum.** Wernher von Braun studied these devices, whose efficiency depends on the number of stages and shape of the exhaust nozzle. Solid or liquid propellants power, for ten points, what projectiles that include the German V-2 and NASA’s Saturn V [five]?

ANSWER: rockets

(6) **In this novel, David Gamut attempts to teach some beavers to sing and, while traveling from Fort Edward to Fort William Henry, Cora and Alice Munro are kidnapped by Magua. This novel follows *The (\*) Deerslayer* in *The Leatherstocking Tales* series, which features Natty Bumppo. For ten points, name this novel by James Fenimore Cooper whose title character Uncas dies, ending a Native American tribe.**

ANSWER: The Last of the Mohicans

(7) **This religious objective is described as a magic city containing a great treasure in the Lotus Sutra. In Jainism, the arihat achieve this goal at death. The Eightfold Path is a guide for reaching this state, which frees a person from (\*) dukkha and samsara. For ten points, name this goal of Theravada Buddhism, a state of enlightenment which ends the karmic cycle of reincarnation.**

ANSWER: Nirvana (accept enlightenment before it is read)

(8) **This is the number of Franz Schubert's "Great C Major" symphony. A musical work with this number includes a setting of Friedrich Schiller's poem (\*) "Ode to Joy." In four-four time, two whole notes and a quarter note tied together will last this many beats. For ten points, give this number of Beethoven's final symphony and the number of performers in a nonet.**

ANSWER: 9 (accept Schubert's Ninth Symphony; accept Beethoven's Ninth Symphony)

(9) **John Crerar founded a library in this city. August Spies was executed in this city for his supposed role in the Haymarket Square bombing. In this city, H.H. Holmes operated a "murder castle" at a hotel built for the 1893 (\*) Columbian Exposition. In 1871, Mrs O'Leary's cow legendarily started a "Great" fire in, for ten points, what largest city of Illinois?**

ANSWER: Chicago

(10) **The *lac* [lack] and *trp* [trip] operons were first discovered in this organism, which generates vitamin K for its hosts. Undercooked beef may be (\*) contaminated with this prokaryote that can divide every 20 minutes in a Petri dish. For ten points, name this Gram-negative, rod-shaped species that is normally found in the human large intestine, the most important bacterial model organism.**

ANSWER: E. coli (accept Escherichia coli)

(11) **This poet wrote "I will come again my Luve / tho' it were ten thousand mile" in a poem that declares "my Luve's like a red, red rose." Lines from this poet's works are commonly translated as "should (\*) old acquaintance be forgot / and never brought to mind?" and "the best-laid plans of mice and men / oft go awry." For ten points, name this Scottish poet who wrote "Auld Lang Syne" and "To a Mouse."**

ANSWER: Robert Burns

(12) **This company's early history is the subject of the 2017 film *The Founder*. Morgan Spurlock relied on this company for thirty days as part of his 2004 documentary *Super* (\*) *Size Me*. In 2017, this company hosted a special giveaway for their 1998 special, Szechuan [sesh-wan] sauce. For ten points, name this fast food chain that sells Big Macs under the "golden arches."**

ANSWER: McDonald's

(13) **For failing to pursue this man, George McClellan lost command of the Army of the Potomac in favor of Ambrose Burnside. Despite Jefferson (\*) Davis's opposition, this man was named General-in-chief of the Confederate Army in early 1865. For ten points, name this Virginian general who surrendered at Appomattox Courthouse to Ulysses S. Grant, ending the Civil War.**

ANSWER: Robert Edward Lee

(14) **For the Koch snowflake, this value approaches infinity as you continue to develop the fractal. Benoit Mandelbrot studied the difficulty of measuring this quantity in real life, a problem known as the coastline paradox. For (\*) circles, this concept is called circumference. For ten points, name this geometric quantity, the total length of the path around a shape.**

ANSWER: perimeter

(15) **In this painting, a short-handled broom hangs near a convex mirror that displays the stations of the cross. An orange sits on a windowsill in the left side of this painting, and a pair of wooden (\*) shoes and a small dog are at the feet of a dark-clothed man and a woman in a long, green dress. For ten points, name this painting of an Italian merchant and his new bride, created by Jan Van Eyck.**

ANSWER: The Arnolfini Wedding (accept The Arnolfini Portrait; accept Giovanni Arnolfini and his Bride; accept any description including the name Arnolfini and marriage)

(16) **This god and Zephyrus both fell in love with Hyacinth, who was accidentally killed by this god. This god served as a shepherd for King Admetus after he killed the Cyclopes as revenge for the death of his son Asclepius. This god pursued the nymph (\*) Daphne, and received his lyre from Hermes. For ten points, name this Greek god of light and music, the twin brother of Artemis.**

ANSWER: Apollo (accept Apollon; or Phoebus Apollo)

(17) **In this city, Danforth and Bloor Streets are connected by the Prince Edward Viaduct. In 2009, this city's CN Tower lost its title as tallest tower in the world. This city, often nicknamed "the Six," lies on the northwest shore of a (\*) Great Lake named for its Canadian province. For ten points, name this most populous city in Ontario and all of Canada.**

ANSWER: Toronto

(18) **The spin form of this phenomenon causes proton NMR spectra to show spacings between peak lines. The position of groups with respect to a double bond can be labeled *cis* or (\*) *trans* in the stereo type of this property. N-butane and isobutane are examples of, for ten points, what property of compounds with the same molecular formula but different structures?**

ANSWER: isomers (accept word forms such as isomerism)

(19) In the HG Wells novel *The Time Machine*, the Traveller brings back two of these objects to prove his story. A collection of poems by Baudelaire is titled for these things “of Evil.” Elizabeth Barrett Browning wrote that her beloved “has brought me many” of these things “plucked from the (\*) garden.” For ten points, name this colorful part of a plant, exemplified by Steinbeck’s *The Chrysanthemums*.

ANSWER: flowers

(20) This empire built the Qhapaq Nan road system and communicated with quipu [kee-poo], a series of knotted strings. A civil war between Huascar and his half-brother, (\*) Atahualpa, weakened this empire, allowing Spanish conquistadors to conquer it. Machu Picchu was part of, for ten points, what empire that was conquered by Francisco Pizarro in modern Peru?

ANSWER: Incan Empire

## Bonuses

(1) Seven people died in one of these events in Springfield, Illinois in 1908, and one of these in Tulsa in 1921 destroyed the wealthy Greenwood community; in both cases, scholars have criticized a lack of historical education about these events. For ten points each,

Name these violent events that, in the early 20th century, often began with lynchings.

ANSWER: **race riots** (accept anything related to a **riot**, **civil disturbance**, etc. over **racial** issues between whites and blacks; prompt on partial answers)

Massive race riots escalated in this city in 1943 and 1967; in the latter, the National Guard was called into this city by Michigan governor George Romney.

ANSWER: **Detroit**

In 1992, 63 people died during the Rodney King race riots in this city, and looting was particularly bad in this city's Koreatown neighborhood.

ANSWER: **Los Angeles** (accept **LA**)

(2) Algorithms for performing this operation include “Bubble,” which checks pairs of adjacent elements and swaps if necessary. For ten points each,

Name this computational task that is usually done to create ascending or descending lists out of randomly listed numbers.

ANSWER: **sorting** (accept **ordering** a set)

This mathematical term describes an arrangement of all the elements of a set. This term is often contrasted with combination, a similar concept that ignores the order of a set.

ANSWER: **permutation** (prompt on “P” or “nPr”)

One of the least efficient sorting functions imaginable, bogosort, simply generates every possible permutation until it lucks into the one in the desired order. If a set has  $n$  elements, there are this many total permutations for bogosort to potentially check.

ANSWER: **n factorial** (accept **n!**)

(3) While this artist stayed at the Quinta del Sordo, the “Villa of the Deaf Man,” he created fourteen murals of dark, dramatic subjects, which were removed from the walls and attached to canvas in the 1870s. For ten points each,

Name this Spanish artist, who painted *La maja desnuda*, *La maja vestida*, and *The Third of May, 1808*.

ANSWER: Francisco (José) de Goya (y Luceientes)

This is the colorful collective name for the fourteen paintings Goya created on the walls of the Quinta del Sordo, so called because of the very dark colors that dominate these paintings.

ANSWER: Black Paintings (accept Pinturas negras)

In one of Goya’s Black Paintings, this Roman counterpart of the Titan Cronus is shown *Devouring His Son*, gnawing on the left arm of a bloodied and headless body.

ANSWER: Saturn

(4) Answer the following about the Holocaust’s profound effect on literature, for ten points each.

In this work, Elie Wiesel recounts how he was deported from a ghetto in Sighet and his eventual arrival at Auschwitz. Wiesel’s loss of faith is shown in this work when he states god is “hanging here on the gallows.”

ANSWER: Night

Art Spiegelman relayed his father’s experiences surviving the Holocaust in this first graphic novel to win a Pulitzer Prize. In this work, Nazis are depicted as predatory cats while Jews are shown as their prey.

ANSWER: Maus

This writer wrote of falling in love with Peter van Pels while hiding in an annex in Amsterdam. Unfortunately, this young girl’s namesake diary had to be published posthumously as she did not survive her time at Bergen-Belsen.

ANSWER: Anne Frank (accept Annelies Frank; accept The Diary of Anne Frank)

(5) At the end of 2016’s *Kimi no Na wa*, the main characters reunite in this city. For ten points each,

Name this large bustling metropolis whose Shibuya Crosswalk is often depicted in film and TV. Otomo Katsuhiro’s 1988 film *Akira* takes place in a “Neo” version of this capital of Japan.

ANSWER: Tokyo

In *Kimi no Na wa*, the main characters are first able to communicate due to this supernatural occurrence. This action, which also happens as the result of a fortune cookie in *Freaky Friday*, causes Mitsuha to use the incorrect pronouns when speaking to Taki’s friends.

ANSWER: switching bodies (accept clear equivalents)

*Kimi no Na wa* became the first Japanese animated film *not* by this director to gross over 100 million yen. This director behind Studio Ghibli has dominated the box office with films like *Princess Mononoke*, *The Wind Rises*, and *Spirited Away*.

ANSWER: Miyazaki Hayao

(6) Because bromine trifluoride's central atom has two unshared electron pairs, this theory predicts an unusual T-shape for the molecule. For ten points each,

Name this theory of molecular geometry, based on electron pairs moving as far away from each other as possible around an atom. It predicts a bent shape for water.

ANSWER: **VSEPR** [ves-pur] theory (accept **valence shell electron pair repulsion** theory; accept **Gillespie-Nyholm** theory)

The molecule methane has four shared electron pairs and no unshared pairs, so it adopts this shape, not trigonal pyramidal, under VSEPR theory.

ANSWER: **tetrahedral**

Molecules like carbon dioxide are classified as linear under VESPR theory because all of their bond angles measure this many degrees.

ANSWER: **180** degrees

(7) This man recruited Castor, Pollux, Heracles, Atalanta, and other heroes to accompany him on a difficult quest set by this man's uncle, Pelias. For ten points each,

Name this Greek hero, who led the Argonauts on a quest for the golden fleece.

ANSWER: **Jason** (accept **Iason**)

Pelias sent Jason after the golden fleece after Jason arrived in Iolcus wearing only one of these pieces of clothing. An oracle had warned Pelias that he would be threatened by a man wearing only one of these strappy pieces of footwear.

ANSWER: **sandals** (prompt on "shoes")

After Jason returned with the golden fleece, this woman helped him claim Pelias's throne by tricking Pelias's daughters into killing him. When Jason tried to marry Glauce, this sorceress killed Glauce and the sons she had had with Jason in revenge.

ANSWER: **Medea**

(8) Dr Hastie Lanyon dies of shock after witnessing the transformation of this novel's protagonist. For ten points each,

Name this novel, in which the respectable first title character creates a potion that transforms him into the ruthless second title character.

ANSWER: The Strange Case of **Dr Jekyll and Mr Hyde**

Dr Jekyll and Mr Hyde were created by this Scottish author, who also created the character David Balfour in *Kidnapped*.

ANSWER: Robert Louis **Stevenson**

In this Stevenson novel, Billy Bones asks Jim Hawkins to look out for a one-legged seafaring man. Jim later boards a pirate ship en route to this novel's title location.

ANSWER: **Treasure Island**, or the mutiny of the Hispaniola

(9) In 1948, the assassination of Jorge Eliécer Gaitán set off riots and started a decade-long civil war. For ten points each,

Name this South American country where the ensuing riots ravaged the capital city and earned the name El Bogotazo [bo-gah-TAH-zo].

ANSWER: Colombia

This is the name given to Colombia's aforementioned decade-long civil war, in which hundreds of thousands of people were killed.

ANSWER: La Violencia (prompt on "(the) violence")

In the aftermath of *La Violencia*, guerrilla fighters formed FARC, a peasant army that terrorized Colombia until signing a ceasefire agreement with Juan Manuel Santos in 2016. That agreement helped Santos win this international prize.

ANSWER: Nobel Peace Prize (prompt on partial answers)

(10) The photograph *Pillars of Creation* shows stars being formed within the "Eagle" one of these bodies. For ten points each,

Name these interstellar clouds of dust and gas. They may be planetary, like the Cat's Eye, or supernova remnants, like the Crab.

ANSWER: nebulae (accept nebulas)

Astronomers seeking stellar nurseries often search for this type of radiation, found between UV rays and gamma rays on the EM spectrum.

ANSWER: X-rays

Newly formed stars of sufficient mass will quickly deplete their supply of the 7-isotope of this element, the lightest of the alkali metals.

ANSWER: lithium (accept Li)

(11) For ten points each, give the following about early Protestantism.

This German theologian was excommunicated by Pope Leo X [tenth] in 1521 for refusing to recant much of his 95 Theses.

ANSWER: Martin Luther

Luther's break from the Catholic Church began this period of religious history, in which Protestants tried to change the workings of the church.

ANSWER: Protestant Reformation

This man, who wrote *Institutes of the Christian Religion* and worked in Geneva after breaking from the Catholic Church, names a group of Protestant denominations that often prefer to call themselves "Reformed Protestants."

ANSWER: John Calvin (accept Calvinism or Calvinists)

(12) The struggle of this novel's central family is paralleled by an old turtle attempting to cross a road. For ten points each,

Name this John Steinbeck novel about the Joad family's westward-trek to California. This novel's title refers to the hardship the Joads will face but also of the deliverance they can achieve.

ANSWER: The Grapes of Wrath

The Joads' flee their home in Oklahoma to escape the famine caused by this extreme 1930s drought. This period, which resulted in "black blizzards," led to a collapse of the agriculture sector and contributed to the Great Depression.

ANSWER: the Dust Bowl

While in California, the Joads meet this christ-figure. This preacher exclaims "you don' know what you're a doin'" as he is murdered for striking against the Hooper Ranch.

ANSWER: Jim Casy (accept either underlined name)

(13) For ten points each, name the following leaders of France.

This current President defeated Marine le Pen in the 2017 elections.

ANSWER: Emmanuel Macron

This general led Free France during World War II and rose to power as President in 1958 as the Fourth Republic fell.

ANSWER: Charles de Gaulle

This Prime Minister of France, known as "the Tiger," led the French delegation at the Paris Peace Conference. His insistence on harsh German reparations made it into the Treaty of Versailles.

ANSWER: Georges Clemenceau

(14) In the early 20th century, a school of composers based in this city developed around Arnold Schoenberg and innovated in atonal music. For ten points each,

Name this Austrian capital city, where Beethoven and Haydn had worked a century earlier.

ANSWER: Vienna

Schoenberg's innovation moved away from the use of keys, instead keeping a balance between every note in the chromatic scale; thus, Schoenberg's technique is often named for this number of tones.

ANSWER: twelve-tone (accept twelve-note; accept other answers including the number **12**)

In 1913, Viennese listeners rioted at Schoenberg's "Skandalkonzert" [scandal concert]; a witness testified in court that the smack of a thrown punch was the most "harmonious" sound of the evening. That riot came just two months before a more famous classical music riot, at the Paris premiere of this Stravinsky ballet.

ANSWER: The Rite of Spring (accept La Sacre du Printemps or Vesna svyashchennaya)

(15) Around 12,000 years ago, the cheetah population experienced one of these events that may have left only a single breeding pair in all of Africa. For ten points each,

Name this type of genetic drift event, similar to the founder effect, in which a disaster like drought or disease severely reduces a population's size, causing future generations to have low genetic diversity.

ANSWER: **bottleneck**

The effect of a bottleneck on a population's gene pool can be calculated using this model of genetics at equilibrium. This equation is usually written as  $p^2 + 2pq + q^2 = 1$  [p squared plus 2 p q plus q squared equals 1].

ANSWER: **Hardy-Weinberg** equation (accept model, equilibrium, etc.; accept **H-W** equation)

If the values of  $p$  and  $q$  in the equation differ from one generation to the next, then the population is experiencing this change in traits over time. Natural selection is the major cause of this change in Darwin's theory of it.

ANSWER: **evolution**

(16) Identify some comic plays by Aristophanes named for animals, for ten points each.

In this Aristophanes play, the title chorus of amphibians annoy Dionysus as he crosses their lake on his way to Hades by chanting "bre-ke-ke-kax-koax-koax," an ancient Greek onomatopoeia similar to the English "ribbit."

ANSWER: The **Frogs** (accept **Batrachoi**)

In this Aristophanes play, Pisthetaerus and Euelpides [yoo-EL-pih-deez] convince the title animals to build a city in the sky called cloud-cuckoo-land, under the direction of the Hoopoe [hoo-poo].

ANSWER: The **Birds** (accept **Ornithes**)

The chorus of this Aristophanes play represent Athenian jurors who swarm like the title creatures as Procleon despairs over his useless son, who is addicted to attending trials.

ANSWER: The **Wasps** (accept **Sphekes**)

(17) This country's majority political parties, the Christian Democratic Union and Christian Social Union, opposed a vote on same-sex marriage until 2017, when its chancellor put the issue to a conscience vote. For ten points each,

Name this European country where, in June 2017, the Bundestag voted to legalize same-sex marriage.

ANSWER: Federal Republic of **Germany**

This German chancellor allowed the same-sex marriage bill to come to a vote, but voted against the measure herself.

ANSWER: Angela **Merkel**

After Germany's same-sex marriage bill passed, this far-right German political party announced its intentions to sue to stop the bill from becoming law. This anti-immigrant party won 97 seats in the Bundestag in 2017 elections, but not enough to file that lawsuit.

ANSWER: **Alternative for Germany** (accept **Alternative für Deutschland**; accept **AfG**; accept **AfD**)

(18) The losing side in this battle was led by a brother of Tecumseh known as “the Prophet,” as Tecumseh was away trying to secure more allies against the Americans. For ten points each,

Name this 1811 battle. Twenty-nine years later, the winning general capitalized on his victory at this battle by using it in a campaign slogan.

ANSWER: Battle of Tippecanoe (accept **Tippecanoe and Tyler Too**)

The “Tippecanoe and Tyler Too” slogan helped this man win the election of 1840. He caught pneumonia after his inauguration speech and died after just a month as President.

ANSWER: William Henry Harrison (prompt on Harrison)

William Henry Harrison led at the Battle of Tippecanoe in his role as Governor of the territory that became this state. Modern governors of this state include Evan Bayh, Mitch Daniels, and Mike Pence.

ANSWER: Indiana

(19) For ten points each, give the following about gravity.

Newton’s Law of Gravitation states that the force of gravity between two objects is proportional to the product of their masses divided by this power of the distance between them.

ANSWER: second power (accept 2; accept square)

This is the magnitude of the gravitational acceleration felt by objects near the surface of the Earth. Round your answer to the nearest tenth of a meter per second squared.

ANSWER: 9.8 meters per second squared

Projectiles being accelerated only by gravity will travel in a path of this shape.

ANSWER: parabola

(20) Features in this national park include the 300-foot-deep Cedar Sink collapse sinkhole, a “Bottomless Pit,” and “Hanson’s Lost River,” believed to have been explored by a man later killed in World War II. For ten points each,

Name this American national park, the longest cave system in the world.

ANSWER: Mammoth Cave National Park (accept Mammoth Caves)

Mammoth Cave is found in this US state, a short drive from Bowling Green and a little south of Fort Knox.

ANSWER: Kentucky

Fort Knox is found just outside this most populous city of Kentucky, which lies on the Ohio River across from Indiana.

ANSWER: Louisville