

Round 5

Brad Fischer • Clare Keenan • Alec Krueger • Lauren Onel • Noah Prince
Allison Salach • Zohra Sattar • Kristin Strey • Tyler Vaughan

Tossups

(1) **This phenomenon is common between aposematic species, such as viceroy, as described by Fritz Müller. This phenomenon occurs via selective favoring, usually as an anti-predator trait, and may be behavioral or (*) appearance based, as in hoverfly and butterfly colorings. Batesian and Müllerian are two prevalent types of, for ten points, what evolutionary phenomenon in which one species is protected by looking like another, dangerous species?**

ANSWER: mimicry (accept word forms like mimics)

(2) **Shallow diagonals in this object sum to Fibonacci numbers. The binomial coefficients are listed in this diagram, and the calculation “ n choose k ” will find the k th number in its n th (*) row. Shading even numbers in this diagram produces a fractal image called Sierpinski’s triangle. For ten points, name this mathematical image whose first few rows are “1”, then “1,1”, then “1,2,1”, a triangular diagram named for a French mathematician.**

ANSWER: Pascal’s triangle

(3) **In Chinese mythology, Dian Mu used these objects to throw her lightning bolts. The Yata no Kagami is a sacred one of these belonging to the Emperor of Japan. The Shinto goddess Amaterasu [ah-mah-tay-rah-soo] was lured out of a cave by one of these objects, which showed her brilliance. The Aztec god Tezcatlipoca [tets-kaht-lee-poh-kah] was represented as a “smoking” one of these objects, and (*) Perseus used a shield as one of these objects to freeze Medusa with her own gaze. For ten points, name these reflective surfaces.**

ANSWER: mirrors

(4) **While in this state, Molly Pitcher provided water to soldiers during the Battle of Monmouth. A popular dueling location in this state, Weehawken, was the site of the deaths of both Phillip and Alexander Hamilton. (*) Hessian forces were attacked on Christmas Day in this state, after George Washington crossed the Delaware into this state to start the Battle of Trenton. For ten points, name this state in which American forces won the Battle of Princeton.**

ANSWER: New Jersey

(5) **The title character brews the “balm of Fierabrás” to cure his and his companion’s wounds, but they just get sick. After battling the Knight of the White Moon, the title character is forced to cease all acts of chivalry for a year. This work’s title character and squire, (*) Sancho Panza, journey to save the “princess” Dulcinea on his elderly steed, Rocinante. For ten points, name this novel about a windmill-dueling, delusional “knight,” written by Miguel de Cervantes.**

ANSWER: The Ingenious Gentleman Don Quijote of La Mancha (accept El ingenioso hidalgo don Quijote de La Mancha)

(6) **The introduction of Zermelo set theory resolved one of these concepts, which concerns the set of all sets that do not contain themselves and is named for mathematician Bertrand Russell. These concepts often arise from (*)** thought experiments, such as a time traveler going back in time and killing his own ancestor. The phrase “this phrase is false” is an example of, for ten points, what kind of statement or argument that logically contradicts itself?

ANSWER: **paradox** (accept word forms, like paradoxical statement; prompt on descriptions, like self-contradiction, before said)

(7) **Investigations into this event were carried out by Luis Alvarez, who noted that sediment from around the world displays a layer of iridium dating to this event. The (*)** Mesozoic Era is defined as ending with this event, which was probably triggered at Chicxulub [chick-shoo-loob] on the Yucatan peninsula. A meteor may have caused, for ten points, what devastating event 65 million years ago that wiped out thousands of species, including T. Rex?

ANSWER: the **K-T extinction** event (accept Cretaceous-Tertiary extinction event, or the **K-Pg extinction** or Cretaceous-Paleogene extinction; accept descriptions of the extinction of the dinosaurs)

(8) **A failed 1982 coup in this country was co-led by Raila Odinga and tried to oust Daniel arap Moi. The community-building concept of “Harambee” was fostered by the first President of this country. Dedan Kimathi led an uprising in the 1950s that sought to reclaim Kikuyu land from European colonists. The (*)** Mau Mau Rebellion challenged British rule of, for ten points, what African country with capital Nairobi, first led by Jomo Kenyatta?

ANSWER: Republic of Kenya

(9) **An author with this surname notes “God has said not a word!” after a girl is strangled with her hair in the poem “Porphyria’s Lover.” Another poet with this surname says “call me by my pet-name” in the collection *Sonnets from the* (*) *Portuguese*, which is titled for her husband’s nickname for her. “How do I love thee? Let me count the ways” and “My Last Duchess” are by these poets. For ten points, give the surname of married English poets Robert and Elizabeth Barrett.**

ANSWER: the **Brownings** (accept Robert Browning or Elizabeth Barrett Browning)

(10) **This instrument is the featured soloist of “Syrinx” by Claude Debussy, who had this instrument play a soft, descending and ascending chromatic figure to open his “Prelude to the Afternoon of a Faun.” (*)** Tamino plays one of these instruments in a work that features “Der Holle Rache” [der holl-ah ROCK-uh], an aria sung by the Queen of the Night. For ten points, name this woodwind instrument, the *Magic* subject of a Mozart opera, whose smaller relatives include the piccolo.

ANSWER: flute (accept The Magic Flute or Die Zauberflöte)

(11) **In this state, a white mob led a 1921 firebombing of the Greenwood district, then the wealthiest African-American community in the country. In 2013, an F5 tornado killed 24 people in this state’s city of Moore. Terry (*)** Nichols was a conspirator in a 1995 act of domestic terrorism in this state, in which 168 people were killed in the Alfred P. Murrah building by Timothy McVeigh. For ten points, name this state, the site of the 1921 Tulsa race riots.

ANSWER: Oklahoma

(12) Six Miqats [mee-kots] are stations where participants in this ritual put on Ihram, the clothes and bodily condition necessary for this ritual. A shortened version of this ritual is the Umrah, which does not include the “stoning of the devil.” Participants in this ritual journey walk in circles around the (*) Ka’aba to remember its construction by Ismail and Ibrahim. All able-bodied Muslims must at some point in their life complete, for ten points, what journey to Mecca?

ANSWER: Hajj (accept Umrah until it is read; prompt on descriptions like “making a pilgrimage to Mecca”)

(13) The wirewound type of this device produces undesired inductance. The total effect of a system of these devices is found by summing of the reciprocals of their strengths if they are connected in (*) parallel; the effect is additive instead if they are in series. The strength of these circuit elements is marked with colored bands. For ten points, name this circuit element that inhibits the flow of electrical current and whose strength is measured in Ohms.

ANSWER: resistors

(14) A city in this novel requires visitors to put on green tinted goggles before entering. A local ruler in this book possesses a Golden Cap that can summon an army three times, and is too afraid of water to steal the (*) Silver Shoes, which this novel’s protagonist uses to return to her Aunt Em, with Glinda’s help. For ten points, name this L. Frank Baum novel Dorothy follows the yellow brick road in hopes of meeting the title figure.

ANSWER: The Wonderful Wizard of Oz (accept The Wizard of Oz, since the novel has occasionally been reprinted under that title)

(15) A music video for this album begins with the voiceover “I tried to change” and the caption “Denial.” That single from this album echoes the Yeah Yeah Yeahs’ “Maps” by noting “slow down, they don’t love you like I love you.” Another song from this album was criticized as (*) “anti-police” after it was performed at Super Bowl 50’s halftime show. For ten points, name this 2016 album, featuring the singles “Hold Up” and “Formation,” by Beyoncé.

ANSWER: Lemonade

(16) This architect created an “inverted ziggurat” in a building with a spiraling interior walkway. The Guggenheim Museum in New York is the work of this man, who designed an Imperial Hotel that survived a 1923 Tokyo earthquake, and who extended (*) cantilevered floors over Bear Run, a stream in Pennsylvania, for the Kaufmann family. For ten points, name this architect of Fallingwater.

ANSWER: Frank Lloyd Wright (accept Frank Lincoln Wright)

(17) This city is home to the port town of Jebel Ali, a top-10 port in the world due to its depth and proximity to the Strait of Hormuz to its northeast. Housing built on artificial, palm-frond-shaped landmasses in this city sit on its shoreline along the (*) Persian Gulf north of Abu Dhabi. For ten points, name this most populous city in the United Arab Emirates, the home of the world’s tallest building, the Burj Khalifa.

ANSWER: Dubai

(18) **This work's protagonist dreams about lions on a beach in Africa, and encourages his apprentice to believe that the "Indians of Cleveland" will be defeated by The Great DiMaggio. This novella's title character catches a giant (*) marlin without Manolin's help after an 84-day unlucky streak, but the fish is eaten by sharks before he returns to shore in Cuba. For ten points, name this novella about the elderly fisherman Santiago, written by Ernest Hemingway.**

ANSWER: The Old Man and the Sea

(19) **This event was made possible when Leopold Lojka [loy-ka] followed the original directions to drive to the National Museum, rather than to a hospital to visit victims of Nedeljko Čabrinović's [neh-DAY-ko cha-brin-oh-vitch's] bombing earlier in the day. The July Ultimatum was sent in response to this event, which was planned by the (*) Black Hand, a pro-Serbian group. For ten points, name this June 28, 1914 event in which Gavrilo Princip killed an Austro-Hungarian royal, triggering World War I.**

ANSWER: assassination of Archduke Franz Ferdinand (accept terms like "killing" or "shooting" instead of "assassination;" do not accept or prompt partial name)

(20) **These phenomena are used to observe diffraction patterns in the Advanced Photon Source. This phenomenon was discovered using a Ruhmkorff coil and barium platinocyanide. Rosalind (*) Franklin scattered this type of radiation to take images of DNA. This type of radiation has energy output just less than that of gamma rays. For ten points, name this type of electromagnetic radiation commonly used in medical imaging to view teeth and bones.**

ANSWER: x-rays

Bonuses

(1) After Team USA's humiliating loss in this sport's 2016 World Cup, Paralympian Josh Pauls tweeted "Really glad I was born without legs. The US sled team has a much better track record of success than the US stand up men's team..." For ten points each,

Name this sport, in which the US Men's team lost to Canada and Finland at the 2014 Winter Olympics. US players not included on the 2016 World Cup team included Cam Fowler and Phil Kessel.

ANSWER: ice hockey

Kessel also tweeted passive-aggressively in the wake of Team USA's World Cup of Hockey performance in September. Kessel doesn't use Twitter much; it was only his second tweet since posting a picture in June of him lifting this legendary trophy after his Pittsburgh Penguins won the NHL playoffs.

ANSWER: Stanley Cup

Calling them "Phil Kessel's Pittsburgh Penguins" might be hard to stomach for fans of this Canadian NHL team, for whom Kessel played six seasons. That said, watching this team at all has been hard to stomach since their last title in 1967, currently the longest title drought in the NHL.

ANSWER: Toronto Maple Leafs (accept either or both names)

(2) This literary character tells Miss Caroline that Walter Cunningham can't afford to bring a lunch to school, since the teacher does not understand the workings of Maycomb, Alabama. For ten points each,

Name this narrator of *To Kill a Mockingbird*, who punches Cecil Jacobs in the schoolyard when he makes fun of her father, Atticus Finch, for defending black townspeople like Tom Robinson in court.

ANSWER: Jean Louise "Scout" Finch (accept either underlined name)

During the summer, Scout and her brother, Jem, try to lure the reclusive Boo Radley out of his house with the help of this small Mississippian boy, the nephew of Rachel Haverford.

ANSWER: Charles Baker "Dill" Harris (accept any underlined name)

Francis is another temporary visitor to Maycomb, but he is much less friendly with Scout and Jem than Dill is. Francis is brought to town by this woman, his grandmother and Atticus's sister, who tries to feminize Scout.

ANSWER: Aunt Alexandria Finch Hancock (prompt on "Hancock")

(3) For ten points each, answer the following about ways in which a chemical reaction is noticeable.

One indication is the formation of a precipitate; for example, when mixing sodium hydroxide and hydrochloric acid, particles of this solid will settle out.

ANSWER: table salt (accept sodium chloride or NaCl)

If the mixing of two liquid chemicals doesn't produce a solid precipitate, it might instead produce a product in this phase of matter, seen as bubbles emerging from the liquid.

ANSWER: gas

This other common sign of a chemical reaction takes place when, for example, copper sulfate is added to water. This phenomenon also occurs when a solution including phenolphthalein drops below 8.2 pH.

ANSWER: color change (accept descriptive answers; accept color change from clear to blue; accept color change from clear to pink or vice-versa)

(4) In 1965, this territory was kicked out of a federation that it had created only three years earlier. For ten points each,

Name this island city-state. On the day of this country's independence, its first Prime Minister, Lee Kuan Yew, cried on TV while delivering the news of this country's expulsion from the merger.

ANSWER: Singapore

Singapore was expelled from this Southeast Asian federation, a country with territory on the Asian mainland, numerous small islands, and the island of Borneo, which this country shares with Brunei and Indonesia.

ANSWER: Malaysia

A primary concern for post-independence Singapore was securing access to this vital resource, which was then almost completely imported from Malaysia. Singapore now relies on the "Four Taps" of this resource, including collection in man-made reservoirs, desalination plants, and waste treatment & reclamation projects.

ANSWER: fresh water

(5) In this epic, the demon Ravana disguises himself as a beggar to trick Sita into crossing a magical protective boundary. For ten points each,

Identify this epic named for Sita's husband, a hero who defeats Ravana with the help of Lakshmana and Hanuman.

ANSWER: Ramayana

In the Ramayana, Hanuman leads an army of these creatures to help Rama save Sita. Because Hanuman has the form of one of these animals, he is able to set the island of Lanka on fire with his long, prehensile tail.

ANSWER: monkeys (accept apes, since the text is sometimes translated this way)

The Ramayana is an epic from this modern country. Other famous works from this country include the Upanishads and the Mahabharata.

ANSWER: India

(6) This character tells Eilert Lovborg to commit suicide “beautifully” after he loses his manuscript; after Eilert’s accidental death in a brothel, this character is implicated in the scandal by Judge Brack and commits suicide herself at the play’s end. For ten points each,

Name this wife of George Tesman and title character of a Henrik Ibsen play.

ANSWER: **Hedda Gabler**

Henrik Ibsen is a playwright from this Scandinavian country, where Hedda Gabler and George Tesman live in Oslo.

ANSWER: **Norway**

Hedda Gabler and Eilert Lovborg die via these items. Earlier in the play, Hedda carelessly plays with these items, fulfilling a literary device named for Anton Chekhov that, if one of these items appears in an early act, it must be used in a late act.

ANSWER: **pistols** (accept Chekhov’s **gun**)

(7) For ten points each, name the following American industrialists.

This billionaire is believed to have been the richest person in American history, due to his success founding and running the Standard Oil Company.

ANSWER: John D. **Rockefeller**

This steel tycoon argued that extreme wealth is used best when wealthy individuals allot it philanthropically, as opposed to governmental interference or private hoarding, in his “The Gospel of Wealth.” This man’s own philanthropy efforts included focus on education, including founding thousands of libraries.

ANSWER: Andrew **Carnegie**

This “Commodore” built a business empire of railroad and steamboat enterprises throughout New York.

ANSWER: Cornelius **Vanderbilt**

(8) The product of two integers can be written as the least common multiple of the two numbers times the “greatest common” type of this concept. For ten points each,

Give this term for the multiplicative “building blocks” of integers. If x is a multiple of y , then y is said to be one of these of x .

ANSWER: **factor** or **divisor** (accept greatest common **factor** or **GCF** or greatest common **divisor** or **GCD**; accept equivalents for “greatest” and/or “common”)

If the greatest common factor of two numbers is 1 - that is, they have no common proper factors - then the two numbers have this relationship.

ANSWER: **relatively prime** (accept **coprime** or **mutually prime**; do not accept or prompt on “prime” alone)

An algorithm named for this ancient Greek mathematician quickly computes the GCD of two numbers; that algorithm can be found in this man’s *Elements*, a work somewhat more famous for its geometry.

ANSWER: **Euclid** of Alexandria

(9) For ten points each, answer the following about nautical art.

Winslow Homer's *The Gulf Stream* shows these creatures circling a small boat in rough Caribbean waters. A century earlier, John Singleton Copley painted the thrilling rescue of Brook Watson from one of these animals.

ANSWER: shark (accept Watson and the Shark)

Théodore Géricault [zher-ee-koh] interviewed shipwreck survivors and visited morgues to properly paint this massive, dramatic oil canvas.

ANSWER: The Raft of the Medusa (accept Le Radeau de la Méduse)

A much calmer artwork, Alfred Stieglitz's *The Steerage*, depicts a lower-class ship sailing from America to Europe. *The Steerage* is a work in this artistic medium, which Stieglitz later promoted by displaying the works of Ansel Adams.

ANSWER: photography

(10) These events are classified into either Type I or II based on the presence of hydrogen in their spectra. For ten points each,

Name these incredibly violent explosions that end the life cycles of certain large stars.

ANSWER: supernova (do not accept or prompt on "nova" alone)

A supernova may occur if one of these objects gains enough matter to reach the Chandrasekhar limit, at which point it collapses and explodes. Sirius B, the smaller of the Sirius binary star system, is an example of these small stellar remnants.

ANSWER: white dwarf (prompt on "dwarf")

A supernova in 1054 created one of these clouds of dust in the shape of a crab. Another famous example of these, in Orion, is shaped like a horse's head.

ANSWER: (Crab and/or Horsehead) nebula

(11) For ten points each, answer the following about buoyancy.

Archimedes's Principle states that the amount of water displaced by a *floating* object is determined by this property of the object.

ANSWER: mass

If the object completely sinks, rather than floats, the amount of water displaced is equal to this other property of the object. This quantity, the amount of space an object occupies, is measured in liters.

ANSWER: volume

This scientist formulated the Hydrostatic Paradox from the fact that the pressure of a liquid depends only on its height. The SI unit of pressure is named for this Frenchman.

ANSWER: Blaise Pascal

(12) In a novel by this author, Martians inject the blood of Earth creatures into their bodies as nourishment, but die out when they are unable to defend themselves against Earth diseases. For ten points each,

Name this early science fiction author of *The War of the Worlds*, who wrote about Dr Kemp witnessing the beating death of his former schoolmate, Griffin, in *The Invisible Man*.

ANSWER: H(erbert) G(eorge) Wells

In this HG Wells novel, an unnamed scientist appears suddenly at a dinner party and tells about his travels among the dainty Eloi and the brutish, subterranean Morlocks, theorizing that they are descended from his contemporary upper and lower classes, respectively.

ANSWER: The Time Machine

In this Wells novel, Edward Prendick is rescued after a shipwreck and taken to a barbaric laboratory, in which the title scientist vivisects animals to create bizarre half-human creatures.

ANSWER: The Island of Doctor Moreau

(13) Liam O’Flaherty’s *Insurrection* takes place during this rebellion, in which a citizen army led by James Connolly sieged Dublin Castle. For ten points each,

Name this April 1916 uprising that was suppressed by British forces after roughly a week of fighting.

ANSWER: Easter Rising (accept equivalent terms for “rising,” such as “uprising”)

The Easter Rising failed to kick the English out of this island country.

ANSWER: Ireland

Two years after the Easter Rising, Éamon de Valera’s Sinn Féin [shin fayn] won a landslide electoral victory but refused to take their seats in this body.

ANSWER: British Parliament

(14) This genre’s “danceability” was given up in favor of fast, progressive improvisation in the 1940s with the growth of bebop, while an “acid” form of this style combined it with 1970s era funk and disco. For ten points each,

Name this broad musical style that developed alongside swing in 20th century America. Music in this genre commonly features syncopated rhythms played by a small ensemble of saxophones, brass, and a rhythm section.

ANSWER: jazz

This jazz trumpeter wrote “Deception” for a 1957 album that also features “Moon Dreams,” and devised the structure of “Flamenco Sketches” on his 1959 album, *Kind of Blue*.

ANSWER: Miles Davis

Miles Davis is credited with popularizing – and, according to one of his album titles, birthing – this style of jazz music with a laid back tempo and a calmer sound than bebop.

ANSWER: cool jazz (accept Birth of the Cool; do not accept smooth jazz or other terms)

(15) This goddess ruled over Fólkvangr and owned a necklace named Brisingamen, which was stolen by a god in the form of a seal. For ten points each,

Name this Norse goddess of love and beauty.

ANSWER: **Freyja** (do not accept “Frey” or “Freyr;” do not accept “Frigg” or “Frigga”)

This shapeshifting Norse trickster god stole Freyja’s necklace, and transformed into a mare to stop a legendary builder from winning the right to marry Freyja.

ANSWER: **Loki**

Loki transformed into a mare to distract the stallion Svadilfari, and became the mother of this eight-legged steed of Odin.

ANSWER: **Sleipnir**

(16) The uninhabited Chambers Island lies in this body of water, just south of a border with Michigan. For ten points each,

Name this inlet of Lake Michigan, on which Sturgeon Bay, Wisconsin lies. The largest city on this body of water is the least-populous city to be home to a National Football League team.

ANSWER: **Green** Bay

The city of Sturgeon Bay is the seat of this Wisconsin county, a popular tourist destination on a peninsula that juts into Lake Michigan east of Green Bay.

ANSWER: **Door** County

On October 8, 1871, one of these disasters struck Peshtigo on the north shore of Green Bay. This disaster killed at least 1,000 people, though a more famous disaster of the same type killed only a few hundred people somewhat to the south.

ANSWER: (Great) Peshtigo **Fire** (accept (Great) Chicago **Fire**)

(17) This event was one of a number of responses to the taxes posed by the Townshend Act, and it was sparked by Sam Adams' declaration that a meeting at the Old South Meeting House could "do nothing further to save the country." For ten points each,

Name this December 16, 1773 protest, in which the Sons of Liberty boarded three ships and destroyed chests of imported leaves.

ANSWER: **Boston Tea Party** (prompt on partial answers)

The colonists weren't opposed to taxes, period; instead, they protested the unfair conditions of the tax. This popular catchphrase described the colonists' major grievance with the Townshend Acts; a modified version of it appears on license plates in Washington, D.C.

ANSWER: **No taxation without representation** (accept **Taxation without representation**; accept *any* rephrasing of the general idea, not just these specific words)

The unpopular Tea Act was promoted by this British Prime Minister, who served from 1770 to 1782, including the bulk of the American Revolution.

ANSWER: Frederick North, Lord **North**

(18) Deciduous trees lose these structures annually, while evergreen trees do not. For ten points each,

Name these photosynthetic organs of plants. They may be broad or needle shaped.

ANSWER: **leaf** (accept **leaves**)

Plants exchange gases through these tiny pores, which are surrounded by guard cells on the underside of leaves.

ANSWER: **stomata**

This process, the evaporation of water from a plant through stomata, helps pull water molecules through the plant.

ANSWER: **transpirational** pull

(19) In a Yasunari Kawabata book titled for these birds, they appear on Yukiko's scarf, which is brought to a tea ceremony. For ten points each,

Name these birds, a symbol of youth. A legend promising good luck for those who fold 1,000 of these birds, and the story of Sadako Sasaki's folding despite being stricken with leukemia, inspired a novel by Eleanor Coerr.

ANSWER: **cranes** (accept **Thousand Cranes**; accept **Sadako and the Thousand Paper Cranes**; accept origami paper **cranes**; accept **orizuru**; accept **senbazuru**)

Yasunari Kawabata is a novelist from this country, where the origami crane legend was born.

ANSWER: **Japan**

Sadako Sasaki lived in this Japanese city. Sadako's illness stemmed from radiation poisoning she received on August 6, 1945, in an event described by a John Hersey work named for this city.

ANSWER: **Hiroshima**

(20) For ten points each, answer the following about the economic study of how goods are produced.

Economists generally agree on three basic factors of production; this factor includes man-made durable goods, like tools, that are used to produce other goods. Some economists consider money itself as part of this factor, as it can be used in the production process; as a result, this term now often refers to money provided to start a business.

ANSWER: capital (accept venture capital or similar elaborations)

The three-factor model of production also includes this factor, the human effort used to produce goods. Workers receive wages in exchange for providing this factor.

ANSWER: labor

This third factor of production is the naturally-occurring resources used in production. Henry George proposed a single tax on this concept, which he argued would be an efficient, progressive tax.

ANSWER: land (accept land (value) tax; do not accept equivalents; this is a technical term)