

Round 5

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Tossups

(1) **The majority of these animals are passerines, and have a backward-facing toe. These organisms evolved independently of mammals, but they are still endothermic vertebrates with four-chambered hearts. Unlike their ancestor (*) *Archaeopteryx*, these animals lack teeth. Hard eggs and light skeletons are characteristics of, for ten points, what class of feathered animals that includes the flightless ostrich?**

ANSWER: birds (accept Aves)

(2) **Sierpinski's triangle is a fractal image created by shading this diagram's even numbers. The calculation "n choose k" will find the kth number in its nth row, and this diagram's rows list the (*) binomial coefficients. A French mathematician names, for ten points, what expanding mathematical image whose first few rows are "1", then "1,1", then "1,2,1"?**

ANSWER: Pascal's triangle

(3) **In Chinese mythology, Dian Mu used these objects to throw her lightning bolts. 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) **This state's popular dueling site, Weehawken, was where both Philip and Alexander Hamilton were fatally shot. 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) **This novel's title character battles the Knight of the White Moon, and is forced to cease all acts of chivalry for a year. This work's title character tries to save the "princess" Dulcinea with the help of his squire, (*) Sancho Panza, and rides the 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 theory of special relativity uses reference frames to explain one of these statements involving an astronaut twin. These concepts often arise from thought experiments, such as a time traveler killing his own ancestor. The phrase “this phrase is (*) false” is an example of these statements, because it cannot seem to be true or false. For ten points, name this type of confusing statement or argument, which logically contradicts itself.**

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

(7) **While investigating this event, Luis Alvarez discovered that sediment from around the world displays a layer of iridium dating to this event. This event may have begun at Chicxulub [chick-shoo-loob] on the Yucatan peninsula, and ended the (*) Mesozoic Era. 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: extinction of the dinosaurs (accept K-T extinction event or Cretaceous-Tertiary extinction event; accept K-Pg extinction or Cretaceous-Paleogene extinction)

(8) **The first president of this country instituted “Harambee,” a community-building strategy. 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) **A poem in this format by Elizabeth Barrett Browning asks “How do I love thee? Let me count the ways,” and is collected in “these poems” from the Portuguese. An (*) Elizabethan version of this poetic form is composed of three quatrains and a couplet. “Shall I compare thee to a summer’s day?” is a poem in this format written by Shakespeare. For ten points, name these fourteen-line poems.**

ANSWER: sonnets

(10) **One of these instruments is played by Tamino to change sorrow into joy while he tries to save Pamina from Sarastro. In an opera named for one of these instruments, “Der Holle Rache” [der holl-ah ROCK-uh] is 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) **This state’s “Unassigned Lands” were claimed in an infamous 1889 land rush. In this state’s capital, 168 people were killed in a 1995 bombing by Timothy McVeigh. In 1921, the wealthiest African-American community in the country, the Greenwood district, was burned during this state’s (*) Tulsa race riots. For ten points, name this central U.S. state where “Sooners” now live in a panhandle north of Texas.**

ANSWER: Oklahoma

(12) **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

(13) **Six Miqats [mee-kots] are stations on the way to this city. This city is visited during the Umrah, and believers in this city walk in circles around this city's (*) Ka'aba to remember its construction by Ismail and Ibrahim. All able-bodied Muslims must at some point in their life complete the Hajj, a pilgrimage to, for ten points, what holy Saudi city?**

ANSWER: Mecca

(14) **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." Another song from this album was criticized as "anti-police" after it was performed at Super Bowl (*) 50's halftime show. Another song on this album ends "He better call Becky with the good hair." For ten points, name this 2016 album, featuring the singles "Hold Up," "Formation," and "Sorry," by Beyoncé.**

ANSWER: Lemonade

(16) **This architect's "inverted ziggurat" is a feature of his design for a building with a spiraling interior walkway, the Guggenheim Museum in New York. This man extended (*) cantilevered floors over Bear Run, a stream in Pennsylvania, in creating a house for the Kaufmann family. For ten points, name this Prairie School 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 southwest of the Strait of Hormuz. Housing in this city is built on artificial, palm-frond-shaped landmasses that sit 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 title character claims that the "Indians of Cleveland" will be defeated by The Great DiMaggio, and goes for eighty-four days without a catch before he hooks a giant marlin without (*)** Manolin's help. The title fisherman's catch is eaten by sharks on the way back to Cuba in, for ten points, what novella about the elderly fisherman Santiago, written by Ernest Hemingway?

ANSWER: The Old Man and the Sea

(19) **Nedeljko Čabrinović [neh-DAY-ko cha-brin-oh-vitch] tried to accomplish this act with a 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. 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 Alexandra Finch Hancock (prompt on "Hancock")

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

One indication of a chemical reaction is the formation of a precipitate, a solid that settles out of solution. This doesn't always happen, though; for example, sodium hydroxide and hydrochloric acid react to form water and this compound, which remains dissolved but can be harvested by boiling off the water.

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 man wrote a poem in which Gunga Din [gun-gah deen] is called a "squidgy-nosed old idol" but is ultimately declared "a better man than I" after he takes a bullet for the speaker. For ten points each,

Name this author who wrote about the life of English people in colonial India in poems like "The White Man's Burden" and a collection of tales about "Toomai of the Elephants," "Rikki-Tikki-Tavi," and a boy who is raised by wolves and battles the tiger Shere Khan.

ANSWER: (Joseph) Rudyard Kipling

In this collection of stories by Kipling, the human child Mowgli is raised by wolves and has adventures in the Indian wilderness with the panther Bagheera.

ANSWER: The Jungle Book

As he grows up, Mowgli is guided by Bagheera and this wise, old bear.

ANSWER: Baloo

(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”)

Knowing the greatest common factor, or GCF, can make this computational process easier. When the fraction 12 over 15 undergoes this process, it becomes 4 over 5.

ANSWER: **reducing** the fraction (accept **simplifying** the fraction; accept descriptions of “getting the fraction into **lowest terms**,” accept word forms for all options)

An algorithm named for this ancient Greek mathematician quickly computes the GCF of two numbers; that algorithm can be found in this man’s *Elements*, a work 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

Some plants have, over the last two centuries, adapted to rising levels of this atmospheric gas by having fewer stomata to exchange less gas. This greenhouse gas, a three-atom compound, is expected to reach 500 parts per million by the end of this century after remaining under 300 ppm for nearly all of human history.

ANSWER: carbon dioxide (or CO₂)

(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)