

Round 4

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Tossups

(1) **The efficiency of refrigerators was once rated in frigories, a unit equivalent to one of these units per hour. It is not a unit of mass or temperature, but one of these units defines the specific heat of (*) water.** There are 4.184 joules in the small version of this unit, and there are nine of their large kind in each gram of fat. For ten points, name this non-SI unit that is listed on packages to show the energy content of food.

ANSWER: calorie (accept small calorie, large calorie, food calorie, kilocalorie, cal, or kcal)

(2) **The coastal resort of Provincetown lies on the tip of this state's eastern region, and cities like New Bedford lie on Buzzards Bay in this state's south. Myles Standish State Forest is found in a coastal region of this state, which includes the islands of Chappaquiddick, (*) Martha's Vineyard, and Nantucket.** Plymouth Colony was established in what is now, for ten points, what New England state that borders both Connecticut and Rhode Island?

ANSWER: Massachusetts

(3) **A deadly biochemical attack in this country occurred when Aum Shinrikyo [ah-oom sheen-ree-kyoh], a doomsday cult, released sarin gas in this country's capital's (*) subway system.** This country, which committed war crimes during its control of Manchukuo, controversially issued textbooks ignoring those crimes and others in China and Korea during World War II. For ten points, name this country currently led by Shinzo Abe [ah-bay].

ANSWER: Japan (accept Nippon or Nihon)

(4) **In a novel by this man, Griffin is disappointed when he can still see the claws of a cat after testing a serum on it. In another novel by this author, England is invaded by (*) Martians in tripods with terrifying heat ray weapons.** For ten points, name this English author of early science fiction novels like *The Island of Doctor Moreau*, *The Invisible Man*, and *The War of the Worlds*.

ANSWER: H.G. Wells (accept Herbert George Wells)

(5) **A test named for these objects will tell whether a relation is a function by checking if one of these objects intersects the graph more than once. These lines do not have (*) slope and are parallel to the y-axis, which is itself one of these lines.** For ten points, name this type of line that creates a right angle when it meets a horizontal line.

ANSWER: vertical (accept vertical lines; accept vertical line test; accept vertical asymptotes)

(6) **One of these objects in Norse myth is the home of Nidhög, a dragon who gnaws on its base and exchanges insults with an eagle with the help of Ratatöskr, a (*) squirrel.** One of these objects connects the Nine Worlds in Norse myth. Odin learned knowledge of the runes by tying himself to Yggdrasil, one of, for ten points, what kind of large, branching plant?

ANSWER: trees (accept elms; accept ash tree)

(7) **Two stories in this collection tell of a knight who learns what women want by marrying an old witch, and of three young men who try to kill death. In this work's frame story, pilgrims stop at the (*) Tabard Inn on the way to the shrine of Archbishop Thomas Becket in the south of England.** The Miller, the Pardoner, and the Wife of Bath tell stories in, for ten points, what collection by Geoffrey Chaucer?

ANSWER: The Canterbury Tales

(8) **Fluids for which this property remains constant are called incompressible. The specific gravity is the ratio of this property for a substance and for water. Water has a value of roughly one (*) gram per cubic centimeter for this quantity.** For ten points, name this physical property, calculated by dividing an object's mass by its volume.

ANSWER: density (accept fluid density; accept mass density)

(9) **This number is the scale degree of the subdominant, and is the number of flats in the key of A flat major. There are this many beats in a measure of common time. The orchestra is traditionally divided into this many families of (*) instruments, including percussion and strings.** For ten points, give the number of strings on a violin and performers in a string quartet.

ANSWER: four

(10) **Despite the fact that this good is not edible, the British lamented a "famine" of it caused by a Union Navy blockade. Boll (*) weevils ruin harvests of this good.** Eli Whitney designed a "gin" to separate the seeds and fibers of, for ten points, what textile cash crop that was overwhelmingly grown by slaves in the American South?

ANSWER: cotton

(11) **Edwin Hubble charted these objects according to their shape on a diagram that resembles a tuning fork. Supermassive (*) black holes are thought to exist at the center of some of these objects, which come in lenticular, irregular, elliptical, and spiral shapes.** Andromeda and the Milky Way are, for ten points, what large systems of millions of stars?

ANSWER: galaxy (accept galaxies)

(12) **One of these systems runs eight hundred miles from Prudhoe Bay to the port town of Valdez, and its revenue is used in a Permanent Fund that pays the residents of Alaska. President Trump put down the (*) Standing Rock protest of one of these systems, Dakota Access, that threatened sacred land and drinking water.** Keystone XL is, for ten points, what type of construction that transports crude oil over land?

ANSWER: oil pipeline (accept crude oil pipes; prompt on descriptions related to "transporting oil;" prompt on "pipe" alone)

(13) **This author wrote a novel in which Stiva [STEE-vah] witnesses the death of a railway worker and Kitty becomes ill after the protagonist begins an affair. Another novel by this author follows several families during (*) Napoleon’s invasion of Russia. Count Vronsky falls from a horse during a race in a novel by this man in which the title noblewoman throws herself under a train. For ten points, name this author of *Anna Karenina* and *War and Peace*.**

ANSWER: Leo Tolstoy (accept Lev Nikolayevich Tolstoi)

(14) **A group of these people defeated Gaius Claudius Glaber after rappelling down Mount Vesuvius on vines. The annual declaration of war on a group of these people allowed kryptes [crip-tees] to freely kill them in order to complete the agoge [ah-goh-gay]. (*) Helots were classified as these people in Sparta, and thousands of these people were crucified along the Appian Way after Spartacus’s revolt failed. The Roman libertini were formerly, for ten points, what class of un-free people?**

ANSWER: slaves (accept additional information, like Roman slaves; accept servus; accept vernae; accept helots if given between the words “declaration” and “Helots,” but do not accept or prompt it earlier or later)

(15) **On the right side of this painting, a woman holds out a pink cloak to cover this painting’s title figure. On the left side of this painting, Zephyrus, the god of wind, (*) blows the title figure of this painting to shore. This painting’s central figure stands on a floating seashell after rising from the sea. For ten points, name this painting depicting the origin of the Roman goddess of beauty, painted by Sandro Botticelli.**

ANSWER: The Birth of Venus (accept La Nascita di Venere)

(16) **On a collaboration with Khalid, this artist sings “Oh, I hope some day I’ll make it out of here.” This artist uses a soundbite from *The Office* in a song on her 2019 album *When We* (*) *All Fall Asleep, Where Do We Go?* This artist frequently wears baggy clothes to avoid criticism about her body. For ten points, name this teenage singer of “Bury a Friend” and “Bad Guy.”**

ANSWER: Billie Eilish [“eye”-lish] (accept Billie Eilish Baird O’Connell)

(17) **A resident of this literary town vanishes after stopping near Wiley’s Swamp on his way home from a nearby farm. A man from this town claims he was chased by the Galloping Hessian. (*) Brom Bones marries Katrina in this town shortly after the disappearance of the schoolteacher, Ichabod Crane. For ten points, name this New England town that, in a short story by Washington Irving, is haunted by the Headless Horseman.**

ANSWER: Sleepy Hollow (accept The Legend of Sleepy Hollow; accept Tarry Town; accept Greensburgh)

(18) **In the fifth century, the Forty Days’ Fast of Saint Martin was established as the lead-up to this holiday. The Sun of Righteousness in Malachi helped establish this holiday on a Roman (*) solstice day in Catholicism. This modern holiday often includes representations of shepherds and Magi visiting a stable in Bethlehem. For ten points, name this Christian holiday celebrating the birth of Jesus.**

ANSWER: Christmas Day (accept Nativity; accept Noel; prompt on “Yule;” prompt on “December 25;” do not accept “Christmas Eve”)

(19) **Small artifacts from this event were carried aboard the *Apollo 11* lunar module, and the Smithsonian maintains the restored machine that accomplished this event. This event, which took place near (*) Kitty Hawk, North Carolina, lasted only twelve seconds and covered one hundred twenty feet of ground. For ten points, name this 1903 accomplishment by Orville and Wilbur, the Wright brothers.**

ANSWER: Wright brothers' first flight of a powered, heavier-than-air aircraft (accept descriptions; accept Wright brothers' flight before "Wright" is read; prompt on "flight")

(20) **These plants are the habitat for cochineals [kah-chih-neels], insects that are harvested to produce a deep red dye. These succulent plants have areoles, small, (*) spiny bumps that defend the plant's stem. The saguaro [sah-WAH-roh] is a giant example of this plant found in Sonora and Arizona. For ten points, name this plant that typically has excellent water storage abilities to survive in the desert.**

ANSWER: cactuses (accept cacti)

Bonuses

(1) This man wrote about a man who prepares a bell and a series of complex levers to try to avoid the title fate in “The Premature Burial.” For ten points each,

Name this American author of horror and mystery stories like “The Black Cat.”

ANSWER: Edgar Allan Poe

In this Edgar Allan Poe short story, Fortunato is purposefully bricked into a wall by Montressor, who lures him to his death with the promise of the title wine.

ANSWER: The Cask of Amontillado

In this other Poe short story, Madeline is entombed alive in the title family’s vault, but returns and shocks Roderick to death while their ancestral home crumbles around them.

ANSWER: The Fall of the House of Usher

(2) The record for the largest known one of these numbers was broken in December 2018 via a distributed computing project called GIMPS. For ten points each,

Name this type of number that, unlike composite numbers, cannot be evenly divided by any positive integer other than itself and one.

ANSWER: prime number(s) (accept, but do not otherwise reveal, Mersenne primes)

The last seventeen times that a new record-high prime number has been found, the prime has been this type of prime number, which is exactly one less than a power of two.

ANSWER: Mersenne prime

The record for largest-known prime number is always certain to be broken again, because this ancient Greek mathematician and author of the *Elements* proved that there are infinitely many prime numbers.

ANSWER: Euclid [yoo-klid] of Alexandria

(3) This sculptor planned forty sculptures for a work commissioned by Pope Julius II [the second] although, due to budget constraints, the finished work only includes six figures. For ten points each,

Name this Italian Renaissance artist, who sculpted the *Horned Moses* for Pope Julius, and who painted *The Creation of Adam* on the ceiling of a Vatican chapel.

ANSWER: Michelangelo di Lodovico Buonarroti Simoni (accept either underlined name)

Michelangelo’s *Horned Moses* is one of the six sculptures that adorn this structure, which was eventually constructed after the death of Pope Julius.

ANSWER: tomb of Pope Julius II (accept equivalent terms such as vault of Pope Julius II; prompt on more general answers like “memorial” or “final resting place” of Pope Julius II; do not accept “grave”)

During a dispute with Pope Julius, during which work on the tomb was suspended, Michelangelo was commissioned to paint *The Creation of Adam* and other scenes from Genesis on the ceiling of this chapel in the Vatican.

ANSWER: Sistine Chapel

(4) This politician served as Woodrow Wilson's Secretary of State, but resigned after the sinking of the *Lusitania*. For ten points each,

Name this Populist American politician. While running for President, he argued for free silver and bimetallism in the American economy with his "Cross of Gold" speech.

ANSWER: William Jennings **Bryan**

Bryan ran on this party's ticket in 1896, gaining Populist votes. This party was founded by Andrew Jackson and opposes the Republican Party.

ANSWER: **Democratic** Party

This president defeated William Jennings Bryan in the 1896 election. This president won the Spanish-American War and annexed Hawaii, but was assassinated by Leon Czolgosz [**chol-gosh**] in 1901.

ANSWER: William **McKinley** Jr.

(5) These animals are the natural predators of balloons in the *Bloons* franchise. For ten points each,

Name this type of animal. In a Sega franchise, one of these animals named Aiai [**eye-eye**] rolls around in a ball collecting bananas.

ANSWER: **monkey** (accept Super **Monkey** Ball; do not accept or prompt on "ape")

This sidekick to Donkey Kong is based on the original design for Donkey Jr. and wears a red hat and shirt. He starred in his own racing game for the Nintendo 64 and has been a playable fighter in the last three *Smash* games.

ANSWER: **Diddy** Kong (accept **Diddy** Kong Racing)

This MOBA game by Riot includes Wukong, The Monkey King as one of dozens of champions who fight in the three lanes and jungle of Summoner's Rift.

ANSWER: **League of Legends** (accept **LoL**)

(6) These events are defined as a large drop in biodiversity in a short amount of time. For ten points each,

Name this type of event in which large numbers of species are wiped out. These events define the boundaries between the Permian and Triassic periods and between the Cretaceous and Paleogene periods.

ANSWER: mass **extinction** events

The extinction event that ended the Cretaceous period is believed to have been caused by this type of event at a site on what is now the Yucatan Peninsula.

ANSWER: cosmic **impact** (accept answers describing an **asteroid impact** and/or **meteorite impact** and/or **comet impact**; accept equivalents, like "an **asteroid** and/or **meteorite** and/or **comet hitting the Earth**;" prompt on partial answers like "asteroid" or "meteor(ite)" or "comet" alone; do not accept any answer including "meteoroid")

The evidence for an asteroid impact includes the presence of this metallic element, whose atomic symbol is Ir [**spell it**], in the Earth's crust at the age of the Cretaceous extinction.

ANSWER: **iridium**

(7) Pierre Simon de Laplace [la-plahss] and Joseph Louis Lagrange [la-gronj] taught in this country during its late-eighteenth century revolution. For ten points each,

Name this country whose other prominent scientists included Antoine Lavoisier, who was guillotined in 1794 during Maximilien Robespierre's Reign of Terror in this country.

ANSWER: **France** (accept Kingdom of **France** or **French** Republic)

This number system was briefly used for timekeeping and the calendar during the French Revolution, but it didn't catch on. The use of this number system was significantly more successful in the metric system.

ANSWER: **decimal** system (accept **base ten**; accept any descriptive answer relating to the number **ten**)

One of the first French thinkers to propose "decimal time" was Jean le Rond d'Alembert [zhon leh ron dal-um-bayr], who co-edited this intellectual project with Denis Diderot. This Enlightenment-era work was a monumental attempt to collect all human knowledge.

ANSWER: **Encyclopédie** (accept **Encyclopedia**)

(8) In this novel, Annemarie Johansen transports a handkerchief coated in cocaine to her uncle Henrik to numb the noses of sniffer dogs. For ten points each,

Name this novel in which Annemarie helps conceal her friend Ellen Rosen by pretending to be her sister while the Danish resistance works to free Danish Jews from the Nazis.

ANSWER: **Number the Stars**

Number the Stars is by this Newbery Medal-winning author of *The Willoughbys*.

ANSWER: Lois **Lowry** (Lois Ann **Hammersberg**)

In this other novel by Lois Lowry, in which Jonas begins to see color after being assigned the title profession in a dystopian society.

ANSWER: The **Giver**

(9) The seventeenth-century doctor Jean Baptist van Helmont used this "theory" to "create" mice by placing a dirty shirt in a jar of wheat for twenty-one days. For ten points each,

Name this now discredited theory which held that snakes, oysters, and other creatures were formed from water, mud, and other non-living parts of the environment.

ANSWER: **spontaneous generation** (accept **abiogenesis**)

Francesco Redi helped disprove spontaneous generation by showing that these creatures, the larvae of flies, only appeared on rotting meat after adult flies landed on it.

ANSWER: **maggots**

Many scientists still believed microbes were spontaneously generated until this man, the creator of the rabies and anthrax vaccines, performed his swan neck flask experiments.

ANSWER: Louis **Pasteur**

(10) In ancient times, Egyptians depicted their people and their pantheon in paintings within the pyramids. Answer the following about pyramid paintings, for ten points each.

Two answers required. In a common pyramid painting, the goddess Nut [noot] is shown arching over the god Geb. Geb would be covered in leaves and Nut with stars, showing that they were the gods of these two domains.

ANSWER: the earth and sky (both parts required; accept in either order)

Another common subject of pyramid paintings is this jackal-headed god, who weighs the hearts of the dead against the feather of Ma'at.

ANSWER: Anubis (accept Anpu or Inpu)

These people, considered to be descendants of Ra, are sometimes depicted wearing the double crown, called the pschent [p'skent]; other times, these people are shown wearing an ornate blue and gold headcloth called the nemes [NEH-mehs].

ANSWER: Pharaohs (accept kings of Egypt)

(11) The popularity of the works of this composer of the oratorios *Saint John Passion* and *Saint Matthew Passion* was revived in the nineteenth century by Felix Mendelssohn. For ten points each,

Name this composer of the *Goldberg Variations* and the *Well-Tempered Clavier*.

ANSWER: Johann Sebastian Bach

Bach's *Passion* oratorios were written in this language, his mother tongue, because he set his music to the Luther Bible instead of a Latin translation. Johannes Brahms' *Requiem* was written in, and named for, this language.

ANSWER: German (accept Deutsch; accept German Requiem; accept Ein Deutsches Requiem)

When he wasn't reviving Bach works, Mendelssohn composed his own music, including incidental music for *A Midsummer Night's Dream* by this much earlier playwright.

ANSWER: William Shakespeare

(12) This scientist was the first person to have an element named after him while alive. For ten points each,

Name this Berkeley chemist who discovered ten transuranium elements and is the namesake of element one hundred six.

ANSWER: Glenn Theodore Seaborg (accept Seaborgium; prompt on "Sg")

This element discovered by Seaborg has atomic number ninety-six. It is named after a husband and wife pair of scientists who discovered polonium and radium.

ANSWER: curium (accept Cm; accept Marie and/or Pierre Curie)

Among Seaborg's discoveries was element one hundred one, which was named in honor of this Russian chemist who is known as the "father of the periodic table."

ANSWER: Dmitri Ivanovich Mendeleev (accept mendelevium; prompt on "Md")

(13) Name the following locations based on their public art designed by glass sculptor Dale Chihuly [chih-hoo-lee], for ten points each.

This city commissioned the Chihuly Garden and Glass near several landmarks built for the 1962 World's Fair, including the International Fountain and the Space Needle.

ANSWER: Seattle

Chihuly's *Fiori di Como*, a collection of thousands of glass flowers, is suspended from the ceiling in the lobby of the Bellagio hotel. The Bellagio, like numerous other casino resorts along a namesake "strip," is technically in the town of Paradise but commonly referred to as part of this city in Nevada.

ANSWER: Las Vegas

This medical center in Rochester, Minnesota is home to numerous chandelier sculptures by Chihuly, as well as the nation's top ranked departments in several medical disciplines.

ANSWER: Mayo Clinic

(14) In a story by this author, the tiger Shere Khan seeks to destroy a boy named Mowgli who was adopted by a pack of wolves. For ten points each,

Name this English author, who wrote about an Indian water-carrier saving a British soldier's life in "Gunga Din."

ANSWER: Rudyard Kipling (accept Joseph Rudyard Kipling)

Mowgli eventually kills and skins Shere Khan in this collection of stories by Kipling that includes the tale of "Rikki-Tikki-Tavi."

ANSWER: The Jungle Book

In this poem by Kipling, the narrator declares "you'll be a Man, my son!" after giving his child advice on how to be a well-balanced adult.

ANSWER: If-

(15) A nine-story octagonal tower made of this material was located in Nanjing but was destroyed during the Taiping Rebellion. For ten points each,

Name this ceramic material used in pottery. In the fourteenth century, European traders fell in love with the blue-and-white decorated style of this material.

ANSWER: porcelain (prompt on "china")

The Porcelain Tower of Nanjing was constructed during this Chinese dynasty, which exported blue and white porcelain vases to Europe. This dynasty ruled between the Yuan and Qing [cheeng] dynasties and fell in 1644.

ANSWER: Ming dynasty

Europeans began to obsess over the manufacturing process for porcelain after this Italian explorer returned from China on the Silk Road with samples of porcelain.

ANSWER: Marco Polo

(16) This man asked God to spare his nephew's hometown from destruction if ten righteous people could be found within it. For ten points each,

Name this biblical patriarch, who interceded on behalf of Lot's hometown just after receiving a prophecy that he would become the father of Isaac with his wife, Sarah.

ANSWER: Abraham (accept Abram; accept Ibrahim)

Abraham negotiated for the preservation of this sinful city, which God destroyed along with Gomorrah in a rain of fire.

ANSWER: Sodom

Because of Abraham's intercession, Lot was able to escape with his family, but only if they did not look back at the burning city as they fled. Lot's wife disobeyed, and was transformed into a pillar of this material.

ANSWER: salt

(17) This man's success with the Orinoco strain of a certain cash crop single-handedly made his colony profitable. For ten points each,

Name this businessman and farmer who planted the first successful tobacco crops in Virginia.

ANSWER: John Rolfe

Rolfe married this daughter of Chief Powhatan and brought her to England, where she lived under the Christian name Rebecca. This woman legendarily saved John Smith's life as a young girl.

ANSWER: Pocahontas (accept Matoaka)

John Rolfe grew his tobacco in this Virginia colony, the first permanent settlement by the British in the New World. John Smith led this colony's early growth, but was injured in summer 1609 and sailed back to England just before its infamous "Starving Time."

ANSWER: Jamestown

(18) Answer the following about similarly-named works of literature that describe dramatic changes, for ten points each.

In this work by Franz Kafka, Gregor Samsa wakes up to discover he's been transformed into an enormous insect-like creature, causing a great strain on his family.

ANSWER: The Metamorphosis (accept Die Verwandlung)

The similarly-named *Metamorphoses* [meh-tah-mor-foh-SEEZ] is an ancient poem that chronicles the history of the world and mythological transformations. It was written by this Roman poet of the *Ars Amatoria*.

ANSWER: Ovid (accept Publius Ovidius Naso)

Another Latin author, Apuleius, also wrote a novel called *Metamorphoses*, though the book is more commonly titled for a "Golden" one of these horse-like animals. In Ovid's *Metamorphoses*, King Midas is cursed with the ears of this animal when he angers Apollo.

ANSWER: donkey (accept The Golden Ass; accept Asinus aureus)

(19) According to legend, when a student asked his professor who Satyendra Nath Bose was, the professor replied, “You don’t know who he was? Half the particles in the universe obey him!” For ten points each,

Bose’s namesake bosons are studied in this branch of physics, which studies the mechanics of sub-atomic scales.

ANSWER: quantum mechanics (accept quantum physics)

Bose-Einstein statistics explain why this balloon-filling element, the lightest of the noble gases, behaves like a superfluid at low temperatures.

ANSWER: helium (accept He)

A recent triumph of Bose quantum mechanics was the 2012 discovery of this “God particle,” a boson believed to give all matter its mass.

ANSWER: Higgs boson

(20) Running hokey campaign ads is, surprisingly, not one of the Constitutional requirements for someone to become US President. Answer the following about requirements for being president, for ten points each.

The qualifications to become president are listed in Section One of this Constitutional article, which details the executive branch.

ANSWER: Article Two

Article Two’s eligibility clause tries to protect the office of the President from foreign interference by dictating that the President must be this type of person. This three-word phrase is not defined by the Constitution, but courts have held that this status is determined by where someone is born, not by who their parents are.

ANSWER: natural born citizens

Section One states that a natural born citizen must be at least this old, and have lived in the US for fourteen years, to be eligible to take office as President.

ANSWER: thirty-five years old