

## Round 8

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### Tossups

(1) **In the complex plane, a point rotates this much when its coordinate is multiplied by  $i$ . A reference angle of this size in standard position on the unit circle terminates at the point (0,1) [zero comma one] after starting at (1,0) [one comma zero]. Two angles of this size add together to be a (\*) straight angle, and any two angles that sum to this size are called complementary. For ten points, name this value that describes one-fourth of a circular rotation or the size of a right angle.**

ANSWER: 90 degrees (accept pi over 2 radians or 100 gradians; prompt on “90” or “pi over 2” by asking “in what unit?”)

(2) **The production of this form of energy is governed by the Shockley-Queisser limit, which dictates the maximum efficiency of a generator with a single p-n junction between its semiconductor wafers. This form of energy can be concentrated via parabolic (\*) dishes or generated via the photoelectric effect in photovoltaic cells aligned in a large panel. For ten points, name this form of renewable energy that is harnessed from the light and heat radiated by the Sun.**

ANSWER: solar energy (accept reasonable equivalents like solar power; do not accept or prompt on “renewable energy”)

(3) **This man is “eyeing the grocery boys” in the poem “A Supermarket in California.” A poem by this man lists body parts, such as “upper-arm, armpit, elbow-socket,” and he describes “drops of red / Where on the deck my Captain lies” in a poem for (\*) Abraham Lincoln. “I Sing the Body Electric” is by this poet, who said “I celebrate myself and sing myself.” For ten points, name this American poet whose collection *Leaves of Grass* includes “O Captain! My Captain!” and “Song of Myself.”**

ANSWER: Walt(er) Whitman

(4) **This city names a style of chipped, chopped ham popular throughout the Rust Belt. The Heinz food company is headquartered in this city, where tourists often eat sandwiches dressed with coleslaw and fries at (\*) Primanti Brothers. Steelworkers traditionally ate pierogis in, for ten points, what city on the confluence of the Monongahela, Allegheny, and Ohio rivers in western Pennsylvania, the state’s second largest city after Philadelphia?**

ANSWER: Pittsburgh, Pennsylvania

(5) **A myth claims that Ethiopia’s Menelik II used one of these objects as a throne when he discovered it wouldn’t work as intended. Harold Brown promoted this object to display the danger of technology developed by Westinghouse and (\*) Tesla. William Kemmler was the first victim of, for ten points, what apparatus used to deliver death sentences, often nicknamed “Old Sparky,” which was phased out in the 20th century in favor of lethal injections?**

ANSWER: electric chair

(6) **This artist painted a red curtain being pulled back, revealing a young George Washington gesturing to an axe, in *Parson Weems' Fable*. In another work by this artist, three elderly women view Leutze's *Washington Crossing the Delaware*. A work by this (\*) Regionalist at the Art Institute of Chicago shows his sister Nan and their dentist holding a pitchfork in front of a farmhouse. For ten points, identify this painter of *American Gothic*.**

ANSWER: Grant Wood

(7) **Giovanni Giustiniani died from wounds he received while defending this city. This city used a giant chain connected to the Old Galata Tower to prevent ships from accessing the Golden (\*) Horn. Orban designed the giant "Basilica" cannon to target this city's Theodosian Walls in a 1453 siege led by Mehmed II. For ten points, name this city, the capital of the Byzantine Empire, which was renamed to Istanbul in 1930.**

ANSWER: Constantinople (do not accept Istanbul or Byzantium)

(8) **Hexagonal arrangements of graphite have registered very low values of this force. The effect of this force is independent of surface area according to Amonton's Laws. This force's magnitude is equal to a namesake coefficient, symbolized (\*)  $\mu$ , times the normal force. This force's static type prevents resting objects from sliding, and it can be mitigated with lubricants. For ten points, name this force that opposes motion between bodies in contact.**

ANSWER: friction

(9) **In a novel by this author, Aglaya falls in love with Prince Myshkin, who suffers a seizure while at her house. Other epileptic characters created by this author include Smerdyakov, who kills Fyodor, the father of *The* (\*) *Brothers Karamazov*. This author of *The Idiot* wrote a novel in which Raskolnikov confesses to the murder of a pawnbroker. For ten points, name this Russian author of *Crime and Punishment*.**

ANSWER: Fyodor Mikhailovich Dostoyevsky

(10) **This holiday's seven principles, including "nia," or "purpose" and "umoja," or "unity," are represented by a kinara holding seven black, red, and green candles that are lit throughout this holiday. This holiday was established in 1966 by Maulana Karenga, who named it for a (\*) Swahili phrase meaning "first fruits." For ten points, name this winter holiday celebrating African heritage, which takes place from December 26 to January 1.**

ANSWER: Kwanzaa

(11) **In this novel, a grave near Brocklebridge Church finally gets a gravestone marked "Resurgam" fifteen years after the protagonist's friend dies at Lowood School. This novel's protagonist is locked up as a child by Sarah Reed and comforts her future husband after Grace Poole's charge, (\*) Bertha Mason, burns down Thornfield Hall. For ten points, name this Charlotte Brontë novel in which the title woman marries Mr Rochester.**

ANSWER: Jane Eyre

(12) **In 2010, this game’s Hall of Fame voted in the suspended Tomoharo Saitou and actually inducted Brian Kibler. The “Power Nine” of this game includes the Moxen and Black (\*) Lotus. The *Kaladesh* expansion for this game was released in September 2016. A player may lose this game by being “decked” or if their life total falls from 20 to 0, due to spells or creature attacks. For ten points, name this trading card game in which planeswalkers tap lands to produce mana.**

ANSWER: Magic: the Gathering (accept MtG; do not accept Magic the Gathering Online or MtGO)

(13) **Arthur Scargill led a 1984 strike of workers in this industry, which Britain had nationalized in 1947. Margaret Thatcher’s victory over those strikers preceded a sharp downturn in this industry, which unofficially ceased in the UK in 2015. With (\*) steel, this good names a community that normalized competition for resources within Europe and inspired the later European Union. For ten points, name this commodity whose anthracite form is commonly mined as a fuel source.**

ANSWER: coal (accept coal mining; accept European Coal and Steel Community; prompt on “mining;” prompt on “ECSC”)

(14) **In this country in September 2015, a camerawoman tripped migrants fleeing from a refugee camp in Roszke [roos-keh], a few miles from this country’s town of Szeged [seh-ged]. In 2015, Viktor (\*) Orban, this country’s Prime Minister, ordered fences on its borders with Serbia and Croatia to stop Syrian refugees from entering this country. For ten points, name this European country that, as critics ironically note, is seeking guest workers to work in Budapest.**

ANSWER: Hungary

(15) **This man helped Atlas steal apples from the Hesperides and rerouted two rivers to clean the Augean stables. After the Amazons attacked this man, he killed Hippolyta and stole her girdle, and in service to Eurystheus, he used the (\*) hydra’s own venom to kill it. As a baby, this hero defeated a pair of snakes sent by hera. For ten points, identify this Greek who slew the Nemean lion as one of his twelve labors.**

ANSWER: Heracles (accept Hercules until “Greek” is read)

(16) **During this event, Hans Geiger counted flashes of light on a zinc sulfide screen, generated when a radon, bismuth, or radium sample emitted an alpha particle. The plum pudding model was (\*) discredited in this event, in which deflection angles of 90 degrees were surprisingly recorded. Ernest Rutherford’s students carried out, for ten points, what experiment that discovered the positively-charged nucleus of an atom, named for the thin metal sheet used in the setup?**

ANSWER: Rutherford gold foil experiment (accept Geiger-Marsden experiment; prompt on Rutherford experiment before his name is read)

(17) **A character in this novel gets a piece of parmesan cheese from Dr Livesey’s snuff box in exchange for his help. In this novel, a cook rebukes Dick Johnson for tearing a page from a Bible to make a (\*) “black spot,” and is the “seafaring one-legged man” that Billy Bones tells Jim Hawkins to look out for. The *Hispaniola* sails in search of Captain Kidd’s buried treasure in, for ten points, what novel about Long John Silver, written by Robert Louis Stevenson?**

ANSWER: Treasure Island, or the Mutiny of the Hispaniola

(18) **One work by this composer includes a “limping waltz” and a dynamic marking of 6 p’s for the bassoon; that sixth symphony was premiered just a week before this man’s death. After this man’s death, Marius Petipa revamped one of his ballets, in which (\*) Von Rothbart curses the princess Odette. Another popular work by this composer is scored for cannonfire. For ten points, name this Russian composer of the *Pathetique* symphony, the ballet *Swan Lake*, and the *1812 Overture*.**

ANSWER: Peter Ilyich Tchaikovsky

(19) **These molecules are called protease-resistant if they cannot be denatured. The secondary structure of these molecules is given in terms of beta sheets and alpha helices. Prions are examples of these molecules that have been (\*) misfolded into the wrong 3-D shape. Actin and myosin are muscle-based examples of, for ten points, what molecules, formed from long chains of amino acids linked by peptide bonds, that may serve as enzymes or carry out cellular transport?**

ANSWER: proteins (accept prions before it is read; prompt on (poly)peptide before “peptide” is read)

(20) **This man lost his re-election bid while running with Charles Cotesworth Pinckney, who replaced his original Vice President. As President, this man suppressed criticism and immigration via the Alien and Sedition Acts. This member of the (\*) Federalist Party and first official resident of the White House died on July 4, 1826, the same day as his rival, Thomas Jefferson. For ten points, name this second President of the United States and father of another President, John Quincy.**

ANSWER: John Adams (prompt on “Adams;” do not accept “John Quincy Adams”)

## Bonuses

(1) In 2016, a 2,300 square mile region deeper and farther from the coast than this region was discovered to have donut-shaped structures formed by the *Halimeda* algae. For ten points each,

Name this largest coral reef system in the world.

ANSWER: Great Barrier Reef

The Great Barrier Reef lies off the coast of Queensland, a northeastern state of this island country with capital Canberra.

ANSWER: Australia

The reef extends all the way to this strait, which separates Australia from New Guinea to its north.

ANSWER: Torres Strait

(2) The Grimm brothers removed this story from the last few editions of their *Children's and Household Tales* when they discovered that it was a Danish tale, rather than a German one. For ten points each,

Name this fairytale in which a dainty girl proves that she is royal by complaining that she slept on something hard, even though it was cushioned by twenty mattresses and twenty quilts.

ANSWER: The Princess and the Pea (accept Prinsessen paa Aerten; accept Die Prinzessin auf der Erbse)

In this Grimm brothers story, the title woman's stepsisters cut off their toes and heels to force their feet to fit into a slipper in an attempt to trick a prince into marrying them.

ANSWER: Cinderella (accept Aschenputtel)

In one version of this story, the title imp viciously tears himself in half after being foiled, but in the first edition of Grimm's tales, he flies away after the queen discovers this creature's true name and stops him from stealing her baby.

ANSWER: Rumplestiltskin

(3) Alfred Eisenstadt's picture of a sailor kissing a stranger in Times Square was taken in 1945 on what would shortly be known as this holiday. For ten points each,

Name this holiday that commemorates the end of the Pacific theater of World War II.

ANSWER: **V-J** Day (accept **Victory over Japan** Day; accept equivalent descriptions; prompt on descriptions of the end of World War II; do not accept V-E Day or Victory in Europe day)

Though the *V-J Day in Times Square* photograph was taken on August 14th, the actual date of the Japanese surrender, V-J Day is celebrated in the U.S. on September 2nd, the anniversary of the official signing of surrender papers onboard this U.S. battleship.

ANSWER: USS **Missouri**

The *Missouri* is now a naval museum in this Hawaiian harbor, where it "keeps watch" over the USS *Arizona* memorial.

ANSWER: **Pearl** Harbor

(4) These substances can be "poisoned" by blocking access to active sites, making them inefficient. For ten points each,

Give this term for a substance that assists in a chemical reaction by increasing the rate at which it progresses, without being consumed as a reactant. Enzymes are biological examples of these substances.

ANSWER: **catalysts**

Catalysts work by lowering this quantity, the amount of energy required to start a reaction.

ANSWER: **activation** energy

Cars employ catalytic converters to de-toxify exhaust. This transition metal, an expensive precious metal with chemical symbol Pt, is commonly used in catalytic converters.

ANSWER: **platinum**

(5) In *The Good Place*, every action during one's life is rated on a point system, and the very top scorers spend afterlife in a utopia. For ten points each,

This voice of Anna in *Frozen* and former star of *Veronica Mars* stars as Eleanor, a horrible person accidentally sent to the Good Place.

ANSWER: Kristen Bell

In the pilot episode, Eleanor fails to correctly pronounce the name of her soulmate, Chidi Anagonye [chee-dee an-ah-GON-yay]; instead, she settles on the name of this singer. Shortly thereafter, the Good Place “glitches,” chaos ensues, and this singer’s “Break Free” is heard bellowing throughout the city.

ANSWER: Ariana Grande

During orientation, it is shown that the afterlife's point system rates following this dietary code as worth roughly 425 points, while “never discussing this dietary code unprompted” is worth some 9800 points.

ANSWER: veganism (do not accept or prompt any other answers)

(6) This author wrote about Peter, Martin, and Jack, who represent different factions of Christianity in *A Tale of a Tub*. For ten points each,

Name this satirist, who also wrote a novel in which a sailor visits the nations of Lilliput, Blefuscu, and Laputa.

ANSWER: Jonathan Swift

Jonathan Swift also wrote this novel, in which the title character goes on fantastical journeys to Lilliput, where he is a giant, and Brobdingnag, where he is tiny.

ANSWER: **Gulliver's Travels** (accept Travels into Several Remote Nations of the World, in Four Parts. By Lemuel Gulliver, First a Surgeon, and then a Captain of several Ships)

Swift's satirical essay *A Modest Proposal* suggests that the people of this nation, his home country, should sell their children as meat to help them survive the Potato Famine.

ANSWER: Ireland (accept Éire)

(7) With James Hartle, this man described a model in which the beginning of the Universe is a singularity of space and time. For ten points each,

Name this Cambridge physicist whose popular science work, *A Brief History of Time*, describes black holes and other cosmological ideas to the non-scientist.

ANSWER: Stephen Hawking

Hartle and Hawking's singularity existed prior to this event, in which the universe quickly and greatly expanded out of a high-density state. The steady-state model competes with this theory, claiming that the universe is eternal.

ANSWER: Big Bang

The steady state theory was largely discarded after the 1964 discovery of this phenomenon, the faint "glow" of radiation left over from the aftermath of the Big Bang. This phenomenon's spectrum has a temperature of 2.7 Kelvin.

ANSWER: cosmic microwave background radiation (accept CMBR; prompt on partial answers)

(8) Peter the Great hated this complex and built a new capital city at St. Petersburg in part to avoid it. For ten points each,

Name this heavily fortified complex, which includes numerous cathedrals and the current residence of Vladimir Putin. It is part of a UNESCO Heritage Site with the nearby Red Square.

ANSWER: the Kremlin

Though "kremlin" is a generic term for Russian fortress complexes, "the Kremlin" is found in this Russian capital city.

ANSWER: Moscow

According to popular culture, a red telephone was installed to provide a "hotline" between the Kremlin and the White House. In reality, it's not a red phone, nor is it in either official residence, but the hotline was created in the wake of poor communication in this October 1962 event.

ANSWER: Cuban missile crisis



(9) Many of the short stories in this collection had first been published in *The Token*, an annual literature book published in Boston in the early 1800s. For ten points each,

Name this collection by the author of *Mosses from an Old Manse*. This collection includes the stories “The Ambitious Guest” and “Dr Heidegger’s Experiment.”

ANSWER: **Twice-Told Tales**

Name this American author of *Twice-Told Tales*, who included the story “Young Goodman Brown” in the collection *Mosses from an Old Manse* and wrote the novel *The House of the Seven Gables*.

ANSWER: Nathaniel **Hawthorne**

*Twice-Told Tales* contains this short story in which Mr Hooper, the title clergyman, hides his face to reflect the sorrow of a broken heart.

ANSWER: The **Minister’s Black Veil**

(10) In one of this composer’s works, a playwright pleads with a seamstress “What a frozen little hand, let me warm it for you.” in the song “Che gelida manina.” For ten points each,

Name this Italian composer of the operas *Madame Butterfly*, *Turandot*, and the aforementioned *La Bohème*.

ANSWER: Giacomo **Puccini**

*La Bohème* inspired this Jonathan Larson musical, in which Mimi’s tuberculosis is replaced with HIV.

ANSWER: **Rent**

In *La Bohème*, “Che gelida manina” is sung by Rodolfo to Mimi as they try to light one of these objects and find her dropped room key. *Rent*’s analog of the song is more explicitly titled for this object.

ANSWER: **candle** (accept “Light My **Candle**”)

(11) You can lead this animal to water, and then you can create a mythology around that happening. For ten points each,

Name this hoofed animal, often used for riding, that was sacred to Poseidon in Greek mythology.

ANSWER: **horse**

These mythical Scottish creatures lure unsuspecting humans into bodies of water and drown them. These creatures appear as gorgeous humans or beautiful black horses, and only reveal their true nature when it is too late.

ANSWER: water **kelpie**

These Greek mythological “sea-horses” had the bodies of winged horses and the hindquarters of fish.

ANSWER: **Hippocampus**

(12) A 1986 state law in Virginia forbids many schools from beginning the school year until after this date; that law is often called the “Kings Dominion” Law, for a theme park that benefits from it. For ten points each,

Name this federal holiday, celebrated on the first Monday in September, which unofficially marks the end of “summer” and officially recognizes workers.

ANSWER: **Labor** Day

Labor Day became a federal holiday mere days after the end of this 1894 labor dispute involving railroad workers, which was led by Eugene V. Debs in Chicago.

ANSWER: **Pullman** strike

Earlier Labor Day celebrations had been held on May 1st, for International Workers’ Day, but this U.S. President in 1894 was worried that socialist protests would be stronger with a federal holiday on that date. Three years later, this President was defeated for re-election by Benjamin Harrison.

ANSWER: Grover **Cleveland**

(13) If Portugal spends one dollar to produce a unit of cloth while England has to spend \$1.50, it still could make financial sense for Portugal to buy English cloth. Answer the following for ten points each.

This economic behavior is the exchange of goods and services between two or more entities - people, countries, etc.

ANSWER: **trade** (accept elaborations, like free **trade**, international **trade**, etc.)

Portugal would want to trade for English cloth if England held the comparative form of this economic concept, as they did in a famous 1817 example. In that example, Portugal was absolutely better than England in production of wine and cloth.

ANSWER: comparative **advantage** (accept absolute **advantage**)

This English economist devised that example to show how free trade can benefit countries, even in situations where a country has absolute advantage in all goods, in his *Principles of Political Economy and Taxation*. He also devised the Iron Law of Wages.

ANSWER: David **Ricardo**

(14) This substance helps promote cell membrane structure and fluidity, helping explain how animal cells exist without cell walls. For ten points each,

Name this essential modified steroid that, in excess, can clog and block arteries.

ANSWER: **cholesterol**

Sterols, fats, and fat-soluble vitamins are all this type of molecule. A bilayer of some of these molecules, with hydrophilic heads and hydrophobic tails, serves as a barrier against ion transfer in cells.

ANSWER: **lipid** (accept (phospho)**lipid** bilayer)

Cholesterol content in the blood is often measured in terms of “good” and “bad” cholesterol; give either the three-letter acronym or three-word name for either of those quantities.

ANSWER: **HDL** or **LDL** (accept **high-density lipoproteins** or **low-density lipoproteins**)

(15) According to legend, the modern form of this set of prayers was popularized by St Dominic. For ten points each,

Name this set of prayers, whose “Luminous” Mysteries were added by Pope John Paul II, and which is prayed with the use of a namesake strand of prayer beads.

ANSWER: Dominican **Rosary** (accept **rosarium**)

Each of the small beads strung in sets of ten on a rosary signifies this short prayer, which asks a holy woman to “pray for us sinners / now and at the hour of our death.”

ANSWER: **Hail Mary** (accept **Ave Maria**; accept **Angelic Salutation**)

One of the first steps in praying the Rosary is this declaration of belief, which is recited on the crucifix. The Roman Catholic Church divides this statement into twelve articles that declare a belief in “the communion of saints, the forgiveness of sins, the resurrection of the body, and the life everlasting.”

ANSWER: **Apostles’ Creed** (accept **Symbolum Apostolorum** or **Symbolum Apostolicum**; accept **Symbol of the Apostles**; prompt on “Creed”)

(16) Answer some questions about what some writers thought the future was going to look like, for ten points each.

Ray Bradbury wrote about a future in which humans colonize a nearby planet and build automated houses in this collection, which includes the short stories “Rocket Summer” and “There Will Come Soft Rains.”

ANSWER: The **Martian Chronicles**

In this futuristic novel by Orson Scott Card, aliens nicknamed “buggers” attack Earth, causing Andrew Wiggin to attend Battle School while his siblings Peter and Valentine create a global war.

ANSWER: **Ender’s Game**

This novel by Aldous Huxley, set in the year 632 After Ford, details Bernard Marx’s life in the World State, a society that has eradicated natural birth and raises children grown to fit into society’s five castes.

ANSWER: **Brave New World**

(17) For ten points each, answer the following about the list of numbers one, one-half, one-fourth, one-eighth, and so on.

This mathematical term describes any ordered list of numbers. They can be finite or infinite – this one happens to be infinite. If the terms of one of these are added together, it is then called a series.

ANSWER: **sequence**

This was specifically a geometric sequence, as you can find the next term by multiplying the previous one by a constant ratio. This term describes any geometric sequence with common ratio between negative one and one, as the terms will get closer and closer to a single value, zero. If the ratio were larger than 1, the sequence would diverge instead.

ANSWER: **convergent** sequence (accept word forms)

The infinite *series* one, one-half, one-fourth, one-eighth, and so on will also converge. Even though there are an infinite number of terms, it all adds up to this finite value.

ANSWER: **two**

(18) For ten points each, answer the following about the original American colonies.

James Oglethorpe founded this southern colony as a debtors' prison. In its early years, it served as a buffer between more "upstanding" English colonies and Spanish Florida.

ANSWER: **Georgia**

This middle colony was considered the "Lower Counties" of another colony, with which it shared a governor. This colony was the first to agree to the Declaration of Independence and is therefore considered the "first state."

ANSWER: **Delaware**

John Winthrop's Massachusetts Bay Colony eventually split into two states: Massachusetts and this other New England state.

ANSWER: **Maine**

(19) This painting was protected by sandbags during the World War II bombing of the Santa Maria della Grazie convent, but the unique painting techniques used in its creation led to its rapid decay. For ten points each,

Name this wall painting in which twelve men, including a feminine-looking Peter, react in shock to an announcement by their leader.

ANSWER: The **Last Supper** (accept L'**Ultima Cena**; accept Il **Cenacolo**)

*The Last Supper* is by this brilliant Renaissance painter whose *The Virgin of the Rocks* paintings show Mary with John the Baptist and Jesus as babies.

ANSWER: **Leonardo** di ser Piero **da Vinci** (accept either underlined portion)

In another Leonardo painting, Mary perches on this woman's lap while reaching to stop an infant Jesus from struggling with a lamb. This saint conceived Mary immaculately so she could become the mother of Jesus.

ANSWER: Saint **Anne** (accept The **Virgin and Child with Saint Anne**)

(20) Fluorescence is an example of this phenomenon, as generated by the absorption of photons. For ten points each,

Give this term for any form of light generated from a non-heat-based source.

ANSWER: **luminescence** (accept word forms, like **luminescent**; do not accept more specific terms, like bioluminescent)

Piezoluminescence is generated by the application of this type of force; similarly, piezoelectricity is the charge that accumulates in response to this force.

ANSWER: **pressure** (accept **stress**)

When a charged particle passes through a medium at speeds faster than this quantity for the medium, a faint luminescence, called Cherenkov radiation, will be emitted. While this quantity differs in different media, it is equal to nearly 300 million meters per second in a vacuum.

ANSWER: **speed of light** (accept **c**)