# Round 3 

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## Tossups

(1) On the Pauling scale, calcium's electronegativity is this number. Racemization [RAY-suh-mah-ZAY-shun] requires this many steps. Silver's most common oxidation state is this number, which is also the number of hydroxyl groups in phenol. A (*) methyl group contains this many carbon atoms, and halogens need this many additional electrons to reach a full valence octet. For ten points, give this group number of the alkali metals that is also hydrogen's atomic number.
ANSWER: one (accept plus one or one plus)
(2) After resigning from his post in the cabinet, this soldier was made second-in-command to his friend Colonel Leonard Wood. In the book The Naval War of 1812, this historiographer advocated for building American naval power, which he did by funding the (*) Great White Fleet. With the First Volunteer Cavalry Regiment, this man became the "Hero of San Juan Hill" before being elected Vice President under McKinley. For ten points, name this member of the Rough Riders, who was the twenty-sixth U.S. president.
ANSWER: Theodore Roosevelt Jr. (accept Teddy Roosevelt; prompt on "Roosevelt" alone)
(3) This action can be performed by Zen Buddhists using a tsu-ku-bai. In Judaism, the limited "netilat yadayim" form of this action can be performed using a cup, and a mikveh can be used to perform a more complete form of this ritual. This action is performed symbolically through the Christian practice of ${ }^{*}$ ) baptism, and can be performed by Hindus in the Ganges River. For ten points, name this ritual action in which believers purify themselves using water.
ANSWER: washing (accept equivalents like bathing; accept specific descriptions like cleaning one's hands or washing one's face; prompt on less specific descriptions like "purifying" or "purifying oneself" before "purify" is read)
(4) This novel's protagonist is apprenticed to the undertaker, Mr Sowerberry, by the beadle Mr Bumble. In this novel, Rose Maylie and Mr Brownlow collect information from Nancy shortly before she is murdered by (*) Bill Sikes. This novel's title orphan is recruited to a gang of pickpockets led by Fagin by a boy nicknamed the Artful Dodger. For ten points, name this novel in which a young boy accidentally enters a life of crime when he is kicked out of a workhouse for asking for more gruel.
ANSWER: Oliver Twist; or, the Parish Boy's Progress
(5) On an episode of this show, titled "Judgment Night," a passenger aboard the Queen of Glasgow discovers he's actually a U-boat captain being punished for war crimes. William Shatner insists that there's 'some... (*) THING on the wing" in "Nightmare at 20,000 Feet," an episode that was remade during this show's 2019 revival, narrated by Jordan Peele. This show's creator introduced it as "a fifth dimension." Rod Serling presented, for ten points, what 1960s anthology show known for its science fiction and supernatural twists?
ANSWER: The Twilight Zone
(6) This country carried out Project 596 to become a nuclear power and achieve one step of the "Two Bombs, One Satellite" goal. The Soviet Union asked the United States to stay neutral in a planned nuclear attack on this country, which gradually broke with the Soviets over ideological differences in the application of (*) Leninism. In 1972, this country welcomed Richard Nixon for a diplomatic visit. For ten points, name this communist power that, for much of the twentieth century, was led by Chairman Mao Zedong.
ANSWER: China (accept People's Republic of China; accept Zhongguo Renmin Gongheguo)
(7) A "Wankel" [VON-kull] one of these devices uses a Reauleaux triangle rotor. This device's "Carnot" [kar- NOH ] type has perfect efficiency. The Otto cycle models a four-stroke example of these devices that once relied on (*) carburetors for proper air mixture. Piston compression causes ignition in the Diesel type of these devices, which may convey rotational motion via crankshaft. For ten points, which device's "internal combustion" type is found in most cars?
 engine)
(8) A poem at the bottom of this expressionist painting describes "Blood and Flaming tongues" that "hovered" as this painting's central figure "stayed behind - quaking with Angst" while two friends walked on "above the blue-black / (*) Fjord." A red sky in this painting may have been inspired by vibrant sunsets caused by the eruption of Krakatoa, and illuminate a harbor in Oslo. For ten points, name this painting by Edvard Munch in which a hairless human raises their hands to their face and opens their mouth wide.

(9) In a story by this author translated by Jean de la Fontaine, one of the title characters promises to repay a loan with interest by August, but is disdainfully told to "dance" since she spent the summer singing. In another story by this author, a title character takes a (*) nap and consequently loses a race against a slower, but more diligent animal. For ten points, "The Ant and the Grasshopper" is attributed to what Greek slave, whose namesake fables include "The Tortoise and the Hare?"

ANSWER: Aesop
(10) A palace in this country contains the Court of the Myrtles and the Hall of the Abencerrajes, and was built during the Nasrid Dynasty. In this country, an eighteen-spired cathedral combining Gothic and (*) Art Nouveau styles has been under construction since 1882, and was designed by Antoni Gaudí. The Alhambra in Granada is within, for ten points, what European country, where the Sagrada Familia cathedral is being built in Barcelona?
ANSWER: $\underline{\text { Spain (accept Kingdom of Spain; accept Reino de España) }}$
(11) This composer adapted a theme from Frederick the Great into The Musical Offering, and composed a set of Variations to help Count Keyser-lingk deal with his insomnia. This composer dedicated a set of concertos to Margrave Christian Ludwig of (*) Brandenburg, and used all twenty-four major and minor keys to write a set of preludes and fugues [fyoogs]. For ten points, name this German Baroque composer whose works for keyboard instruments include the Goldberg Variations and The Well-Tempered Clavier [klah-veer].
ANSWER: Johann Sebastian Bach (accept J.S. Bach)
(12) Tourism to this historic compound usually includes visits to the towns of Zalesye and Kopachi, a tour of the Red Forest, and an inspection of the New Safe Confinement erected in 2016. This facility contains a corium-lava (*) "elephant's foot" discovered by "liquidators" in 1986. An arched steel structure at this facility encloses a concrete sarcophagus around reactor number four. For ten points, name this power plant near the town of Pripyat in Ukraine, the site of a massive nuclear disaster.
ANSWER: Chernobyl Nuclear Power Plant (accept ChNPP; accept Vladimir Lenin Nuclear Power Plant)
(13) In a poem by this author, the speaker becomes "tired and sick" in a "lecture-room" and leaves to look up "in perfect silence at the stars." This poet of "When I Heard the Learn'd Astronomer" said "the great star early droop'd in the western sky" in the poem "When (*) Lilacs Last in the Dooryard Bloom'd," and wrote "our fearful trip is done" in another poem dedicated to Abraham Lincoln. For ten points, name this poet who collected "O Captain! My Captain!" and "Song of Myself" in Leaves of Grass.

ANSWER: Walt Whitman (accept Walter Whitman)
(14) Cladograms are used to revise this science, which is imprecise due to para-phyletic groups. This science once used the heading Monera. A dichotomous key in this system may point to the modern domain Archaea. Carl (*) Linnaeus is the "father" of this science, in which binomial nomenclature gives the name Homo sapiens to the human species. For ten points, what branch of biology uses groups like the "kingdom" and "genus" to classify organisms?
ANSWER: taxonomy (accept word forms like taxonomic classification; prompt on "cladistics," "systematics," or "biology;" prompt on "classification" before "classify" is read)
(15) This country's city of Maidan Shahr was briefly led by Zarifa Ghafari, its youngest female mayor. ISIS claimed responsibility for a suicide bombing that killed nearly two hundred people at this country's (*) Hamid Karzai Airport; in the following days, the US killed seven children in a retaliatory drone strike. This country's leader, Ashraf Ghani, fled to nearby Uzbekistan in August 2021. Two weeks of airlift evacuations followed the American withdrawal from, for ten points, what Asian country where Kabul is controlled by the Taliban?
ANSWER: Afghanistan (accept Islamic Emirate of Afghanistan; accept Da Afganistan Islami Imarat; accept Emarat-e Eslami-ye Afghanestan; accept Islamic Republic of Afghanistan; accept Jumhuri-yi Islami-yi Afganistan; accept Da Afganistan Islami Jumhoryat)
(16) One of these religious structures named "The Place of Teti's Cult is Enduring" has a "Cannibal Hymn" inscribed on its walls as part of a "Text" named for these places. The "Teti" one of these structures is a smooth-sided one in Saqqara, near one built for (*) Djoser [JOH-sur] by Imhotep. Mastabas were a "stepped" type of these structures, three of which were built for rulers like Khafre and Khufu near Giza. For ten points, name this large, imposing kind of structure where Egyptian pharaohs were buried.
ANSWER: pyramids (accept pyramids of Giza; accept descriptions of specific pyramids, such as the Pyramid of Teti, Djoser, Menkaure, Khafre, and/or Khufu; prompt on more general terms like "tomb," "necropolis," or "burial place")
(17) These angles are created by the diagonals of any ortho-diagonal quadrilateral. Thales' theorem can be written as a bi-conditional statement relating this type of angle and the diameter of a circle. The Law of Cosines reduces to the (*) Pythagorean Theorem when this type of angle is involved. Triangles can contain a maximum of one of either an obtuse angle or an angle of this type. Perpendicular lines meet at, for ten points, what type of angle that measures exactly ninety degrees?

ANSWER: right angle (accept right alone after "angle" is read)
(18) During this geological period, the Sierra Nevadas formed and gymno-sperms replaced seed ferns as the dominant flora. Named for a European mountain range that contains the world's largest dinosaur tracks, this period included the bird-like $\left(^{*}\right.$ ) Archaeopteryx [ar-kee-op-teh-rix]. This period was dominated by megafauna like Allosaurus, Stegosaurus and huge sauropods like Brontosaurus. For ten points, name this Mesozoic period between the Triassic and Cretaceous.
ANSWER: Jurassic period
(19) While ambassador to France, this politician started a fashion craze for furry hats. This thinker wrote a popular newspaper column under the pseudonym Silence Do-good, and used another false name when he published (*) Poor Richard's Almanac. This politician created America's first volunteer fire department, and served as the first Postmaster General in the presidential cabinet. For ten points, name this founding father whose portrait appears on the one-hundred dollar bill.
ANSWER: Benjamin Franklin
(20) In this novel, Emily de Thoux [duh TOO] meets Cassy and Emmeline after they scare a wealthy landowner to death. Eliza leaves Emily Shelby's home to save her son, Harry, in this novel. George helps search for Chloe's husband, who is (*) purchased from the family of Augustine St Clare in this novel, and who is beaten to death on the orders of Simon Legree. For ten points, name this novel about a peaceful American slave, written by Harriet Beecher Stowe.

ANSWER: Uncle Tom's Cabin; or, Life Among the Lowly

## Bonuses

(1) A modified type of this structure called a tableau [tab-low] is used in the simplex method for linear programming. For ten points each,

Name these mathematical objects that organize values into rows and columns.
ANSWER: matrix (accept matrices)
If you multiply matrix A times matrix B, you may or may not get the same answer as when you multiply B times A. Thus, matrix multiplication does not have this property.
ANSWER: commutativity (accept word forms like commutative)
Multiplying a matrix by this specific type of matrix will always be commutative because multiplying by this matrix does not change the original matrix. In the same way, multiplying any real number by the number one will return the original number because one is a "multiplicative" one of these.
ANSWER: identity matrix (accept multiplicative identity)
(2) In 1912, the Royal Albert Hall hosted an enormous benefit concert for the families of the musicians who played during a maritime tragedy. Answer the following about the concert, for ten points each.

The concert memorialized the band of this "unsinkable" White Star Line ship, which sank while sailing from England to America in 1912.

## ANSWER: RMS Titanic

The concert included a performance of this composer's Funeral March. This Polish composer also wrote the Revolutionary Étude and the Minute Waltz.
ANSWER: Frédéric Chopin (accept Frédéric François Chopin; accept Fryderyk Franciszek Chopin)
This British composer conducted part of the concert, which included a performance of this man's Enigma Variations. ANSWER: Edward Elgar (accept Sir Edward William Elgar)
(3) One of these objects is at the center of astronomical object 3C 273, which is the most distant object visible through a backyard telescope because it is brighter than all stars in its surrounding galaxy combined. For ten points each,

Name these astronomical objects that are so dense that not even light can escape from their event horizons.

## ANSWER: black holes

3C 273 is one of these objects, the most luminous type of object in the universe. These objects are composed of an active galactic nucleus powered by a supermassive black hole.

## ANSWER: quasars (accept quasi-stellar object and QSO)

Radio astronomer Maarten Schmidt confirmed the vast distance between quasars and Earth by measuring the high degree of this shift, an example of the Doppler effect.
ANSWER: redshift (do not accept or prompt on "blueshift")
(4) A modern country named for this empire has its capital at Bamako. For ten points each,

Name this north African empire ruled by Sundiata Keita and Mansa Musa.
ANSWER: Malian Empire (accept Republic of Mali; accept Manden Kurufaba)
The Mali Empire was rich in gold and this mined, mineral resource that is essential for human life, and that is the most common food seasoning.
ANSWER: salt (accept table salt; accept rock salt; accept halite; accept sodium chloride or $\underline{\mathbf{N a C l}}$ )
Mali traded salt and gold over this hot desert in northern Africa.
ANSWER: Sahara (accept as-sahra al-kubra)
(5) This literary character travels through India, Hong Kong, and the United States, but is described as "one of those English gentlemen who are wont to see foreign countries through the eyes of their domestics." For ten points each,

Name this fictional adventurer who lets his French servant, Passepartout [pas-par-too], do most of the legwork as they circumnavigate the globe as quickly as possible.

## ANSWER: Phileas Fogg

Phileas Fogg was created by this French author of adventure novels like Journey to the Center of the Earth and Twenty Thousand Leagues Under the Sea.
ANSWER: Jules Verne (accept Jules Gabriel Verne)
Phileas Fogg is the protagonist of this Jules Verne novel, in which he wins a bet against London's Reform Club by completing the title achievement.
ANSWER: Around the World in Eighty Days (accept Le tour du monde en quatre-vingts jours)
(6) Answer these questions about Odin's quest for knowledge, for ten points each.

Odin traded one of these body parts to be able to drink magical water that would give him wisdom.
ANSWER: eye
Odin gave his eye to this god so that he could drink the water of wisdom. After this god was decapitated, Odin magically kept his head alive as a source of advice.

## ANSWER: Mimir (accept Mim)

Seeking even more wisdom, Odin hung himself from the world-tree Yggdrasil [IGG-drah-zil] with his spear to gain knowledge of these symbols, which were used for writing and fortune telling.
ANSWER: runes (prompt on "letters" or "alphabet")
(7) You've decided to buy a DNA testing kit and get your genealogical profile. Answer these questions about the process, for ten points each.

Before the company can sequence the DNA in your saliva sample, this process is used to amplify the DNA. This process uses a thermal cycler and Taq [tack] polymerase enzyme.
ANSWER: PCR (accept polymerase chain reaction)
The company can trace your matrilineal ancestry using DNA from your mitochondria. If you are male, your father's line can be traced using this chromosome.
ANSWER: $\underline{Y}$ chromosome
Since 2012, companies can look for variants in genes like SPAG17 and TTF1 to determine what percentage of your DNA was inherited from this other humanoid species that went extinct about forty thousand years ago.
ANSWER: Neanderthals (accept Homo neanderthalensis)
(8) In a poem, this animal is encountered after "I willed away my Keepsakes - Signed away / What portion of me be / Assignable." For ten points each,

Name this animal, whose "Blue - uncertain stumbling Buzz" breaks up "the Stillness in the Room" in a poem that begins "I heard [this animal] buzz - when I died."
ANSWER: fly (accept I heard a Fly buzz - when I died-)
"I heard a Fly buzz - when I died-" is by this American poet, who also wrote "Because I could not stop for Death."
ANSWER: Emily Dickinson (accept Emily Elizabeth Dickinson)
Most of Dickinson's poems are untitled, and are known by their first line or phrase. Give the first phrase of the Dickinson poem that asks "Who are you?" and says it is "dreary - to be - Somebody!"
ANSWER: I'm Nobody! Who are you? (do not accept or prompt on variations like "I am Nobody")
(9) Answer the following about the landmark interstate commerce case Gibbons v. Ogden, for ten points each.

The monopoly in Gibbons v. Ogden was ruled unconstitutional by this highest American judicial body. At the time of the judgement, this body was led by Chief Justice John Marshall.
ANSWER: Supreme Court of the United States (accept SCOTUS)
In Gibbons v. Ogden, the Supreme Court ruled against a monopoly of these specific vessels, which were used for shipping and transit through the rivers of New York state in the 1800s.
ANSWER: steamboats (accept steamships; prompt on "boat" or "ship")
This American entrepreneur, nicknamed "Commodore," worked as a steamboat captain and business manager for Gibbons, and combatted other steamboat monopolies before building a railroad empire.
ANSWER: Cornelius Vanderbilt
(10) This author developed his most famous argument over time, from its original use in Discourse on the Method to a modified version in Meditations on First Philosophy. For ten points each,

Name this seventeenth-century French philosopher who famously concluded "Cogito ergo sum," [koh-gee-toe ayr-goh soom] or "I think, therefore I am."

## ANSWER: René Descartes

The statement "cogito ergo sum" is written in this language. Descartes [day-cart] first wrote the statement in French because he feared that using this language would reach fewer people.
ANSWER: Latin (do not accept or prompt on "Italian" or "Roman")
Descartes's Discourse on the Method revolutionized philosophy by promoting this concept as a starting point. Descartes notes that he never accepts anything as true until he clearly knows it to be true. In other words, this term describes people who question or doubt things that other people accept.
ANSWER: skepticism (accept word forms like skeptic)
(11) In theory, a meta-material super-lens could be used to see a nano-machine at work because the lens has a negative value for this quantity. For ten points each,

Name this optical quantity, the ratio of light's speed in a vacuum to its speed in a medium. This quantity is about 1.33 for water and 2.42 for diamond.

ANSWER: index of refraction (accept refractive index; prompt on " $n$;" do not accept or prompt on "reflection")
For a light wave at the boundary of two media, this law states the ratio of the sine of angle of incidence to the sine of angle of refraction equals the reciprocal ratio of the indices of refraction.

## ANSWER: Snell's law (accept Snell-Descartes law)

At the boundary between air and a polished silver surface, Snell's law predicts that $95 \%$ of incident light will experience this phenomenon instead of refraction. This phenomenon explains why you can see yourself in a mirror.

ANSWER: reflection
(12) Romantic poet Robert Burns wrote about people with this nationality "wha hae wi' Wallace bled" and "wham Bruce has aften led." For ten points each,

Name this European nation, Burns's homeland, whose dialect he used to write about schemes that "gang aft agley."

Burns wrote "the best-laid schemes o' [these creatures] an' men / gang aft agley" in a poem addressed to one of these small mammals when he "[Turned] Her Up in Her Nest With the Plough."
ANSWER: mouse (accept To a Mouse)
Burns also used the Scots dialect to write this poem, often sung at New Year's, which asks "should ault acquaintance be forgot / and never brought to mind?"

## ANSWER: Auld Lang Syne

(13) In this game series, bells can be used to purchase items and pay off your mortgage. For ten points each,

Name this video game series, whose newest release, New Horizons, came out in March 2020. This game series allows players to create their own home and interact with anthropomorphized villagers.
ANSWER: Animal Crossing (accept Doubutsu no Mori [doh-boo-tsoo noh moh-ree])
This racoon-like, anthropomorphic loan shark owns and mortgages the player's home in the Animal Crossing games. This adorable slum-lord is the namesake of a fan-run New Horizons trading website.
ANSWER: Tom Nook (accept Nookazon; accept Tanukichi)
Because of its multiplayer capability, New Horizons depends heavily on player trading. In 2020, this actor, who played Frodo Baggins in The Lord of the Rings, made waves by politely selling his turnips on another player's island.
ANSWER: Elijah Wood
(14) Answer the following about one of the three "Grand Dames" [grahn dahmz] of a nineteenth-century French art movement, Berthe Morisot [bayr-tuh moh-ree-soh], for ten points each.

Morisot was part of this French art movement. This movement focused on painting en plein air [ahn plah-nayr] and using broad, sketch-like brush strokes to capture the movement and natural lighting of scenes like Waterlilies and Morisot's Grain Field.
ANSWER: Impressionism (accept word forms like Impressionist movement)
This Impressionist gave the movement its name with his painting Impression: Sunrise. He also painted many Waterlilies floating near a green, Japanese-style bridge.
ANSWER: Claude Monet (accept Oscar-Claude Monet or Claude Oscar Monet; do not accept or prompt on "Manet")

Morisot captured an outdoor scene of a woman and a little girl standing by the railing of one of these architectural features, looking out over Paris.
ANSWER: balcony (accept Woman and Child On the Balcony)
(15) Give the following about Spanish Florida for ten points each.

Spanish Florida originally included much more than modern-day Florida; it extended north into this state that borders Florida on the Atlantic coast.
ANSWER: Georgia
The first European to reach Florida was this Spanish conquistador, who, according to legend, was searching for the Fountain of Youth.
ANSWER: Juan Ponce De León
The Spanish founded this city in Florida in 1565, making it America's oldest city.
ANSWER: Saint Augustine
(16) This ruler was the son of Pepin the Short, and his territory was divided between his three grandsons after the death of his son, Louis the Pious. For ten points each,

Name this Medieval king who was crowned Holy Roman Emperor in the year 800.
ANSWER: Charlemagne (accept Charles the Great; accept Carolus Magnus; accept Charles I; prompt on "Charles" or "Carolus")

Charlemagne began his rule as the king of these European peoples, who had been united by the Edict of Paris.
ANSWER: Franks (accept Frankish people; do not accept or prompt on "France" or "French")
Charlemagne was crowned Holy Roman Emperor by Pope Leo III [third] on this Christian holiday.
ANSWER: Christmas Day
(17) This Sanskrit epic contains the Bhagavad Gita, in which a god reminds a prince of his royal duties during the Kurukshetra War. For ten points each,

Name this ancient Indian classic attributed to Vyasa.
ANSWER: Mahabharata
The Mahabharata is important to this Indian religion. Gods of this religion, including Indra and Brahma, interact directly with the story.
ANSWER: Hinduism (accept sanatana dharma)
This Hindu preserver god appears in the Mahabharata as his avatar Krishna, who advises Arjuna in the Bhagavad Gita.
ANSWER: Vishnu
(18) In a novel by this author, the student Ras-kol-ni-kov murders Lizaveta and Alyona in Saint Petersburg. For ten points each,

Name this Russian author who also described the lives of Ivan, Alexei, and Dmitri in The Brothers Karamazov.
ANSWER: Fyodor Dostoevsky (accept Fyodor Mikhailovich Dostoevsky)
Raskolnikov commits his double murder in this novel by Fyodor Dostoevsky. In this novel, inspector Porfiry Petrovich provokes Raskolnikov to confess.
ANSWER: Crime and Punishment (accept Prestupléniye i nakazániye)
After being convicted of the murders, Raskolnikov is sentenced to punishment in this frozen, far-north region of Russia.

ANSWER: Siberia (accept Sibír)
(19) Perfectly elastic collisions and negligible particle volume are two of the assumptions made in the kinetic theory of these substances. For ten points each,

Name this state of matter whose molecules are in constant, random motion, but with much greater separation between particles than in a liquid.
ANSWER: gases
Using kinetic theory, it is possible to derive Fick's laws of this process, in which gas particles spread out from an area of high concentration to an area of lower concentration.
ANSWER: diffusion (do not accept "effusion")
While kinetic theory assumes an ideal gas, this equation models real gases using $a$ and $b$ parameters to correct for intermolecular attraction and particle volume, respectively.
ANSWER: Van der Waals equation
(20) In 2007, the Supreme Court ruled against Lilly Ledbetter when she sued Goodyear over this type of discrimination. For ten points each,

Name this type of discrimination that affected Ledbetter's pay at Goodyear. The pay gap caused by this type of discrimination has held steady over the last decade at roughly eighty-four cents to the dollar.
ANSWER: gender discrimination (accept sex discrimination or sexism; accept "being discriminated against because she is female" and equivalents)

The Supreme Court ruled that Lilly Ledbetter's claim was invalid because it had been too long since the discrimination against her had occurred, and thus her claim had violated this type of statute.
ANSWER: statute of limitations
Ledbetter lost her argument that the one-hundred-eighty day statute of limitation should be triggered by each paycheck in which she was discriminated against. The Supreme Court rejected that argument, but it was adopted into law by the Lilly Ledbetter Fair Pay Act of 2009, which was signed by this Democratic president.
ANSWER: Barack Obama (accept Barack Hussein Obama)

