

# Round 1

## Regulation

(Tossup 1) These bodies are home to a habitat that comes in fringing, barrier, and atoll types. Species denser than these bodies that rest on their bottom live in the benthic zone. Nutrients in these bodies of water are provided by cold seeps, hydrothermal vents, marine snow, or whale falls. For the point, name these bodies of water, which include the Arctic, Atlantic, and Pacific.

ANSWER: ocean (accept sea until “Arctic”; prompt on coral “reef” with “Where are reefs located?”)

(Tossup 2) Definitions of these substances include electron pair acceptor and hydrogen donor. Depending on whether they lose all of their protons in water, these substances can be classified as either strong or weak. These substances name a type of rain often caused by pollution. These substances have a pH less than seven and are often sour tasting. Vinegar and lemon juice are, For the point, what substances that are often corrosive?

ANSWER: acids

(Tossup 3) CalTech alumni and faculty help run this agency’s Jet Propulsion Laboratory. This agency has been responsible for exploring Gale crater with a machine whose name was proposed by sixth-grader Clara Ma. This agency’s Orion craft will launch the second Artemis mission in 2022. For the point, name this American space agency that landed Buzz Aldrin and Neil Armstrong on the moon.

ANSWER: NASA (or the National Aeronautics and Space Administration)

(Tossup 4) A scientist with this surname names a temperature above which ferromagnetism disappears. Two scientists with this surname discovered the element polonium. A woman with this surname studied at the Flying University, an underground educational institution in Poland. For her work, she won two Nobel prizes, and she coined the term radioactivity. For the point, name this last name of physicists Pierre and Marie.

ANSWER: Curie

(Tossup 5) An “Integrated” technique to designing these devices is based on silicon semiconductor substrates and handles billions of transistors. Kirchoff names a “loop” and “junction” law governing the behavior of these devices. “Voltage equals current times resistance” is a statement of Ohm’s law which governs these devices. For the point, name these devices consisting of components that allow electricity to flow.

ANSWER: electronic circuits (accept integrated circuits or prompt on “board”s or “breadboard”s)

(Tossup 6) A characteristic named for this mathematician is determined by the number of vertices minus the number of edges plus the number of faces. This mathematician set the foundation for graph theory by observing the bridges of Seven Bridges of Königsberg. His namesake constant is approximately 2.718 and is represented with an  $e$ . For the point, name this prolific Swiss mathematician and physicist.

ANSWER: Leonhard Euler

(Tossup 7) These three letters begin the last word in an astronomy term for high luminosity regions whose other two words are “active” and “galactic.” Scientific names beginning with these three letters typically derive from the latin word for a pit or seeds inside a fruit. For the point, name these three letters that begin the name of a central organelle ending with “leus” [lee-us].

ANSWER: nuc

(Tossup 8) In these structures, fast flowing deposits of calcite is often affectionately referred to as these structures’ “bacon.” Troglodites dwell in these Karst topographical structures which are formed from dissolution of rocks. Stalactites hang from the ceiling of these structures. For the point, name these structures underground networks with surface entrances that serve as a hibernation spot for bats and bears.

ANSWER: caves (accept sinkholes until mentioned; prompt on “hole”s)

(Tossup 9) The probability of encountering these entities is encoded in the Drake equation. The Fermi paradox arises from the high probability of these entities existing though none have been discovered. For these entities to exist, it is thought they have to arise in a star system on a planet with water that sits within the goldilock zone. For the point, name this theoretical type of life that exists on planets other than our own.

ANSWER: extraterrestrial(s) life(form)s (or aliens; accept obvious equivalents)

(Tossup 10) Two charged particles undergoing this sort of event can cause a form of radiation called bremsstrahlung. Kinetic energy isn’t conserved in inelastic examples of this event between two carts. Momentum is conserved for the two cart system under both elastic and inelastic examples of this event. For the point, name this event where two objects come in contact and exchange force.

ANSWER: collisions (or colliding)

(Tossup 11) Dmitry Belyayev ran an experiment that showed that these animals could be selected to show affection to humans; that experiment resulted in the first successful taming of the silver variety of these animals. It’s not dogs, but this genus of Canidae’s [CAN-uh-DAY-ees] most common variety is referred to as red [this animal], due to the color of its fur. For the point, name these animals whose true variety is classified as *Vulpes*.

ANSWER: foxes (accept Vulpes before mentioned)

(Tossup 12) Mulliken’s scale of this property takes the average of the electron affinity and the first ionization energy. Differences in this property determine whether a bond is ionic, polar covalent, or nonpolar covalent. A common scale for measuring this property is named for Pauling. Fluorine has the highest value of, for the point, what property, the tendency of atoms to attract electrons?

ANSWER: electronegativity

(Tossup 13) Repeatedly undergoing this process results in the shortening of telomeres. A checkpoint in this process ensures kinetochores are attached to spindle fibers. Cytokinesis shortly follows this process, which occurs after the G2 phase and is abbreviated M. The phases of this process include prophase, anaphase, and telophase. For the point, name this asexual division of a cell that produces two identical daughter cells.

ANSWER: mitosis (prompt on “M” phase until mentioned; prompt on “cell division; do NOT accept or prompt on meiosis)

(Tossup 14) The kernmantle type of this material has a core of high tensile strength surrounded by an abrasive-resistant outer layer. The “dynamic” type of this material is stretchable giving it use in mountaineering and rock climbing. For the point, name this type of material made up of fibers like yarn or string twisted or weaved together to create tensile strength for pulling.

ANSWER: ropes (prompt on “chord”)

(Tossup 15) Two drugs to treat this condition measured on the Hamilton-Norwood scale are Minoxidil [muh-NOX-uh-dill] and Finasteride [FIN-uh-STARE-uh-dee]. Alopecia [al-OH-pay-shee-uh] is the scientific name for this condition treated with brands like Propecia and Rogaine, as well as follicular implants. This condition’s “male-patterned” form happens for around 50% of men. For the point, name this irreversible hair shedding process.

ANSWER: balding (accept alopecia before mentioned; prompt on “hair loss”)

(Tossup 16) A historical one of these events at lapilli-layered excavation site Regio V was where a skeleton was found crushed under a giant rock. The underrepresented dangers from these events are a Javanese-named destructive mudflow called lahar and fast moving hot gas and tephra known as pyroclastic flow. For the point, name these catastrophic events where volcanoes spew up lava and fast flowing debris into the air.

ANSWER: volcanic eruptions (accept eruption of Mount Vesuvius)

(Tossup 17) The work done by a gas is proportional to the change in this quantity when pressure is held constant. This quantity is measured off a burette during titration. The number of moles divided by concentration equals this quantity. This quantity is reported in liters for liquids. For the point, name this quantity measured in cubic meters, the amount of space occupied by an object.

ANSWER: volume (accept liters until mentioned, prompt afterwards)

(Tossup 18) Members of the *Variola* genus were the origin of this disease. British soldiers once used blankets infected with this disease as weapons. The first treatment for this disease involved inoculation with a similar disease affecting cows. Edward Jenner created the first vaccine for this disease. For the point, name this deadly pox disease eradicated in 1980.

ANSWER: smallpox

(Tossup 19) Family types of these objects include clusters, clumps and tribes. The Canadian Space Agency launched the microsatellite NEOSat to detect these objects. The Kirkwood Gaps are so named for gaps in the distribution of these objects. Large examples of these objects include ones named Pallas and Ceres. For the point, name these planetoid objects that form a namesake belt between Mars and Jupiter.

ANSWER: asteroids

(Tossup 20) The nitrate of this element was used to develop early photographs. This element has the highest thermal and electrical conductivity of any metal and is the lighter of the two elements in electrum. The adjective “sterling” denotes an alloy that is composed of 92.5% of this metal. For the point, give this element with atomic number forty-seven and chemical symbol Ag.

ANSWER: silver (prompt on Ag before mention)

(Tossup 21) This molecule’s blood levels are regulated by Insulin and glucagon. This molecule is chemically identical to dextrose. The disaccharide sucrose is made up of fructose and this other sugar molecule. This six-carbon sugar is the most common metabolic start point for cellular respiration. For the point, name this sugar broken down at the beginning of glycolysis.

ANSWER: glucose (prompt on “C6H12O6”)

(Tossup 22) Some scientists originally hypothesized this class of planets could only form outside the frost line, a position disproved with the discovery of “hot” ones named after a planet in our Solar System. This class of planets is named for its abundance of hydrogen and helium, unlike a similar “ice giant” which have heavier elements. For the point, name this class of giants that includes Jupiter and Saturn named after their most abundant phase of matter.

ANSWER: gas giants (accept just gas after “giant” has been read; accept hot Jupiter until Jupiter is read; prompt on “giant”; do NOT accept or prompt on “Ice giant”)

(Tossup 23) They’re not integers, but an early example of Cantor’s pairing function was used to prove the countability of this set of numbers. Using a proof by contradiction, Hippasus proved that the square root of two was not a member of this set. This subset of the reals are represented by a capital Q. For the point, name this set of numbers that can be expressed as the ratio of two integers, unlike irrationals.

ANSWER: rational numbers (accept Q before mention)

(Tossup 24) Hodgkin and Huxley developed a model of these cells after experimenting with a Giant squid one. Santiago Ramon y Cajal [ee caHAL] determined the doctrine of these cells; that they communicate at synapses, which was later discovered to be done using neurotransmitters. These cells communicate through action potentials that they send down their axons and receive at their dendrites. For the point, name this type of nervous tissue cell found in the brain.

ANSWER: neurons (prompt on “axon” before mentioned)

(Tossup 25) Events in this period are the subject of Stephen Jay Gould's theory of contingency. Many important fossils from this period were discovered at the Burgess Shale by Charles Walcott. This period was preceded by the Ediacaran and succeeded by the Ordovician. Trilobites and mollusks first appeared during this period. For the point, name this first geological period of the Paleozoic Era, which names an explosion in biodiversity.

ANSWER: Cambrian period

(Tossup 26) Along with chromium, this is the only period four element to violate the Aufbau principle. This element sits to the right of the ferromagnetic elements. The sulfate salt of this element is usually attached to five water molecules and is a deep blue color. When combined with tin, this element forms the alloy bronze. For the point, name this transition metal with atomic twenty-nine and chemical symbol Cu.

ANSWER: copper (prompt on Cu before mentioned)

(Tossup 27) Paul Boyer developed the flip-flop mechanism of this molecule's production via gamma subunit rotation. This molecule is primarily produced by establishing a proton concentration gradient followed by oxidative phosphorylation in its namesake synthase. This molecule is invested at the beginning of glycolysis. For the point, name this energy currency of the cell which has three phosphate groups.

ANSWER: ATP (accept adenosine triphosphate; accept ATP synthase)

(Tossup 28) The energy of one of these particles must surpass the work function to eject an electron. Albert Einstein won his Nobel Prize in physics for his use of this particle to explain an effect where electron emission occurred due to these particles hitting a metal. This particle mediates the electromagnetic force. For the point, name this massless particle which carries the phenomenon of light.

ANSWER: photons

(Tossup 29) Lindlar names a compound of this type that is "poisoned." A convertor named for this class of compounds reduces the toxicity exhaust gases in a vehicle. They are heterogenous in a different phase than the reaction. This class of compounds lower a reaction's activation energy, but are not themselves consumed in the reaction. For the point, this class of compounds that accelerate the speed of a reaction.

ANSWER: catalysts

(Tossup 30) Being able to only use four of these without having two nodes have the same one names a planar graph theorem that was the first computer-assisted proof. The brain only uses three types of cone cells to perceive this phenomenon. A dispersive prism splits a monochromatic beam of light into these phenomena. For the point, name this quality of a substance which is encoded by the wavelength of visible light, such as red or blue.

ANSWER: colors (accept chromatism or chromatic until "monochromatic" prompt afterwards)

## Extra

(Tossup 31) This device was made possible with the invention of cavity magnetrons and was first marketed as the Radarange. According to legend, Percy Spencer invented this device after realizing the magnetron had melted a candy bar in his pocket and was able to later use it to pop popcorn. For the point, name this type of electric oven that uses the namesake form of radiation to heat up food.

ANSWER: microwave oven (accept microwaves; prompt on “oven”)

(Tossup 32) Efforts to weaken these events include an attempt to do so with silver iodide in Project Stormfury. Major category 5 occurrences of these events as measured on the Saffir-Simpson scale include Kenna and Patricia. The division of the National Weather Service that monitors these events is located in Miami. Primarily hitting countries in the Caribbean Sea and states like Florida are, for the point, what tropical cyclones that occur in the Atlantic Ocean?

ANSWER: hurricanes (accept tropical cyclone until mentioned, prompt afterwards; prompt on typhoon with “What is that event called when it occurs in the Atlantic Ocean?”)