

Round 3

Regulation

(Tossup 1) Irving Langmuir created a probe to measure this substance which can be confined in a powerful magnetic field inside a torus-shaped device called a tokamak. This substance makes up an aurora borealis and exists in the interior of the sun. This form of matter is responsible for conducting the electricity in lightning and can be generated by ionizing gas. For the point, name this fourth state of matter.

ANSWER: plasma

(Tossup 2) In one competition at the World Games, competitors find control points using the “thumb” and “protractor” varieties of this device. This device works using a magnet’s tendency to align with the Earth’s magnetic field. For the point, name this device that helps explorers determine which direction is north.

ANSWER: compass (accept thumb compass; accept protractor compass; accept magnetic compass)

(Tossup 3) Dark green spots appear in this material’s “disease” due to a reaction with chlorides. August Rodin was accused of casting a live model to create a sculpture named for this material. The age named for this material was between the Neolithic age and the Iron age. Despite containing zinc, brass is often confused for this alloy. For the point, name this material, an alloy of 90% copper and 10% tin.

ANSWER: bronze

(Tossup 4) A fractal made of this shape is named after Sierpinski, and one of these shapes named after Blaise Pascal. The ratio of the length of different sides of these shapes defines the sine, cosine, and tangent functions used in trigonometry. Its internal angles sum to 180 degrees and it can be acute, obtuse, or right. For the point, name this shape that has three angles and three sides.

ANSWER: triangle

(Tossup 5) Alkenes are characterized by having a carbon with this many bonds to another carbon. Pi bonds are formed between atoms with at least this many bonds. A molecule of nitrogen gas contains this many nitrogen atoms, and table salt contains this many unique elements. Helium has this atomic number. A molecule of water contains, for the point, how many hydrogen atoms?

ANSWER: two

(Tossup 6) People without the Duffy antigen are immune to a form of this disease. The parasites that cause this disease can enter a dormant hypnozoite state before invading red blood cells. Artemisinins have outpaced the use of quinine in treating this disease, which is primarily caused by the vivax and falciparum species of Plasmodium parasites. For ten points, name this infectious disease spread by female Anopheles mosquitoes.

ANSWER: malaria

(Tossup 7) Though these particles are theorized to decay, this has not been confirmed by any observations yet. Two of these particles form a chain reaction responsible for fusion in stars. This particle is composed of two up quarks and one down quark. This particle is equivalent to the H⁺ ion, which is formed when acids are added to water. For the point, name this positively-charged particle contrasted with the neutron and electron.

ANSWER: **proton**

(Tossup 8) This object was discovered by Clyde Tombaugh in 1930, the first object in what was to be named the Kuiper Belt. This body is orbited by the moon Charon which is nearly half its size. In August 2006, the IAU downgraded the status of this body reducing the number of full-fledged planets in the solar system. For the point, name this former 9th planet from the sun.

ANSWER: **Pluto**

(Tossup 9) Purkinje fibers in this organ are connected through the Bundle of His to this organ's AV node. The SA node serves as the pacemaker for this organ. The atrium is the smaller upper chamber of this organ that primes this organ's ventricles to pump. Most arteries transport away from this organ while veins head to this organ. For the point, name this organ that circulates blood throughout the body, blockage of which can lead to its namesake "attack."

ANSWER: **heart** (accept **heart** attack)

(Tossup 10) DPPC reduces this quantity in the alveoli of the lungs which is measured in dynes per centimeter. Adhesive forces and the cohesion of this property allow for capillary action. Surfactants reduce the value of this quantity. Corks can float in cups with a convex water line due to this property. For the point, name this property that allows water striders to move along the top of water.

ANSWER: **surface tension** (accept **water tension**; prompt on "tension")

(Tossup 11) The first part of this structure to be put into place is called Zarya. Peggy Whitson spent more time living in this structure than any other American. Unity and Destiny are the names of other parts of this structure, and occupants of this structure might use some of their mandatory exercise time on a piece of equipment called the COLBERT [kol-bair]. The CSA, JAXA, and the ESA are three of the organizations which oversee this structure. Crewed continuously since 2000, identify this orbital laboratory.

ANSWER: **International Space Station** (accept **ISS**; prompt on partial answers)

(Tossup 12) Gypsum can form "flowers" and "beards" in these places. "Soda straw" is a very common speleothem in these places. These places can form from the dissolution of limestone in karst topography. Mammoth and Carlsbad are two U.S. examples of these places. For the point, name these underground locations that contain stalagmites and stalactites which are explored by spelunkers.

ANSWER: **caves** (or **caverns**)

(Tossup 13) The Van der Waals equation extends an equation used to describe a certain form of this type of substance. These substances can be modeled as hard spheres, while in another formulation they are assumed to have no mass and completely elastic collisions. That formulation is the “ideal” for of this type of matter, while the “greenhouse” variety is responsible for global warming. For the point, name this phase of matter exemplified by substances like carbon dioxide and water vapor.

ANSWER: gases

(Tossup 14) These devices control the flow of operation with a “kernel.” John Von Neumann names an architecture for these devices. These devices whose invention was theorized by Charles Babbage use registers to perform quick computations. RAM is used on these devices to store bits in memory. Linux and Windows are two operating systems for these devices. For the point, name these devices that can run programs which can be written using a keyboard.

ANSWER: computers (accept operating system; accept equivalents like laptop)

(Tossup 15) Drugs to treat this condition include cisplatin. Multiple myeloma is the name of this condition when it affects plasma cells, and if it occurs in bone marrow, it is called leukemia. This condition spreads by metastasis from malignant tumors. For the point, name this condition of uncontrolled cell division that is commonly treated with radiation and chemotherapy.

ANSWER: cancer

(Tossup 16) Biosynthesis of carnitine requires this organic molecule, which is used as a cofactor for the hydroxylation of lysine and proline residues during collagen synthesis. Linus Pauling advocated megadoses of this antioxidant to prevent the common cold. A disease caused by a lack of this vitamin is marked by anemia, gum bleeding, and tooth loss, and is called scurvy. For the point, name this vitamin found in high quantities in citrus fruits.

ANSWER: Vitamin C (accept ascorbic acid)

(Tossup 17) An isthmus made of this material is called a tombolo. Ergs are broad flat lands of this material that form into hill-like mounds which can be crescent or star-shaped. This material is finer than gravel but coarser than silt and can be heated to form glass. Wind forms this material into dunes. For the point, name this material found in the desert and on beaches.

ANSWER: sand (accept sand dunes; prompt on dunes)

(Tossup 18) Lyonization can convert one form of these structures into a Barr body. To avoid death, cancer cells extend the ends of these structures, which are called telomeres. Spindle fibers bind to centromeres on these structures to pull them apart during anaphase. A karyotype can visualize the 23 pairs of these structures found in human cells. Males have one X and one Y form of, for the point, what genetic structures which contain packaged DNA?

ANSWER: chromosomes (accept X chromosome; accept Y chromosome)

(Tossup 19) Karl von Frisch studied how these organisms communicate the location of food through a waggle dance. These creatures of the genus *Apis* will spontaneously migrate in colony collapse disorder. These creatures are specialized into “drone,” “nurse” and “queen” classes. For the point, name these organisms whose most famous variety creates honey while helping with pollination.

ANSWER: bees (accept European honeybees; accept Apis mellifera before mentioned)

(Tossup 20) For unit complex numbers, this operation represents a rotation and for a sequence of terms this operation can be represented by a capital pi. This operation can be carried out on binomials with a technique called FOIL. The identity element for this operation is 1. For the point, name this operation which for natural numbers is equivalent to repeated addition.

ANSWER: multiplication

(Tossup 21) Kussmaul breathing can indicate a complication of this condition in which harmful keto-acids accumulate in the bloodstream. In one form of this disorder, GLUT4 transporters do not respond to a hormone secreted from the Islets of Langerhans. Its “Type 1” or “juvenile” form occurs when beta cells in the pancreas cannot secrete insulin, leading to hyperglycemia. For the point, name this disorder marked by high blood sugar levels.

ANSWER: diabetes (accept diabetes mellitus; accept Type 1 diabetes; accept Type 2 diabetes; accept diabetic ketoacidosis)

(Tossup 22) This thing is accidentally rejected in a type I error, while accidentally accepted in a type II error. In statistical testing, one of these statements is “alternative” to the “null” one. The scientific method requires that this statement be testable. For the point, name this conjecture weaker than a theory that proposes a possible explanation for a phenomenon.

ANSWER: hypothesis (accept hypotheses; accept null hypothesis; do not accept or prompt on theory)

(Tossup 23) This scientist’s “dangerous idea” was resisted with “skyhooks” according to Daniel Dennett in a book about his theories. Alfred Russel Wallace independently developed a theory that made this scientist famous. This man was sailing with Robert Fitzroy on the H.M.S. Beagle when he discovered the beak patterns of his namesake finches in the Galapagos. For the point, name this author of *On the Origin of Species* who proposed the theory of natural selection as a means of evolution.

ANSWER: Charles Darwin (accept Charles Robert Darwin)

(Tossup 24) This mineral’s piezo-electric properties make it useful as a crystal oscillator. This mineral is found at the bottom of Bowen’s reaction series. This mineral with a Mohs hardness of 7 is the second most abundant in the Earth’s crust after feldspar. For the point, name this mineral composed of silicon dioxide whose crystal varieties include jasper and amethyst.

ANSWER: quartz (prompt on Silicon dioxide; prompt on SiO₂)

(Tossup 25) When these events form over a body of water they are known as “waterspouts,” and the first visible stage of their formation is the presence of a mesocyclone. The intensity of these events is measured by the enhanced Fujita scale. Nebraska and Kansas are in the heart of these events’ namesake “alley.” For the point, name these columns of intensely spinning wind.

ANSWER: tornadoes (accept twister; prompt on cyclone; prompt on whirlwind; prompt on vortex)

(Tossup 26) This molecule is extracted from plants by using supercritical carbon dioxide. It’s not adenine or guanine, but this purine has the scientific name 1,3,7-Tri-methyl-xanthine. Adenosine receptors in the brain recognize this molecule which gives this molecule its central nervous stimulating property. For the point, name this molecule found in chocolate, tea, and coffee.

ANSWER: caffeine

(Tossup 27) In mass spectrometry, molecules described by this term are formed by breaking apart larger molecules. Names for molecules described by this term typically end with the suffix “-ate” or “-ite” such as carbonate or sulfate. Molecules described by this term form bonds held with electrostatic forces. For the point, name these atoms or molecules with a net charge.

ANSWER: ions (accept charged atoms/molecules before charge is read; accept ionic bond; prompt on “acid”)

(Tossup 28) The tetracycline family of these medications binds to the 30S ribosomal subunit to block protein synthesis. One of these substances that Alexander Fleming discovered in mold was among the first treatments for Streptococcus infections. That drug is penicillin. For the point, name these medications that fight bacterial infections.

ANSWER: antibiotics (accept antimicrobial drugs; accept antibacterial drugs)

(Tossup 29) Carl Hilt theorized that at lower depths the quality of this material goes up. The anthracite variety of this substance has the highest amount of carbon resulting in it also providing the most amount of energy. Workers extracting this material can suffer from Black Lung. For the point, name this black rock commonly used as an energy source.

ANSWER: Coal

(Tossup 30) The “giant impact hypothesis” holds this body may have been created in the aftermath of a collision with the planet Theia. This body is home to dark, basalt plains which tricked ancient astronomers into believing they were made of water. The Sea of Tranquility, the landing point of Apollo 11, is on this body. For the point, name this body, Earth’s only natural satellite.

ANSWER: Moon (accept Luna)

Replacements

(Tossup 31) This organ is coated with a mucus-rich alkaline fluid from Brunner's glands. Projections in this organ are flattened in Celiac disease. This organ is divided into the ileum, the jejunum, and the duodenum and it absorbs nutrients through extended projections known as villi. For the point, name this digestive organ that takes in chyme from the stomach and feeds into the large intestine.

ANSWER: small intestine (prompt on intestine)

(Tossup 32) One supporter of this theory offered \$100,000 for anyone who could find a triangle that could be drawn with three right angles, but "pushed the goal post" when presented with non-Euclidean geometry by youtuber Wolfie6020. Washington Irving popularized the myth that people believed in this theory until Christopher Columbus sailed the Pacific Ocean to get to the West Indies. For the point, name this conspiracy theory that alleges the world is not actually spherical.

ANSWER: Flat Earth theory (accept any description about the theory that the earth isn't round)