

# Round 1

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## Regulation Tossups

(1) This entity “floats” on top of a lower layer when subject to isostasy [[EYE-soss-tuh-see]]. This layer's most abundant elements by weight are oxygen and silicon. The boundary between this layer of the Earth and the mantle is known as the Moho discontinuity. For the point, name this outermost layer of the Earth.

ANSWER: **Crust** (accept Oceanic **Crust** or Continental **Crust** before mentioned; prompt on “Lithosphere” by asking “What part?”)

(2) This quantity is proportional to temperature, but inversely proportional to pressure from the combined gas law. This quantity has a value of 22.4 for one mole of an ideal gas. For the point, name this quantity describing the space occupied by a substance, usually expressed in liters.

ANSWER: **Volume**

(3) These expressions are classified as analytic because they are a finite power series. The Fundamental Theorem of Algebra states that every one of these expressions with degree “n” and complex coefficients has “n” complex roots. For the point, name these expressions that contain coefficients and variables, like “x squared minus one.”

ANSWER: **Polynomials** (prompt on “Quadratic” by asking “What larger class do quadratics belong to?”)

(4) One form of this element is named after Buckminster Fuller, while another form of this element ranks at the top of the Mohs hardness scale. Graphite is a form of this element, which together with oxygen and hydrogen forms molecules of glucose. For the point, name this element, the fundamental basis of organic molecules and life.

ANSWER: **Carbon** (or **C**)

(5) The rotary form of this process is used to purify substances. This process explains why sweating cools the body, and salt deposits are created when it occurs in saline water. When this process occurs at low pressures or high temperatures, it is called boiling. For the point, name this process in which a liquid turns into a gas.

ANSWER: **Evaporation** (accept word forms such as **Evaporate** or **Evaporating**; accept **Vaporization**; accept **Boiling** before mentioned)

(6) Impurities from this element's "pig" form are removed in the Bessemer process. With cobalt and nickel, this element is naturally ferromagnetic, and this element oxidizes to form a red compound called rust. For the point, name this transition metal with symbol Fe [[F-E]] that alloys with carbon to make steel.

ANSWER: **Iron** (accept **Fe** before mentioned)

(7) This desert is the alleged home of a "Death Worm," which may be the Tartar sand boa. This desert was formed by the rain shadow of the Tibetan Plateau, and it is the native habitat of the Bactrian camel. China constructed a "Green Wall" to contain, for the point, what large Asian desert that covers southern Mongolia?

ANSWER: **Gobi** Desert

(8) The strong form of this concept is refuted in the Chinese room argument. A test for this concept evaluating indistinguishability from human conversation is named for Alan Turing. For the point, name this concept that refers to a computer's ability to think like a human brain.

ANSWER: **Artificial Intelligence** (or **A.I.**)

(9) A paper by this scientist proposed a new calculation for mean squared displacement of particles. That paper on Brownian motion and another on mass-energy equivalence were half of this man's 1905 "Annus Mirabilis." For the point, name this scientist who, in that same year, published explanations of the photoelectric effect and special relativity.

ANSWER: Albert **Einstein**

(10) Use of this material must be halved by 2030 to meet the criteria of the Paris Agreement. Satellites like Sentinel-5P monitor this material's sulfur dioxide output, and varieties of this material include lignite and anthracite. For the point, name this fuel source composed mostly of solid carbon.

ANSWER: **Coal** (accept **Lignite** or **Anthracite** before mentioned; prompt on "Fossil Fuels")

(11) Two of these particles behave as a boson in a Cooper pair, and these particles name the most stable flavor of neutrino. These particles and stable leptons possess antiparticles called positrons, and these particles are the quanta and force carrier of the electromagnetic force. For the point, name these negatively charged particles that orbit the nucleus of an atom.

ANSWER: **Electrons**

(12) A specific class of these compounds is named for Gilbert Lewis. The Bronsted-Lowry definition of these compounds involves the donation of hydrogen ions in solution. The acetic form of these compounds is found in vinegar. For the point, name these compounds which exhibit a pH below 7, contrasted with bases.

ANSWER: **Acids** (accept Super**acid**; accept Lewis **Acid**)

(13) This molecule is rapidly copied in the lab technique PCR, and the enzyme helicase splits this molecule before it is replicated by a polymerase. This molecule contains adenine, cytosine, guanine, and thymine. For the point, name this double-helix structure that contains genetic information.

ANSWER: **DNA** (accept **Deoxyribonucleic Acid**)

(14) This man's namesake transformation converts between coordinate systems that differ only by relative motion. This scientist was the first to formalize the concept of inertia, and he is famous for making discoveries that supported Copernicus's heliocentric theory. For the point, name this Italian polymath who improved the telescope.

ANSWER: **Galileo Galilei** (accept either; accept **Galilean** Invariance; accept **Galilean** Transformation; accept **Galilean** Moons)

(15) The warming effect of this natural phenomenon has increased the biodiversity of areas like Nantucket. The Antilles Current connects with this phenomenon at the intersection of the Florida Strait. For the point, name this warm ocean current that originates in the southern US and makes its way along the eastern coastline through the North Atlantic.

ANSWER: **Gulf Stream**

(16) Primary examples of these compounds are oxidized to aldehydes and carboxylic acids, while secondary types are oxidized to ketones. These compounds are characterized by the presence of a hydroxyl group. Methanol and ethanol are the simplest members of, for the point, what class of compounds found in beer and liquor?

ANSWER: **Alcohols** (accept Primary **Alcohol** or Secondary **Alcohol**; prompt on specific molecules like "Methanol" or "Ethanol;" prompt on "Hydroxyl")

(17) Fat is stored in the subcutaneous layer of this organ that makes up the integumentary system. Exocrine glands secrete an oily substance called sebum to lubricate this organ, which is the largest in the human body. The dermis and epidermis are layers of, for the point, what organ affected by eczema and acne?

ANSWER: **Skin** (accept **Dermis** before mentioned; accept **Epidermis** before mentioned)

(18) These cells are coated with a myelin sheath, which allows them to quickly transmit action potentials. These cells are split into "sensory" and "motor" types and separated from each other by synapses. For the point, name these signal-transmitting nerve cells, the basic units of the nervous system.

ANSWER: **Neurons** (accept **Nerve Cells** before mentioned)

(19) The *Cassini-Huygens* [[HOY-genz]] space-research mission discovered many of this body's physical features, including the String of Pearls and Great White Spot. The second-largest moon of this planet is called Rhea, and other moons of this planet include Enceladus [[en-keh-LAH-duss]]. Titan is the largest moon of, for the point, what sixth planet from the Sun, located between Jupiter and Uranus?

ANSWER: **Saturn**

(20) The core collapse type of these events occurs when stars accumulate extremely massive iron cores. Thermal runaways can be seen in the type 1a form of these events that occur when a white dwarf surpasses the Chandrasekhar [[shon-druh-SAY-karr]] limit. For the point, name these extraordinary large stellar explosions.

ANSWER: **Supernova** (do not accept or prompt on just "Nova")

(21) These animals were hypothesized to be juvenile examples of the *Torosaurus*. Two species of this animal were the *horridus* and *prorsus*, and these animals were first thought to be an extinct type of bison. The *Tyrannosaurus rex* was likely the primary predator of, for the point, what dinosaurs that may have defended themselves with their three horns?

ANSWER: **Triceratops**

(22) Unlike addition, this operation is not commutative for matrices in general. The use of numerous instances of this operation upon one number is called exponentiation. Often thought of as a form of repeated addition, this is, for the point, what operation that when applied to 2 and 3 yields 6?

ANSWER: **Multiplication**

(23) An unnamed ring of this planet parallels the orbit of its moon Galatea. Objects in a one-to-two resonance with this planet are known as "twotinos," and a spinning storm on this planet is known as the Great Dark Spot. Triton is a moon of, for the point, what planet in the solar system, located farthest from the Sun?

ANSWER: **Neptune**

(24) One of these devices was codenamed D1 and was deployed at Flers-Courcelette [[FLEHR koor-suh-LET]] in France. The Soviet T-34 type of these devices was first deployed against the invading Germans in World War Two. The Battle of El Alamein debuted one of these devices with a fully rotating gun turret. The M4 Sherman was one type of, for the point, what heavily armored military vehicles?

ANSWER: **Tanks** (accept British **Mark I**; or Male **Tanks**; or T-34 **Tanks**; or M4 Sherman **Tanks**)

(25) These devices can include a light-blocking component called a coronagraph. Protesters on Mauna Kea are trying to prevent the construction of a Thirty-Meter one of these devices. NASA administrator James Webb is a namesake of, for the point, what type of devices, one of which is named for Edwin Hubble?

ANSWER: **Telescopes** (accept Space **Telescopes**; accept James Webb Space **Telescope**; accept Hubble Space **Telescope**)

**Extra Questions**

(1) A procedure known as CABG ["Cabbage"] is used to remove blockages in these structures. Most of these structures carry oxygenated blood, and the largest of these structures is the aorta. A person's pulse can be detected by feeling, for the point, what blood vessels that carry blood away from the heart?

ANSWER: **Arteries** (or **Artery**)

(2) The product of the linear dimension and flow speed is divided by this quantity to give the Reynolds number. This quantity's kinematic form is equal to its dynamic form divided by the density of the fluid. For the point, name this quantity, a measure of a fluid's internal resistance to flow.

ANSWER: **Viscosity**