

Round 2 Elementary

Round 2 Tossups

(1) The “deep” variety of these phenomena is driven by thermohaline [[ther-moh-HAY-leen]] circulation. These phenomena form the confines of gyres [[GIRES]] such as the Sargasso Sea. Benjamin Franklin was the first person to chart one of these phenomena in the Atlantic Ocean. The Gulf Stream is a prominent warm-water version, for the point, what large flows of water that circulate water through the world's oceans?

ANSWER: Ocean **Currents**

(2) The temperature at which a volatile compound undergoes this reaction most readily is called the flashpoint. Smoldering is an extended, slow rate form of this reaction. The incomplete form of this reaction produces carbon monoxide and solid carbon instead of the typical CO₂ and water. For the point, name this form of rapid exothermic redox reactions in which fuel is burned.

ANSWER: **Combustion** (accept Incomplete **combustion**; accept **Burning** before mentioned; accept answers indicating **Flames** or **Fire** before “Flashpoint,” and prompt after; prompt on "oxidation," "reduction," or "redox" reactions)

(3) This disease's likelihood is increased by the presence of mutations to the BRCA1 and BRCA2 genes. Surgical treatments for this disease include a lumpectomy or a mastectomy. Awareness groups for this disease use pink ribbon logos. The mammogram can be used to detect, for the point, what cancer most commonly found in women?

ANSWER: **Breast Cancer** (accept Ductal **carcinoma**; accept Lobular **carcinoma**; prompt on "cancer")

(4) The fractional form of this technique is used to refine petroleum products. This technique, which cannot separate azeotropes [[AY-zee-oh-tropes]] without an additional component, is used to produce spirits from fermented products. For the point, name this technique of separating mixtures based on boiling point.

ANSWER: Classical **Distillation** (accept Fractional **distillation**)

(5) The discovery that these objects were once much more plentiful in the early universe helped refute the steady-state thesis. Gravitational lensing can cause multiples of these objects to appear, as in an Einstein cross. A supermassive black hole rapidly accretes new matter, creating for the point, what highly luminous active galactic nuclei?

ANSWER: **Quasars** (accept **Quasi-Stellar Radio Sources**; accept **Quasi-Stellar Objects** or **QSOs**; prompt on "Active Galactic Nuclei" or "AGN" before read)

(6) The most common types of this nutrient are phyloquinone [[fih-loh-KWY-nohn]] and menaquinone [[meh-nah-KWY-nohn]]. This vitamin, which is synthesized by gut bacteria, is often given as a shot to newborn babies to prevent hemorrhaging. For the point, name this vitamin found in dark, leafy plants, which is necessary for blood clotting.

ANSWER: Vitamin **K**

(7) This material releases heat as it cures, requiring coolants such as water or liquid nitrogen to be pumped through it as it sets. This material's reinforced type is augmented with steel rebar. This material is composed of rough aggregate held together with a binding agent. For the point, name this material made of stone set in cement that is used to make structures such as buildings and dams.

ANSWER: **Concrete** (accept Reinforced **concrete**; prompt on "cement" until mentioned)

(8) Planck's constant times frequency finds the energy of these particles. Young's double-slit experiment showed that these particles can interfere with themselves. The collision of these particles with metals can release electrons as part of a certain "electric" effect. The carrier of the electromagnetic force are, for the point, what massless particles, the quanta of light?

ANSWER: **Photons**

(9) A byproduct of this crop named Bagasse [[bah-GAHSS]] is seen as a potential energy source, and Brazil is the world's leading producer of this good. Production of this crop in the Caribbean is the largest driving force in deforestation in the region. Molasses is a valuable byproduct from processing this crop. For the point, name this perennial grass, a crop grown to produce a namesake sweet substance.

ANSWER: **Sugarcane** (prompt on "Sugar")

(10) The Australian town of Lightning Ridge produces this material's "black" form. This material fluoresces UV light and can create rainbow-like reflections. For the point, name this hydrated, amorphous type of silica, whose gem grade varieties are noted for their iridescence.

ANSWER: **Opal** (accept Black **opal**; prompt on "Silica" before mentioned)

(11) One type of these events occur when the mass of an inert core overcomes degeneracy pressure, causing core collapse. The 1a type of these events are used as a standard candle and occur when a white dwarf exceeds the Chandrasekar [[chahn-drah-SEH-kar]] limit. For the point, name these extremely bright stellar events, the explosion of a star.

ANSWER: **Supernova** (accept Type 1A **Supernova**; prompt on "SN" or "SNe"; do not accept or prompt on "nova")

(12) The most common type of this ecosystem is the "fringing" variety, which grows in shallow waters just below the surface. These ecosystems can create atolls when the island around which they grow erodes below sea level. Colonies of polyps held together by calcium carbonate form, for the point, what ecosystem, the largest of which is the Great Barrier in Australia?

ANSWER: **Coral Reef** (accept **Fringing reef** or Fringing **coral reef**; prompt on "Reef" or "Great Barrier Reef")

(13) Environmental cues called zeitgebers [[ZITE-geh-buhs]] entrain these phenomena, which are triggered by the release of melatonin from the pineal [[pih-NEE-ahl]] gland. Exposure to artificial blue light can disrupt these phenomena, which are controlled by the suprachiasmatic [[soo-prah-kai-ahs-MAH-tik]] nucleus. For the point, name this phenomenon, the body's natural sleep-wake cycle.

ANSWER: **Circadian Rhythm** (or **Circadian Clock**; or **Circadian Cycle**)

(14) This element forms a double bond with benzene in the Birch Reduction. This element was first isolated by Sir Humphrey Davy by using electrolysis [[ee-lek-TRAH-lih-siss]] on this element's hydroxide, which is also called caustic soda, or lye. This element is exchanged with potassium in an active transport pump. For the point, name this element that reacts with chlorine to form table salt.

ANSWER: **Sodium** (accept **Na**; or **Natrium**)

(15) Along with Uranus, this body's existence was predicted by the now-debunked Titius-Bode [[TIH-tee-us BOAD]] law. Along with Vesta, this sole dwarf planet of the inner Solar System was visited by the Dawn spacecraft. For the point, name this largest asteroid, which is named for the Roman goddess of the harvest.

ANSWER: 1 **Ceres**

(16) Much modern knowledge of the historical western practice of this profession derives from the works of Galen [[GAY-len]]. The code of ethics governing this profession is often written to include the phrase "first, do no harm." For the point, name this profession which is governed by the Hippocratic oath.

ANSWER: **Medicine** (accept **Medical**; accept **Doctors**; accept **Healing**; accept **Surgery**; accept synonymous answers)

(17) This element's crystalline form is the primary component of photovoltaic cells. Integrated circuits frequently utilize a thinly sliced "wafer" of this element. This element is the most common material used in modern semiconductors. For the point, name this element with atomic number 15, which sits directly below carbon on the periodic table.

ANSWER: **Silicon** (or **Si**)

(18) This disease, which is caused by a namesake bacteria-derived toxin, is sometimes called "The Blue Death." The main treatment for this disease involves lightly sweetened water-based liquids or oral rehydration therapy. For the point, name this bacterial disease spread by contaminated drinking water, which causes diarrhea so severe it can cause deadly dehydration.

ANSWER: **Cholera** (accept **Cholera** toxin or **Cholera**; accept **Blue Death** before mentioned)

(19) This constellation contains the Amazon Star, Bellatrix [[BEH-lah-triks]]. The stars Alnitak [[al-nih-TAHK]], Alnilam [[al-nee-LAHM]], and Mintaka [[min-TAH-kah]] make up this constellation's namesake "belt." This constellation's brightest stars are Rigel [[RYE"-jel]] and Betelgeuse [[BEH-tel-"juice"]]. For the point, name this constellation depicting a hunter from Greek mythology.

ANSWER: **Orion** (accept **Orion**'s belt)

(20) This organ, which contains a duct named for scientist Giovanni Santorini, releases its namesake digestive juices into the small intestine through the Duct of Wirsung [[VEER-zoong]]. This organ's endocrine-producing cells are contained within the Islets of Langerhans. Type One diabetes is caused by the immune system attacking this organ's beta cells. For the point, name this organ that secretes insulin.

ANSWER: **Pancreas** (accept **Pancreas** juice(s))

(21) Modern computers typically replace these devices with solid-state technology. Individual blocks of data in these devices can be retrieved in any order, allowing for random-access memory. For the point, name this component of a computer used for long-term storage, whose capacity can be measured in terabytes or megabytes.

ANSWER: **Hard Drive** (or **Hard Disk** Drive; or **HDD**; or **Fixed Disk**; prompt on "storage" or "disk"; do not accept or prompt on "memory")

(22) Candidates for the composition of this entity include GIMPS, WIMPS, and sterile neutrinos. This entity gets its name from interacting with gravity but not electromagnetic radiation, making it hard to detect. For the point, name this form of matter which is believed to make up 80 percent of the known mass in the universe.

ANSWER: **Dark Matter** (accept **Dark Matter** halo; do not accept or prompt on "dark energy")

(23) According to Carmichael's Theorem, for every value over twelve, the nth member of this construct will have at least one unique prime divisor. This construct's closed-form expression can be found with Binet's [[bih-NEHS]] formula. This construct converges at the golden ratio. A tiling spiral illustrates, for the point, what sequence named for an Italian mathematician, whose first five numbers are 1, 1, 2, 3, 5?

ANSWER: **Fibonacci** Sequence (or **Fibonacci** Numbers)

(24) This scientist's namesake equation governs the wave function of a quantum-mechanical system. This scientist created a thought experiment involving a Geiger counter, a hammer, and poison to illustrate flaws with the Copenhagen interpretation of quantum mechanics. For the point, name this Austrian physicist who is best remembered for theorizing a cat who is both dead and alive.

ANSWER: Erwin **Schrödinger** (or Erwin Rudolf Josef Alexander **Schrödinger**; accept **Schrödinger**'s Cat; accept **Schrödinger** equation)

(25) In one thought experiment, this scientist imagined a cannon tall enough to fire a cannonball into orbit. This scientist names the standard SI unit of force, and, coinciding with Leibniz [[LIBE-nitz]]. This author of *Principia Mathematica* independently developed calculus. For the point, name this English physicist who described the three laws of motion and a namesake law of universal gravitation.

ANSWER: Isaac **Newton** (or Sir Isaac **Newton**; accept **Newton**'s flaming laser sword; accept **Newton**'s laws of motion)

Extra Question

(1) This disease can be treated with the four-drug RIPE ["RIPE"] regimen. The formation of a bump under the skin in the Mantoux [man-TOO] test is a positive sign for this disease which presents as nodules that can be viewed with a chest x-ray. For the point, name this respiratory disease caused by mycobacterium, which was historically called consumption.

ANSWER: **Tuberculosis** (or **TB**; accept **Consumption** before mentioned)