

(MS) Science Bee Round 2

Regulation Tossups

(1) Ralph Solecki claimed that the presence of flower pollen with a buried member of this species was evidence of a ritual burial. This species is believed to have interbred with the Denisovans. The 1983 discovery of the hyoid bone of this species suggests that they had the ability to talk. For the point, name this close relative of modern humans whose remains were first discovered in a namesake German valley.

ANSWER: **Neanderthals** (or Homo **Neanderthalis**; accept pronunciations which replace the "TH" with a "T" sound; prompt on "Neander Valley")

(2) Amorphous solids can experience this process when broken bonds form a percolation cluster. At a point named for this process, solids and liquids exist in equilibrium. This physical process usually occurs because of an increase in a material's internal temperature. For the point, identify this physical process in which a substance transitions from a solid to a liquid, generally due to heat or thermal energy.

ANSWER: **Melting** (or **Fusion**; accept **Liquefaction** before mentioned)

(3) Sequences of this type of unit are described by the term endianness. The standard size of this unit is referred to as an octet, and its smallest component is known as a nibble. The largest types of this unit are prefixed with peta, exa, and zetta, though tera and giga are more common. For the point, name this unit of data which is defined by Java as having eight bits.

ANSWER: **Bytes** (accept Peta**byte**; accept Exa**byte**; accept Zetta**byte**; accept Tera**byte**; accept Giga**byte**)

(4) Air rises into this atmospheric layer because of the Brewer-Dobson circulation. It's not the thermosphere, but temperature rises with altitude in this atmospheric layer. This layer absorbs the vast majority of UV radiation emitted by the Sun. For the point, name this layer of Earth's atmosphere which contains the ozone layer, located between the troposphere and mesosphere.

ANSWER: **Stratosphere** (prompt on "Ozone Layer")

(5) An experiment measuring these particles determined their average time of decay to be about 878 seconds. The capture of these particles in stars is described by the r-process and the s-process. In beta-minus decay, one of these particles is converted into a proton. For the point, name this subatomic particle found in the nucleus, which is similar in mass to a proton, but carries no electric charge.

ANSWER: **Neutrons**

(6) Brumation is a lesser form of this phenomenon practiced by reptiles. Ectothermic animals cannot experience this phenomenon due to their inability to regulate their own metabolic rates. Aestivation is the name for this behavior when it occurs in the summer months. Torpor and dormancy are related to, for the point, what animal behavior involving a minimal rate of activity, as seen in bears during winter?

ANSWER: **Hibernation** (accept word forms; accept **Aestivation** before mentioned; prompt on "Heterothermy;" prompt on "Torpor" or "Dormancy" before mentioned)

(7) A namesake "Float" process is used to produce this substance, and electronic pH meters often use an electrode made from this substance. Hydrofluoric acid is commonly used to etch this material, and most modern labware consists of this material's borosilicate variety, a substance called Pyrex. For the point, name this fragile material used to make beakers and test tubes.

ANSWER: **Glass** (accept Soda-lime **Glass**; accept Borosilicate **Glass**; accept Pyrex **Glass**)

(8) A simple device used to measure this quantity consists of cups on arms arranged in a radially symmetric manner around an axle. Like direction, this quantity can be measured with an anemometer [[an-eh-MAH-meh-ter]]. This quantity is related to observed conditions by the Beaufort scale. For the point, name this quantity which can be over 200 miles per hour during a tornado.

ANSWER: **Wind Speed** (or **Wind Flow** Speed; prompt on "Wind;" prompt on "Speed")

(9) They're not jellyfish, but single-celled dinoflagellates known as *zooxanthellae* [[zoo-ZAHN-theh-lee]] live symbiotically with this animal. An increase in ocean acidity and ocean temperatures have led to mass "bleaching" in this species, which contributes to collapse in their colonies. For the point, name these marine invertebrates that construct namesake reefs.

ANSWER: **Coral** (accept **Coral** Reefs or **Coral** Polyps; prompt on "Cnidaria" [[NYE-dare-ee-uh]])

(10) The chemical equation for this process was first written by Cornelis van Niel during his studies of sulfur bacteria. The reverse Krebs cycle is used by some bacteria to replicate a byproduct of this process, which allows plants to convert carbon dioxide into glucose through the Calvin cycle. For the point, name this chemical process in which oxygen is produced by plants through sunlight.

ANSWER: **Photosynthesis**

(11) A Mesopotamian version of this object utilized for irrigation was called a shaduf. These devices are divided into a set of classes partially based on the relative positions of the load or resistance, and the effort. For the point, name this simple machine composed of a beam pivoted at its fulcrum, exemplified by a seesaw or crowbar.

ANSWER: **Lever**s

(12) One type of this device named after Wolfgang Goethe [[GUR-tuh]] uses water. That type of this device was based on a concept postulated by Lucien Vidi that is used to predict stormy weather. Other variants of this device include the Fortin and Fitzroy types, although both were preceded by the original invented by Evangelista Torricelli [[TORR-uh-chell-ee]]. For the point, name this device that measures atmospheric pressure.

ANSWER: **Barometer**

(13) The Cthulhu [[KUH-THOO-loo]] Macula is a formation on this object's surface that is located near a region named for astronomer Clyde Tombaugh. New Horizons performed the only flyby of this object and studied its largest moon, Charon. The discovery of Eris led to the re-classification of this object in the Kuiper belt. For the point, name this dwarf planet that used to be the ninth planet in the solar system.

ANSWER: **Pluto** (or 134340 **Pluto**)

(14) These objects can be found at the core of quasars and active galactic nuclei, along with an accretion disk. External objects approaching these bodies undergo spaghetti-fication. The Schwarzschild radius describes the distance between the singularity of these bodies and their event horizons. For the point, name these extremely dense objects whose gravity is so strong that not even light can escape.

ANSWER: **Black Holes**

(15) The infamous Japanese unit 731 dropped bombs with this disease on the cities of Ningo and Changde during the Second Sino-Japanese War. This disease was caused by a bacterial infection of *Yersinia pestis*, which was carried by pests such as fleas and rats. One-third of Europe fell prey to, for the point, what disease known as the "Black Death?"

ANSWER: Bubonic **Plague** (Accept *Y. pestis* before mentioned; accept **Black Death** before mentioned)

(16) The Madhava-Leibniz series refers to this transcendental number for which Archimedes derived an approximation. Welsh mathematician William Jones was the first to use a Greek letter to represent this constant. The ratio of a circle's circumference to its diameter is, for the point, what irrational number found in the formula for the area of a circle, roughly equivalent to 3.14?

ANSWER: **Pi** (accept **Pi**-R-squared; prompt on "Archimedes's constant")

(17) The largest species of these animals are placed in the genus *Aptenodytes* [[ah-TENN-oh-dytes]]. One species of these animals from South America possesses a distinctive yellow crest and is known as the southern rockhopper. The Adélie [[uh-DAY-lee]] and emperor are examples of, for the point, what flightless birds most commonly found in Antarctica?

ANSWER: **Penguins** (or **Sphenisciformes**)

(18) This element is naturally produced by the nuclear decay of uranium and thorium and can be synthesized from hydrogen through nuclear fusion. This element is the lightest stable monatomic gas, as well as the lightest of the noble gases. For the point, name this light element that is commonly used to inflate balloons.

ANSWER: **Helium** (or **He**)

(19) Inflammation of this body part is the primary feature of otitis. The hammer, stirrup, and anvil are three small bones in this larger body part where repeated stress can cause tinnitus. For the point, name this body part whose lobes can vary widely in size from person to person, and where excessive wax buildup can cause temporary deafness.

ANSWER: **Ears**

(20) This planet's orbit was correctly predicted by the Titius-Bode law. Because of one distinctive characteristic, astronomers believe this planet with moons such as Umbriel and Titania was struck by a protoplanet. This planet is the nearest of the bodies known as ice giants. For the point, identify this seventh planet from the sun that exhibits such extreme tilt that it spins on its side.

ANSWER: **Uranus**

(21) The fennec is a desert type of this animal native to North Africa. The Arctic species of this canid is one of the few land predators of Baffin Island where they prey on lemmings. Animals of this type can be described as vulpine, and their offspring, known as kits, are born to females called vixens. For the point, name this mammal known for its pointy ears and orange fur.

ANSWER: **Foxes** (accept Fennec **Fox**; accept Arctic **Fox**)

(22) This scientist abandoned his idea of a “cosmological constant” after Hubble found evidence of the expansion of the universe. This scientist told a friend that his biggest regret was co-signing a letter telling the United States to research the atomic bomb. For the point, name this patent office clerk who developed the theory of relativity and produced the equation $E = mc^2$.

ANSWER: Albert **Einstein**

(23) The sebaceous glands are contained within this organ, which is the primary component of the integumentary system. Oncogenesis can affect this organ as a result of excess ultraviolet radiation, leading to conditions such as melanoma. For the point, name this organ that can suffer second degree burns that may produce blisters.

ANSWER: **Skin** (prompt on "Dermis;" prompt on "Epidermis")

(24) This company created the programming language GraphQL and the database Cassandra. This company was the subject of controversy after an app called "This Is Your Digital Life" was used to collect user data by Cambridge Analytica. In 2022, this company announced that it was changing its name to Meta. For the point, identify this company named after a social networking site created by Mark Zuckerberg.

ANSWER: **Facebook** (accept **Meta** before mentioned)

(25) A lengthy QRS complex on a graph of this organ's activity can indicate a bundle branch block. Purkinje [[purrr-KIN-GEE]] fibers in this organ carry electrical signals that pass from the SA node to the AV node. Blockage of the coronary arteries can damage the muscle of this organ, which is monitored by an EKG. The atria and ventricles are found in, for the point, what cardiovascular organ that pumps blood throughout the body?

ANSWER: **Heart**

Extra Questions

(1) The strength of this bent geometry molecule's hydrogen bonds causes this molecule to have an unusually high specific heat and boiling point. This molecule readily self-ionizes, producing hydroxide and hydronium. This molecule has its highest density at 4 degrees Celsius and expands as it freezes. For the point, name this highly polar universal solvent made by binding two hydrogen atoms to an oxygen atom.

ANSWER: **Water** (or **H2O**)

(2) This quantity and reactance collectively contribute to the impedance of a system. A superconductor is characterized as having a value of zero for this quantity, the reciprocal of which is conductance. This quantity times current is equal to voltage by Ohm's law. For the point, name this quantity, defined as the opposition to flow of electric current, symbolized R.

ANSWER: **Resistance** (or Electrical **Resistance**)