# Euros Science Bee Round 3 (Varsity/JV)

## Regulation Tossups

(1) Specimens of this extinct species, which may be the ancestor of the Flores “hobbit”, include Turkana Boy, and though they are not *homo habilis*, they inhabited the Olduvai Gorge. Peking Man was another specimen of this out-of-Africa species, which may have used fire and largely lacked body hair. For the point, name this human ancestor whose name means "upright man."

ANSWER: *Homo* ***Erectus*** (prompt on "Homo"; prompt on "Upright Man"; do NOT accept "Human")

(2) The angular mil is a version of this unit used in gunnery calculations. This unit is defined as the angle subtended at the center of a circle that intercepts an arc length equal to the circle’s radius. Two pi of this unit correspond to a full circle. To convert a given angle from degrees into this unit, the value must be multiplied by pi over 180. For the point, name this SI unit of angle denoted by the symbol rad.

ANSWER: **Radian** (accept **Rad** before mentioned)

(3) This application layer protocol no longer uses TCP and can be adapted to use the unreliable UDP protocol. Many websites use the secure variant of this protocol, which is sometimes indicated with a green padlock on web browsers. Typically the first part of a URL on the Internet, this is, for the point, what internet protocol that mediates the transfer of data between links and provides communication on the World Wide Web?

ANSWER: **HTTP** (or **Hypertext Transfer Protocol**; or **HTTPS**; or **Hypertext Transfer Protocol Secure**; or **HTTP** over TLS; or **HTTP** over SSL)

(4) The Carrington Event is believed to have been caused by plasma from this region primarily composed of stellar filaments. Geomagnetic storms can be caused by collisions between the Earth and the mass ejections of this region, which can be viewed with the naked eye during a total solar eclipse. For the point, name this outermost layer of the Sun’s atmosphere.

ANSWER: **Corona** (prompt on "Sun")

(5) This procedure uses toxic compounds called antineoplastic drugs to inhibit new cell divisions and prevent DNA repair. In some individuals, this procedure causes new development of curly hair patterns, and this procedure often causes nausea and vomiting due to causing the death of the stomach and intestinal linings. Patients undergoing this treatment frequently lose their hair. For the point, name this cancer treatment that is contrasted with radiation therapy.

ANSWER: **Chemo**therapy (accept **CTX**; do NOT accept “Radiation Therapy”)

(6) John Backus developed FORTRAN while working at this company, which created a Unix operating system called AIX. This company's DeepQA project led to a product that competed against Brad Rutter and Ken Jennings on *Jeopardy!*. For the point, name this computing company that developed Watson and created business laptops called ThinkPads.

ANSWER: **IBM** (or **International Business Machines** Corporation; prompt on "Big Blue")

(7) He's not Werner Heisenberg, but this person claimed that there are properties that cannot be both observed and measured at the same time, such as position and momentum, which as part of an idea of complementarity in quantum mechanics. This person predicted the properties of a metal that is similar to zirconium, which was named hafnium, after the Latin word for Copenhagen. For the point, name this Danish physicist who created a model of an atom with discrete energy levels and electrons that move across levels.

ANSWER: Niels **Bohr** (or Niels Henrik David **Bohr**; accept **Bohr** Model)

(8) The transverse form of this quantity gives the scalar form of angular momentum when multiplied by distance and mass. Given a drag force opposing gravity, a falling object's maximum value for this quantity is its terminal form. The area under a curve plotting this quantity over time represents displacement over a time interval. Acceleration is the derivative of, for the point, what vector quantity that represents speed and direction, measured in meters per second?

ANSWER: **Velocity** (accept Terminal **Velocity**; do NOT accept or prompt on "Speed")

(9) This compound is the simplest of the alkanes, and this compound is the primary component of natural gas. This compound is primarily emitted from fossil fuel use and agricultural sources, such as cow belching. Formed from four hydrogen atoms and one carbon atom is, this is, for the point, what simplest hydrocarbon, which is a major greenhouse gas, second to carbon dioxide in its impact?

ANSWER: **Methane** (or **CH4** before "four hydrogen atoms" is mentioned, then prompt after)

(10) Partners of this effort agreed to follow the Bermuda Principle. Aristides [[ar-rihs-TEE-dees]] Patrinos and Francis Collins led this effort, which obtained much of its data from blood donors from Buffalo, New York. On March 31, 2022, the T2T consortium announced that this effort's mission was complete, producing a gapless sequence of a human Y chromosome. For the point, name this landmark project which aimed to understand the sequences of three billion base pairs that make up DNA.

ANSWER: **Human Genome** Project (prompt on "HGP")

(11) This vessel's *Zarya* module is known as the Functional Cargo Box, and its Integrated Truss Structure is attached to its four Solar Array Wings. This most expensive single object ever created was created as a merger between the *Freedom* and *Mir-2* vessels. For the point, name this extraterrestrial vessel in low Earth orbit, managed by NASA, Roscosmos, the ESA, and other space agencies.

ANSWER: **International Space Station** (accept **ISS**)

(12) A surfactant found in this organ called DPPA helps maintain compliance. Patients with cystic fibrosis suffer from a buildup of mucus in both the digestive tract and this organ. Spirometers are commonly used to measure the function of this organ in which alveoli are found. Amphibians are not generally born with this organ, but obtain them while undergoing their metamorphosis. For the point, what is this organ that filters oxygen obtained from the air?

ANSWER: **lung**s

(13) The long head of this muscle possesses a tendinous extension called the lacertus fibrosus, contributing to shoulder stability. The short head of this muscle originates from the coracoid process, providing a strong and direct pull for flexion in the central arm joint. Working antagonistically to the triceps, this is, for the point, what double-headed muscle on the anterior aspect of the upper arm?

ANSWER: **Biceps** Brachii

(14) Jakob Karl Ernst Halm confirmed that this quantity raised to the 3.5 power in main sequence stars roughly gives their luminosity. The TOV limit defines the highest value of this quantity that a neutron star can have before collapsing. For the point, name this quantity that must be 15 to 20 times greater than that of the Sun for a star to form a black hole.

ANSWER: **Mass** (do NOT accept "Weight")

(15) Boyan Slat founded a non-profit organization which uses vessels such as System 001 to clean this area through a 2,000 foot long barrier. This formation bounded by the North Equatorial Current is actually invisible to satellite imagery and boaters because it consists of microplastics, and this area is created due to the presence of a gyre. For the point, name this massive area of marine debris in the world's largest ocean.

ANSWER: Great **Pacific Garbage Patch** (accept **Pacific Trash Vortex**; accept **North Pacific Garbage Patch** prompt on “North Pacific Ocean”, “Pacific Ocean”, or “North Pacific Gyre”)

(16) This planet contains a *rupes* system with ridges called dorsa, while its largest crater is Caloris Planitia. *Mariner Ten* discovered that this planet possesses a magnetic field, and Urbain Le Verrier claimed that this planet's orbit was influenced by another non-existent body, later given the name Vulcan. The *Messenger* probe visited, for the point, what moonless planet, the smallest in the Solar system and the closest planet to the Sun?

ANSWER: **Mercury**

(17) Children who have taken aspirin while having the flu or this disease are at higher risk of Reye's syndrome. Under certain conditions, the virus responsible for this disease, the varicella-zoster virus, can reactivate later in life, causing shingles. For the point, identify this highly contagious disease that typically presents with a fever followed by an itchy, fluid-filled blistering rash that spreads across the body.

ANSWER: **Chickenpox** (accept **Varicella** before "varicella-zoster" is mentioned; prompt on "Pox")

(18) A strait called the Saltstraumen, which can form a 10-meter vortex, connects two of these features, near which epishelf lakes are commonly found. The outlets of these features sometimes form rocky islands called skerries, and these features form when glaciers erode coastlines below sea level. For the point, name these long, narrow sea inlets common along the coastline of Norway.

ANSWER: **Fjord**s [[FYORD]] (prompt on "inlets")

(19) This man, along with Georges Lemaître [[LUH-meht]], names a law which describes the effect by which objects in an expanding universe move away from each other with a velocity proportionally related to their initial and current distances. This astronomer gives his name to a classification scheme for galaxies that is shaped like a tuning fork. For the point, name this American astronomer who lends his name to a space telescope that has been orbiting Earth since 1990.

ANSWER: Edwin **Hubble** (or Edwin Powell **Hubble**; accept **Hubble**-Lemaître Law; accept **Hubble** Sequence; accept **Hubble** Tuning-fork Diagram; accept **Hubble** Space Telescope)

(20) A test that identifies the presence of this polysaccharide involves an orange solution of iodine and potassium iodide, and if this polysaccharide is present that solution turns a blue-black color. The enzyme amylase hydrolyzes this carbohydrate into smaller molecules such as glucose and maltose. A natural component of most plants, this is, for the point, what white, odorless powder, which is the main component of fruits and vegetables such as bananas and potatoes?

ANSWER: **Starch** (or **Amylum**)

(21) Pedipalps present in this class of invertebrates that possess chelicerae can play a sensory role, housing specialized organs for touch and taste. Respiration in these arthropods primarily occurs through book lungs or tracheal systems. Mites and ticks are in, for the point, what arthropod class with eight legs, such as scorpions and spiders?

ANSWER: **Arachnid**s (accept **Arachnida**)

(22) According to Archimedes, if a sphere is inscribed in a figure of this shape, it will take up two-thirds of its volume. In mathematics, a figure by this name has an Euler [["OILER"]] curvature of zero. Liquid volumes are read from the bottom of the meniscus in a piece of laboratory equipment known by this word and the adjective "graduated." For the point, name this shape whose volume is pi times radius squared times height, the region between and including two parallel congruent circles.

ANSWER: **Cylinder**

(23) In *Mucuna holtonii*, these structures have evolved to reflect sound waves. Whether an organism is a monocot or dicot typically determines how many of these structures it possesses. Along with the sepal, these structures make up the perianth, or non-reproductive portion of a flower. For the point, name these often colorful modified leaves that attract pollinators to flowers.

ANSWER: **Petals** (accept **Corolla**; prompt on "Flowers" before mentioned; prompt on "Leaves" before mentioned)

(24) An example of this animal named "Mr. Green Genes" became the first fluorescent form of its kind in the U.S. after he was cloned at the Audubon Nature Institute in New Orleans. The first and only type of this animal to reach space was Félicette, a stray tuxedo who was launched by the French space program on October 18, 1963. The first cloned pet, appropriately named "CC," was, for the point, what animal that was involved in a quantum physics thought experiment by Erwin Schrödinger?

ANSWER: **Cat**s (accept **Feline**)

(25) Lines on these diagrams use three letters to determine the station identification code, and alternating lines and two dots are used on these diagrams to indicate a squall line. These diagrams use red semicircles and blue triangles to indicate regions with low and high atmospheric pressure, respectively. For the point, name these diagrams that a meteorologist on television may stand in front of when making a forecast.

ANSWER: **Weather Map** (or Synoptic **Weather Chart**; prompt on "Map"; prompt on "Chart")

(26) These machines can be powered via electromagnetic propulsion, in a technique used by ThyssenKrupp, although they are typically powered via hydraulics. Elisha Otis created a "safe" version of these machines which automatically brakes in case of a hoisting cable failure, and sky lobbies are designed to allow interchange between them. For the point, name these machines which vertically transfer people between different levels of a building.

ANSWER: **Elevator**s (accept **Lift**s)

(27) This animal order's smallest species, at under 0.035 ounces, is the wolfi. These animals can change their texture by altering their skin papillae and can rapidly change color by activating its chromatophores, which is why they have been called "the wizards of camouflage." These animal's chemoreceptors help it taste via its suction cups. The giant Pacific is the largest example of, for the point, what clever marine animal, a cephalopod with eight limbs?

ANSWER: **Octopus** (or **Octopi**; accept Giant Pacific **Octopus**; prompt on "cephalopods")

(28) These structures are made of corneous beta-proteins that are folded into beta sheets and linked together with disulfide bonds. The cleaning and rearrangement of these structures is called preening, and the first fossilized evidence of these structures was found on Archaeopteryx, but it is now believed many dinosaurs had them. For the point, name these insulating biological structures found in the plumage of birds.

ANSWER: **Feather**s (accept **Plume**s or **Plumage** before mentioned; accept Pennaceous **Feather**)

(29) Small solid or liquid particles called CCN induce this gas to condense, preventing it from supercooling. This gas can reach up to three percent concentration when the weather is 90 degrees, and this gas is generally considered to be the most abundant greenhouse gas in the Earth's atmosphere. The concentration of this gas in the atmosphere is measured as humidity. For the point, name this greenhouse gas made up of two hydrogen and one oxygen atoms.

ANSWER: **Water Vapor** (prompt on "Water" or "H2O"; do NOT accept "Steam")

(30) The first two Johnson solids, polyhedrons where each face is a regular polygon, are different forms of this shape. The volume of the square type of these shapes can be found by multiplying the base and the height, then dividing by three. For the point, name these three-dimensional shapes in which its the lateral faces are always triangles with a polygonal base connected to a vertex.

ANSWER: **Pyramid**s

## Extra Question

(1) The chronic lack of production of this substance is known as xerostomia [[ZEER-oh-STOH-mee-ah]]. The edible-nest swiftlet and the black-nest swiftlet use this substance to create its nests, which are collected to make the delicacy bird's nest soup. In response to a ringing bell, Russian physiologist Ivan Pavlov classically conditioned a dog to secrete, for the point, what body fluid that is secreted by glands in the mouth?

ANSWER: **Saliva** (accept **Spit**)