

IESO – Environmental Science Bee – Round 3

Regulation Tossups

(1) One species of this disease in non-human primates is the Reston virus, which was first found in crab-eating macaques imported from the Philippines. Another species that causes this viral disease got its name from a case in which a human became infected after contact with chimpanzees in the Tai Forest. The 2014 origin of an outbreak this disease was traced to Gueckedou, a village where bats are typically hunted. For the point, name this hemorrhagic fever virus which has seen outbreaks in Africa.

ANSWER: **Ebola** (or **Ebolavirus**; accept **Ebola** hemorrhagic fever; accept **EVD**; accept **EHF**)

(2) This process occurs twice as quickly in the Moran process as opposed to the Wright-Fisher model, and Motoo Kimura proposed that this process plays a pivotal role in his neutral theory of molecular evolution. The founder effect of this process can arise in humans due to cultural isolation, as seen with the Amish. Loss of genetic diversity can occur from this process's population bottleneck. For the point, name this process whereby allele frequency changes over time due to random chance.

ANSWER: **genetic drift** (accept **allelic drift**; anti-prompt on "founder effect or "population bottleneck")

(3) Attempts to oxygenate part of this river called "Bubbly Creek," which suffered from gas emissions after being used as a sewer by meatpackers, have met with little success. Due to industrial pollution, this river's native bass species faced threats prior to the construction of a Sanitary and Ship Canal that diverted its flow to the Des Plaines. This Midwestern river's flow was reversed in 1900 through locks. For the point, name this river which receives water from Lake Michigan.

ANSWER: **Chicago** River

(4) Robert T. Paine introduced this concept when observing the relationships between starfish and mussels in intertidal zones. This term applies to animals whose removal can cause dramatic trophic cascades. This term is used to describe the impact of sea otters who control sea urchin populations to keep kelp forests healthy, as well as beavers for their roles as ecosystem engineers. For the point, name this term which designates certain species as having a strong impact on their ecosystems.

ANSWER: **keystone** species

(5) Neutralism is a mostly hypothetical version of this phenomenon. Commensalism is a form of this phenomenon in which one of the parties remains unaffected, and a form of this phenomenon involving "cleaning" is demonstrated with the clownfish and sea anemone [[uh-NEH-muh-nee]]. This phenomenon is called mutualism when both parties benefit, while parasitism is when one party suffers while the other gains. For the point, name this type of long-term interaction between two organisms of different species.

ANSWER: **symbiosis** (prompt on descriptions)

(6) This archipelago's Ka'ū Desert was formed due to acid rainfall caused by a volcano. Animals endemic to this archipelago include dime-sized snails called kāhuli, as well as a species of goose called the nene [[nay-nay]]. This archipelago includes the active volcano of Kīlauea [[KILL-oh-WAY-ah]], and many have protested the environmental impacts of building observatories on its Mauna Kea. For the point, name this archipelago where climate change was blamed for exacerbating wildfires on Maui.

ANSWER: **Hawaiian** Islands

(7) The impact of naturally occurring amphibole forms of this material is currently being studied in El Dorado, California. British social worker Lucy Deane Streatfeild was among the first people to note the dangers of this substance for human and environmental health during her time as a factory inspector. Exposure to this substance is the cause of most instances of mesothelioma. For the point, name this toxic material previously used for insulation and fireproofing.

ANSWER: **asbestos**

(8) The "heave" of this substance can form a unique karst-like topography called a hummock. Climate change causes solifluction [[soh-lih-FLUK-shun]] of this substance due to increasing the size of its active layer. So-called "drunken trees" are a consequence of the degradation and thaw of this substance, and, like tar, this substance is a frequent source of well-preserved mammoths. For the point, name this type of soil characterized by consistently remaining below 32 degrees Fahrenheit.

ANSWER: **permafrost** (prompt on "soil")

(9) This person popularized a term called *flygskam*, or "flight shame," due to pollution caused by the aviation industry. This person was noted for making a carbon-neutral trans-Atlantic crossing on the *Malizia Two* yacht which used solar panels, en route to the 2019 UN Climate Action Summit. In 2018, this activist began skipping school every Friday in a climate strike. For the point, name this Swedish climate change activist who founded the School Strike for Climate.

ANSWER: Greta **Thunberg** (or Greta Tintin Eleonora Ernman **Thunberg**)

(10) Project Kaisei aims to reverse damage caused by this area. Dutch inventor Boyan Slat created a vessel which consists of a floating barrier to clean up this area, part of the Ocean Cleanup. The North Equatorial Current, Kuroshio Current, and California Current form a gyre which results in this area's creation. For the point, name this area of the world's largest ocean known for its expanses of marine debris, largely caused by plastic pollution.

ANSWER: Great **Pacific Garbage Patch** (accept **Pacific Trash Vortex**; accept North **Pacific Garbage Patch**)

(11) The MS *Nordic Orion* saved approximately 80,000 dollars' worth of fuel costs by traveling along this feature. This feature's clearing in the summer is enabling gray whales to re-enter it for the first time in 200 years. It was speculated that this route could be commercially used to support oil exploration in Alaska's Prudhoe Bay. For the point, name this once highly-sought-after route through Canada which connects the Atlantic and Pacific Oceans, which is being cleared due to reduced sea ice levels in the Arctic.

ANSWER: **Northwest Passage**

(12) This technology is divided into "vapor-dominated" and "liquid-dominated" types depending on the topography and natural resources from which it draws. A 2022 Purdue study proposed using this technology to prevent the eventual eruption of the Yellowstone supervolcano. The majority of energy usage in Iceland is derived from this type of power, which is also popular in Indonesia. For the point, identify this technology which generates electricity using heat from within the Earth.

ANSWER: **geothermal** power (prompt on "renewable energy")

(13) The Mega Rice Project introduced in the southern part of this island attempted to transform peat swamp forest into paddies, contributing to fires that caused haze incidents. This island, which has been heavily deforested due to demand for tropical timber and palm oil, contains the easternmost Asian elephants. Rafflesia, the world's largest flower, is also endemic to this island, which is home to the largest non-human primate outside of Africa. For the point, name this island that, with Sumatra, is home to orangutans in Indonesia.

ANSWER: **Borneo** (or **Kalimantan**; do not accept or prompt on "Indonesia")

(14) The composition of this substance is determined by the NPK ratio. The use of an ammonium-based type of this product in rice paddies has contributed to climate change through the release of methane. Overusing this substance can contribute to the acidification of soil by increasing the concentration of hydrogen ions. Phosphate and potash are two of the basic components of, for the point, what common agricultural product used to provide nutrition to plants?

ANSWER: **fertilizer**

(15) A type of crocodile named the "muddy dragon" is sometimes named for this river, which produces more plastic pollution than any other river. The baiji freshwater river dolphin lived in this river before becoming possibly extinct. This river, which the Changjiang sturgeon is currently restricted to, is home to the world's largest power station along its shores. For the point, name this body of water which houses the Three Gorges Dam, the longest river in China.

ANSWER: **Yangtze** River

(16) This phenomenon, which has a "Modoki" variant, can raise wind speeds when Tehuantepecer [[teh-wan-teh-PEH-ser]] winds occur. As a result of this phenomenon, which has phases based on Walker circulation, the Peruvian anchovy industry collapsed in 1972. For the point, name this environmental effect in which ocean temperatures increase across the Pacific Ocean, unlike La Niña [[NEEN-yah]].

ANSWER: **El Niño** [[el NEEN-yoh]] (or **El Niño**-Southern Oscillation; or **ENSO**; accept **ENSO** Modoki; do NOT accept or prompt on "La Niña")

(17) Two people were charged with poaching 600 of these species in Boiling Spring Lakes, and this species, native to the U.S. Carolinas, thrives in nutrient-poor soil and needs frequent fires, as it clears off shrubs which block this species' access to sunlight. This plant of the genus *Dionaea* possesses a "heat sensor" that allows it to close its leaves when threatened. For the point, name this carnivorous plant species which can help manage populations of insects.

ANSWER: **Venus flytrap** (accept *Dionaea muscipula*)

(18) Mass poisonings of this gas from a ruptured pipeline in Satartia, Mississippi led to hundreds of evacuations. This gas's combination with ocean water leads to the creation of hydrogen ions, lowering pH levels and causing acidification. Potent concentrations of this gas have been used to kill off bugs in greenhouses without harming plants. For the point, name this byproduct of cellular respiration whose increase in the atmosphere is a result from burning fossil fuels.

ANSWER: **carbon dioxide** (accept **CO2**)

(19) This country's forest conservation movement called Chipko involves tree hugging. This country's Project Tiger was launched to protect the world's largest wild tiger population. This country was the site of the world's worst industrial accident in the Bhopal disaster, wherein leaked gas caused soil pollution. Climate change is expected to intensify monsoons in, for the point, what country in South Asia where New Delhi is known for its air pollution?

ANSWER: **India** (or **Bharat**; accept Republic of **India**; or **Bhārat** Gaṇarājya)

(20) This plant's mass flowering causes rodent population explosions called "ratadas" in South America. This plant's extensive rhizome networks prevent landslides on steep slopes and can regenerate entire forests after fires. The rapid growth of this plant allows it to sequester carbon 40 times faster than hardwood trees, though synchronized die-offs release methane. For the point, name this giant grass species whose shoots are the primary food source for giant pandas.

ANSWER: **bamboo**

(21) This location experiences eutrophication [[yoo-TROH-fih-KAY-shun]] due to runoff from a nickel mine-operated tailings dam at Yabulu. This location is the subject of a 2050 water quality improvement plan by the Natural Heritage Trust. The Ok Tedi Mine in Papua New Guinea has severely damaged the northern end of this location, which stretches into the Torres Strait. For the point, name this coral system located off the coast of Queensland, the world's largest coral reef.

ANSWER: **Great Barrier** Reef

(22) This group showcased the University of Pennsylvania's experiments on head injuries in the film *Unnecessary Fuss*. The co-founder of this group went undercover while working at a lab in Silver Spring, where he witnessed 17 macaques studied by the Institute for Behavioral Research. This organization launched a global campaign which placed the quote "I'm Me, Not Meat" on billboards. For the point, name this controversial US-based organization, the largest group advocating for animal rights.

ANSWER: **PETA** (or **People for the Ethical Treatment of Animals**)

(23) A new virus borne by this animal in 2024 is the Wetland virus in China. Higher numbers of the winter variety of this animal in Maine is raising concern about its impact on the state's moose population. Warmer climates led to the expansion of this animal's *Ixodes* [[ik-SUH-deez]] *scapularis* species, which is the number one variety to spread Lyme disease. For the point, name this parasitic arachnid typically found in grassy and wooded areas in the United States.

ANSWER: **ticks**

(24) In 1998, a university in this country introduced a concept in which people would limit themselves to no more than 2000 watts of energy by 2050. This country's oldest nature preservation organization, Pro Natura, oversees 700 of its nature reserves. This country was the site of the 1986 Sandoz chemical spill, which killed a large population of eels in the Rhine. For the point, name this European country where the sale of single-use plastic on public land is banned in Geneva.

ANSWER: **Switzerland** (or **Swiss Confederation**)

(25) The Koji variety of the *aspergillus* species of these organisms are commonly used to make soy sauce, while another species can be edible in certain blue cheeses. That species of this type of organism contains an antimicrobial isolated by Alexander Fleming to create the world's first manufactured antibiotic. This organism often develops in homes and buildings due to humidity. For the point, name this fungal structure, often dust-like in appearance, which can cause food to spoil.

ANSWER: **mold** (prompt on "fungus" or "fungi")

(26) To protect these animals, high frequency lights can be shone through windows to make them appear visible on the UV spectrum. Rapid collapses in the population of these animals were attributed to the pesticide DDT by ecologist Rachel Carson. They're not rodents, but outdoor pet cats kill millions of these animals each year. For the point, identify this broad class of animals whose extinct examples include the dodo and the passenger pigeon.

ANSWER: **birds** (or **Aves**; accept specific types of birds)

(27) One of these facilities in Fresh Kills was the source of the "syringe tide" in the New York area. A polyethylene composite liner is used within these facilities to prevent the movement of leachate into nearby water sources. A Superfund operation was implemented in the Love Canal neighborhood of Niagara Falls due to toxic chemicals dumped in one of these facilities. Covering about 2,200 acres of land, Las Vegas has one of the largest examples of, for the point, what type of site used to dispose of waste?

ANSWER: **landfills** (accept obvious equivalents like **garbage dump**)

(28) Infrared remote sensing is used by environmentalists to detect the central cold covers of these phenomena. The Humboldt and Benguela currents prevent these phenomena from ever occurring off western South America or western Africa, and none of them have ever crossed the equator due to a weaker Coriolis effect. These phenomena are measured by the Saffir-Simpson system based on a scale from one to five. For the point, name these tropical weather phenomena which commonly form in the Atlantic.

ANSWER: **hurricanes** (or **cyclones**; accept **typhoon** though the term is typically used for the Pacific; prompt on "tropical storms")

(29) One of these events hosted at Amchitka Island in Alaska prompted the creation of Greenpeace and sparked fears of triggering a tsunami. The Runit Dome was constructed to enclose the debris from one of these events called Ivy King in the Marshall Islands. Another of these events called Operation Castle disfigured Bikini Atoll. For the point, name these destructive events in which mushroom clouds are generated, often leading to radioactive waste from a weapon detonation.

ANSWER: **nuclear tests** (accept clear-knowledge equivalents)

(30) The fennec fox, which lives in this specific ecosystem, is known for its large ears which dissipate heat. This ecosystem, where the addax antelope is native, is known for its sand dunes in places such as the Grand Erg Oriental. This ecosystem was formerly much wetter during the African humid period, when Lake Chad was much larger than at present. The world's largest non-polar desert, this is, for the point, what desert, which encompasses countries such as Libya, Algeria, and Egypt?

ANSWER: **Sahara** Desert (prompt on "desert")

Extra Questions

(1) A cycle involving this element includes the uplift of minerals like apatite. The atmosphere does not play a significant role in this element's namesake cycle, as it primarily involves its release from rocks via erosion. For the point, name this element with atomic number 15, which is naturally stored in rocks and used in matches.

ANSWER: **phosphorus** (accept **P**; accept **phosphorus** cycle)