

IESO Environmental Science Bee – Finals (MES)

Regulation Tossups

(1) **The trilobites emerged during this period, when the End Botomian and Dresbachian extinction events occurred, both of which may have been caused by changes in the carbon cycle or anoxia. This period, which was the first of the Paleozoic Era (+) and the Phanerozoic Eon, saw the emergence of most major animal phyla. This period ended due to volcanic activity which ushered in the (*) Ordovician period.** For the points, name this geologic period which witnessed an "explosion" of life.

ANSWER: **Cambrian** period (accept **Cambrian** Explosion)

(2) **According to this system, the entirety of New Zealand is labeled as "Cfb." The eastern sides of continents are often labeled as "Cfa" in this system, and this system uses the letter (+) "E" only when referring to tundras or ice caps. Global heating is causing more locations to shift towards areas classified as (*) "temperate" in this system from "continental" areas, signified with a D.** For the points, name this climate classification system named for a German-Russian climatologist.

ANSWER: **Köppen** climate classification (accept **Köppen**-Geiger climate classification)

(3) **This animal formed the *Hydrodamalis* genus with similar species named Takikawa and Cuesta. This animal, part of the sirenian order, was only found in the (+) Commander Islands off the coast of Kamchatka. These animals were first noted on the Great Northern Expedition of Vitus Bering, and shortly hunted to extinction thereafter for their thick blubber. The closest known relative to the (*) dugong is, for the points, what marine mammal, which went extinct in the 1700s and is named for a German naturalist?**

ANSWER: **Steller's sea cow** (or ***Hydrodamalis gigas***)

(4) **The "notch and release" method of removing these structures is preferred due to its low environmental impact. The "flushing flow" method is used to distribute sediment accumulated by these structures. One of these structures in (+) China slowed the rotation of the earth by 0.06 microseconds. and salmon ladders are used to allow (*) migrating fish to pass by these structures. Most hydro-electric power is created by, for the points, what man-made blockages of rivers?**

ANSWER: **dams**

(5) **This country has the largest gold mine in Latin America, Pueblo Viejo, which has polluted the Hatillo Dam within the Cibao region. This country has the most diverse climate zones of any (+) Caribbean country, as frost is commonly found around its (*) Pico Duarte. This country's town of Punta Cana was a jungle before it became a hotspot for residents and tourists. For the points, name this country in the Caribbean where air pollution from traffic congestion affects Santo Domingo.**

ANSWER: **Dominican Republic** (or **República Dominicana**; accept **DR**; accept **La Dominicana**)

(6) **In 2023, water from this incident treated with the Advanced Liquid Processing System was gradually released into the Pacific Ocean, with no observed increase in local levels of tritium. This incident was caused by a wave which exceeded the (+) 18-foot seawall and 30-foot elevation of a facility operated by TEPCO. The events which caused this incident led to explosions in Units 3 and 4 and the (*) release of radiocaesium.** For the points, name this nuclear accident which followed a 2011 earthquake and tsunami in Japan.

ANSWER: **Fukushima** Daiichi nuclear accident

(7) **Since the 1996 Clean Air Act was passed, the tetraethyl compound of this element has been banned in the United States as an antiknock agent for gasoline. Failure to maintain service (+) pipes containing this element caused dangerous accumulations in the water supply in Flint, Michigan. This toxic element was once used in (*) paint to make it last longer.** For the points, name this toxic heavy metal element whose chemical symbol is Pb.

ANSWER: **lead**

(8) **The population of the volcano type of this animal is threatened by droughts in eastern Mexico. Lake Xochimilco [[soh-chee-MEEL-koh]] and Lake Chalco are the only remaining habitats of this animal, which was formerly common in the (+) Anahuac region. This animal, often confused for mudpuppies, is known for its ability to regenerate parts of its brain and heart tissue. Closely related to the (*) tiger salamander, this is, for the points, what endangered amphibian with an Aztec name, which often appears to be smiling?**

ANSWER: **axolotl** [[ak-suh-LAH-tull]] (or **Ambystoma mexicanum**; accept volcano **axolotl**; prompt on "salamander")

(9) **This quantity appears in the denominator for the logistic Verhulst equation for population growth. Species that live at densities close to this quantity often have long lifespans and fewer offspring. (+) and are contrasted with R-strategists. A population's birth rate equals its death rate at this quantity, where its growth (*) levels off.** For the points, name this quantity symbolized K, the maximum population size that can be sustained by a specific environment.

ANSWER: **carrying capacity** (accept **K** or **K**-selection before read)

(10) **Upon this river's shores is the Southerly Wastewater Treatment Plant, which identified a certain brown film on this river. This river was once described as a place where people (+) "decayed" rather than drowned, and its water was described as "oozing" by Time Magazine. Carl Stokes attempted to resolve this river's oil slicks, which caught on (*) fire multiple times.** For the points, name this once extremely toxic American river which flows through Cleveland, Ohio.

ANSWER: **Cuyahoga** River (be lenient on pronunciation)

(11) **One scholar noted that even without this man's most noted work, his books like *The Power of Movement in Plants* and solution to the formation of coral atolls would have made him famous as a geologist. The (+) Huxley-Wilberforce debate argued over a proposition this man outlined in such texts as *The Descent of Man* and his journal of a voyage aboard the HMS (*) *Beagle*. For the points, name this English scientist whose book *On the Origin of Species* essentially founded the science of evolution.**

ANSWER: Charles **Darwin** (or Charles Robert **Darwin**)

(12) **This work references research by Lonnie Thompson and how core drilling in ice can determine how much of a certain gas was in the air when the snow fell. This work presents the Keeling Curve. (+) showcasing the increasing pattern of carbon dioxide in the atmosphere. The presenter of this film states that global warming is "really not a (*) political issue, so much as a moral one." For the points, name this 2006 American documentary film in which former vice president Al Gore discusses climate change.**

ANSWER: An **Inconvenient Truth**

(13) **This figure was known for leading opposition to the creation of a reservoir within the Hetch Hetchy valley, after which he camped with Theodore Roosevelt. This man, who became a rival to the conservationist Gifford Pinchot, names a set of (+) woods in Marin County. This co-founder of the Sierra Club is nicknamed the "Father of the National Parks." (*) For the points, name this Scottish-born American preservationist, known for his activism concerning Yosemite National Park.**

ANSWER: John **Muir**

(14) **An amendment to this deal was named after Doha and established a second commitment period beginning in 2013. Though the U.S. signed this agreement, its non-ratification by Congress was due to the passage of the (+) Byrd-Hagel Resolution. This treaty, which was agreed upon by 160 countries, laid the groundwork for the (*) Paris Agreement in 2016. For the points, name this 1997 international treaty which aimed for countries to reduce their greenhouse gas emissions, named after a city in Japan.**

ANSWER: **Kyoto** Protocol (or **Kyōto** Giteisho)

(15) **The readings of these devices help predict fog formation in valleys and frost risk for crops. Wetland restoration projects use these devices to monitor habitat suitability for amphibians. (+) These instruments help detect favorable conditions for bark beetle infestations in forests, and cave preservationists use these instruments to prevent speleothem deterioration. (*) For the points, name these instruments used in meteorological science to measure atmospheric moisture content.**

ANSWER: **hygrometers**

(16) **Corexit is a chemical commonly used in response to these events, as it is able to emulsify surface slicks. One of these events in Alaska's Prince William Sound was caused after a (+) tanker called the Exxon Valdez crashed into a reef. Another example of these disastrous events occurred on the (*) Deepwater Horizon platform in the Gulf of Mexico.** For the points, name these environmental disasters caused by the release of petroleum into an ecosystem.

ANSWER: **oil spills** (accept clear-knowledge equivalents)

(17) **In 2019, one of these programs accidentally created sturdlefish, a hybrid between Russian sturgeon and American paddlefish. Animals raised in these programs often exhibit decreased survival instincts. The term (+) "extinct in the wild" generally refers to species that are still extant in these programs but not in natural habitats. (*)** For the points, name these programs by which humans help wild animals reproduce to rebuild endangered populations.

ANSWER: **captive breeding** (accept clear-knowledge equivalents, including just "zoos")

(18) **This figure provided voiceovers for a film called The Year Earth Changed on how wildlife responded to the COVID-19 Pandemic. This person also featured in Extinction: The Facts and (+) The Truth About Climate Change is noted for his advocacy against population growth. This man is perhaps most well-known for his Planet Earth and (*) Life series.** For the points, name this British biologist and broadcaster known for his narrations of nature documentaries.

ANSWER: David **Attenborough** (or David Frederick **Attenborough**)

(19) **Events that may have contributed to this period include the 1257 Samalas eruption in Indonesia and the eruption of the Billy Mitchell volcano in Papua New Guinea. This period included the Maunder Minimum, which saw very low (+) sunspot frequency. The Grindelwald Fluctuation of increased glacial expansion occurred during this period, which followed the (*) Medieval Warm Period.** For the points, name this period of depressed temperatures which lasted from roughly 1300 to 1850.

ANSWER: **Little Ice Age** (accept **LIA**; prompt on "Ice Age")

(20) **This process has induced swarms of minor earthquakes near disposal wells. This method creates methane migration pathways that can contaminate aquifers and release greenhouse gases, and this method's (+) high water demands have depleted aquifers in drought-prone regions. Toxic fluid used in this procedure contains sand-like materials called proppants (*)** to keep breakages open. For the points, name this extraction technique which injects high-pressure fluids to crack underground rock formations.

ANSWER: **fracking** (or **hydraulic fracturing**)

(21) **These chemicals were first detected in the atmosphere by James Lovelock using electron capture devices. The Montreal Protocol was instituted to phase out the use of these chemicals, of which (+) freon is the most common example. These chemicals react with an atmospheric allotrope of oxygen in the stratosphere, (*)** producing oxygen gas and free radicals. For the points, name this class of chemicals that were once used as aerosols, which created the hole in the ozone layer.

ANSWER: **CFCs** (or **chlorofluorocarbons**)

(22) **Pollution caused by this company was the basis of a 2009 documentary titled *Crude*. Lawyer Steven Donziger is known for his lawsuits against this company as part of a scandal which has been described the (+) "Amazon Chernobyl."** This company has faced controversy for its management of the Lago Agrio oil field in Ecuador, which it inherited from (*) Texaco after they dumped toxic waste there. For the points, name this second-largest American oil company behind ExxonMobil.

ANSWER: **Chevron** Corporation

(23) **The fluctuation test showed these events occur randomly rather than in response to selection. Nonsense examples of these events create premature stop codons, while (+) missense ones substitute amino acids. UV light commonly causes thymine dimers, a type of these events, while transversions and transitions are two categories of (*) point examples.** For the points, name these changes to the DNA sequence that can be frameshift or silent, providing the raw material for evolution.

ANSWER: **mutations** (prompt on "changes to DNA" before "For the points" is read)

(24) **This work was mocked by the essay "The Desolate Year" and was inspired in-part by a letter from its author's friend, Olga Huckins, to the *Boston Herald*. This book was republished in 1994 with an introduction by (+) Al Gore. This book takes its title from the John Keats ballad "La Belle Dame sans Merci," describing a time in which (*) "no birds sing."** For the points, name this 1962 book by Rachel Carson about the dangers of excessive use of the insecticide DDT, leading to its eventual ban by the EPA.

ANSWER: **Silent Spring**

(25) **Thomas Lovejoy of this organization created the concept of debt-for-nature swaps. The Living Planet Report is published by this organization, which engaged in a (+) dispute over an initialism with World Wrestling Entertainment. Using a (*) panda in its logo is, for the points, what non-governmental organization dedicated to environmental protection?**

ANSWER: **World Wide Fund** for Nature (accept **World Wildlife Fund**; also accept **WWF**)

(26) **Wangari Maathai of this country established the Green Belt Movement to plant trees. This country contains most of Lake Turkana, (+) which was impacted by the construction of another country's Gilgel Gibe Three Dam on the Omo River. This country pioneered ivory burning to discourage elephant poaching, protected within its Tsavo East National Park and (*) Maasai Mara Preserve.** For the points, name this country where a rhinoceros sanctuary is found in Nairobi National Park.

ANSWER: Republic of **Kenya** (or Jamhuri ya **Kenya**)

(27) **Donald Trump objected to the construction of these devices offshore of a Scottish golf course partly for environmental reasons. Pile-driving to create offshore "farms" of these devices causes underwater noise pollution, and the creation of (+) blades for these devices from fiberglass take up a large volume of space in landfills due to their hollowness. These devices have been criticized for their impacts on migrating birds who (*) collide with them.** For the points, name these devices which harness moving air to generate power.

ANSWER: **wind** turbines

(28) **The polarized form of this phenomenon can cause mayflies to lay their eggs in dangerous locations like blacktops. This phenomenon inhibits zooplankton feeding behavior, contributing to (+) algal blooms. Glare and sky glow are forms of this phenomenon, which can disrupt migration patterns of nocturnal animals by being (*) confused with lunar cycles.** For the points, name this phenomenon in which the excessive visible electromagnetic radiation in a city prevents stars from being visible.

ANSWER: **light pollution** (prompt on “sky glow” or “glare” before each is respectively read; prompt on “artificial light”)

(29) **The dried stalks of these plants provide winter shelter for beneficial insects, while their pollen supports over 150 bee species. These plants' root systems form dense mats that can prevent soil erosion while extending up to (+) eight feet deep. These heliotropic plants exhibit phototropism during growth, though mature specimens generally face east. (*)** For the points, name these tall yellow members of genus *Helianthus* that produce edible seeds high in oil content.

ANSWER: **sunflowers** (accept *Helianthus annuus*)

(30) **One of these biomes includes nearly all of Uruguay and is one of the main three divisions of the Pampas. Grasses in these biomes survive their yearly dry-season wildfires by storing water in their roots. The (+) Sudanian example of these biomes is separated from the Sahara by the Sahel, and they exhibit sparse tree cover and form a transition zone between (*)** deserts and rainforests. For the points, name this grassland biome home to zebras, giraffes, and lions.

ANSWER: **savanna** (accept **prairie**; prompt on “grassland” or “woodland”; prompt on “shrublands”)

Extra Questions

(1) **This animal's "Amur" subspecies has been protected within Korea's DMZ. This animal, though typically known for its rosettes, can have black coloring, (+)** particularly common within peninsular Malaysia. This animal, with the scientific name *Panthera pardus*, has been disputed as being more closely related to the lion or the (*) similarly-colored jaguar. For the points, name this large, spotted cat which can be found in Asia and Africa.

ANSWER: **leopards** (or *Panthera pardus*)

(2) **An international agreement for distributing water from this river in an efficient manner is known as Minute 319. In 1905, this river overran the banks of an irrigation canal, creating the Salton Sea. The (+) "Law of the River" regulates the usage of this river's water in seven western states, and due to excessive agricultural use, this river no longer flows into the (*)** Gulf of California. For the points, name this threatened river of Mexico and the United States which flows through the Grand Canyon.

ANSWER: **Colorado** River (prompt on “Lake Mead” before read)