

IESO – Environmental Science Bee – Round 1

Regulation Tossups

(1) This gas was responsible for the Upper Big Branch Mine disaster in 2010, as well as the Aliso Canyon gas leak, the worst gas leak in U.S. history. This gas is responsible for 30 percent of the rise in global temperatures since the Industrial Revolution. This gas supports some chemotrophs around cold seeps in the ocean floor, and it enters the atmosphere through the belching of cows. For the point, name this highly-flammable gas formed from one carbon atom and four hydrogen atoms.

ANSWER: **methane** (accept **CH₄** until “carbon”)

(2) According to the competitive exclusion principle, these concepts can have only one occupant without causing extinction of one species. These concepts are partitioned due to natural selection and other evolutionary processes. Inter-species competition occurs when the realized examples of these concepts overlap. For the point, name this concept from ecology, referring to the role and space an organism has within its broader environment.

ANSWER: ecological **niche**

(3) This project was delayed due to concerns about environmental impacts to Lake Oahe [[oh-AH-hee]]. A youth group called ReZpect Our Water was formed to oppose this project, which was built to transfer oil from the Bakken formation. This project, supported by Donald Trump alongside the Keystone XL pipeline, caused protests at the Standing Rock Indian Reservations due to fear it could contaminate the Missouri River. For the point, name this controversial oil pipeline named for two U.S. states in the northern Great Plains.

ANSWER: **Dakota Access** Pipeline (or **DAPL**)

(4) The Dobzhansky-Muller model explains how genetic incompatibilities drive this process. This process can occur through mechanisms like genetic drift or sexual selection, and may be preceded by reproductive isolating barriers like temporal isolation. Allopatric and sympatric forms of this process differ in whether a geographic barrier exists. For the point, name this evolutionary process by which a lineage is split, creating two or more distinct species.

ANSWER: **speciation** (prompt on “evolution”)

(5) A desert adjacent to this lake and the Dike Kokaral has been known to kick up clouds of pesticides during windstorms. Proposals have been made to link the Yenisei and Ob rivers to this lake, whose Vozrozhdeniya Island became a peninsula before fully joining the mainland. This lake, whose water was diverted to the Karakum Canal, suffered from the effects of cotton farming in Uzbekistan. For the point, name this formerly massive Central Asian lake which has lost nearly 90 percent of its original size.

ANSWER: **Aral** Sea

(6) This process is measured by the TOPEX/Poseidon satellite system using microwave pulses. This process can cause coastal squeezing, which made the Bramble Cay melomys the first known mammal to go extinct due to this process. This process increases the frequency and severity of saltwater intrusions and is exacerbated by thermal expansion. For the point, name this consequence of global warming primarily caused by melting ice sheets and glaciers.

ANSWER: **sea-level rise** (accept equivalents indicating that the level of the **ocean** is **increasing**; prompt on "climate change" or "global warming"; prompt on glacier/ice sheet "melting"; prompt on "flooding")

(7) Thomas Sankara combatted the destruction of this region by planting millions of trees. A drought in this region resulted in 50 percent reduced crop yields in Mauritania. Irrigation and decreased precipitation have been blamed for the shrinkage of this biogeographical region's Lake Chad. For the point, name this semi-arid ecosystem which is expanding due to desertification south of the Sahara.

ANSWER: **Sahel** (or **Sahelian** acacia savanna; prompt on "Africa")

(8) White-winged doves prefer nectar from this plant, Gila [[HEE-lah]] woodpeckers form nests in its sides, and its fruits are eaten by the Tohono O'odham people. Younger versions of this plant species are known as "spears" prior to its growing of thick arms, allowing it to retain moisture in an arid climate. This species of succulent native to the Sonoran Desert has been known to grow to over 30 feet. For the point, name this largest cactus in the United States which can live for hundreds of years.

ANSWER: **saguaro** (accept **Carnegiea gigantea**; prompt on "cactus" before read)

(9) This animal's *Bathymodiolus* genus is known for living in areas around hydrothermal vents. The "zebra" species of this animal has become a major invasive species in the Great Lakes region, which threatens freshwater species of it. These animals often latch onto rocks via a byssus, and an endangered freshwater species of these animals often produce pearls. For the point, name these marine mollusks that are distinguished from clams by their elongated shells.

ANSWER: **mussels** (prompt on "mollusk"; do not prompt on "clam")

(10) Mitigation measures for this process, which can induce cultural eutrophication, can be evaluated with the SELDM [{"Seldom"}] model. This process occurs when the rate of precipitation exceeds the infiltration capacity and is particularly prone to happening on impervious surfaces like concrete. This process is the primary cause of water-caused soil erosion. For the point, name this process by which excess surface water flows into the environment.

ANSWER: **runoff** (or **overland flow**; prompt on "stormwater")

(11) This phenomenon was first documented by the British Antarctic Survey at Halley Station, though initial readings were dismissed as equipment errors. The Montreal Protocol successfully addressed this problem, though this region still forms seasonally over Antarctica. This phenomenon allows harmful UV-B radiation to reach Earth's surface, increasing skin cancer risks. For the point, name this anthropogenic depletion of the stratospheric layer that protects Earth from ultraviolet radiation.

ANSWER: **ozone hole** (accept clear-knowledge equivalents)

(12) This figure created the *Virgin Earth Challenge* with Richard Branson, and this person devised a "Global Marshall Plan" in his book, *Earth in the Balance*. This person won the Nobel Peace Prize in 2007 alongside the United Nations' IPCC. Green candidate Ralph Nader was blamed for the loss of this man, who pushed for a reduction in greenhouse gases from one high office in the 1990s. For the point, name this climate change activist who served as the vice president of Bill Clinton.

ANSWER: Al **Gore** (or Albert Arnold **Gore** Jr.)

(13) Parts of this body of water have formed a "dead zone" since the 1970s due to nitrogen pollution, a side effect of chicken farming on its eastern shore. Amish farmers have been criticized for inadequate management of cow manure, leading to pollution of this estuary. The Oyster Wars occurred on this bay, which is now so devoid of those natural filters that its waters have become murky. For the point, name this bay in the U.S. where pollution has reduced harvests of blue crabs off the coast of Maryland.

ANSWER: **Chesapeake** Bay

(14) Before the popularization of the Leblanc process, burning of this organism was a primary method to create soda ash in Scotland, though salt would replace this organism in order to create sodium carbonate. The "giant" form of this organism is called *Macrocystis* and is the largest of the brown algae. For the point, name this brown seaweed that can form forests under the ocean's surface.

ANSWER: **kelps** (accept **kelp** forests; accept giant **kelp**; accept bladder **kelp**)

(15) This disaster resulted in the creation of a "Red Forest" within the 30-Kilometre Zone. Forest fires in the area surrounding the site of this disaster threatened the city of Bryansk in 2010 and resulted in an increase of caesium-137 in airborne dust. This disaster forced Kyiv to switch its water supply from the Dnieper River, as the Pripyat River was contaminated. For the point, name this worst nuclear disaster in history, which occurred in northern Ukraine.

ANSWER: **Chernobyl** disaster (accept **Chornobyl** disaster)

(16) In India, these animals' populations have been greatly reduced due to the use of the drug diclofenac in livestock. In the United States, the "turkey" version of this animal is often called a buzzard. Examples of these "New World Group" birds include the Andean and California condors, and these birds are noted for their bald, unfeathered heads, which keep them clean while feeding. For the point, name these birds known for eating the flesh of dead animals.

ANSWER: **vultures** (prompt on "bird"; prompt on "buzzard" or "condor" before mentioned)

(17) The greater glider is known for almost exclusively feeding on these plants, which includes species such as the yellow box and the karri. These plants also include the mountain ash, the world's tallest flowering plant, found in Tasmania. These plants in the Myrtaceae [[mer-TAY-see]] family produce a type of oil which makes them highly vulnerable to bushfires. Sometimes called gum trees, these are, for the point, what trees mostly native to Australia and fed on by koalas?

ANSWER: **Eucalyptus** [[YOO-kah-LIP-tuss]] (prompt on "gum tree")

(18) This protected area saw the reintroduction of wolves in 1995, which led to the removal of the Northern Rocky Mountain wolf from the endangered species list. This protected area contains the oldest and largest public bison herd in the United States. In 1872, this protected area became the world's first national park, and it is known for its geysers, most notably, Old Faithful. For the point, name this national park mostly situated in northwestern Wyoming.

ANSWER: **Yellowstone** National Park

(19) A marine example of this phenomenon called "the Blob" was blamed for sea lion beachings in California between 2013 and 2015. A particularly strong instance of this phenomenon was responsible for accelerating grape ripening in Europe in 2003. In 2022, China underwent one of these events for 80 days, and another example in 2021 contributed to the spread of the Lytton wildfire. For the point, name this type of disaster where a region experiences elevated temperatures for a period of time.

ANSWER: **heat waves** (accept synonyms like **extreme heat**; prompt on "heat" alone)

(20) The MOSE [[MOE-say]] Project was implemented to protect this city by using gates to close off inlets at Lido, Malamocco, and Chioggia [[kee-OH-jya]]. That project will protect this city specifically against events called *acqua alta*, which can be intensified by sirocco and bora winds. Those events in this city, compounded by subsidence, often inundate the Piazza San Marco. For the point, name this city on a lagoon in the northwestern Adriatic Sea, known for its canals and vulnerability to flooding.

ANSWER: **Venice** (or **Venezia**)

(21) A 1783 instance of this substance being released at Laki, Iceland led to fluorine poisoning in livestock, and this solid substance easily falls into fur, straining animals. Though this substance can help fertilize soil, it can also cause silicosis in humans and make land unusable by depriving soil of oxygen. This dark, loose substance causes extreme turbidity as it enters water, though it eventually forms scoria and pumice. For the point, name these pieces of rock and crystal produced during volcanic eruptions.

ANSWER: volcanic **ash** (accept **tephra**; prompt on "scoria" and "pumice" before mentioned; do not accept or prompt on "lava")

(22) The last known specimen of an extinct poisonous bird species named for this region, named Incas, died at the Cincinnati Zoo. The northernmost parrot species in the Americas was named for this region, home to protected areas such as Congaree National Park. This region is known for containing barrier islands such as the Sea Islands and Outer Banks. For the point, name this region encompassed by two U.S. states, one of which is home to Great Smoky Mountains National Park.

ANSWER: **Carolinas** (generously accept North or South **Carolina**)

(23) One of these animals named Ken Allen was known as "Hairy Houdini" as he regularly escaped his enclosure. A "diplomacy" planned by Malaysia involves giving these critically endangered animals to nations who purchase its palm oil. The rarest species of these animals is the Tapanuli, whose presence is exclusive to the Batang Toru Ecosystem in North Sumatra. For the point, name this genus of great apes that mostly live in the rainforests of Indonesia.

ANSWER: **orangutans** (accept **Pongo**; prompt on "great ape")

(24) This ecosystem is heavily supported by dust blowing west from Chad's Bodélé [[BOH-deh-leh]] depression, providing phosphates for plant growth. Species such as the black caiman, emperor tamarin, and the blue poison dart frog are endemic to this ecosystem, the site of a rubber boom centered in Manaus. This ecosystem is nicknamed the "lungs of the planet" for producing much of the world's oxygen. For the point, name this largest rainforest in the world, occupying northern South America.

ANSWER: **Amazon** Rainforest (prompt on "rainforest")

(25) A post-exposure prophylaxis called the Milwaukee protocol is used to treat this disease, which is endemic to every U.S. state except Hawai'i. This disease's vaccine was co-developed by Louis Pasteur and Emile Roux [[ROO]]. Bat bites are responsible for most human deaths from this disease, although fewer than one percent of bats carry it. For the point, name this nervous, viral infection once known as hydrophobia, which causes afflicted animals to foam at the mouth.

ANSWER: **rabies** (accept **hydrophobia** before mentioned)

(26) To benefit from this phenomenon, the *Stenocara* beetle climbs sand dunes in the Skeleton Coast. This phenomenon is known as *camanchaca* when it provides moisture in the Atacama Desert, and climate change is causing this phenomenon to become less common in the Bay Area, negatively impacting the water supply of redwoods trees. Distinct from mist, for the point, what term refers to clouds situated close to the ground?

ANSWER: **fog**

(27) These animals can experience population collapses due to overpopulation of a species called the crown of thorns starfish. One condition affecting these animals occurs when stress causes symbiotic algae to be expelled. Individual examples of these animals are known as polyps, which construct colonial calcium carbonate structures that are vulnerable to ocean acidification. For the point, name these cnidarian animals vulnerable to bleaching, which construct reefs.

ANSWER: **coral**

(28) When these disasters pass over water, they can sometimes result in raining fish. Less intense versions of these disasters called dust devils can also be known as sand pillars when they contribute to sending mineral dust into the atmosphere. The combination of cold air from the Rockies coupled with warm air from the Gulf of Mexico makes these disasters particularly common in an "alley" in the southern Great Plains. For the point, name these natural disasters, consisting of rotating columns of air.

ANSWER: **tornadoes** (or **twisters**; accept **Tornado** Alley; accept **waterspout** before "dust")

(29) These environments are the namesake of a "stream syndrome" related to flashy hydrographs caused by quick pulses of water into rivers and creeks. Animal life in these ecosystems is characterized by a typical lack of specialists, though generalists such as raccoons thrive. These ecosystems can form a heat island due in part to a lack of green spaces and the heat retention of concrete. For the point, name these densely-packed ecosystems which include places like Shanghai and New York.

ANSWER: **urban** environments (accept **city** or **cities**; accept **suburbs**)

(30) The New Valley Project attempts to use this body of water's overflowing of the Toshka Lakes to irrigate part of the Western Desert. Controversy surrounds the building of the Grand Ethiopian Renaissance Dam on this river, and the construction of the Aswan High Dam led to the creation of Lake Nasser and the end of this river's predictable flooding. For the point, name this river which provides irrigation for Egypt.

ANSWER: **Nile** River

Extra Questions

(1) An electric barrier is used in the Des Plaines River to prevent these organisms from reaching the Great Lakes. Some populations of these fish in Illinois are prone to jumping when motorboats drive by. Methods to control the population of these animals include controversial bow and arrow fishing methods. For the point, identify these East Asian fish invasive to North America, which are related to koi.

ANSWER: Asian **carp** (or **Cyprinidae**; prompt on "fish")

(2) This type of pollutant is the primary source of mono-nitrogen oxides in the atmosphere, which can cause acid rain. Secondary air injection is utilized to reduce the amount of unburned fuel and carbon byproducts found in this type of pollutant. Since 1975, catalytic converters are required in gasoline-powered vehicles operating in the United States to reduce this pollutant. Carbon monoxide is produced by, for the point, what type of air pollution emitted by cars?

ANSWER: car **exhaust** (or **exhaust** gas; accept vehicle **emissions** before "emitted" and prompt afterward; prompt on "air pollution"; prompt on answers indicating "particulate matter")