|  |
| --- |
| Note: 1 period = 40 minutes |

Unit 1: The Living World: Ecosystems

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes and Vocabulary** | **Lab /  Practical activity** | **Formative (BR or TOTD) or**  **Summative Assessment** |
| 4 periods | 1 – 7 | Vocab: biotic, abiotic, ecosystem, community, symbiosis, mutualism, commensalism, parasitism, exploitative competition, interference competition, resource partitioning | Create a symbolic model for each type of interaction (A2) | * Interpret symbolic models for different types of interactions. * What are the benefits and limitations of a territorial system? * How does resource partitioning reduce competition? |
| 3 periods | 8 – 11 | Vocab: biome | To demonstrate differences in solar radiation at different latitudes, project a square grid onto a ball or balloon – outline the “squares” | * [https://earthobservatory.nasa.gov/biome/ graphmatch\_advanced.php](https://earthobservatory.nasa.gov/biome/%20graphmatch_advanced.php) |
| 2 periods | 12 – 13 | Vocab: marine, littoral, benthos, stratification, eutrophication, biogeochemical cycles, reservoir, --cline, pycno-- |  | * Explain why different bodies of water appear to be different colors |
| 2 periods | 14 | Vocab: sink, coal, oil & natural gas, limestone, peat, glux | **Activity** **14**: Investigation 1.1 Carbon cycling simulation | * Lab discussion |
| 2 periods | 15 – 17 | Vocab: fixation, assimilation, nitrification, ammonification, excretion, runoff, leaching, uplift & weathering, mineralization, immobilization, evaporation, condensation, precipitation, infiltration, percolation |  | * Identify the reservoirs and the fluxes in each biogeochemical cycle. * Specify if the flux is biologically, chemically or geologically driven. |
| 1 period | 18 | Vocab: primary productivity, GPP, NPP, productivity | Relate the relevant features of estuaries and wetlands to their high NPP. | * Distinguish between primary productivity and primary production. |
| 2 periods | 19 | Vocab: Leaf Area Index (LAI) | **Activity 19**:Investigation 1.2 Determining primary productivity in grass  (plan on 2 weeks to complete this lab) |  |
| 2 periods | 20 – 22 | Vocab: trophic level, producer, consumer, decomposer, detritus, pyramids, | **Activity 21**:  Complete the energy flow | * Select a type of ecological pyramid and defend its use. |
| 2 periods | 23 – 24 | Vocab: herbivore, carnivore, omnivore, phytoplankton, zooplankton |  |  |
| 1 period | 25 |  |  | Assessment Unit 1 |

Unit 2: The Living World: Biodiversity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 4 periods | 26 – 29 | Vocab: stability, resistance, resilience, habitat fragmentation, species richness, species evenness | Rank-abundance diagram | * What are the components of biodiversity? * Analysis of rank-abundance data for 2 forest stands. |
| 1 period | 30 | Ecosystem services |  |  |
| 1 period | 31 | Island Biogeography |  | * Are island species more likely to be generalists or specialists? Why? |
| 3 periods | 32 – 34 | Vocab: tolerance, periodic, episodic |  |  |
| 1 period | 35 |  |  | * How does adaptation occur? |
| 2 periods | 36 – 39 | Vocab: primary succession, sere, secondary succession, keystone species, indicator species |  |  |
| 1 period | 40 |  |  | Assessment Unit 2 |

Unit 3: Populations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 1 period | 41 | Vocab: abundance, distribution, density, age structure, fertility, sex ratio, natality, mortality |  |  |
| 1 period | 42 | Vocab: biotic potential (r), carrying capacity (K) |  | * Relate reproductive strategy to seres in ecological succession. |
| 3 periods | 43 – 46 | Vocab: survivorship curve, life expectancy, IMR | Create a survivorship curve for elk | * Compare human survivorship pre- and post-1950 USA |
| 2 periods | 47 – 48 | Vocab: limiting factors |  |  |
| 4 periods | 49 – 52 | Vocab: per capita, biotic potential, rmax, density dependent, density independent | Plot rainfall and pronghorn fawn survival on graph  **Activity 51**:  Investigation – Modeling Population Growth | * Explain any correlation between rainfall and fawn survival |
| 1 period | 53 | Vocab: demographics, histogram, age diagram, population momentum |  | * Describe a population as growing, stable or declining, based on the age diagram |
| 2 periods | 54 – 56 | Vocab: demographic transition | Rule of 70 (Rule of 72)  Plot population data |  |
| 1 period | 57 |  |  | Assessment Unit 3 |

Unit 4: Earth Systems and Resources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 3 periods | 58 – 61 | Vocab: crust, mantle, core, transform boundary, divergent boundary, convergent boundary, island arc, hotspot, lithosphere, asthenosphere, Mohorovicic discontinuity, subduction, convection, mantle plumes, fault | Graph the movement of 2 points on either side of the San Andreas fault.  Describe the movement.  Graph the earthquake activity at the Tonga Trench. Describe the tectonic activity based on the graph.  Graph volcano age in Hawaii. Calculate the rate of movement of the island chain | * From what sources did we learn the structure of the earth? * Name and describe the different types of plate boundaries. |
| 3 periods | 62 – 65 | Vocab: soil horizons, soil profile, erosion, sand, silt, clay, loam | Identify soil type (class) by doing a soil analysis and comparing the results to the soil triangle. | * How is soil formed? * How is it characterized? * How does parent rock and climate impact soil type? |
| 2 periods | 66 – 67 | Vocab: troposphere, stratosphere, mesosphere, thermosphere, exosphere, Coriolis effect, tricellular model: Hadley cell, Ferrel cell, polar cell |  | * Relate the tricellular model to global precipitation patterns. |
| 1 period | 68 | Vocab: watershed, tributary, endorheic basin |  | * How does the development of human communities impact water runoff? |
| 1 period | 69 – 70 | Vocab: insolation, solstice, equinox | **Activity 70:**  Investigation 4.3: Measuring Energy | * How does the tilt of the earth’s axis impact the climate? Explain |
| 1 period | 71 – 72 | Vocab: rain shadow, leeward, windward, El Nino Southern Oscillation cycle |  |  |
| 1 period | 73 |  |  | Assessment Unit 4 |

Unit 5: Land and Water Use

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 1 period | 74 |  | **Activity 74**: Investigation 5.1: The Tragedy of the Commons | * Explain how the tragedy of the commons occurs |
| 3 periods | 75 - 78 | Vocab: clearcutting, Green Revolution, slash and burn, tillage, irrigation |  | * What are the conflicting outcomes of the Green Revolution? How did this happen? |
| 1 period | 79 – 80 | Vocab: pesticides, Delaney Clause, genetic engineering, pesticide resistance, pesticide treadmill |  | * Why was the Delaney Clause replaced legislatively? * Why is genetic diversity important in crops? * How does pesticide resistance develop? |
| 2 periods | 81 – 82 | Vocab: CAFOs, Free range, riparian zone |  | * Compare and contrast CAFOs and free range cattle. * Describe the effects of rotating grazing on rangeland. * Describe the effects of livestock rotation on rangeland. |
| 1 period | 83 |  |  | * Describe a comprehensive solution to overfishing. |
| 1 period | 84 | Vocab: tailings overburden, spoil pile |  | * Compare and contrast surface mining and subsurface mining. Include the advantages and disadvantages of each. |
| 1 period | 85 | Vocab: urbanization, urban sprawl, saltwater intrusion |  | * Describe the effects (good and bad) of urbanization on the environment. |
| 1 period | 86 - 87 | Vocab: ecological footprint, sustainability |  | * What are the 2 primary factors that determine sustainability? * Is calculating sustainability actually that easy? |
| 1 period | 88 | Vocab: urban runoff | **Activity 88**:  Investigation 5.2: Testing water runoff | * Green space debate |
| 1 period | 89 | Vocab: IPM |  | * Does IPM eliminate the use of pesticides? Explain |
| 2 periods | 90 – 91 | Vocab: sustainable agriculture, no-till, conservation, plow pan, dust bowl, terracing |  | * What practices could have prevented the Dust Bowl? |
| 1 period | 92 | Vocab: aquaculture |  | * Develop and argument *for* or *against* fish farming as a sustainable solution. |
| 1 period | 93 | Vocab: selective logging, strip cutting, crown fires, surface fires, ground fires, prescribed burns |  | * Justify the use of prescribed burns as a forest management strategy. |
| 1 period | 94 |  |  | Assessment Unit 5 |

Unit 6: Energy Resources and Consumption

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 1 period | 95 | Vocab: turbine, generator, transformer, photovoltaic cell, kWh, joule | **Activity 95**: Investigation 6.1: Home electricity survey | * What are the largest consumers of electricity in your home? |
| 2 periods | 96 - 98 | Vocab: non-renewable, renewable, fossil fuel, TWh, biofuels, solid fuel, cumulative graph | Plot world energy consumption and interpret changes | * How has the “energy diet” of the world |
| 3 periods | 99 – 102 | Vocab: fossil fuels, coal, peat, lignite, bituminous coal, syn-gas, coke, anthracite, petroleum, non-conventional oils, oil shale, oil sands, natural gas, liquid natural gas, fractional distillation, hydraulic fracturing (fracking), |  | * Distinguish between resources and reserves. * How does technology impact the amount of resource in reserve? * What is octane? |
| 4 periods | 103 – 105 | Vocab: fission, fusion, fuel rods, control rods | **Activity 104**:  Investigation 6.2: Modelling half-lives | * How is enrichment achieved? * How important is reactor design relative to operator expertise? * How does the level of fissionable material compare between fuel and weapons? |
| 1 period | 106 | Vocab: biomass, petrol, 1st, 2nd, 3rd, 4th generation biofuels |  |  |
| 3 periods | 107 – 108 | Vocab: solar thermal, monofacial solar panel, bifacial solar panel, passive solar, active solar, direct solar steam generation | **Activity108**:  Investigation 6.3: Solar heating houses  Investigation 6.4: Solar power | * To what would attribute the changes in cost of electricity from different sources in 2010 and 2016? |
| 2 periods | 109 – 110 | Vocab: powerhouse, dam, ship lock, tides, ebb tide, flow tide, wave power |  |  |
| 2 periods | 111 – 113 | Vocab: geothermal, heat pump, hydrogen fuel cells, anode, cathode, catalyst |  | * How can geothermal energy be used, if not for producing electricity? |
| 1 period | 114 | Vocab: conservation, superinsulation, “light bulb socialism” |  |  |
| 1 period | 115 |  |  | Assessment Unit 6 |

Unit 7: Atmospheric Pollution

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 4 periods | 116 – 119 | Vocab: primary pollutants, secondary pollutants, photochemical smog, ozone, tetraethyl lead (TEL), Clean Air Act, smog, volatile organic compounds (VOCs), sublimate, peroxyacyl nitrates (PANs), Thermal inversion, particulates | While all cities showed a significant drop in PM2.5, propose an explanation about why the drop varied so much.  What is the annual average of gas & particle emissions from volcanoes? | * Is there a difference between ground-level ozone and ozone in the stratosphere? * Why was TEL added to gasoline in the first place? |
| 1 period | 120 | Vocab: Radon-222 | **Activity 120**: Investigation 7.1: Measuring particulates in air | * Suggest an explanation for why radon is correlated with lung cancer but no other cancers? |
| 2 periods | 121 – 123 | Vocab: National Ambient Air Quality Standards (NAAQS), electrostatic precipitator (ESP), scrubbers, catalytic converter, oxidation rxn, reduction rxn, SO2, NOx, acid precipitation, pH |  |  |
| 1 period | 124 | Vocab: decibel, echolocation, noise induced hearing loss (NIHL) |  |  |
| 1 period | 125 |  |  | Assessment Unit 7 |

Unit 8: Aquatic and Terrestrial Pollution

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 1 period | 126 | Vocab: point source (PS), non-point source (NPS) |  | * From a list, identify the PS and the NPS. |
| 8 periods | 127 – 134 | Vocab: tolerance range, indicator species, Clean Water Act, estuaries, benthic, booms, sorbents, permafrost, cost – benefit analysis, mariculture, dissolved oxygen (DO), biological oxygen demand (BOD), oxygen sag curve, hypoxic, aerobic, dead zone, gyres, turbidity, Secchi disk, clarity | **Activity 129**:  Investigation 8.1: Cleaning up oil spills | * Act 130 – Quickwrite * What causes deadzones to form, and what contributes to their dissipation? * Explain the relationship between turbidity and DO. |
| 1 period | 135 | Vocab: endocrine disrupting chemicals (EDCs), |  | * What is the predominant effect of EDCs? |
| 1 period | 136 | Vocab: wetlands, mangroves |  | * Why are wetlands important to the ecosystem? * Why are wetlands often exploited by humans? |
| 1 period | 137 | Vocab: eutrophication, Trophic status index, oligotrophic, mesotrophic, eutrophic, hypertrophic |  | * Why is eutrophication often seasonal? |
| 1 period | 138 | Vocab: thermal pollution |  | * Suggest reasons why the increase in temperature will cause fish to use more oxygen. |
| 1 period | 139 | Vocab: Persistent organic pollutants (POPs), bioaccumulation, biomagnification |  |  |
| 1 period | 140 | Vocab: municipal solid waste (MSW), leachate, |  | * In the decomposition graphic (p 282), how does the actual time compare to your expectations of the time for decomposition? * What are the alternatives? |
| 3 periods | 141 – 143 | Vocab: reduce, reuse, recycle, e-waste, mitigation, remediation, Superfund | **Activity 142**:  Investigation 8.2: Recording your trash | * Where is the nearest e-waste disposal site? * Where is the nearest Superfund clean-up site? |
| 2 periods | 144 | Vocab: Sewage, primary treatment, secondary treatment, tertiary treatment, aerobic, anaerobic | b:  Investigation 8.3: The role of microbes in sewage treatment |  |
| 1 period | 145 | Vocab: toxicity, LD50, dose response curve, threshold response, acute, chronic |  |  |
| 5 periods | 146 – 151 | Vocab: pathogen, vector, endemic diseases, emerging diseases, epidemic, pandemic, SIR model - susceptible, infected, removed; antigenic drift v antigenic shift |  |  |
| 1 period | 152 |  |  | Assessment Unit 8 |

Unit 9: Global Change

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of periods** | **Activity number** | **Notes** | **Lab /  Practical activity** | **Formative or**  **Summative Assessment** |
| 2 periods | 153 | Vocab: ozone, UV, CFCs, polar stratospheric clouds, HCFC, HFC, HFO |  |  |
| 7 periods | 154 – 159 | Vocab: greenhouse effect, climate change, inundation, weather patterns, albedo, permafrost, ice shelf | **Activity 158**:  Investigation 9.1: Albedo and ice cube melting |  |
| 2 periods | 160 – 161 | Vocab: acidification, pH, calcite, aragonite, |  | Besides the shells of sea organisms, what else seems to be affected by ocean acidification? |
| 1 period | 162 | Vocab: invasive species |  |  |
| 2 periods | 163 – 165 | Vocab: threatened, endangered, extinct, habitat fragmentation, phenotypic plasticity |  |  |
| 4 periods | 166 – 170 |  |  |  |
| 1 period | 171 |  |  | Assessment Unit 9 |

Sciences Practice Chapter

This chapter provides skills support for the six skills listed and integrated throughout AP Environmental Science. There is no prescribed time to utilize these activities, use your discretion to assign these activities when you feel they will be best utilized. Integration of these activities will help support students gain confidence in the application of the science practices.