Name:

## Lesson 4 Guided Notes: Air Pollution

- 1. How has COVID19 possibly saved more lives in China than it has taken? Be sure to explain how most air pollutants negatively impact human health.
- 2. Draw out a thermal inversion in the box below. How does it happen and what are some common places where this phenomena is seen.

Normal Air Flow	Thermal Inversion	Fixing a Thermal Inversion

3. What were the original 6 criteria pollutants of the Clean Air Act in 1970 and which were added in 1990?

Original Six		Added in 1990
1.	4.	1.
2.	5.	2.
3.	6.	3.
		4.
		5.

## 4. What is the difference between a primary pollutant and a secondary pollutant?

## Primary Pollutant:

## Secondary Pollutant:

<u>5-6 Smog</u>: For each the following pollutant drawings be sure include the name, source, classification environmental impact, human impact, and control method.

What is smog?

Industrial Smog and Acid Deposition

Photochemical Smog

8. Why is indoor air pollution such a big deal? Draw out a building with "sick building syndrome" below.

Sick Building Syndrome

9. Noise Pollution – what is it and what are the health and environmental impacts?

Air Pollutant Cheat Sheet						
Pollutant	Source	Environmental Impact	Human Impact	Control		
Sulfur Dioxide (SO <sub>2</sub> )	Coal combustion	Industrial smog Leads to acid rain- H <sub>2</sub> SO <sub>4</sub> (sulfuric acid)	Respiratory irritation	Scrubbers		
Nitrogen Oxides (NO <sub>x</sub> )	Fossil fuel combustion - cars Agriculture	Precursor to photochemical smog Leads to acid rain- HNO₃ (nitric acid) Greenhouse gas	Respiratory irritant	Catalytic converters		
Carbon Monoxide (CO)	Incomplete combustion	Contributes to increase in atmospheric carbon	Low concentration -headaches High concentration death	Catalytic converters		
Particulate Matter	Coal combustion Combustion of biomass Cars Agriculture	Reduces visibility Contributes to smog	Respiratory disease	Electrostatic precipitator		
Lead	Leaded gasoline Airborne paint particles - leaded paint	Can travel on prevailing winds – heavy metal deposition on soil and in water	Neurological damage- especially in children & developing fetus	Global ban on leaded gasoline		
Tropospheric Ozone	Secondary pollutant—reaction of NO <sub>x</sub> and VOCs in sunlight	Major component of photochemical smog Plant tissue damage Greenhouse gas	Respiratory irritant	Limit emissions of primary pollutants like NOx and VOCs		
Volatile Organic Compounds (VOCs)	Organic compounds that become vapors - gasoline, perfumes, terpenes, solvents	Precursor to ozone formation and therefore component of photochemical smog	Respiratory irritant	Prevent vaporization during fueling Use alternative cleaning products/ limit dry cleaning solvents		
Mercury (Hg)	Coal burning	Mercury biomagnifies up the food chain and bioaccumulates in organisms	Large cold water fish contain high levels of mercurywhen consumed can cause neurological damage	Decrease use of coal		
Carbon Dioxide (CO <sub>2</sub> )	Combustion	Greenhouse gasincrease global temperatures	Change in climate increase severity of storms, rising sea levels	Decrease use of fossil fuels, protect forests from deforestation		
(Brown Smog) Photochemical Smog	Requires cars, sunlight, NO <sub>x</sub> and VOCscreate secondary pollutants	Brown hazepoor air quality— hundreds of toxinscan travel to the poles on prevailing winds	Respiratory irritation Asthma	Decrease use of fossil fuels and decrease use of cars carpool		
(Gray Smog) Industrial Smog	Coal burning	Gray hazelimits light decrease photosynthesis	Respiratory irritant Lung damage	Scrubbers, filters, electrostatic precipitators, fluidized bed combustion		
PANs	Secondary pollutant formed like tropospheric ozone	Component of photochemical smog Plant tissue damage	Respiratory irritation	Limit emissions of primary pollutants like NOx and VOCs $% \left( {{{\mathbf{N}}_{\mathbf{x}}} \right)$		
Acid Deposition	Secondary pollutant Coal Burning—SO <sub>2</sub> + water creates sulfuric acid Cars- NO <sub>x</sub> - creates nitric acid	Acids damage plant tissues Leach toxic metals from the soil Lowers pH of surface waters and can kill aquatic organisms	Damage to buildings & statues (increase erosion) Crop damage- loss of profits	Limit emissions of SO <sub>2</sub> and NO <sub>2</sub>		
Formaldehyde	Dangerous chemical found in many materials used indoor	n/a	Headaches, nausea, respiratory irritant, and cancer	Use formaldehyde-free materials Increase ventilation		
Radon	Naturally occurring radioactive gas seeps into buildings underground	n/a	Lung cancer	Seal leaks in foundations and basements		
Asbestos	Used in insulation and ceiling tiles in older buildings	n/a	Fibers cause lung irritation and cancer	Removal by professionals		