**ICE, EV & Air Quality Connections Worksheet (3-5)**

Do internal combustion engines (ICE) and electric vehicles (EV) affect our air?

Together, we are going to find out:

* Does vehicle transportation affect air quality?
* What type of air pollution comes from vehicles?
* How does air pollution affect our health?
* Can certain vehicles help make the air cleaner (healthy)?

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| **1. Watch the** [**video**](https://www.youtube.com/watch?v=GCBGIPsB-qw) **about vehicles and air pollution. Write or draw what you observe:** |
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| **Class Reflection:** How do vehicles affect how healthy the air is? What solutions do you think could help with reducing air pollution from vehicles? Share your thoughts as a class. |

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| **2. Let’s find out about two types of air pollution that comes from vehicles.** |
| **Particulate Matter (PM)** |
| **Particulate Matter**, also called **PM**, is a type of air pollution that is released from emissions, including vehicle exhaust. Let’s learn more about PM air pollution in this [video](https://www.youtube.com/watch?v=nzHpcryefOE). |
| **Particulate Matter** is a **pollutant** made up of very **tiny particles** and **droplets** that **float** in the air.   * PM comes from **natural** sources like **dirt**, **dust**, and **wildfire smoke**. * PM comes from **human-made** sources like **soot** from **burning fuels** for energy and heat. * PM can make the air **hazy**. |
| Look at the image of the size of two types of particulate matter, PM 2.5 and PM 10, compared to other objects.   * How does the size of PM 2.5 compare to PM 10? * What do you notice about the size of PM 2.5 and PM 10 compared to the size of a human hair and a grain of sand? |

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| **2. Let’s find out about one type of air pollution that comes from vehicles.** |
| **Ground-Level Ozone** |
| **Ground-level ozone** is a type of **air pollution** that is formed from emissions released into the atmosphere from burning fossil fuels for energy. Let’s learn more about Ozone air pollution in this [video](https://www.youtube.com/watch?v=3yiJTcFp2Xc). |
| **Ozone: Good Up High, Bad Nearby!**   * Ozone is an **invisible** gas, so a clear, blue sky can still have high ozone pollution. |
| 1. Look at the two images. With a partner, discuss the similarities and differences of ozone in the atmosphere. Next, share observations as a class. |
| 1. Label the image with the correct terms to explain how ozone is made.   Word bank: *emissions, warm air, sunlight, ground-level ozone* |

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| **3. How does air pollution affect our health?** | |
| Draw a line to **match the words and pictures** to explain how **breathing PM affects our health**: | |
| Health Effects of Breathing PM:   * **Premature death in people with heart or lung disease** * **Non-fatal heart attacks** * **Irregular heartbeat** * **Aggravated** [**asthma**](https://www.epa.gov/asthma) * **Decreased lung function** * **Increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.** | Draw an image of one health effect of breathing PM: |

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| **3. How does air pollution affect our health?** | |
| Draw a line to **match the words and pictures** to explain how **breathing Ozone affects our health**: | |
| Health Effects of Breathing Ozone:   * **Cause coughing and sore or scratchy throat.** * **Make it more difficult to breathe deeply and vigorously and cause pain when taking a deep breath.** * **Inflame and damage the airways.** * **Make the lungs more susceptible to infection.** * **Aggravate lung diseases such as asthma, emphysema, and chronic bronchitis.** * **Increase the frequency of asthma attacks.** | Draw an image of one health effect of breathing Ozone: |

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| **4. Let’s figure out how ICE vehicles and electric vehicles work.** |
| Now, let’s put together what we now know about **PM air pollution** and its **health effects** to learn how different types of **vehicles** affect how clean the air is.   * First, watch the [video](https://www.youtube.com/watch?v=5tN6eynMMNw) about how an **ICE (internal combustion engine) vehicle** works. * Now, watch the [video](https://www.youtube.com/watch?v=fIvnKKPERZk&t=47s) about how an **electric vehicle (EV)** works. |
| How are **electric vehicles** and **ICE vehicles** the **same**? Draw or write your answer: |
| How are **electric vehicles** and **ICE vehicles** **different**? Draw or write your answer: |
| **Class Reflection:** Share your thoughts on the following questions as a class:   * Is **clean air** important? Explain your reasoning. * Do **ICE** or **electric vehicles** make our air **dirtier**? Explain with evidence. * Do **ICE** or **electric vehicles** make our air **cleaner**? Explain with evidence. |