**Internal Combustion Engine, EV & Air Quality Worksheet**

How do internal combustion engines 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 reduce air pollution from vehicles? Share your thoughts as a class. |

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| **2. Particulate Matter (PM)** |
| **Particulate Matter (PM)** 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**.
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|   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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| **3. 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 us 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.
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|  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.
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|  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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| **4. How does PM 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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| **5. How does ozone 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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| **6. How internal combustion engine vehicles and EVs 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 **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.
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| How are **EVs** and **internal combustion engine vehicles** the **same**? Draw or write your answer: |
| How are **EVs** and **internal combustion engine 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 **internal combustion engine** or **EVs** make our air **dirtier**? Explain with evidence.
* Do **internal combustion engine** or **EVs** make our air **cleaner**? Explain with evidence.
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