What We Breathe

Trace how environmental exposures can cause respiratory distress.

HAP.12.6 "Research and discuss new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each environmental exposure, circle what enters the body or changes in the inhaled air, and draw an arrow to its effect on breathing or oxygen delivery.

Three Paths to Breathing Trouble

1. At a school health fair, a student asks whether a sweet-smelling vape cloud is only water vapor. An e-cigarette heats a liquid into an aerosol that can carry nicotine, tiny particles, and other chemicals deep into the lungs. Some flavoring ingredients may irritate airways when inhaled, even if they are safe to eat. In 2019, investigators linked many cases of severe vaping-associated lung injury to vitamin E acetate in some THC vaping products, especially those obtained informally. That finding does not mean every vaping illness has the same cause. Product contents and symptoms matter when researchers investigate a case.

2. After a nearby wildfire, a teen walks home while the sky looks hazy. Wildfire smoke contains fine particles that can travel deep into the lungs and trigger inflammation. Inflamed airways can swell, making it harder to move air, especially for someone with asthma. Smoke can also contain carbon monoxide, a gas that binds to hemoglobin and reduces how much oxygen the blood can carry. Particle levels can remain high even when flames are distant, and visible haze does not measure the exact dose a person inhales. Researchers use air monitors and exposure histories rather than appearance alone.

3. Now imagine a runner who becomes short of breath at a mountain race, far from smoke or vaping. At high altitude, oxygen still makes up about 21% of outdoor air, but air pressure is lower. Each breath supplies fewer oxygen molecules, which can reduce oxygen transfer into the blood. This is a change in the amount of oxygen available per breath, not a new lung irritant. To research an unexplained breathing problem, compare the timing of symptoms with exposure records, product information, air-quality measurements, and altitude. Breathing trouble can also have medical causes, so exposure alone does not prove causation.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why is "just water vapor" an inaccurate description of an e-cigarette aerosol? Explain one way its contents could affect the lungs.

2. Explain two different ways wildfire smoke could contribute to breathing trouble.

3. How does high altitude differ from smoke particles as a cause of breathing trouble?

4. A person who vapes develops lung symptoms. Why does the 2019 finding not identify the cause by itself? Name two kinds of information that could help investigate.

3 YOUR TURN

Your own words

Create a new, realistic situation in which two exposures from the passage overlap. In 4 to 5 sentences, explain how each could contribute to respiratory distress and identify evidence you would seek to test your explanation.

ANSWER KEY

What We Breathe

PART 1 · READ AND MARK

Underline each environmental exposure, circle what enters the body or changes in the inhaled air, and draw an arrow to its effect on breathing or oxygen delivery. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why is "just water vapor" an inaccurate description of an e-cigarette aerosol? Explain one way its contents could affect the lungs.	**The aerosol can carry nicotine, tiny particles, and other chemicals. Inhaled ingredients may irritate the airways.**
2	Explain two different ways wildfire smoke could contribute to breathing trouble.	**Fine particles can trigger inflammation and airway swelling, making air harder to move. Carbon monoxide can bind to hemoglobin, reducing the blood's oxygen-carrying ability.**
3	How does high altitude differ from smoke particles as a cause of breathing trouble?	**At high altitude, lower air pressure means fewer oxygen molecules are available per breath. Smoke particles can inflame the airways instead.**
4	A person who vapes develops lung symptoms. Why does the 2019 finding not identify the cause by itself? Name two kinds of information that could help investigate.	**Vitamin E acetate was linked to many cases, not every vaping illness. Investigators could examine the product's contents and compare the timing of symptoms with the person's exposure history.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

At a mountain race near a recent wildfire, a runner begins to feel short of breath. Fine smoke particles could inflame the runner's airways and make it harder to move air. Low air pressure at altitude could also reduce the oxygen available with each breath. I would check air-monitor readings from the race to see whether the runner was exposed to smoke particles.

Accept other plausible combinations of two passage exposures if the response accurately explains both mechanisms. Evidence should help establish an exposure or its timing, without claiming that exposure alone proves the cause.