Air on the Move

Trace how air is prepared, moved, and used

HAP.12 "Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders. Design and use models to illustrate the functions of the organs of the respiratory system..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline structures that prepare air, circle the five processes involved in breathing and gas exchange, and number each cause-and-effect link about pressure or asthma. Use your marks to trace what happens between inhaling and cellular respiration.

From the Nose to the Cells

1. Air enters through the nose, where hairs and sticky mucus trap particles. Blood vessels warm incoming air, and moisture on the lining humidifies it. Tiny cilia sweep trapped material toward the throat. Air then passes through the trachea and branching bronchi to smaller bronchioles. At the alveoli, thin, moist walls and nearby capillaries allow gases to diffuse.

2. Breathing has five linked processes. Pulmonary ventilation moves air into and out of the lungs. During external respiration, oxygen diffuses from alveoli into blood while carbon dioxide diffuses into alveoli. Blood transports these gases. During internal respiration, oxygen diffuses from blood into body tissues. In cellular respiration, cells use oxygen to release energy from food.

3. When the diaphragm contracts, the chest cavity expands and lung pressure briefly drops below room pressure, so air flows in. A sealed syringe models how changing air volume changes pressure; the table records readings before its valve is opened. In asthma, inflamed airways narrow and make ventilation harder, reducing the fresh air reaching alveoli for gas exchange.

SEALED SYRINGE READINGS

Air volume (mL)	Syringe pressure (kPa)	Room pressure (kPa)
60	100	101
50	120	101

2 ANSWER WITH EVIDENCE

Use the passage

1. Explain how two features of the nose prepare air before it reaches the alveoli.

2. Trace oxygen from inhalation to its use by a cell. Name the five linked processes in order and state what happens to oxygen in each.

3. Which syringe reading predicts that air would flow in if the valve opened? Explain using both pressures.

4. How can asthma interfere with external respiration? Start with the change in the airways.

3 YOUR TURN

Your own words

Draw two labeled panels showing inhaling and exhaling. In each, show diaphragm position, chest cavity volume, lung pressure compared with room pressure, and airflow direction; add one sentence explaining how a nose structure prepares incoming air.

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PART 1 · READ AND MARK

Underline structures that prepare air, circle the five processes involved in breathing and gas exchange, and number each cause-and-effect link about pressure or asthma. Use your marks to trace what happens between inhaling and cellular respiration. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Explain how two features of the nose prepare air before it reaches the alveoli.	**Hairs and mucus trap particles, while blood vessels warm the air. Moisture on the lining also humidifies it.**
2	Trace oxygen from inhalation to its use by a cell. Name the five linked processes in order and state what happens to oxygen in each.	**Pulmonary ventilation brings oxygen into the lungs. External respiration moves it from alveoli into blood. Blood transports it to tissues. Internal respiration moves it into tissues. Cellular respiration uses it to release energy from food.**
3	Which syringe reading predicts that air would flow in if the valve opened? Explain using both pressures.	**At 60 mL, syringe pressure is 100 kPa, below room pressure of 101 kPa, so air would flow in.**
4	How can asthma interfere with external respiration? Start with the change in the airways.	**Inflamed airways narrow, making ventilation harder. Less fresh air may reach the alveoli, limiting gas exchange.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Inhaling panel: The diaphragm is flat and low, chest cavity volume increases, lung pressure is below room pressure, and an arrow points into the lungs. Exhaling panel: The diaphragm is domed and high, chest cavity volume decreases, lung pressure is above room pressure, and an arrow points out of the lungs. Sentence: Nasal mucus traps particles before air reaches the alveoli.

Accept any two accurate nose features in question 1. For the panels, accept pressure labels that describe the brief pressure difference while air is moving.