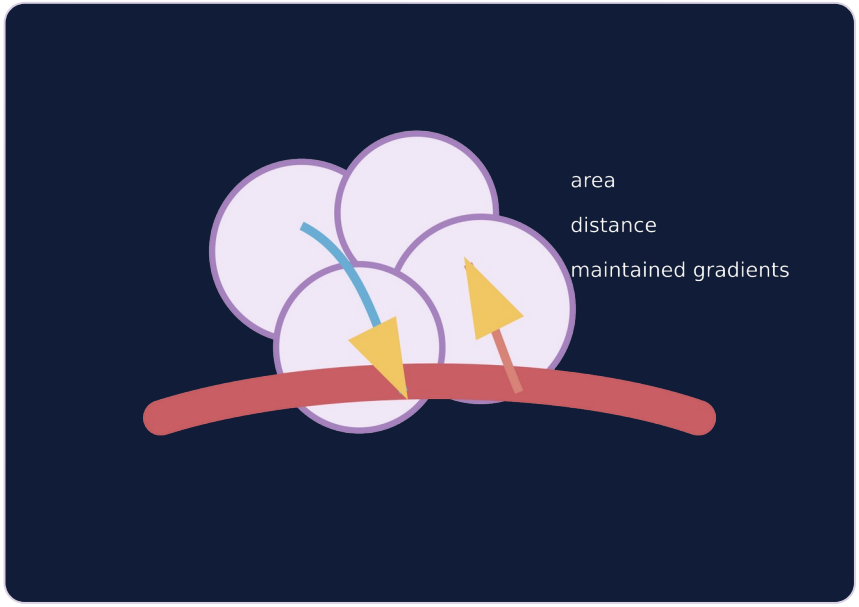
Gas exchange

I can link alveolus features to rapid gas exchange using concentration gradients and diffusion distance.

Notice. Recall. Be ready to explain.

1 In which direction does oxygen diffuse at an alveolus?

2 In which direction does carbon dioxide diffuse?



Retrieval answers

Make a prediction

Which change would most directly shorten the distance that oxygen must diffuse: more alveoli, a thinner wall or faster ventilation?

A More alveoli

B A thinner wall

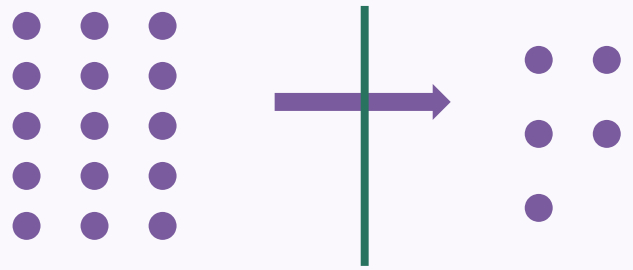
C Faster ventilation

Commit, then check

Watch the model

1. Ventilation refreshes alveolar air and helps maintain oxygen and carbon dioxide gradients.
2. Blood flow carries gases away or brings them to the exchange surface, maintaining gradients.
3. A one-cell-thick exchange surface gives a short diffusion distance, while many alveoli give a large surface area.

A short diffusion distance



View labelled diagram

Optional video

Choose and justify

Why does a rich blood supply support oxygen diffusion into blood?

A It makes oxygen particles choose the blood

B It removes oxygenated blood and maintains a gradient

C It thickens the alveolus wall

D It stops carbon dioxide moving

Give the deciding clue before checking.

Check the reasoning

Connect the science

1. Feature: large surface area. Effect: more membrane available at once. Consequence: greater total diffusion.
2. Feature: thin wall. Effect: shorter diffusion distance. Consequence: faster exchange.

3. Feature: ventilation and blood flow. Effect: maintain gradients. Consequence: continued net movement.

Illustrative crossings in equal volumes

Left → right: 8 Right → left: 2

Net left → right = 8 − 2 = 6

At balance: 5 − 5 = 0; motion continues.

Build a linked explanation

Point to the net direction for each gas. Then explain one adaptation.

Gas	Alveolar air compared with arriving blood
Oxygen	Higher concentration
Carbon dioxide	Lower concentration

Thin walls → what physical effect? → how does this help diffusion?

Reveal shared reasoning

Independent Task · 10 min

Your independent evidence

A disease thickens the alveolar wall but does not initially change surface area. Explain how this affects oxygen uptake. Then state why increasing ventilation may not completely remove the problem.

Optional support

Use three parts: the feature, what it changes, and how that affects diffusion. Start: “Thin walls help because…”

Make one precise correction to the same work after feedback.

Open worksheet pages

Model after first attempt

Exit · 3 min

What changed in your thinking?

Complete: a thin exchange surface increases diffusion rate because…

1. Point to one improvement in your work.
2. Choose what you want to revisit.
3. Tell your teacher; agree the next step together.

Retrieval and prediction check

1 Alveolar air into arriving blood, down its oxygen gradient.

2 Arriving blood into alveolar air, down its CO_2 gradient.

A thinner wall

Return to Starter

Check the deciding clue

It removes oxygenated blood and maintains a gradient

Correct. Link maintained gradient to continued net diffusion.

Compare your reason. Correct one step if needed.

Return to We Do

Our shared reasoning

Oxygen: air → blood. Carbon dioxide: blood → air.
Thin walls give a short diffusion distance, so gases cross more quickly down their gradients. Blood flow and ventilation help maintain gradients.

Return to shared task

Compare after your first attempt

A thicker alveolar wall increases the distance oxygen must diffuse, so the rate of oxygen movement into blood falls. Faster ventilation may maintain a steep oxygen concentration gradient, but it does not make the thickened exchange surface thinner, so the longer diffusion path remains.

Use the model to improve your explanation in your own words.

Return to independent task

Your lesson resources

Worksheet pages are stored inside this PowerPoint.

Worksheet · page 1

Worksheet · page 2

Standard PDF

Supported PDF

Depth PDF

Editable Word worksheet

Open online lesson / model

Named files are in this week’s folder. Online lesson and video need internet.

Optional concept video

Worksheet · page 1

Use your printed copy.
Keep the first attempt.

MADE BY MATT / LAUNCH SCIENCE

W4L2 | Build an alveolus explanation

Wednesday | 09:30–10:10 | Explore | Editable pupil sheet

Name: _____ Date: _____

Core first. Write, speak, point or dictate your own words. Keep the first attempt so you can improve it.

Optional support: Use three parts: the feature, what it changes, and how that affects diffusion. Start: "Thin walls help because…"

Work together

Sketch an alveolus next to a capillary. Label air and blood.

Gas	Alveolar air relative to arriving blood	Net direction
Oxygen	Higher	
Carbon dioxide	Lower	

Your labelled sketch / arrows:

1. **Complete both net-direction entries.**

2. **Explain how thin walls help oxygen uptake.**

Return to task

Worksheet · page 2

Continuation is optional.
Improve the same work.

MADE BY MATT / LAUNCH SCIENCE

W4L2 | Continue and improve

Use after the core questions when directed

3. **Explain how blood flow helps maintain gas exchange.**

Optional transfer

If the wall thickens, will extra ventilation necessarily restore the original exchange rate?

Depth: name an assumption or limit, then say what evidence would strengthen your answer.

Improve the same work

One correction I made, and why:

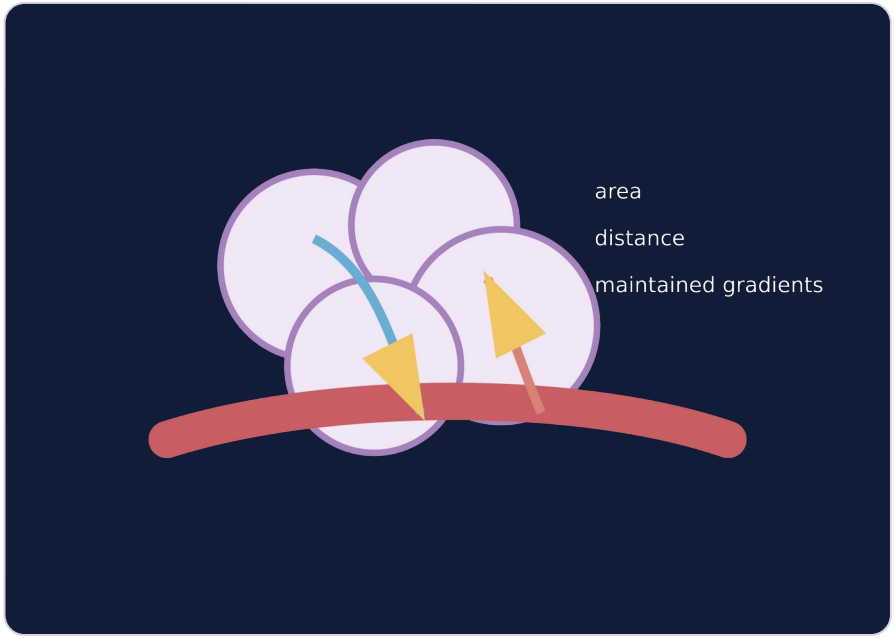
My request for next time: _____

Return to task

Watch, pause and explain

Gas exchange in the lungs

How does a thin wall help oxygen move into the blood?

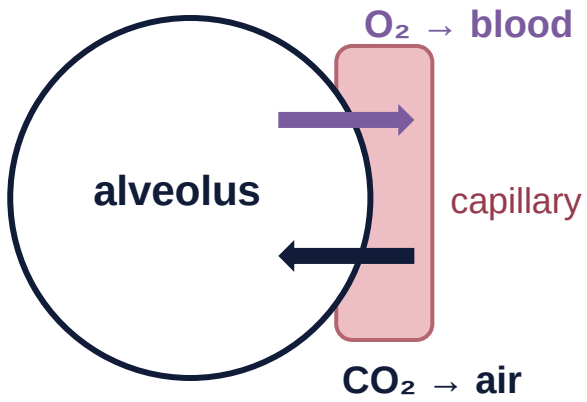


Play freesciencelessons video

No connection? Use the still model and explain the same question.

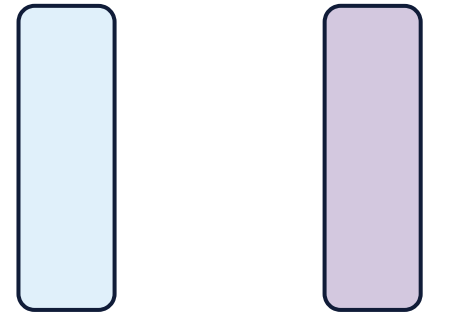
Look closely at the model

Gas exchange in one alveolus



- LARGE SURFACE AREA
- WALL ONE CELL THICK
- GOOD BLOOD SUPPLY

limewater test



clear → cloudy = CO_2

A model illustration: use the stated data for calculations.

Return to I Do