

Lesson 13 - Inhaled and exhaled air

(Downloadable Student Document)

Science - Biology - Key Stage 3

Cells, Tissues and Organs

Miss Wickham



Recap

1. What are the reactants of respiration?
2. What are the products of respiration?
3. What is respiration?
4. In which organ does gas exchange take place?
5. What is the name of the air sacs in which gas exchange takes place?



Recap

1. What are the reactants of respiration?

Oxygen + glucose

2. What are the products of respiration?

carbon dioxide + water

3. What is respiration?

A chemical reaction using oxygen and glucose to release energy

4. In which organ does gas exchange take place?

Lungs

5. What is the name of the air sacs in which gas exchange takes place?

Alveoli



What happens when we breathe in and out?

Task: Compare (what is the SAME and what is DIFFERENT) the inhaled and exhaled air.

Gas	Inhaled Air (%)	Exhaled Air (%)
Oxygen	21	17
Carbon Dioxide	0.04	4
Nitrogen	78	78

Example: Looking at nitrogen 78% is inhaled and 78% is exhaled, therefore it has stayed the same.



What happens when we breathe in and out? (answer)

- The nitrogen volume stays the same
- There is less oxygen exhaled than inhaled
- There is more carbon dioxide exhaled than inhaled

Gas	Inhaled Air (%)	Exhaled Air (%)
Oxygen	21	17
Carbon Dioxide	0.04	4
Nitrogen	78	78



Recap on drawing tables

What features make a good table? Write at least 3 features of a table.



Recap on drawing tables

What features make a good table? Write at least 3 features of a table.

Draw with a pencil and ruler

Independent variable goes in the left column

Dependent variable goes in the right column

Descriptive headings

There should be columns for repeats and averages



Task - Draw a table for our results to test the hypothesis: 'the time a candle burns for is different for inhaled and exhaled air'.

The table should include the features from the previous slide



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The table should include the features from the previous slide

Air type	Time candle burns for (s)				
	1	2	3	4	Mean
Inhaled					
Exhaled					



Conclusion

1. What is the relationship between the air type and time the candle burned for?
2. Use data to back up what you've said.
3. Can you explain why this happens?

Air type	Time candle burns for (s)				
	1	2	3	4	Mean
Inhaled	5.81	6.01	2.32	5.94	
Exhaled	3.21	4.22	3.67	6.29	



Conclusion

1. What is the relationship between the air type and time the candle burned for?
 2. Use data to back up what you've said.
 3. Can you explain why this happens?
-
1. The candle burns for a **longer time in inhaled air** than in exhaled air.
 2. For example, the mean burn time was **5.92 seconds** in the inhaled air but only **3.7 seconds** in the exhaled air.
 3. This is because inhaled air has a **higher concentration of oxygen** than the exhaled air. The candle goes out when the oxygen level falls below a certain point and this happens sooner in exhaled air.



A student said “I believe we breathe in more oxygen when running because our hearts are beating faster than when we are at resting heart rate”. Design an experiment to test this hypothesis.

Include:

- Independent, dependent and control variables**
- Method in numbered steps**
- A table to record results**



A student said “I believe we breathe in more oxygen when running because our hearts are beating faster than when we are at resting heart rate”. Design an experiment to test this hypothesis.



When lighting a fire, make sure no strong wind is blowing and ask an adult to supervise.

Example variables:

Independent variable - breathing rate (before and after exercise)

Dependent variable - volume of oxygen inhaled

Control variables - altitude, same person

Example method:

1. Collect inhaled breathe from the student before does exercise, trap into a jar.
2. Light a candle and place in the jar and time how long it takes for the candle to stop burning.
3. Repeat steps 1 and 2 with inhaled air after exercise.
4. Record data in table.



A student said “I believe we breathe in more oxygen when running because our hearts are beating faster than when we are at resting heart rate”. Design an experiment to test this hypothesis.

Air type	Time candle burns for (s)				
	1	2	3	4	Mean
Inhaled resting					
Inhaled after exercise					

