

Oxygen Analyzer - Respiration Student Handout

Oxygen is so important to humans that we have multiple organ systems just to make sure we have enough and can get it to the cells throughout our bodies. The **Respiratory System** works with the **Cardiovascular** system to transport oxygen. The Respiratory System is comprised of our lungs and other organs that help us breathe. The Cardiovascular system is made up of our heart and blood vessels.

Sitting still, breathe deeply. Feel your chest rise and fall with your breath. This action is caused by your **diaphragm** which is a muscle that allows your lungs to expand or contract forcing air in or out. Also while sitting, count how many times you breathe in one minute.

1. How many breaths do you take in a minute?

Now, as directed by your teacher, exercise in place for a minute – either jogging in place or doing jumping jacks. Then again, count how many breaths you take in a minute.

2. How many breaths did you take in a minute after exercising? What felt different about your breathing? Why do you think breathing feels different now than while sitting still?

Humans and other animals need oxygen to function. As biological processes happen in our cells, a process known as cellular respiration takes place where oxygen is bound with carbon to make carbon dioxide. Without oxygen, cellular respiration can not take place and our bodies can not efficiently produce energy.

Group Demonstration

Split up into three groups – one group will act as the lungs, one as atoms of carbon, and one as oxygen molecules.

The group representing the lungs form a circle holding hands with a single opening.

The group acting as the atoms of carbon go into the lungs. These carbon atoms are byproducts of biological activities in cells and require oxygen to be bound to them.

The group acting as oxygen molecules stands at the opening of the lungs.

The students acting as the lungs step back to expand, widening the circle, this is the effect of the diaphragm expanding. With more room in the lungs, the oxygen molecules are sucked into the circle.

Once in the lungs the oxygen molecules will bind with the carbon atoms (hold hands). Now carbon-dioxide is in the lungs and must be expelled.

Now the lungs contract, the students step in and the circle shrinks. With less room in the lungs the carbon dioxide is forced out.

Think about this demonstration and the earlier experiment. You should have felt that you breathe more deeply and rapidly after exercising than compared with sitting still.

3. Why do you think this is? Try to explain your reasoning in terms of the amount of **oxygen** required and the amount of **carbon dioxide** you expelled.

As we consider how our breathing is affected by physical activity, we should understand that oxygen is very important and needed for our bodies to make and use energy. We should also know that our earth's atmosphere is made up of about 20% oxygen. But sometimes in closed environments where the air is not exchanged with the atmosphere (like a submarine or an incubation chamber) the percentage of oxygen can change and requires close monitoring.