

Health – Respiration

4th Grade

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References:

- Columbus Public Schools SLC Guide
- Missouri Department of Elementary and Secondary Education, Curriculum Section

Benchmarks:

CPS 4th grade SLC 18

Objectives:

Students will better understand the way lungs work and the role they play in supporting human life.

Materials:

- Worksheet

Initial Demonstration:

Review what the students already know. What gas do people use from the air? (Oxygen) What gas do people release? (Carbon dioxide). Where does this take place? (In the lungs.)

Fill in worksheet with students. (See attached sheet.) Explain that the trachea (TRA-kee-uh) is the rather firm tube that runs up the front of your neck. After moving down the trachea, the air moves into smaller tubes in your lungs – kind of like getting off the highway onto smaller streets. These smaller tubes are called “bronchial tubes.” Ask if anyone has ever had bronchitis. Bronchitis is when these tubes become infected.*

Lungs are soft and spongy – They are NOT empty balloons. Your heart is a muscle, but it is also soft. Your ribs protect your heart and lungs from damage. Have the students feel their ribs. Then have them feel below their ribs. Do things feel different? Why? (Your ribs make a hard shell around your chest, your lower abdomen is soft.) Ask if anyone has ever been hit in the chest with something. Think what would have happened if you did not have ribs to protect your soft heart and lungs.

The diaphragm (DIA-gram) is the muscle that makes your lungs expand and contract. It allows you to breath, even when you aren't thinking about it.

We know that the lungs take in oxygen from the air and release carbon dioxide. But where does it go from there? Does oxygen just accumulate in the lungs? It is carried to the rest of the body by the blood. How does the carbon dioxide that is released by the lungs get there? (blood) What else does the blood carry that we cannot live without? (“energy” would work)

We’ve talked about converting energy into different forms and we know that we store energy from food and release it in the form of heat or motion when we go outside and play. What do you notice about your body after you finish running fast? (Sweating, warm, breathing hard) Why is this? We know that we need oxygen and energy to stay alive, and these two things are connected. When we use the energy stored inside of us we also use oxygen. We are constantly using the energy we have stored from our meals – every time we take a breath, every time our hearts beat, every time we move in our seat, every time we think, even when we sleep we are using energy. Similarly, we are constantly using oxygen. This is why we never stop breathing. It also explains why when we exercise we breath hard – because we are using lots of energy and we need lots of oxygen.

* Someone might ask how these tubes become infected. Pick up some chalk dust in your hand and pretend to sneeze. Watch the chalk dust become airborne and float away. Ask if anyone could imagine inhaling this. Where would it go? (Into your lungs) This is similar to the way infection is sometimes spread.

Target Observations:

- Air moves from our mouth and nose to our trachea and into the lungs.
- The lungs take oxygen from the air and put it into the blood.

Target Model:

- We breathe to get oxygen in our blood.
- This oxygen is used whenever we expend energy.
- We exhale carbon dioxide as a waste product.

Procedure:

Taking partner’s heartbeat.

Have one person sit comfortably (upright) facing their partner. Have one person place their arm on the desk, palm up. The partner should place two fingers (index and middle – NOT thumb) on the palm-side of the wrist, slightly off center to the thumb-side. Slight pressure may be needed, but you should be able to detect your partner’s heartbeat. If you cannot find the pulse, you may want to have the student take their own pulse in their neck. Place two fingers (again, not the thumb) an inch or two to the right or left of

the center of your throat. You should be in the vertical groove of your neck just under your jaw and the pulse should be much more pronounced than in the wrist.

Tell the class when to begin counting and have one person count the number of times their partner's heart beats in 30 seconds. Have them double the number and record it. These numbers should probably be between 60 and 100 beats per minute. Some people will have very low numbers because they did not feel every heart beat. Explain that this is why doctors and nurses use a special instrument that makes listening to heart beats much easier – a stethoscope. Now have the class switch partners and record the other person's heart rate. Write down these numbers and have the class compare their heart rates with those of other animals. Where do people fit? What do they notice about the chart?

Mouse	980 beats/minute
Squirrel	250
Dog	100
Horse	40
Elephant	25

Usually the larger an animal is, the less often its heart has to beat. Why do we think this is? (Because the larger the animal, the larger the heart and so it moves much more blood with each beat.)

Ask for three volunteers that think they are tough. (Make sure their recorded heart rates fall within the normal range.) Inform that they are going to exercise for five solid minutes and that they cannot stop. Start a timer and have them do jumping-jacks and run in place for five minutes. Have them keep a brisk pace. While they are exercising, set up a place for each of them to go IMMEDIATELY upon completing the exercising. Have a partner waiting to take their heart rate. After five minutes of exercise, have a partner record their heart rate as before. Write the resting heart rate for these individuals on the board next to their heart rates corresponding to exercise. What do we notice? Why is one so much greater than the other? When we exercise we use energy. We know this. We also know that we use more oxygen and that's why these individuals were breathing hard. So our bodies need energy and oxygen in a hurry. How do we move these things around inside us? (Blood) What moves the blood? (Our hearts) How can we move things faster? (Heart beats faster). Does this explain what we've just seen? (Yes)

Target Observations:

- Larger animals have slower heart rates
- Our heart rates increase during exercise

Target Revised Model:

- Bigger animals have bigger hearts that pump more blood with each beat, so have slower heart rates.
- We are using more energy when we exercise, so we need more oxygen in the blood, increasing our heart rate and how fast we breathe.

Summary:

Students have learned the basics of respiration. They should know that we get oxygen from the air, and breathe out carbon dioxide. Heart rate and breathing rate increase during exercise to allow for faster usage of stored energy.