

20,000 Breaths a Day

Abstract

Students review their daily activity and develop an action plan to increase their physical fitness and monitor their progress over a few weeks. Students also learn about the respiratory system, asthma and allergies and simulate what it feels like to breathe with asthma.

Logistics

Time Required

- **Class Time:**
One 50 minute class
- **Prep Time:**
10 minutes

Materials

- One straw for each student
- Copy of “20,000 Breaths a Day Student Worksheet,” for each student
- Stopwatch per pair of students, if available
- One beanbag per pair of students

Classroom Requirements

- Gymnasium or outdoor area.

Learning Objectives

- Analyze the effects of physical activity on the respiratory system.
- Develop an action plan to increase daily activity, monitor breathing and progress on achieving physical fitness.
- Understanding lung diseases such as asthma and the connections between allergies, asthma and air quality.
- Simulate the effects of asthma on breathing.
- Demonstrate the benefits of active living and clean air.

Prescribed Learning Outcomes BC Curriculum:

Health – Healthy Living

- C1 analyze factors that influence health (e.g. physical activity, nutrition, stress management)
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Preparation

1. Gather required beanbags, stopwatches and straws.
2. Photocopy “20,000 Breaths a Day Student Worksheet,” one per student.

Classroom Implementation

Part A

Students consider active living and their own activity levels.

1. In gymnasium or outdoor area, begin with a discussion about active living. For instance, ask: “What is active living?”
2. Seize students’ attention by sharing an amazing fact or giving them a challenge.
3. Distribute—20,000 Breaths a Day Student Worksheet.
4. Ask students to complete the chart on the worksheet estimating the amount of time they participate in moderate-intensity (walking, skating, bike riding) and/or vigorous-intensity physical activity (running, soccer).
5. Ask students to compare their estimate to the recommendations in *Canada’s Physical Activity Guidelines*, which recommend 60 minutes of moderate- to vigorous-intensity physical activity daily, as explained on the worksheet. For more information: <http://www.csep.ca/english/view.asp?x=804>
6. Share the following information about active living: *Active living is a commitment to incorporate physical activity into one’s daily lifestyle. Active living can occur in all aspects of our everyday routine, including activities at home, work, school and leisure. One way to have an active lifestyle is to include active transportation in our daily lives. Depending on where you live, you may be able to choose more active transportation (walking, biking). Extracurricular activities and even shopping are ways to get around and get some exercise. Other examples include shoveling snow or raking leaves instead of relying on snow or leaf blowers, using a push mower, or taking the stairs instead of the elevator. Making small changes, such walking or biking instead of driving, contribute to active living and in turn benefit our environment by keeping our air free of harmful pollutants. Encourage students to increase their daily activity with small steps such as increments of 5 to 10 minutes rather than one big leap.*
7. Discuss ways that students can increase their amount of daily activity. Share Tips to Get Active from the Public Health Agency of Canada <http://www.phac-aspc.gc.ca/hp-ps/hl-mvs/pa-ap/04paap-eng.php>. Ask students to complete the table for Week 1, making a commitment to increase their daily activity by 5 to 10 minutes each day.

Part B

Students explore activity intensity and simulate breathing with asthma.

1. Explain the Breathing Activity. Students work in pairs to monitor their breathing while they are doing various activities for one minute. While doing an activity, students are to carry on a conversation with their partner. Then they rank each activity according to their breathing.
2. Ask the students to pair up and complete the Breathing Activity along with the ranking on the worksheet.
3. Ask students which activities had the biggest impact on their breathing. Explain that as their fitness levels increase, their breathing rates also change. During exercise, they will still breathe more often and take deeper breaths, but they will gasp less and be able to carry on a conversation.
4. Once per week (Week 2 through Week 6) provide a copy of page 2 of the worksheet to each student. Ask students to record the week number on the worksheet. At the beginning of each week, students record their current activity and indicate how they will increase their activity if they are not yet achieving the recommended guidelines. During the week, students record whether they achieved increasing their activity level. Each week, have students complete the Breathing Activity again (with Steps 7 and 8 above) and encourage them to compare the current week to the previous week. Students complete the chart and the Breathing Activity for Week 2 to Week 6.
5. At the end of the six weeks, ask students to compare Week 6 to Week 1 to see their progress on increasing their activity and fitness levels.
6. Explain that the next activity will help students understand what it feels like to breathe with asthma symptoms. Invite students to complete the Breathing Through a Straw Activity. Review the safety precautions that are provided on the —20,000 Breaths a Day Student Worksheet and demonstrate how the students should complete the activity. Ask them to indicate their experience using a thumbs up if it remains easy to breathe or a thumbs down if it gets harder to breathe. Remind students that if anyone is having difficulty breathing or feeling light-headed or dizzy, they should stop breathing through the straw, sit down, and regain normal breathing.

NOTE: Ensure you are following the safety guidelines for your school board/district and/or province to know the medical background and physical limitations of your students. For the Breathing Through a Straw' activity, you must be aware of which students have asthma or any other lung condition.

7. After students complete the questions on page 3 of the worksheet, invite them to share their experience with the activity. Share the following information about air quality and health:

There are many things that have a negative effect on the respiratory and cardiovascular system such as smoking, second hand smoke, inactive lifestyles and air pollution. Air pollution can have a negative and detrimental effect on the respiratory system (lungs and airways), cardiovascular system (heart function and blood circulation), and major organs (heart and lungs). Air pollution:

- *makes it harder to breathe and irritating your respiratory system*
- *triggers asthma attacks and other lung diseases*
- *makes existing heart and lung conditions worse*
- *causes premature death.*

Everyone reacts differently to air pollution depending on their personal health. It is important to know if you are especially sensitive to air pollution. Groups of people that are especially at risk include children, the elderly, and those with pre-existing cardiac (heart) or and respiratory diseases such as coronary artery disease (angina or heart attack), heart rhythm problems, heart failure, chronic obstructive pulmonary disease and asthma, to name a few.

During exercise, athletes take 10 to 20 more breaths per minute than the average person, and they also take deeper breaths. High performance athletes such as the Clean Air Champions spend countless hours training outdoors — it is their office! Air quality is very important to maintaining their good health and for allowing them to perform at their best. The same applies for anyone exercising outdoors. We all need clean air to have healthy bodies.

Negative health effects increase as air pollution worsens. Studies have shown that even small increases in air pollution can cause small but measurable increases in emergency room visits, hospitals admissions and death. In fact, it has been shown that even small increases in air pollution levels for a short period of time can worsen illness among sensitive or at-risk people.

8. Have students read the Asthma Facts on the worksheet. Share the information below from the Air Aware website,

http://www.cleanairchampions.ca/programs/air_aware/fact_sheets.php

Asthma is a “chronic inflammatory disease of the airway” that causes the following symptoms: shortness of breath, tightness in the chest, coughing, and wheezing. Asthma can vary in its severity, can vary from person to person, and can flare up from time to time. The cause of asthma is not known and currently there is no cure. People with asthma often have trouble breathing when they are in the presence of what are called “triggers.” When someone has asthma and their symptoms are “triggered,” it means that the flow of air is obstructed as it passes in and out of the lungs. There are two types of asthma triggers: allergic triggers that cause inflammation of airways — dust mites, animals, cockroaches, moulds, and pollen, non-allergic triggers that can irritate airways that are already inflamed — viral infections, smoke, exercise, cold air, chemical fumes and strong-smelling substances, certain air pollutants and intense emotions.

Many people with asthma also have allergies. People with allergies and asthma who come

in contact with their allergic triggers will have a reaction in their airways as well as the usual allergy symptoms (itchy, watery eyes, etc.) An allergy is an abnormal reaction by your body to things that your body becomes sensitive to. These are called allergens. There are two types of allergens: ingested allergens (food, drink and medicines) and inhaled allergens (pollen, dust, animal dander, mould, etc.) Inhaled allergens are the most common cause of allergy problems in people with asthma.

Viral infections such as the common cold are one of the most common non-allergic triggers. Another non-allergic trigger is exercise, and this is often referred to as exercise-induced asthma. Cold, dry air is believed to be the main cause of exercise-induced asthma. When exercising, we tend to breathe quickly, shallowly and through the mouth. The air reaching the lungs misses the warming and humidifying effects of breathing through the nose.

Smoke from smoking cigarettes, inhaling second-hand smoke or smoke from fires is another non-allergic trigger. Strong-smelling substances such as perfume can be another trigger. Air pollution such as ground level ozone, particulate matter and nitrogen dioxide are three pollutants that can also trigger non-allergic asthma symptoms.

Asthma can affect anyone. Most people with asthma can live full, active lives. Asthma symptoms can be managed, and the goal is to be symptom-free by avoiding asthma triggers, by taking medication, by following an asthma action plan, and by following-up regularly with your doctor.

9. Explain that breathing through a straw is similar to how people with asthma feel when their asthma is triggered. When air quality is very poor, it affects everyone, but it puts people with lung diseases and asthma at risk for their symptoms to worsen. Hospital visits increase during periods of poor air quality, and it can even lead to unexpected deaths. The level of risk from air pollution depends on the amount of pollution in the air, the amount of air being inhaled (we breathe more deeply when we are physically active), and the overall health of the individual.
10. Discuss how it would feel to be an elite athlete such as a Clean Air Champion that has asthma and has to compete in a location with poor air quality (e.g., the Beijing Summer Olympics). Remind students that the most common medical condition in the last three Olympics was asthma.
11. Divide the class in half, with one group representing the general population in North America and the other group representing athletes in North America. The following table indicates the percentage of the general population and the athletic population in North America affected by asthma, respiratory allergies, and exercise-induced asthma.

North America	General Population	Athletes
Asthma	10 – 12%	Up to 23%
Respiratory allergies	10 – 25%	Up to 45%
Exercise-induced asthma	5 – 15%	Up to 50%

Use the following table to identify how many people in the general population group would have asthma and how many in the athlete group would have asthma. Repeat this for respiratory allergies and exercise-induced asthma. If your class size is not listed below, use the percentages in the above table to identify the numbers of students for each group.

North America	General Population			Athletes		
Class Size	24	28	30	25	28	30
Asthma*	2	2	2	3	3	4
Respiratory allergies*	3	4	4	6	6	7
Exercise-induced asthma*	2	2	2	6	7	8

*For the general population, this table uses 12% for asthma, 25% for respiratory allergies and 15% for exercise-induced asthma.

12. Reinforce the importance of air quality for individuals with active lifestyles and discuss how air quality might affect those who often train outdoors, such as elite athletes or those who have lung diseases such as asthma. The benefits of exercise almost always outweigh leading an inactive lifestyle, but one should always be aware of the air quality in their location when exercising outdoors. For people with asthma, exercise helps to strengthen breathing muscles, to boost the immune system, and to maintain a healthy body weight.
13. Many people check the weather before going outdoors. We can also get in the habit of checking the Air Quality and Health Index (AQHI) and Ultraviolet (UV) rating. For people with seasonal allergies, it is also important to check the pollen report. Use the Internet or Smartphone applications to access weather reports that include the current UV rating and pollen reports. The AQHI can also be accessed online and with Smartphone applications.

These resources can help everyone to lead healthier lives.

AQHI: http://www.cleanairchampions.ca/programs/air_aware/the_aqhi.php

Weather Network: <http://www.theweathernetwork.com/>

Extension

Option 1: Walk Score

Transportation is one of the biggest contributors to climate change and ground level ozone (a component of smog). Close to 30% of the total energy consumed in Canada is for transportation. More than 50% of all of the energy we use for transportation is used for personal vehicles. Choosing more active types of transportation is a great way to increase activity levels while also reducing air pollution and the greenhouse gas emissions that contribute to climate change. Have students use Google Maps — <http://maps.google.ca>— to get directions for different ways of getting to school. Students enter their home address, and then click on —Get Directions— and enter the school address. Google Maps will create a map indicating the driving route from their home to school. Click on the icons on the left to get directions for taking the bus, walking, or biking. Google Maps also provides the distance and estimated travel time.

Walk Score — <http://www.walkscore.com>— can help students compare the walkability of different neighborhoods. Have students enter their home addresses and compare the walk scores of different communities. The map lists local restaurants, shops, schools, and parks, and the distance to each.

Another useful website: <http://www.cyclevancouver.ubc.ca/cv.aspx>

Option 2: Being Active

Knowing your heart rate helps you measure your exercise level and progress in a fitness program. Ask each student to develop a personal physical fitness goal. Ask them to pick one moderate- to vigorous-intensity physical activity to focus on over a period of weeks. Over a period of weeks students measure and record their breathing and heart rate during this activity, and then analyze the impact of regular physical activity on their breathing and heart rate. With the class discuss the principles of fitness training – FITT- frequency, intensity, time and type. Share information about target heart rates during exercise using the Target Heart Rate Calculator.

http://exercise.about.com/cs/fitnesstools/l/bl_THR.htm

To monitor their heart rate, students count their rate for 10 seconds and then multiply by 6 to record their heart rate per minute. To find their pulse:

Radial Pulse: Using the tips of your middle and index finger of the right hand, place these fingers on your other wrist (palm facing up) just below the base of the thumb.



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Carotid Pulse: Using the middle and index finger of the right hand, find the carotid artery. This artery is found on the neck between the windpipe and the neck muscle, just under the lower jawbone.



Students will feel a pulse once they have found the artery. Have them hold the two fingers in place while counting the pulse for 10 seconds.

Give activity Handout for students to take home for the duration of this assignment. When the period of weeks is complete, ask students to return the analysis to class and discuss the results together during a class period.