

## Reflection

I taught this lesson to my adult literacy class, a pre-GED level class of around 25 students. It followed a lesson we had done a few classes earlier which focused on BPA in plastic and understanding technical documents.

Most students grasped the concept of exposure quickly and were able to give several examples of how we are exposed to BPA, such as drinking water from water bottles made with BPA, heating food in plastic that contains BPA, eating canned food, and babies drinking contaminated breast milk. (If you did not do the previous lesson on BPA in plastic you could use a more commonly known toxin, such as mercury or asbestos, as an example.)

After reading the handout about the park by the paint factory some students immediately knew what to do and starting scribbling equations on the side of their handout without my prompting them. However, a good number of students seemed to need a bit more direction, so I thought doing one problem together would be helpful.

I also found it particularly beneficial to have students put their work on the board for the remaining three problems. We took our time with each one, having the volunteer explain their reasoning and allowing other students to agree, disagree, or ask questions. We had to check that all the answers were given in the same units, e.g., converting minutes to hours.

For one of the problems, a student in the audience had used a different approach. We put her work on the board as well and compared the two answers, which were slightly different. This was for “Ellen”.

Approach 1:

$$3 \text{ months} \times 30 \text{ days} = 90 \text{ days}$$

$$90 \text{ days} / 2 = 45 \text{ days}$$

$$2 \text{ hrs} \times 45 \text{ days} = 90 \text{ hours}$$

Approach 2:

$$12 \text{ weeks} \times 7 \text{ days} = 84 \text{ days}$$

$$84 \text{ days} / 2 = 42 \text{ days}$$

$$42 \text{ days} \times 2 \text{ hrs} = 84 \text{ hours}$$

After both approaches were on the board I asked the rest of the class which approach they had used. Most students had used the second approach. I asked the student who took the first approach where he got his numbers. There’s four weeks in a month, so three months in 12 weeks, he explained. I asked the class if a month was always exactly 4 weeks, and they said it wasn’t, it was usually a little more. So can we use the first approach, I asked. After some discussion we said that the first approach was more of an estimate, and the second approach gave us a more exact answer.

Next, we turned to the “Risk: Points of Contact” activity. We began by quickly brainstorming ways other than through the air we breathe that we are exposed to toxins. Then students were tasked with ordering a list of possibilities for exposure from “most dangerous” to “least dangerous,” for which I broke them into groups of four.

## Skill:

### Objectives:

Continue to discuss health as related to environmental and social factors

Understand that exposure to toxins determines health effects of those toxins, and that the means and duration of exposure are also determinants

### Time:

### Materials

Copies for each student of “Fact Sheet: Volatile Organic Compounds (VOCs)” from SfA activity “Risk: Points of Contact”

Copies for each students of “The Park by the Paint Factory (Air)” handout from SfA activity “Exposed!”

Copies for each student of “Check Your Answers: Volatile Organic Compounds (VOCs)” from SfA activity “Risk: Points of Contact”

### Preparation

Review SfA activities “Risk: Points of Contact” ([http://sfa.terc.edu/materials/pdfs/risk\\_points\\_of\\_contact.pdf](http://sfa.terc.edu/materials/pdfs/risk_points_of_contact.pdf)) and “Exposed!” (<http://sfa.terc.edu/materials/pdfs/exposed.pdf>)

Cut points of contact strips along dashed lines, make enough copies of packets of strips so that each group of four students can get one, from SfA activity “Risk: Points of Contact”

This activity generated a lot of critical thinking and discussion. After groups had decided on an order for the slips, I gave them the answer sheet and time to compare answers and discuss observations in their small groups. Following that we were able to have a rich full group discussion. Many groups had put exposure to contaminated air lower on their list, while it is actually listed as the highest risk. A lot of groups also put eating contaminated food high on their list, and were surprised to see that it is actually the lowest risk.

This lesson could be followed by a unit that looks at sources of toxins in students' living and working environments, having students brainstorm how they are exposed and researching and comparing health risks from exposure.

## Activity Overview

### 1. Intro (5 min)

- Ask: What does toxic mean?
- Write on board: harmful or poisonous to humans
- Say: Contaminants, or toxins, only pose a risk when people are exposed—when there's a point of contact between a person and the contaminant. For example, cigarettes cause cancer when people smoke them, but not when they are sitting on a shelf.
- Make connections: Think back to our study on BPA the other week, how can we be exposed to BPA? (If applicable)
- Say: We're going to do two exercises today that look at exposure to toxins called VOCs...

What are VOCs? (10 min)

1. Before reading ask: What is evaporation?
2. Read, full group: VOCs fact sheet
2. After reading ask: How many of the products that contain VOCs do you use in your daily life?

### 2. The Park By the Paint Factory (40 min)

- Read, full group: "The Park by the Paint Factory (Air)" handout
- Predict: Who had the most exposure to the VOCs in the park? How would we guess? (Students write down their prediction)
- Do together: Figure out the exposure time for Rodrigo
- Students do independently: Figure out the exposure time for Sofia, Ellen, and David
- Share: Select three students to put work on the board for either Sofia, Ellen, or David
- Discuss: Were our predictions correct?

### 3. Points of Contact (50 min)

- Say: Breathing in polluted air isn't the only way to expose ourselves to VOCs, there are other ways... Solicit suggestions. Say: How do you figure out which is worse for you?

## Helpful Definitions

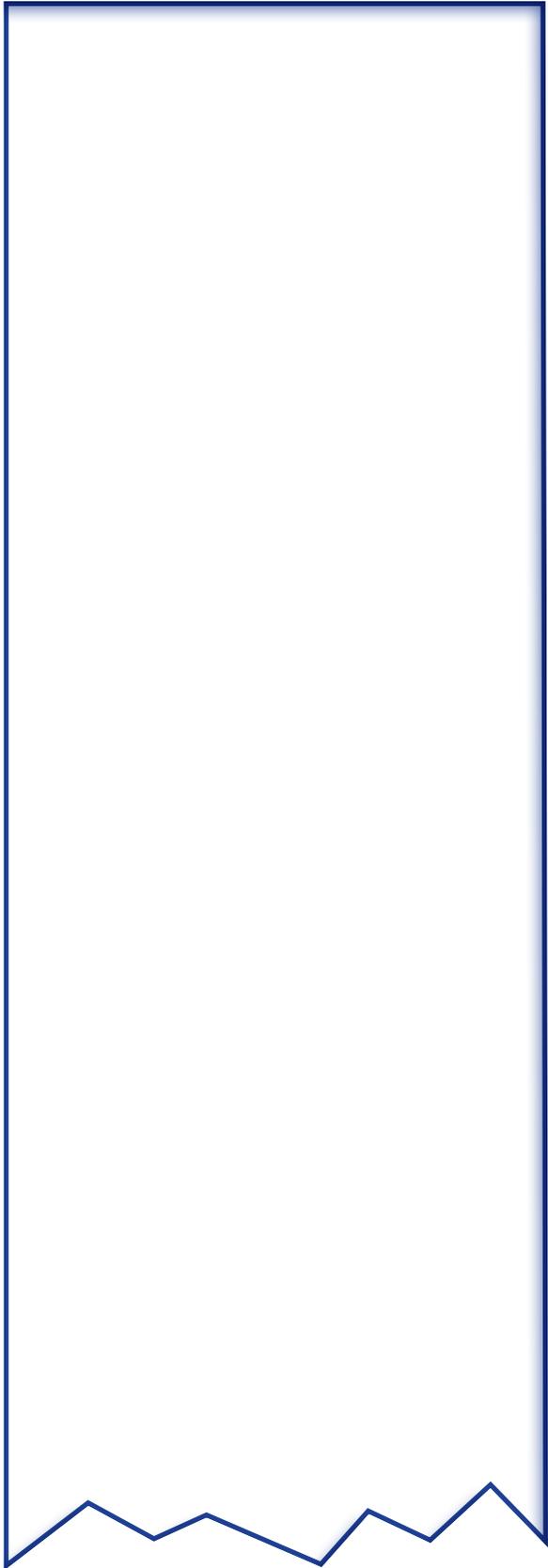
evaporation - when a liquid become a gas

exposed - when there's a point of contact between a person and the contaminant

toxic - harmful or poisonous to humans

VOCs - (see fact sheet)

- Give directions: In small groups, rearrange the activities listed on these slips of paper so they are in order of most dangerous (most exposure) to least dangerous (least exposure)
- Draw on board: Most exposure (most dangerous) <-----> least exposure (least dangerous)
- Do: Put students in groups of 3-4
- They do: Give groups 15-20 min to order the slips of paper. Circulate and ask groups questions about their reasoning as they work
- Do: When groups are done distribute the answer sheet- one to each student- and give them time to compare their list to the answer sheet
- Discuss, full group: What did you get right? What did you get wrong? What surprised you as being more or less dangerous than you thought?



### Worth Noting

N/A

### Smart Moves

- √ Slow down.
- √ Talk it out.  
Use your senses.
- √ Connect ideas to what people already know.  
Play with different ways to show it and say it.  
Show numerical relationships in more than one way.  
Encourage verification.