

LESSON
9.3**Interdisciplinary Application***For use with the lesson "Solve Quadratic Equations by Graphing"***Air Pollution**

Earth Science Air pollution occurs when wastes dirty the air. People produce most of the wastes that cause air pollution. Such wastes can be in the form of gases or particles of solid or liquid matter.

Industrial processes produce a wide range of pollutants. Plants that produce plastic foams are a major source of chlorofluorocarbons (CFC's), compounds of chlorine, fluorine, and carbon. Scientific studies indicate that CFC's harm the environment by breaking down ozone molecules in Earth's upper atmosphere. Because of this, many countries, including the United States, have agreed to end production of CFC's.

Hydrochlorofluorocarbons (HCFC's) are compounds containing hydrogen, chlorine, fluorine, and carbon. Industry and the scientific community view certain chemicals within this class of compounds to be acceptable alternatives to chlorofluorocarbons. The HCFC's have shorter atmospheric lifetimes than the CFC's and a much smaller capacity to harm the stratosphere where the ozone layer is found. Because they still contain chlorine and have the potential to destroy stratospheric ozone, they are viewed only as temporary replacements for the CFC's.

In Exercises 1 and 2, use the following information.

Your Earth science class is doing a study on the emission of greenhouse gases. The amount of hydrochlorofluorocarbons in the atmosphere from 1995 to 2003 can be modeled by $H = -0.222t^2 + 6.7t + 17.667$ where H is the number of hydrochlorofluorocarbons in thousands of metric tons and t is the number of years with $t = 0$ representing 1995.

1. Sketch a graph of the model.
2. According to the model, in what year will the number of HCFC's in the atmosphere be zero?

In Exercises 3 and 4, use the following information.

Perfluorocarbons (PFC's) are compounds containing fluorine and carbon. The two main uses are in aluminum smelting and semiconductor production. The production of the PFC's has been decreasing due to better efficiency of the processes that produce them. These chemicals were introduced as alternatives to CFC's and HCFC's. Although they have a lifetime in the atmosphere of up to 50,000 years, they do not harm the ozone layer. But they are powerful greenhouse gases that have a potential to cause global warming. The amount of perfluorocarbons in the atmosphere from 1995 to 2003 can be modeled by $P = -0.02t^2 - 0.019t + 2.3$ where P is the number of perfluorocarbons in thousands of metric tons and t is the number of years with $t = 0$ representing 1995.

3. Sketch a graph of the model over your graph from Exercise 1.
4. According to the model, in what year will the number of PFC's in the atmosphere be zero?