

# What's It All About?

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As we struggle through life busy with so much of what we, in our more serious moments, call trivia, sometimes we stop and ask ourselves, "What's it all about? What's really important?"

Mathematics teachers really are as responsible for considering the ultimate worthwhileness of their energy-devouring professional activities as ministers, social workers, government workers, politicians and physicians. In fact, by our very nature, we may be better trained and better equipped to examine our activities logically in perspective.

So, what's really important? Consider the following:

$$2^{\frac{x}{35}} N = Y$$

This equation can be used to compute the number of years, (x) it will take the mass of human flesh and blood to equal Y if the world's population mass doubles every 35 years (the present rate).

Substituting 180,000,000 for N (accepting 3,650,000,000 as the number of people on earth averaging 100 pounds each yields 180,000,000 tons of humanity) and solving for x gives

$$x = 115 (\text{Log } Y - 8.25).$$

Since Y represents a limit beyond which the mass of humanity cannot go, let's arrive at a reasonable value for this limit via the following argument presented by scientist Isaac Asimov:

"The total mass of living tissue on earth today is estimated to be something like 20 million million tons, and this cannot really increase as long as the basic energy source for life is sunlight. Only so much sunlight reaches earth; only so much sunlight can be used in photosynthesis; and therefore only so much living plant tissue can be built up each year. The amount built up is balanced by the amount destroyed each year, either through spontaneous death or consumption by animal life.

"Animal life may be roughly estimated as one-tenth the mass of plant life or about two million million tons the world over. This cannot increase either, for if, for any reason, the total mass of animal life were to increase significantly, the mass of plants would be consumed faster than it could be replaced,

as long as sunlight is only what it is. The food supply would decrease drastically and animals would die of starvation in sufficient numbers to reduce them to their proper level.

"To be sure, the total mass of human life has been increased throughout history, but only at the expense of other forms of animal life. Every additional ton of humanity has meant, as a matter of absolute necessity, one less ton of non-human animal life.

"Not only that, but the greater the number of human beings, the greater the mass of plants that must be grown for human consumption as food (either directly, or indirectly by feeding animals destined for the butcher) or for other reasons. The greater the mass of grains, fruits, vegetables and fibers grown, the smaller the mass of other plants on the face of the earth.

"Suppose we ask, then, how many years it will take for mankind to increase in numbers to the point where the mass of humanity is equal to the present mass of all animal life? Remember that when that happens there will be no other animals left - no elephants or lions, no cattle or horses, no cats or dogs, no rats or mice, no trout or crabs, no flies or fleas.

"Furthermore to feed that mass of humanity, all the present mass of plant life must be in a form edible to man; which means no shade trees, no grass, no roses. We couldn't afford fruits or nuts because the rest of the trees would be inedible. Even grain would be uneconomic, for what would we do with the stalks? We would most likely be forced to feed on the only plants that are totally nutritious and require only sunlight and inorganic matter for rapid growth - the one-celled plants called "algae."

If the total mass of animal life is 2,000,000,000,000 tons, then  $x = 115$  (1230 - 8.25). Simple calculation puts  $x$  at 466 years. This means that by the year 2437 A.D. the last animal other than man will have died, and the last plant other than algae will also have died.

It should be noted also that the human population by 2437 A.D. will be over 8,000 times the present number, that there will be 200,000 people per square mile of total earth surface - desert, ocean, mountain, river, plain. The present density of crowded Manhattan (New York City) at noon is estimated at only 100,000 persons per square mile!

So what's important? Something has got to give! The human population of earth cannot continue to grow at the present rate. And, along with the population explosion, we have pollution of our environment. The National Wildlife Federation states it this way:

America is in trouble because our greed has put us on a collision course with disaster. Our Second Annual EQ Index - measuring national Environmental Quality - reveals the sobering fact that we are still losing ground on almost every front. Our air is dirtier. Our water is more polluted. Land for food, wildlife and living space is deteriorating. Certain minerals may soon be exhausted. Apathy is our biggest problem.

The Wisconsin Mathematics Council, through action by the executive board and lots of hard work by members William Miller, Pat Lautenschlager, John Knutson, and Donna Kringen, has begun a war on pollution. The first skirmish was a cooperative effort with the state Department of Public Instruction to produce a teacher's handbook, *Pollution: Problems, Projects, and Mathematical Exercises, Grades VI-IX*. This handbook contains problems and exercises involving actual pollution data that are keyed to mathematical topics studied in Grades VI-IX as well as descriptions of individual and group projects that will make students aware of environmental pollution situations. It can be obtained from DPI Publication Order Service, 162 Langdon Street, Madison, Wisconsin 53702, for 50¢ per copy.

The rationale behind the efforts to produce this publication revolves around the conviction that today's youth must become aware of earth's ecological state if they are to influence adults and their peers to do something to stop man's pell mell acceleration towards total disaster long before 2437 A.D.

What's it all about? What's really important? If we are willing to stop the busy, irrelevant activities that use up our precious time and think, we all know that the population explosion and the environmental pollution of earth's resources must be slowed down, and soon!

What can you do? I suggest two immediate actions: obtain and study a copy of "Guidelines for Citizen Action on Environmental Problems", free from The Conservation Education Association, P. O. Box 450, Madison, Wisconsin 53701, and bring into your teaching as much environmental pollution information as you can.

Good Luck!

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## Two Preference Paradoxes

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Given    A is preferred to B  
and      B is preferred to C

under some reasonable scheme for decision-making, one normally deduces that,  
under the same scheme and at the same time,

A is preferred to C.

This note is written to convince the reader that such a deduction is invalid.