

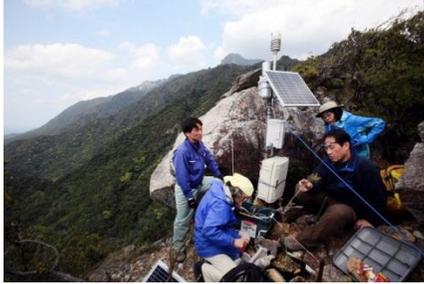
RESULTANTS

Unit 2 Dr. John P. Cise Professor of Physics , Austin Community College,

1212 Rio Grande St., Austin TX 78701 jpcise@austincc.edu & NY Times April 25, 2013 by Martin Fackler

YAKUSHIMA JOURNAL

Scientist Says *Pollution* From China Is Killing a Japanese Island's Trees



INTRODUCTION: Vector A=Tokyo to Beijing is 1300 miles 15° North of West.
Vector B = Beijing to Shanghai is 665 mi. 25° East of South , Vector C = Shanghai to Yakushima is 540 mi. 20° South of east

QUESTION: Find resultant R: Tokyo to Yakushima? ... Magnitude & direction.

ANSWER: $R = \sim 672 \text{ MI. @ } 42.3^\circ$ South of West.

Osamu Nagafuchi, second right, an environmental engineer, checks a monitoring station around Yakushima to measure levels in the air of ozone and sulfur emissions, which are typically the byproducts of burned coal or automobile exhaust. YAKUSHIMA, Japan — A mysterious pestilence has befallen this island's primeval forests, leaving behind the bleached, skeletal remains of dead trees that now dot the dark green mountainsides.

Osamu Nagafuchi, an environmental engineer with a passion for the island and its rugged terrain, believes he knows the culprit: airborne pollutants from smog-belching China, hundreds of miles upwind.



HINTS: Find components of all three vectors . Set up a organized grid to add up X components, then add up the Y components to obtain the resultant's R_x and R_y . Use pythagoras to find R and $\tan \theta$ to find direction of R.

For years, Mr. Nagafuchi's theory was ignored by fellow scientists and even mocked by bureaucrats in the national government who administer the forests on this southwestern island. But Japan has begun taking his warnings more seriously, as the nation has been gripped by a national health scare over rising levels of potentially dangerous airborne particles that have swept into other parts of Japan and that many now believe were produced by China, its huge and rapidly industrializing neighbor. Japanese officials still dispute whether airborne pollutants are responsible for killing the pine trees. But they and other scientists have at least begun to view Yakushima, which is far from Japan's own industrial centers, as a pristine laboratory for understanding how China's growing environmental problems could be affecting its neighbors. "We are starting to feel like the canary in a coal mine," said the island's mayor, Koji Araki. "Our island is right downwind from China, so we get the brunt of it." The dying trees are from an endangered species of pine that is found only on Yakushima and a neighboring island. He has set up small monitoring stations around the island to measure levels in the air of ozone and sulfur emissions, which are typically the byproducts of burned coal or automobile exhaust. On a recent afternoon, Mr. Nagafuchi climbed to the highest of those stations, atop Mt. Kuromi, a windswept peak that rises 6,000 feet above the sea below. After hooking up his laptop to download data from the station's small digital recorder, he pointed out the thin, gauzy haze that clouded what he said should have been pristine air. ("The worst is when winds blow from Beijing and Tianjin," two Chinese cities about 900 miles to the northwest), said Mr. Nagafuchi, 62, who visits Yakushima once a month to collect the data readings. "This is proof that when such a big country industrializes, its effect will spread everywhere." Public anxieties about environmental effects from China have soared this year, after Beijing recorded alarming increases in pollution levels. That was followed by officials in western Japan issuing warnings in their own cities of high levels of particulate matter measuring 2.5 micrometers or less, known as PM 2.5, that are small enough to become embedded in human lungs.