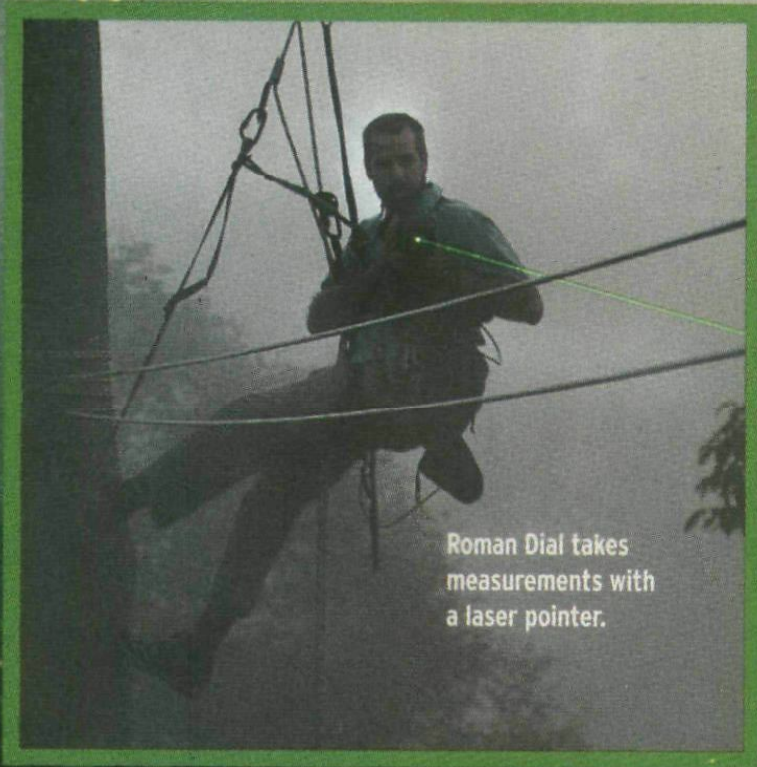


Roman Through

Scientist Roman Dial measures volume of 3-D spaces in the rain forest.

by Melissa Stewart



Roman Dial takes measurements with a laser pointer.

What do orangutans, flying squirrels, and scientist Roman Dial have in common? They spend days at a time cruising through rain-forest treetops—without ever touching the ground. Although Dial teaches at Alaska Pacific University, he does research in the tropical rain forests of Borneo, an island in Southeast Asia. Using a system of ropes and pulleys, Dial moves from tree to tree, collecting data to create 3-D maps of the rain forest.

"The forests of Borneo are significantly different from those in Central America," Dial told *MATH*. "There's much more open space in Borneo's forests."

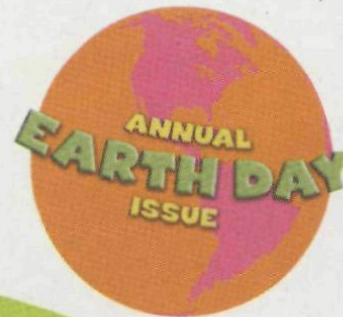
Dial's findings explain why gliding animals are so common in Borneo. "The open spaces make gliding the best way to get through forests," says Dial. Borneo's rain forests are home to gliding lizards, frogs, squirrels, and snakes.

To make his maps, Dial finds the *volume* of these open spaces. No, not the noise level—volume is the amount of space taken up by a 3-D space or object, and is measured in cubic units, such as cubic feet. In addition, "We often do measure the height and circumference of trees," Dial told us, "and we can calculate trunk volume."

Dial uses a laser pointer and powerful computer to precisely calculate the volume of rain-forest trees and the spaces between them. You can also calculate volume using the formulas we'll show you. You won't even need to glide around the classroom!

Lowland rain forest along river, Danum Valley, Borneo

the Trees



DIAL UP VOLUME

To find the volume of an open space in the rain forest, Roman Dial first finds the area (A , measured in square units) of the open space's floor. He multiplies that times the height (h) of the open space.

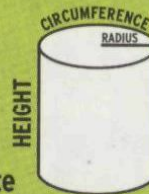


Volume (V) of open space = Ah

Dial measures the circumference (C) of rain-forest trees. From that measure, he can

determine the tree's radius (r):

$r = C \div \pi \div 2$



Then he could estimate the volume of the tree by using the formula for volume of a cylinder.

Volume (V) of a cylinder = $\pi r^2 h$

(Another way to think about it: It's the area of the circular base times the height.)

WHAT TO DO

Read "Dial Up Volume" above. Use the volume formulas to answer the questions. If allowed, use a calculator. Use 3.14 for π . When necessary, round answers to the nearest hundredth.

1 During his last trip to Borneo's rain forest, say that Dial found an open space with an area of 3,058 square meters. The space's height was 61 meters.

a. What equation would you write to find the volume of the open space in cubic meters?

b. What is the volume?

2 The open spaces in a rain forest in Costa Rica are smaller. If one had an area of 259 square meters, with a height of 49 meters, what would be the volume?

3 In the rain forest, Dial measures a tree with a height of 6.6 meters and a circumference of 4.71 meters.

a. What equation would you write to find the tree's radius?

b. What is the radius?

c. What equation would you write to find the approximate

volume of the tree?

d. What is the approximate volume?

4 Another tree has a height of 63 meters and a circumference of 6.28 meters. What is its approximate volume?

WEB WISE: Roman Dial is featured in part one of the "Deep Jungle" miniseries on PBS's *Nature*. To learn more, visit: www.pbs.org/wnet/nature/index.html

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