 Formulas in the bush

The scenario

Trees are harvested to make many products that we use in everyday life such as furniture and housing frames. The forestry industry use a variety of formulas when working with trees and timber. You will pick 5 trees in your local area and use these formulas to calculate the height of the trees, which trees you could cut down and the volume of timber in each.

Activity 1

The height of trees, h metres, can be found using the formula $h=\frac{15d}{2}$. Where *d* is the diameter of the tree in metres.

1. Find 5 trees in your area and use a tape measure to measure their circumference.
2. Use the formula $C=πd$ to work out the diameter of each.
3. Use the formula above to work out the height of each tree.

Activity 2

Only trees which have a diameter greater than 55cm can be cut down for timber.

1. What would the circumference have to be to have a diameter greater than 55cm?
2. Would you be allowed to cut down any of the five trees you picked?

Activity 3

Trees have a similar shape to a cylinder but because they taper off (get smaller at the top) we cannot use the volume of a cylinder formula to work out how much wood they contain.

The formula $V=\frac{πd^{2}h}{4}$ is used instead, where *d =* diameter of the log in cm and *h* = the length of the log in cm. Calculate the volume of wood in the five trees you picked.

Activity 4

Only tall, straight trees with no low branches are suitable to harvest for their timber. The forestry industry use the formula $V=0.48d^{2}L+10$ to calculate the useable timber in a tree. *d* is the diameter one metre above the ground and *L* is the length of the useable timber.

1. Estimate the length of useable timber for each of the trees you picked in Activity 1.
2. Use the formula above to calculate the amount of useable timber in each of your trees.

Outcomes

* MA4-12MG calculates the perimeters of plane shapes and the circumferences of circles
* MA5.2-8NA solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques
* MA5.2-12MG applies formulas to calculate the volumes of composite solids composed of right prisms and cylinders
* MA5.2-1WM selects appropriate notations and conventions to communicate mathematical ideas and solutions
* MA5.2-2WM interprets mathematical or real-life situations, systematically applying appropriate strategies to solve problems