



## Problem of the Week

### Problem B and Solution

#### A Walk in the Woods

#### Problem

Cassie takes a walk through the woods behind her house. She notices that there is a row of trees which seem to follow a pattern. There are pines, junipers, and maples, all 2 m apart from one another. There are 70 pines in total. The junipers are placed one after every 3<sup>rd</sup> pine, and the maples are located one after every third juniper. At the end of the row, there is a line of 10 birch saplings which start 75 cm from the other trees, and are spaced 75 cm apart.

- Form a row of the symbols P, J, M, and B which illustrates the pattern of Pines, Junipers, Maples, and Birch saplings.
- How long is this row of trees?
- Once they mature, the pines are 25 m high, and the maples are 17 m high. What is the total height of the pines and maples?

#### Solution

- The pattern up to the first maple is: **P P P J P P P J P P P J M**. After 7 repeats of this pattern, there will be  $7 \times 9 = 63$  pines,  $7 \times 3 = 21$  junipers, and 7 maples. Since there are 70 pines, this will be followed by **P P P J P P P J P B B B B B B B B B B** to account for the remaining 7 pines and the 10 birch saplings. In this final segment, there are 2 more junipers and no more maples.
- There are  $63 + 21 + 7 + 7 + 2 = 100$  pines, junipers, and maples, so there are 99 spaces of 2 m, or 198 m of those trees (plus the width of one tree). Since there is a 75 cm space before the first birch sapling, and 9 such spaces between them, this will add a total of  $0.75 \times 10 = 7.5$  m for the saplings. Thus the total length of the row is about  $198 + 7.5 = 205.5$  m.
- At maturity, the total measure of the heights of the pines is  $25 \times 70 = 1750$  m, and of the maples is  $17 \times 7 = 119$  m. Thus the total length of standing lumber is  $1750 + 119 = 1869$  m.

