Enigmas & puzzles

Guarding the gold
Barry R Clarke

Down at Whimsy Woods, the pixies have been alerted that a wicked elf is planning to steal their biggest sack of gold. The pixies keep their savings in four tree trunks A–D, each containing a single sack of gold coins. The sack in tree A contains 1kg, B has 2kg, C contains 3kg and D has 4kg. To confound the elf, they have decided to change the bags around.

Three sacks are selected from the four to be used in three consecutive moves. No sack will be moved more than once. Afterwards, there is again a single sack of coins in each tree, but they are now in a different order, which can be deduced from the following facts (all amounts in kg):

(1) The first amount moved was greater than the second.
(2) After the second move, the total amount in C was greater than the sum in the other three trees.
(3) After the third move, the total amount in B increased.

What is the amount of gold coins in each tree now?

Last month’s solution
Harriet (111kg) was in the middle and Fred (37kg) climbed off.
Dividing each weight by 37 reveals that the five weights are in the ratio 1:2:3:4:5. Considering the seats from either the left or right end, there are only three possible arrangements for the balancing of weights with all five seats occupied: (a) 5 1 2 3 4 with weight 2 seated centrally and the total distance times weight on each side \((2 \times 5) + (1 \times 1) - (1 \times 3) + (2 \times 4) = 11\); (b) 4 1 3 5 2 (total 9); and (c) 2 3 4 5 1 (total 7). The only possible rearrangements for (a) are 3 _ 2 4 1 (5 climbs off), 1 3 2 5 _ (4 climbs off), or 3 4 2 _ 5 (1 climbs off); for (b) we can have 5 _ 3 2 4 (1 climbs off), 2 1 3 5 _ (4 climbs off), or 1 2 3 4 _ (5 climbs off); and for (c) 2 1 4 _ 5 (3 climbs off) or 1 3 4 5 _ (2 climbs off). Only with the first case for (b) 5 _ 3 2 4 does the total distance times weight \((2 \times 5) + (1 \times 2) + (2 \times 4) = 10\) increase each side (from 9 to 10) to result in a greater bending. Here, Harriet (3×37kg) is central throughout and Fred (1×37kg) climbs off.