



## Problem of the Week

### Problem C and Solution

### Out on a Limb

**Problem**

There are 15 Blue Jays and 14 Orioles that wish to rest on the branches of three older trees. Each of the trees will have at least 4 Blue Jays and 2 Orioles. However, no tree may have more Orioles than Blue Jays in its branches. Determine the largest number of birds that can be in one tree.

**Solution**

Since each tree contains at least 4 Blue Jays and 2 Orioles, let's start by putting this minimum number of Blue Jays and Orioles in each tree.

Tree 1	Tree 2	Tree 3
4 Blue Jays, 2 Orioles	4 Blue Jays, 2 Orioles	4 Blue Jays, 2 Orioles

The number of Blue Jays not yet in a tree is  $15 - 4 - 4 - 4 = 3$ .

The number of Orioles not yet in a tree is  $14 - 2 - 2 - 2 = 8$ .

To produce the greatest number in a tree, as many as possible of the remaining birds should be put in one particular tree. Let's start by putting all of the remaining Blue Jays in Tree 1. Then we have

Tree 1	Tree 2	Tree 3
7 Blue Jays, 2 Orioles	4 Blue Jays, 2 Orioles	4 Blue Jays, 2 Orioles

Let's put as many Orioles in Tree 1 as possible. Since Tree 1 cannot have more Orioles than Blue Jays, we can put at most 5 more Orioles in Tree 1. Now we have

Tree 1	Tree 2	Tree 3
7 Blue Jays, 7 Orioles	4 Blue Jays, 2 Orioles	4 Blue Jays, 2 Orioles

The number of Orioles that are still not in a tree is  $14 - 7 - 2 - 2 = 3$ .

We cannot place any of these Orioles in Tree 1 because then there will be more Orioles than Blue Jays in that tree. Can we place these in the remaining two trees? We can place 2 in Tree 2 and 1 in Tree 3. So we have

Tree 1	Tree 2	Tree 3
7 Blue Jays, 7 Orioles	4 Blue Jays, 4 Orioles	4 Blue Jays, 3 Orioles

Therefore, the largest number of birds that can be in one tree is 14.

