

2024 Maths Challenge

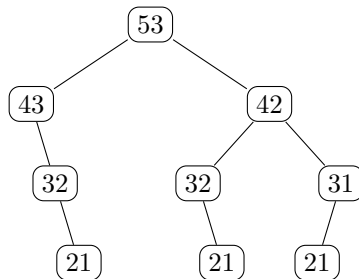
Middle Primary

Solutions for Students

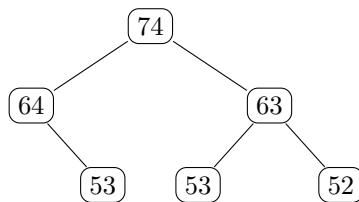


MP3 Drop Bears

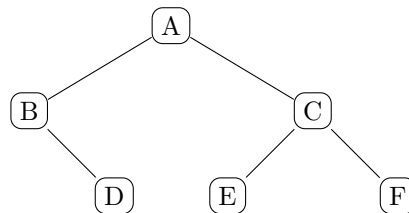
a Using drop bear subtraction we get the following tree.



b By working backwards from the given nest 53, we get the following partial tree.

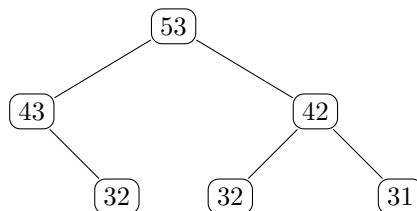


c We label the nests with the letters A to F as shown.

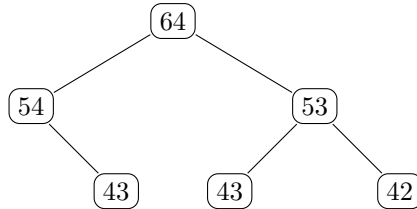


The only allowable nest below 43 is 32. So neither A nor C is 43. Hence one or more of B, D, E, F is 43.

If B is 43, then we have the following partial tree.



If D or E is 43, then we have the following partial tree.

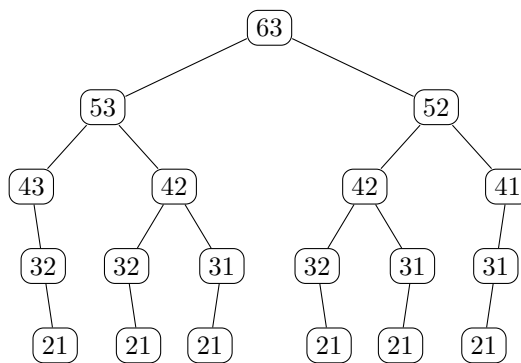


Comment

If F is 43, then C is 54 and there is no address for E. So there are only two different partial trees.

- d** From the example in the introduction and the solution to Part **a**, we see that drop bear tree 52 is the mirror image of drop bear tree 53 (ignoring the addresses).

The common address above 52 and 53 is 63. So drop bear tree 63 is symmetrical, as seen below.



This tree may also be found by trial and error.

2025 Maths Challenge

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Published by

AMT PUBLISHING

Australian Maths Trust
170 Haydon Drive, Bruce ACT 2617 AUSTRALIA
Telephone: +61 2 6201 5136
www.amt.edu.au



Australian Government
**Department of Industry,
Science and Resources**

This project is supported by the Australian Government Department of Industry, Science and Resources through the Science Competitions: Mathematics and Informatics Olympiads grant opportunity.

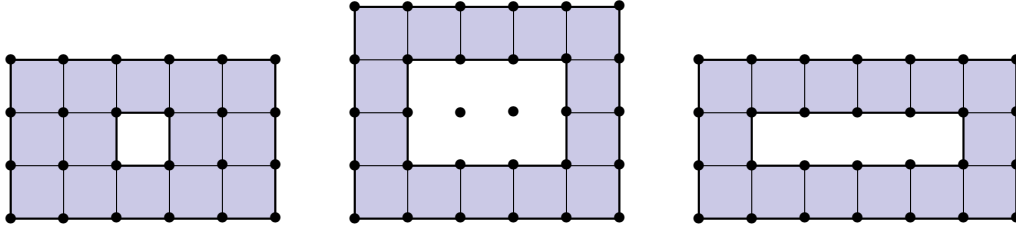
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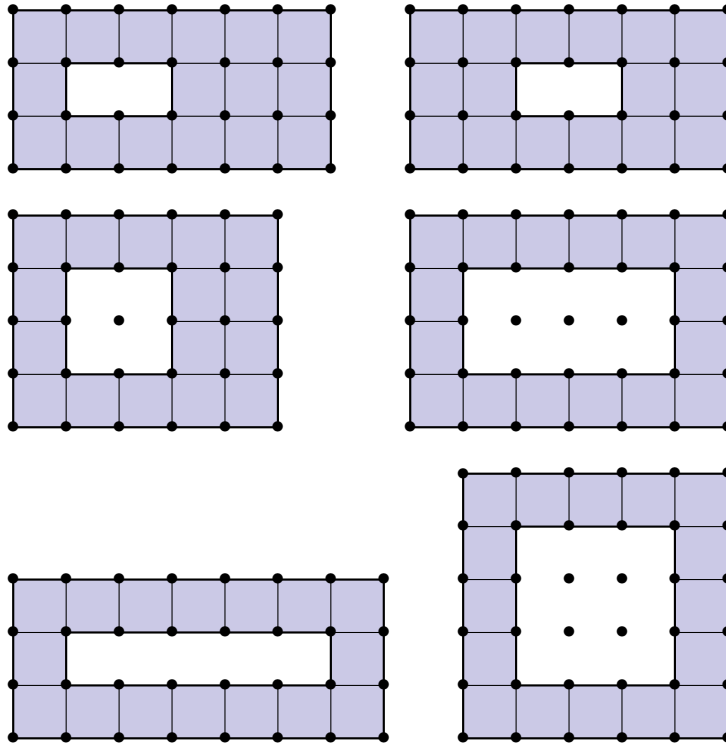
Mathematics Challenge for Young Australians Challenge Stage ISSN 1328-4444

MP4 Holey Rectangles

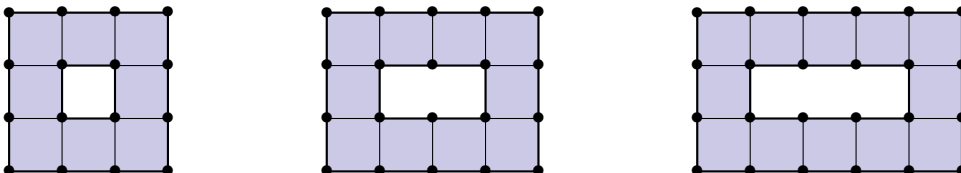
a Here are three more holey rectangles with area 14:



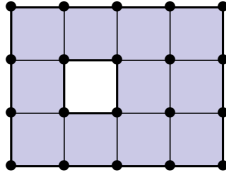
b Here are six holey rectangles with area 16:



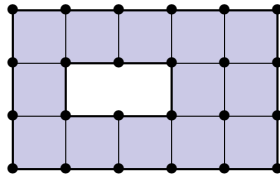
c Here are holey rectangles with height 3 and areas 8, 10, 12:



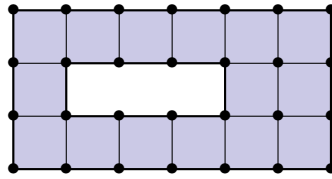
d Here is a holey rectangle with area 11:



Extending the outer and inner rectangles by 1 unit to the right increases the area to 13:



Repeating this extension increases the area by 2 each time, next to 15, then 17, and so on.



In this way, Tenzin can get all odd areas greater than 9.