E08: Exercise on $B^+$-trees

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Consider the B+-tree below with order 2 (each node except for the root must contain at least two search key values – and 3 pointers). Show the tree that would result after successively applying the following operations.

Remove 1

Borrow from sibling
Exercise (cont.)

Remove 41

1. Merge leaves

2. Borrow from sibling
Exercise (cont.)

1. Merge leaves

2. Merge nodes and push 30 down

Remove 3
Exercise (cont.)

Insert 41
Exercise (cont.)

1. Split leaf and copy 13 up

2. Split root and move 30 up

Insert 1