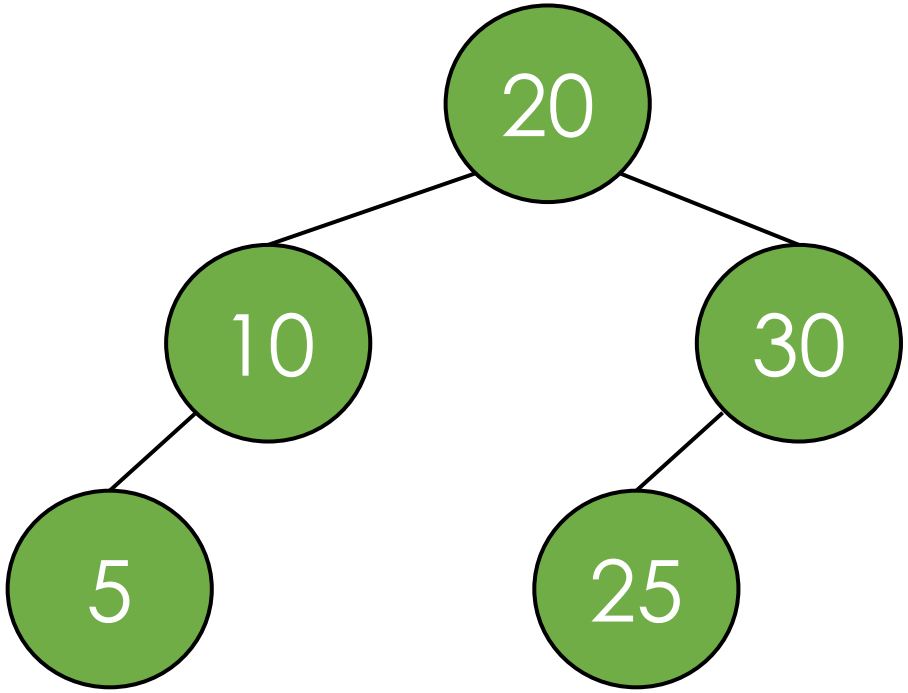
Binary Search Trees: Insert

By the end of this video you will be able to…

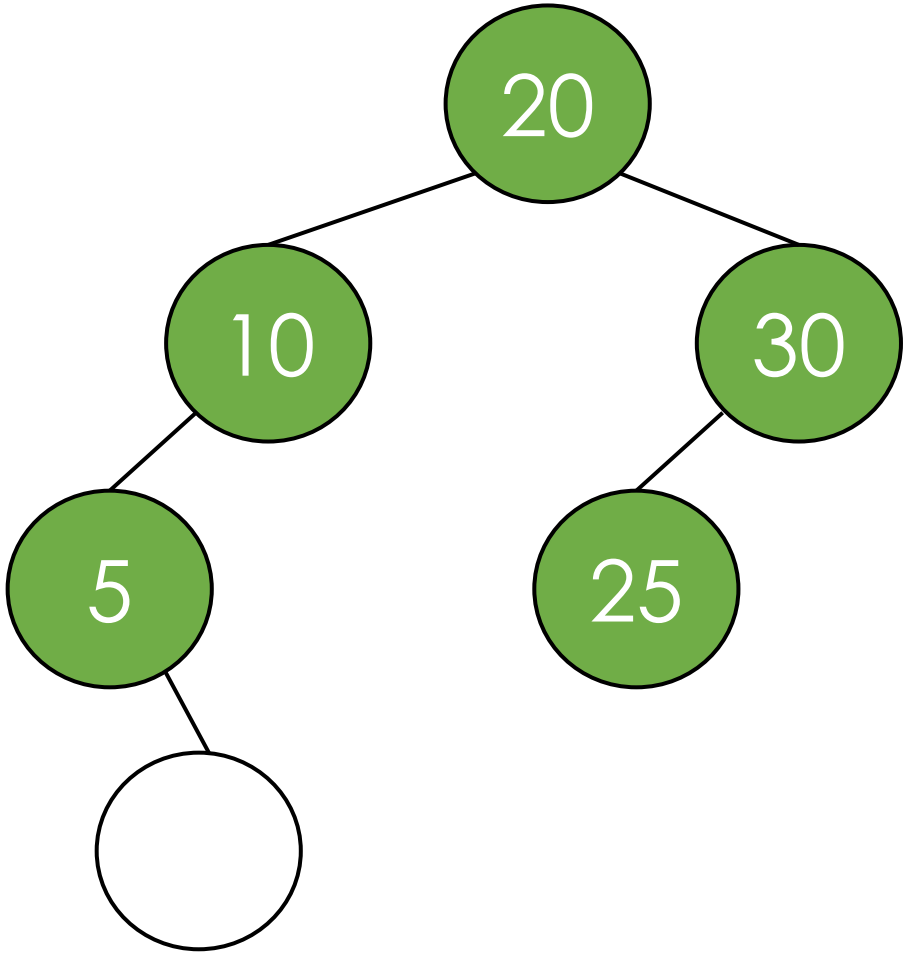
- Insert an item into a Binary Search Tree

Binary Search Tree - Insertion



Where should we insert 7?

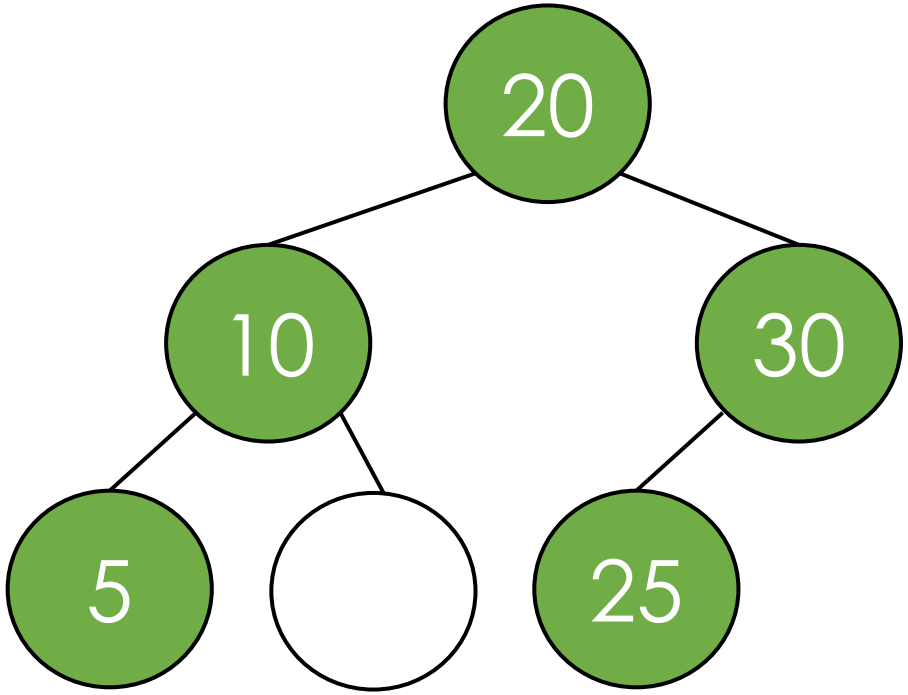
Binary Search Tree - Insertion



Option A

Where should we insert 7?

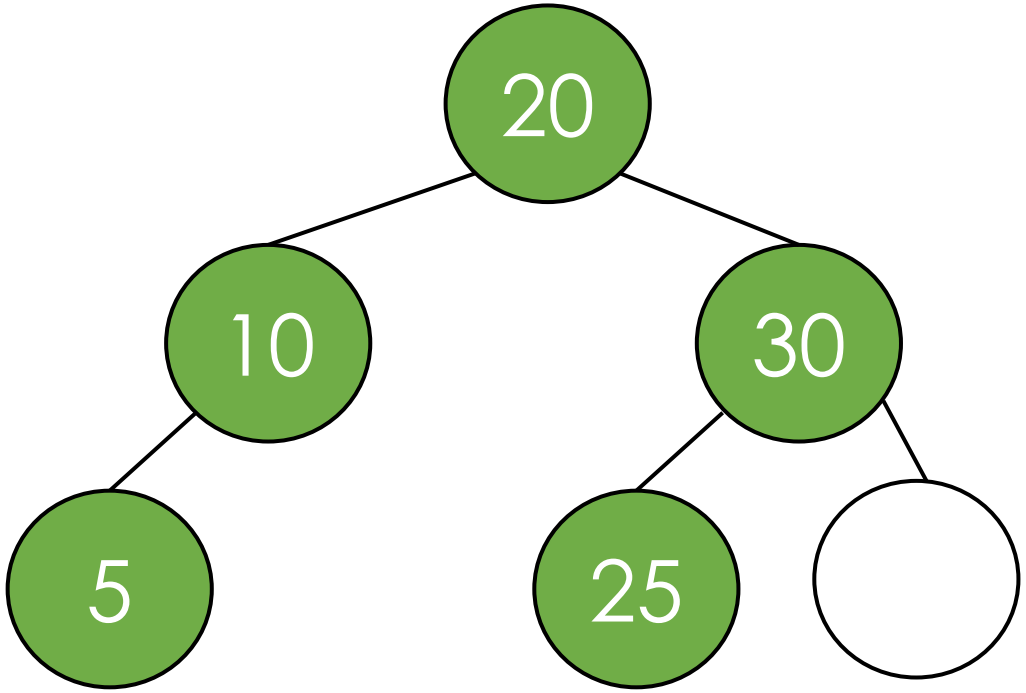
Binary Search Tree - Insertion



Option B

Where should we insert 7?

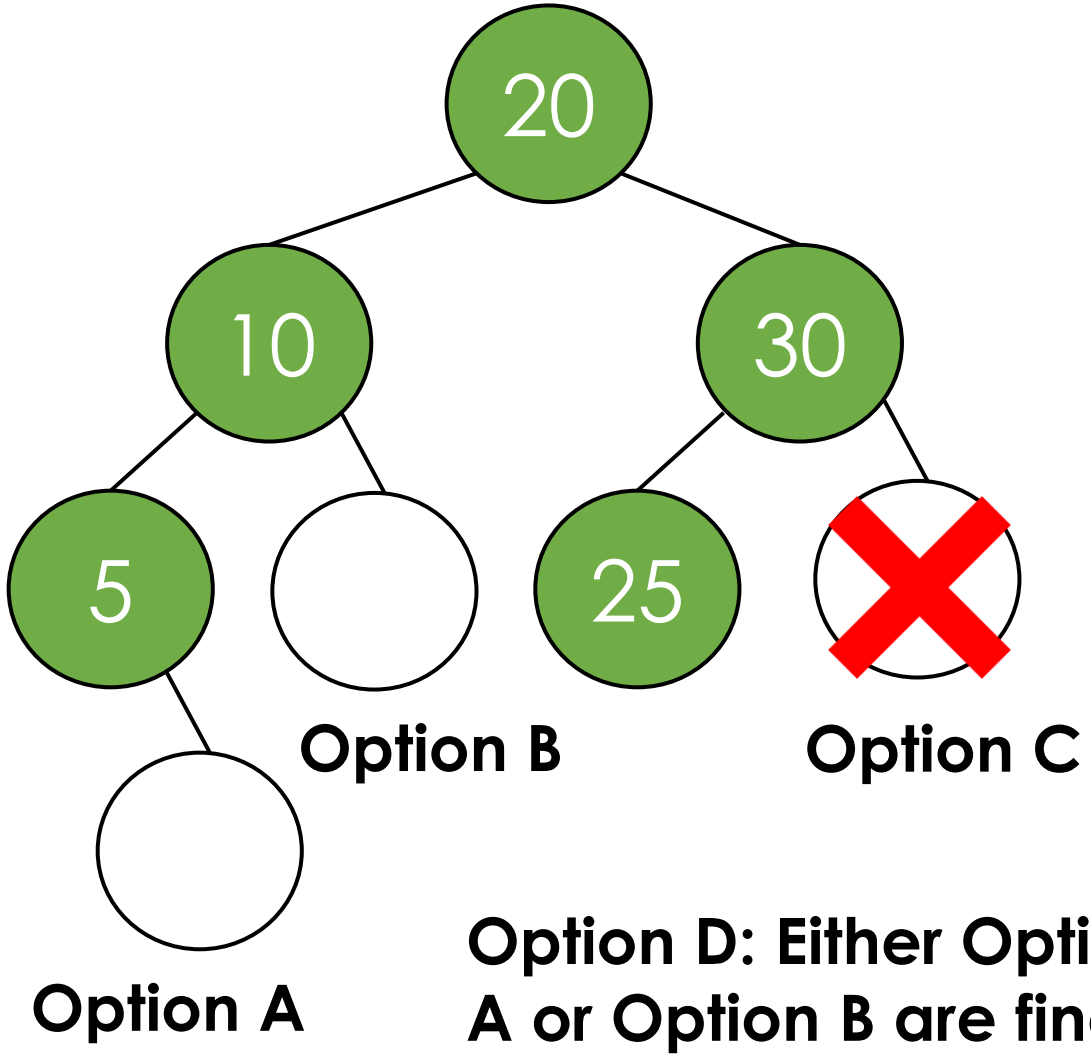
Binary Search Tree - Insertion



Option C

Where should we insert 7?

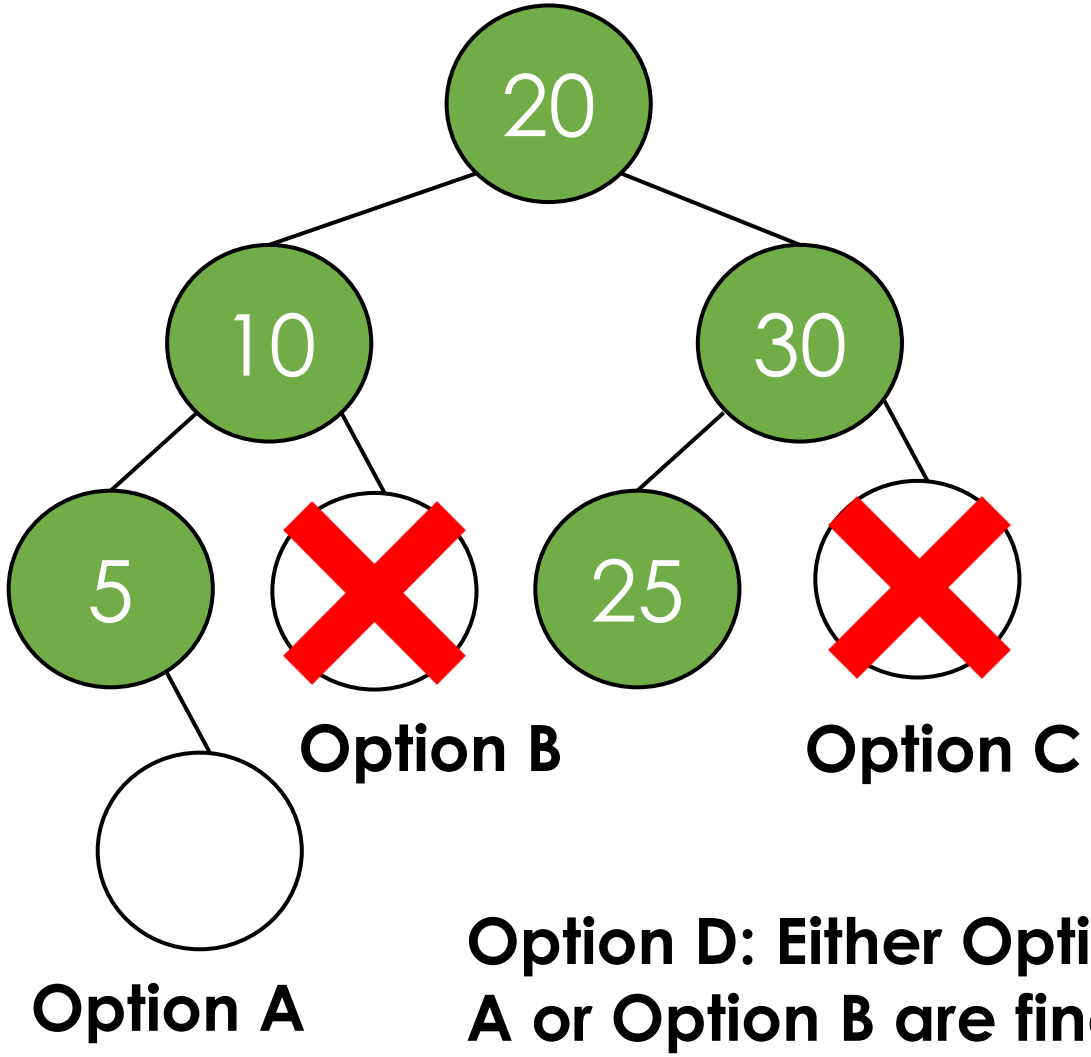
Binary Search Tree - Insertion



Where should we insert 7?

Option D: Either Option A or Option B are fine.

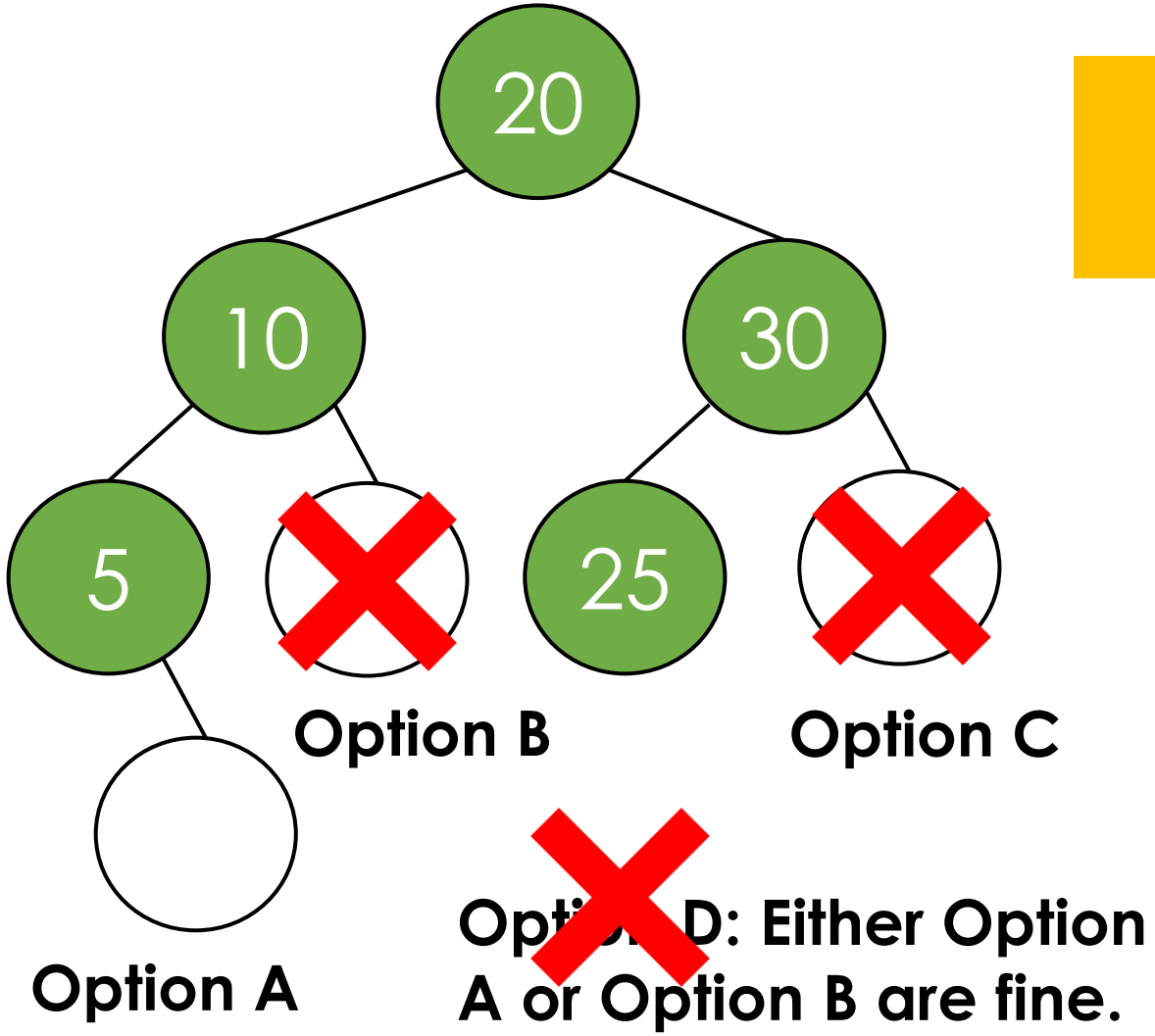
Binary Search Tree - Insertion



Where should we insert 7?

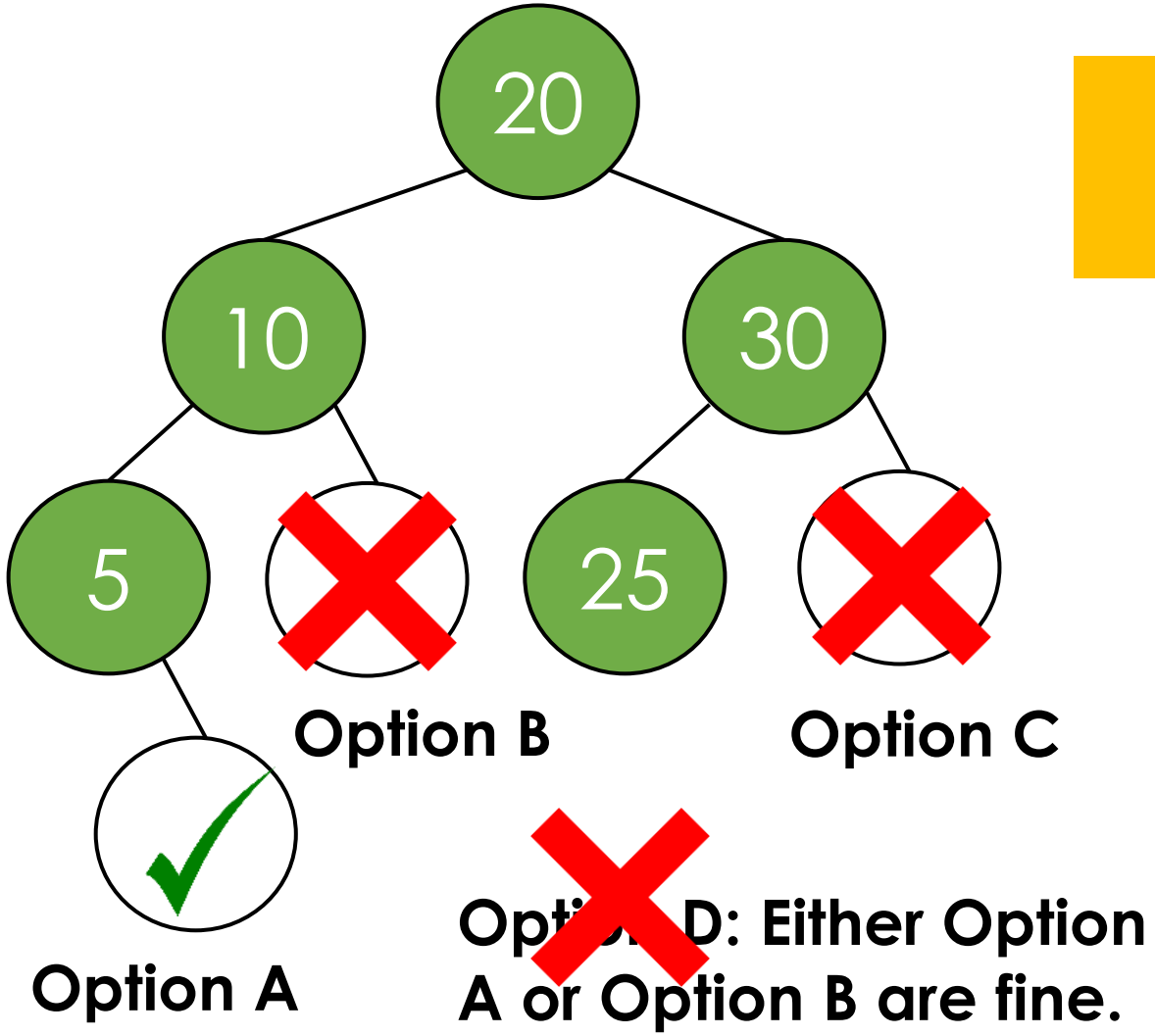
Option D: Either Option A or Option B are fine.

Binary Search Tree - Insertion



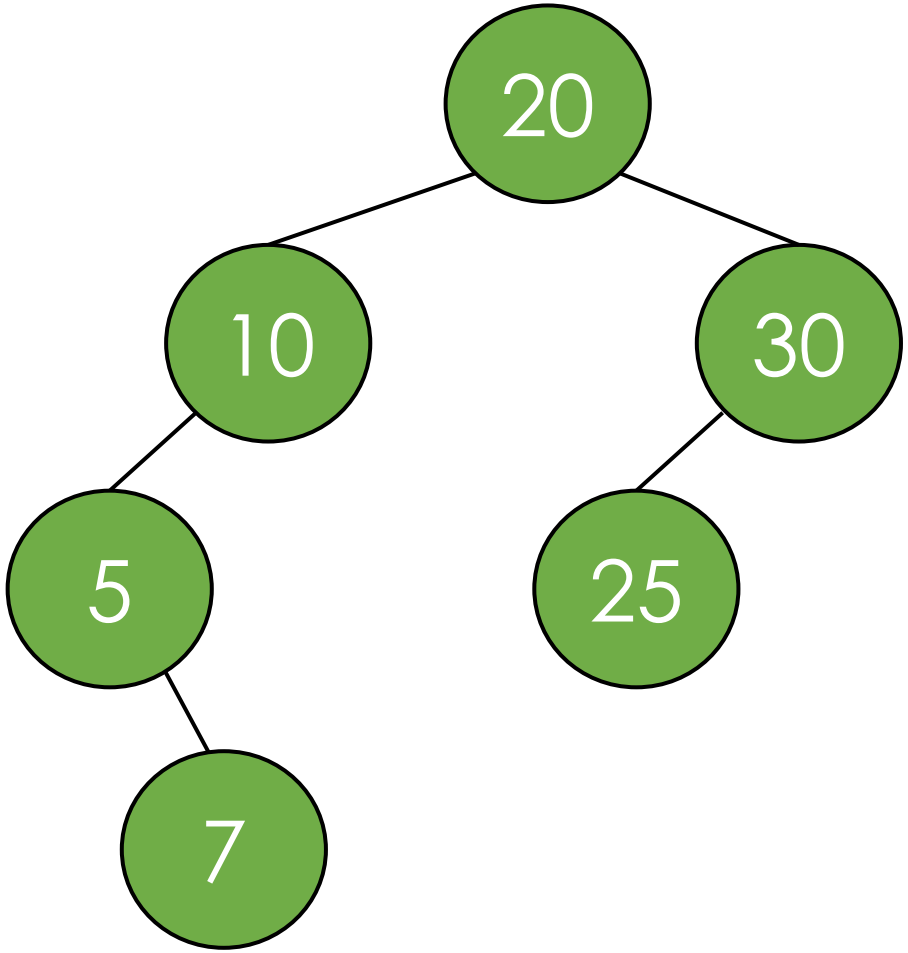
Where should we insert 7?

Binary Search Tree - Insertion

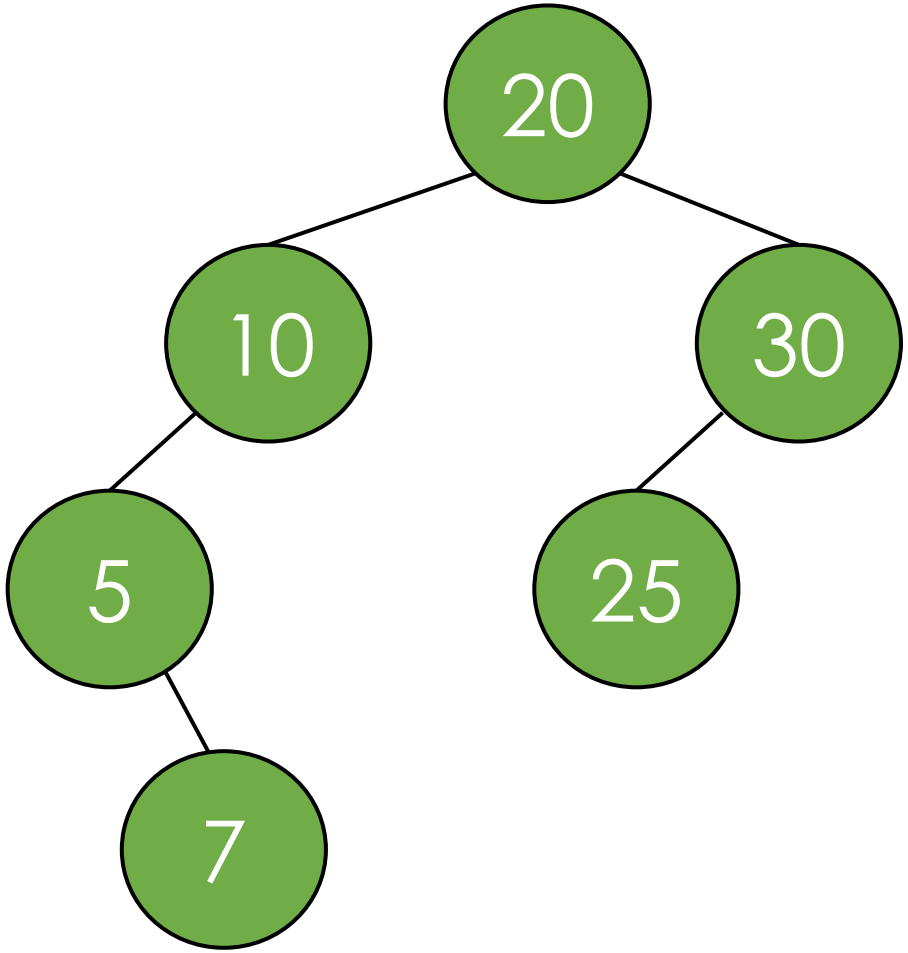


Where should we insert 7?

Binary Search Tree - Insertion

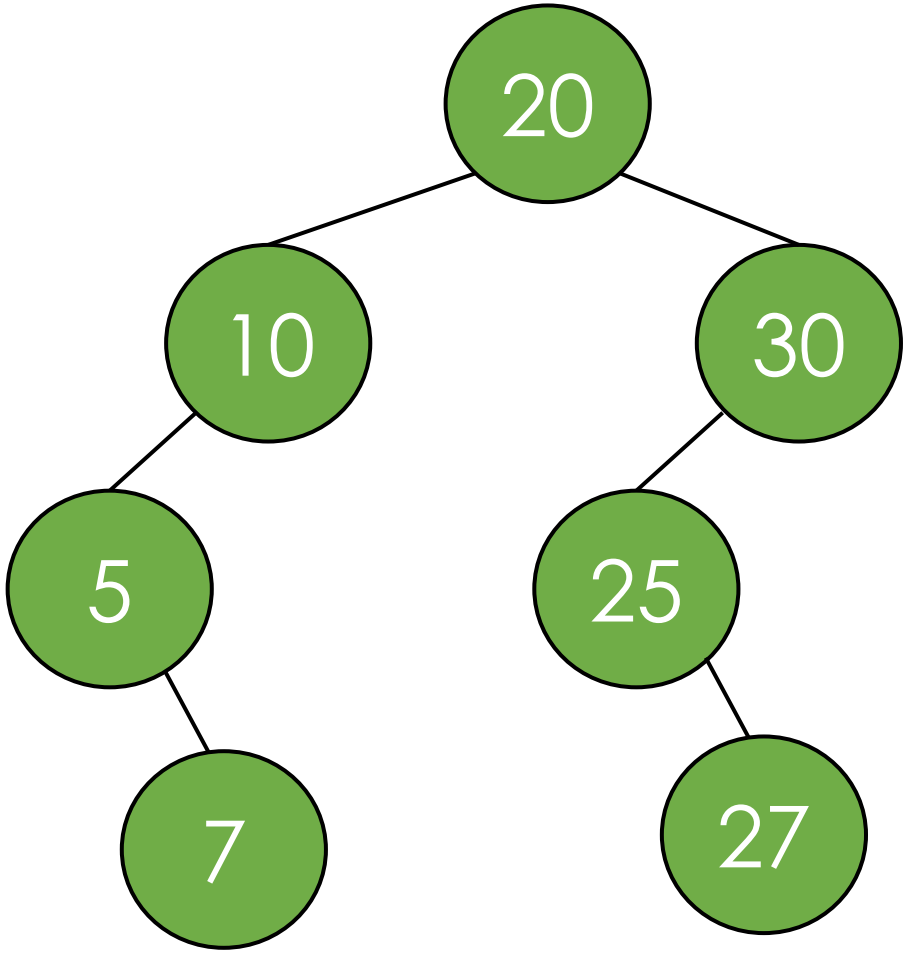


Binary Search Tree - Insertion



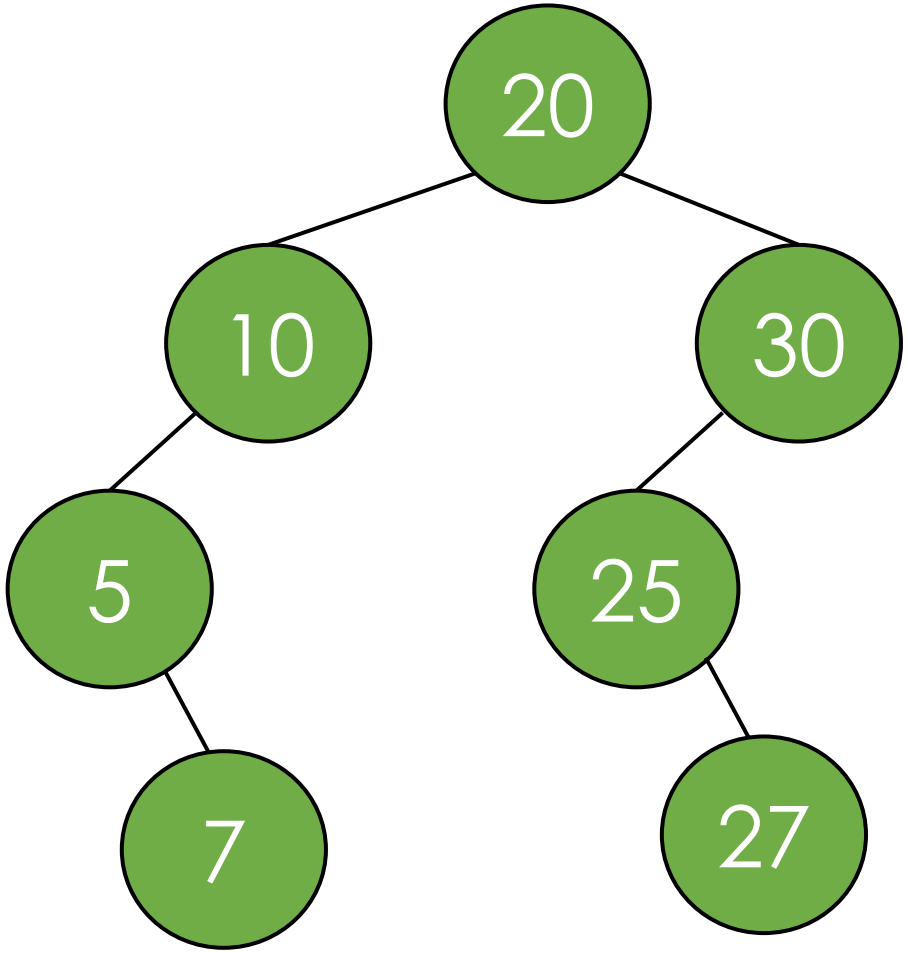
Insert 27?

Binary Search Tree - Insertion



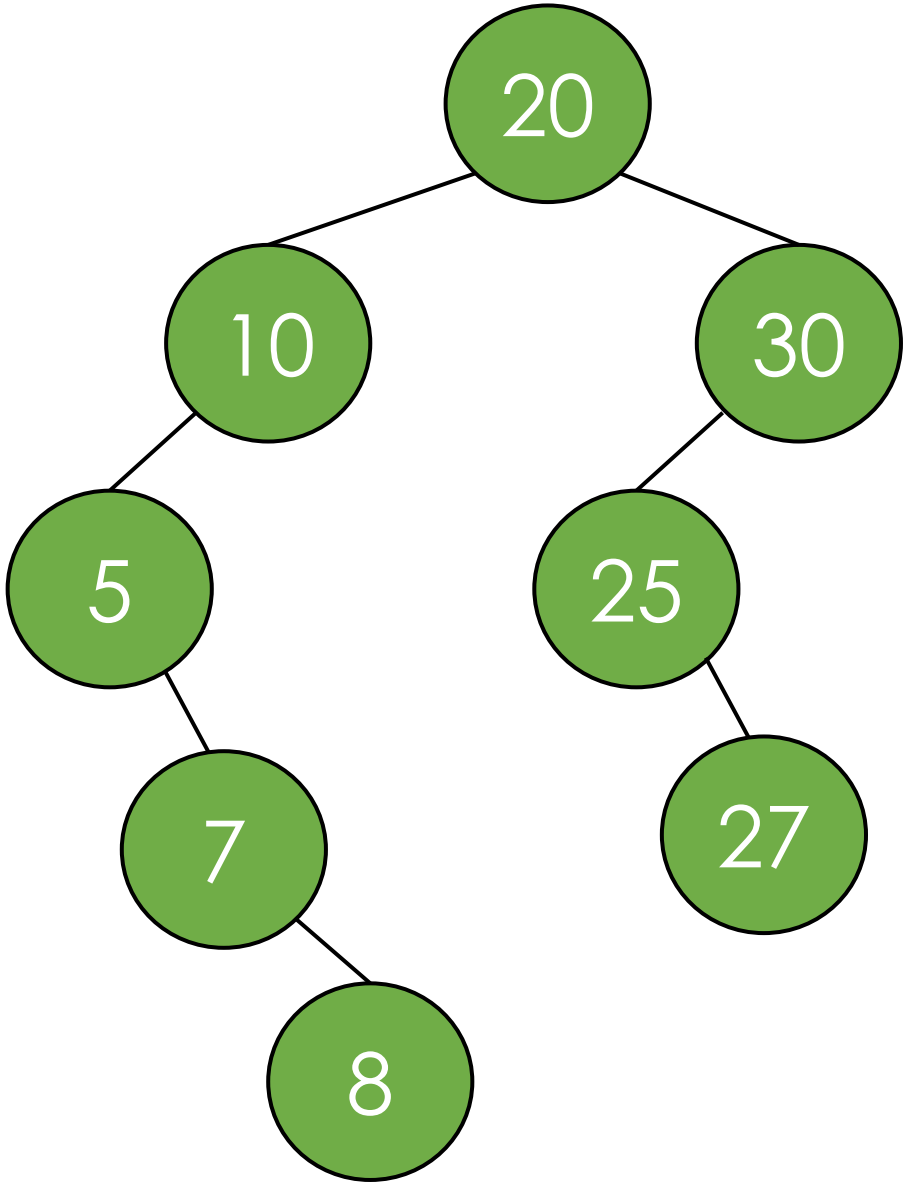
Insert 27?

Binary Search Tree - Insertion



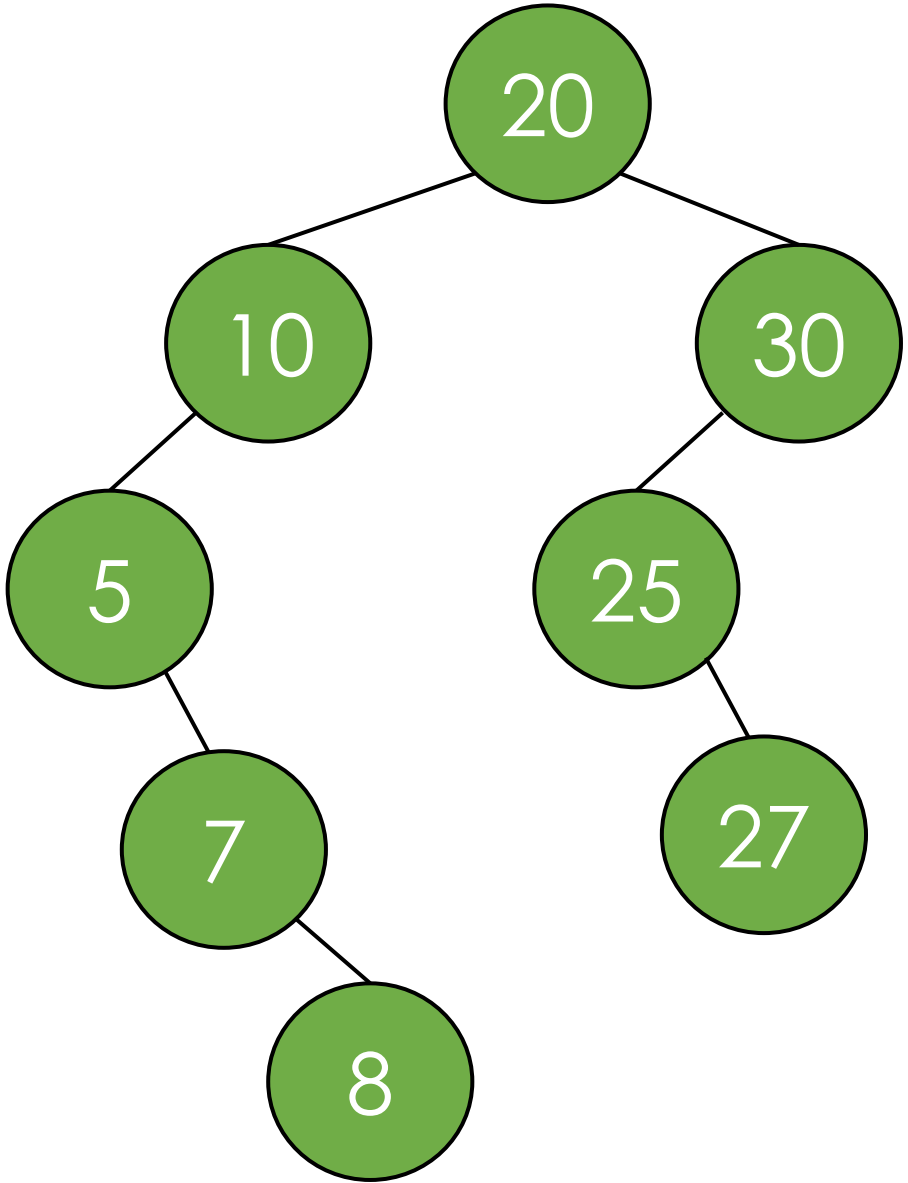
Insert 8?

Binary Search Tree - Insertion



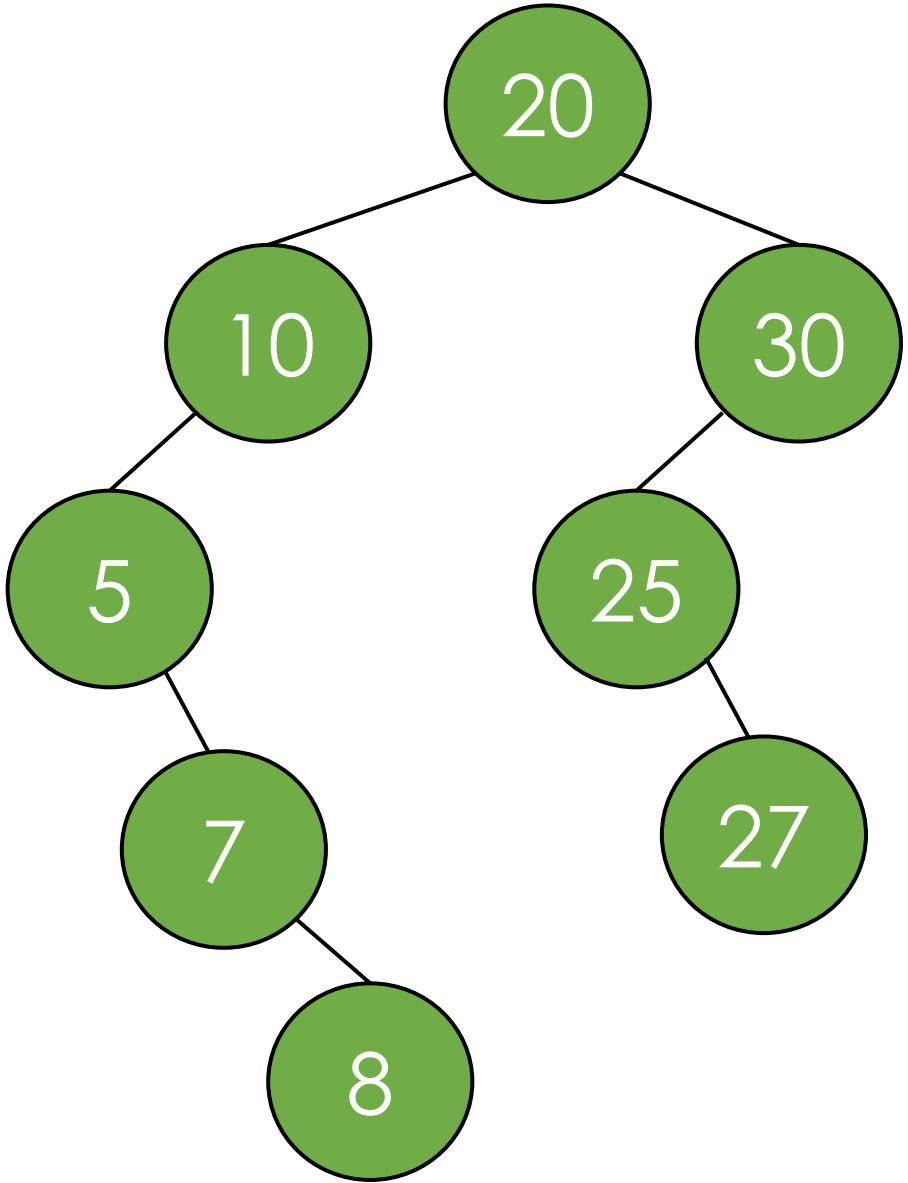
Insert 8?

Binary Search Tree - Insertion



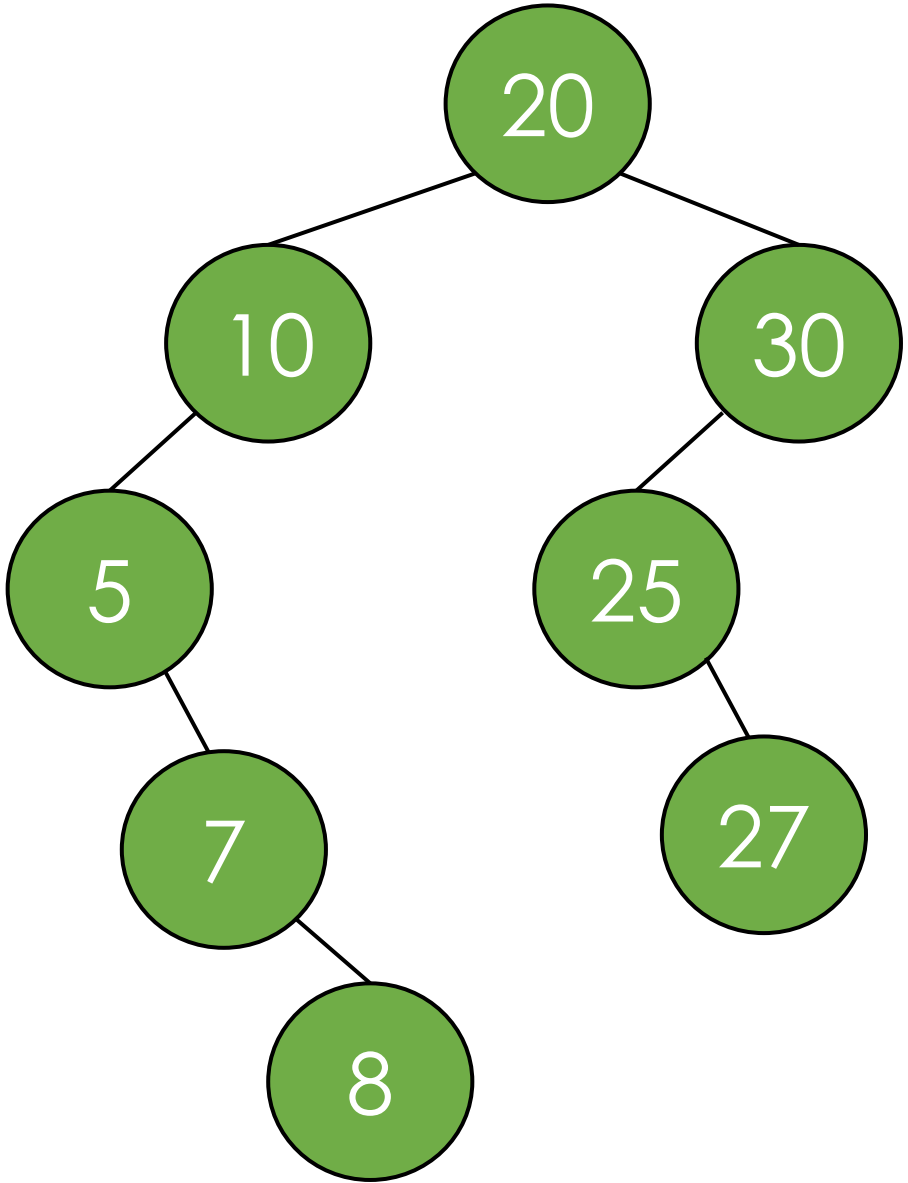
There's no rule that BSTs will be full trees (or balanced).

Binary Search Tree - Insertion



Again, this is solved cleanly with either recursion or iteration.

Binary Search Tree - Insertion



Again, this is solved cleanly with either recursion or iteration.

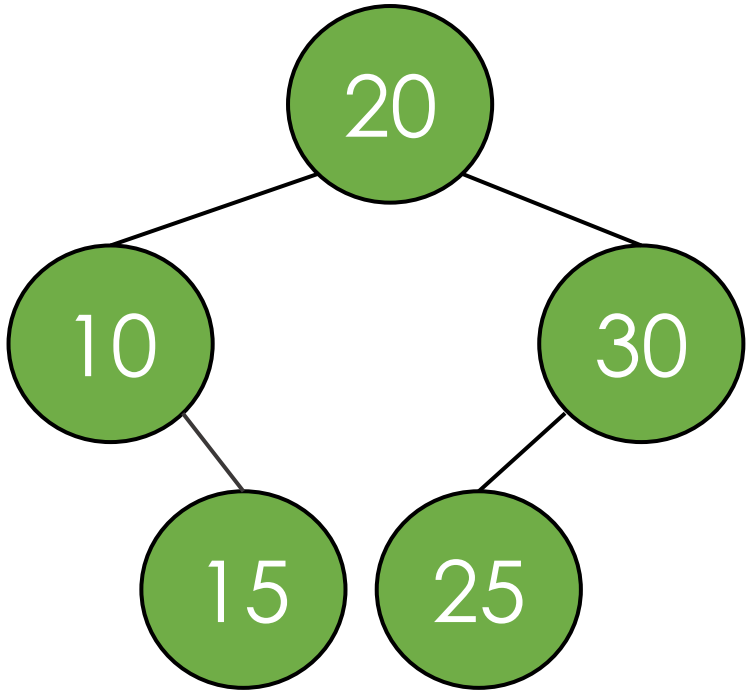
We'll show you how to do it iteratively in the support video

Next step

- Deletion in a BST

BST: Insert Algorithm

```
insert(item, node):
  if (node.val == item)
      return false
  else if (node.val < item)
     if (node.right == null)
         add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
          add as left child, return true
      insert(item, node.left)
```



BST: Insert Algorithm

```
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  if (node.val == item)
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  else if (node.val < item)
     if (node.right == null)
         add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
          add as left child, return true
      insert(item, node.left)
```

If BST doesn't allow duplicates

BST: Insert Algorithm

```
insert(item, node):
  if (node.val == item)
      return false
  else if (node.val < item)
     if (node.right == null)
         add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
          add as left child, return true
      insert(item, node.left)
```

add to right tree

BST: Insert Algorithm

```
insert(item, node):
  if (node.val == item)
      return false
  else if (node.val < item)
     if (node.right == null)
         add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
          add as left child, return true
      insert(item, node.left)
```

If the right tree is empty, add node there

BST: Insert Algorithm

```
insert(item, node):
  if (node.val == item)
      return false
  else if (node.val < item)
     if (node.right == null)
        add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
         add as left child, return true
      insert(item, node.left)
```

Insert into right tree

BST: Insert Algorithm

```
insert(item, node):
  if (node.val == item)
      return false
  else if (node.val < item)
     if (node.right == null)
         add as right child, return true
     insert(item, node.right)
  else // node.val > item
      if (node.left == null)
          add as left child, return true
      insert(item, node.left)
```

Insert into left
(same idea)