

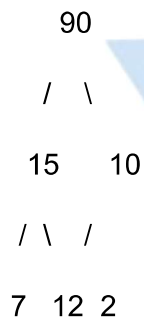
Insert In Heap

Max Heap-

A **Max Heap** is a complete binary tree where the value of each node is greater than or equal to the values of its children.

Example 1-

[90, 15, 10, 7, 12, 2]



Example 2-

[50, 30, 40, 10, 60]

Step-by-Step Process:

1. Insert 50

50

No swaps needed.

2. Insert 30

50

/

30

No swaps needed.

3. Insert 40

50

/ \

30 40

No swaps needed.

4. Insert 10

50

/ \

30 40

/

10

No swaps needed.

5. Insert 60

50

/ \

30 40

/ \
10 60

Next, **60** is greater than **30**, so swap **60** and **30**:

50
/ \
60 40
/ \
10 30

Finally, **60** is greater than **50**, so swap **60** and **50**:

60
/ \
50 40
/ \
10 30

Final Heap:

[60, 50, 40, 10, 30]

Tree Representation:

```
60
 / \
50  40
 / \
10  30
```

Min Heap Example-

In a **Min Heap**, the value of each node is **less than or equal** to the values of its children.

Example 1-

[10, 20, 15]

```
10
 / \
20 15
```

Example 2-

[10, 5, 30, 2, 8, 15]

1. Insert 10

10

2. Insert 5

Insert 5 as left child of 10 $\rightarrow 5 < 10 \rightarrow$ swap

5

/

10

3. Insert 30

Insert 30 as right child of 5 $\rightarrow 30 > 5 \rightarrow$ no swap

5

/ \

10 30

4. Insert 2

Insert 2 as left child of 10

→ Compare $2 < 10$ → **swap**

→ Now compare $2 < 5$ → **swap**

```

    2
   / \
  5   30
 /
10

```

5. Insert 8

Insert 8 as right child of 5 → $8 > 5$ → no swap

```

    2
   / \
  5   30
 / \
10  8

```

6. Insert 15

Insert 15 as left child of 30

→ Compare $15 < 30$ → **swap**

```

    2

```

/ \
5 15
/ \ /
10 8 30

Final Min Heap Tree:

2
/ \
5 15
/ \ /
10 8 30

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