## **Build Heap**

- 1. Let index = length/2-1. This is the parent of the last node in the tree, i.e. list[index + 1] . . . list[length-1] are leaves
- 2. Convert the subtree with root of list[index] into a heap.
  - a. Given list[a] is root of tree, list[b] is left child (root \*2 +1), list[c] is right child (root\*2+2), if exists
  - b. Compare list[b] with list[c] to determine larger child, list[largerIndex]
  - c. Compare list[a] with list[largerIndex]. If list[a] list[largerIndex], then swap, else already a heap
  - d. If swap, repeat step 2 for the subtree of list[largerIndex]
- 3. Convert the subtree with the root of list[index-1] into a heap, repeat until list[0]

## Heap Sort

- 1. Swap the root with the end of the list.
- 2. Heapify the list up to but not including the root
- 3. Repeat until there is only one node in the list

## Simulate the heapsort algorithm manually to sort the array:

## Show all steps

- 1. Make into a heap
- 2. Sort

Max-Heap

[0]	5	5	5	5	5	5	92	92	92	
[1]	22	22	22	22	92	92	5	76	76	
[2]	9	9	9	81	81	81	81	81	81	
[3]	76	76	92	92	22	76	76	5	54	
[4]	63	63	63	63	63	63	63	63	63	
[5]	81	81	81	9	9	9	9	9	9	
[6]	48	48	48	48	48	48	48	48	48	
[7]	92	92	76	76	76	22	22	22	22	
[8]	54	54	54	54	54	54	54	54	5	
[9]	28	28	28	28	28	28	28	28	28	

[0]	92	28	81	81	5	76	76	22	63	63	28	54
[1]	76	76	76	76	76	5	63	63	22	54	54	28
[2]	81	81	28	48	48	48	48	48	48	48	48	48
[3]	54	54	54	54	54	54	54	54	54	22	22	22
[4]	63	63	63	63	63	63	5	5	5	5	5	5
[5]	9	9	9	9	9	9	9	9	9	9	9	9
[6]	48	48	48	28	28	28	28	28	28	28	63	63
[7]	22	22	22	22	22	22	22	76	76	76	76	76
[8]	5	5	5	5	81	81	81	81	81	81	81	81
[9]	28	92	92	92	92	92	92	92	92	92	92	92

[0]	9	48	5	28	28	5	22	9	5	5	
[1]	28	28	28	5	22	22	5	5	9	9	
[2]	48	9	9	9	9	9	9	22	22	22	
[3]	22	22	22	22	5	28	28	28	28	28	
[4]	5	5	48	48	48	48	48	48	48	48	
[5]	54	54	54	54	54	54	54	54	54	54	
[6]	63	63	63	63	63	63	63	63	63	63	
[7]	76	76	76	76	76	76	76	76	76	76	
[8]	81	81	81	81	81	81	81	81	81	81	
	92	92	92	92	92	92	92	92	92	92	
[9]	~-	<b>~</b>	~-	~~	~~		~~				