Heapsort Demo
Starting point. Array in arbitrary order.

we assume array entries are indexed 1 to N
Heap construction. Build max heap using bottom-up method.
Heap construction. Build max heap using bottom-up method.

sink 5
Heap construction. Build max heap using bottom-up method.

sink 5
Heap construction. Build max heap using bottom-up method.

sink 5
Heap construction. Build max heap using bottom-up method.

sink 4
Heap construction. Build max heap using bottom-up method.
Heap construction. Build max heap using bottom-up method.
Heap construction. Build max heap using bottom-up method.

sink 3
Heap construction. Build max heap using bottom-up method.

sink 3
Heap construction. Build max heap using bottom-up method.
Heap construction. Build max heap using bottom-up method.
Heap construction. Build max heap using bottom-up method.
Heapsort

Heap construction. Build max heap using bottom-up method.

sink 2

7-node heap

S T X P L R A M O E E
Heap construction. Build max heap using bottom-up method.

sink 1
Heap construction. Build max heap using bottom-up method.

sink 1
Heap construction. Build max heap using bottom-up method.
Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 11
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

**exchange 1 and 11**
Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

sink 1
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.
**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 10
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 10
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

sink 1
Heapsort

Sortdown. Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 9
**Sortdown.** Repeatedly delete the largest remaining item.

**Exchange 1 and 9**
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 8
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 8
**Heapsort**

Sortdown. Repeatedly delete the largest remaining item.

sink 1

```
M
1
P
O
L
E
E
A
R  S  T  X
M  P  E  O  L  E  A  R  S  T  X
1
```
**Heapsort**

*Sortdown.* Repeatedly delete the largest remaining item.

**sink 1**

```
R S T X
```

```
P M L O
```

```
P E A
```

```
P M E O L E A R S T X
```

1 2
**Sortdown.** Repeatedly delete the largest remaining item.

sink 1
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 7

R S T X

POEMLEARSTX

1 7
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 7

```
R  S  T  X

A  O  E  M  L  E  P  R  S  T  X
  1    7
```
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

sink 1
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
Heapsort

Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 6
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 6
Sortdown. Repeatedly delete the largest remaining item.

sink 1
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

```
<table>
<thead>
<tr>
<th>M</th>
<th>E</th>
<th>E</th>
<th>A</th>
<th>L</th>
<th>O</th>
<th>P</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 5
**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 5
Sortdown. Repeatedly delete the largest remaining item.

sink 1
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.
Heapsort

Sortdown. Repeatedly delete the largest remaining item.
**Sortdown.** Repeatedly delete the largest remaining item.

**Heapsort**

exchange 1 and 4
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 4
**Heapsort**

*Sortdown.* Repeatedly delete the largest remaining item.

sink 1

```
A
  
E   E
  
M   O
  
P

L

R

S

T

X
```

```
A   E   E   L   M   O   P   R   S   T   X
  
1
```
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

sink 1

```
   E
  /|
 / 1
2  A
   E
 L M O P
 R S T X
```

```
 E  A  E  L  M  O  P  R  S  T  X
 1  2
```
Sortdown. Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

```
exchange 1 and 3
```

```
1 3
```
Sortdown. Repeatedly delete the largest remaining item.

exchange 1 and 3
Heapsort

Sortdown. Repeatedly delete the largest remaining item.

sink 1
Sortdown. Repeatedly delete the largest remaining item.
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.

exchange 1 and 2

```
E A E L M O P
R S T X
```

1 2
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

**exchange 1 and 2**
Heapsort

**Sortdown.** Repeatedly delete the largest remaining item.
**Heapsort**

**Sortdown.** Repeatedly delete the largest remaining item.

*end of sortdown phase*
Ending point. Array in sorted order.