6.5-8.

The operation Heap-Delete (A, i) deletes the item in node i from heap A. Give an implementation of Heap-Delete that runs in $O(\lg n)$ time for an n-element max-heap.

Answer.

The procedure Max-Heap-Delete is similar to Heap-Extract-Max procedure.

```
\begin{array}{ll} \operatorname{Max-Heap-Delete}(A,i) \\ 1 & \text{if } A.heap\text{-}size < 1 \\ 2 & \text{error "heap underflow"} \\ 3 & i = A[A.heap\text{-}size] \\ 4 & A.heap\text{-}size = A.heap\text{-}size - 1 \\ 5 & \operatorname{Max-Heapify}(A,i) \end{array}
```

The running time of MAX-HEAP-DELETE is $O(\lg n)$, since it performs only a constant amount of work in lines 1–4, while the procedure MAX-HEAPIFY in line 5 takes time $O(\lg n)$.

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