THE BINARY HEAP

THE BINARY HEAP

A HEAP IS JUST A TREE WITH A SPECIAL PROPERTIES OR CONSTRAINTS ON THE VALUES OF ITS NODES

THIS IS CALLED A HEAP PROPERTY

HEAPS CAN BE OF TWO TYPES:

MINIMUM HEAP

MAXIMUM HEAP

THE BINARY HEAP

MINIMUM HEAP

EVERY NODE VALUE SHOULD BE
<= VALUE OF IT'S CHILDREN

THE NODE WITH THE SMALLEST VALUE SHOULD BE THE ROOT OF THE TREE

MAXIMUM HEAP

EVERY NODE VALUE SHOULD BE
>= VALUE OF IT'S CHILDREN

THE NODE WITH THE LARGEST VALUE SHOULD BE THE ROOT OF THE TREE

HEAP PROPERTY

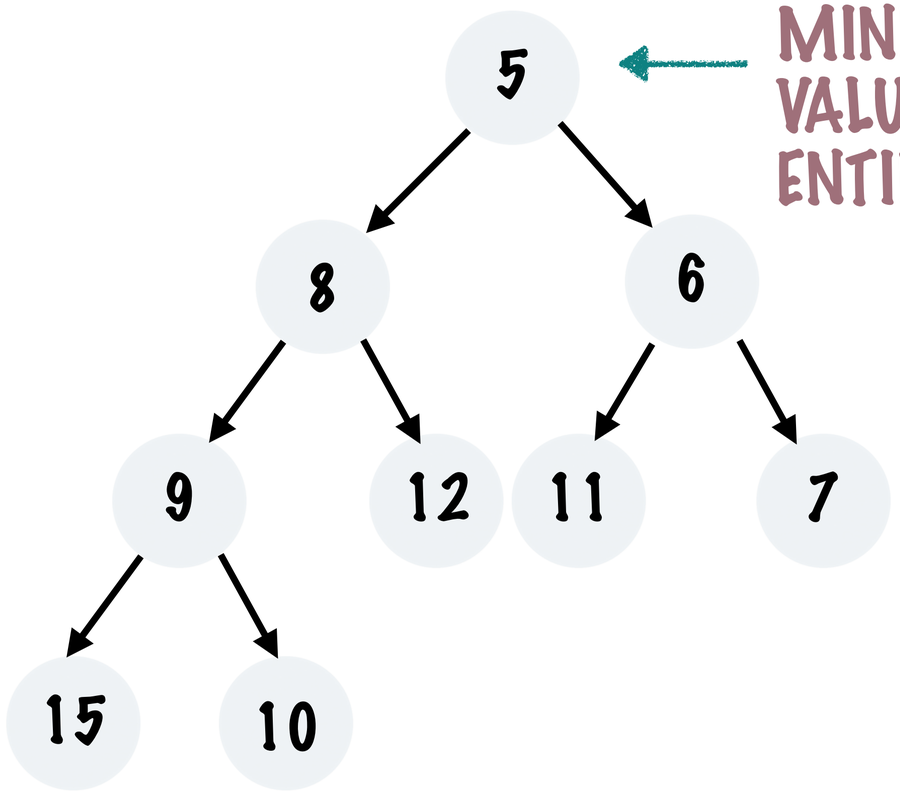
IF H IS THE HEIGHT OF THE TREE
- THE LEAF NODES SHOULD ONLY BE AT LEVEL H OR H - 1

SHAPE PROPERTY

THE HEAP SHOULD FORM A COMPLETE BINARY TREE -
ALL LEVELS EXCEPT THE LAST SHOULD BE FILLED

THE BINARY HEAP

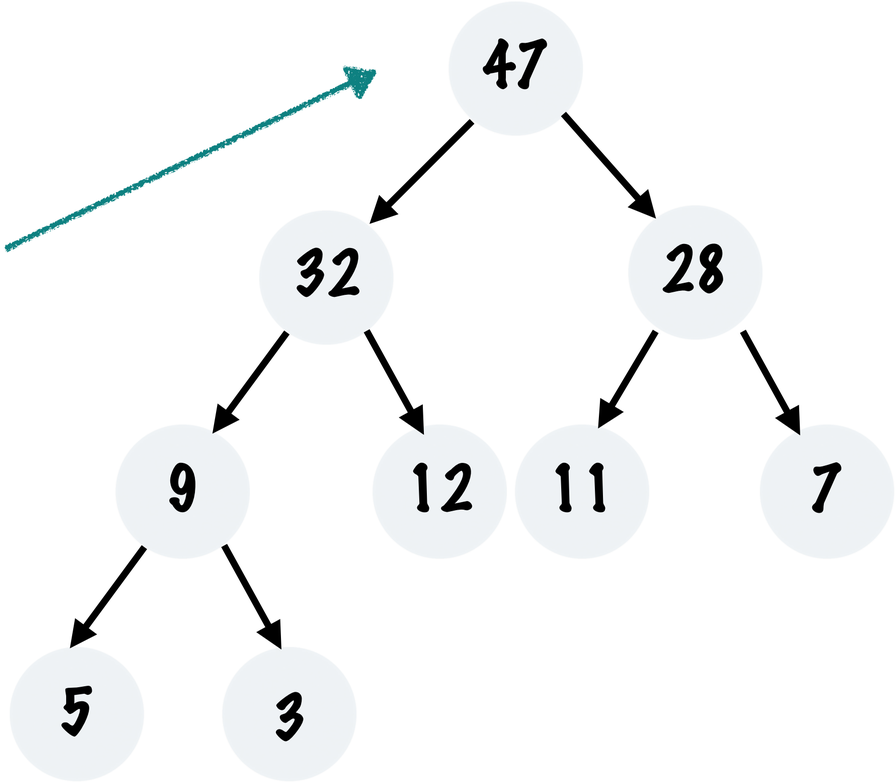
MINIMUM HEAP



MINIMUM VALUE IN THE ENTIRE TREE

MAXIMUM HEAP

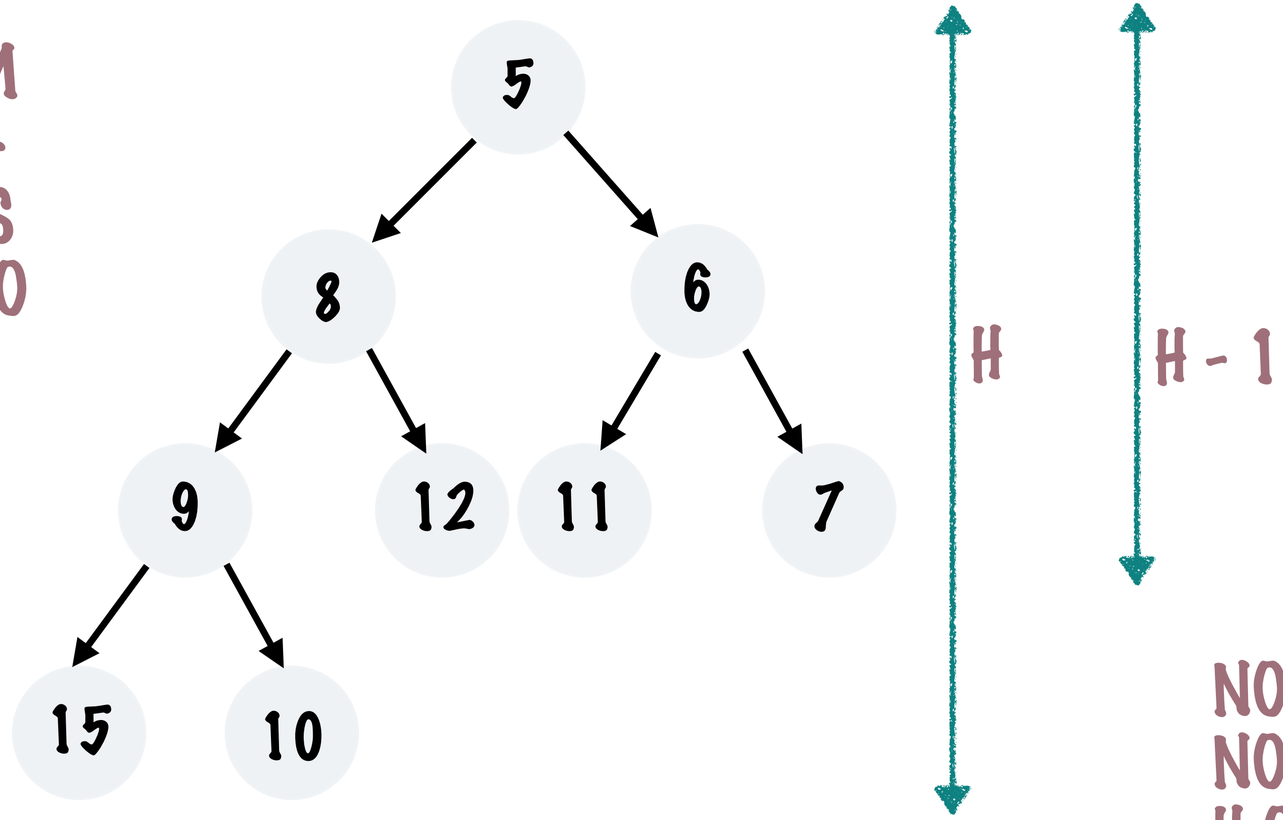
MAXIMUM VALUE IN THE ENTIRE TREE



THE BINARY HEAP

MINIMUM HEAP

LET'S CONSIDER THE MINIMUM HEAP FROM HERE ON - EVERYTHING WHICH APPLIES HERE IS EQUALLY APPLICABLE TO THE MAXIMUM HEAP

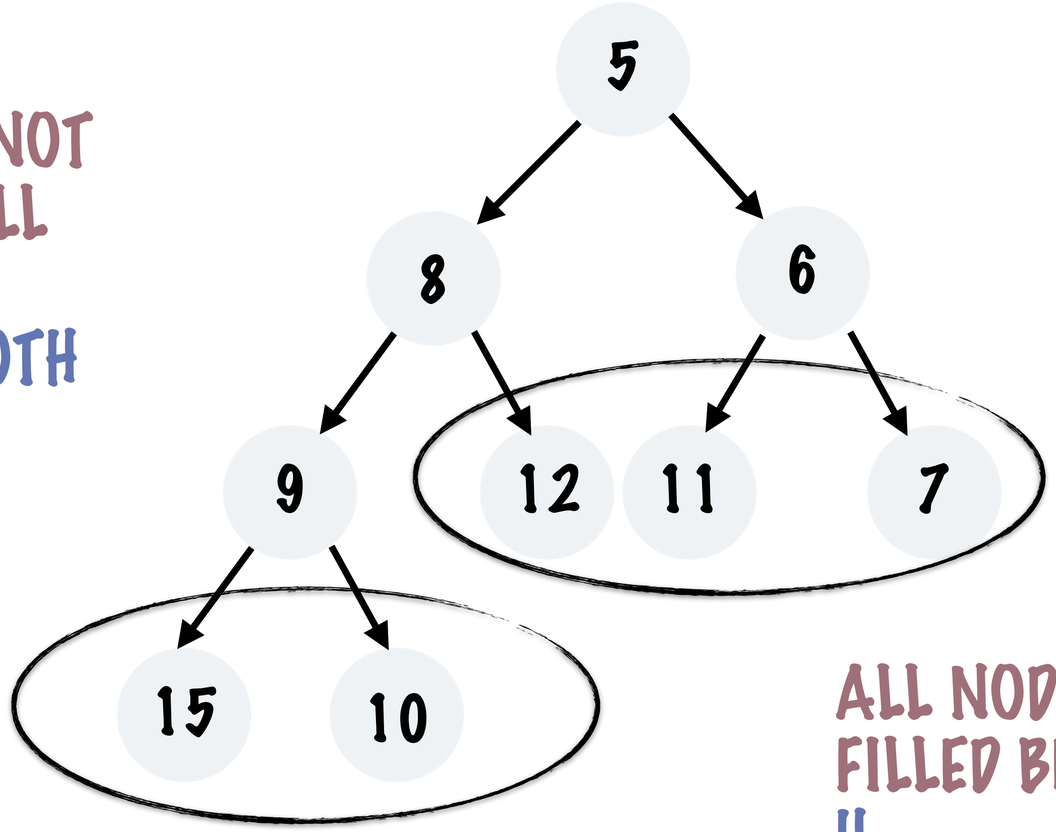


NOTE THAT ALL LEAF NODES ARE AT HEIGHT H OR H-1

THE BINARY HEAP

MINIMUM HEAP

THESE NODES CANNOT HAVE CHILDREN TILL ALL THE NODES AT LEVEL H-1 HAVE BOTH LEFT AND RIGHT CHILDREN



ALL NODES AT LEVEL H-1 HAVE TO BE FILLED BEFORE MOVING ON TO LEVEL H