Choose a set $R$ of size $n^{3/4}$ by drawing that many things uniformly at random, independently.

Sort $R$:

Find all the things in $S$ between $a$ and $b$ (time $O(n)$), to form a list $T$:

If $|T| < 4n^{3/4}$, sort $T$: (otherwise output FAIL)

- We can see in time $O(n)$ that there are 5 things in $S$ less than $a$, and 3 things in $S$ larger than $b$.
- The median is the 8’th smallest thing in $S$, which is the $8 - 5 = 3$’rd smallest thing in $T$.
- Return 8

If this calculation shows that the median is not in $T$, output FAIL.