

Largest value of n

Consider the number THIRTEEN.

$$\text{THREE} + 10 = \text{THIRTEEN}$$

Crossing out letters in common gives us :

$$\cancel{\text{T}}\cancel{\text{H}}\cancel{\text{R}}\text{E}\text{E} + 10 = \cancel{\text{T}}\cancel{\text{H}}\text{I}\cancel{\text{R}}\text{T}\text{E}\text{E}\text{N}$$

$$10 = \text{TIN}$$

$$\text{So } 10 = \text{T} + \text{I} + \text{N}$$

But we also know that

$$\text{TEN} = 10$$

$$\text{So } 10 = \text{T} + \text{E} + \text{N}$$

So $\text{I} = \text{E}$ which is not allowed.

So the maximum value of n is 12.