

m, n integers s.t. $3m + 4n = 100$

What is the smallest possible value of $|m-n|$?

One solution is

$$\underbrace{3 \times 20}_{60} + \underbrace{4 \times 10}_{40} = 100$$

We adjust until m & n are as close as possible :

$$3 \times (20-4) + 4 \times (10+3)$$

$$= 3 \times 16 + 4 \times 13 = 100$$

$$3 \times (16-4) + 4 \times (13+3)$$

$$= 3 \times 12 + 4 \times 16 \quad \text{No, getting further apart}$$

So the best we can do is $|m-n| = 3$