**A painter takes 4 hours less than his apprentice in painting a room. If they work together, they take 1 hour and a half. How long would it take for the apprentice to paint the room if he worked alone?**

SOLUTION. Let "x" be the time, in hours, that the apprentice takes. Then, the boss takes (x - 4) hours.

Let’s express the amount of work each one does in an hour:

BOSS ==> 1/(x - 4)

APPRENTICE ==> 1/x

TOGHETHER ==> 1/1.5 = 2/3

If we add the boss’ part and the apprentice’s part, we get the part they complete in an hour.

. . 1 . . . . . .1 . . . . . 2
——— + ——— = ——
x - 4 . . . . . x . . . . .3

. . 1 . . . . . .1 . . . . .2
——— + ——— - —— = 0 . . . . . . Rearranging

x - 4 . . . . . x . . . . 3

3x + 3·(x- 4) - 2x·(x - 4)
——————————— = 0 . . . . . common denominator
. . . .3x·(x - 4)

-2x² + 14x - 12
———————— = 0
. . . .3x·(x - 4)

The algebraic fraction is 0 when its numerator is 0..

-2x² + 14x - 12 = 0

Solving the quadratic equation:

x = 6

x = 1 (we discard it as it is nonsense  --- why?)

ANSWER. The apprentice would take 6 hours.