Ejercicio:

(68cm)   (24cm)   (16m710g)

$68x + 24y = 1600$

$ax + by = c$

a = 68

42 = 9

100 = 7

1 - mcd

$d = mcd(a,b) = mcd(68,24)$

$68 = 2 \times 24 + 20$

$24 = 1 \times 20 + 4$

$20 = 5 \times 4 + 0$

$mcd(68,24) = 4 = d$

$4 \mid 1600 \rightarrow$ hay soluciones

2 - Bezout

$25 + 2t = d$

$68s + 24t = 4$

$4 = 24 + 2(-7-1)$

$4 = 24 + (-68 + 24)(-1)\cdot(-1)$

$4 = -68(-1) + 24(3) = -68 + 24t = 4$

$(s,t) = (-1,3)$

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3 - Sol Particular

$\alpha = 4$ $\}$ → $n = 400$

$\alpha n = C = 1600$

$(x_0, y_0) = (-400, 1200)$

4 - Determinar α, β

$\begin{cases} a = \alpha d \\ b = \beta d \end{cases} \rightarrow \begin{cases} \alpha n\alpha \\ \beta n\beta \end{cases} \begin{vmatrix} 68 = \alpha 4 \\ 24 = \beta 4 \end{vmatrix} \rightarrow \begin{cases} \alpha = 17 \\ \beta = 6 \end{cases}$

5 - Sol general

$\begin{cases} x = x_0 + \beta k \\ y = y_0 - \alpha x \end{cases} \rightarrow \begin{cases} x = -400 + 6k \\ y = 1200 - 17k \end{cases}$ $k \in \mathbb{Z}$

6 - Comprobación

$k = 1$

$x = -400 + 6.1 = -394$

$y = 1200 - 17.1 = 1183$

$68x + 24y = 1600$

$68(-394) + 24(1183) = 1600$ → Correcto ✓

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Probamos para que salga una solución coherente. $(x \, e \, y > 0)$

$$\begin{cases} 0 < -400 + 6K \\ 0 < 1200 - 17K \end{cases} \rightarrow \begin{cases} \dfrac{400}{6} < K \rightarrow 66,66 < K \\ 17K < 1200 \rightarrow K < 70,58 \end{cases}$$

66 67 68 69 70 71
●───●───●───●───○
66,66   70,58

$K \in \{67, 68, 69, 70\}$

Posibles combinaciones lineales:

$K = 67$
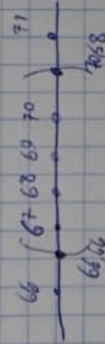
$$\begin{cases} x = -400 + 6(67) = 2 \\ y = 1200 - 17(67) = 61 \end{cases}$$

$6x + 24y = 1600$

$6(2) + 24(61) = 1600$

$68(2) + 24(61) = 1600$ //

$K = 68$

$$\begin{cases} x = -400 + 6(68) = 8 \\ y = 1200 - 17(68) = 44 \end{cases}$$

$68(8) + 24(44) = 1600$ //

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$K = 69$

$\begin{cases} x = -400 + 6(69) = 14 \\ y = 1200 - 17(69) = 27 \end{cases}$

$68(14) + 24(27) = 1600$ //

$K = 70$

$\begin{cases} x = -400 + 6(70) = 20 \\ y = 1200 - 17(70) = 10 \end{cases}$

$68(20) + 24(10) = 1600$ //

7- Resumen

$a = 68$

$b = 24$

$c = 1600$

$d = 4$

$n = 400$

$dn = 1600$

$s = -1$

$t = 3$

$ns = -400$

$nt = 1200$

$\alpha = 17$

$\beta = 6$

$\begin{cases} x = -400 + 6K \\ y = 1200 - 17K \end{cases}$

$K \in \{67, 68, 69, 70\}$

Posibles Combinaciones:

• 2 ladrillos de 68cm y 61 de 24cm

• 8 ladrillos de 68cm y 44 de 24cm

• 14 ladrillos de 68cm y 27 de 24cm

• 20 ladrillos de 68cm y 10 de 24cm