La portée de tir vaut :

$$y = 0$$

$$\Leftrightarrow \quad \frac{-g}{2 v_E^2 \cos^2 \beta} x^2 + (\tan\beta) x = 0$$

2 solutions :

- soit $x = 0 \Rightarrow$ point de lancer
- soit $x = x_p = 14$ donc $\frac{-g}{2 v_E^2 \cos^2\beta} x_p + \tan\beta = 0$

$$\frac{-g}{2 v_E^2 \cos^2\beta} x_p = -\tan\beta$$

$$x_p = \tan\beta \times \frac{2 v_E^2 \cos^2\beta}{g}$$

$$x_p = \frac{2 v_E^2 \cos\beta \sin\beta}{g}$$

$$x_p = \frac{v_E^2 \sin(2\beta)}{g}$$

$$x_p \times g = v_E^2 \sin(2\beta)$$

$$\sin(2\beta) = \frac{x_p \times g}{v_E^2}$$

$$2\beta = \arcsin\left(\frac{x_p \times g}{v_E^2}\right)$$

$$\beta = \frac{\arcsin\left(\frac{x_p \times g}{v_E^2}\right)}{2} = \frac{44,4}{2}$$

$$\beta_1 = 22,2^\circ$$

$$\beta_2 = 90 - 22,2 = 67,8^\circ$$