An arrow is thrown in air its time of flight is 5s;the range is 200m. Determine the vertical component of the velocity of projection, horizontal component, max height and angle made with the horizontal.

Solution:
Let:
$t = 5s$
$S = 200m$

$v_x-?$ $horizontal\ component\ of\ velocity$
$v_y-?$ $vertical\ component\ of\ velocity$
$H-?$ $max.\ height$
$\alpha-?$ $angle\ with\ the\ horizontal$

The time to rise and the time to slope are equal: $\frac{1}{2}t$

$$H = \frac{1}{2}g\left(\frac{1}{2}t\right)^2 = \frac{1}{2}9.8\left(\frac{1}{2}*5\right)^2 = \textbf{30.625}\boldsymbol{m}$$

$$S = v_x * t => v_x = {^S}/{_t}$$
$$v_x = \frac{200}{5} = \textbf{40}\ \boldsymbol{m/s}$$

$$H = v_y * \frac{1}{2}t => v_y = \frac{2H}{t}$$
$$v_y = \frac{2*30.625}{5} = \textbf{12.25}\ \boldsymbol{m/s}$$

$$\alpha = \text{arctg}\left(\frac{v_y}{v_x}\right) = arctg\left(\frac{12.25}{40}\right) = \textbf{17°}$$

Answer: $H = \textbf{30.625}\ \boldsymbol{m}, v_x = \textbf{40}\ \boldsymbol{m/s}, v_y = \textbf{12.25}\ \boldsymbol{m/s}, \alpha = \textbf{17°}$