An arrow shot on s flat surface at an angle of 57 at 95m/s, have to find range, time in air, max height, height after 10 secs, and what is the velocity at those 10 secs

Solution:

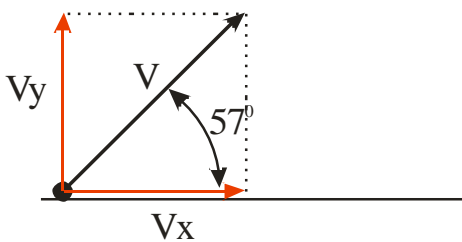Let:

$v = 95 \ m/s$

$t = 10 \ sec$

$\alpha = 57°$

$S-?, t_{total}-?, H-?, H_{(10)}-?, v_{(10)}-?$

$S = v_x * t_{(total)} = vt_{(total)}cos\alpha$

$t_{(total)} = 2\dfrac{v_y}{g} = 2\dfrac{vsin\alpha}{g}$

$t_{(total)=2*\frac{95*sin57°}{9.8}=16.26 \ sec}$

$S = 95 * 16.26 * cos57° = 841.3 \ m$

$H = \dfrac{1}{2}g(\dfrac{1}{2}t_{(total)})^2 = \dfrac{1}{2} * 9.8 * (16.26)^2 = 323.88 \ m$

After 10 sec an arrow will be in free falling such as the maximum height is at $t = 1/2t_{(total)} = 8.13 \ sec$

$v_{(10)} = g(10 - \dfrac{1}{2}t_{(total)}) = g * (10 - 8.13) = 18.33 \ m/sec$

$H_{(10)} = H - \dfrac{1}{2}g(10 - \dfrac{1}{2}t_{(total)})^2 = 306.75 \ m$

Answer:

$t_{(total)} = 16.26 \ sec, \ S = 841.3 \ m, \ H = 323.88 \ m, \ v_{(10)} = 18.33\dfrac{m}{sec}, \ H_{(10)} = 306.75 \ m$