A cannon is fired at 90 m/s and an angle of 40 degrees above the horizontal.

Find:
(a) The total time in the air
(b) Total horizontal distance (range)
(c) Maximum height of the projectile
(d) Height at 4 seconds
(e) Speed it hits the ground
(f) Velocity at the top
(g) Velocity at 7 seconds
(h) The time it has a height of 75 m

\[ V_x = 68.9 \text{ m/s} \]
\[ V_{oy} = 57.9 \text{ m/s} \]
\[ g = -9.8 \text{ m/s}^2 \]
a) \[ \frac{y}{V_{f,y} = 0 \ (T = 0)} \]
\[ V_f = at + V_0 \]
\[ 0 = -9.8t + 57.9 \]
\[ 5.85 = t \]
\[ \times 2 \]
\[ t = 11.7 \text{ sec} \]

b) \[ \sqrt{\frac{x}{t}} \]
\[ 68.9 \text{ m/s} = \frac{x}{11.8} \]
\[ x = 813 \text{ m} \]
c) \[ y = \frac{1}{2} \cdot (-9.8) \cdot (5.9)^2 + (57.5)(5.9) \]
   \[ dy = 171 \text{ m} \]

d) \[ dy = \frac{1}{2} \cdot (-9.8) \cdot (4)^2 + 57.5(4) \]
   \[ dy = 153.2 \text{ m} \]

\[ 90 \text{ m/s} \]
\[ V @ \text{top} = V_x \]

\[ V = 68.9 \text{m/s} \]

\[ v_f = v_i + at \]

\[ v_f = v_i + 6.75 \times (7 - 9.8) \]

\[ v_f = -10.7 \text{m/s} \]
h) $t = ?$

$by = 7.5\, m$

$7.5 = \frac{1}{2}(-9.8)t^2 + 57.9\, t$

$-4.96 + 57.9\, t - 7.5 = 0$

$t = 1.48\, s, 10.3\, s$