Answer on Question 49948, Physics, Mechanics — Kinematics — Dynamics A projectile is fired from ground level with a velocity of 500 m/s at 30 to the horizontal. Calculate its horizontal range, the greatest height it reaches, and the time taken to rise to that height.
Solution
Vertical initial speed is

$$v_{y0} = v_0 \sin\alpha = 500 \cdot \sin 30^\circ = 250\, m/s$$

Time it takes particle to reach highest point can be found from equation for velocity

$$v_y = v_{y0} - gt$$

At that point velocity is zero, hence

$$t_h = \frac{v_{y0}}{g} = \frac{500}{9.8} \approx 25.5\, s$$

The height itself is equal to

$$h = \frac{v_{y0}^2}{2g} \approx 3188.9\, m$$

Now we can find horizontal distance. It is equal to twice the time t_h multiplied by horizontal velocity

$$l = 2v_{x0}t_h = 2v_0 \cos\alpha \cdot t_h = 2 \cdot 500 \cdot \sin 30^\circ \cdot 25.5 \approx 22083.6\, m$$