Question 32258

Since the rocket rises with constant acceleration, directed upwards, the velocity at given moment of time is $v(t)=at$.

a) The y-coordinate of the rocket as a function of time is $y(t)=\frac{at^2}{2}$. Hence, for given y , time to move to it is $t_1=\sqrt{2\frac{y}{a}}$. Thus, according to first formula, at that moment of time velocity is $v=at_1=a\sqrt{\frac{2h}{a}}=\sqrt{2ha}$. This relation connects velocity with height and acceleration. Knowing that for $h=3.3m$ velocity is $v=28\frac{m}{s}$, obtain $a=\frac{v^2}{2h}=118.8\frac{m}{s^2}$.

b) Since $y(t)=\frac{at^2}{2}$, for $t=0.1s$, $y=118.8\cdot\frac{(0.1)^2}{2}=0.594m$.

c) Knowing that $v(t)=at$, for $t=0.1s$, $v=118.8\cdot 0.1=11.88\frac{m}{s}$.