$V = \frac{1}{3}\pi\left(\frac{25h^2}{196}\right)h = \frac{25\pi}{588}\cdot h^3$

$\frac{dV}{dt} = \frac{25\pi}{588}\cdot 3h^2 \cdot \frac{dh}{dt} = \frac{25\pi}{196}h^2\boxed{\frac{dh}{dt}}$

At $h=6$; get $-2 = \frac{25\pi}{196}(36)\cdot\frac{dh}{dt} \Rightarrow \frac{dh}{dt} = \frac{-2\times 196}{25\pi\times 36} = \frac{-98}{225\pi} \approx 0.1356.$

(b) Asking for $\frac{dr}{dt}$

$h = \frac{14}{5}r \iff r = \frac{5h}{14}$

$\frac{dr}{dt} = \frac{5}{14}\cdot\frac{dh}{dt} = \frac{5}{14}\left(\frac{-98}{225\pi}\right) = \frac{-7}{45\pi}$ //

Optimization: (A) Typically, goal is to "optimize" → max something good / min — " — bad

(B) want to achieve this goal within a special set of constants

- Identify goal
- write down the set of constraints clearly
- sketch a model
- Formulate a math model, solve using calculus

Eg) Suppose that a ball is thrown up in the air and its height after t seconds is $4+48t-16t^2$ ft. Determine how long it will take for the ball to reach its maximum height and determine this max height.

Ans