

## ASG v2 Ex 9.4

### (Descartes' Theory of falling bodies)

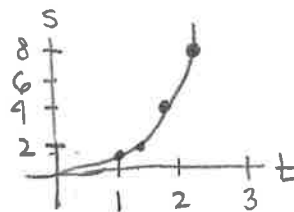
According to Descartes (1629) a body falls three times further during the second half of its descent than in the first half. In other words, the second half of the distance fallen will take only  $\frac{1}{3}$  of the time that the first half took. For example,

if it takes 1 second to fall 1 meter, then it will take

$\frac{4}{3}$  sec. to fall 2 meters and

$\frac{16}{9}$  sec to fall 4 meters and

$\frac{64}{27}$  sec to fall 8 meters



This can be expressed by saying the distance  $s(t)$  obeys the relationship  $s\left(\frac{4}{3}t\right) = 2 \cdot s(t)$ .

Interestingly, this recursive relationship has the solution

$$s(t) = s(1) \cdot t^{\frac{\log(2)}{\log(4/3)}}$$

This is not constant acceleration, since  $\frac{d^2 s(t)}{dt^2} \neq \text{constant}$ .