**3.1 Velocity**

**Remember**: The instantaneous velocity of an object is defined as the limit of average velocity over an ever-shortening time interval.

If the position function is $s=f\left(t\right)$, where $s$ is the displacement of the object from the origin at time $t$, then:

 $v= $

In other words:

If a stone is dropped from a cliff that is 175 m high, then its height in metres after *t* seconds is $h=175-4.9t^{2}$.

1. Find its velocity after 1 and 2 seconds.

1. When will the stone hit the ground?

1. With what velocity will it hit the ground?

The position function of a cheetah moving across level ground in a straight line chasing after prey is given by the equation $s\left(t\right)=t^{3}-15t^{2}+63t$ where $t$ is measured in seconds and *s* in metres.

1. What is the cheetah’s velocity after 1s? 4s?
2. When is the cheetah momentarily stopped?
3. What are the positions of the cheetah in part b)?
4. When is the cheetah moving in the positive direction? The negative direction?

1. Find the position of the cheetah after 10 seconds.
2. Find the total distance traveled by the cheetah during the first 10 seconds.