

3.4 Rectilinear Motion

Notes about motion along a straight line:

Given a function, $s(t)$ that is moving along a straight line...

Average velocity over the interval $[a,b]=$

Instantaneous velocity at time $t=$

+ velocity means _____ - velocity means _____

Instantaneous speed at time $t =$

Instantaneous acceleration at time $t=$

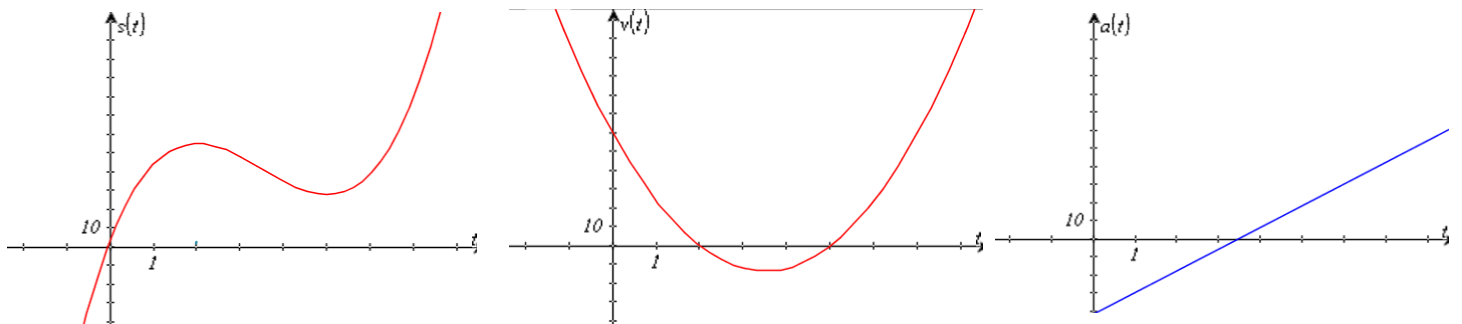
If velocity and acceleration have the same signs: _____

If velocity and acceleration have opposite signs: _____

If

- $v > 0, a > 0 \rightarrow$ moving in the positive direction and speeding up
- $v > 0, a < 0 \rightarrow$ moving in the positive direction and slowing down
- $v < 0, a > 0 \rightarrow$ moving in the negative direction and slowing down
- $v < 0, a < 0 \rightarrow$ moving in the negative direction and speeding up

Describe the motion of the particle shown in the graphs below.



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Example:

A particle is moving along the x -axis such that the distance from the origin is represented by $s(t) = 2t^3 - 21t^2 + 60t + 3$ for $t \geq 0$.

(a) When is the object moving to the left / right?

(b) When is the object speeding up? Slowing down?

(c) What is the average velocity over the first 5 seconds?

(d) What is the total distance traveled over the first 10 seconds?