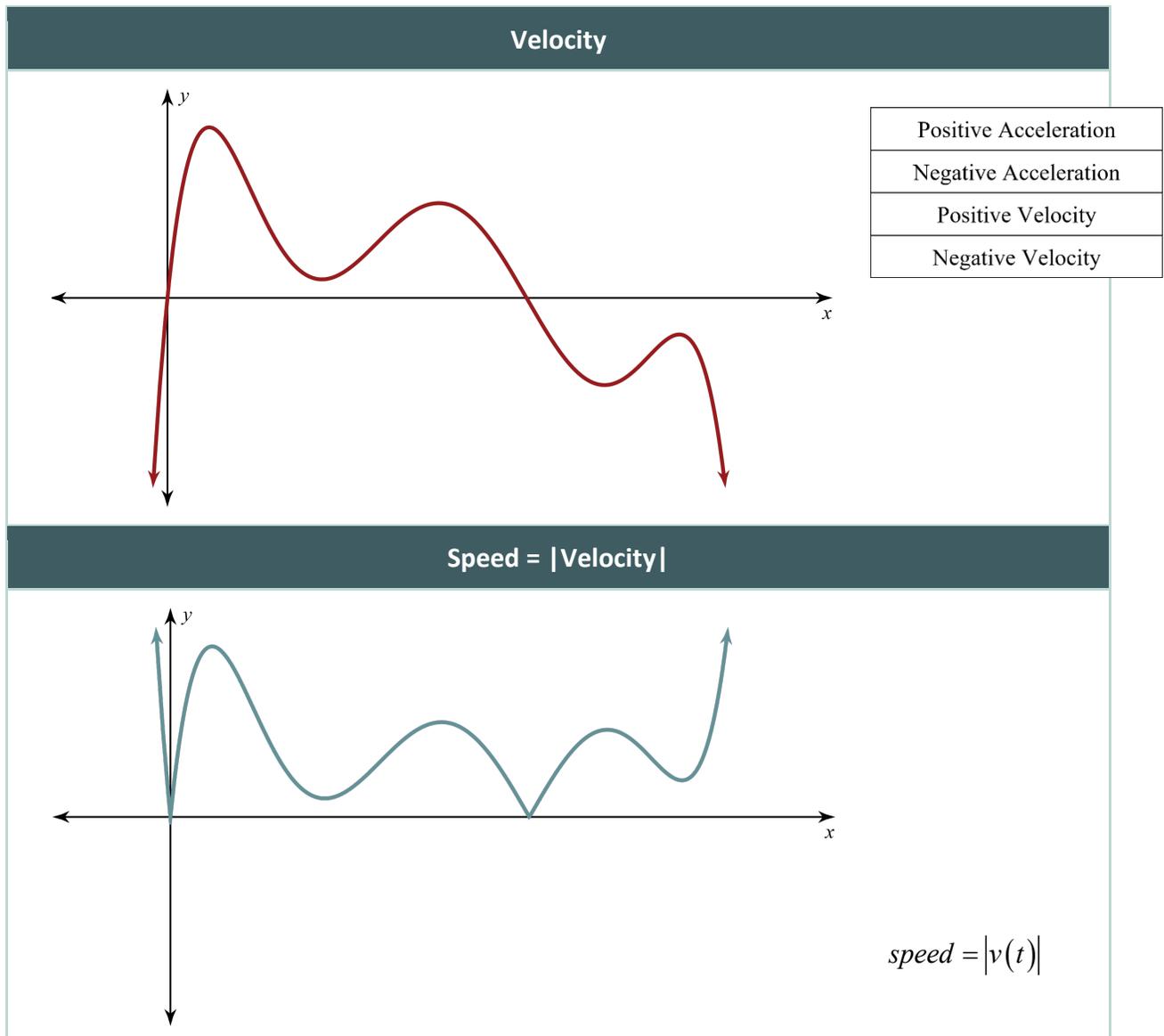


POSITION, VELOCITY, AND ACCELERATION: GUIDED NOTES

$s(t)$ = position function $s(t)$ = position

$v(t) = \frac{\Delta s}{\Delta t}$ as $\Delta t \rightarrow 0$ $s'(t) = v(t)$ = velocity

$a(t) = \frac{\Delta v}{\Delta t}$ as $\Delta t \rightarrow 0$ $s''(t) = v'(t) = a(t)$ = acceleration



Speed, on its own, measures how fast an object is traveling. Velocity represents both the speed and direction traveled.

Example Problems

The function $s(t) = 5 + \cos\left(\frac{\pi t}{2}\right)$ on the closed interval $[0, 3]$ models a particle's vertical motion along a line.

- 1) At what value(s) of t is $v(t) = 0$? Describe the particle's motion.
- 2) At what value(s) of t is $a(t) = 0$?
- 3) On what interval(s) is $v(t) > 0$? $v(t) < 0$?
- 4) On what interval(s) is $a(t) > 0$? $a(t) < 0$?
- 5) Based on these results, when is the particle speeding up on the time interval? When is the particle slowing down? Justify your answers.