Calculus 4.3 Key Points

Relationship of Position-Velocity-Acceleration:

Position: The location of an object - Units include meters (m), feet (ft), miles (mi)
Velocity: The rate of change of position - Units include meters per second $(\frac{m}{s})$, feet per minute $(\frac{ft}{min})$, miles per hour $(\frac{mi}{h})$
Acceleration: The rate of change of velocity - Units include meters per second per second $(\frac{\frac{m}{s}}{s}$ or $\frac{m}{s^2})$, feet per minute squared $(\frac{ft}{min^2})$, miles per hour squared $(\frac{mi}{h^2})$

Finding the slope of a position function tells us the velocity of an object and finding the slope of a velocity function tells us the acceleration of an object:

Derivative of
Position ➡ Velocity ➡ Acceleration

Finding the area under the curve of an acceleration function tells us the change in velocity of an object and finding the area under the curve of a velocity functions tells us the distance traveled by an object:

Integral of
Acceleration ➡ Velocity ➡ Position

Note: There can be an infinite number of antiderivatives of a function, represent by the $+ C$ when integrating. Taking the integral of a velocity function over an interval will give you the distance traveled by an object, but to find the object's position, you need a given position at a time to solve for the $+ C$ and find the position function. The same applies when integrating acceleration functions to find an object's velocity.