Particle Straight Line (Graphical): Ex Prob 3

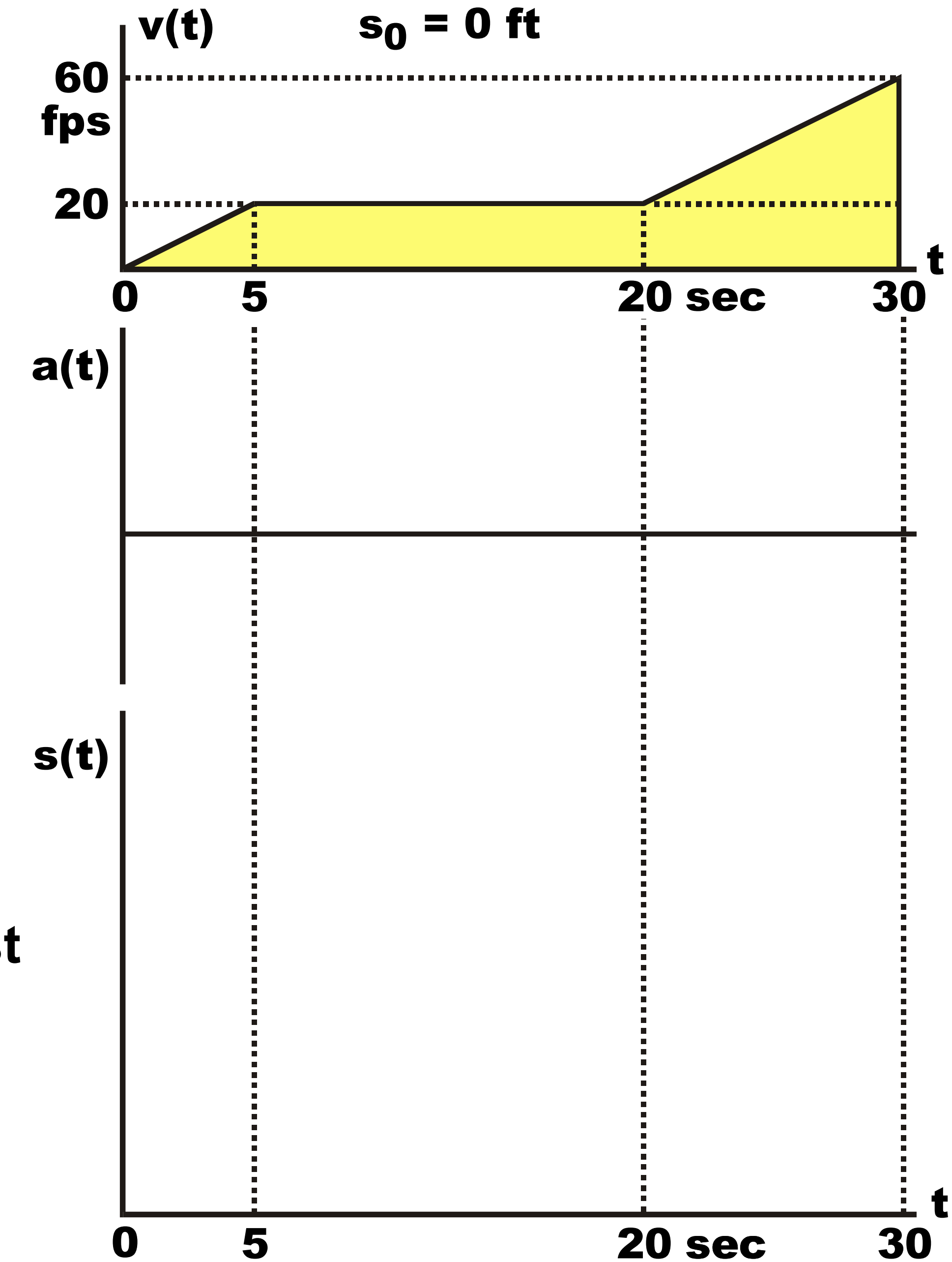
Given the v(t) graph at right, draw the a(t) and s(t) graphs.

Defining Eqns

① $a = \frac{dv}{dt}$

② $v = \frac{ds}{dt}$

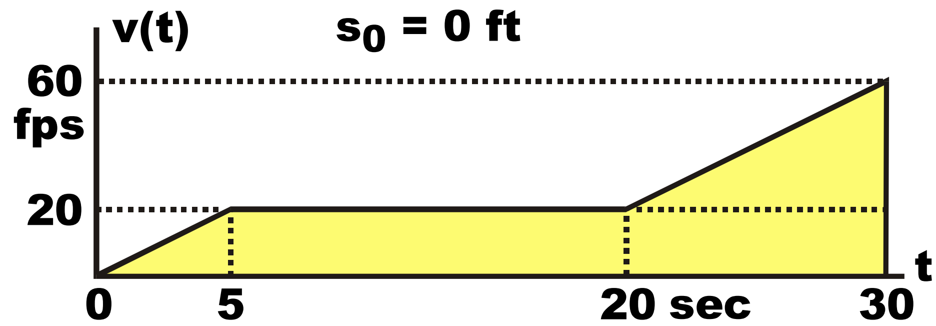
③ $a\,ds = v\,dv$



To work this problem, you must learn and be comfortable with the graphical interpretation of these defining equations.
(See the next page…)

A Graphical Problem

Understand the graphical interpretation of the defining kinematic equations!



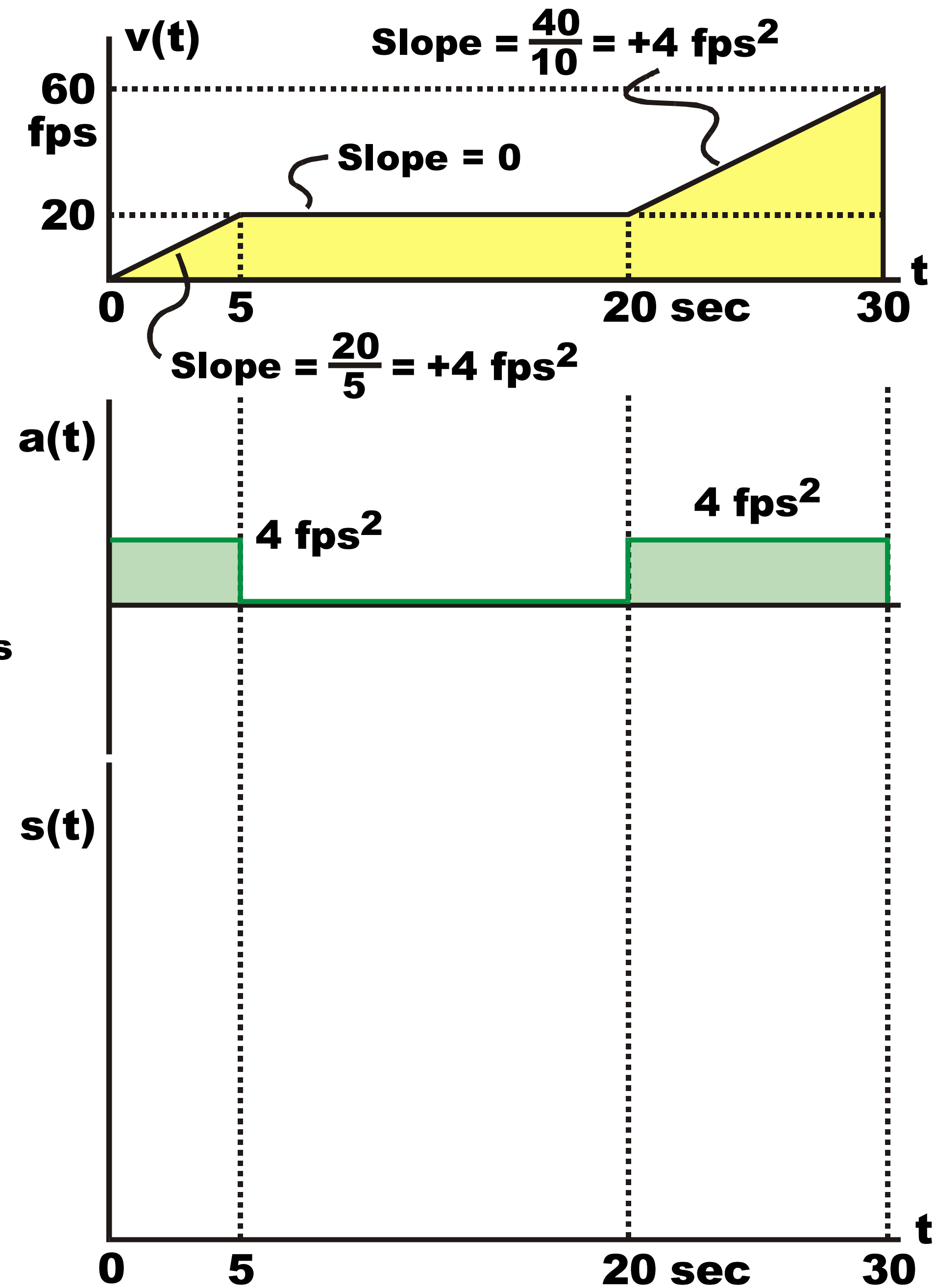
Graphical Interpretation of the Defining Eqns

$a = \dfrac{dv}{dt}$	At a point, the acceleration a = slope of the v(t) curve
$\Delta v = \int a\,dt$	Over an interval, the change in v Δv = area under the a(t) curve
$v = \dfrac{ds}{dt}$	At a point, the velocity v = slope of the s(t) curve
$\Delta s = \int v\,dt$	Over an interval, the change in s Δs = area under the v(t) curve

A Graphical Problem

Given the v(t) graph at right, draw the a(t) and s(t) graphs.

1. Accel = v(t) slopes…



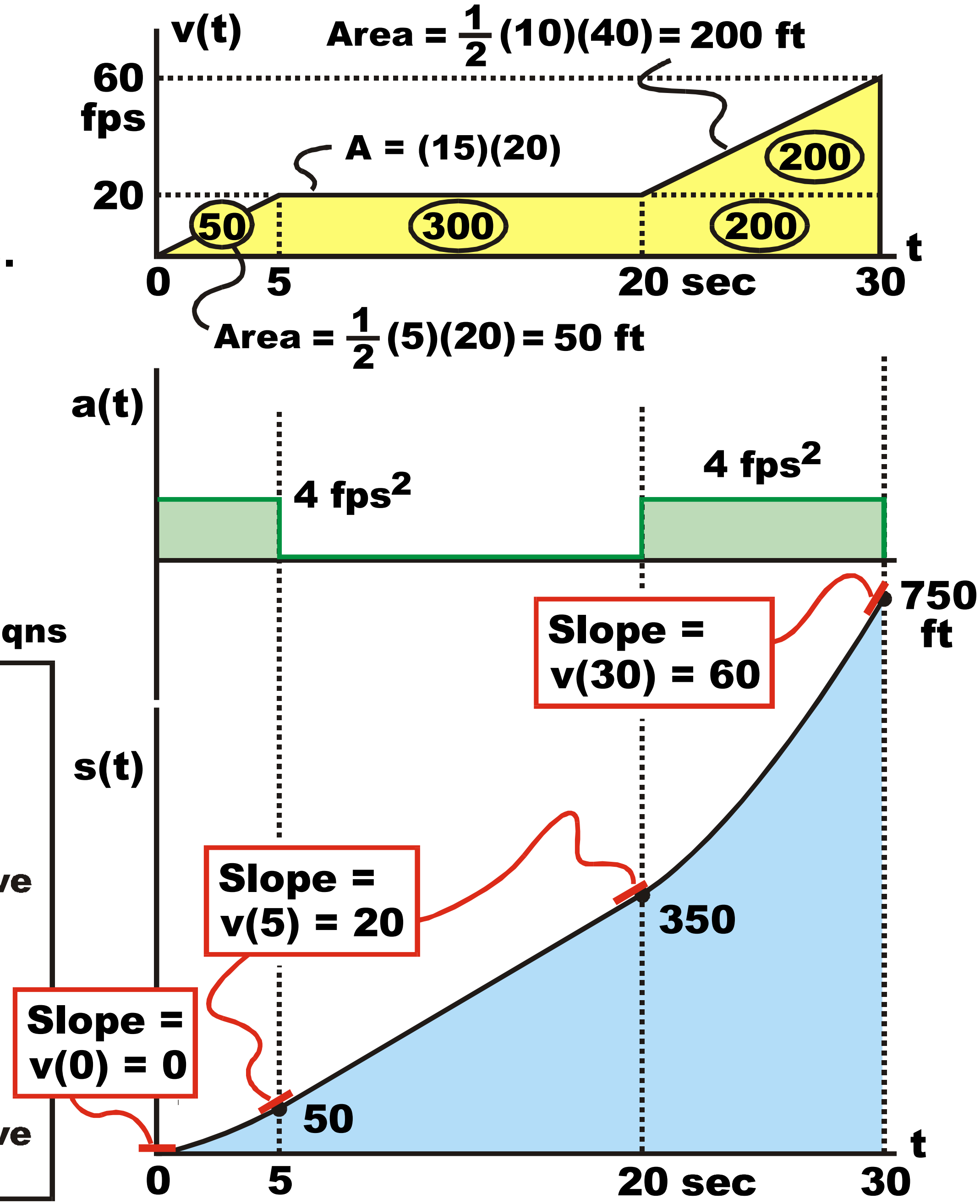
Graphical Interpretation of Defining Eqns

$a = \frac{dv}{dt}$	At a point, a = slope of v(t) curve
$\Delta v = \int a\,dt$	Over an interval, Δv = area under a(t) curve
$v = \frac{ds}{dt}$	At a point, v = slope of s(t) curve
$\Delta s = \int v\,dt$	Over an interval, Δs = area under v(t) curve

2. Find and label areas under the v(t) curve…

These are Δs over the 0-5, 5-20, and 20-30 time intervals.

3. The s(t) curve shapes come from the slopes. At a point, the *slope* of the s(t) curve = *v(t)* at that point.



Graphical Interpretation of Defining Eqns

$a = \dfrac{dv}{dt}$	At a point, a = slope of v(t) curve
$\Delta v = \int a\,dt$	Over an interval, Δv = area under a(t) curve
$v = \dfrac{ds}{dt}$	At a point, v = slope of s(t) curve
$\Delta s = \int v\,dt$	Over an interval, Δs = area under v(t) curve