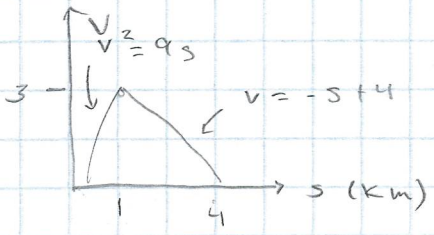
20-P-KM-AF-007

Rectilinear Erratic Motion: Advanced

Q: A hot air ballons motion is charted on the graph below. Graph this motion in a-s, v-t, s-t and write in the appropricate boxes below.

A:



a of s

$v = \sqrt{9s}$

$v = 3\sqrt{s}$

$a = dv/ds \Rightarrow \frac{3}{2\sqrt{s}}$

$v = -s + 4$

$a = -1$

s of t

$v^2 = 9s$

$v = 3\sqrt{s}$

$\int_0^t dt = \int_0^s ds/v$

$t = \int_0^s \frac{ds}{3\sqrt{s}}$

$t = \frac{2}{3}\sqrt{s}$

$\frac{9}{4}t^2 = s$

$v = -s + 4$

$\int_0^t dt = \int_0^s ds/v$

$t = \int_1^s \frac{ds}{-s+4}$

$t = -\ln(|s-4|) + \ln(3)$

$t - \ln(3) = -\ln|s-4|$

$\ln(3) - t = \ln(s-4)$

$e^{\ln(3)-t} = s-4$

$3e^{-t} + 4 = s$

v of t

↳ iderivate s of t

$s' = \left(\frac{9}{4}t^2\right)'$

$v = \frac{9}{2}t$

$s' = (3e^{-t} + 4)'$

$v = -3e^{-t}$

→ graph from $0 < t < 10$

~~20~~

20 - P - ISM - AF - 007