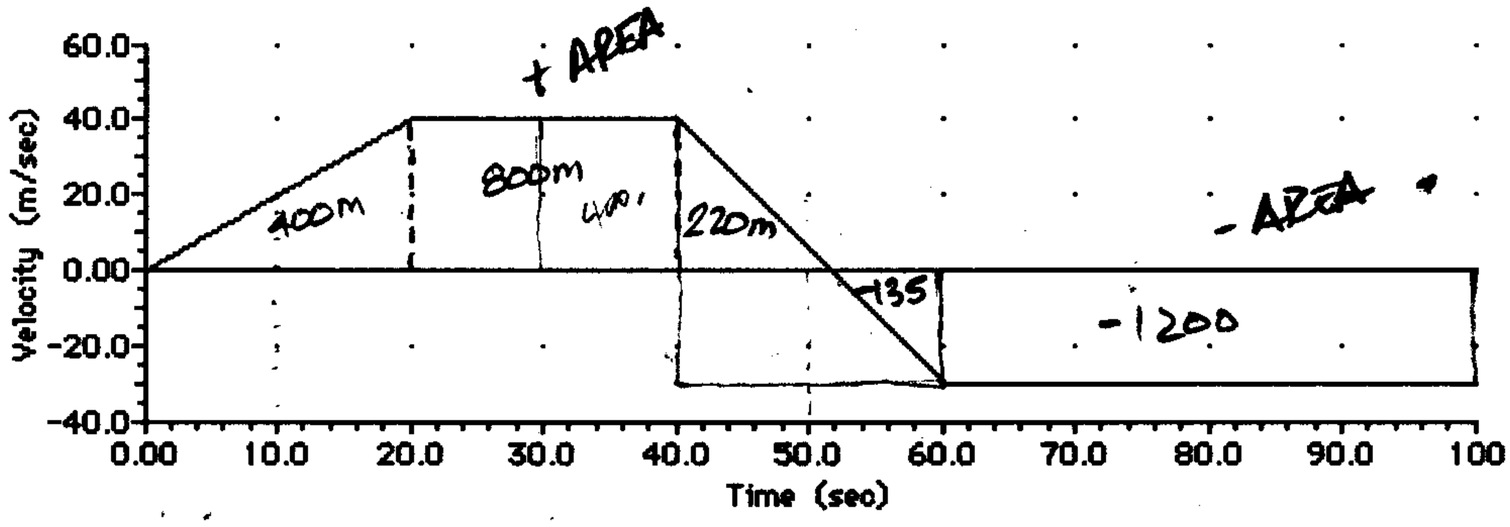
NAME: KEY **DATE:** _____ **PD:** _____
PHYSICS - Mr Smith

MORE ONE-DIMENSIONAL MOTION QUESTIONS.....

Show all work in the spaces provided to get credit for your answers, including all equations used and number with proper units.

1. Use the graph to answer the following questions.



a. What is the acceleration at 10.0 seconds? _____

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$ = slope of line @ 10s $= \frac{40.0\ m s^{-1}}{20.0\ s} =$ **$+2.00\ m/s^2$**

b. What is the acceleration at 50.0 seconds? _____

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$ = slope of line at 50s $= \frac{-30.0 - 40.0}{20.0\ s} = \frac{-70.0\ m s^{-1}}{20.0\ s} =$ **$-3.50\ m/s^2$**

c. Find the distance traveled during the first 20.0 seconds. _____

distance = area under graph. (above x-axis!)

$= vt$

$= \frac{1}{2}(40.0\ m s^{-1})(20.0\ s) =$ **400. m**

d. Find the displacement during the first 100.0 seconds. _____ 2 WAYS!

① $\vec{s} = \vec{v}_{AVE}\,\Delta t$

But you need $\vec{v}_{AVE}$ over each section of the graph... "weighted" for each time section. (TEDIOUS!)

② Total area between graph and x-axis... (See diagram)

0-51s:

$AREA_1 = 400 + 800 + 220 = 1420\ m$

$AREA_2 = -135 + -1200 = -1335\ m$

$AREA_1 + AREA_2 =$ **$+85\ m$**

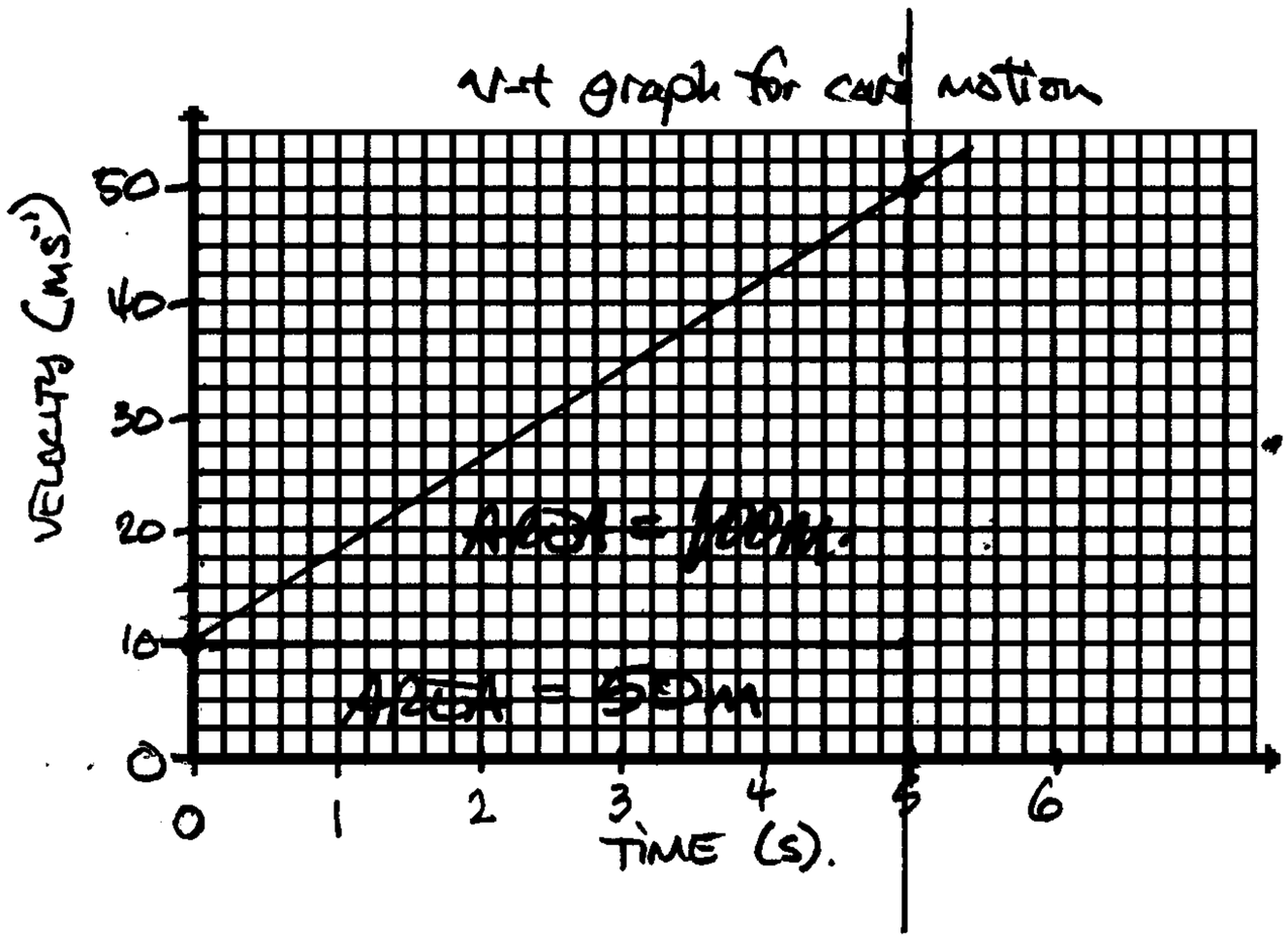
e. Find the displacement from 30.0 seconds to 40.0 seconds. _____

FROM GRAPH, **$\vec{s} = +400.\ m.$**

straight line.

2. A car is traveling 10.0 m/s at a time of 0.00 seconds. The car accelerates at a uniform rate to a speed of 50.0 m/s in a time of 5.00 seconds.

a. Sketch a velocity-time graph for this motion. Clearly label the axes.



b. What is the acceleration of the car? _____

$\vec{a} = \frac{\Delta \vec{v}}{\Delta t}$ = slope of vt graph $= \frac{\vec{v}_f - \vec{v}_i}{t_f - t_i} = \frac{50.0\,ms^{-1} - 10.0\,ms^{-1}}{5.00\,s} = \boxed{+8.00\,m/s^2}$

c. What is the average velocity of the car? _____

$\vec{v}_{AVE} = \frac{\vec{v}_f + \vec{v}_i}{2}$ since constant acceleration $= \frac{50.0\,ms^{-1} + 10.0\,ms^{-1}}{2} = \boxed{+30.0\,m/s}$

d. What distance is traveled during the first 5.00 second interval? _____

$s = \Delta v \Delta t$ = AREA under graph 0 → 5 s. $= 50.0\,m + 100.\,m = \boxed{150.\,m}$

OR: $s = v_{AVE}\Delta t = \left(\frac{50.0\,ms^{-1} + 10.0\,ms^{-1}}{2}\right) 5.00\,s.$
$= (30.0\,ms^{-1})(5.00\,s) = \boxed{150.\,m}$ ✓

e. What distance is traveled during the first second? _____

AREA UNDER GRAPH:

$10m + 4m \approx \boxed{14.0m.}$ (approx)

OR: $s = v_{AVE}\Delta t = \left(\frac{18.0\,ms^{-1} + 10.0\,ms^{-1}}{2}\right) 1.00\,s.$
$= \boxed{14.0m.}$ ✓

* Note importance of bringing y-axis to ~~zero~~ if using area-under-the-graph-method for determining "s"!