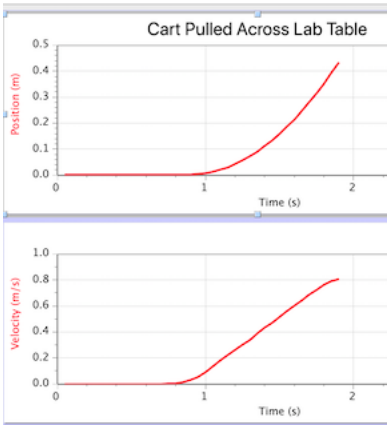
ABRHS PHYSICS (CP) NAME: KEY

Average Velocity

A cart was pulled across a lab table and recorded with Logger Pro and a motion detector, making the position and velocity graphs shown to the right. As usual, the cart was held for about 1 second before it was released.



1. Is the position graph a line or a curve? What does this mean about the motion?

Curve! Therefore the velocity is NOT constant. (In fact, this is speeding up.)

2. Is the velocity graph a line or a curve? What does this mean about the motion?

Line! That means the acceleration is constant! The slope of the velocity graph is the acceleration

3. Was the position, velocity or acceleration of the cart constant while being pulled across the table? How do you know?

constant acceleration.

You should have a sheet that shows the graphs with the values of the graphs shown for four different times. Record the numbers from the graphs below.

	Graph 1	Graph 2	Graph 3	Graph 4
Time (s)	1.00	1.25	1.50	1.75
Position (m)	.007	.057	.159	.315
Velocity (m/s)	.091	0.301	.515	.725

4. a. Between Graphs 1 and 3, how far did the cart move? How long did that take?

.159 - .007 = .152 meters 1.5 - 1.0 = .5 seconds

d = .152 meters t = .5 seconds

b. So what was the average velocity of the cart between Graph 1 and Graph 3?

$\bar{v} = \frac{d}{t} = \frac{.152}{.5} =$ .304

average velocity = .304 meters/second

Average Velocity

5. a. Between Graphs 2 and 4, how far did the cart move? How long did that take?

.315 - .057 1.75-1.25

d = .258 meters t = .5 seconds

b. So what was the average velocity of the cart from Graph 2 to Graph 4?

$\bar{V} = \frac{d}{t} = \frac{.258}{.5} =$

average velocity = .516 meters/second

Now to hopefully notice some things!

6. How does the average velocity between the times t = 1 and t = 1.5 (question 4) compare the velocity at t = 1.25?

.304 m/s = .301 m/s The same!

7. How does the average velocity between the times t = 1.25 and t = 1.75 (question 5) compare the velocity at t = 1.5?

.516 m/s = .515 m/s The same!

8. How does the average velocity between the times t = 1 and t = 1.5 (question 4) compare to the average of the velocities at t = 1 and t = 1.5?

$\frac{.091 + .515}{2}$ = .303 m/s The same!

9. How does the average velocity between the times t = 1.25 and t = 1.75 (question 5) compare to the average of the velocities at t = 1.25 and t = 1.75?

$\frac{.301 + .725}{2}$ = .513 m/s The same!

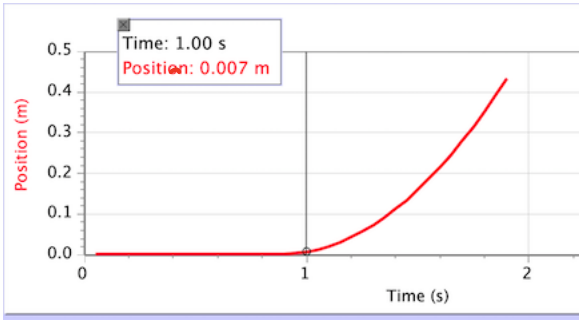
10. What is the old and NEW equation for average velocity?

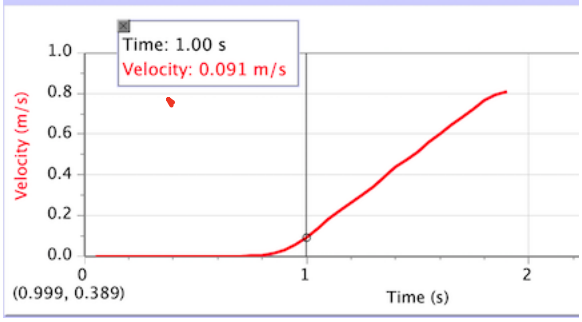
OLD

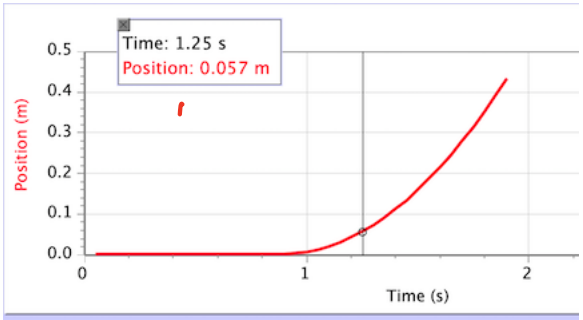
$\bar{V} = \frac{d}{t}$

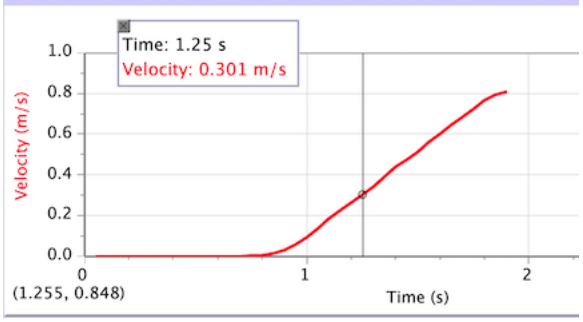
NEW

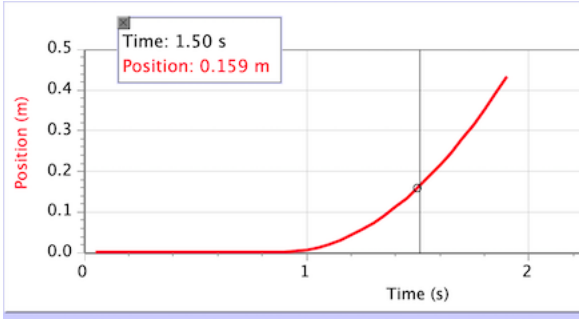
$\bar{V} = \frac{V_i + V_f}{2}$

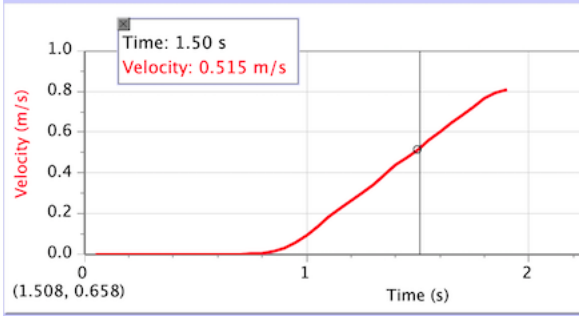

Time: 1.00 s
Position: 0.007 m
Position (m)
Time (s)

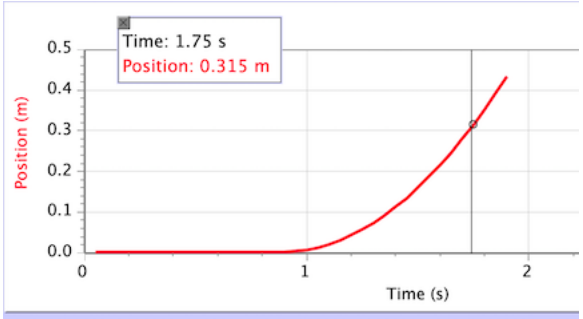

Time: 1.00 s
Velocity: 0.091 m/s
Velocity (m/s)
Time (s)
(0.999, 0.389)

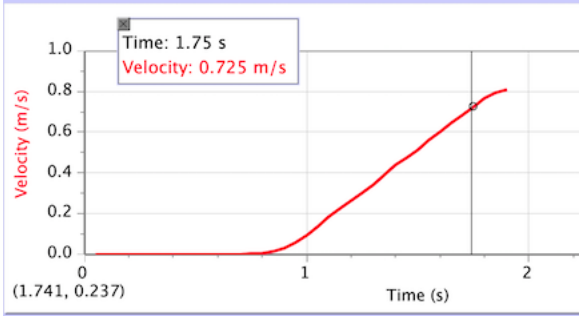

Time: 1.25 s
Position: 0.057 m
Position (m)
Time (s)


Time: 1.25 s
Velocity: 0.301 m/s
Velocity (m/s)
Time (s)
(1.255, 0.848)


Time: 1.50 s
Position: 0.159 m
Position (m)
Time (s)


Time: 1.50 s
Velocity: 0.515 m/s
Velocity (m/s)
Time (s)
(1.508, 0.658)


Time: 1.75 s
Position: 0.315 m
Position (m)
Time (s)


Time: 1.75 s
Velocity: 0.725 m/s
Velocity (m/s)
Time (s)
(1.741, 0.237)