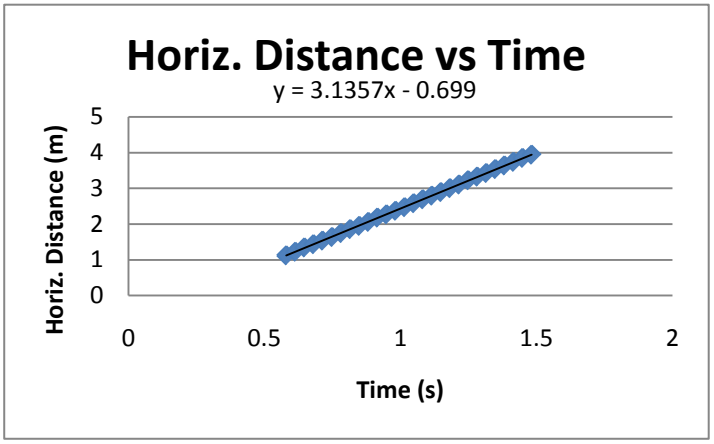
Trajectory Lab

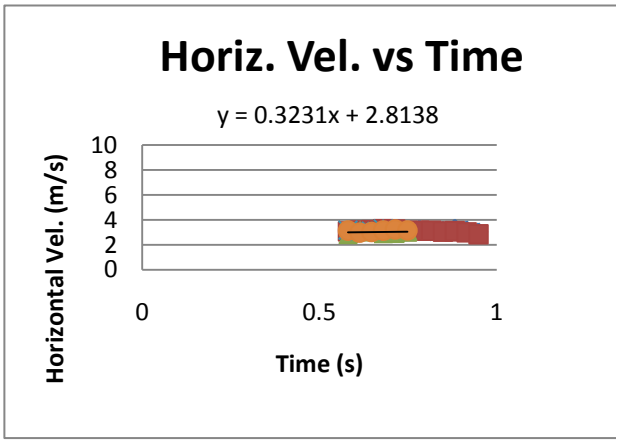
Note the Trajectory Lab Handout that explains how to download a movie from Logger Pro 3.8 and collect the dat

Here is Mr. Konichek's Data Collected from the Logger Pro Basketball Shot movie.

Below is the four graphs made from this data and the analysis of the data.

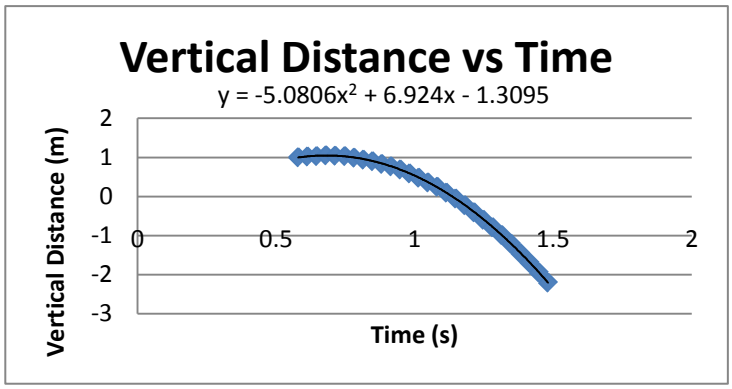
| time (s) | X-Position (m) | Y-Position (m) | X-Velocity (m/s) | Y-Velocity (m/s) |
|---|---|---|---|---|
| 0.58 | 1.1256139 | 1.0050124 | 2.88941075 | 0.73700912 |
| 0.613333 | 1.2261152 | 1.0251127 | 3.14066386 | 0.50250622 |
| 0.646667 | 1.3467167 | 1.0351628 | 3.10307972 | 0.36815848 |
| 0.68 | 1.4371678 | 1.0552631 | 2.96452777 | 0.09188517 |
| 0.713333 | 1.537669 | 1.0452129 | 2.98662572 | -0.31278258 |
| 0.748333 | 1.6381703 | 1.0351628 | 3.0848758 | -0.74863036 |
| 0.781667 | 1.7487216 | 0.9949623 | 3.19065557 | -1.20852463 |
| 0.815 | 1.859273 | 0.9447117 | 3.09435854 | -1.40514859 |
| 0.848333 | 1.9497241 | 0.9045112 | 3.11553855 | -1.66664562 |
| 0.881667 | 2.0602755 | 0.8341603 | 3.28304063 | -1.94302404 |
| 0.915 | 2.180877 | 0.7738596 | 3.14903897 | -2.21940246 |
| 0.948333 | 2.2713281 | 0.6934586 | 2.989912 | -2.68840827 |
| 0.981667 | 2.3718294 | 0.5929573 | 3.04016262 | -3.09878835 |
| 1.015 | 2.4723306 | 0.482406 | 3.14903897 | -3.40029208 |
| 1.048333 | 2.582882 | 0.3618045 | 3.23279 | -3.58454436 |
| 1.081667 | 2.6934333 | 0.2512531 | 3.16578917 | -3.96979912 |
| 1.115 | 2.7939346 | 0.1005012 | 3.09041324 | -4.45555514 |
| 1.148333 | 2.8944358 | -0.0502506 | 3.14903897 | -4.8408099 |
| 1.181667 | 3.0049872 | -0.2211027 | 3.19091449 | -5.23443977 |
| 1.215 | 3.1054884 | -0.402005 | 3.26629042 | -5.5275684 |
| 1.248333 | 3.2260899 | -0.5929573 | 3.24954021 | -5.73694599 |
| 1.281667 | 3.3265912 | -0.7839097 | 3.11553855 | -5.97144889 |
| 1.315 | 3.4270924 | -0.9849122 | 3.14066386 | -6.37345387 |
| 1.348333 | 3.5376438 | -1.2060149 | 3.13228876 | -6.85083478 |
| 1.381667 | 3.638145 | -1.4472179 | 3.07366303 | -7.18583892 |
| 1.415 | 3.7386463 | -1.6884209 | 3.10046337 | -7.39689153 |
| 1.448333 | 3.8491976 | -1.939674 | 3.01503731 | -7.60040655 |
| 1.481667 | 3.9396488 | -2.2009772 | 2.86428544 | -7.73859576 |

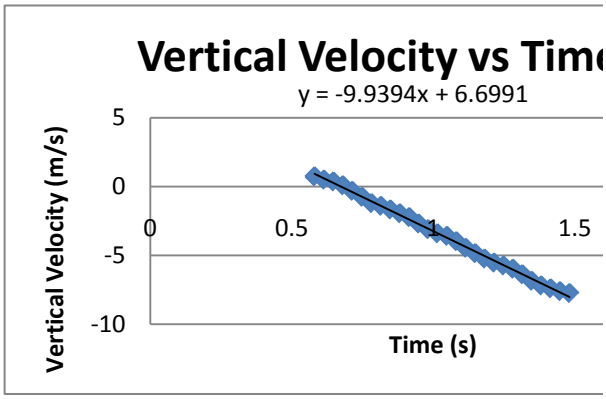


Note in the above graph that the slope of a distance/time graph is velocity. This graph shows that the horizontal velocity is a constant 3.13 m/s.

Again the above graph shows a const
as the slope of a vel./time graph shov
and the acceleration is near zero (.32
the above graph.
Horizontally following Newton's 1st L




The above graph shows the velocity is changing as the slope is changing.

If you are in calculus the 1st derivitive is -10.16 t + 6.9 for any time t, thus vertical velocity is changing with time.

If you are in calculus the 2nd derivitive is -10.16 which is the acceleration in the vertical direction.

To calculate the % error I would have to take (10.16-9.8)/9.8 * 100%

3.673469 % error which is less than 10% so is OK

Again the slope of a vel./time graph is
Thus my above graph i
the vertical acceleratio
For non-calculus stude
=(9.9394-9.
1.422449
under 2% t

The graphs show the independence of the horizontal & vertical components because the horizontal component is not accelerating (following Newton's 1st law) whereas at the same instant in time the vertical comp velocity is accelerating (following Newton's 2nd law) not carrying what the horizontal component is doing. Indep

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vs acceleration
m/s/s) in

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n is -9.9394 m/s/s
nts that makes my error
.8)/9.8 * 100%
% error which is
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