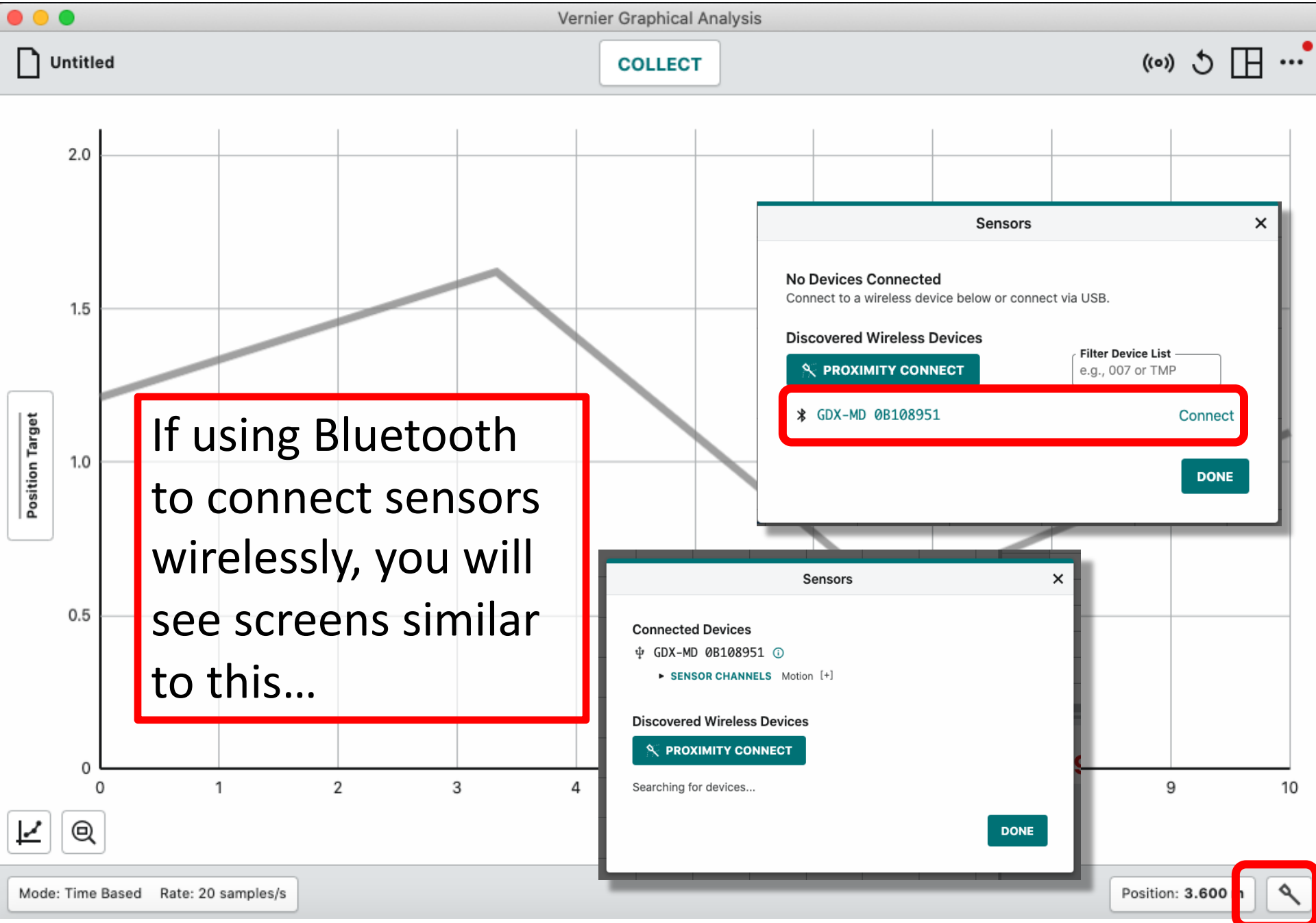
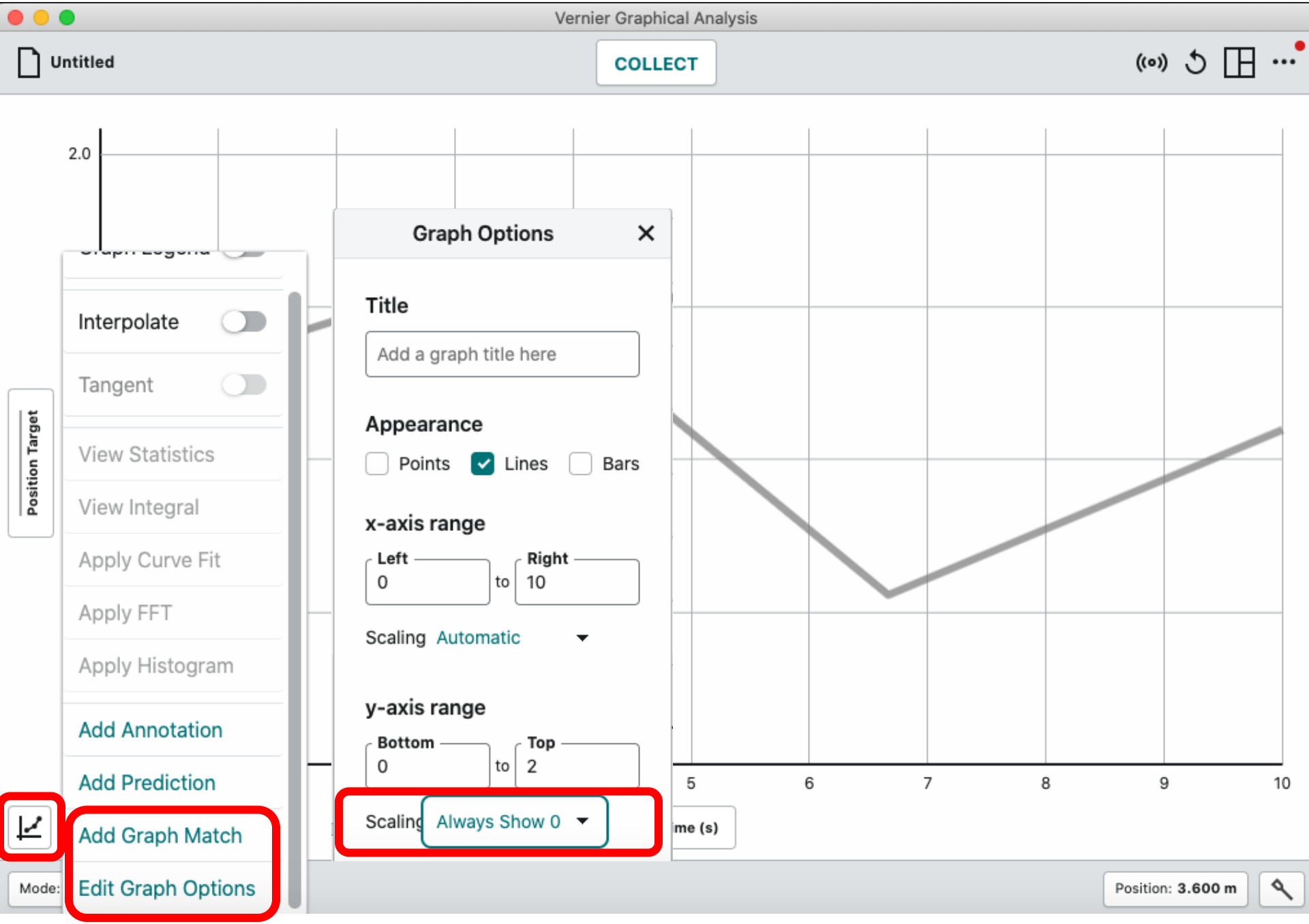
Motion Graph Matching

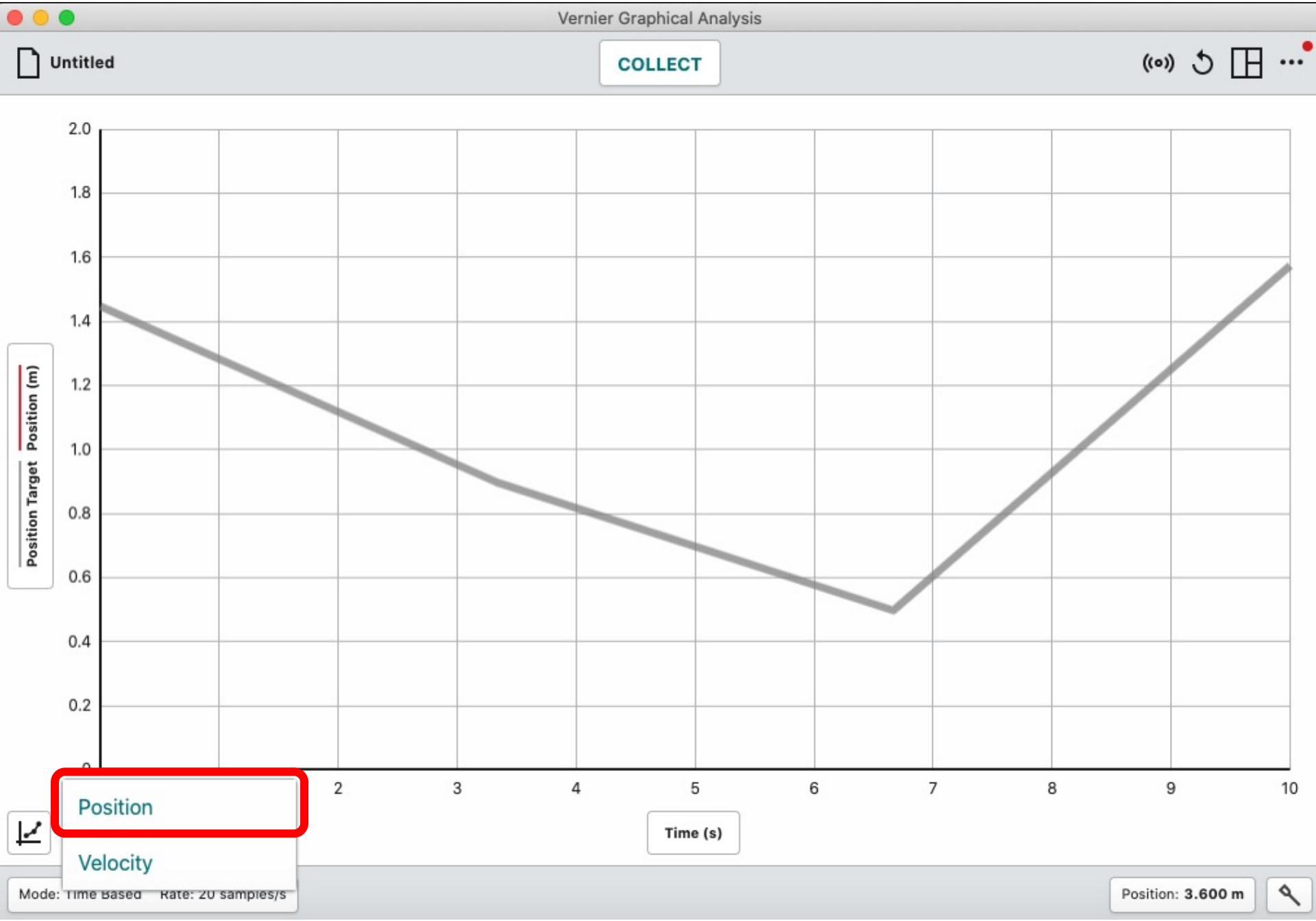
- Goal: gain experience with graphs of motion and kinematics concepts.
- Groups of 3 or 4 students.
- Connect GoDirect Motion Detector to laptop. Follow the directions given below…
- Spread out and make sure sound can reflect only off of moving student.

1. Connect GoDirect Motion detector to Graphical Analysis – either by Bluetooth (check unit ID number) or USB cable. You should hear it clicking.
2. Under the Graph Options menu:
   (a) choose Edit Graph Options and under Scaling choose Always Show Zero.
   (b) choose Add Graph Match, Position.
3. Click on the Collect button with a student moving along a line directly in front of the sensor. Repeat the experiment until you get a close match with the gray "Position Target" line segments.
4. Once you have a satisfactory match, discuss what the Velocity and Acceleration graphs should look like. Then use the "window" menu to display two graphs and compare Velocity to Position and then Acceleration to Velocity.

5. Under the Graph Options menu choose Add Prediction, and draw a parabolic curve on the Position Graph. Once again try to move in front of the sensor to Collect Data that matches. Repeat until you have a satisfactory match and then compare with Velocity and Acceleration.
6. Use the Add Prediction feature to draw a straight diagonal line on the Veloicty Graph. Get your best match and compare all three graphs.
7. Every time you collect data the trial is saved as a Data Set. You can click on the y-axis to view different data sets.
8. Share the data and save the file to each student's laptop so everyone has a copy. This is done using the "Host a data sharing session" button (looks a little like a WiFi symbol).
9. Pick your best or most interesting motion and be prepared to share…


Vernier Graphical Analysis
Untitled
COLLECT
Position Target
2.0
1.5
1.0
0.5
0
0
1
2
3
4
9
10
If using Bluetooth to connect sensors wirelessly, you will see screens similar to this…
Sensors
No Devices Connected
Connect to a wireless device below or connect via USB.
Discovered Wireless Devices
PROXIMITY CONNECT
Filter Device List
e.g., 007 or TMP
GDX-MD 0B108951
Connect
DONE
Sensors
Connected Devices
GDX-MD 0B108951
SENSOR CHANNELS Motion [+]
Discovered Wireless Devices
PROXIMITY CONNECT
Searching for devices...
DONE
Mode: Time Based Rate: 20 samples/s
Position: 3.600

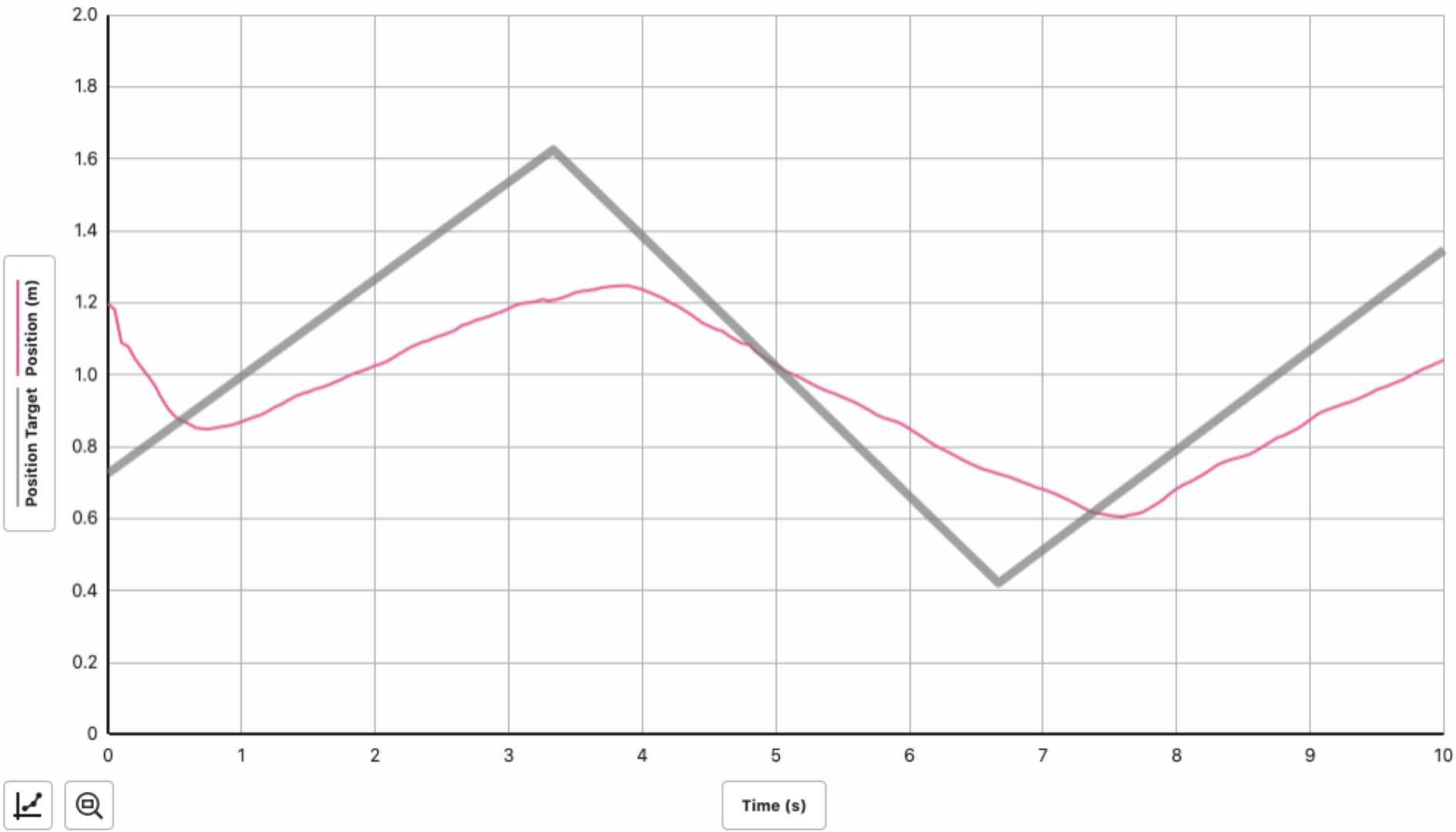

Vernier Graphical Analysis
Untitled
COLLECT
2.0
Position Target
Interpolate
Tangent
View Statistics
View Integral
Apply Curve Fit
Apply FFT
Apply Histogram
Add Annotation
Add Prediction
Add Graph Match
Edit Graph Options
Graph Options
Title
Add a graph title here
Appearance
Points
Lines
Bars
x-axis range
Left
0
to
Right
10
Scaling Automatic
y-axis range
Bottom
0
to
Top
2
Scaling
Always Show 0
5
6
7
8
9
10
me (s)
Mode:
Position: 3.600 m


Vernier Graphical Analysis
Untitled
COLLECT
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
Position (m)
Position Target
2
3
4
5
6
7
8
9
10
Time (s)
Position
Velocity
Mode: Time Based
Rate: 20 samples/s
Position: 3.600 m

Vernier Graphical Analysis

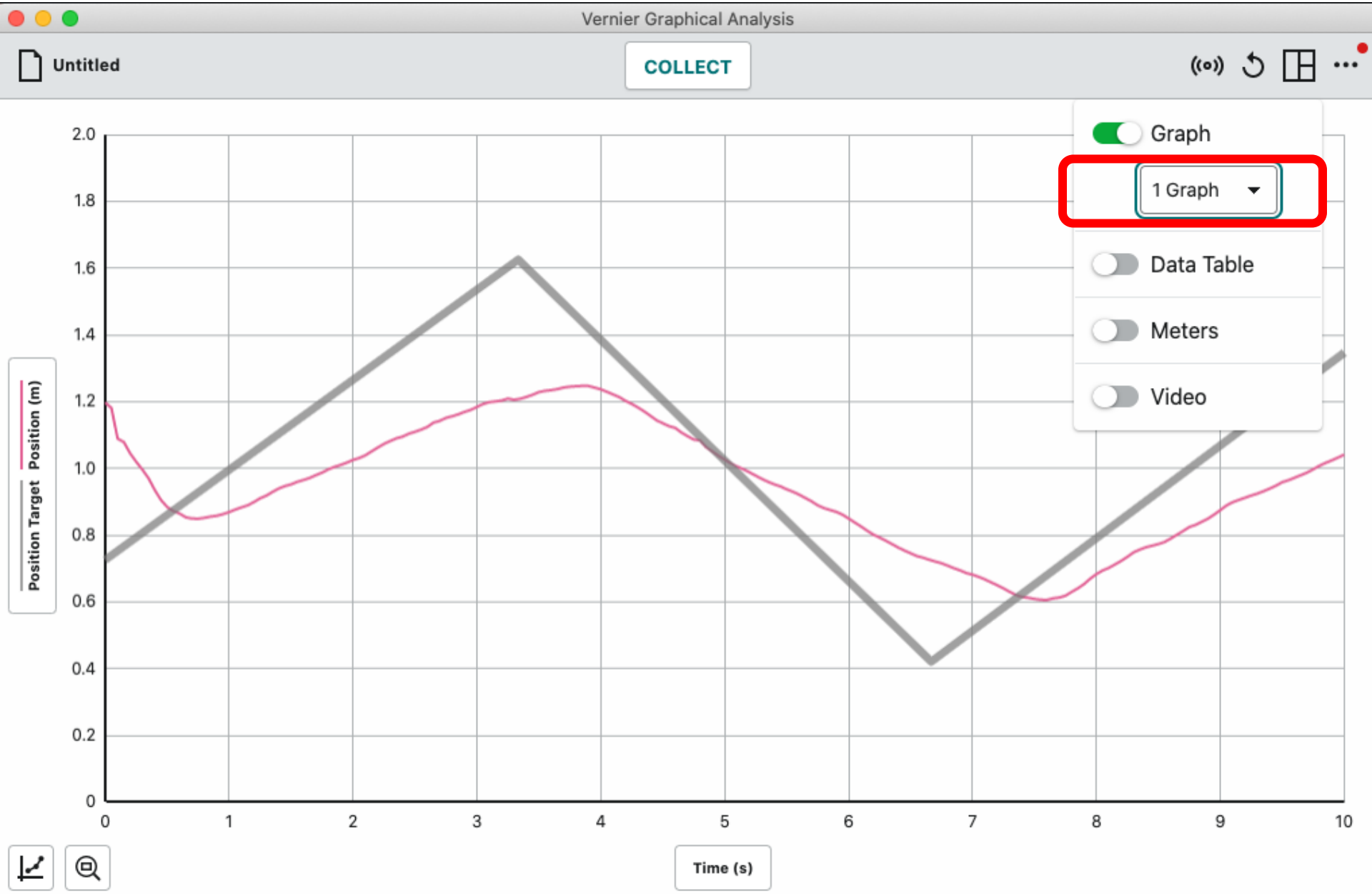
Untitled

COLLECT



Mode: Time Based Rate: 20 samples/s

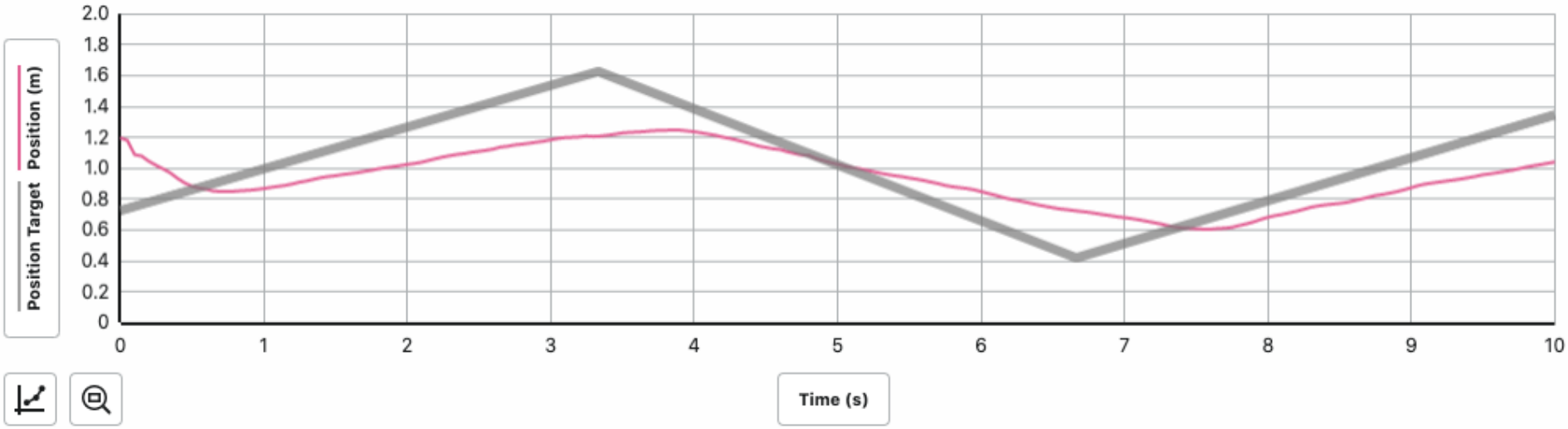
Position: **3.600 m**

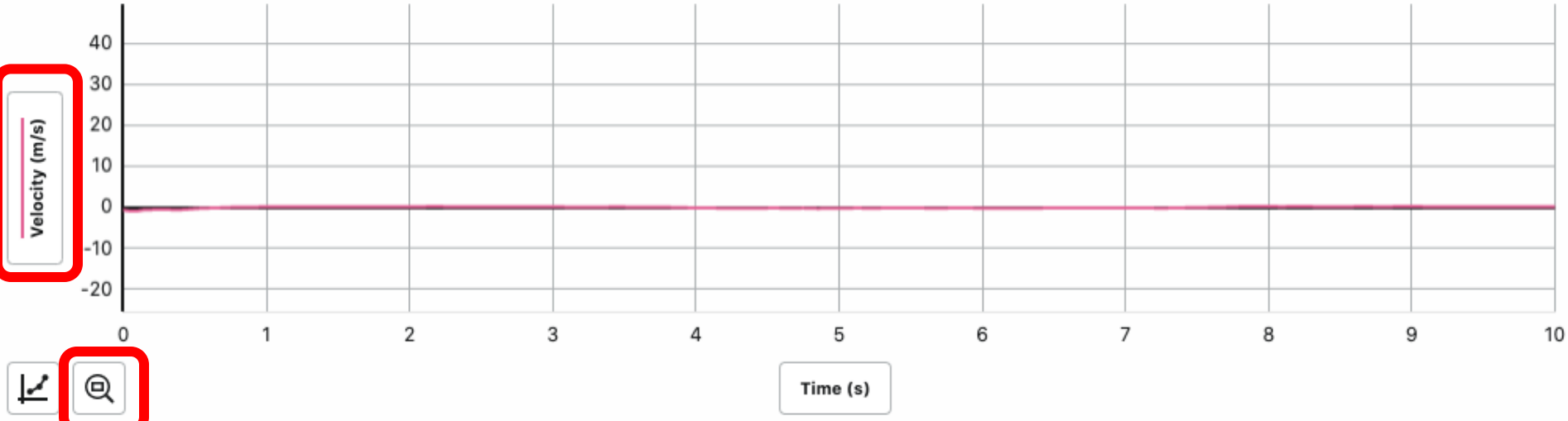

Vernier Graphical Analysis
Untitled
COLLECT
Graph
1 Graph
Data Table
Meters
Video
Position (m)
Position Target
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
1
2
3
4
5
6
7
8
9
10
Time (s)
Mode: Time Based
Rate: 20 samples/s
Position: 3.600 m

Vernier Graphical Analysis

Untitled

COLLECT





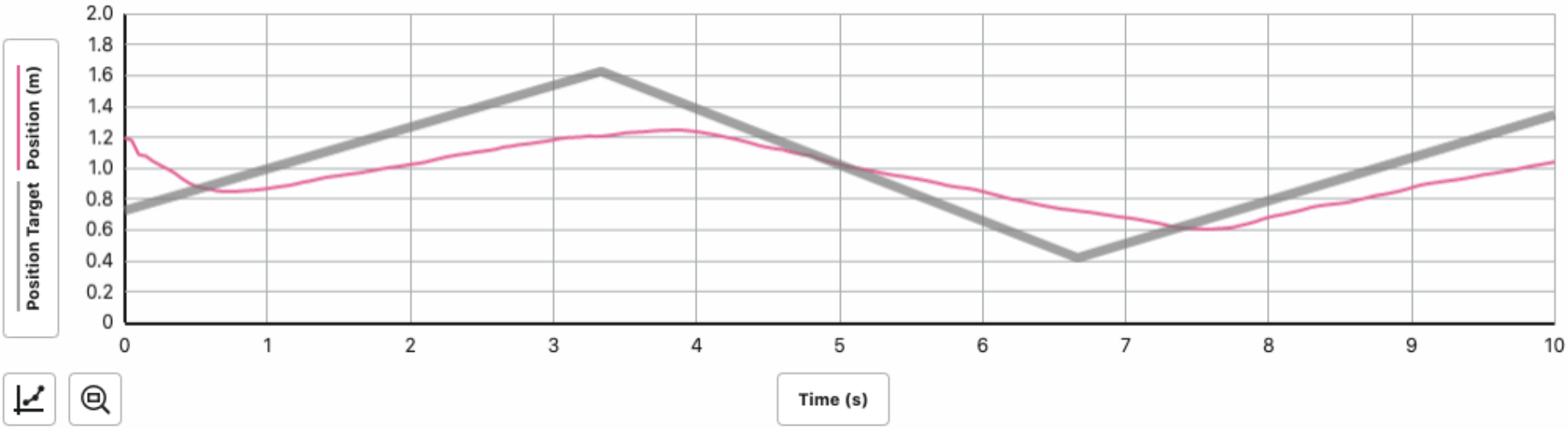
Mode: Time Based Rate: 20 samples/s

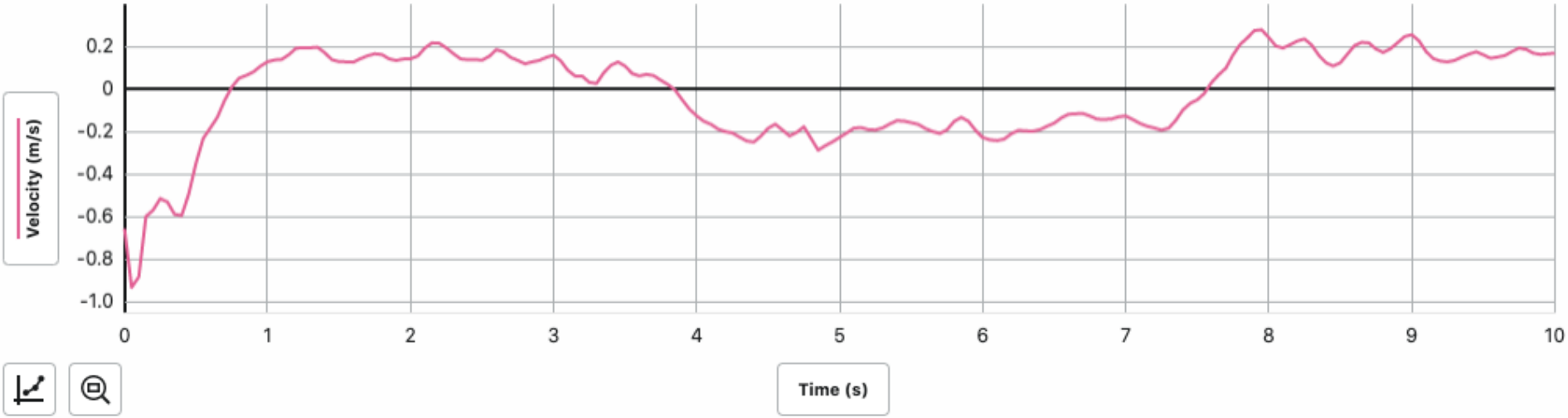
Position: **3.600 m**

Vernier Graphical Analysis

Untitled

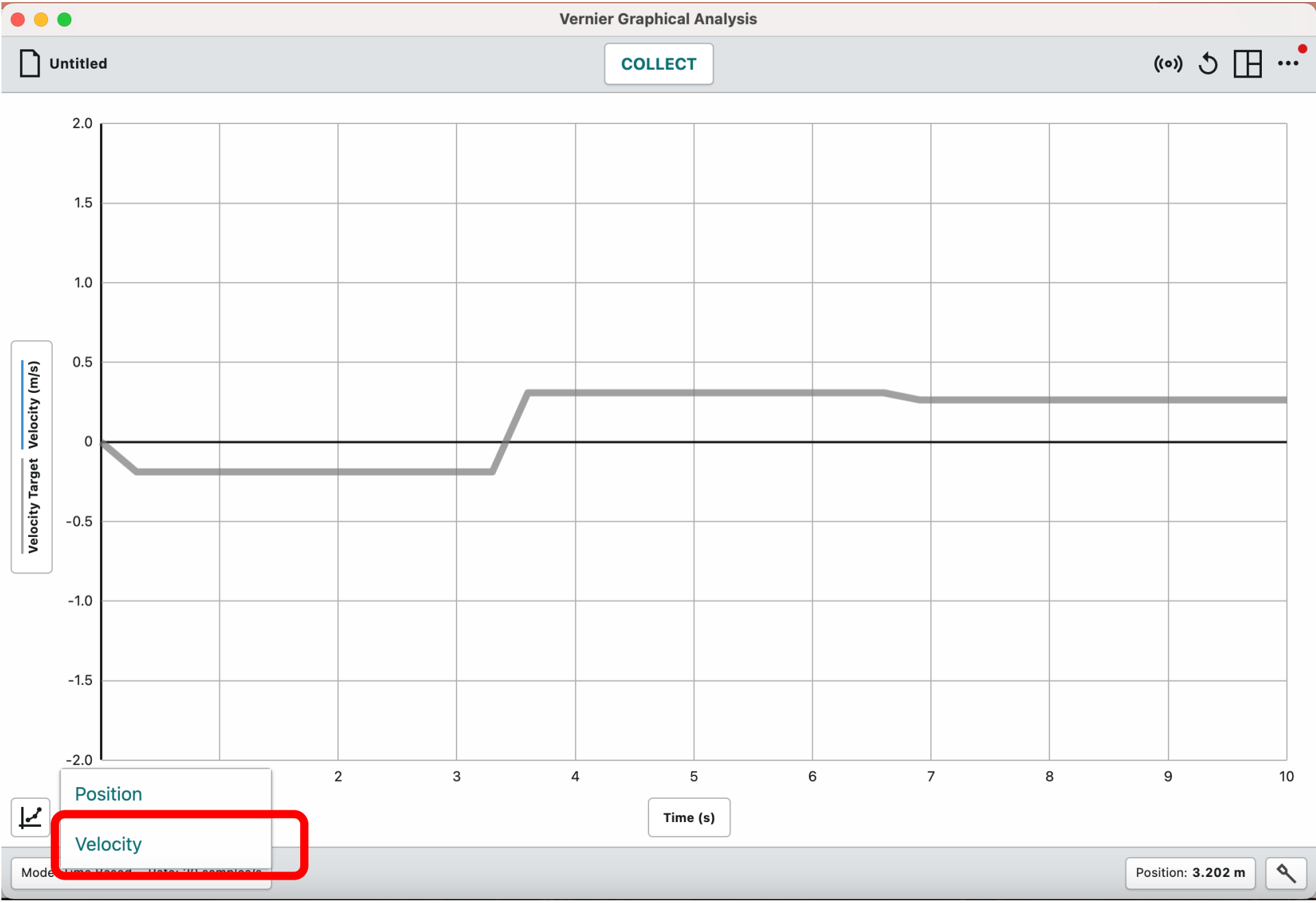
COLLECT

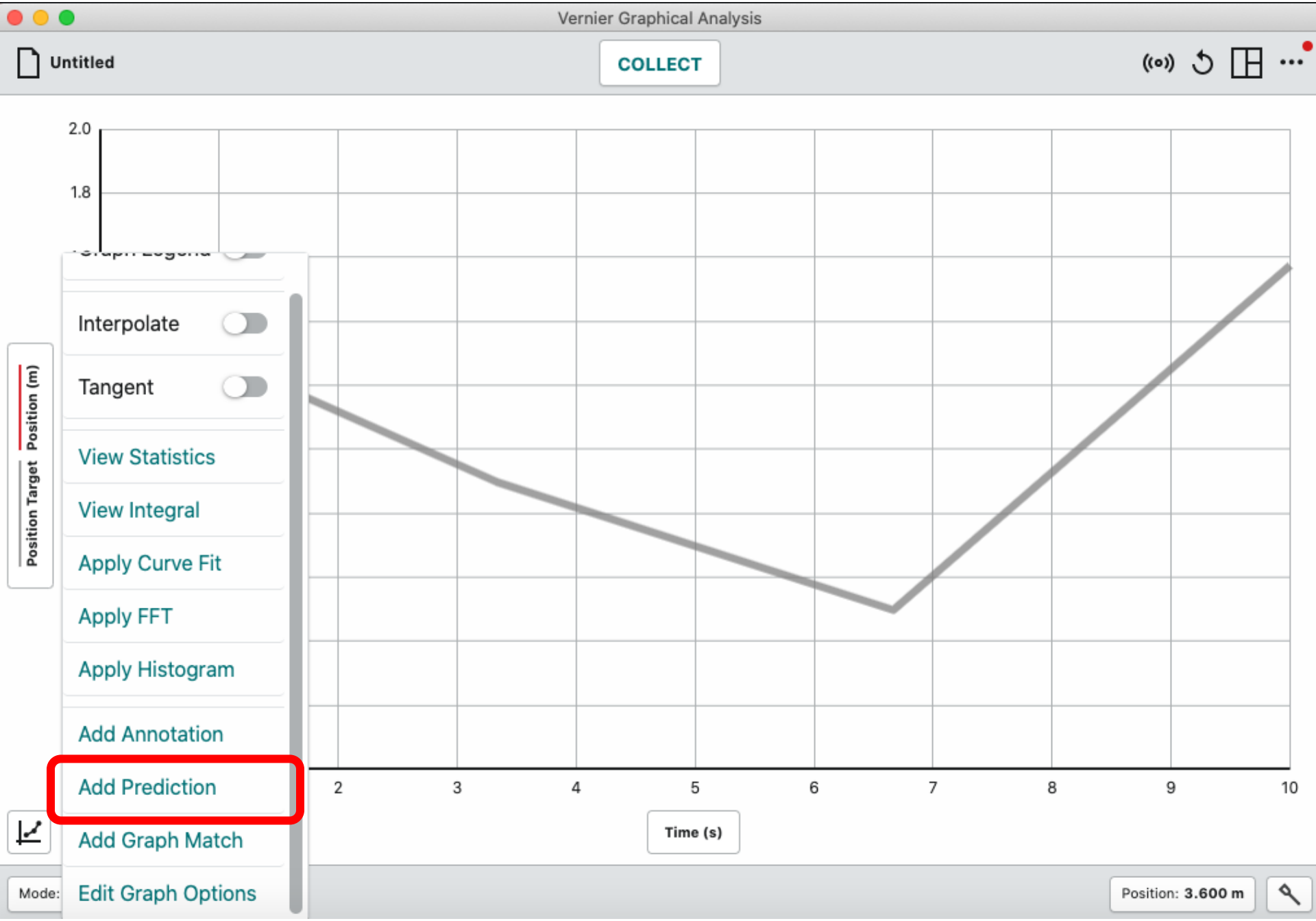




Mode: Time Based Rate: 20 samples/s

Position: **3.600 m**

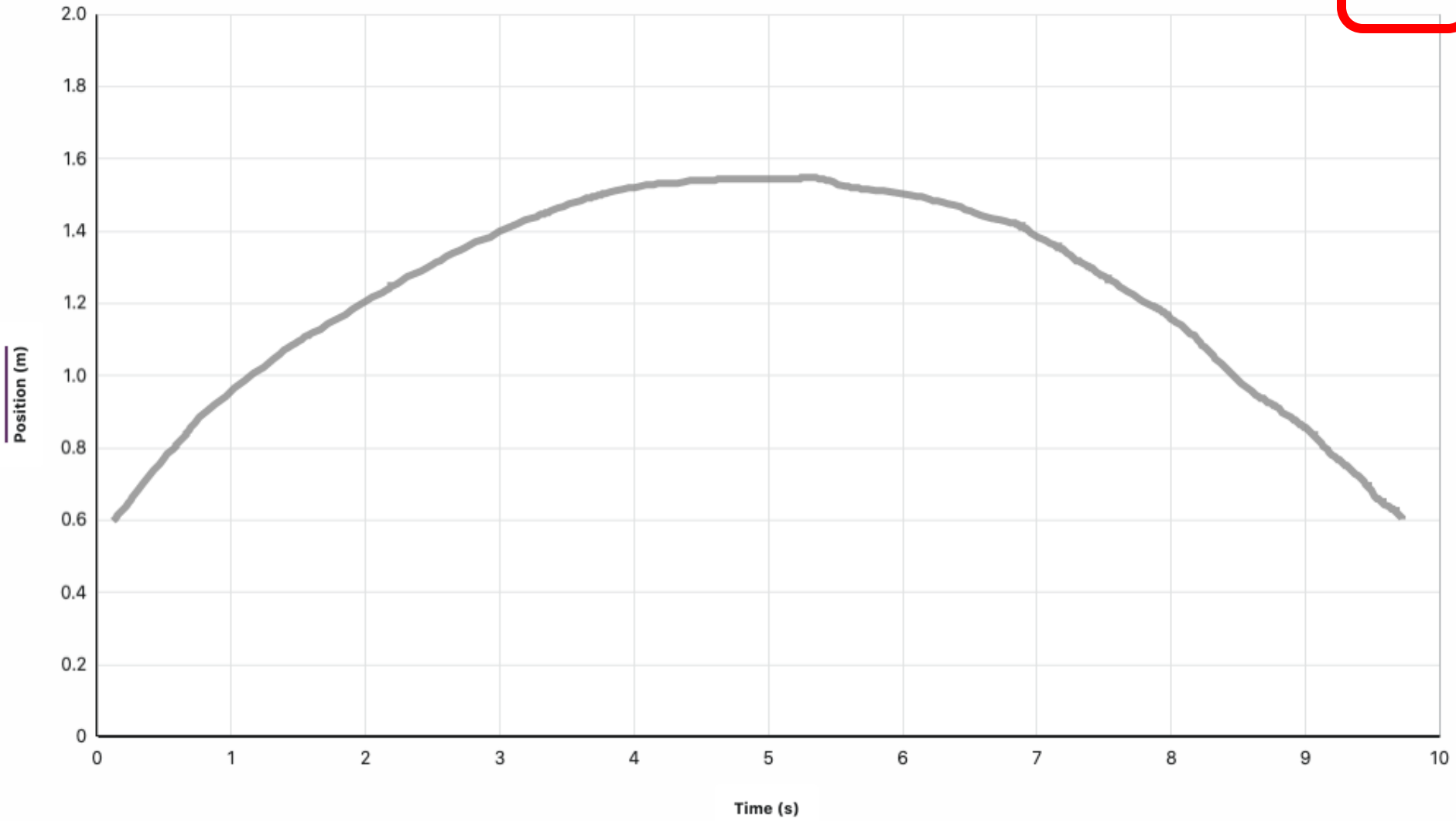

Vernier Graphical Analysis
Untitled
COLLECT
2.0
1.5
1.0
0.5
0
-0.5
-1.0
-1.5
-2.0
Velocity (m/s)
Velocity Target
2
3
4
5
6
7
8
9
10
Time (s)
Position
Velocity
Position: 3.202 m


Vernier Graphical Analysis
Untitled
COLLECT
2.0
1.8
Interpolate
Tangent
View Statistics
View Integral
Apply Curve Fit
Apply FFT
Apply Histogram
Add Annotation
Add Prediction
Add Graph Match
Edit Graph Options
Position (m)
Position Target
2
3
4
5
6
7
8
9
10
Time (s)
Mode:
Position: 3.600 m

Vernier Graphical Analysis

Prediction 1

CANCEL SAVE



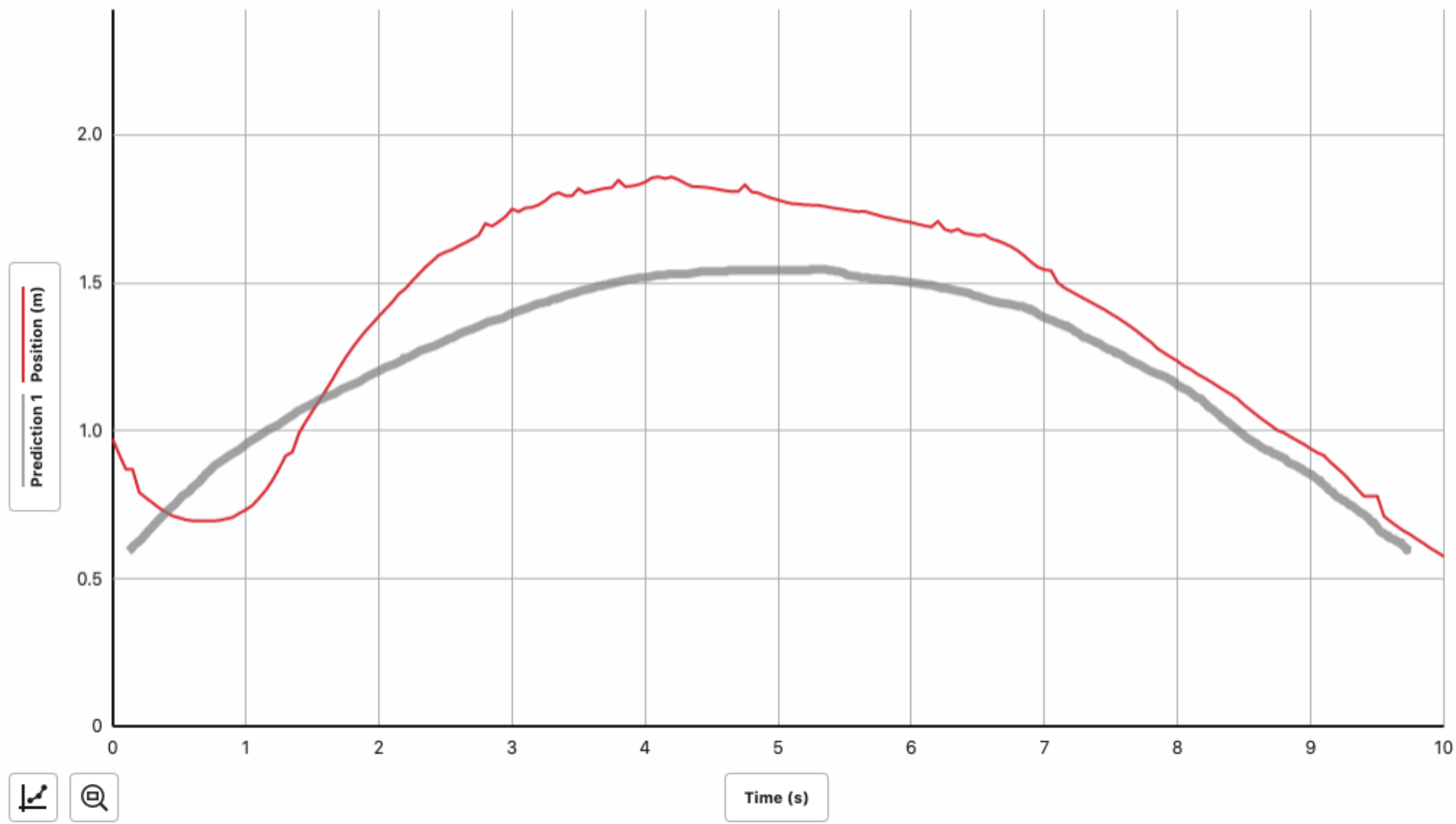
Mode: Time Based Rate: 20 samples/s

Position: **3.600 m**

Vernier Graphical Analysis

Untitled

COLLECT



Mode: Time Based Rate: 20 samples/s

Position: **3.600 m**