Graphing Motion Lab

<u>Purpose</u> - to compare the graphs of moving objects with their actual motion and to be able to recognize types of motion by graph alone.

<u>Procedure</u> -

Part A - Vernier Lab Quest

1.) Working with a Vernier Lab Quest, connect the green motion sensor to the Lab Quest. Connect the Lab Quest to your laptop using the supplied USB cord. Turn on the Vernier Lab Quest.

2.) Open the Lab Quest software "LoggerLite" on your laptop.

3.) Click on the folder titled "Open". Click on "Physical Science w Vernier". Click on the file titled "35a Graphing your Motion".

2.) Mark 4 metres on the floor from the motion detector using masking tape, leave a piece of tape every metres.

3.) Aim the motion detector at one partner standing 1 metre away, the second partner click collect. When the motion detector begins clicking walk slowly away from it (don't swing your arms as this will throw off your results). <u>Sketch the graph</u>. Repeat this time walking faster and again <u>sketch</u>.

4.) Open "35b Graphing your Motion". Using the motion detector walk so that the graph you produce matches the one shown. Repeat as many times as necessary to produce a close match. Call your teacher over to check your graph.   Teachers Signature - _____

5.) Open "35c Graphing your Motion". Using the motion detector walk so that the graph you produce matches the one shown. Repeat as necessary. Call your teacher over to check your graph.
                              Teachers Signature - _____

6.) Open "35d Graphing your Motion". Note this is a **velocity time graph**. Click collect and produce this graph. Repeat as necessary.   Teachers Signature - _____

7.) Open "35e Graphing your Motion". Note this is a **velocity time graph**. Click collect and produce this graph. Repeat as necessary.   Teachers Signature - _____

Part B - Interactive Physics

1.) Double click on the Interactive Physics icon on your laptop.

2.) Turn gravity off by clicking World, Gravity, and Setting the number to zero.

3.) Create a circle by clicking on the circle button.

4.) Create a force on the circle by clicking on the force button, then the centre of the circle, then drag the arrow a short distance to the left.

5.) Click the circle, then click Measure, Position, X-graph. Enlarge the graph and click Run, <u>record whether the circle accelerates or moves at a constant velocity</u>.

6.) After the graph has taken shape click stop. <u>Sketch the graph</u>.

7.) Click reset, click on the graph and click delete. Click Measure, velocity, X-graph, enlarge the graph, <u>run and sketch</u>.

8.) Click reset, click on the force arrow which is attached to the circle, click delete.

9.) Click the centre of your circle and drag a **<u>blue</u>** velocity arrow to the right.

10.) Change back to a position graph.

11.) Click run, record whether the circle accelerates or moves at a constant velocity, <u>sketch the graph</u>.

12.) Reset, change back to a velocity graph, <u>run and sketch the graph</u>.

Note: that $1.592e^{-16}$ means 1.592×10^{-16}, you can assume this to be zero.

<u>Discussion</u> -

1.) How does the $\vec{d}/t$ graph of an object at rest appear?

2.) How does the $\vec{d}/t$ graph of an object moving at constant velocity appear?

3.) How does the $\vec{d}/t$ graph of an object accelerating appear?

4.) How does the $\vec{v}/t$ graph of an object moving at constant velocity appear?

5.) How does the $\vec{v}/t$ graph of an object accelerating appear?

<u>Conclusion</u> - Summarize what you did to find your results and state the results that answer the purpose. That is, state how the graphed line in the following $\vec{d}/t$ graphs differ from the $\vec{v}/t$ graphs in what the line describes of the objects movement in the following six graphs.