Linear Momentum Problems – Alternate Solutions

Name: ____ Date: ____________________

Your Task: Solve the problem below using the algebraic method you learned in class previously. You will then check your solution using Wolfram Alpha (a computational search engine).

Practice Problem:

1. An air track glider of mass 3 kg, moving at 2.0 m/s [right], collides elastically with another glider of mass 1 kg, which is moving at 0.2 m/s [left].
   A) Calculate the velocities of each glider after the collision? (use the algebraic method learned in class and compare with the solution in part B)
   B) Use http://wolframalpha.com to solve the problem (see solution on next page and try it in WolframAlpha to be sure you know how to use it before attempting further problems)

Assignment:

Use WolframAlpha to solve the following problems from the original problems that were handed out to you. Be sure to show your work for the initial Momentum and Kinetic Energy equations. Print the wolframAlpha results from the computer screen as part of your solution.

From Hand-out: #1, 2, 3 using Wolfram Alpha. Check question 3 using the algebraic (full) method.

WolframAlpha Solution for Example 1

WolframAlpha computational knowledge engine

3(2)+1(-.2)=3a+1b and 3(2)^2+1(-0.2)^2=3a^2+1b^2

Input the momentum and kinetic energy equations that represent the system.

Input:

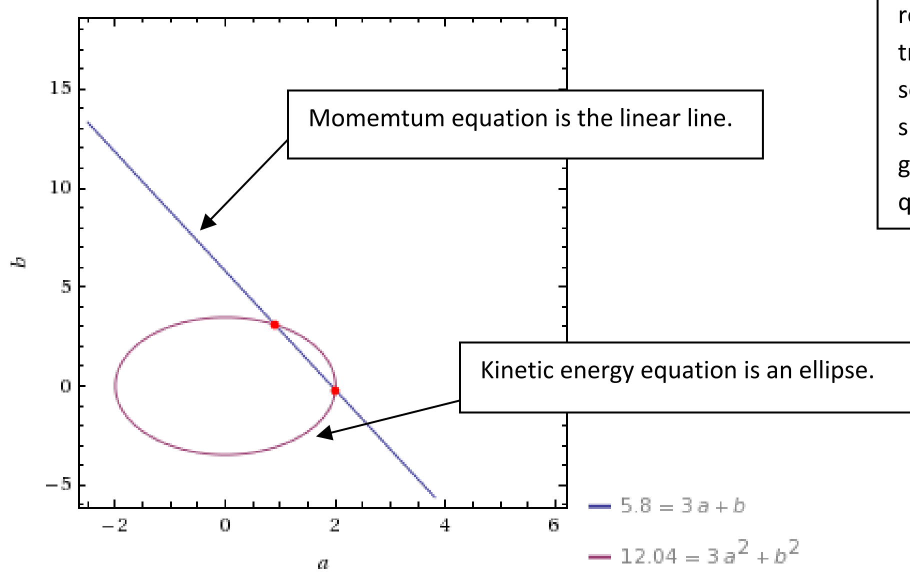
$$3\times 2+1(-0.2)=3a+1b \bigwedge 3\times 2^2+1(-0.2)^2=3a^2+1b^2$$

Result:

$$5.8=3a+b \bigwedge 12.04=3a^2+b^2$$

Wolfram interprets this as finding the intersection of the two equations – it shows what you input and the numerical result. The solution is traditionally discovered by solving for a variable and using substitution. The alternate graphical result is very clear and quite meaningful.

Plot of solution set:



Alternate form:

$$3a+b=5.8 \bigwedge 3a^2+b^2=12.04$$

Solutions:

$a\approx 0.9,\quad b\approx 3.1$

$a\approx 2.,\quad b\approx -0.2$

The two solutions (points of intersection) give the **final state** of the system after collision and the **initial state** of the system before collision and.

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