Name _____ Date _____ Period _____

The Monkey and the Hunter

Part I: Explore the Controls

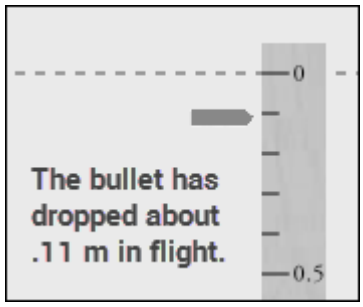
In your web browser (mobile phones not recommended), navigate to www.gigaphysics.com, then click **Virtual Labs** in the heading bar and **The Monkey and the Hunter** from the list of labs.

Now is a good time to explore how the controls work before you start collecting data. Use the **Move rifle…** sliders to reposition the rifle. The **Fire Rifle** button will not only fire the rifle but start the monkey falling. Practice using the **Freeze** button to stop the foam bullet and the monkey in midair so you can measure their positions with the ruler; it will turn into a **Restart** button to let to resume motion. (Just drag the ruler with your mouse to move it into position.) Also try using the **Set muzzle velocity** slider to control the speed of the foam bullet when you fire.

When you are comfortable with the controls, go to the next step.

Part II: Collect Your Data

With the rifle in the upper left corner and a medium muzzle velocity (the exact value doesn't matter), fire the rifle and use the **Freeze** button to stop the motion before it hits the monkey.



Drag the ruler into position to measure (a) how far the bullet has dropped in flight and (b) how far the monkey has dropped in that same time. For the bullet, measure from the tip of the bullet to the point on the dotted line immediately above the tip. For the monkey, measure from the crosshairs straight up to the dotted line. Even though the ruler only has ticks marks every tenth of a meter, you should try to estimate the hundredths digit as well. Add your measurements to the first line of the data table below.

Then use the **Restart** button and allow the bullet to hit the monkey. Now measure the same two distances—the drop of the bullet and the monkey. The dotted line still marks the beginning position of each. Add your data to the first line of the table below.

Now move the rifle to some different positions and change the muzzle velocity, as indicated in the remaining lines of the table. Take midair and impact measurements for each condition as you did before, and add them to your table. Remember that your positions don't have to be exact; anywhere near the left-center is OK for the second line, for example.

Position of rifle	Muzzle velocity	Distance bullet dropped (midair)	Distance monkey dropped (midair)	Distance bullet dropped (impact)	Distance monkey dropped (impact)
upper left	medium				
top center	slow				
lower left	fast				
lower center	slow				

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Part III: Draw Conclusions

Whenever you measured the distances that the bullet and the monkey had fallen, what did you notice?

Is there any combination of rifle position and muzzle velocity that could cause the hunter to miss the monkey (assuming that the hunter aimed directly at the monkey as in this demonstration)? Explain your answer.

Suppose that two toy carts are pushed off the edge of a table at the same time, one of them at 1 m/s and the other at 2 m/s. Which one, if either, will hit the ground first? Explain your answer.