



MSC Adams and Conceptual Understanding: Making Them Connect Through Design

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Abstract

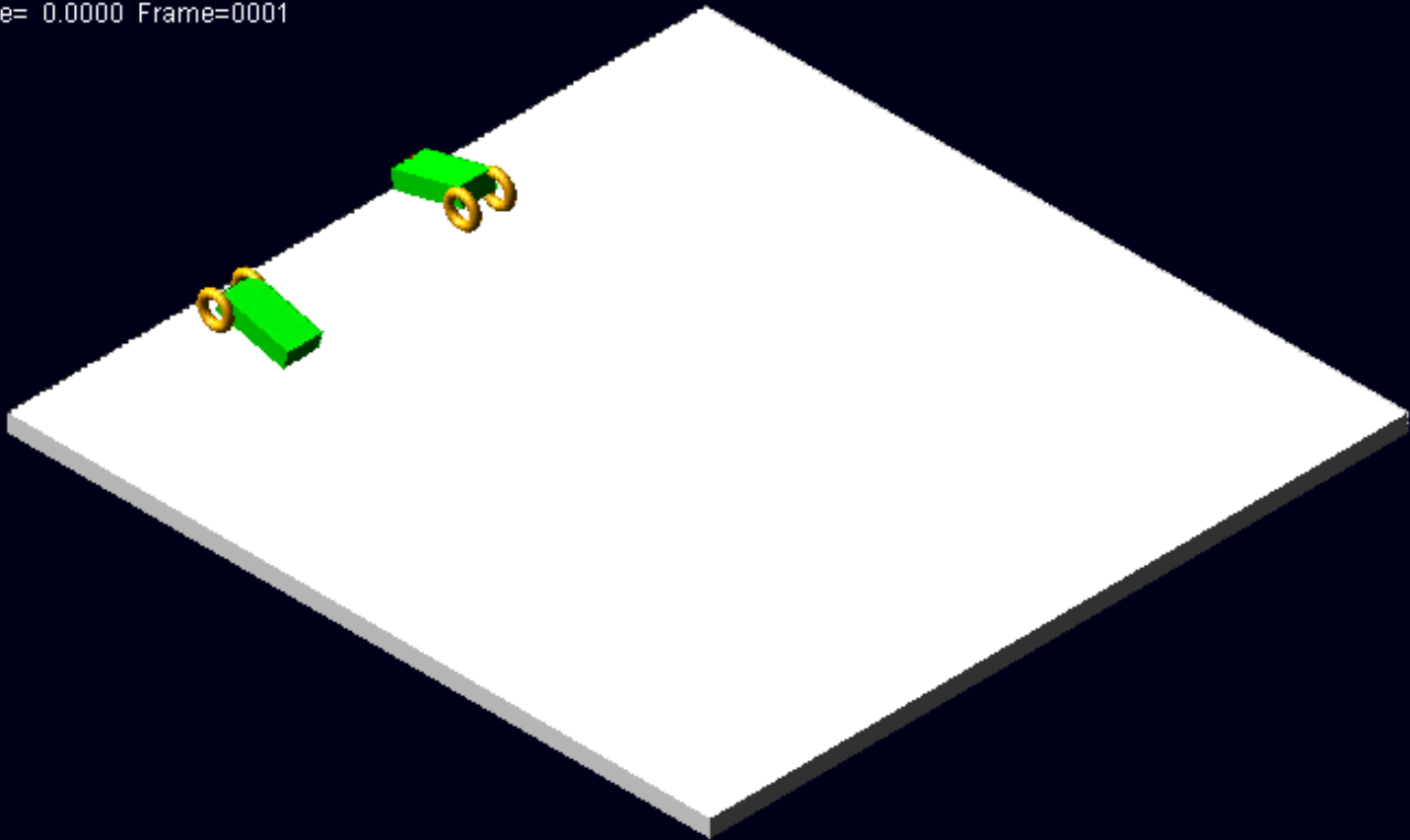


- A learning moment is when a student is poised to absorb information and relevant information is being provided in a timely manner.
- Deep lasting understanding occurs when information “fits” a consistent internal structure of knowledge
- But ... how do I create this?



- One of the green blocks will spin or rotate more than the other, which one will rotate the most? Why? So what?

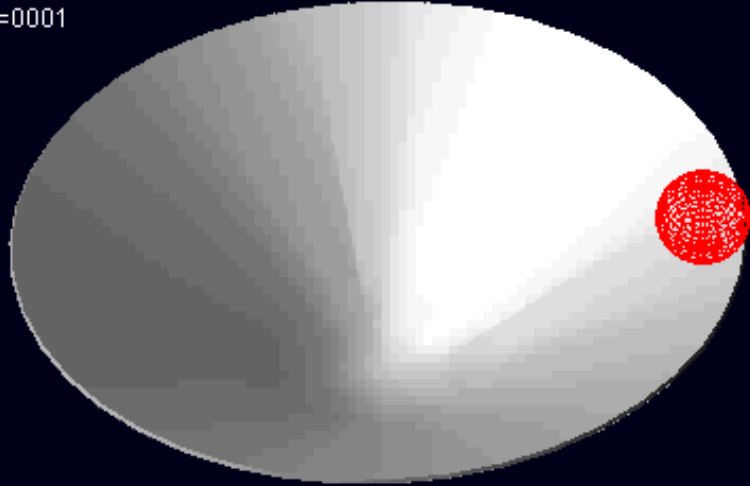
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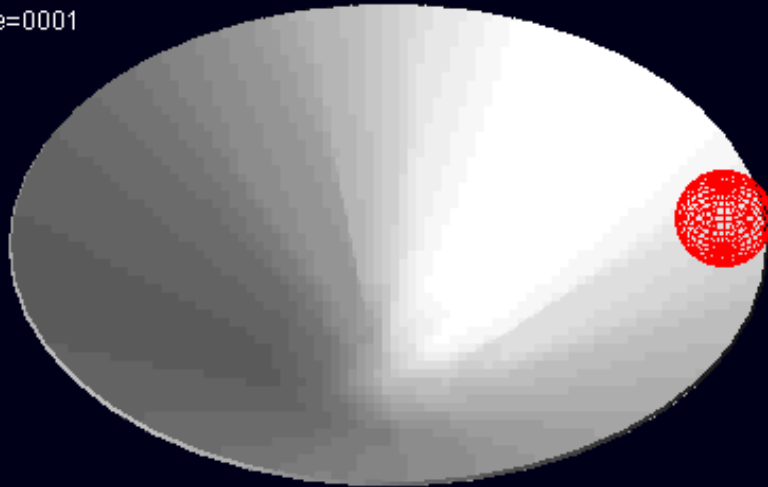


Which One Has Least Friction?

OptionA Time= 0.0000 Frame=0001

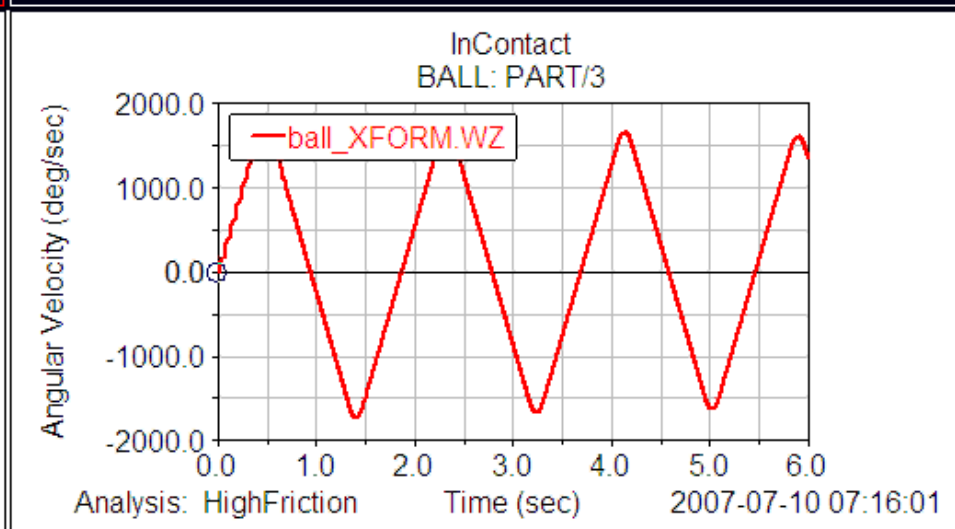
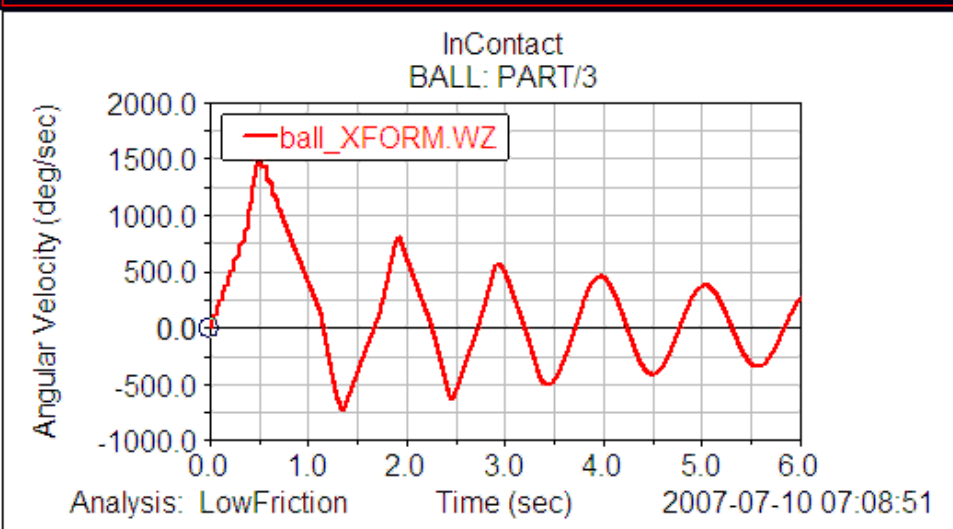
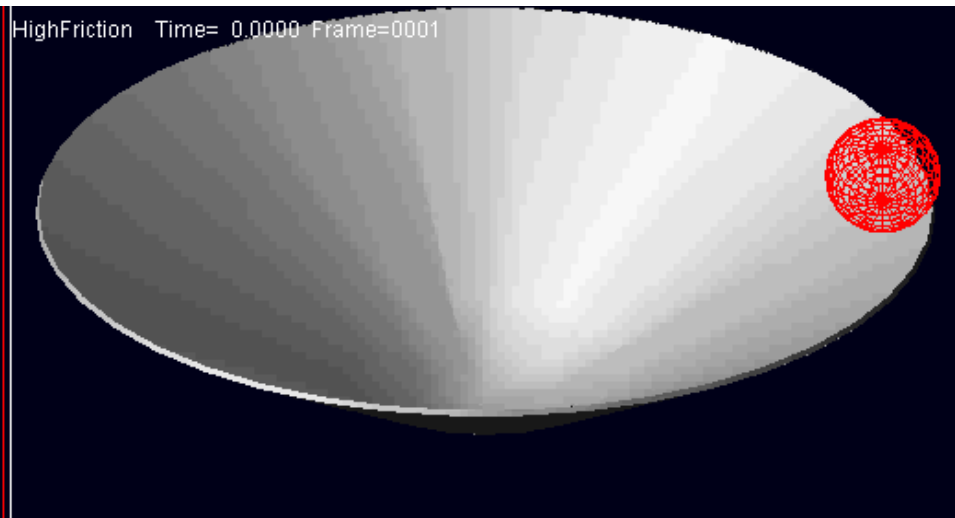
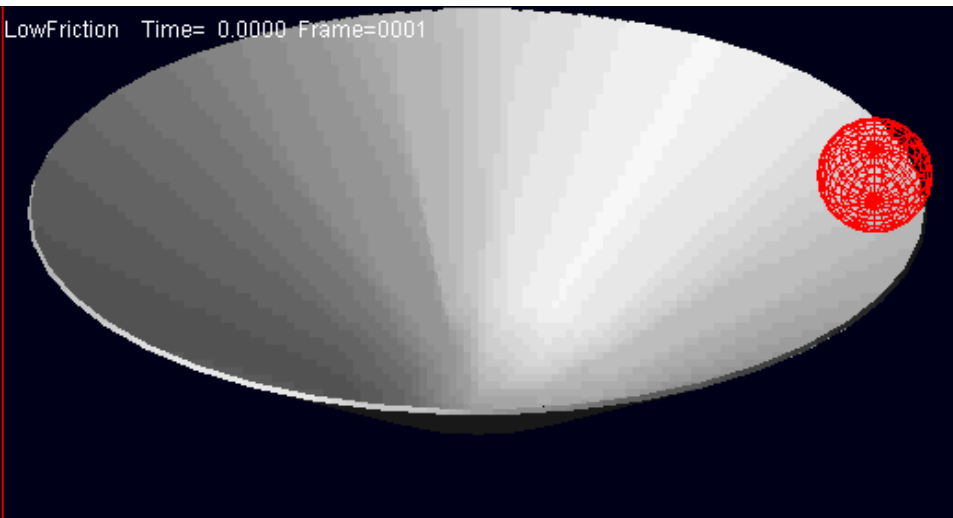


OptionB Time= 0.0000 Frame=0001





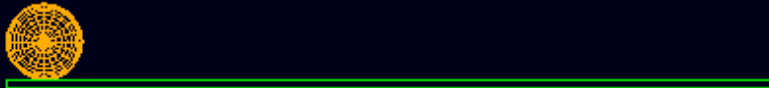
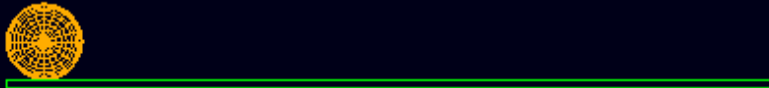
Solution





Does Terminal Velocity Go Up or Down with Coefficient of Friction?



<p>HighFriction Time= 0.0000 Frame=001</p> 	<p>LowFriction Time= 0.0000 Frame=001</p> 
<p>And the Answer Is?</p>	

Where Do These Come From?



- We have published a process for developing them:
 - Everett, Louis J., and Arun Pennathur, “[A Design Process for Conceptual Based, Counter-Intuitive Problems](#)”, 2007 ASEE Conference, Hawaii.
- You can be involved:
 - leverett@utep.edu or <http://2020engineer.iss.utep.edu/world>

But How Do I Know You are Getting it?

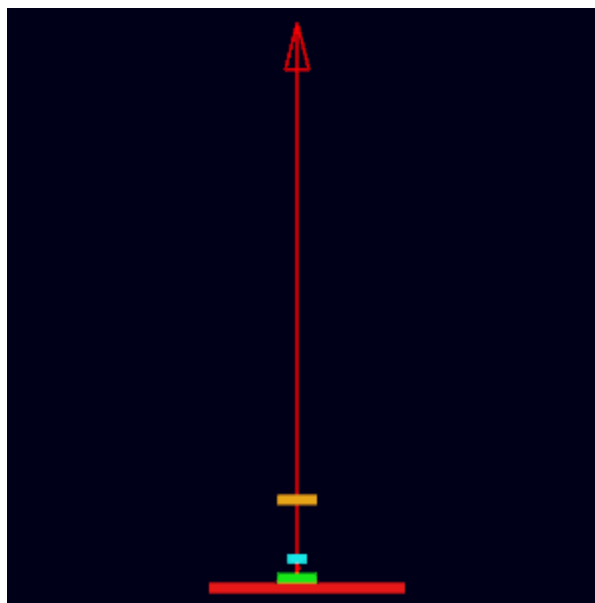


- Ask for a design
- Build me a toy that is spring loaded, jumps off the table, flips over backward and lands on its feet.
- So... now what?
 - <http://www.youtube.com/watch?v=Tm8683XDulg>
- Got it?



How to Jump

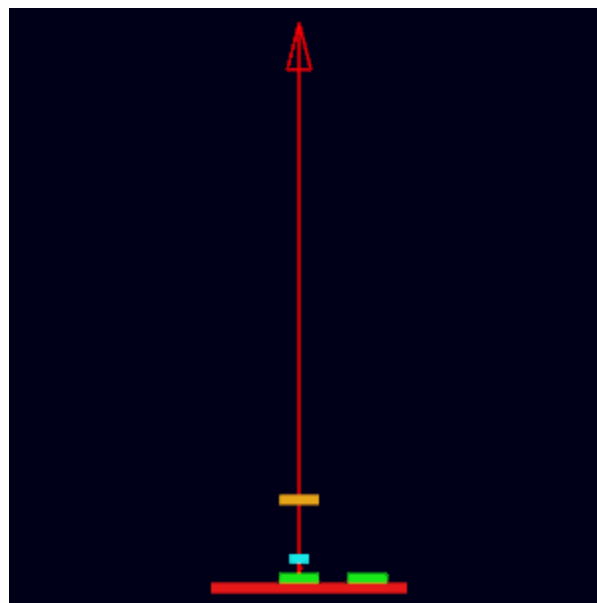
- Conservation of linear momentum





How to Flip

- Angular Momentum



How to Compute the Proper Values



- Let d be horizontal distance between masses
- M and B are moving and base masses
- Must determine an average J
- Applied impulse determine elevation
- Applied angular impulse determines rotation
- Equate elevation to rotation

$$\frac{2dP^2}{gJM(B+M)} = 2\pi$$

Conclusions



- Students often think they know something and by the time they realized they don't its too late. Get their attention early.
- Students MUST learn to use fundamentals in their thinking. Make them do simple designs that require them to use principles to “get started”.
- Simple MSC Adams simulations can do both.

Contact Details :

- For further information (or to hire our students) please contact

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