Няма много време за видеото, затова направо започва:

This is a ball sliding without friction on a wire with length S. Now we make the same wire, but this time we flip it upside down and let another ball slide. Which ball will finish first?

This question is counterintuitive and shows us why maths, especially calculus, plays a huge role in physics.

    Pause and try to solve it alone or with friends.

    Now the explanation:

If we show the relation between the velocity of the balls and time, as they move through the wire, on a graph we have this:

We said no friction, so both balls will slide with the same velocity on the first parts of their wires. Then ball number 1 one loses speed and gains it back to exit the half-circle. The other one does the opposite: it gains some and then loses it.

Since the graphs relate the velocity of the balls with time, the area below the curves is our length vt=S. That means that the first graph needs to be stretched a little bit more to compensate for area. Because the width of the first one is bigger, the moment, in which the first ball reaches the end, happens later than the second one.   
    So we get our answer: Ball number 2 finished first!