

Mersenne: *Harmonie Universelle* (1636)

"I question whether Lord Galileo ever did the experiments of falls along the plane, since he nowhere says so, and the proportion he gives often contradicts experiment." (p. 112)

Mersenne carried out a number of inclined plane experiments before Galileo's *Two New Sciences* was published, from low to high inclinations. In the set of experiments presented immediately preceding the above quotation, he first calculates the expected distance of fall along the inclined plane in a given time, based on a value he had obtained for the distance of fall in 1 second, and then measures the actual distance the sphere travels along the plane. Dominico Bertoloni Meli has reduced the reported data to *the ratio of the observed distance to the expected distance*, using a common denominator of 7 (corresponding to the then unknown fact that a rolling sphere covers 5/7 of the distance of a freely sliding sphere in any given time):

<u>Inclination of the plane</u>	<u>Observed/Expected Distance</u>
15 deg	5.25/7
25	4.97/7
30	5.6/7
40	6.0/7
45	6.0/7
50	5.0/7

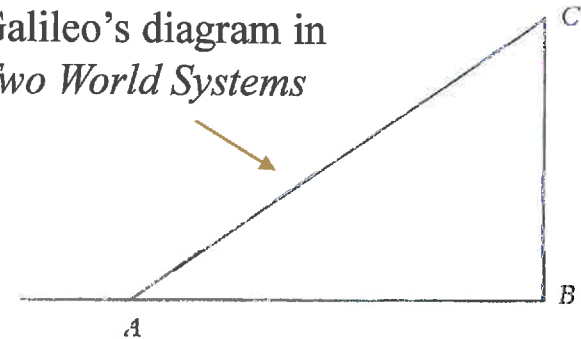
Mersenne remarks on the difficulties of getting well-behaved results at 50 deg and above.

GALILEO'S INCLINED PLANE EXPERIMENTS

“We made the same ball descend only one-quarter the length of this channel, and the time of its descent being measured, this was found always to be precisely one-half the other. Next making the experiment for other lengths, comparing now the time for the whole length with the time of one-half, or with that of two-thirds, or of three-quarters, and finally with any other division, by experiments repeated a full hundred times, the spaces were always found to be to one another as the square of the times. And this for all inclinations of the plane. ... We observed also that the times of descent for diverse inclinations maintained among themselves accurately that ratio that we shall find later assigned and demonstrated by our Author.”

Two New Sciences (1638) p. 213

Galileo's diagram in
Two World Systems



Galileo's announced dimensions in
Two New Sciences:

Length: 12 braccia

Height: 1 to 2 braccia



Angle: 4.8 to 9.6 deg

Maximum time: 4.9 sec

Minimum time: < 0.9 sec