

**S100: Science: a foundation course**  
**S100/01: Science Course Unit 1: Introduction**

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**Clip transcript: Galileo's incline plane experiment**

**Michael Pentz:**

Now I'm going to go over the main steps of this experiment in case you've run into some difficulties with it. But before we do that let's just stop and think about the background to the experiment. What was the hypothesis that Galileo had that the experiment was meant to test? Well it was simply that falling bodies are uniformly accelerated, by which he meant that their speed increased by the same amount in each interval of time so that, for example, if in one second they reached a speed of 10 metres a second, then in 2 seconds they reached a speed of 20 metres a second, in 3 seconds, 30 metres a second, and so on. Now to test that hypothesis he could simply have dropped some heavy object from the windows on different floors of some tall building and measured the time it took for the object to reach the ground. And he could have measured the speed that it had at the moment it hit the ground. But he had no means of measuring the speed – even we'd find it difficult to measure the speed of a falling object at the moment of impact, and for Galileo it was absolutely out of the question. So he couldn't test his hypothesis directly, he had to translate it into another form which he could test. And what he did was to turn it into the form which says the distance an object falls in a given time is proportional to the square of the time. He's got rid of the speed you see, which he can't measure, and replaced it by a statement involving the distance which he can measure.

Now this is spelt out in detail for you in the broadcast notes that go with this television programme so I shan't go into it in any more detail.

But there was a second problem that Galileo faced and was the problem of measuring the time of fall of the ball. Even if he dropped it from the top of the Leaning Tower it would only take a couple of seconds to reach the bottom, so how could he measure such a short time when the start is at the top of the building and the stop is down in the piazza? He's got a problem, so he hits on another ingenious scheme of diluting gravity so as to slow everything down by rolling his ball down a piece of scantling instead of dropping it from a tower. So now it takes a reasonably long time to fall or rather roll, and moreover it all happens in the same room – the start and the stop – a pretty palatial room in his case, but nevertheless a room. So that's the second ingenious idea in the design of the experiment, to stretch the time scale out to make the time easier to measure with his fairly primitive time-measuring devices.