



Practical 7 Centripetal force – rotating trolley



Purpose

The aim of this experiment is to verify the equation for centripetal force.



Safety

Do not allow the rotating table to turn too fast!

You will need:

- Trolley
- Spring
- Plastic runway
- Wooden support
- Washers
- Rotating table
- Power supply (0–12V)
- Ruler
- Stop clock
- Newtonmeter
- Balance
- G clamps

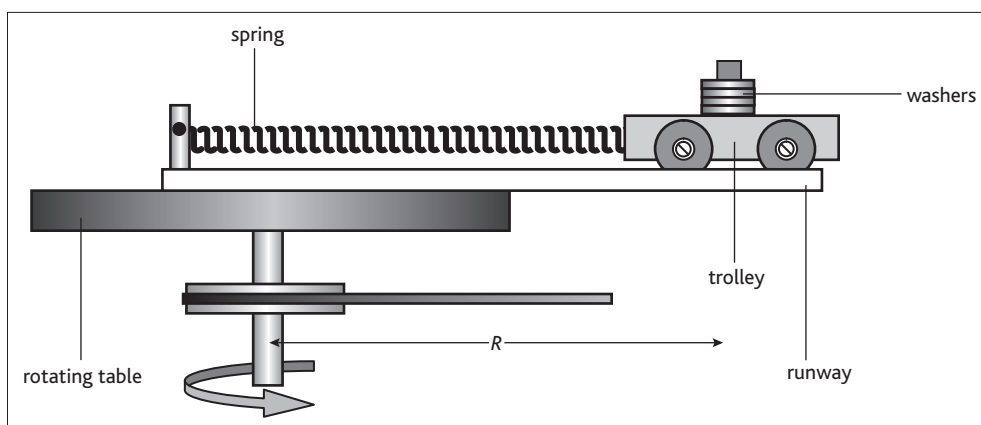


Figure 1: Rotating trolley setup

Experimental instructions

Set up the apparatus as shown, clamping the rotating table firmly to the bench. Carefully increase the speed of the motor until the trolley just touches the stop at the end of the runway. Measure the rotation rate and use it to calculate the speed (v) of the trolley in a circle of radius R .

Measure the mass of the trolley and its load (m) and hence calculate the theoretical value of the centripetal force needed to keep it in the orbit at that speed (centripetal force = $\frac{mv^2}{R}$).

Using a newtonmeter, measure the force required to extend the spring by the amount needed for the trolley to touch the end of the runway. Compare your two values and comment on your findings.

Repeat the experiment for different values of the load on the trolley.

Analysis and conclusions

Plot a graph of the measured force against mv^2 . Use the graph to verify the equation for centripetal force.

Comment on the most important sources of error in your experiment and how they might be reduced.