TI-nspire™

Grade level: 9-12
Subject: Precalculus
Time required: 45 minutes

Motorcycle Tire Balancing

by Kelli Slaten

Activity overview

In this activity, students will explore linear and angular velocities and the relationship between them. This exploration is based on using a spin balancer to balance motorcycle tires of different sizes. Since a spin balancer rotates at a constant velocity, the linear and angular velocities of the tires being balanced can be readily explored as students learn the relationship between linear and angular velocities.

Concepts

- *Measuring circular motion*
- *Linear velocity*
- *Angular velocity*

Teacher preparation

Prior to beginning this activity, students should be familiar with basic trigonometric functions and finding arc lengths of circles in radians. Students should be familiar with the term "road speed" as another term for linear velocity. A discussion of why tires need to be balanced and how a spin balancer works will provide students with helpful information.

Classroom management tips

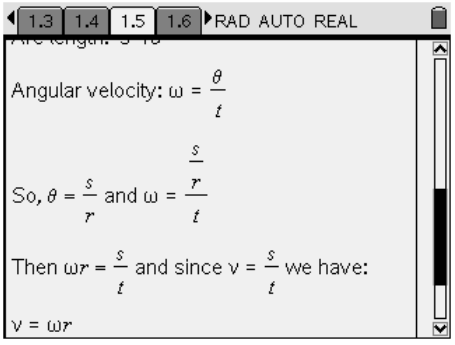
This activity is primarily teacher-led with periods of independent student work. Students may save their work on the handheld. The instructor should provide file-naming directions.

TI-Nspire Applications

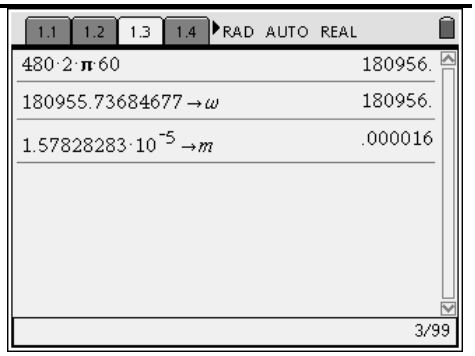
Calculator, Graphs & Geometry, Lists & Spreadsheets, Notes

Step-by-step directions

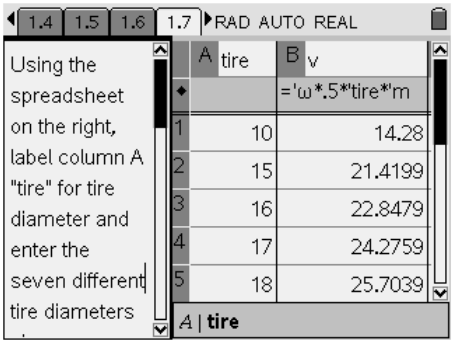
Once students have read the preliminary information given in the first three pages of the problem, they will need to use their knowledge of finding arc lengths of circles in order to derive the formula that relates linear velocity to angular velocity.



Next students need to convert the speed of the spin balancer to radians per hour and then inches to miles and store these as variables.



Make sure that students remember to convert the tire diameter to radius when they enter their formulas in the spreadsheet.



Assessment and evaluation

- *The instructor should assess students' understanding during the activity.*
- *Students' files could also be transferred to the instructor for evaluation.*
- *Another option would be to have students compare their final results with each other or with the entire class for discussion.*

Activity extensions

There are many opportunities for further exploration of the relationship between linear and angular velocities. A few are listed here:

- *Find the linear speed of a point on the outside of the tire, in miles per hour, when on the spin balancer.*
- *What are the fastest moving points on the tire? Why?*
- *Is there a slowest moving point? Explain.*
- *Is the tire moving at a constant speed? Explain.*