

Disneyland Dream: Rotation

This travelogue of the Barstow's trip to Disneyland recounts many details of their trip and how they won the trip through the Scotch Tape mail-in sweepstakes. Many of the references are rather quaint and antiquated, and the innocent enjoyment of the Barstow family offers both laughable moments and a look back at how life used to be.

In this scene, Mr. Barstow (the narrator) describes the rides they encounter in Fantasy Land. Both rides exhibit some rotational motion. The first ride has Dumbo-like cars attached to a center hub that spins around. From the clip, one can observe that the period of rotation is about 10 seconds. Then, have the students determine the rotation rate in revolutions per minute (rpm) and radians/second.

$$\omega = \frac{\# \text{ rev}}{\text{time}} = \frac{1 \text{ rev}}{10 \text{ s}} \frac{60 \text{ s}}{1 \text{ min}} = 6 \frac{\text{rev}}{\text{min}}$$

$$0.1 \frac{\text{rev}}{\text{s}} \left(\frac{2\pi \text{ rad}}{1 \text{ rev}} \right) = 0.6 \frac{\text{rad}}{\text{s}}$$

Then, ask the students to determine the tangential velocity of little Danny and his mother as they "fly through the air on Dumbo's big ears."

$$v_{tan} = \omega r = 0.6 \frac{\text{rad}}{\text{s}} 10 \text{ m} = 6 \frac{\text{m}}{\text{s}} = 13 \text{ mph}$$

The second half of the scene shows the Mad Hatter's Tea Cup ride, where cups rotate on a rotating platform. Similar calculations as above can be repeated here. How do the angular and tangential velocities compare with Dumbo?

For more advanced students, have them develop a function that describes the position of a particular rider on the Mad Hatter's Teacup Ride.