FLINN SCIENTIFIC

Curve Ahead, Reduce Speed! Worksheet

Data Table

		Time/10 rev (s)			
Demonstration	**Radius**	**Trial 1**	**Trial 2**	**Trial 3**	**Avg. Time/10 rev (s)**
Part I: Control					
Part II: Tighter Curve					
Part III: Banked Curve					
Part IV: Less Friction					

Results Table

Demonstration	Rotational Speed (rev/s)	Period (s)	Distance, $2\pi r$ (cm)	Linear Speed, d/t (cm/s)
Part I: Control				
Part II: Tighter Curve				
Part III: Banked Curve				
Part IV: Less Friction				

Calculations

1. Calculate the average time for 10 revolutions for each part of the demonstration. Record the average times in the data table.

2. Determine the rotational speed (revolutions per second) of the PVC block "car" for each part by dividing 10 revolutions by the average time. Record the rotational speed for each part in the results table.

3. The period of revolution is the time it takes the turntable to make one complete revolution and is equal to 1/rotational speed. Calculate the period for each part and record in the results table.

4. Determine the actual distance the car travels per revolution. Since the car travels in a circle, the distance is the same as the circumference of the circle, or $2\pi r$, where r is the radius of the circle. Calculate the distance per revolution for each part of the demonstration (the distance should be the same for Parts I, III, and IV) and record in the results table.

5. The linear speed is the distance the car travels per unit of time. Divide the distance per revolution by the period to determine the maximum safe linear speed of the block for each part. Record the linear speed in the results table.

Discussion Questions

1. Compare the effect of the decreased radius on the rotational speed of the turntable to the effect on the linear speed of the block. Explain the difference.

2. Use the results from Part III to explain why most NASCAR race tracks have high-banked curves.

3. A driver was traveling the posted speed limit on a rainy day. As his car entered a curve, the car started to skid. Use the results from Part IV to explain why he was "traveling too fast for conditions."

4. You are part of an engineering team assigned to design a new curving on-ramp for an interstate highway. Describe the features you would include with the on-ramp in order for cars to reach the posted highway speed limit as they exit the ramp.