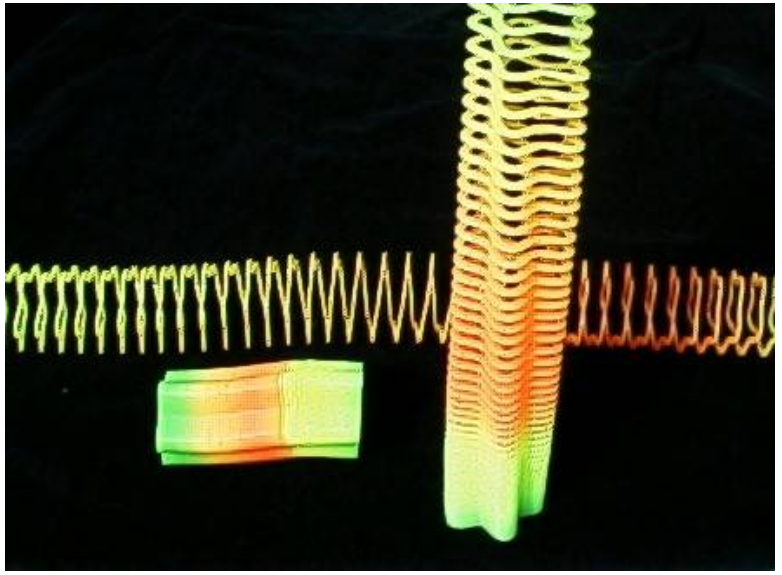
Newton's laws of motion:

1: Inertia

A body perseveres in its state of rest or of uniform rectilinear motion, unless it is compelled to change that state by forces impressed thereon.

Noone goes to an amusement park to experience uniform rectilinear motion, but to experience the forces that change the motion!

Read more



Newton's second law of motion.

F= m **a**

That's why you feel the acceleration in your body when you ride in carousels, roller coasters or other rides

The whole body is accelerated

a= F /m

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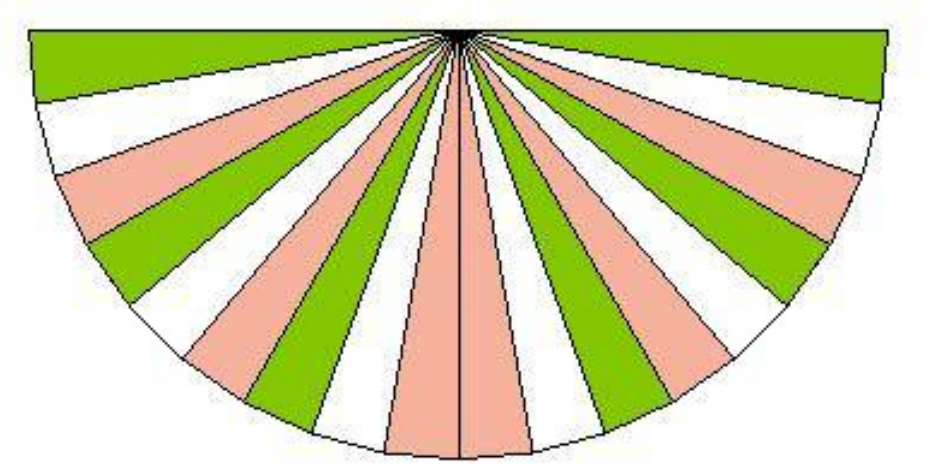
Acceleration - horizontal

- A FORCE is required to change the velocity (speed and/or direction of motion)
- Horizontal acceleration can be measured with a soft toy on a string
- The angle of the string depends on the acceleration

Example: 10 degrees –
from 0 to 50 km/h in 8s



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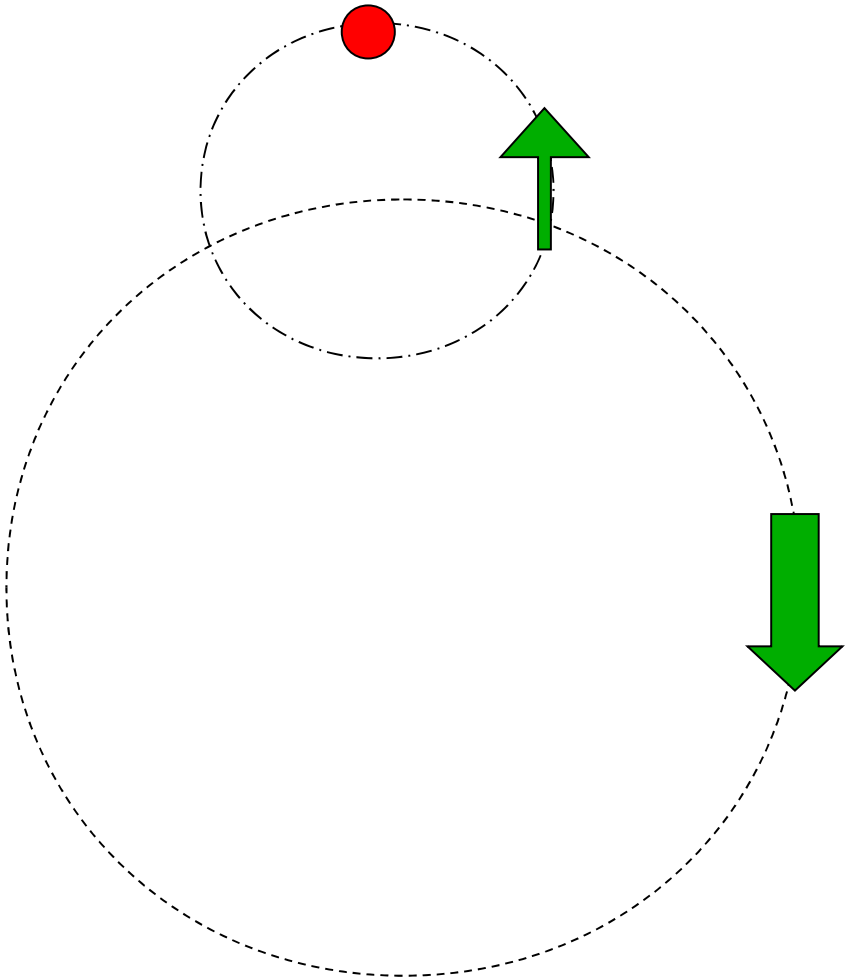
Combined circular motions



Tea Cups
Octopus
Clown Drums

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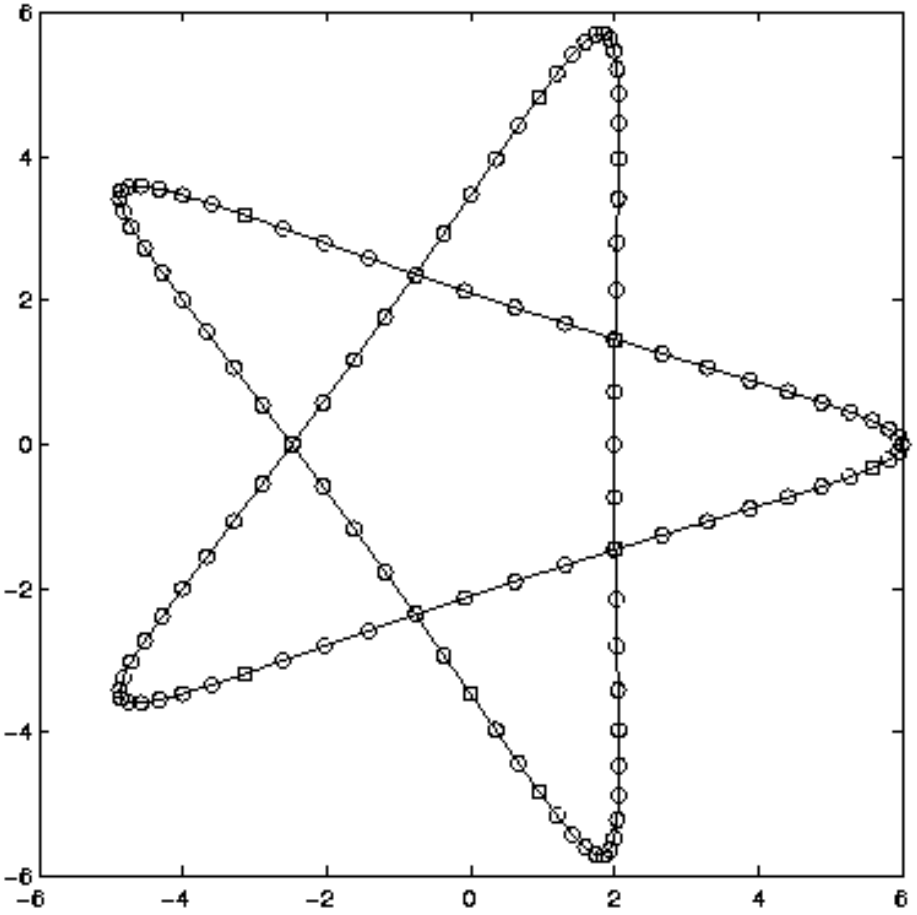
How does the rider move ?



This is the approximate path for common TeaCup rides. The cups move faster in the middle, whereas the acceleration is largest furthest from the center.

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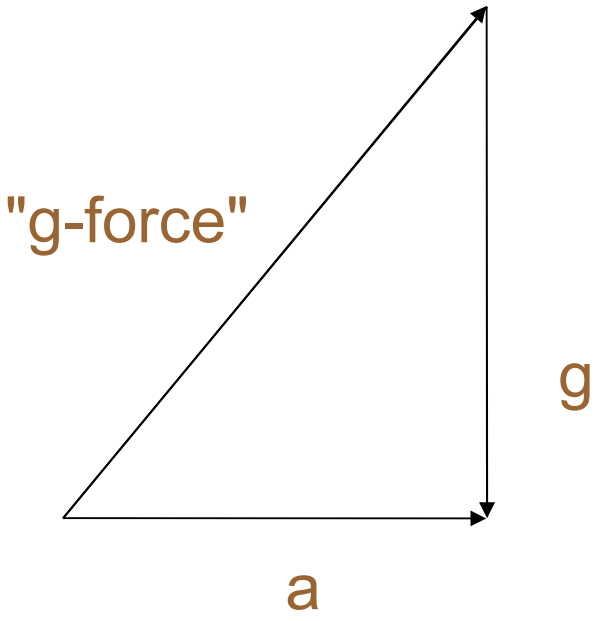
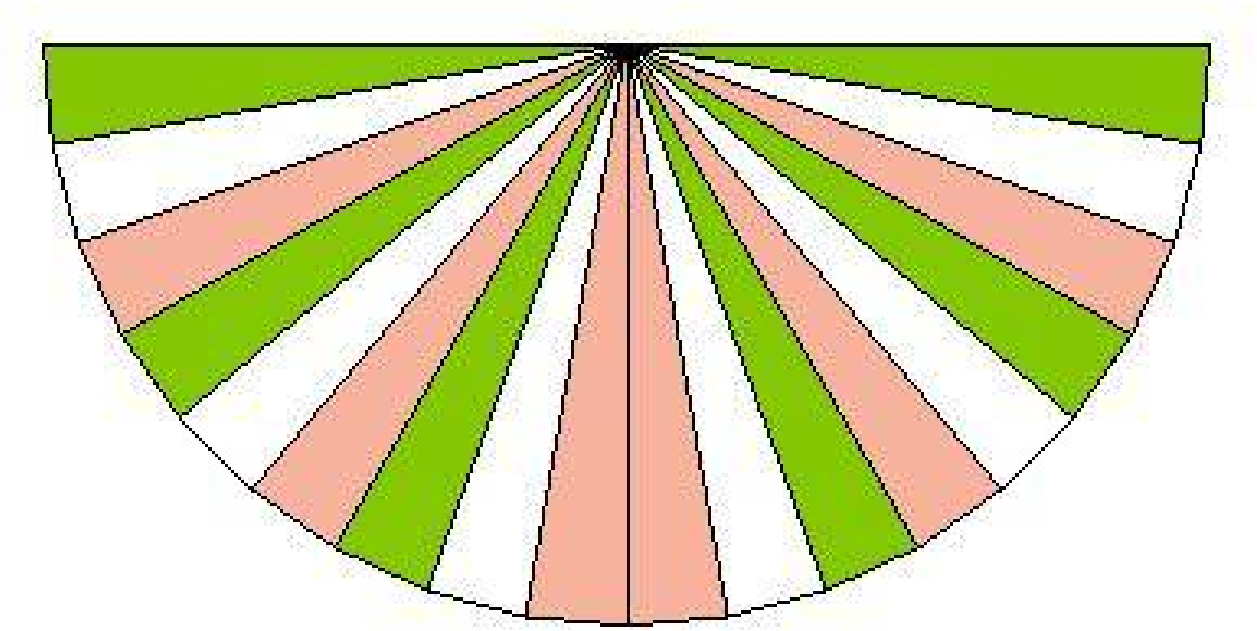
Measuring acceleration – and g-force





g - acceleration of gravity - downwards
a - centripetal acceleration – inwards
”g-force”- force (per kg) exerted by the string on the toy, often expressed in units of "g"

In the TeaCup ride, the maximum acceleration is about g/2 (giving 30°)

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How large acceleration?

The angle is about 45° corresponding to an acceleration of g.

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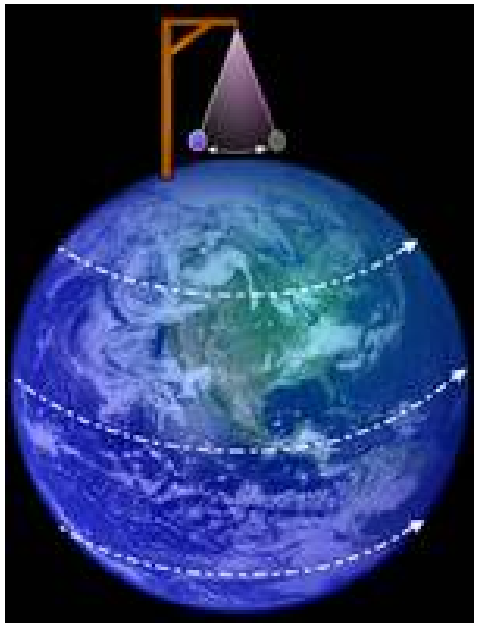
How can we know that the Earth spins around its axis?

“In the carousel, the toy moved like this. I think it was to show that the Earth spins"

"I learned that in the carousel, the toy continued swinging in the same direction, while I moved around"

Foucault's pendulum - a classical experiment to demonstrate the rotation of the Earth



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What happens in rotating systems?

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How do you feel when you exit this ride - onto a rotating platform?

Bring out your soft toy on a string and let it swing!

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