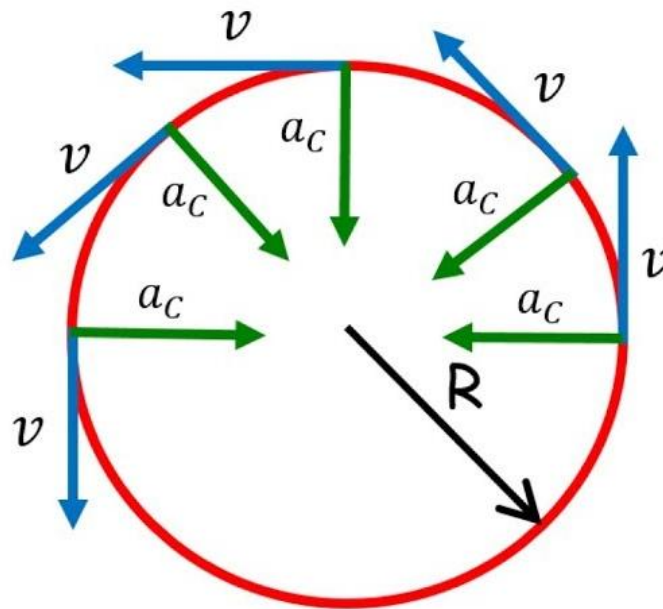


# Centripetal acceleration

When moving along a circular path of radius  $R$ , with constant speed  $v$ , an object has acceleration directed towards the center, called Centripetal Acceleration:

$$a_c = \frac{v^2}{R}$$



# Homework

**Problem 1** The Figure shows an Olympian throwing a metal ball attached to a wire (the sport is called hammer throw). Assume that the ball of mass 4 kg is moving along a circular trajectory of radius 1 m, at speed 20 m/s.

- Find the tension of the wire. You may neglect the presence of gravity.
- Can you justify why gravity may be neglected?



**Problem 2.** A car is moving on a ramp of radius  $R= 30\text{m}$ . Find the maximum speed that it may reach without skidding, if the coefficient of static friction between the road and the tires is  $\mu=0.7$ .

**Problem 3.** Find the speed and period of orbital motion of *the International Space Station* around the Earth. Note that its orbit is located **400 km** above the ground. This is much smaller than the Earth radius  **$R=6370$** . This means that you can assume the gravitational force acting on the space station to be the same as on Earth surface,  **$Mg$** . Also, for simplicity, take the radius of the orbit to be equal to that of Earth.