PHYSICS
PREPARATORY WORKSHOP
ELEVENTH GRADE
Delivery date November 3

Deliver in the notebook with complete procedures.

What Is Uniform Circular Motion?

The movement of a body following a circular path is called a circular motion. Now, the motion of a body moving with constant speed along a circular path is called Uniform Circular Motion. Here, the speed is constant but the velocity changes.

f a particle is moving in a circle, it must have some acceleration acting towards the centre which is making it move around the centre. Since this acceleration is perpendicular to the velocity of a particle at every instant, it is only changing the direction of velocity and not magnitude and that's why the motion is uniform circular motion. We call this acceleration centripetal acceleration (or radial acceleration), and the force acting towards the centre is called centripetal force.

In the case of uniform circular motion, the acceleration is:

$a_r = v^2/r = \omega^2 r$

If the mass of the particle is m, we can say from the second law of motion that:

$F = ma$

$mv^2/r = m\omega^2 r$

This is not a special force, actually force like tension or friction may be a cause of origination of centripetal force. When the vehicles turn on the roads, it is the frictional force between tyres and ground that provides the required centripetal force for turning.

A car accelerates uniformly from 0 to 72 km/h in 11.5 seconds.

1. What is the acceleration of the car in m/s^2?

In aviation, a "standard turn" for a level flight of a propeller-type plane is one in which the plane makes a complete circular turn in 2.00 minutes. If the speed of the plane is 170 m/s.

2. What is the radius of the circle?
3. What is the centripetal acceleration of the plane?

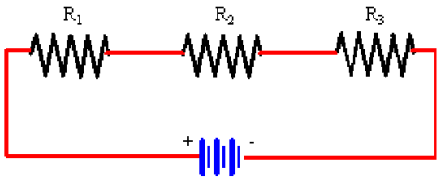
4. A fly of mass 2.00 g is sunning itself on a phonograph turntable at a location that is 4.00 cm from the center. When the turntable is turned on and rotates at 45.0 rev/min, calculate the centripetal force needed to keep the fly from slipping?

5. The earth orbits the sun in 365 days. What is the tangential speed, in m/s, of the earth in orbit? The average sun-earth distance is 1.50×10^{11} m

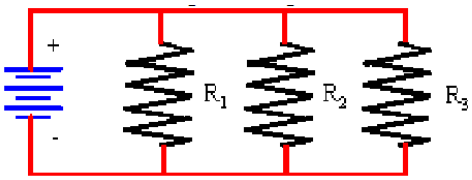
6. A 35.0 kg boy is swinging on a rope 7.00 m long. He passes through the lowest position with a speed of 3.00 m/s. What is the tension on the rope at that moment?

Use $T = \frac{mv^2}{R} + mg$

In the diagram below, R1 = 5.7 Ω, R2 = 10.28 Ω, and R3 = 15.45 Ω. The battery supplies an emf of ε = 0.37 V.



7. What is the equivalent resistance, RS?
8. What is the current through each resistor?



In the diagram below, R1 = 4.3 Ω, R2 = 8.93 Ω, and R3 = 15.765 Ω. The battery supplies an emf of ε = 0.53 V.

9. What is the equivalent resistance?
10. What is the current through each resistor?