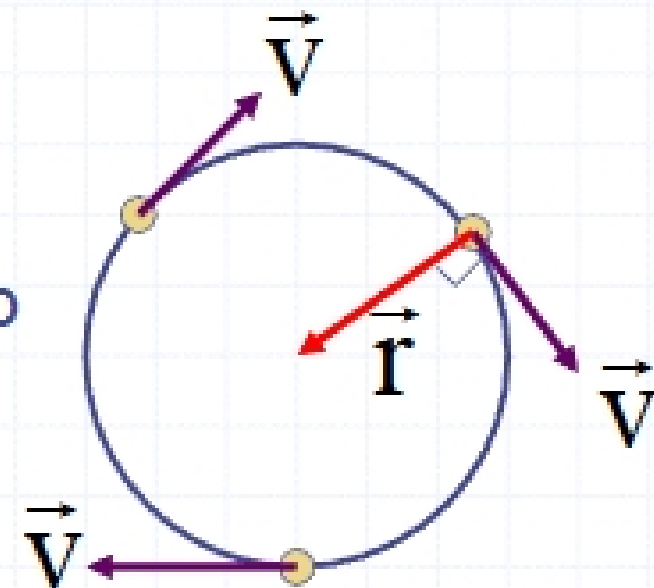


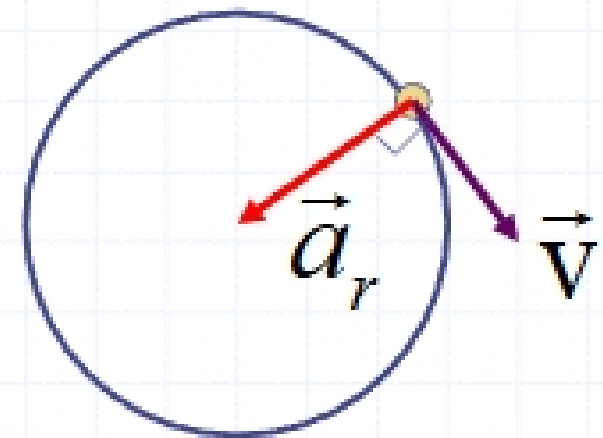
Uniform Circular Motion (Section 6.5)

- An object moving on a circular path of radius r at a constant speed v
- As motion is not on a straight line, the direction of the velocity vector is not constant
- The motion is circular
- Compare to:
 - 1D – straight line
 - 2D – parabola
- Velocity vector is always tangent to the circle
- Velocity direction constantly changing, but magnitude remains constant



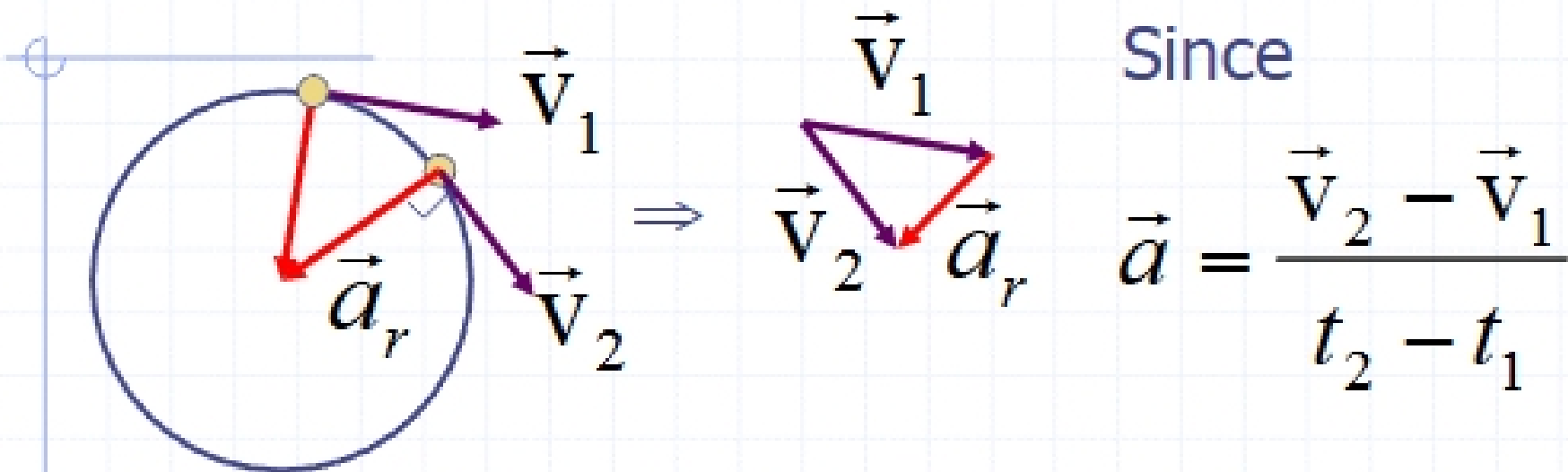
- ❑ Vectors \mathbf{r} and \mathbf{v} are always perpendicular
- ❑ Since the velocity direction always changes, this means that the velocity is not constant (though speed is constant), therefore the object is accelerating

- ❑ The acceleration \mathbf{a}_r points radially inward. Like velocity, its direction changes, therefore the acceleration is not constant (though its magnitude is)



- ❑ Vectors \mathbf{a}_r and \mathbf{v} are also perpendicular
- ❑ The speed does not change, since \mathbf{a}_r acceleration has no component along the velocity direction

- Why is the acceleration direction radially inward?



- This radial acceleration is called the centripetal acceleration

$$a_r = \frac{v^2}{r} \quad (\text{eq. 6-15})$$