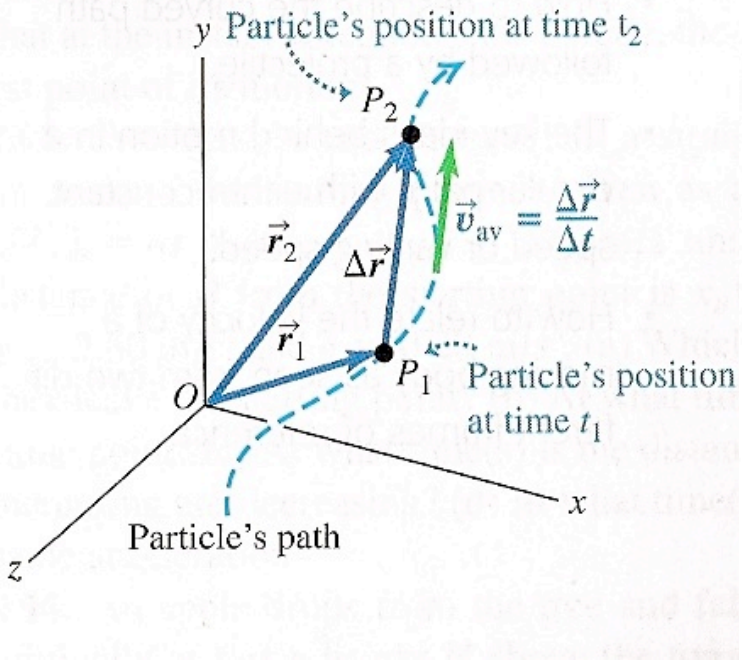
LE VECTEUR VITESSE ET LE VECTEUR ACCELERATION EN CINÉMATIQUE DU POINT MATERIEL

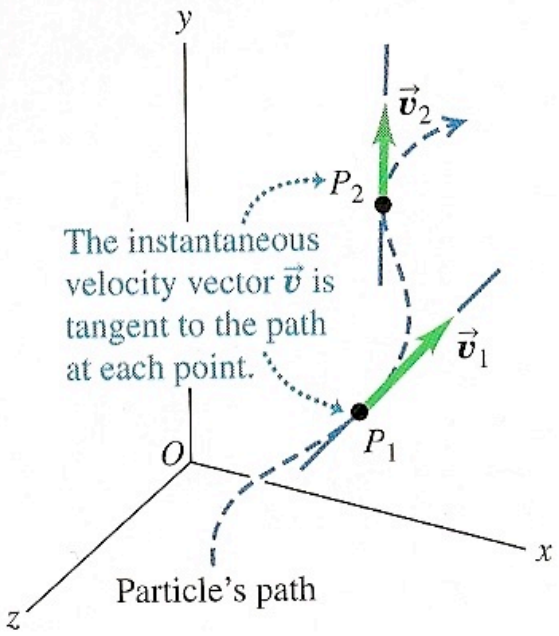
Les schémas suivant illustrent le chapitre Cinématique du Point Matériel du cours de mécanique.

I – LE VECTEUR VITESSE : $\vec{v} = \lim_{\Delta t \to 0} \frac{\Delta \vec{r}}{\Delta t} = \frac{d\vec{r}}{dt}$

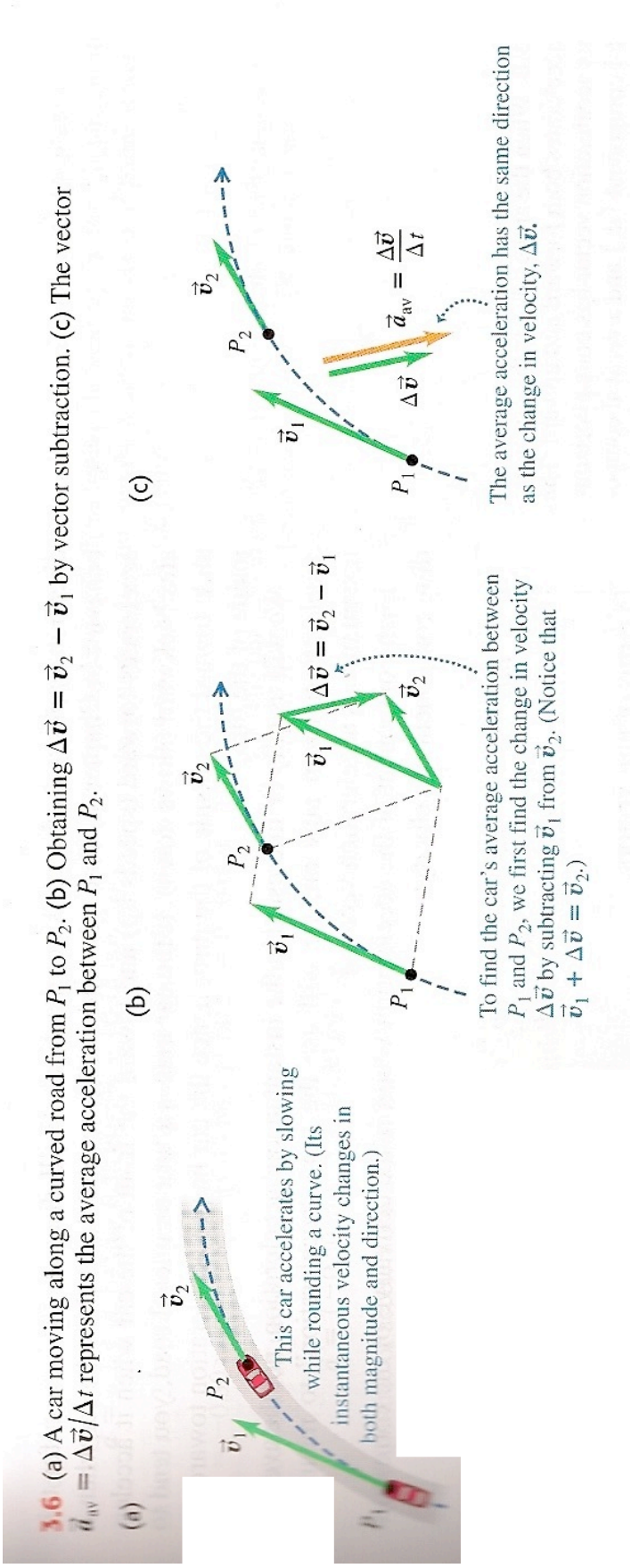
3.2 The average velocity $\vec{v}_{av}$ between points P_1 and P_2 has the same direction as the displacement $\Delta\vec{r}$.



3.3 The vectors $\vec{v}_1$ and $\vec{v}_2$ are the instantaneous velocities at the points P_1 and P_2 shown in Fig. 3.2.

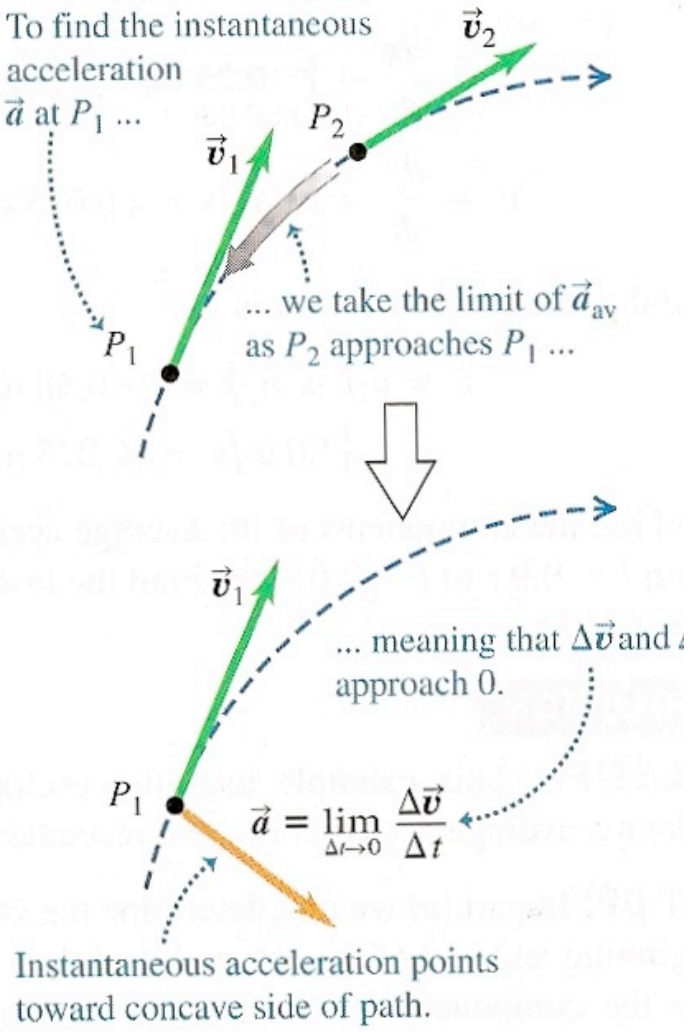


II – LE VECTEUR ACCELERATION : $\vec{a} = \lim_{\Delta t \to 0} \frac{\Delta \vec{v}}{\Delta t} = \frac{d\vec{v}}{dt} = \frac{d^2\vec{r}}{dt^2}$

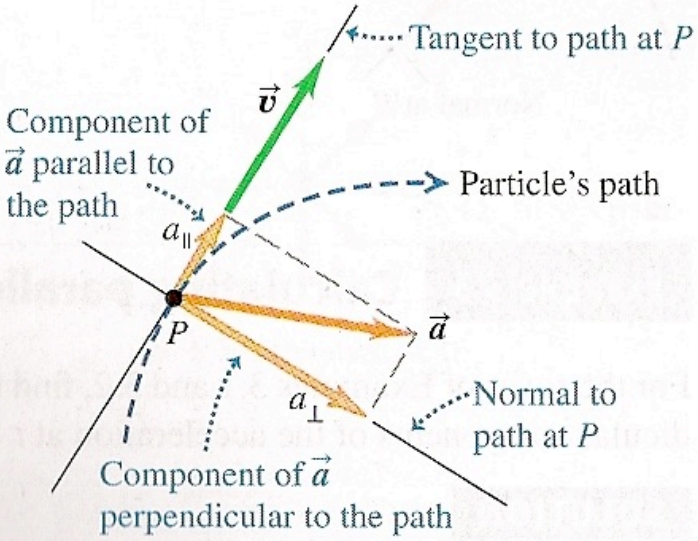


3.6 (a) A car moving along a curved road from P_1 to P_2. (b) Obtaining $\Delta\vec{v} = \vec{v}_2 - \vec{v}_1$ by vector subtraction. (c) The vector $\vec{a}_{av} = \Delta\vec{v}/\Delta t$ represents the average acceleration between P_1 and P_2.

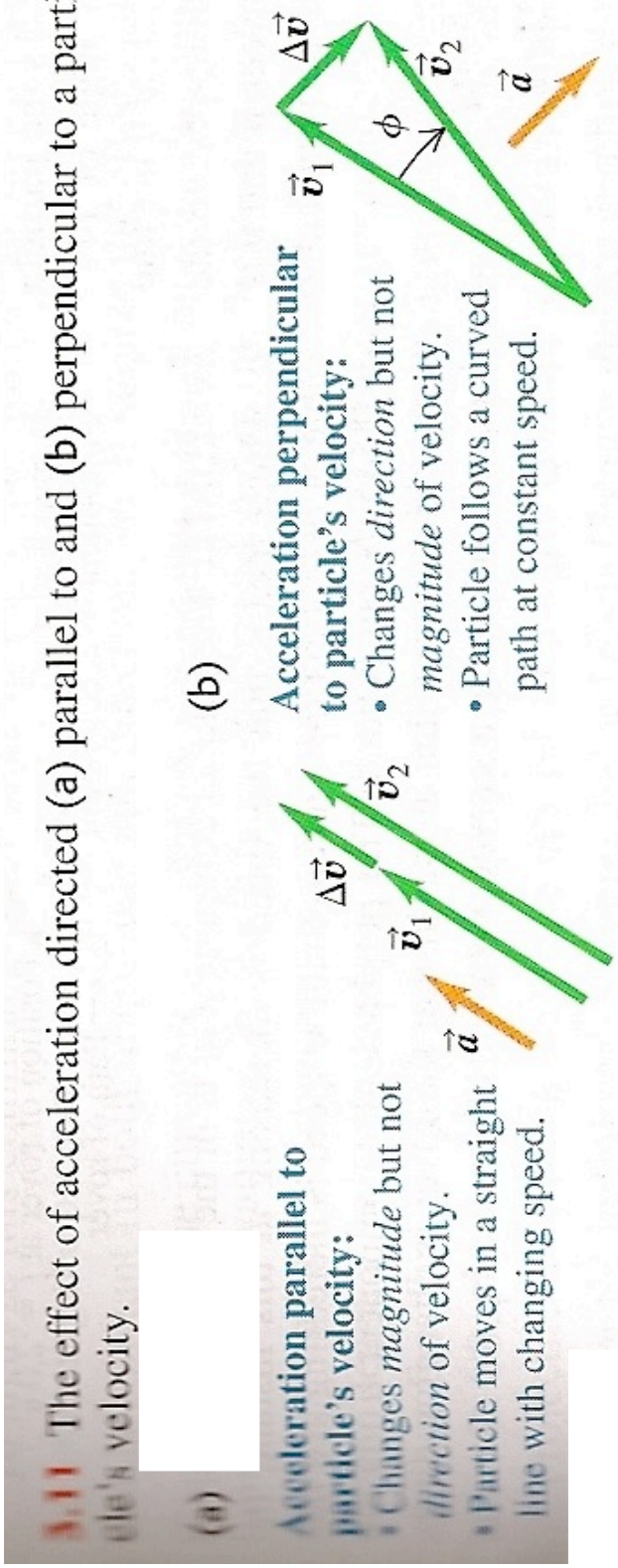
3.7 Instantaneous acceleration $\vec{a}$ at point P_1 in Fig. 3.6.



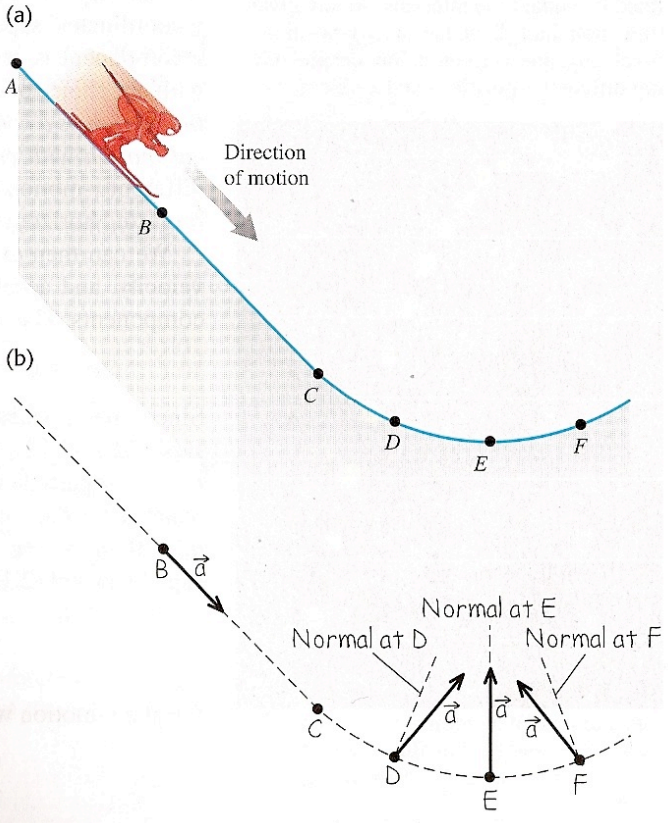
3.10 The acceleration can be resolved into a component $a_{\parallel}$ parallel to the path (that is, along the tangent to the path) and a component $a_{\perp}$ perpendicular to the path (that is, along the normal to the path).



3.11 The effect of acceleration directed (a) parallel to and (b) perpendicular to a particle's velocity.

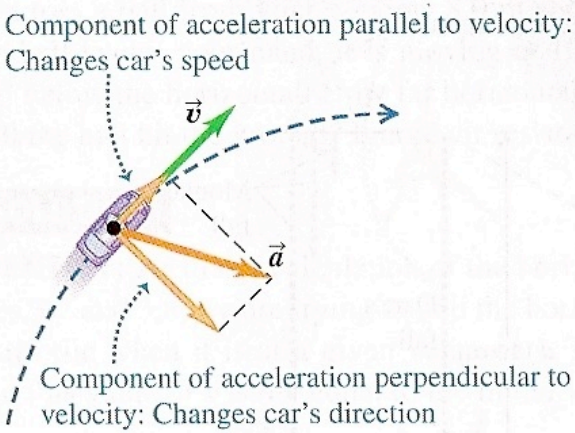


3.14 (a) The skier's path. (b) Our solution.

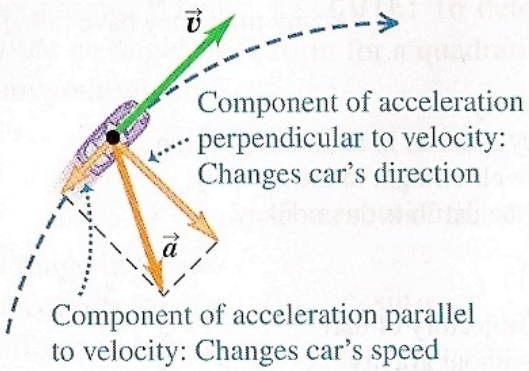


3.27 A car in uniform circular motion. The speed is constant and the acceleration is directed toward the center of the circular path.

Car speeding up along a circular path



Car slowing down along a circular path



Uniform circular motion: Constant speed along a circular path