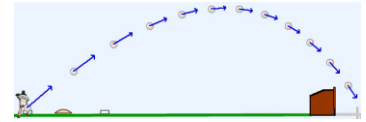


### 20.5.1 MG road-map: Projectile motion (2D)

A baseball (particle  $Q$ ) flies over Earth  $N$  (a Newtonian reference frame). Aerodynamic forces on the baseball are modeled as  $-b\vec{v}$  ( $\vec{v}$  is  $Q$ 's velocity in  $N$ ).  $\hat{n}_x$  is horizontally-right,  $\hat{n}_y$  is vertically-upward, and  $N_o$  is home-plate (point fixed in  $N$ ).



**MG road-map** for projectile motion  $x$  and  $y$  ( $\hat{n}_x, \hat{n}_y$  measures of  $Q$ 's position vector from  $N_o$ )

Variable	Translate/ Rotate	Direction (unit vector)	System $S$	FBD of $S$	About point	<b>MG road-map equation</b>
$x$	Translate	<input type="text"/>	<input type="text"/>	<b>Draw</b>	Not applicable	<input type="text"/> · ( <input type="text"/> = <input type="text"/> ) (20.1)
$y$	Translate	<input type="text"/>	<input type="text"/>	<b>Draw</b>	Not applicable	<input type="text"/> · ( <input type="text"/> = <input type="text"/> ) (20.1)
$x$	<input type="text"/>					<b>MotionGenesis</b> command ©
$y$	<input type="text"/>					<b>MotionGenesis</b> command ©



**Draw FBD**